

"BRITAIN'S FAVOURITE THREE"—1929 MODEL

# Amateur Wireless

and  
Radiovision

Every  
Thursday 3d

Vol. XIV. No. 356

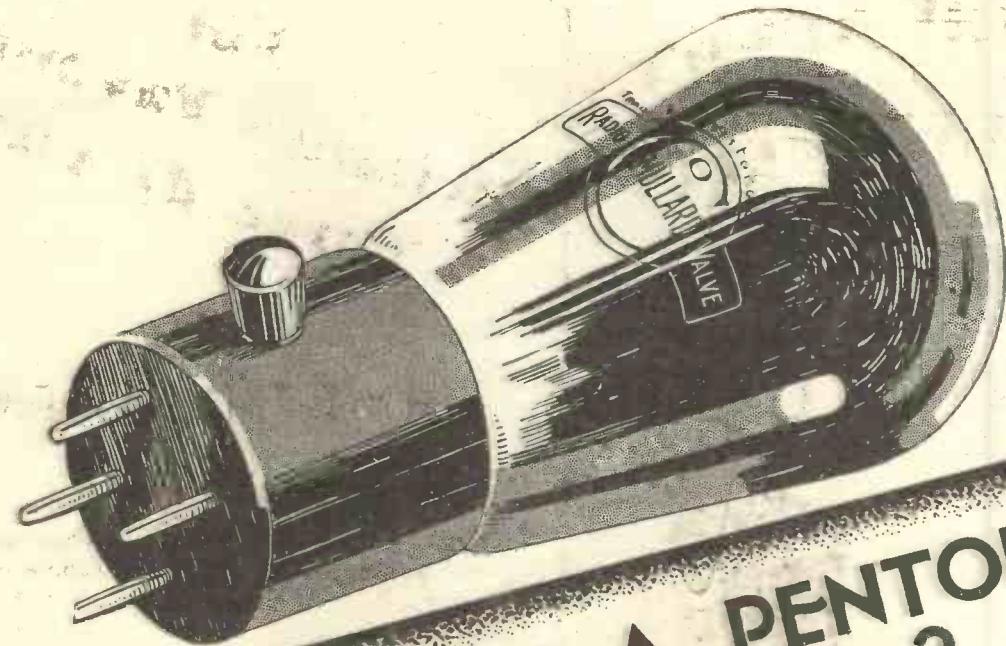
Saturday, April 6, 1929

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LONG WAVES

BRITAIN'S  
"FAVOURITE  
THREE"



1929 MODEL



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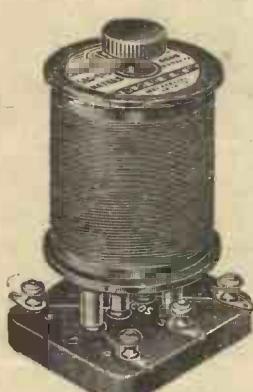
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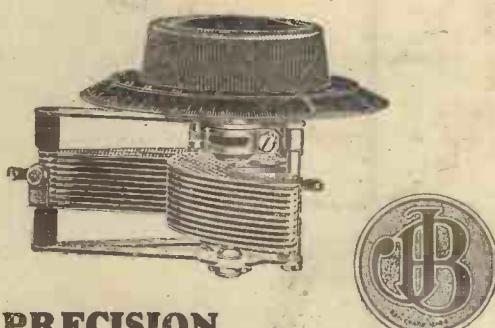
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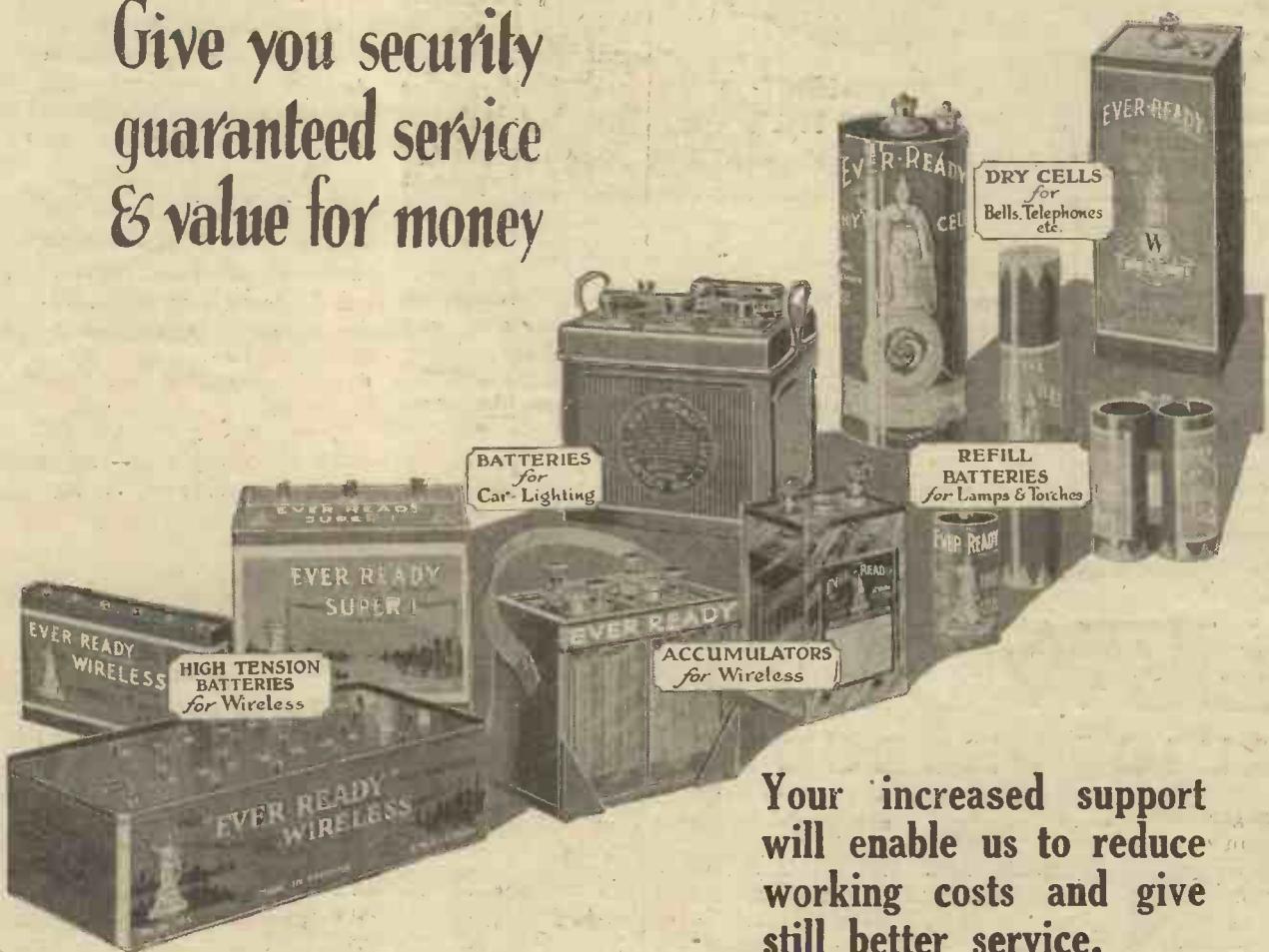
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APRIL 6, 1929

No. 356, Vol. XIV

# Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

— Editor: BERNARD E. JONES —

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E. :: Research Consultant: W. JAMES :: Assistant Editor: H. CORBISHLEY

## *Is There Jamming?—Fultograph Filmed!—“Hot” News—Exit Jeffrey— The General—Don’t Swear!—Next Week*

**Is There Jamming?**—Why is it that when thinking of towns with “broadcasters in every block” one always starts with New York? Apparently the U.S. has not the monopoly of jamming, for the evening paper in Toronto, Ontario, gives every day the programme of five stations in Toronto itself, nine stations elsewhere in Canada, together with a schedule of the programmes of seventy stations in the United States.

**Fultograph Filmed!**—A film entitled *The Fultograph Story* has been incorporated in Pathé Pictorial No. 571. This has been booked by over a thousand cinemas throughout the country, and is expected to be showing in most districts within a week. Incidentally, perhaps all broadcast picture enthusiasts are not aware of the fact that experimental tests are being made at the Royal Airship Works at Cardington in the course of which weather maps are being transmitted by the Fultograph system and received in a number of places in the south of England. There is obviously a big future for this sphere of picture broadcasting.

**“Hot” News**—And, while on the subject of Fultographs, a word of praise must be given to the Wireless Pictures people for the way in which they are starting to fulfil their promise about giving listeners *real* news pictures. Boat-race photographs were broadcast within an hour and a half of the race, you may remember, and evening papers contained pictures of the Grand National wired, via Fultograph, from Aintree.

**Exit Jeffrey**—A loss to broadcasting and a gain to “talkies” is Mr. R. E. Jeffrey, who, we learn, has resigned from the staff of the B.B.C. in order to take charge of the sound production department of British International Pictures, Ltd. Mr. Jeffrey has, of course, been associated with broadcasting for the past six years, and the fact of his leaving the sphere in which he is at present best known will be



Before its time—a spark transmitter and receiver in use, in 1902, at Streatham Fire Station. A telephone is now used.

regretted by all listeners. Nevertheless, he should be able to do some good work for the “talkie” people, and they are certain to be congratulated on the initiative they show in getting good men like Jeffrey with ready-made experience.

**The General**—A broadcast which will be of particular interest to all members of the Salvation Army is that from 2LO and

5XX on April 7, when General Higgins, the new leader of the Army, will conduct a service to be relayed from the Congress Hall, Clapton, London, E.

**Don’t Swear!**—Has it ever occurred to you when listening to the running commentaries, such as the football broadcasts and the Boat Race relay, what a temptation it is for the commentator to make ejaculations which the microphone and some of the millions of listeners might not like? After all, we are only human, and it is very natural that a keen sport enthusiast should forcibly and fiercely vent his feelings in ungentlemanly style when, say, a good pass is dropped! The B.B.C. makes thoughtful provision for this, often, by placing a large notice, “Don’t Swear!” in front of the running commentator’s “mike.”

**A New Relay!**—A clever skit is to be given on April 9, under the fascinating title of “A relay from the National Radio Station in Erewhonia.” This programme, which consists of typical scenes from British life, is said to be founded on a study of B.B.C. methods made by a Northern Erewhonian representative during a visit to London!

**“The Proms.”**—The B.B.C. has decided to hold an eight weeks’ season of Promenade concerts again this year, starting on Saturday, August 17, and concluding on October 12. Sir Henry Wood will be the conductor. The “Proms.” series is one much appreciated by listeners—“high,” “mezzo” and “low-brow.”

**Next Week**—So many people like reasonably simple and self-contained sets, particularly if electric-light mains can be used, that the AMATEUR WIRELESS Technical Staff is sure next week’s set will be a winner. It is a “simplicity” two-valver, working entirely from A.C. mains and using the new directly-heated valves and a simple rectifier for H.T. No H.T. batteries to run down or accumulators to “go phut” just when there is a good programme to be heard!

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# 14 AUDIENCES AT ONCE!

## *Political Broadcasts Made Possible by Wireless*

By An "A.W." CORRESPONDENT

and other sounds similar to atmospherics being introduced. Now, it is a curious fact that noises one would hardly notice when listening to speech on headphones assume serious proportions when the whole is raised to loud-speaker level. This may easily be confirmed on any wireless set. Unless, therefore, the input is strong enough to ensure an output intensity well above that of any interference, the amplified results are rather like those obtained when trying to receive a distant station during a thunderstorm!

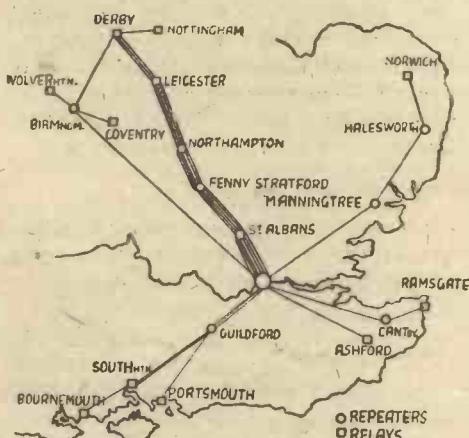
Repeaters solve the problem, as with them we are able to start with a moderate input; send this over a limited distance, at the end of which it is still well above the noise level; then amplify again to the allowable limit, pass on over the next section and so on, finally feeding it into the power banks and loud-speakers at the hall. This, then, is the procedure adopted in all the great political relays.

#### **Twenty-six Trunk Lines!**

The final unit at the transmitting end was a thirteen-way change-over and monitoring panel from which radiated twenty-six trunk lines, each of the thirteen circuits thus being duplicated again. The spare lines were used for communication between engineers at the input and output stations, enabling the engineer in charge to watch the whole system from his position at the Albert Hall itself.

At each receiving end there were one or two engineers in charge of a standard "B" amplifier and power bank of from four to sixteen LS5A's, depending on the size of audience and number of loud-speakers. The latter were of the well-known Marconi-phone moving-coil type with rubber dia-

RECENTLY I described in AMATEUR WIRELESS how land-lines were used for a giant political "S.B." of speeches from Newcastle simultaneously to a number of other towns. From this, shall we say, "modest," beginning the scheme has grown until when Mr. Lloyd George spoke last week at the Albert Hall, in London, his words were carried to thirteen other towns



Map showing the towns in which Mr. Lloyd George's speech was simultaneously heard

and over 1,000 miles of special P.O. trunk-lines. Great care was taken to prevent interference or "cross-talk," and repeaters (special valve amplifiers) were inserted at land-line points *en route*.

The repeaters used on long-distance land-line are the outcome of work done on valves and low-frequency amplifiers—another example of the manner in which the requirements of broadcasting have stimulated improvements in the technique of allied sciences.

In the old days, when there were no repeaters, it would have been practically impossible to relay a speech over more than a moderate distance and amplify it for a large audience with any degree of success. In the first place, a long line is bound to pick up interference from electrical sources and tends therefore to be "noisy," clicks

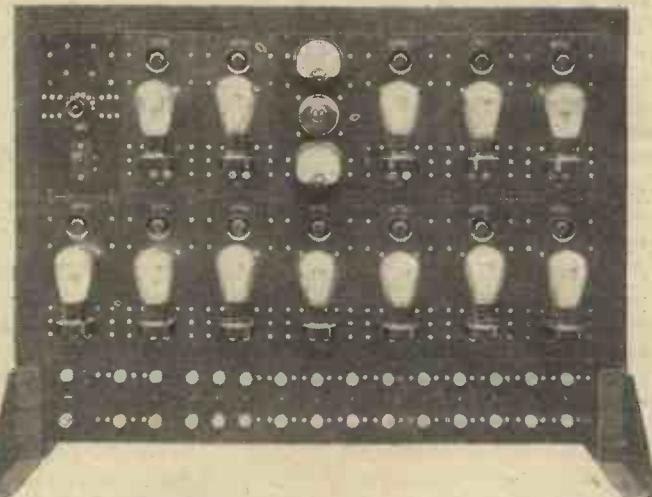
## *A Record*

At Mr. Lloyd George's relay, which creates a record for this type of "wired broadcasting," the first stage was, of course, the microphone, a Marconi-Reisz, followed by a special double microphone amplifier placed immediately below the platform. The amplifier incorporates two stages, resistance-capacity coupled, with volume control and a pitch-raising device, necessary because the capacity of a long telephone line acts like a condenser across the circuit and cuts off the

higher frequencies. By artificially distorting the input — over-emphasizing the high notes and harmonics—it is possible to counterbalance the effect and obtain a natural output. The entire amplifier panel is duplicated, and in the event of a fault in either the change over may be accomplished in a fraction of a second by means of two switches.

Following this comes the "distributor" panel, consisting of fourteen valves in parallel—one feeding each line and one the amplifier in the Albert Hall itself. The

grids are connected together to the secondary of a special 10 to 1 Marconi Ideal transformer, but the output circuits are independent. It is therefore possible to control the input to individual lines and a fault on any one line will not affect the others. A listening point and volume control are also fitted to each circuit.



The distributing panel for twelve of the fourteen circuits

phragm, this equipment being standard for public speech and music reproduction.

No fewer than 191 trawlers and drifters carry wireless apparatus. This evidence of the value of wireless in small ships was furnished by Mr. Kellaway at the recent meeting of the Marconi Company. This figure is about one-fifth of all the trawlers which might be fitted.

# IMPROVING YOUR PORTABLE



*Here is a Series of Hints Showing How the Utility of a Portable May Be Greatly Increased*

IT is probably safe to state that portable and transportable receiving sets at the present time are used as much in the home as out of doors, in fact, this type is taking the place of the more conventional pattern to a greater and greater extent.

There are, however, one or two difficulties that arise in the use of a portable in the home due to certain limitations in the design. For instance, the H.T. battery incorporated in most portable sets is—due to the necessity of keeping down the weight and bulk to a minimum—of small capacity and is therefore an uneconomical proposition when used on other than out-of-door occasions.

### Use a Super-capacity Battery

For continuous indoor working with a portable receiver it is an excellent plan

for both economical and efficient working of the set to use an external H.T. battery of the power or super-power type particularly where, as is the case with many present-day portable receivers, a super-power valve is fitted in the last stage. Naturally there arises the difficulty of connecting up the external H.T. battery and disconnecting the internal battery without interfering with the wiring of the set with its attendant risks every time one wishes to transport the receiver.

panel and the jack-switch placed in the "in" position. To reconnect the internal accumulator the foregoing procedure is reversed.

### Additional Loud-speaker

One of the most useful improvements which can be made to an existing portable or transportable receiver is a provision for the quick connection of external headphones, loud-speaker, picture receiver or amplifier. The necessary requirements in this case are very simple and merely necessitate the fitting of a jack and two valve sockets to the panel and slight alterations to three wires as shown by Fig. 3. When this is carried out the act of plugging in any external piece of apparatus, automatically cuts out the existing loud-speaker which is fitted to the receiver.

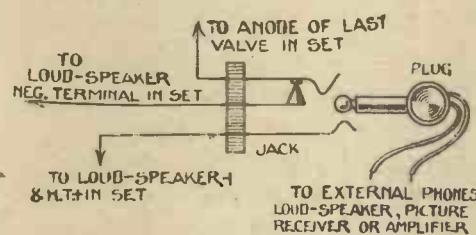


Fig. 3. Method of wiring jack for use of external loud-speaker or picture receiver

There is, however, as shown by Fig. 1 a simple method of permanently altering the wiring by the addition of a small jack-switch and two or three valve leg sockets which enables either the internal H.T. battery or any external H.T. supply such as a power type battery, H.T. accumulator or mains unit to be connected into the circuit by pushing in the jack-switch and plugging the leads from the external H.T. source into the sockets on the panel. The photograph in the heading, for instance, shows a mains unit used in this manner.

To enable the receiver to be used for outdoor work the external supply leads are simply removed from the panel of the set and the jack-switch is pulled out.

### An Alternative Accumulator

In cases where the frequent recharging of the small internal accumulator is a difficulty, a jack-switch and socket may be fitted on the panel, in a similar way to that for connecting the external H.T. supply; the wiring alterations in this case should be made as shown in Fig. 2. To connect up an external accumulator the leads from this should be plugged into the socket on the

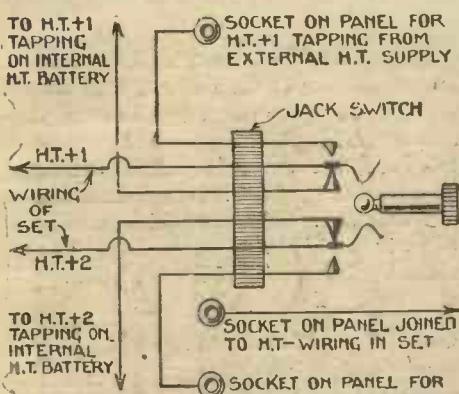


Fig. 1. External H.T. supply may be used in this manner

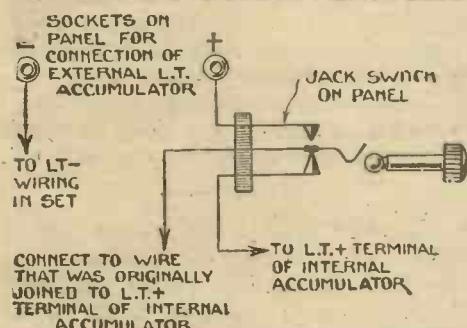


Fig. 2. This diagram shows how external L.T. may be obtained

### Provision for Meters

Among the minor improvements which may be made is the fitting of points on the

(Continued at foot of next page)

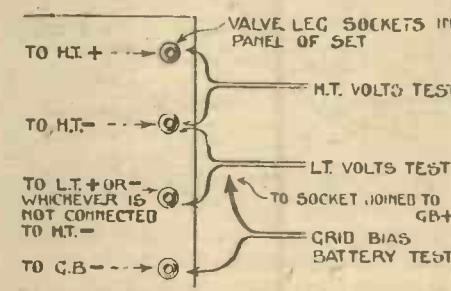


Fig. 4. Arrangement of testing points for voltmeter

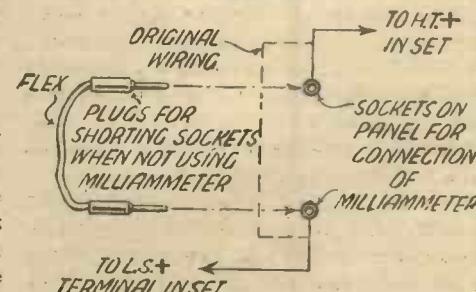


Fig. 5. This diagram shows how a milliammeter may be inserted in the anode circuit of the last valve.

# ELECTRICAL RECORDING at HOME

A NEW system of gramophone recording, particularly devised for home use, has been developed in the laboratories of the Stuttgart Broadcasting Co. The patentee is Oberregierungsrat Rammelsberg, of Wernigerode, in Central Germany, and his invention has been developed by Mr. Formis, who probably will introduce it at the Berlin Wireless Exhibition this coming September.

The new process opens up many hitherto unthought of possibilities and briefly is as follows: A microphone, in the case of music a high-class Reisz microphone, will have to be used, but for ordinary speech it is quite sufficient if one earpiece of a headphones be used as a microphone. The currents coming from this microphone are passed through an eight-stage amplifier. From here the impulses drive the usual commercial gramophone pick-up. The action of the pick-up is thus reversed or, in other words, the pick-up becomes a motor. A small diamond takes the place of the pick-up needle and, in operation, this

diamond is pressed or hammered into the substance of the record disc and forms the grooves, without previous preparation of the disc. The disc material is non-inflammable celluloid, about  $\frac{1}{16}$  in. thick, both sides of which can be used. Immediately after recording, any ordinary gramophone using an electrical pick-up, an amplifier and loud-speaker can play whatever has just been impressed on the celluloid. The record can be played sixty or seventy times before wearing out. The record disc, while the recording is being done, is carried by a gramophone table in the usual way, except that a special rubber-pad is interposed between table and disc.

For making a number of records it is necessary to use copper or zinc instead of celluloid discs and to use the metal record as a master. For playing the celluloid record it is necessary to use a fibre needle



Making gramophone records at home by the Rammelsberg System

and, as in recording, to use a rubber disc under the record.

## Long Records

For records that will last longer than ten minutes or a quarter of an hour, Mr. Formis proposes using an endless non-inflammable celluloid band which will be passed under the recording diamond by means of two rotating cylinders some distance apart.

G. DONALD.

## "IMPROVING YOUR PORTABLE"

(Continued from page 517)

panel to which a voltmeter may be applied for determining H.T., L.T., and grid bias voltage, or for temporarily connecting a milliammeter into the anode circuit of the last valve in order to determine whether that valve is working at its best.

These testing "points" may take the form of valve sockets fitted near one side of the panel, as shown in Figs. 4 and 5 respectively. As the use of a milliammeter necessitates the actual breaking of the circuit a "bridge" or re-connecting attachment formed by fixing two small wander plugs to each end of a short length of flex must be utilised to re-make the circuit after using the milliammeter.

## Two Loud-speakers at Once

Incidentally this "break" in the anode circuit may be employed for the connection of an external loud-speaker in series with, and, of course, additional to, the internal instrument. This means, of course, that both internal and external loud-speakers will be operating at the same time and if desired the extra instrument may be situated in another room. In cases where the leads to the second loud-speaker are of any considerable length, however, it will be advisable to employ an output transformer for feeding this instrument, so that there will be no possibility of H.T. leakage, or unwanted capacity to earth or—in the event of a mains H.T. supply unit being used with the set—to prevent the possi-

bility of dangerous shocks being received from the loud-speaker terminals.

## Outdoor Aerials

Where no provision is made on the set

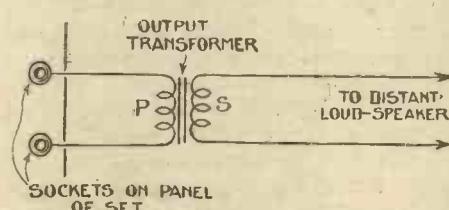


Fig. 6. Output transformer connections for distant loud-speaker

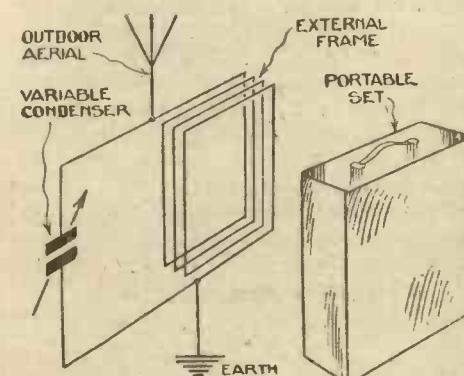


Fig. 7. How to add external aerial and earth for connecting up an outdoor aerial and earth the method of using the outdoor aerial and earth without interfering with the wiring of the portable set shown by Fig. 7 may be used.

A small frame aerial containing about 15 turns of frame aerial wire (the best number of turns should be found by experiment) wound in a square with 12-in. sides is connected up to the outside aerial and earth and shunted by a .0005-microfarad variable condenser. This frame aerial and condenser is then brought to within a foot or so of the frame aerial in the portable set and the latter tuned in the ordinary manner; the external frame condenser should also be adjusted until best results are obtained. Stations which previously came in weakly will now be heard at considerably increased volume without appreciable reduction of selectivity.

## Obtaining Directional Effects

Finally mention should be made of that little-used component the turn-table. Good turn-tables can now be obtained quite cheaply and are easily fitted to an existing portable or transportable receiver. The advantages of a turn-table are twofold as its use enables the set to be placed on a polished table without risk of damage to the surface and at the same time the whole receiver can easily be turned round to any desired position.

A dispatch from Prague states that at Poderbrady, where the main wireless receiving station in Czecho-Slovakia is located, the Czecho-Slovak Post Office is installing a short-wave transmitting station for telegraphic communication with America.

# On Your Wavelength!

## An Unexpected Emergency

I WONDER how many readers have had the delight of arranging to give a display of how to receive a musical programme, and then at the last moment to find that the set, which worked so well the previous night, has developed a subtle fault? I myself have had this occur on two occasions. The first instance was when I had promised a special concert to some musical high-brows. As the time for the concert to begin drew near, the set developed crackles and in a very short space of time the signals could only just be heard with the ear close to the loud-speaker. Hasty tests with instruments showed that one of the intervalve resistance couplings had ceased its useful functions owing to a burn out or fault in the wire.

## A Bright Idea

It was then a few minutes to the time when the concert was due to begin. Three critical musicians were wagging their heads in a knowing fashion and the nearest radio dealer's shop, a mile away, was closed for the evening. It was an emergency which caught me napping, for it is rarely that a wire anode resistance gives up the ghost after a couple of month's service. Resistance bobbins from the junk box only totalled about 4,000 ohms, and everything seemed lost when a bright idea struck me. In less than five minutes a high-resistance moving-coil milliammeter was in the anode circuit of that valve, and 200,000 ohms of resistance did service as an anode coupling that night. It was an interesting experience, and the moral is that a high-resistance instrument has more uses than one.

## A Surprise

A somewhat astounding announcement is that in future provincial main stations are to rely upon local artistes to supply the majority of their star turns. It is said that the local spirit must be encouraged, and this is held to be the way to do it. Considering that as soon as an artiste, whether he be instrumentalist, vocalist, ventriloquist, entertainer or whatnot, makes a bee line for London and higher pay as soon as ever he has begun to attract any attention in his own home town, I am rather afraid that provincial stations are going to come off rather worse than 2LO over the deal.

I am hoping that somebody has got hold of the wrong end of the stick in making such an announcement, for I can really hardly see how such a silly course could be taken. Actually it is quite on the cards that though the B.B.C. is striving to give the public alternative programmes by means of the regional scheme and in other ways, the provincial public does not want alternative programmes: what it wants is

London. At any rate, I nearly always find in talking to people from distant parts of the country that they consider the London programmes far better than their own, and frequently say what a shame it is that they cannot always have them. So far as I can see, two completely different programmes sent out simultaneously from various points would be absolutely sufficient for the whole country's requirements. If only two programmes had to be provided each day good fees could be paid the artistes and the very best talent in all departments could be secured.

## Life in the Old Joke Yet

You remember the story of the joke? I have referred to it on several occasions in these columns. In case you have joined the great band of AMATEUR WIRELESS readers since it was last mentioned, here is the history. In one of the very earliest numbers of AMATEUR WIRELESS I perpetrated a joke about Adam having possessed a loud-speaker made from his spare parts. This spread all over the world in the most astonishing way, appearing with or without an illustration in papers of practically every European country, as well as those of distant parts of the world. A reader sent me a Japanese paper containing it and others reported its outbreak in the most astonishing places. About three years ago the joke won a prize in an American paper which had previously announced that it was not the slightest use sending in anything that was not absolutely original! It hadn't cropped up, though, for quite a long time; in fact, I had begun to think that the dear old thing was at last dead. Not a bit of it, though; I happened to switch on 5GB or 2LO—I forget which it was now—the other night when an entertainer was at work, and sure enough out it came!

## Why Have Anonymity?

The B.B.C. new dramatic producer has not been long in the saddle, yet his personality is beginning to be felt. His latest decision, that of not publishing the names of artistes speaking the lines of plays, has caused severe heart burnings among those who take part in radio productions. Now what is the position?

Some years back the B.B.C. laboriously built up a repertoire company of players chosen for their voices and ability to speak lines clearly and well and with a certain amount of meaning. Not content with that bright idea, they proceeded to fix up a whole string of plays for months ahead to be played by these chosen people, who, no doubt, had a comfortable little contract. So far, so good, but their next step was possibly the worst. They hired photo-

graphers who took them in every possible attitude with absurd backgrounds, and, of course, always with the camel-like affair on which was supported a very ludicrous business which held the microphone.

After this well-thought-out campaign, which some wireless papers are suggesting should be repeated, it was discovered that Miss Dulcet's voice was always the same, whether she was Mrs. Wiggins or Joan of Arc, and also that her very comfortable figure was firmly embedded in the minds of listeners. It became irritating to hear the same voice one day as the fat girl of Peckham and next evening as Melisande.

## A Stage Parallel

To return to the anonymity edict. There is much to be said for it. If an artiste has a flexible voice—and how few have—it is much better to leave the listener his or her own mind picture of the character than to picture some very worthy, but very ordinary, person speaking the words of the play. There are some cases where it would do no harm, but it must be remembered that on the stage the dress and make-up divest the artiste of much of his very own appearance. Seldom in a costume play does the artiste put up outside the theatre a picture of himself as, for example, Shylock unless he is dressed for the part. The same should apply to radio drama; but, of course, it can't be done.

There is, of course, another point which might be stated. So many of our well-known actresses and actors mumble their words that really anonymity is in their favour. They must realise this. However, I don't suppose the projected boycott by many of these famous artistes will materially affect radio drama. *Anonymity* is very interesting.

## Sunday

Dull and dreary Sunday broadcasting continues. Having educated a large section of the public to expect entertainment on Sundays, the B.B.C. now proceeds to drive its converts out of their homes to places of refreshment and those evil cinematograph palaces! True, Sandler sometimes comes to the rescue with a bright spot of music and there are occasional symphony concerts; but, in the main, the Sunday programmes save such a lot of filament current! Religious broadcasts can be interesting, we all know, but this type of broadcast rapidly reaches the saturation point unless there is some powerful microphone personality to hold the attention. As it is, the Sunday programmes seem to have degenerated into a repetition of hymns just as irritating as the "plugging" of popular songs. On Sunday, Savoy Hill takes its finger off the pulse of the nation in

## On Your Wavelength! (continued)

order to gratify a few "extremists." Who is responsible?

### *Pictures and Squeaks*

Sunday is usually the field-day for the experimenter. There must be hundreds of thousands of wireless gentry who look upon Sunday afternoon as being sacred to the soldering iron. Aerials are pulled down and put up again, new sets are tried out, new loud-speakers put on, and modern components put in. Therefore, Sunday afternoon, after the concert transmission would be an ideal time for prolonged Fultograph transmissions and "squeak" tests. In regard to "squeak" or low-frequency note tests, I find that individual B.B.C. engineers have peculiar ideas as to their utility. Their attitude is that they consider very few people could make use of such tests and that the remainder would be completely mystified and probably led astray into the ranks of oscillators. The success of such tests would, of course, depend on the manner in which they were put over. The B.B.C. can rest assured that all AMATEUR WIRELESS readers will know how to make use of "squeak" tests.

### *Our Good Sets*

Truth to tell, our receiving sets are getting so good that we want something a little more scientific than broadcast music for making comparisons between transformers, chokes, and loud-speakers. The broadcast of individual *pure* notes on various parts of the musical scale is the only method which will enable us to make further progress towards perfection. Therefore, let us have a weekly half-hour of low-frequency calibration tests and let that half-hour be at the time most convenient to us—Sunday.

### *The Grand National*

Temporary sets were erected in thousands of offices for the reception of the running commentary on the Grand National. I penetrated into one West End office in time to hear this most successful broadcast on a real "Heath Robinson" crystal set. A wire had been slung out of a window for an aerial and the set consisted of a few turns of bell-wire on a roll of cardboard, and a crystal detector. Someone had forgotten to bring a "pukka" set, and as everybody else had brought their headphones something had to be done about it. Bell-wire was produced from an old store cupboard and some bright youth found a small piece of crystal in his pocket! A drawing pin and a couple of paper clips completed the set, which gave satisfactory signals on six pairs of headphones!

### *—and Pictures*

A triumph was scored by the still-picture people by the transmission of photographs illustrating both the Boat Race and Grand National. Pictures of the latter were sent from the course over the

land-line and were received in the *Morning Post* office within twenty minutes of their having been taken. Anyone who saw the reproductions in the Saturday issue of the paper must have been astonished by their excellent quality. This, of course, opens up a wonderful field, for the Fultograph transmitter is quite portable, so that it can be taken to the scene of almost any important event. All that is needed then is a small emergency dark room in which to develop the films. The negatives are then put straight on to the photo-electric transmitter and sent over the land-line to their destination. No less than eight pictures of the Boat Race were sent out within a little over an hour of the finish and those who received them had a splendid piece of wireless entertainment. I think that a prophecy I made some months ago is likely to be fulfilled this year. I said then that we should have a picture of the finish of the Derby broadcast the same evening.

### *Heating by Wireless*

One of the lay papers rather went in off the deep end the other day by giving its readers to understand that they might shortly warm their houses by means of wireless. The actual facts are that in laboratory experiments, heat transmissions have been made over very short distances, and that it has been proved quite possible to carry out this kind of thing on a very small scale. There is considerable difference though, between producing in a coil of wire a degree of heat that can be measured only by the most delicate instruments, and creating in a living-room the kind of fog that you and I like on a cold winter's night. The transmission of heat by wireless is one of the things that will probably come in the far away future, but it is most unlikely that something of the sort will happen next week, or anything of that kind. So there is no need for you to rush off and sell your fire-grates and gas-stoves, just at once.

### *A Pentode Point*

I am very fond of the pentode valve myself, though I come across from time to time numbers of people who have tried them and given them up in disappointment, since they have been unable to obtain from them the kind of quality that they want. The whole trouble with the pentode is to obtain exactly the right impedance in the output circuit. Get this and quality is beautiful; fail to get it and it may be very much lacking. Output transformers are now available which exactly suit the pentode valve. One that I am very pleased with has a tapped secondary, so that it may be adapted to suit the particular loud-speaker which is to be used with the valve. With the moving-coil loud-speaker it is essential to wind the coil exactly to fit the

pentode. Too few turns mean poor signal strength; too many spell poor quality.

### *American Sets To-day*

Looking through advertisements in the catalogues of American wireless manufacturers, one cannot fail to be struck by the size of the receiving sets in use in the States to-day. It may come as a surprise to some readers to know that the average American set nowadays contains no less than six valves, whilst many have seven or eight. They are not super-heterodyned, for that type of set is not greatly used now; most of them, in fact, are absolutely straight receivers, containing two or three H.F. stages, a rectifier, and two or three note-magnifiers. The American wants his set to be able to bring in a big number of stations at full loud-speaker strength, and it must be also sufficiently selective to cut out a local station at very short range. The high-frequency side is not, as a rule, designed for big magnification per stage; what the makers aim at is comparatively small magnification from each valve.

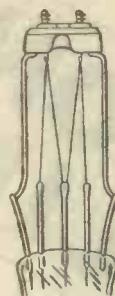
### *What of Television?*

I am writing my notes earlier this week under orders from the Editor, who informs me that, owing to Easter, this issue goes to press two days earlier than usual, and I should not be surprised if, before my readers see these words, the Postmaster-General has not publicly announced the results of the B.B.C.'s recent tests of Baird television. While I have been unable to obtain official information, I learn from a number of special sources that the tests were successful from the Baird point of view and very significant to the P.M.G. and to the broadcasting authorities. Indeed, I rather expect the P.M.G. to announce his personal faith in the system and to explain his proposals for giving it further broadcasting facilities of an experimental nature. I believe most of the witnesses were impressed by the extraordinary improvements made by Mr. Baird in recent months and by the amount of detail and degree of illumination displayed by the transmitted image. Doubtless there is a big difficulty to be overcome—not so much in the system itself, but in the great width of the frequency band which would be occupied by the transmission and the consequent risk of general interruption of speech transmission—and this difficulty, I expect, has delayed the P.M.G.'s announcement. Mr. Baird will have our hearty congratulations and those of all reasonable people should it be found that the tests were of such a nature as to cause the B.B.C. to change its attitude, and I shall be the first to congratulate the B.B.C. themselves on what I hope will be an announcement of their goodwill to the Baird system. And, between ourselves, AMATEUR WIRELESS ought to come in for a good word, too.

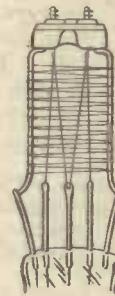
THERMION.

# SHOCK-PROOF!

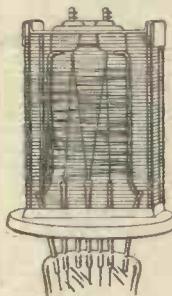
When you buy your Screened Grid Valve insist on the one which will give you the longest service—choose Cossor. These illustrations show why the Cossor Screened Grid Valve is the most robust—the most dependable—and the most uniform Screened Grid Valve made in Great Britain. Remember that this wonderful new system of **interlocked** construction is to be found only in the Cossor Screened Grid Valve. No other make of Valve has these outstanding features of design.



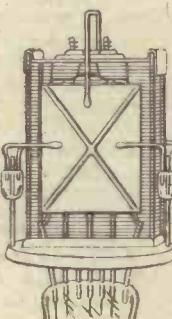
Here you see the double length of Cossor filament famed for its colossal emission. Note the seonite bridge holding it rigidly in position.



Around the two stout grid supports is wound the first grid, electrically welded at twenty-five points.



Note the enormous strength and rigidity of the screen. See how it is built on four stout supports and capped by a metal bridge-piece anchored to seonite insulator.



Finally, observe the construction of the anode. Actually two rectangular nickel plates are used and for greater rigidity each is diagonally ribbed.

# NOISE-PROOF!

Noises are generally due to loose elements in a valve. In the Cossor Screened Grid Valve the elements are **interlocked**. Even under the hardest blow individual movement is impossible. The Cossor Screened Grid Valve is built like a bridge. Every joint is scientifically welded to ensure long life and complete rigidity.

# BREAK-PROOF!

Never before has such a wonderful system of construction been used in any Screened Grid Valve. Even the hardest blow cannot disturb the perfect alignment of the elements which are rigidly held at top and bottom. As a result every Cossor Screened Grid Valve retains its characteristics throughout its abnormally long life. For any Screened Grid Receiver choose Cossor. Accept no substitute—for there is no adequate substitute for the Cossor system of **interlocked** construction.

#### Technical Data.

Cossor 220 S.G. (2 volts, .2 amps.) and 415 S.G. (4 volts, .15 amps.)  
Max Anode Volts 150, Impedance 200,000, Amplification Factor 200, Grid Bias 1.5 volts at max. anode Volts. Price (each)

**22|6**

Demand the

# Cossor S.G. Valve

The only Screened Grid Valve with **INTERLOCKED** construction

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**ONLY ONE SHILLING**

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Valves to Use in Your Set.  
Start Radio with the Clipper  
Two for £5!  
A Broadcast Revolution.  
Under My Aerial.  
If Your Set Starts Motor-boating. By W. James.  
More About the Lodestone Loud-speaker. By W. James.

#### GRAMO-RADIO SECTION

Can You Cut Out Needle Scratch?  
Where to Place a Volume Control.  
Is Gramo-Radio at a Standstill?  
If I Were Bass Deaf. By H. T. Barnett.  
A Good Pick-up. By W. James.  
Designing Scratch Filters. By J. H. Reyner, B.Sc., A.M.I.E.E.  
The University of the Ether. By B.B.C. Officials.  
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Some Broadcasters.  
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My Radio Week-end. By J. Godchaux-Abrams.  
Wavelengths of the European Stations.  
Wireless Fallacies.  
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Short-wave Relays from Colombo.  
Wiring Your New House for Radio.  
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Radio Quarrels in the United States.  
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Using the Melody Maker on the Short Waves.  
New System of Focused Radio.  
Reference Sheets. Compiled by J. H. Reyner, B.Sc., A.M.I.E.E.  
A Free Broadcast Map.

Full-size Blueprints of all sets described in this issue are available at half-price until April 30th

**WIRELESS MAGAZINE**  
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# Cutting Out — NEEDLE SCRATCH

*One of the advantages of Gramo-Radio Reproduction is that surface noises associated with all Gramophones can be almost eliminated. In this article our Technical Editor describes various filter systems which are used to this end.*

OPINION is divided as to the desirability of fitting special filters to cut out the noise of the scratch on records which are reproduced through the medium of the wireless set. One of the advantages of electrical reproduction is that one can juggle with the frequency response from the record as one wishes. For example, it is well known that the bass on a gramophone record cannot correctly be reproduced because the movement of the needle

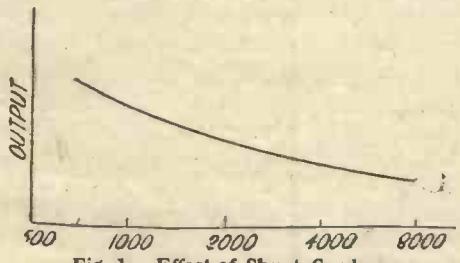


Fig. 1. Effect of Shunt Condenser

to reproduce frequencies below 200 cycles becomes so large as to be impracticable under ordinary conditions. We can, however, if we wish, put in an amplifier which has a rising characteristic at the bass end to compensate for this defect. Whether the results would be altogether desirable is entirely a different story, but the instance serves to illustrate the flexibility of electrical reproduction.

The problem of scratch is more concerned with the upper end of the frequency spectrum, for it is here that the noises constituting the scratch predominate. It is not possible to say that scratch only occurs at or above any definite frequency, for in point of fact it is due to a conglomeration of noises occurring throughout the whole of the audible range, but there is little doubt that scratch does predominate in the upper registers.

The question is whether we can minimise scratch by cutting off a certain proportion of the upper frequencies. At first sight this seems heresy, and indeed many individuals claim that the whole idea of a scratch filter is impracticable and unworkable. I myself do not hold this view, for, as in most other aspects of wireless, a great deal depends upon the personal factor, and also upon the amount of compromise which is deemed advisable. At any rate, I have conducted a number of tests at Elstree

which have given a distinct measure of success.

One of the complications of the problem is that the average loud-speaker is by no

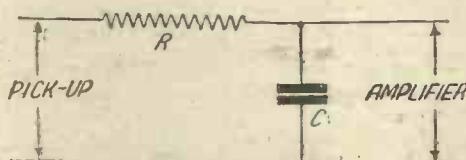


Fig. 2. Simple R.C. Filter

means a good reproducer in the upper frequencies. The taking of response curves on loud-speakers is quite a fascinating subject. The difficulties in the way of producing a true response curve to which one could swear are so large as to render the problem almost impossible, but it is a fairly easy matter to obtain a comparison of the relative radiation at different frequencies, and the number of loud-speakers which commence to cut off in the region of 2,000 to 3,000 cycles per second is quite surprising. There are few loud-speakers indeed of the average cone type which will reproduce faithfully about 4,000 cycles per second, and in the average case the response is falling gradually the whole time for

quencies above 4,000 to 5,000 cycles per second were cut off, quite an appreciable portion of the scratch was removed. The scratch, in fact, ceased to be evident during the playing of the record, and only became apparent when the music ceased, which, after all, is sufficient for our purpose. These tests, incidentally, were taken on a moving-coil speaker which had been definitely proved to go up to frequencies above 8,000. Moreover, aural tests conducted from opinions given by independent listeners indicated that there was little

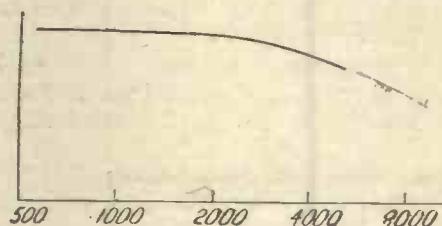


Fig. 3. Cut off with R.C. Filter

loss of brilliance if frequencies above 5,000 were omitted. Indeed, it takes a very critical ear to distinguish the difference.

Consequently, if we can retain the frequencies up to this limit and cut them off above, we shall obtain a certain measure of elimination of the scratch, resulting in a greater clarity of tone. With the ordinary loud-speaker, as has been pointed out, we can reduce this limit somewhat and commence our cut-off in the neighbourhood of 4,000 cycles per second, since the loud-speaker itself is not likely to give us very much above this point. This was the principle which was adopted in making the tests, and it has met with quite a good measure of success. We now have to consider the methods by which we can achieve this cutting-off of the upper frequencies.

The simplest method is to connect a condenser across the pick-up or some suitable portion of the amplifying circuit. This, however, is not a satisfactory method, because it causes a gradual reduction of the output, so that not only shall we reduce the frequencies above the cut-off point, but also considerably affect the frequencies below. It is indeed difficult to consider this as a cut-off in the ordinary

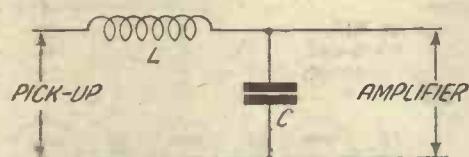


Fig. 4. A better form of Filter

1,000 or 1,500 cycles before this point is reached.

Now tests actually made with a very sharp cut-off filter indicated that if fre-

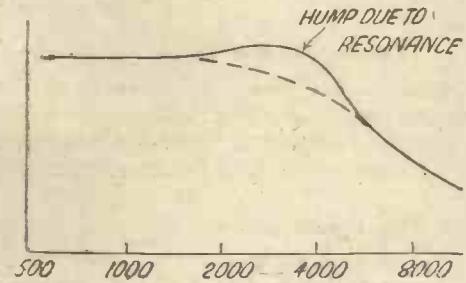


Fig. 5. Cut off with L.C. Filter

(Continued on page 538)

# MY WIRELESS

*Weekly Tips,  
Constructional  
and  
Theoretical—*

## A Neutralising Snag

I had a rather interesting experience the other day in connection with a neutralised receiver which was supplied with high-tension from an A.C. mains unit.

It was pointed out to me that with the power plug one way round in the socket the set could not be stabilised, but yet normal working was obtained when the plug was reversed! I tried neutralising the receiver myself. I had not the time to spend on making numerous tests, but the trouble was completely cured by connecting a high frequency choke in one of the wires to the primary of the transformer. This choke was afterwards fitted in the mains unit.

It should be noted that an ordinary choking coil may become too hot and eventually burn out if used in this manner.

## Low Notes and Motor-boats

In order that the low notes may be magnified by a resistance-capacity-coupled amplifier, or one of the popular types having a resistance stage and a transformer stage, it is necessary that the coupling condenser be of suitable capacity in comparison with the resistance of the grid leak.

The condenser is marked c in the diagram Fig. 2 and the grid-leak R. Usual values are .005-microfarad and 2 megohms, but when the very best quality of reproduction is desired the coupling condenser c may be of .1 microfarad and the grid leak R have a resistance of 1 megohm.

There is a disadvantage, however, in employing components which pass the very low notes; and this is that motor-boating is likely to be troublesome in the absence of special filters. It is therefore just as well so to design the low-frequency amplifier that the very low notes which the loud-speaker is *not* capable of reproducing correctly shall not be amplified.

Ordinary horn type loud-speakers and certain cone types, too, do not reproduce the very low notes, and it is therefore hardly worth while employing an amplifier which will magnify them. The low notes may be reduced by cutting down the capacity of the coupling condenser or the grid leak's resistance, and it is sometimes possible to employ a value as low as .001 microfarad with a .1-megohm grid leak.

## G.B. from A.C.

The grid bias for power valves supplied with high-tension of 200 volts or more may amount to as much as 40 or 50 volts, and dry batteries are often employed. But when a mains high-tension unit is used it is not very difficult to arrange a rectifier and smoothing circuit for the grid bias.

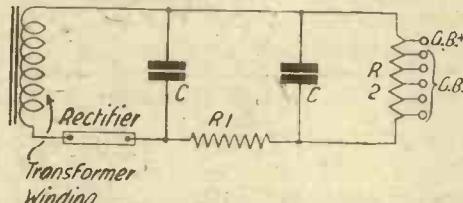


Fig. 1. An A.C. Grid Bias Unit

When the rectifier is of the Westinghouse type only one additional transformer winding is required and, of course, a smoothing circuit. A suitable arrangement is sketched in Fig. 1, which shows a half-wave rectifier, a resistance-capacity filter, and a tapped resistance. The amount of the A.C. voltage to be delivered by the transformer is dependent upon the type of rectifier and the grid bias required, but will usually not be more than 40 or 50 volts. Condenser c may have a capacity of 2-microfarads,

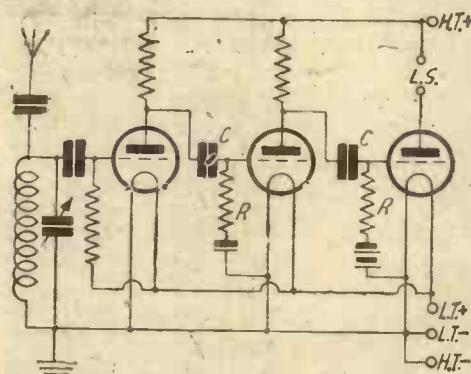


Fig. 2. A typical R.C. arrangement

resistance R.1, a value of 10,000 ohms and R.2 of 30,000 ohms. A choking coil may be employed instead of resistance R.1, but a resistance is, of course, much cheaper.

## A Mysterious Howl

It is surprising how the results to be obtained from a receiver fitted with an

DEN  
By  
W.JAMES

*For the  
Wireless  
Amateur*

H.F. stage may be affected by small matters that are apt, at least for a time, to pass unnoticed.

I have in mind the case of a quite ordinary receiver having three valves. The first was of the shielded type, and it was followed by a detector and power valve in the usual straightforward manner. But the complaint was made that the expected results were not being obtained because squeals and howls were produced—sometimes even before the reaction was adjusted to the point where the anode circuit of the high-frequency stage would oscillate.

Now the loud-speaker usually stood on the cover of the receiver, and if high-frequency currents were passing through the loud-speaker cord there would be trouble. There would be coupling between the input and output circuits, in this instance the aerial connecting wire and the loud-speaker cord.

Tests were therefore made, and showed that the strength of the howl could be varied by altering the position of the loud-speaker cord, which seemed to prove that high-frequency currents were flowing in the speaker circuit.

## Buzzing Chokes!

Iron cored components such as low-frequency inter-valve transformers or choking coils are liable to buzz unless the iron or steel laminations fit accurately together and are well bolted in position. It is not unusual to come across an output choke, for example, which is so constructed that it is actually possible to hear the broadcast by placing the ear within a foot or so of it. Obviously such a component must introduce distortion, and it is, therefore, desirable to guard against looseness or poorly fitting parts by tightening all fixing bolts and, when necessary, by jamming together loose laminations with pieces of cardboard or wood.

It is sometimes rather difficult to locate the particular lamination which is vibrating. A cure may, however, sometimes be effected by varnishing the core sheets in order that they shall tend to stick together, but on occasion it is found that an odd piece has been built into the core and is the cause of the trouble. This piece must be removed.

# Points About Exponential Horns

By H. BRAMFORD

THERE is no doubt but that the exponential horn is an excellent form of reproductive amplifier, but many constructors are disappointed in the results obtained owing to the fact that the general design has not been well considered. The secret of perfection lies in the correct shape of the horn.

The best horn for tonal reproduction is the wood horn, but good hard ply-wood should be used. Soft wood will absorb sound instead of reflecting it. Then, again, the seams must be made a perfect fit and

allowing for bends. frequencies, and the size of the mouth of the flare will govern the total range of those frequencies. The best way to plot out a shape for any given purpose is first to decide the space available for the mouth, which should be as large as possible, and then determine the overall length. Where the horn is to be folded in any manner, decide upon the formation of the fold, which is of no great importance providing the curves are graceful, and from this calculate what the overall length will be,

### Plotting the Horn

Now plot on paper, as shown in the sketch, the straight horn, and divide it into a number of equal parts, each of which is termed a pitch. Now the width or diameter at each pitch should be directly proportional to the distance, as will be noticed, and whatever size horn is made, these proportions will ensure that the horn will possess fairly good acoustical properties. One cannot give any particular hard and fast rule, as so many will wish to house the horn in some existing cabinet. The idea is that at each alternate pitch the diameter, or width, should be doubled, getting as much length to the horn as possible, and starting, of course, from a small neck. For a 2-ft. square mouth the length should not be less than five feet, and this may be taken as a fair basis upon which to work.

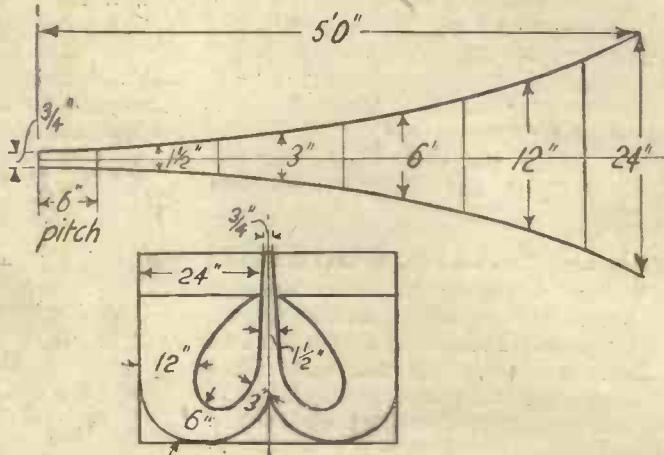
Having plotted the straight horn in this manner to the best advantage possible for given conditions, the rest of the job merely amounts to plotting a corresponding shape to any curvature, and this should be quite easy to do, as the main essential is to watch that the ratio of increase is the same at equal pitch distances along the entire curve. For an exponential horn of the

matched impedance type it is only necessary to form the double flare merging at the input, as shown, and this may have some advantage over the single outlet, but both sections must be perfectly alike in shape and construction. The square section horn, of course, is easier to make in wood than one of round section.

Readers who do not wish to go to the trouble of constructing a horn of the type described will be interested to know that an excellent range of non-metallic exponential horns are marketed by Messrs. Scientific Supply Stores. These horns are made in both straight and folded patterns, the latter type being particularly useful when space is a primary consideration.

By reason of the good general design, approximately even response to all frequencies above 130 cycles is obtained with very little falling off down to 60 cycles.

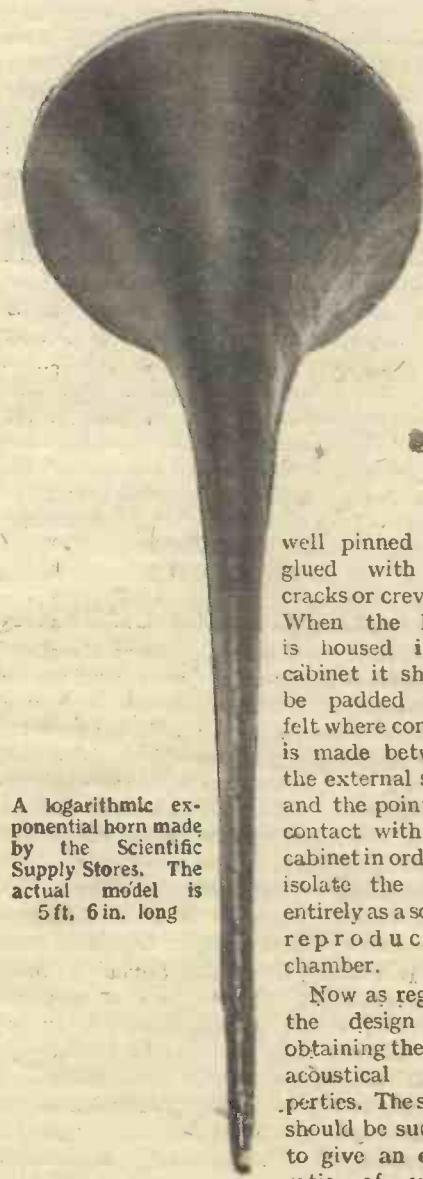
On fitting a well-designed exponential horn to a loud-speaker base in place of the ordinary short metal horn, one is immediately impressed by the fullness and "body" of the reproduced music, while



Dimensions of straight and folded types of exponential horns

there is a total lack of the "blare" and "tinniness" usually associated with horn loud-speakers.

The fitting of the unit, which may be either a horn loud-speaker base or of the gramophone attachment type, should be carefully carried out, as a really airtight joint is essential for good results. Suitable units for use with these exponential horns are the Brown, Amplion, Lissen, and Bullphone gramophone units.



A logarithmic exponential horn made by the Scientific Supply Stores. The actual model is 5 ft. 6 in. long

well pinned and glued with no cracks or crevices. When the horn is housed in a cabinet it should be padded with felt where contact is made between the external sides and the points of contact with the cabinet in order to isolate the horn entirely as a sound-reproducing chamber.

Now as regards the design for obtaining the best acoustical properties. The shape should be such as to give an equal ratio of cut-off

# THE BATTLE OF THE GIANTS

JOTTINGS FROM MY LOG :: By JAY COOTE

**N**EITHER the title of a silent film nor that of a talkie, but merely a record of the nightly struggle which is taking place between high-power stations and the forecast of the general battle which must inevitably take place in 1930!

For some days I have been trying to get a good reception from Lahti, and up to quite recently at every attempt the Eiffel Tower has baulked my efforts. Not that anyone, I believe, wants to hear the Paris transmitter, for its programmes are very poor in comparison with those offered to us by other studios, but the fact remains that its power (some 15 kilowatts) and its position in the long-wave band greatly interfere with the broadcasts of the Finnish station.

### Lahti

Fortunately, at times, the Eiffel Tower wavelength is subject to variations; on one or two nights, as it wavered from its course, so Lahti was effectively captured. On March 23 I was able to hold the Finn for more than half an hour at full loud-speaker strength, and during that period gleaned a mass of information. The call is given out now by a male, now by a lady announcer; it varies from *Lahti, Lahti*, to a longer announcement, for sometimes at the end of an item you may hear "*Huomio! Huomio! Suomen Yleis Radio Lahti Helsinki*"; but on days when a Swedish transmission is given (on Fridays from the high-power station, on Tuesdays from Helsingfors only) you will pick up words in the Scandinavian language, namely: "*Giv akt! Giv akt! Finlands Rundradio Lahti Helsingfors.*"

Apparently the station puts out no interval signal, but preceding the main

transmission I heard a series of faint notes which to my mind would coincide with an automatic broadcast of a very thin bugle call. This was repeated at intervals of about ten seconds before speech was heard. Generally speaking, the station is off the air by, latest, 9 p.m. G.M.T., except on special nights, when an operatic transmission is given; but the best time to search for it is towards 7.30 to 8 p.m. If you happen to hear the Swedish language—an easy one to recognise in view of the opportunities offered to us by Motala—do not jump to the conclusion that you have necessarily tuned in to a Scandinavian transmitter, for at 7.45 p.m. nightly Lahti puts out a news bulletin in both Finnish and Swedish, in view of its mixed population.

The high-power station is rated at 20 kilowatts, and on favourable nights the signals are very powerful. Possibly, with an outside aerial the nearer Eiffel Tower may swamp them, but with a frame you can make use of its directional properties and cut out the French broadcasts. Lahti on an air line must be roughly 1,150 miles from London; it is worth trying to get.

### More Crowding

This tussle to disentangle two powerful stations from one another, although perhaps not the ideal aim of a wavelength plan, if not carried too far breaks the monotony of "you press the button, we do the rest" class of reception and leaves one with the feeling that something has been accomplished. But you can have too much of a good thing, and this is what I foresee for 1930.

At present, of the high-power stations

we have Moscow, Motala, Zeesen, 5XX, Lahti, and Eiffel Tower working daily in an already crowded corner of the ether. Do you know that Zeesen now threatens to increase its power to 200 kilowatts; that Eiffel Tower, still on a nominal 15, contemplates pushing up to 100 kilowatts; and that Warsaw has decided to erect a "super" with 50 kilowatts in the aerial?

No special mention has been made of Hilversum, Kalundborg, Leningrad, Huizen or Kovno, which do not come within the affected broadcast band limits; yet these are all transmitters of which the concerts are easily capturable in the United Kingdom. It is unfortunate, however, that they fall within the areas of spark interference.

### On the Medium Band

In the medium band the menace is even greater, for on any evening now we may expect experimental tests from the new Oslo transmitter with actually 60 kilowatts in the aerial, and Bucharest in the near future will also contribute a 24-kilowatt voice. Turin, it was officially stated at the opening ceremony, is eventually to become one of the largest stations in Europe; yet Rome contemplates the erection of a 50-kilowatter and Prague is imbued with the same ambition. Add to these Langenberg and Daventry 5GB, which are no weaklings, a threat by France to put up a super-power station in Strasbourg as a counter-blast to Freiburg and Stuttgart, the new Bratislava station, two further additions to Czechoslovakia, and Switzerland's intention to build twin semi-giants at Gros de Vaud, and Suhrental, and you have a fair picture of what 1930 may bring us—the Battle of the Giants!

### LOUD-SPEAKER VARIETIES

**A**N extraordinary amount of ingenuity has been expended upon loud-speaker development. In addition to such standard models as horn, cone, and moving-coil speakers, with their many modifications in design, one notes the appearance of the electrostatic type in which variations in voltage, as distinct from current, are used to set a large diaphragm into audible vibration.

Another ingenious application of the electrostatic principle is the so-called "corona" speaker in which voltages derived from a low-frequency amplifier are applied to a surface which has initially been charged up to a point just short of that at which a silent brush or corona discharge occurs. The additional low-frequency voltages create disturbances in the air molecules adjacent to the charged surface, and in this way set up sound waves. B.A.R.



Lilian Braithwaite—An Impression by Lissenden

### FREQUENCY MODULATION

**T**HE increasing congestion on the ether, particularly in the zones reserved for broadcasting, draws attention to a new method of modulation which has recently been developed with the object of reducing the width of the sideband fringe accompanying the wavelength allotted to each station.

In the new system of transmission, instead of varying the amplitude of the transmitted carrier wave, the latter is kept at a constant height or level, but the waves are more crowded together in certain parts than in others, the relative "spacing" being controlled by the applied microphone currents. By using this method of frequency modulation it is possible to confine the width of the resultant side-bands to approximately 100 cycles, as compared with normal widths of 5,000 cycles and upwards required in "amplitude" modulation systems.

M.N.

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

THE week of sports commentaries was not bad, although the Grand National did not sound as thrilling as it was last year. Difficult to find the real reason. Possibly the number of horses participating made the job of impromptu description hard. Messrs. Lyle and Hobbs coped with the task like stalwarts, but the odds were against them.

"I am glad to see that you have all of a sudden 'got religion,'" writes H.B. (Who said I had?) "But I am sure that, devout churchman as you must now be, you cannot be in favour of the kind of Sunday broadcast which was given us from 5GB recently." He goes on to enumerate the items thus: "5-5.30, Children's Service; 5.30-5.45, Old Testament Reading; 5.45-6.15, Church Cantata; 6.30 Religious Service in Welsh; 8-8.45, Religious Service; 8.45, Charity Appeal; then over an hour of Handel's music."

Well, if H.B. reads my notes as closely as he pretends, he would know (1) that I am *not* a devout churchman (being merely content to be devout) and (2) that I have done, and am still doing, my best for bright Sunday broadcasts.

Are not we getting rather too much Teddy Brown? There is a sameness about him. His tinkly bits all sound alike and his "stunt" endings are stereotyped, if not identical. Moreover, he is hardly an expert saxophonist—his tone is too fuzzy to be agreeable. Why doesn't he give us a good programme on his xylophone alone? He is quite capable of doing this.

A reader "views with apprehension" the threatened return of Schubert's Unfinished Symphony "twice nightly." He was "forced to complain" about it not long ago, and now finds that after a lull it is being served up again. "Although a masterpiece, it does not stand constant repetition, and I solemnly assure the B.B.C. that in putting it over so often they are helping to ruin it as a classic." After which solemn warning there is only one thing for the B.B.C. to do—give it *once* nightly!

Joseph Szigeti gave us a pleasing violin recital. His playing is of the kind I admire

—more expression and less tricks. One item in particular—De Falla's "Spanish Dance"—was rendered by him in such an understanding manner that the melody seemed to live; in fact, it *did* live.

♦ ♦ ♦

Are the provincial dance bands up to broadcasting standards? I was listening to Paul Raffman's band from Birmingham, and one could not fail to make a comparison between this and London bands. Raffman may sound well enough in a dance hall, but it does not follow that what serves well in a dance hall will broadcast well. I should imagine that Raffman's band is quite good to dance to "in the flesh," but there aren't enough instruments in this combination to make it a success over the ether.

♦ ♦ ♦

*The Count of Como* was spoilt by mumbling. The music was tuneful enough, but the continuity was absolutely lost. The few words I heard lead me to believe that I didn't miss much!

♦ ♦ ♦

J. H. Squire has indeed a flair for finding or personally arranging tasteful musical medleys. Let us hear the octet play again these arrangements of excerpts from well-known and well-liked selections and songs. For instance, "Everybody's Melodies" and "A Potted Concert in One Item" are ingeniously arranged.

♦ ♦ ♦

Julian Rose excels himself as an announcer. Well—somewhat of a contrast to our "refined" announcers, so that one must laugh with him.

♦ ♦ ♦

*All Aboard* from Birmingham was another of those self-praised revues which turn out to be commonplace variety. In the official programme it was stated that,

the book was "by accident," and I can well believe it. I am sure that no one would sit down and dish up such stuff deliberately.

♦ ♦ ♦

Ann Penn—although good—has a fault which I dislike. It is staleness. She fails to vary her programme sufficiently, and one tires of even the best material. This fault is certainly not confined to Ann. Others need pulling up for the same reason. Wish Wynne, for instance.

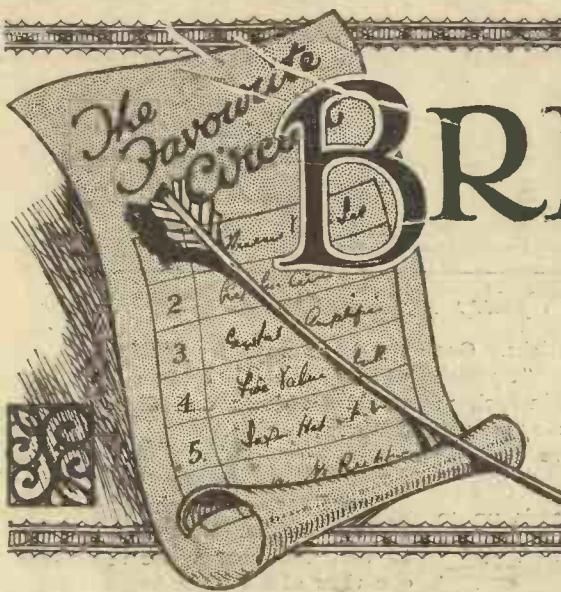
♦ ♦ ♦

"The—shall I say?—abdication of Fred Elizalde's Savoy Band has given us the opportunity of hearing regularly what is adjudged by the experts to be 'the finest dance band in the country,'" writes "Harold," my adviser on matters syncopated. "The band in question is that led by Ambrose at the Mayfair Hotel."

Well, I don't like to be too dogmatic myself about dance orchestras, but there seems to be something in what "Harold" says. Ambrose's band has a quiet rhythmic way about it which is a relief from the blaring crudities of other orchestras. I gather, by the way, that in Ambrose we listen to the highest paid violinist in England!



Broadcasting Takes the Place of the Newspapers.—The photograph shows a crowd outside a London wireless dealer's listening to the result of the Grand National



# BRITAIN'S "FAVOURITE"

## UP-TO-DATE

*Dual Wavelength Range :: No Coil Changing  
Motor-boat Stopper :: For Long or*

**N**EITHER apology nor explanation is needed in describing this new version of Britain's "Favourite Three," one of the most successful three-valvers which has been described by the AMATEUR WIRELESS Technical Staff.

There is an interesting little bit of history behind the original version of the "Favourite." It will be remembered that it

voting. There is no reason to suppose that although developments in wireless are said to move quickly the voting would be any different to-day, and the fact which will be most obvious to present owners of the "Favourite" or to those who were interested in its design on first publication is that the present receiver bears very much the same outward appearance. Indeed, the end in view with which this set was designed was, first, to present owners of Britain's "Favourite Three" a chance to add and incorporate just those refinements which a year's progress has made possible, and not entirely to modify the set to gratify some new craze; and, second, in the light of our readers' voting in 1928 and subsequent technical developments, to present to all readers the opportunity to make up a really good practical three, without any unnecessary frills or limitations of performance.

### Modifications

As it is expected that a large number of set constructors who perhaps have an entirely different type of set will want to make up this "1929 Favourite Three," it is necessary to describe it with the object of explaining the whole set to these newcomers. Present owners of "Favourite Threes" will readily see the additions which have been incorporated and can modify their own receivers accordingly. There is not the slightest need to make up an entirely new set and only the minimum of parts will have to be scrapped.

By far the most obvious feature is that a six-pin coil has taken the place of the previous plug-in coil arrangement. All set

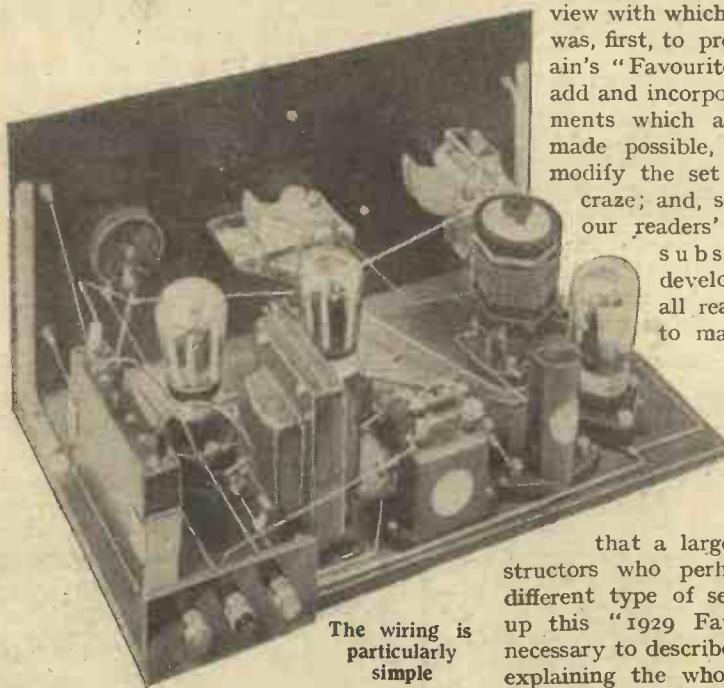
owners can see that this is a good point, because, although plug-in coils are by no means as dead as the proverbial dodo, in a

### A GREAT FEAT

This set was first produced at the beginning of the year to decide the most popular results obtained by constructors of the "Favourite" advised. So here is Britain's latest improvements, and it is one o

general-purpose set of this nature coil changing is nothing better than a bother. The six-pin coil can be of the dual range type and a simple push-pull switch on the panel allows of either the long or the short wavebands to be received. Alternatively, the very short waves can easily be received.

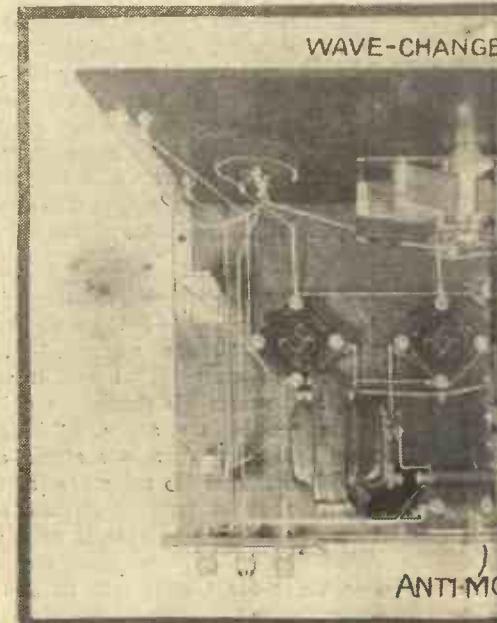
With a plain coil arrangement, even if a tapping is taken to an intermediate point



The wiring is particularly simple

was described only last year in "AMATEUR WIRELESS," No. 294, and its special point of interest was that it embodied the circuit voted first in an AMATEUR WIRELESS competition which had been organised a little time before the publication of the "Favourite Three."

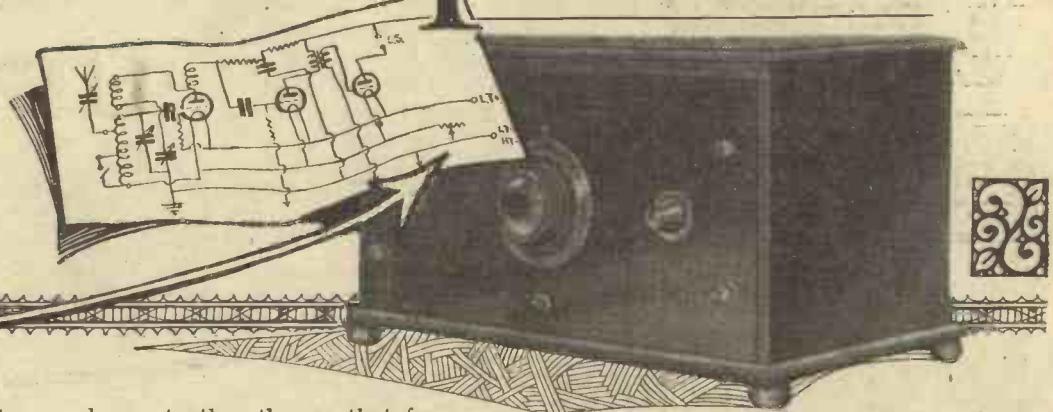
"Choose your circuit" was the theme of the competition and the "Favourite" was the material form of the most popular



This photograph shows the modifications to the "Favourite Three" receiver.

# "FAVOURITE THREE"

*... Selectivity Control  
Short Waves*



along the winding, listeners close to a powerful station may have cause to complain of lack of selectivity. Well, this

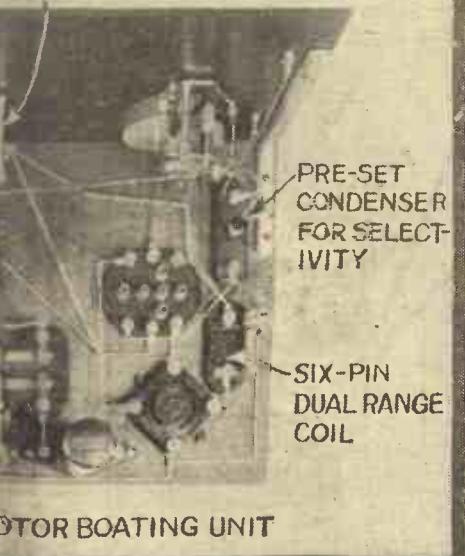
## FAVOURITE.

ning of 1928 as a result of an "A.W." circuit. So satisfactory have been the "Favourite," and so insistent has been that we considered a 1929 edition of the Britain's "Favourite Three" with all the of the best "threes" you can make.

difficulty has been overcome in this new edition by the incorporation of a small variable condenser of the pre-set type, which can, if desired, be placed in series with the aerial lead.

There is a flex connection from the aerial terminal of the panel, to the other end of which is attached a spade tag. This can be shifted from one side of the pre-set con-

## SWITCH ON PANEL



## MOTOR BOATING UNIT

that have been made to bring Britain's "Up-to-date

denser to the other so that for local reception, when the very greatest strength is needed, and selectivity does not matter very much, the series condenser can be cut out of circuit.

For the reception of the more distant transmissions adjacent to the wavelength of the local station, however, judicious use of the series pre-set condenser will be found an almost complete cure for inter-station jamming.

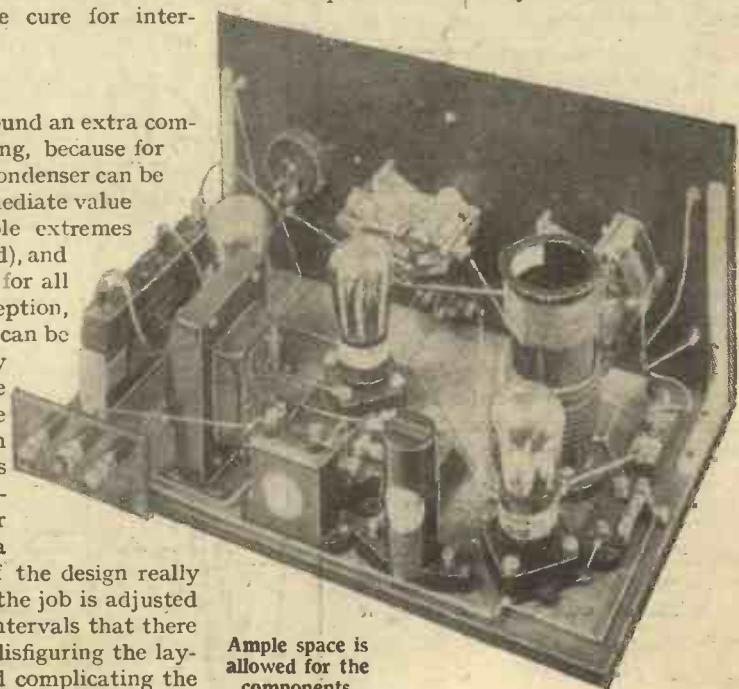
## Simple Tuning

This will not be found an extra complication when tuning, because for most purposes the condenser can be pre-set at one intermediate value between the possible extremes (say .0001-microfarad), and this will be suitable for all distant station reception, while the condenser can be cut out altogether by changing over the position of the spade tag for local station reception. There is ample space available on the panel for the mounting of a pre-set condenser if the design really necessitated it, but the job is adjusted at such infrequent intervals that there is no real point in disfiguring the layout of the panel and complicating the wiring by shifting the pre-set condenser from the baseboard to the panel.

A common H.T. lead for the anodes of all three valves is a feature which will be obvious from the circuit diagram, and this, of course, makes for simplicity, since it means that only one H.T. potential has to be applied. The voltage on the detector valve anode is, of course, cut down by the resistance of the R.C. coupler, while the

D.C. resistance of the primary of the L.F. transformer cuts down the H.T. voltage to a suitable value for the first L.F. valve.

A trouble which is likely to arise when a power valve taking a large H.T. current is employed is that motor-boating may be set up, or the tendency to L.F. oscillation



Ample space is allowed for the components

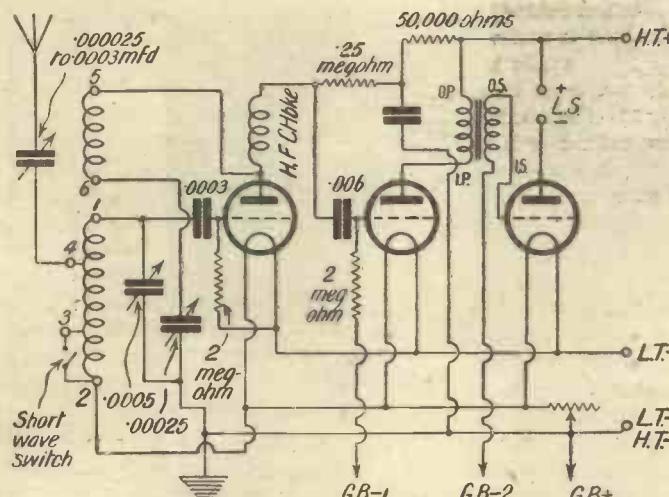
accentuated. The same trouble is likely to arise if a mains eliminator is employed and, in rare instances, builders of the original Britain's "Favourite Three" (and incidentally of many other receivers having a common H.T. tapping) may have had difficulty in preventing motor-boating when working from the mains.

Well, any such troubles are now obviated

from  
4/7 Dec  
11 Mely 1929 4/7 } } Eliminators → Petes Scott Co Ltd.  
77 City Rd  
London E.C.1.

## "BRITAIN'S FAVOURITE THREE UP-TO-DATE" (Continued)

in the 1929 edition by the incorporation of a motor-boating stopper in the H.T. circuit. This consists simply of a fixed condenser and 20,000-ohm resistance in series with the primary winding of the L.F. transformer. This is a complete cure for motor-boating in a receiver of this type. It will be seen from the photographs that the con-



The Circuit Diagram

denser is placed on the baseboard quite close to the R.C. coupler.

### Long and Short Waves

For the benefit of those who are making up the "Up-to-date Three" as a new receiver, it must be explained that in its new guise, or rather with the addition of its latest improvements, it is a very good receiver for general work. In practically every part of the country it should be capable of giving good loud-speaker reception of 5XX, 5GB, and a local station. In most cases a healthy batch of foreigners should also be easily receivable on the loud-speaker, provided, of course, that a good aerial is employed and there should really be no need to use phones in order to get a proper amount of enjoyment from the set.

If you are making up the set as an entirely new venture you will require for its construction the parts mentioned in the appended list. Comparison of this list with existing receivers will see what needs to be purchased by present possessors of a "Favourite Three" who wish to bring it up to date.

### Components

Ebonite or bakelite panel, 16 in. by 8 in., and strip, 4 in. by 2 in. (Becol, Raymond, Paxolin, Radion).

.0005-mfd. variable condenser, log mid-line type (J.B., Polar, Ormond, Burton, Burndept).

.00025-mfd. variable condenser, log mid-line type (J.B., Polar, Ormond, Burton, Burndept).

7-ohm panel-mounting rheostat (Lissen, Igranic, G.E.C., R.I. & Varley).

Push-pull switch (Lotus, Lissen, Trix, Wearite).

Panel brackets (Bulgin, Camco).

Dial indicator (Bulgin).

Three anti-microphonic valve holders (Benjamin, Lissen, Burton, Wearite).

.0003—.000025-mfd. pre-set condenser (Formidenser type J, Igranic).

.0003-mfd. fixed condenser with series clip (Dubilier, Lissen, Graham-Farish, Mullard).

2-megohm grid leak (Dubilier, Lissen, Graham-Farish, Mullard).

Six-pin coil base (Tunewell, Lissen, Lewcos, Peto-Scott).

High-frequency choke (Lissen, R.I. and Varley, Burndept, Polar, Tunewell, Trix).

Resistance - capacity coupling unit (Dubilier, Lissen, R.I. & Varley, Graham-Farish, Mullard).

50,000-ohm resistance (Graham-Farish, Lissen, Dubilier, Mullard, R.I. & Varley).

2-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Ferranti, Mullard).

Low-frequency transformer (R.I. and Varley, Lissen, Philips, Mullard, Cossor Igranic).

Grid-bias battery clips (Bulgin). Two black and one red wander plugs (Clix).

Baseboard, 16 in. by 9 in. (Pickett, Clarion, Camco).

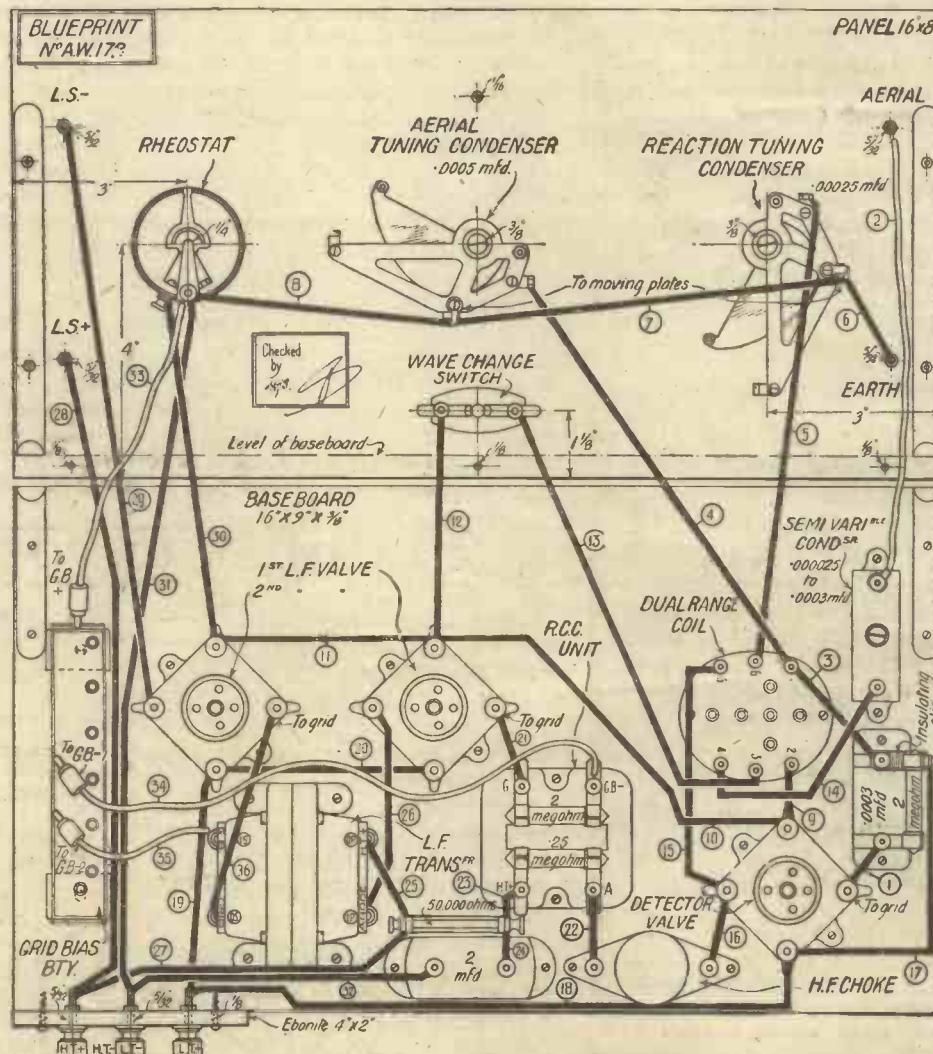
Connecting wire (Glazite). One yard of thin flex (Lewcoflex).

Seven terminals, marked : Aerial, Earth, L.T. +, L.T. -, H.T. +, H.T. -, L.S. +, L.S. - (Bellng-Lee, Eelex, Igranic).

The following constructional details will be of interest to those who are making up the set, while those who are simply adding the tit-bits, as it were, may pass on to the operating details which will be given.

A new blueprint is available, and can be obtained, price 1s., post free, from Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. This is a great help in building up the set, because

(Continued at foot of next page)



The Wiring Diagram. Blueprint available, price 1/-

# The ARCADIAN PORTABLE AFIELD



WITH the instructions for building the "Arcadian Portable" published last week and in the previous week, AMATEUR WIRELESS Nos. 354 and 355, readers interested in portable sets have had an opportunity to make up this excellent 1929 portable. In last week's issue sufficient operating notes were given to enable those listeners who had completed the construction of the receiver and loud-speaker unit to get the whole portable working as soon as possible.

#### Thumb Control

As stated in the specification of the "Arcadian," the fact that it is to all intents and purposes a one-thumb control receiver is a great operative advantage; it is interesting to note how this works. If you take an ordinary H.F. and detector receiver it will be found that if logarithmic condensers are employed for tuning, the dial settings will be approximately the same over the middle portions of the scales, and any variation between the settings of the H.F. and aerial condensers will be noticed only at the extreme ends of the scale. This is simply because one circuit

gets a little "behind" or "ahead" of the other, and this can be corrected quite easily simply by placing a small correcting or balancing condenser across one circuit.

This is just what has been done in the present receiver. Thus, when operating the "Arcadian" the knob of the ganging condenser (which, as a matter of fact, is a pre-set condenser mounted on a wooden panel) should be adjusted in conjunction with a thumb control, and at the extreme ends of the main condenser scale the ganging condenser will be found to be relatively important.

The circuit of this portable is a very efficient four-valver, and if used as an indoor transportable the receiver can be made to give some very startling results in the way of DX getting.

#### Full Volume Out-of-doors

As a portable, however, only the stations which can be received at full volume are really of interest, because when out of doors, and for dancing at picnics, and so on, full loud-speaker strength is an asset. As a matter of interest it may be stated that the

#### SOME HINTS ON ITS OPERATION

dial readings of the stations which an average London amateur will wish to receive when working the

"Arcadian" out of doors, are as follows: On the short waves—London, 98 degrees, Daventry 5GB, 140 degrees; on the long waves—Croydon, 80 degrees; Hilversum, 100; Daventry 5XX, 145 degrees and Radio Paris, 170.

As the main condenser dial is gradually turned from zero to 180 degrees by means of the thumb control, the knob of the pre-set condenser should be slowly screwed in a little at a time, in order to correct for inaccuracies of ganging.

If, for any reason, it is desired to get at the "internals" of the receiver while it is in operation it is better to move the loud-speaker side of the cabinet rather than the set side, for the loud-speaker can be removed without disturbing the batteries. It may be necessary to do this, for instance, in order to adjust the reed movement of the loud-speaker or to vary the H.T. or screen-grid voltages.

One little point which may be mentioned as the result of an extended practical test of the "Arcadian" is that it is wise to see that all the battery plugs are a tight fit in their sockets before closing up the sides of the receiver. Loose plugs and faulty connections can cause a deal of bother in portable sets, and troubles of this kind are greatly accentuated if the receiver is used in a car, and in consequence the "works" are severely jolted about before the set is put into operation.

## "BRITAIN'S FAVOURITE THREE UP TO DATE"

on the one sheet are incorporated a wiring diagram, drilling guide, and layout template. When drilling the panel do not forget the holes for the mounting brackets and those through which wood screws are passed in order to attach the panel to the baseboard.

The blueprint can be used in a very convenient fashion for showing the exact positions of the baseboard components. It is rather important to adhere as closely as possible to the dimensions given in this original design and no difficulty will be found in doing so, for there is ample space to spare on the baseboard and panel. Wiring-up should be carried out with rigid wire, and in this particular instance in order to make the job of wiring-up as simple as possible, bare wire, and not insulated wire, such as Glazite, has been employed.

For the variable connections, such as the lead from the aerial terminal to the pre-set condenser, and the three leads to the grid bias battery, thin rubber-covered flexible wire, such as Lewcoflex, is best employed. The grid bias connections are taken as follows: One from the moving arm of the filament rheostat to the positive battery socket; one from the G.B. terminal on the R.C. coupler to about the 3-volt tapping on the G.B. battery; and finally one from the G.B. negative terminal on the L.F. transformer to the 7½ or 9-volt tapping.

A wiring point which will be of interest to owners of existing "Favourites" is that the connection which formerly made contact with all the one-hole fixing devices on the panel has now been dispensed with as it is possible that some constructors did not

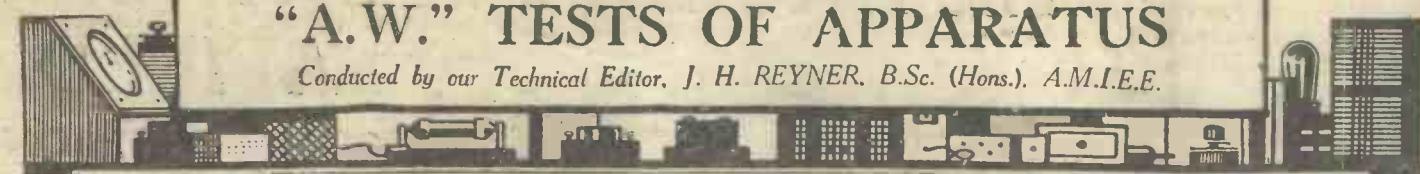
manage to make a very good job of "communing" the framework of the two condensers and the moving arm of the rheostat with this one connection fixed between the components and the panel. In the present design this busbar has been transferred to a more accessible position, as will be seen by the photographs.

As usual, this receiver can be seen in the Somerset Street windows of Messrs. Selfridge, Ltd., and London listeners should take advantage of this excellent opportunity to see the way in which this very popular three has been brought up to date.

The Radio Corporation of America recently issued its annual report for 1928, showing total gross income of \$101,851,603 and net income of \$23,661,990.

## "A.W." TESTS OF APPARATUS

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

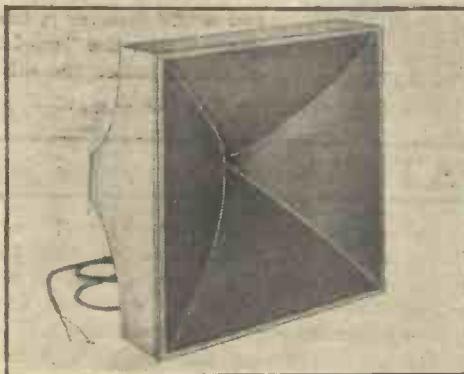


### Grawor Loud-speaker

A LOUD-SPEAKER of a novel cone type is the Grawor and an instrument of this type has been received for test from Messrs. Henry Joseph, 11, Red Lion Square, High Holborn, London, W.C.1. A cone of a resultant rectangular form is employed in the Grawor and the diaphragm itself is composed of four damp-impervious sectors joined together by strips of pliable material. Each strip has a maximum width equidistant between the apex and the edge of the diaphragm, and this gives a useful degree of elasticity.

The edges of the diaphragm are attached by means of a pliable surround to a light wooden chassis which is really capable of producing a sufficient baffle effect without further enclosing of the back of the diaphragm. Nevertheless, for domestic reasons it is usually desired to operate the instrument in a cabinet and an attractive range of loud-speakers complete in cabinets is obtainable. The chassis are made in three sizes, namely 12½ in., 16 in. and 19 in. square, and each is fitted with a Grawor reed movement.

The resultant tone is very pleasing and not unnaturally deep. Speech is very natural and not tinged with that "boominess" so often produced by cone-type loud-speakers which appear to give a very "live" reproduction of the ordinary musical frequency range.



Grawor Loud-speaker

### Polar Reaction Condenser

**I**N these days of high-magnification screen-grid valves, it seems almost unnecessary to fit a slow motion control to the reaction; but, having used such a condenser, in different types of circuit, we are convinced that it forms an aid to tuning and adds pleasure to this operation. This is particularly true in the case of portable receivers when the reaction control is of far greater importance.

The construction of the new Polar Ideal reaction condenser which we have received for test is particularly robust. The moving plates are held in position by an insulated moulding at the panel end in which a cone and ball bearing is fixed: the bearing at the farther end and the slow-motion device are clamped to insulated supports which form part of the main moulding. Although the fixed plates are clamped at

speaking, has the overall dimensions of 3 in. by 1½ in., while at the base are attached two cardboard flaps which facilitate the tacking of the battery to the baseboard, or other methods of fixing. Convenient terminals are provided and the polarity indications are clearly moulded on the insulating compound at the top of the cell.

It may be remembered that cells of this type have been used in AMATEUR WIRELESS receivers and we have found them entirely satisfactory and very convenient in use.

### G.E.C. Reed Movement

**T**HE GENERAL ELECTRIC CO., Magnet House, Kingsway, London, W. are well known as manufacturers of high-class loud-speakers of the cone type; it is therefore to be expected that the new cone which has been recently introduced by the G.E.C. would be a well-designed article. Actually this is an inexpensive unit and utilises a straightforward magnetic system.

Every effort is made to keep the component compact: the electro-magnet and armature are mounted in a metal cradle with dimensions of 3½ in. by 1½ in. by 1½ in. high: these dimensions do not take into account the length of the reed, the adjusting knob or the terminals. It is possible when building portable sets, to mount the unit inside the cone, even if the cone angle is somewhat obtuse. The armature comprises a strip of metal firmly

one end only, they are amply rigid and cannot be appreciably distorted even when considerable pressure is applied to them.

Two small knobs are fitted, the outer of which is fixed to a spindle mounted to the main spindle and controlling the slow motion ball gearing. The slow motion ratio is approximately 20 to 1. The second knob is attached to the main spindle and gives a 1 : 1 ratio. The motion is smooth and free from stiff spots.

Complete with one hole fixing device and terminals this component makes a most useful reaction condenser. The total length of the component is 2½ in., whilst its width is 2¼ in. We found the maximum capacity was 95 micro-microfarads.

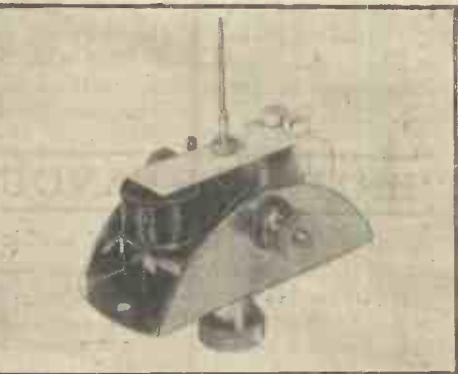
The makers are Wingrove and Rogers, Ltd., Mill Lane, Old Swan, Liverpool.

### Siemen's Grid-bias Battery

**T**HREE are many points in a receiver at which it is very convenient to place a small 1½ volt grid-bias battery in order to obviate the need for taking G.B. leads out to tappings on an external battery.

For example, a midget 1½-volt cell can conveniently be incorporated in the screen-grid H.F. stage in order to provide the necessary bias, while in the case of an anode-bend detector, it is a good point to see that the necessary biasing voltage is generated fairly close to the valve itself and that lengthy grid leads are not trailed about the receiver.

A convenient little bias battery which fulfils all these requirements is manufactured by Messrs. Siemens Bros. & Co., Ltd., of Woolwich, London. Externally the cell is rectangular and, roughly



G.E.C. Reed Movement

fixed at one end and lying over an electro-magnet at the other.

We tested the unit in conjunction with several cones including a good quality floating cone. The results were quite good, music and speech being reproduced with clarity and pleasing tone. Although the strength of reproduction was not quite as high as some expensive units we have tested the overall performance is satisfactory and the unit may be recommended.



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(Described in "A.W." March 23)

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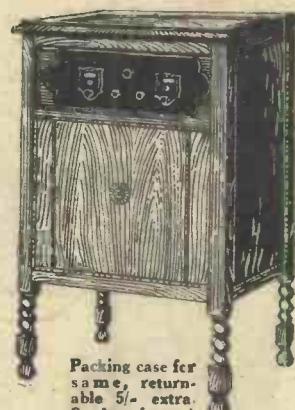
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# RADIOGRAMS

**P**HOTOGRAPHS taken during the Boat Race were transmitted experimentally by the Fultograph process from Daventry 5XX between 2 and 2.45 p.m. on the same afternoon.

The Glasgow Bach Society's concert on April 8 in the Stevenson Hall is to be put "on the air." The broadcast will include the Concerto in C major for three pianos and strings, the Concerto in D minor for solo violin and strings, which is a transcription of the Concerto in D minor for solo pianoforte and strings, and one item not by Bach—a suite for strings from the symphonies of William Boyce.

Northern listeners will be interested to hear that "Georgé," and "Wullie" are to return to the Aberdeen studio on April 12. Some two years ago a meeting of these two "worthies" (created by Arthur Black) was a weekly feature of Aberdeen programmes.

The French P.T.T. has now definitely decided on the site of the new high-power Strasbourg transmitter; the station is to be erected at Brumath, some 14 miles from the city.

Anthony Hope's famous novel "The Prisoner of Zenda," which scored so great a success both on stage and screen, is being

adapted for the microphone and will be broadcast from London and Daventry some time in May.

"That the broadcast play is not a satisfactory form of art" is the subject of a discussion which will take place between Miss Naomi Royde Smith and Mr. Compton Mackenzie at the 5GB studio on April 19. Savoy Hill is providing the disputants with microphone facilities to enable them to decide whether the broadcast play can ever "get over."

The Foden Motor Works Band have been declared eight times champions of the Belle Vue Contest at Manchester; last year they were awarded the challenge cup outright. On April 8 both London and Manchester will broadcast their concert.

*Square Pegs*, a polite satire by Clifford Bax, and *The Dear Departed*, by Stanley Houghton, will be found in the variety programme given to 5GB listeners on April 20; as usual, Clapham and Dwyer will contribute their spot of bother.

On April 18 the Newcastle studio will present a new revue entitled *Tyne Trifles*, from the pen of the Gateshead humorist, E. A. Bryan; the cast will include Sal Sturgeon, Doris Miller, Tom Heenan, and Harold Earnshaw, all popular favourites.

In order to reduce serious interference, the French broadcasting authorities are endeavouring to obtain permission for the Eiffel Tower to lower its wavelength to 1,470 metres; in the meantime the transmitter suspended the broadcast of the mid-day concerts for one week in order to carry out a shortening of the aerial.

Russia is holding its first radio lottery on April 15. The broadcasting authorities recently received authority from the Soviet Union to organise a national lottery in which the prizes to be won consisted of wireless transmitters, loud-speakers, and other radio material. Two million tickets have been issued at 50 copecks each (about 6d.); all profit derived from this undertaking is used for the development of wireless instruction in schools and workmen's clubs.

From a Continental source it is reported that the Baird International Television Company, Limited, has now concluded contracts with some seven European stations for the transmission of living pictures; Berlin will be one of the first Continental cities to be so equipped—to be closely followed by Radio Paris.

Test transmissions have been satisfactorily carried out with the new Vienna short-wave transmitter, and it is stated that details of the official times of broadcast, wavelength, and power will be shortly issued. The station will relay the Vienna entertainments.

The high-power short-wave Dutch wireless station at Huizen (PCL) works on 18.4 metres between 11 a.m. and 5 p.m., and on 38.8 metres from 3 p.m. to 1 a.m. G.M.T., thus giving daily a fourteen-hour public telephony service.

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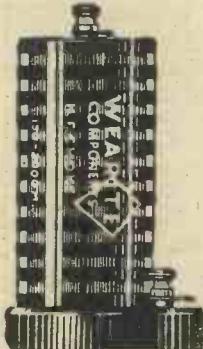
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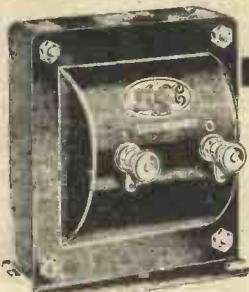


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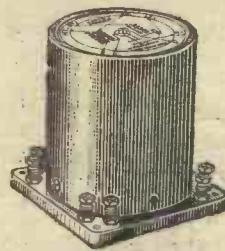
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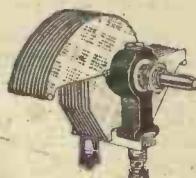


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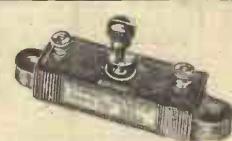
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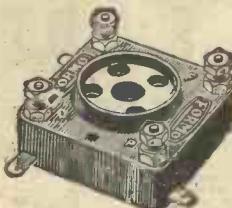
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## LETTERS TO THE EDITOR

*The Editor does not necessarily agree with the views expressed by correspondents.*

**Round the World with an "A.W."** Set

SIR.—Having had your "Home and Abroad" set during my trip round the world, I felt I ought to write and let you know the excellent results obtained at the different places we visited.

When off watch at night I used to listen regularly to 2XAF all along the Mediterranean. 5SW and PCJJ were easily obtained in Australia. Melbourne was heard in the Suez Canal, and now with coils 2, 4, and 6 or 7, according to the type of detector valve in use, Huizen comes in on 16.88 metres. I added one stage L.F. for good speaker results, and feel quite disappointed if unable to listen for some station about 2,000 miles away. The chief difficulty, however, is the difference in time, but the other morning, quite one hour after sunrise, 2XAF was coming through on the loud-speaker.

B. (Annan).

#### Foreign Valves

SIR.—I entirely agree with J.D.B. (Ulster) that the cheaper foreign valves lack "pep." I must explain that my previous letter was only written in the same strain as the article which prompted it, i.e., valves were being compared solely by their mutual conductance values, and as such the particular make of Austrian valve mentioned was equal to English. It will be remembered, however, that I mentioned that the part of a valve which is of paramount importance is the filament, the quality of which, I admit, is doubtful in the *cheaper valves*.

As he appears to have been unfortunate with the foreign valves he has bought, I would suggest that J.D.B. should try those made by the Dutch firm Philips, which are sold in France at 37.50 and 55 francs (ordinary and power respectively).

J. S. (London, S.W.).

#### A Linen Speaker Controversy

SIR.—Several letters have appeared in your correspondence columns lately from readers who have constructed linen-diaphragm loud-speakers. While making allowances for the exuberance developed when suddenly becoming the possessors of loud-speakers very much superior in performance to anything they may have previously owned, such remarks as "equal to, or better than, any moving-coil speaker I have heard" cannot be allowed to pass without comment.

The plain fact is that, to people with a musically trained ear (and they are comparatively few), the M.C. speaker, operated under correct conditions, is incomparably in a class by itself. One wonders what conditions obtained when your enthusiastic

"linen-diaphragm" constructors formed their opinions of M.C. reproduction. They must have been pretty ghastly! The conventional "Det. 2 L.F." or "H.F. det. 2 L.F.", with 120 volts H.T., will most decidedly not cope with a M.C. speaker.

To the many "plodders" in the search for quality reproduction, via M.C. speakers, the extravagant claims of some of your "linen-ites" must be somewhat amusing.

I have built your "linen" speaker, and agree that it is good—exceptionally good. But in moving-coil class—no, decidedly not.

To conclude, it is an established medical fact that a very high percentage of the inhabitants of these islands is partly or wholly—"tone-deaf"!

F. S. (London, N.).

#### Mr. Frank Newman

SIR.—I was pleased to see my photograph among "Broadcast Artistes of the Month" in No. 354 of your excellent paper (page 444), but must beg you, if possible, for the insertion of a correction.

I left Lozells Picture House, Birmingham, on February 7 (when I gave my last broadcast) to go to the New Empire Theatre, Leicester Square, as one of the two solo organists there. At the Empire I have the largest cinema organ in this country—a Wurlitzer organ.

FRANK NEWMAN (London, W.).

#### 5XX Quality

SIR.—I have followed the correspondence in AMATEUR WIRELESS for a considerable time and note that W. J. F. (Redruth) experiences the same trouble that one hears on all sides in Penzance. No one can deny that the quality of 5XX varies considerably in such short periods as twenty-four hours. The programmes are only comparable to mincemeat, especially when from 8 p.m. to 8.30 p.m. "Daventry only" a talk is sandwiched in on any subject.

Why we should be penalised, I really am at a loss to understand. Thus, again the tit-bit of the evening is usually 9.35 to 11.0, which is after country listeners have gone to bed.

I imagine that A. M. H. (Coventry) has a number of stations at his disposal and is not a 5XX listener only. Should this correspondent visit Cornwall, he will be welcome to try the experiment of listening to 5XX for one week.

Perhaps A. M. H. would be interested to know that 5GB is not comparable with such stations as Turin, Toulouse, Nuremberg and Stuttgart at one quarter of the power, and as an alternative programme it is useless to us here.

BRITISH SIX (Penzance).

#### NEXT WEEK

An All-from-the-Mains "Two"

Don't Miss It!

# OUR INFORMATION BUREAU

**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

## Aerial Types.

Q.—Why is it that most amateurs use a single-wire aerial for their receiving stations when, according to what can be seen from photographs of professional stations and warships, the use of a multi-wire aerial of the cage or "sausage" type appears to be the type most favoured by the people who should know which is the best aerial.—A. P. (Godalming).

A.—Multi-wire aerials of the type you refer to possess a large capacity and as a fairly large capacity aerial is required for transmitting purposes it explains why such aerials as you have seen in photographs are in common use in professional circles. The receiving aerials of these stations and ships, however, are of the single wire type and if it were possible to see more detail in the photographs in question or even to visit the stations or ships themselves it would be seen that quite a small single wire aerial is in use in addition to the large main aerial.—L. C.

**When Asking Technical Queries**  
PLEASE write briefly and to the point  
**A Fee of One Shilling** (postal order or postage stamps) 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.

## Damaged Valve.

Q.—Recently one of my valves was dropped from a height of about 3 ft. to the floor and, although the filament is intact, the valve no longer works. Can you suggest what has happened? N.H.—(London.)

A.—It is possible that the electrodes have become misplaced and either the filament is touching the grid or the latter is touching the anode. A defect of this kind can be traced by testing with a battery and meter, between the grid and filament or grid and plate legs of the valve for short-circuits. If no reading is obtained in either case the valve is all right on this score, and probably one of the wires may have broken off between the electrodes and the legs. This can be remedied by removing the base and completing the broken wire. If the electrodes themselves are damaged, or their positions altered, it is improbable that this valve will work properly again; in any case its characteristics will be materially altered.—B.

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### NO CAPACITY CHANGE - OVER SWITCH

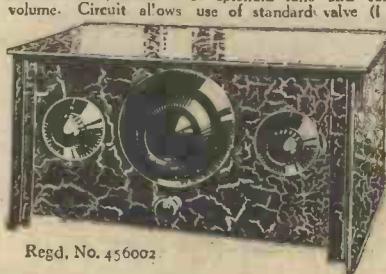
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## The TRIX H.F. CHOKE

The TRIX H.F. Choke is eminently suitable for use in every type of receiver. Works evenly over a waveband of 5 metres to 3,000 metres. Can be mounted either horizontally or vertically.

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Specially Recommended for the Linen Diaphragm

The Lassophone Triangle Fork Reed Balanced Armature Cone Unit is a triumph of British inventive genius and workmanship. Reproduces all frequencies equal to a moving coil speaker on one set. Guaranteed not to overload on the most powerful set. Specially recommended for use with The Linen Diaphragm and is unequalled by any other unit.

**The LASOPHONE**  
Fork Reed Balanced Armature Cone Unit

Manufactured by  
**H. H. LASSMAN, F.R.A., A.M.I.R.E.**  
(Dept. A.W.), 429 Barking Road, East Ham, E.6

ever, we fall very rapidly down to the normal curve indicated by the dotted line, after which the frequencies are cut off more or less uniformly to an increasing extent.

It will be seen that the effect of this resonance has sharpened up the cut-off very considerably. It is still not a really sharp cut-off, and such a result can only be obtained by the use of a number of sections all made up in a similar manner. This, combined with the proper design of the value of inductance and capacity to accentuate the resonance effect, enables particularly sharp cut-off filters to be made up. The reader, however, who wishes to experiment can do this by using an arrangement such as that shown in Fig. 4, using high-frequency chokes for the inductances and various values of condenser until he obtains the required cut-off. It is preferable to use chokes having a really high inductance, such as the Lewcos, Bulgin SG type, or the Burne-Jones. With such chokes a capacity of the order of .005 will be found to give the required results.

## WIRELESS IN PARLIAMENT

(From Our Own Correspondent)

MAJOR OWEN asked whether there was any provision in the regulations relating to wireless licences whereby totally incapacitated persons might be excused the payment of the annual licence.

Lord Wolmer said the answer was in the negative. The only wireless licences issued free of charge were those issued to blind persons under the provisions of the Wireless Telegraphy (Blind Persons Facilities) Act, 1926.

We are to hear a Kennedy-Fraser recital from all Scottish stations on April 11. This will be given from two studios. From Glasgow the Station Orchestra will play a selection of the Kennedy-Fraser melodies and the Rev. Kenneth MacLeod will tell some of the island legends on which the songs are based. From the Edinburgh studio, Mrs. Kennedy-Fraser, Margaret Kennedy, and Patuffa Kennedy-Fraser, will give a recital of the songs. Some of Miss Patuffa Kennedy-Fraser's songs will be sung to her own accompaniment on an old Celtic harp.

The completion of the new big broadcasting station in Prague, which is being installed by the Standard Electric Company, will be in operation during the course of the year.

In the *Royal Gazette*, which is the official publication of the Spanish Government, appears an order approving the project put forward by the Radio Society of Argentine for the establishment of wireless communication between Spain and the Argentine.

Picture transmissions on the Fultograph system are shortly to be carried out daily by the Prague and Bratislava broadcasting stations.

## "GRAWOR"

Comes to your aid!

THE "SECTORPHONE" LOUD-SPEAKER CHASSIS embodying the famous "Grawor" Double Magnet Unit and an entirely new and Patented design of diaphragm has set a new standard in reproduction.

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## RADIO-EQUIPPED TRAINS

MOST of the long-distance expresses in Austria are now equipped with receiving apparatus for the reception of broadcast concerts, special carriages being reserved for passengers desirous of passing away the time with these entertainments. A charge of roughly sixpence per hour over and above the railway fare is made, and statistics show that the service has rapidly gained in popularity; whereas from September to December, 1926, 10,000 travellers had paid fees to listen to the concerts, in 1928 the figure had increased to 100,000. It has been proved that some 70 per cent. of the passengers carried on trains at some time during the journey now visit the radio compartment. Generally speaking, only transmissions from the Vienna station are tuned in, but as occasions arise, so listeners are given opportunities of hearing many of the German entertainments. In order to avoid any possible interference the carriages containing both the receiving sets and headphones are lighted by gas only. Arrangements are now being made with neighbouring countries to provide a similar service on international trains.

The San Francisco studio of the National Broadcasting Company (U.S.A.) reports that its musical library, consisting of some 10,000 pieces of music, is valued at about £5,000.

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Two-programme Set	.. .. .. .. ..	WM25
Centre-tap Set	.. .. .. .. ..	WM50

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Super Reinartz One	.. .. .. .. ..	AW127
Beginners' One-valver	.. .. .. .. ..	AW140
Long-range Hartley	.. .. .. .. ..	WM54
Reflexed One for the Loud-speaker	.. .. .. .. ..	WM6
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Reinartz One	.. .. .. .. ..	WM127

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Empire Short-wave	.. .. .. .. ..	AW28
Next Step 2 (D, Trans)	.. .. .. .. ..	AW34
Centre-tap 2 (D, Trans)	.. .. .. .. ..	AW42
Rover 2 (HF, D)	.. .. .. .. ..	AW53
General-purpose 2 (D, Trans)	.. .. .. .. ..	AW55
30/- 2 (D, Trans)	.. .. .. .. ..	AW61
Trapped Reinartz (D, Trans)	.. .. .. .. ..	AW92
"Q" 2 (D, Trans)	.. .. .. .. ..	AW99
Long Distance Two (HF, D)	.. .. .. .. ..	AW110
Three-waveband Two (D, Trans)	.. .. .. .. ..	AW134
DX Headphone Two (HF, D)	.. .. .. .. ..	AW143
Ace of Twos (D, Pentode)	.. .. .. .. ..	AW146
Home Two (D, Trans)	.. .. .. .. ..	AW148
Chapman Reinartz Two (D, Trans—4d. with copy of "A.W.")	.. .. .. .. ..	AW157
Globe DX Two (SG, D.)	.. .. .. .. ..	AW159
East to West Short-wave Two (D, Trans)	.. .. .. .. ..	AW171
Beginner's Two (D, Trans.)	.. .. .. .. ..	AW174
Auto Two (D, Trans)	.. .. .. .. ..	WM44
British Broadcast 2 (D, Trans)	.. .. .. .. ..	WM56
Two-programme 2 (D, Trans)	.. .. .. .. ..	WM62
Q-coil 2 (D, Trans)	.. .. .. .. ..	WM66
Crusader (D, Trans)	.. .. .. .. ..	WM76
Flat-dweller's 2 (HF, D)	.. .. .. .. ..	WM97
Two-Daventry Two (D, Trans)	.. .. .. .. ..	WM99
Tetrode Short-wave Two (SG, D)	.. .. .. .. ..	WM107
Key-to-the-Ether Two (D, Pentode)	.. .. .. .. ..	WM114
Meteor Two (D, Trans)	.. .. .. .. ..	WM135
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Hartley DX (D, RC, Trans)	.. .. .. .. ..	AW63
Broadcast 3 (D, RC, Trans)	.. .. .. .. ..	AW76
Selectus 3 (HF, D, Trans)	.. .. .. .. ..	AW81
Q-coil 3 (D, RC, Trans)	.. .. .. .. ..	AW84
Clarion 3 (D, 2 Trans)	.. .. .. .. ..	AW88
Miniature Hartley Three	.. .. .. .. ..	AW101
Summer-time DX Three (HF, D, Trans)	.. .. .. .. ..	AW106
Three-valve Mains Receiver (HF, D, Trans)	.. .. .. .. ..	AW109
British Station Three (HF, D, Trans)	.. .. .. .. ..	AW122
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Wide-world Short-waver (SG, D, Trans)

New Year Three (SG, D, Pentode)

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FOUR-VALVE SETS

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"Q" 4 (HF, D, RC)

Explorer Four (HF, D, RC, Trans)

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Ranger Four (SG, D, RC, Trans)

Faculty Four (HF, D, 2 RC—Q-coil)

Broadcast Picture Four (HF, D, 2RC)

The Orchestra Four (D, RC, Push-pull)

All Europe Four (2HF, D, Trans)

Revelation (HF, D, RC, Trans)

Simplicity (HF, D, 2 Trans)

Astral (HF, D, 2 RC)

Trapped 3-4 (D, 2RC Parallelled)

Gramo Radio 4 (D, RC, 2 Trans Push-Pull)

Q-coil 4 (HF, D, Trans, RC)

Screened grid 4 (HF, D, 2RC)

Five-pounder Four (HF, D, RC, Trans)

Frame-aerial Four (HF, D, 2RC)

Touchstone (HF, D, RC, Trans)

Reynier's Furzehill Four (SG, D, 2 Trans)

Economy Screen-grid Four (SG, D, RC, Trans)

Binowave Four (SG, D, RC, Trans)

Standard-coil Four (HF, D, 2RC)

Dominions Four (2SG, D, Trans)

The Drum Major (HF, D, RC, Trans)

FOIVE-VALVE SETS

All these 1s. 6d. each, post free.

Individual 5 (2HF, D, 2 Trans)

School 5 (HF, D, 2RC)

"Q" Gang-control Five (2HF, D, 2 Trans)

Exhibition 5 (2HF, D, RC, Trans)

Phoenix (2HF, D, 2LF)

1928 Five (2HF, D, 2 Trans)

All-the-world 5 (2HF, D, 2RC)

Cataract 5 (HF, D, RC, Push-pull)

Empire Five (2SG, D, RC, Trans)

Fidelity Five (HF, D, RC)

SIX-VALVE SETS

1s. 6d. each, post free.

Short-wave Super-6 (Super-het, Trans)

Adaptor for above (see miscellaneous list)

Nomad (2HF, D, RC, Push-pull, Trans)

Connoisseur's Six (2HF, D, RC, Push-pull)

Eagle Six (3HF, D, RC, Trans)

## SEVEN-VALVE SETS

1s. 6d. each, post free.

Simplayne (Super-het)	.. .. .. .. ..	WM22
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## PORTABLE SETS

Holiday 3 (D, 2 Trans)	.. .. .. .. ..	AW32
Table Grand 4 (HF, D, 2RC)	.. .. .. .. ..	AW93
Attaché Portable 2 (HF, D)	.. .. .. .. ..	AW96
Daventry Portable (D, Trans)	.. .. .. .. ..	AW105
Daventry Loud-speaker Portable (2HF, D, RC, Trans)	.. .. .. .. ..	AW107
Town and Country (HF, D, RC, Trans)	.. .. .. .. ..	AW111
House and Garden (SG, HF, D, RC, Trans)	.. .. .. .. ..	AW116
"Best-yet" Portable (SG, D, 2 Trans)	.. .. .. .. ..	AW136
House Portable (SG, D, RC, Trans)	.. .. .. .. ..	AW168
Arcadian Portable with Linen-diaphragm Loud-speaker (half-scale)	.. .. .. .. ..	AW177
Springtime 2 (D, Trans)	.. .. .. .. ..	WM12
Countryside 4 (HF, D, 2 Trans)	.. .. .. .. ..	WM17
Chumby 4 (HF, D, RC, Trans)	.. .. .. .. ..	WM80
Chumby 4 (with modification for LS and HT)	.. .. .. .. ..	WM80a
Pilgrim Portable (D, Trans)	.. .. .. .. ..	WM94

## AMPLIFIERS

All these 1s. each, post free.

Utility (RC, Trans)	.. .. .. .. ..	AW63
Screened-grid HF Unit	.. .. .. .. ..	AW75
One-valve LF Unit	.. .. .. .. ..	AW79
Super-power Push-pull	.. .. .. .. ..	AW86
Hook on Short-wave	.. .. .. .. ..	AW104
Purity Amplifier	.. .. .. .. ..	AW108
Add-on Distance-getter	.. .. .. .. ..	AW117
Screened-grid HF Amplifier (3RC)	.. .. .. .. ..	AW128
Searcher Unit (HF)	.. .. .. .. ..	AW176
Gramo-radio Amplifier (2 v.)	.. .. .. .. ..	WM72
Super-power Unit (2 v.)	.. .. .. .. ..	WM103
Signal Booster (HF Unit)	.. .. .. .. ..	WM128
Auditrol Amplifier	.. .. .. .. ..	WM132

## MISCELLANEOUS

Adaptor for Short-wave Super 6	.. .. .. .. ..	AW67a
H.T. front A.C. Mains	.. .. .. .. ..	AW73
"A.W." Moving-coil Loud-speaker	.. .. .. .. ..	AW97
H.T. Eliminator for A.C. (200 v. output)	.. .. .. .. ..	AW102
L.T. and H.T. Mains Unit (DC)	.. .. .. .. ..	AW123
Knife-edge Wayetrap	.. .. .. .. ..	AW131
All-metal Eliminator for H.T.	.. .. .. .. ..	AW135
Duplex-diaphragm Loud-speaker	.. .. .. .. ..	AW142
Power-plus Loud-speaker	.. .. .. .. ..	AW149
Linen-diaphragm Loud-speaker with Baffle	.. .. .. .. ..	AW152
Pedestal Cone Loud-speaker	.. .. .. .. ..	AW164
Listener's Speaker, price 4d. with copy of "A.W."	.. .. .. .. ..	AW170
Arcadian Linen-diaphragm Loud-speaker (full-size)	.. .. .. .. ..	AW177a
D.C. Unit (H.T.)	.. .. .. .. ..	AW178
Wavetrap	.. .. .. .. ..	WM64
Portable Cone Loud-speaker	.. .. .. .. ..	WM73
"Junior" Moving-coil Loud-speaker	.. .. .. .. ..	WM81
Universal Short-wave Adaptor	.. .. .. .. ..	WM82
Linen-diaphragm Loud-speaker	.. .. .. .. ..	WM90
Valveless A.C. Power Unit for L.T.	.. .. .. .. ..	WM100
Valveless A.C. Power Unit for H.T.	.. .. .. .. ..	WM101
Simple Cone	.. .. .. .. ..	WM111
Buzzer Wavemeter	.. .. .. .. ..	WM121
James H.T. Unit for A.C. Mains	.. .. .. .. ..	WM125
Lodestone Loud-speaker	.. .. .. .. ..	WM126
James H.T. Unit for D.C. Mains	.. .. .. .. ..	WM133

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<b>GREAT BRITAIN</b>											
25.53	1,751	Chelmsford (5SW) 15.0	0.5	291.3	1,030	Radio Lyons ...	1.5	277	1,084	Turin	0.5
243.0	1,230	Newcastle (BNO) 1.0	0.5	305	997	Bordeaux (PTT) 0.5	0.3	333	900	Naples (Napoli) 1.5	0.5
258.6	1,160	"Leeds (2LS) ... 0.13	0.13	505.6	981	Marseilles (PTT) 0.5	0.5	387	775	Genoa	3.0
270.3	1,109	"Sheffield (6LF) 0.13	0.13	322	930	Vitus (Paris) ... 2.0	2.0	443.8	676	Rome (Roma) ... 3.0	3.0
288.5	1,040	"Bournemouth (6BM) 1.0	0.5	336	892	Petit Parisien ... 0.5	0.5	456	653	Bolzano	0.3
288.5	1,040	"Bradford (2LS) 0.13	0.13	354	840.7	Algiers (PTT) ... 2.0	2.0	504.2	595	Milan	7.0
288.5	1,040	"Edinburgh (2EH) 0.35	0.35	370	817	Radio LL. Paris 1.0	1.0				
288.5	1,040	"Hull (6KH) ... 0.2	0.2	382.2	785	Toulouse (Radio) 9.0	9.0	308.3	973	Zagreb (Agram) 1.25	1.25
288.5	1,040	"Dundee (2DE) 0.13	0.13	400	749	Mont de Marsan 0.1	0.1	582	515	Ljubljana	5.0
294.1	1,020	"Liverpool (6LV) 0.13	0.13	414	724	Radio Maroc (Rabat) 2.0	2.0				
294.1	1,020	"Stoke-on-Trent (SST) 0.13	0.13	427	701	Grenoble (PTT) 1.5	1.5	520	567	Riga	2.0
294.1	1,020	"Swansea (6SX) 0.13	0.13	430	697	Radio Flandre Lille 0.25	0.25				
302.0	951.1	Belfast (2BE) ... 1.0	1.0	448	668	Paris (Ecole Sup., PTT) 0.7	0.7	2,020	148.4	Kovno	15.0
311	994	Aberdeen (2BD) 1.0	1.0	473	635.1	Lyons (PTT) ... 5.0	5.0				
323	928	Cardiff (5WA) ... 1.0	1.0	1,487	201	Eiffel Tower ... 8.0	8.0	242	1,240	Rjukan	1.0
358.0	838	London (2LO) ... 2.0	2.0	1,748	171	Radio Paris ... 8.0	8.0	297	1,020	Notodden	0.7
378	793	Manchester (2ZY) 1.0	1.0					365	820	Bergen	1.0
390	757	"Plymouth (5PY) 0.13	0.13					387	775	Fredriksstad	1.0
401	748.3	Bowling (5SC) 1.0	1.0					387	725	Aalesund	1.0
482	622	Daventry Ex. (5GB) 25.0	25.0					387	653	Porsgrunn	1.0
1,562.5	1,12	Daventry (5XX) 25.0	25.0					498	604	Oslo	1.5
*Relay stations. <sup>†</sup> Relays 2LO.											
<b>AUSTRIA</b>											
248	1,209	Linz	0.5	219	1,370	Flensburg	1.5	387	775	Lisbon CTIAA (Wed. and Sat. 10-midnight)	1.5
277.8	1,080	Salzburg (under construction)	0.5	240	1,250	Nürnberg	4.0	387	725	Portugal	1.5
554.2	847	Graz	0.5	250	1,200	Kiel	0.7	387	653	Madrid (EAJ13)	0.5
456	694	Klagenfurt	0.5	250	1,200	Cassel	0.7	387	604	Oviedo (EAJ19)	0.5
456	694	Innsbruck	0.5	263.2	1,140	Cologne	4.0	387	597	Barcelona (EAJ1)	0.5
520	577	Vienna	20.0	267.8	1,120	Münster	1.5	387	557	Seville (EAJ1)	0.5
<b>BELGIUM</b>											
220	1,360	Chatelineau	0.25	272.7	1,100	Kaiserslautern	1.5	387	520	Radio España	1.0
250	1,200	Schaerbeek	0.5	280.4	1,070	Königsberg	4.0	387	480	San Sebastian	0.5
		Brussels	0.5	283	1,061	Berlin (E)	0.7	387	436.8	Stockholm	1.5
275	1,090	Ghent	0.5	283	1,061	Magdeburg	0.7	387	436.8	Sundsvall	1.0
280	1,070	Liège	0.5	317.2	943	Dresden	0.75	387	436.8	Boden	2.0
312	910	Arlon	0.25	321.2	937	Breslau	4.0	387	436.8	Motala	3.0
412	85	Brussels	10.0	326.4	919	Gleiwitz	6.0				
<b>CZECHOSLOVAKIA</b>											
265	1,130	Kosice	2.0	329.7	910	Bremen	0.75				
293.7	1,004	Bratislava	4.0	348	848	Aachen	0.75				
342	853	Prague (Praha)	5.0	462.2	649	Langenberg	25.0				
432.3	694	Brunn (Brno)	2.4	462.4	632	Berlin	4.0				
<b>DENMARK</b>											
830	883	Copenhagen (Kjøbenhavn)	1.0	475.4	632	Leipzig	4.0				
1,155	559	Kalundborg	7.5	537	559	Munich	4.0				
<b>ESTHONIA</b>											
408	735	Reval (Tallian)	1.3	566	530	Augsburg	0.5				
<b>FINLAND</b>											
371	600	Helsingfors (Helsinki)	0.8	566	530	Hanover	0.7				
1,504	159	Lahti	20.0	577	520	Freiburg	0.7				
<b>FRANCE</b>											
80.75	9,755	Agen	0.25	1,050	182	Zeelen	20.0				
200	1,500	Fécamp	0.8	1,050	182	Norddeich	10.0				
211.3	1,420	Heziers	0.1								
233	1,260	Bordeaux (Radio Sud-Ouest)	2.0								
245	1,224	Lille (PTT)	0.8								
252.1	1,190	Juan-les-Pins	0.4								
253	1,185	Montpellier	0.25								
254	1,180	Rennes (PTT)	1.0								
255	1,175	Toulouse (PTT)	1.0								
268	1,188	Strasbourg	0.3	222.2	1,355	Cork (5CK) ... 1.5	1.5	1,232	243	Stamboul	5.0
274	1,192	Limoges (PTT)	0.5	411	730	Dublin (2RN) ... 1.5	1.5	1,840	163	Angora	5.0
<b>IRISH FREE STATE</b>											

## CHIEF EVENTS OF THE WEEK

### LONDON AND DAVENTRY, 5XX

April 8 Roumanian national programme.  
9 British national programme, a burlesque.  
10 "The Cherry Orchard," a comedy by Anton Chekov, arranged by Dulcima Glasby.  
11 A vaudeville programme.  
12 B.B.C. symphony concert, relayed from the Queen's Hall.

### DAVENTRY EXPERIMENTAL, 5GB

April 9 "The Cherry Orchard," a comedy by Anton Chekov, arranged by Dulcima Glasby.  
10 A vaudeville programme.  
11 B.B.C. popular orchestral concert, from the People's Palace.  
12 "Requests," an orchestral and vocal programme.

April 13 Hip-Hip-Hoo-Radio, a revue. Books and lyrics by Graham Squiers; music by Shirley Goodall.

### CARDIFF

April 9 The second concert of the Newport Choral Society (31st season).

### MANCHESTER

April 13 The Conquering Hero, a play by Allan Monkhouse, arranged by Victor Smythe.

### NEWCASTLE

April 13 Alibis, a play by Harold Melvill.

### GLASGOW

April 13 Running commentary on the Scotland v. Edinburgh Association Football International, from Hampden Park, relayed to London and Daventry.

### BELFAST

April 13 A concert by prizewinners in the Belfast Musical Competitions (1929).

## BRITAIN'S FAVOURITE THREE DE LUXE

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Our customers report wonderful success from this set. Twenty stations obtained on loud-speaker. OUR KIT OF PARTS, cash price, £4 4s. or 15/- down and 5 payments of 15/-. Complete kit with MULLARD Valves, £6 9s. 6d., or 18/- down and 10 payments of 12/-. Oak Cabinet, 14x7 in, 14/6 extra.

CLARION THREE Coils (Tunewell) 21/- per pair. TITAN COILS—BULGIN, WEARITE, 15/- each. DUNHAM Tuners, 9/6; switch for same, 2 9.

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Complete with 2 Coils 3 GNS.

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## Do You Want to Know About?

Wireless symbols and contractions? Accumulators? Laws of A.C. circuits? Current-carrying capacities and resistances of wires? Details of coil windings? The Reinartz circuit? What valves to use? What "blue glow" means?

These are only representative of the thousands of questions you can "ask" the

## Letts' Amateur Wireless 1929 Notebook Diary

1/9 (Post Free) from this office 2/9

# WIRELESS & HEALTH

SOME BENEFICIAL EFFECTS OF WHICH YOU MAY NOT BE AWARE

EACH fresh scientific discovery plays its own part directly or indirectly in the health and longevity of the human race. Mention need only be made of the Roentgen rays, Finsen's light therapy, the Curie discovery of Radium, etc., in order to see how far-reaching and beneficial legitimate use of such scientific phenomena are in such diseases as commonly affect the human anatomy.

One's thoughts turn naturally to the sense of hearing when wireless is mentioned, for instance, for it is with our auditory apparatus that we appreciate the transmissions sent over the ether for our entertainment or education. It is remarkable how one finds in active practice such a large percentage of adults, say over the age of forty-five or so, who suffer from deficient sensitiveness in one or other ear, at times in both; a simple experiment is easily made by those of, or over, the age mentioned if they will test the hearing of each ear alternately with a watch which has a pronounced "tick."

### A Help to the Deaf

The chances are that by testing by placing the watch near the ear, then gradually drawing it away, it will be noticed that one organ is more sensitive than the other.

Now, it has been found that in many cases of diminished sensitivity, not actual or even partial deafness, the use of the ear-phones while listening to transmissions have brightened up and stimulated the hearing considerably. The vibrations received by the drum of the ear have apparently acted as a stimulant with satisfactory results, these being demonstrated when the auditory apparatus is put to ordinary use—in other words the patient finds that he or she "hears" better. As we reach middle life there are few who retain the special senses at normality; glasses may be required for reading for example. Tissues harden, become less elastic, less sensitive, and by the same method as corrective glasses are used in mild eye cases, so we have at hand a very pleasant remedy in headphones and loud-speakers of a mild corrective for incipient ear trouble.

There is a further advantage in some cases as well. One patient complaining of an oversupply of the natural wax of the ear canal has found a considerable improvement since using a wireless set; in this case it is likely that the offending wax is not permitted to "ball up" as it did previously, the vibrations received preventing this. Anyhow there is no other reason one can think of, for the patient does not require

to visit his surgeon so frequently as before.

That wireless will tend to longevity will be admitted by all I think; one of the most troublesome conditions which a doctor is called upon to treat is that of persons who deplore the fact that old age is creeping on and that the world has no further use for them.

### A New Interest

Many a piteous sight has been noted, prior to the wireless age, of people of seventy years or over, practically awaiting their end, with most interest in life gone.

One of the neatest sets I have seen for quite a time was a five-valver constructed by a retired clergyman who had decided that he was of no further use on this sphere. Here was an old man who did not know the difference between a hacksaw and a chisel who had acquired the art of "keeping young."

It might be said that this old minister would have found similar benefit from other hobbies . . . this I question very much, however, for sustained interest in wireless construction and use seems to be illimitable, more especially as the date is not far distant when the other important sense . . . seeing moving objects will be brought into play.

Doc PAGE.



**BELLING-LEE**

Advt. of BELLING & LEE, Ltd., Queensway Works, Ponders End, Middlesex

**HELLESEN**  
DRY BATTERIES



**DON'T SPECULATE**

"A little flutter now and then is relished by the wisest men," but I cannot understand why people should wish to gamble where H.T. Batteries are concerned. HelleSEN Batteries are so consistent, so reliable and they bring you in so great a return in ampere-hours for the money you spend, that—as Ridley remarked—they justify the gilt edge which appears round the container. Next time you need a new H.T. Battery ask your dealer for a HelleSEN, remembering that the Triple capacity batteries do not even cost twice as much as the corresponding Standard capacities; an investment, not a speculation.

PRICES		
Standard Capacity		
"Wiray"	9-volt	Grid Bias Type ...
"Wirin"	60-volt	H.T. Type ...
"Wirup"	99-volt	H.T. Type ...
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"Kolin"	60-volt	H.T. Type ...
"Kolup"	99-volt	H.T. Type ...

32/3

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HELLESEN DRY BATTERIES · INSTRUMENTS  
POLYMET · MICA & PAPER CONDENSERS  
HAND & CYCLE LAMPS, TORCHES, ETC

A. H. HUNT, LTD., CROYDON, SURREY

**INCREASING YOUR RANGE**  
WITH the coming of summer, H.F. amplification is more than ever important in order to get winter-time range from a set; and one of the best ways of getting to know about H.F. amplification is to read "The Book of the Neutrodyne," by J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E. (Cassell & Co., Ltd.). This is not a technically worded text book, but is in every way understandable by the man in the street; and in the hundred-and-twenty-odd pages of the book are contained some most helpful hints and information on neutralised H.F. amplification, making the whole well worth the price of 1s. 6d.

**HOW H.T. IS MADE!**

RECENTLY an AMATEUR WIRELESS representative had the opportunity of seeing a novel film which has been produced for Siemens Bros. & Co., Ltd., of Woolwich, showing the whole process of manufacturing H.T. batteries. It really is most interesting to see the deal of care expended in the manufacture of small dry cells, and it is to be noted that a representative of Messrs. Siemens will be pleased to show the film at any wireless club meeting. Club secretaries should communicate direct to Messrs. Siemens.

**A WORLD TIME INDICATOR**

MANY DX enthusiasts will have found the need for some form of chart or indicator which will show them the exact time at any part of the world corresponding to Greenwich time. This demand has now been supplied by Messrs. J. H. Willis & Co., Ipswich Road, Norwich, who have produced a world time indicator. The chart, which is of stiff board, carries a rotatable central disc which is simply turned round and the times can be read off direct without any calculation.

Another Russian broadcasting station has been installed at Turuchansk on the borders of the Polar circle. Placed, as it is in the wild and dreary Tundra of the Northern Jenissei district, it is the only means of communication the trappers and the explorers have with the outside world.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. od.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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Any other Condenser, H.F. Choke, or L.F. Transformer, supplied by adding balance.

2 Polar .0005, No. 3, at 5/9. .0001 Reaction 4/-  
2 Dual Range C.T. Coils, with Reaction (Tunewell), Anode, 10/6; Aerial, 10/6. 3 Lotus or Formo V.H. at 1/3.  
Formodenser, "J." 2/- Dubilier 1 mfd., 2/6. .01 Fixed, T.C.C. 1/9. 3-meg. Lissen or Edison Bell, 1/- S.G. H.F. Choke, Peto - Scott, 5/- H.F. Choke, Lissen, 5/6.  
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The above Kit with  
AMERICAN TYPE  
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VALVES 2v.  
S.G. 22/6. D 10/6. P 12/6.  
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CLEARTRON  
S.G. 2v. 12/6  
C.T. 15, L.F. or H.F. 4/-  
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Screen Grid 2v. 12/6  
Usual Types 4/- each  
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BLUE SPOT 25/-  
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4 POLE ADJUSTABLE  
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For use with S.G. Valves.  
A.C. with Valve and  
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Kit of Parts and "Valves  
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Massive All Purpose H.F. Choke	5/9
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Dual Range for existing Cossor,	10/6
Lissen Sets, each	No alteration needed.

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Pentodes and screen-grid valves are fully described, together with some helpful operating notes, in a new booklet issued by the Edison Swan Electric Co., Ltd., 123-5 Queen Victoria Street, E.C.4. Copies can be obtained on application (mentioning AMATEUR WIRELESS), and will be found very useful when operating Edison pentodes and screen-grid valves.

A N interesting experiment recently took place in Moscow when a short-wave telephony transmitter was taken up by an engineer in an ordinary gas balloon. Communication with the earth was easily established even at heights exceeding 4,000 metres (13,000 feet). Two-way communication was maintained continuously for two days and two nights on a wavelength of 43 metres, the transmissions being simultaneously picked up by Odessa, Vladivostock, Minsk, and Leningrad.

Senator Marconi and Mr. David Sarnoff, head of the Radio Corporation of America, have been elected to the board of directors of the Gramophone Co., Ltd. (His Master's Voice).

W. D. Terrell, chief of the U.S. Radio Division of the Department of Commerce, in his annual report to the Federal Radio Commission states that during the year ending December, 1928, 9,093 inspections were made of the radio installations on American and foreign vessels clearing U.S. ports. These inspections showed 235 cases of defective apparatus and lack of proper equipment or personnel.

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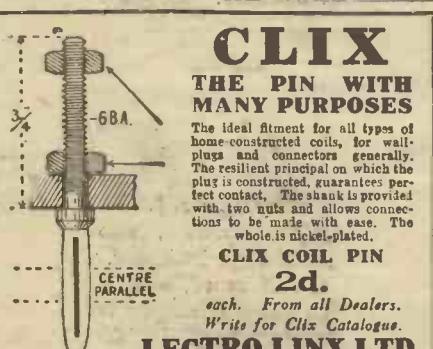
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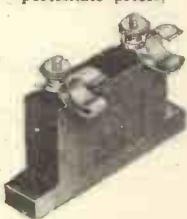
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Intermediate Capacities at proportionate prices.



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This set incorporates the latest developments in Receiver design—full constructional details free on request.

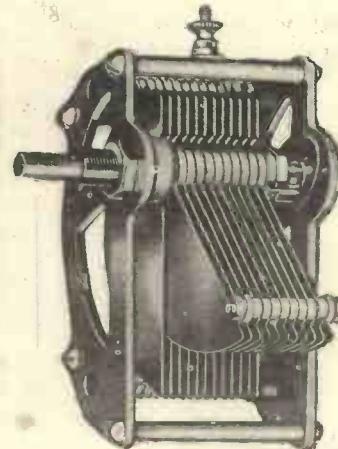
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If unobtainable from your dealer, write direct to us giving his name and address.

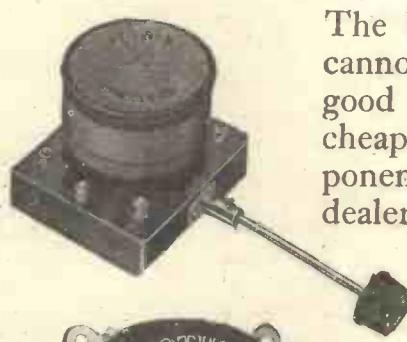


Advt. of Dubilier Condenser Co., (1925) Ltd., Ducon Works, Victoria Road, N. Acton, London, W.3  
G230/F

Don't Forget to Say That You Saw it in "A.W."



Build your Set with Lotus Components



The best of circuits cannot produce a good set if you use cheap shoddy components. Ask your dealer for Lotus.

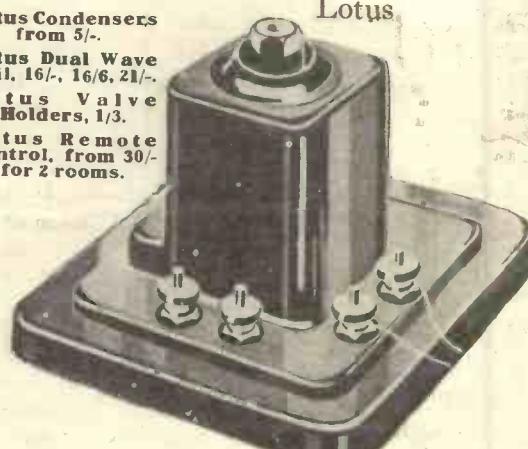


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THE MARK OF BETTER RADIO

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TWO FINE SETS IN THIS ISSUE

# Amateur Wireless

and  
Radiovision

Every Thursday 3<sup>d</sup>

Vol. XIV. No. 357

Saturday, April 13, 1929

## Getting Results with BRITAIN'S FAVOURITE THREE

BLUEPRINT  
of this  
FAMOUS  
SET now  
AVAILABLE



1929 Model

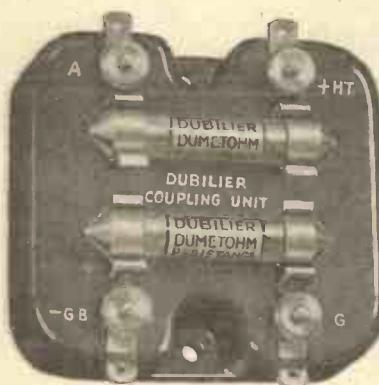
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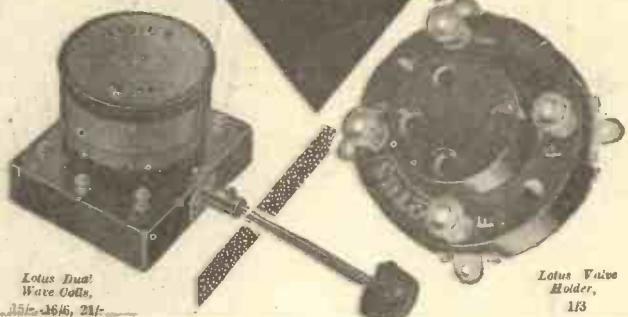


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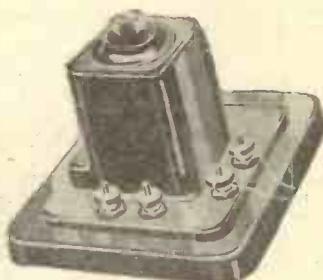
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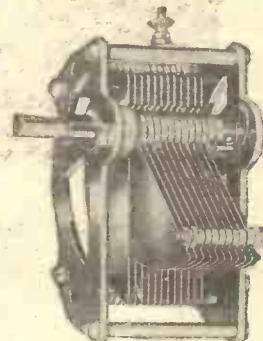


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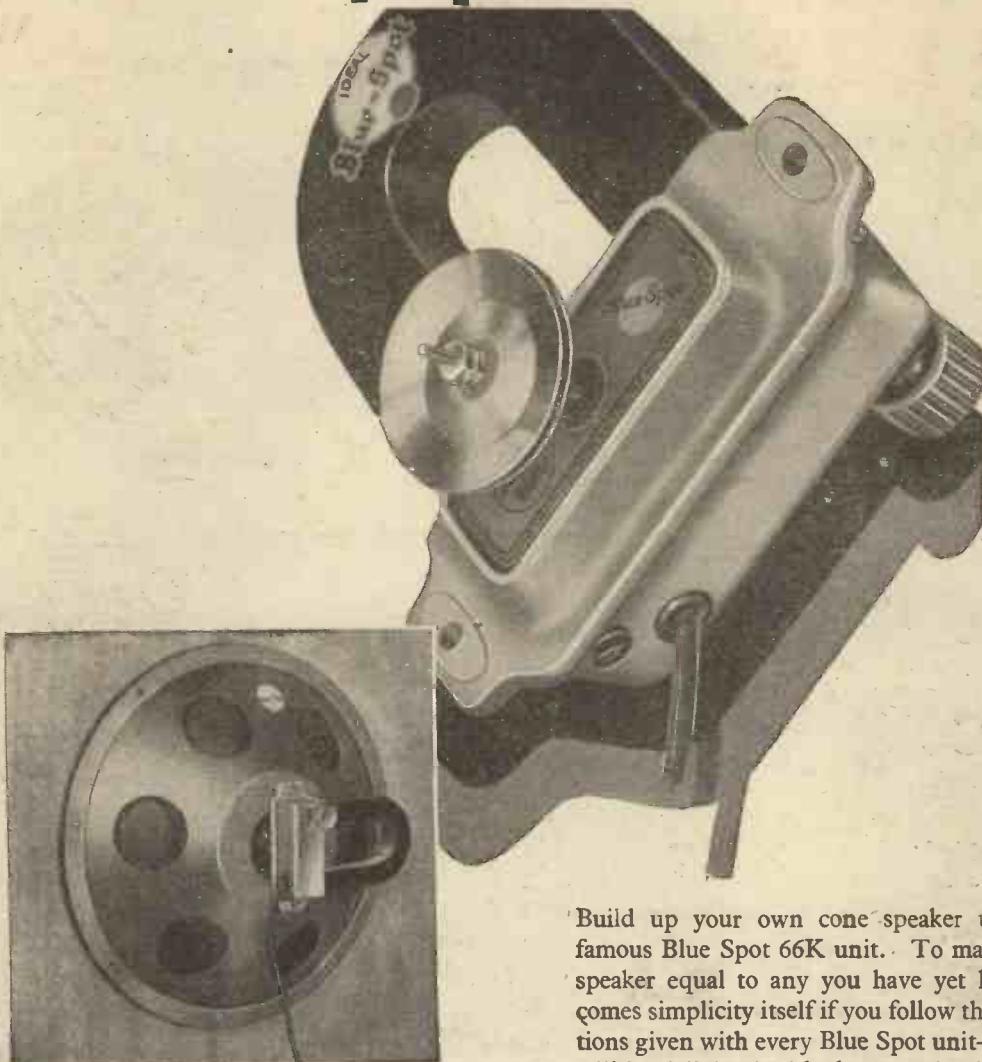
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APRIL 13, 1929

No. 357. Vol. XIV.

# Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E.

Research Consultant: W. JAMES

Assistant Editor: H. CORBISHLEY

## *That B.B.C. Ban—A Radio Hero—Radio at 103!—“Talkies” are Booming—The Unseen Five Hundred—“Threes” and “Fours”*

**That B.B.C. Ban**—There is still much ado about nothing—namely, the B.B.C. ban on the announcement of names of dance tunes. It has been suggested, we know, that this ban is the result of interested people having used the microphone as a means of publicity. However this may be, we are rather inclined to agree with a correspondent who says that it is *not* a coincidence that there is more variety in the programmes while the ban is in action!

**A Radio Hero**—Yet another wireless operator hero. In this case he is R. Osbjornson, the operator of the ill-fated cargo steamer *Selje*. He remained at his post in the sinking vessel, sending out calls for help until the generator room was flooded, and the transmitter went out of action. He then went up on deck to find that the other members of the crew had gone to the steamer *Kaituna* (with which the *Selje* was in collision) without realising he was left behind. He managed to sound the ship's siren just as the vessel sank in shark-infested water.

**Radio at 103!**—At Chelmsford, Essex, is what the newspapers call “a wonderful young woman”—she celebrated her 103rd birthday last week! In a recent interview the good lady, after airing her views on modern girls and short skirts, said that she has only two interests in life. One is preparing for the celebration of her 104th birthday and the other is *listening-in*. We wish her many more years in which to enjoy her hobby.

**“Talkies” are Booming**—If one is to believe what one is told by film stars themselves, soon no cinema in any civilised country will be showing “silent” films. “Talkies” will be all the rage. Douglas Fairbanks and Mary Pickford (his wife) are talking about a giant combination in which Warner Bros. are to take part. Charlie Chaplin has not yet definitely “fallen,” but Chaliapine, the famous singer, is a newcomer to the cinema and will probably appear in talking films this summer. Incidentally he has been offered £100,000 to make a talking



The City of Glasgow leaving Croydon, with which it will be in radio communication, on the first trip of the Air Mail Service to India

film of *Boris Godounov*. If technical developments keep pace with these giant artistic and commercial forecasts, then there should be a great deal in “talkies” to interest wireless fans.

**The Unseen Five Hundred**—Incidentally a new use is being found for loud-speakers on the stage. At the Charlottenburg Opera House in Berlin, they are

bringing Wagner up to date, and by means of microphones and loud-speakers “there are brought on the stage the voices of a chorus of 500 (*sic!*) for whom there would be no room in front of the footlights.” With the unlimited possibilities of electrical public address and gram-o-radio, what giant operas Wagner could have produced!

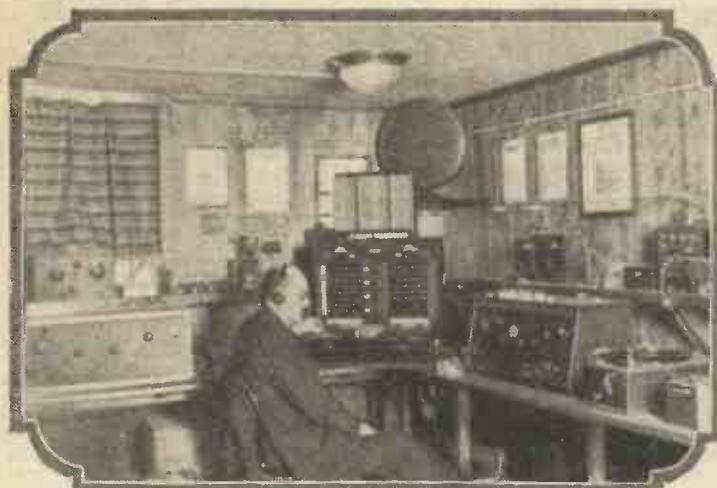
**Wireless and Weather**—So the old rumour that wireless causes bad weather is still afoot! We have never seen any statistics to prove the point but here are some figures from the Royal Meteorological Society, which, if you are a lover of statistics, may kill the old rumour once and for all. “The average rainfall in England requires for its production roughly 330,000 horse power per square mile, night and day throughout the year. The total horsepower used by all broadcasting stations in Gt. Britain and Northern Ireland is under 55 horse-power; the corresponding figure for Europe being about 400 horse-power. Any effect of broadcasting on weather would therefore be due to sub-homoeopathic doses of less than one in 1,000,000,000! Applying the same arithmetic to domestic affairs one finds that to produce a year's rain for the tennis court by means of an electric kettle, would cost over £800.” We cannot vouch for these figures, but they sound convincing!

**Radio at Brooklands**—An “A.W.” Correspondent who was at Brooklands at the recent opening meeting of the season, had his ardour damped by the rain, but was cheered to find the old familiar loud-speaker “putting” over gramo. music during intervals.

**“Threes” and “Fours”**—This week we deal at greater length with the up-to-date version of “Britain's Favourite Three”—a really good “three” for broadcast reception. Next week we are to have an efficient four-valver designed by our Technical Editor, Mr. J. H. Reyner, with dual-range, simplicity of control, and “super” performance. *In toto*, a “four” worth waiting for!

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An interior view of Dr. Reisser's Ether-policing Station

I HAD, of course, been acquainted with the excellent work done by Dr. Reisser for the Reichsrundfunk-Gesellschaft (German Broadcasting Corporation) in policing the ether, superintending the activities of German transmitting stations and performing a number of other useful duties. His "den" turned out to be the snuggest, most up-to-date, and best equipped wireless laboratory I have yet come across.

There, all around the walls, could be found

moment's notice, be heard.

Apart from superintending what is going on in the ether, checking, controlling and policing the German stations and comparing their performance with the working of foreign stations, this laboratory is intended for the occasional re-transmission of German or foreign broadcasting stations to the transmitters of Berlin and stations connected up to Berlin.

The equipment of the laboratory com-

# POLICING THE ETHER

*An Account of Dr. Reisser's Station in Germany*

By Dr. ALFRED GRADENWITZ

animposing array of the most efficient wireless receivers, by means of which any wireless station in Germany or elsewhere in Europe or beyond the seas could at a

prises a large number of receiving sets for wave ranges of from 12 to 2,000 metres.

These receivers are accurately calibrated so that any station can be identified with absolute certainty.

Two lines connected with the preliminary amplifier room at the Voxhaus headquarters of the Berlin broadcasting station serve for transmission and telephone communication respectively.

All connections between sets on the one hand and the switchboard on the other are laid out permanently under the table carrying the apparatus. Switch panels are provided at every operator's seat. A 4-volt circuit serves to supply the heating current, alternating-current mains supply the anode current, and H.T. accumulators are also available.

There are in all, four outdoor aerials, 40, 30, 15, and 10 metres in length respectively, in addition to frame aerials.

## BAIRD TELEVISION—FACILITIES AT LAST!

A Letter from the Postmaster-General to the Baird Television Development Co., Ltd.

Sir,

The Postmaster-General has considered the results of the recent television demonstration, in conjunction with the British Broadcasting Corporation, and his technical advisers, and he has reached the following conclusions which accord generally with the opinions of those who witnessed the demonstration. The demonstration showed that the Baird system was capable on that occasion of producing with sufficient clearness to be recognised the features and movements of persons posed for the purpose at the transmitting point. It is not at present practicable to reproduce simultaneously more than perhaps two or three individuals or to exhibit any scene or performance which cannot be staged within a space of a few feet in very close proximity to the transmitting apparatus.

In the Postmaster-General's opinion the system represents a noteworthy scientific achievement; but he does not consider that at the present stage of development television could be included in the broadcasting programmes within the broadcasting hours. He bases this view not so much upon the quality of the reproduction which further experiments may be expected to improve, as upon the present limited scope of the objects which can be reproduced.

The Postmaster-General is, however, anxious that facilities should be afforded,

so far as is practicable without impairing the broadcasting service, for continued and progressive experiments with the Baird apparatus and he would assent to a station of the British Broadcasting Corporation being utilised for this purpose outside broadcasting hours. He understands that the Corporation would agree in principle to this course, provided satisfactory terms were negotiated between the Corporation and the Baird Company.

It will probably be essential that any experimental demonstrations of television should be accompanied by the broadcasting of speech and, in consequence, two wavelengths and two transmitters would be required. It will not be possible to provide a second transmitter in a suitable locality which will avoid interference with important wireless services in Central London until the completion of the new station of the British Broadcasting Corporation at Brookmans Park, which is expected to be ready in July. In the meantime, it is suggested that the Company should open negotiations with the Corporation as to the financial and other arrangements which may be necessary, and it would probably be advantageous to them to enter upon discussions of the technical aspects with the Corporation's Chief Engineer.

In order to find room for a television service in broadcasting hours it will

probably be necessary to utilise for the reproduction of vision wavelengths outside the bands now being used for speech broadcasting. These bands, as you are doubtless aware, are already highly congested and it is important therefore, that the Company should press on with experiments on a much lower band which will be notified to the Company in due course.

In conclusion, it is necessary to emphasise that in granting facilities for experimental demonstrations in which the public can if they so desire take part, neither the Postmaster-General nor the British Broadcasting Corporation accept any responsibility for the quality of the transmission or for the results obtained. The object of the demonstrations is to afford the Baird Company a wider opportunity than they at present possess for developing the possibilities of their system of television and for extending the scope and improving the quality of the reproductions. While the Company will not be precluded from selling apparatus to anyone who desires to purchase it, the purchaser must understand that he buys at his own risk at a time when the system has not reached a sufficiently advanced stage to warrant its occupying a place in the broadcasting programmes.

(Signed) G. E. P. MURRAY.  
General Post Office      March 27, 1929.



# An All-mains Two

*A No-trouble Receiver for those who have A.C. Mains—Safe and Simple*

and last until their initial cost, of a shilling or so, is forgotten!

This receiver will find a warm reception from two classes of AMATEUR WIRELESS readers. First, there are the experienced people who realise the difficulties which attend obtaining H.T. and L.T. from A.C. mains and in working a two-valver from alternating current without any humming or motor-boating.

Second, there are those programme enthusiasts who do not care very much about the technical side of their sets, but who have always wanted something which has no battery bothers. A large number in this latter class will possibly get the receiver made up for them by one of their more technical friends.

Just what this "two" will do is this. It will give ample loud-speaker strength from a main broadcasting station up to about twenty-five miles or so distant. At greater distances than this it will still give satisfactory loud-speaker strength, but there will not be that amount of volume in hand which is always dictated by purity critics.

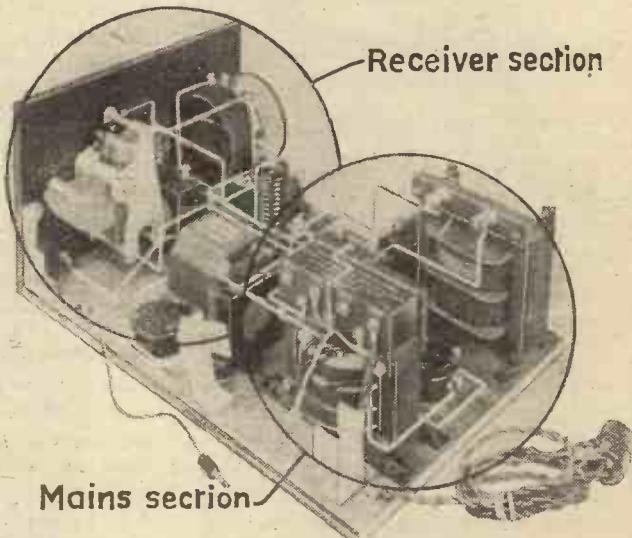
There is no reason why, if the mains are fairly quiet in working, headphones should not be used and quite

a respectable D.X. reception log obtained. Loud-speaker working at normal distances from B.B.C. stations is, however, the "daily bread" of this two-valver, and it has been designed primarily for those who want broadcast programmes without battery troubles. It has been designed as a two-valver because quite a large number of those who make up this receiver will

in view, and for ordinary broadcast reception a really good two-valver is as much as many folk require.

If you glance at the photographs you will see that the whole receiver is very compact, when the fact is taken into account it is *all complete* and that no external batteries or accumulators have to be housed. The one lengthy flex lead to a convenient lighting plug does the trick!

To beginners the baseboard may seem to present a rather fearsome appearance, and this is perhaps because, in addition to the normal components necessitated by the circuit, the baseboard carries the few



The receiver section and the mains section are entirely separate as this picture shows

extra "gadgets" which provide both H.T. and L.T.

Of course, to constructors of AMATEUR WIRELESS sets, one set can hardly ever be more "difficult" to construct than another, because it is child's play to mount the components and just as simple to wire them up with the aid of a combined blueprint and wiring diagram. And, while talking of blueprints, don't forget that one can be obtained for this receiver, price 1s. post free, from AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

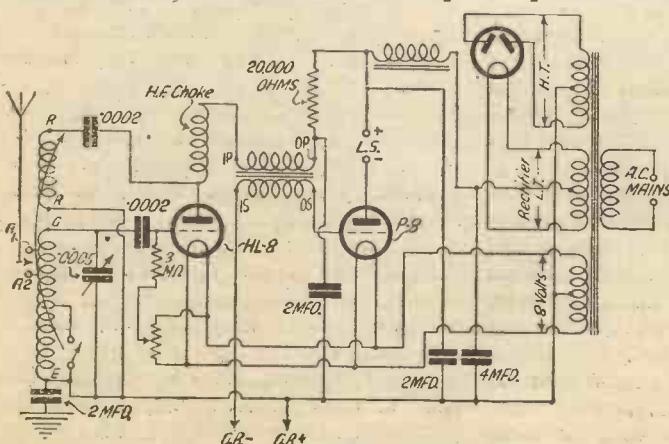
Technical readers will be anxious to understand the working of this all-from-A.C. "two," and the rather less technical enthusiasts must forgive the following brief description and analysis of the circuit. They can pass on direct to the constructional details.

**A** YEAR or so ago people used to say how nice it would be if batteries could be dispensed with altogether in wireless sets, and how the scope of radio would be widened if the whole business of operating a receiver could be reduced simply to the simple job of tuning-in and switching on and off.

Well, since then mains eliminators have been developed, and the lucky possessors of either A.C. or D.C. mains, of any normal voltage, can now work their sets direct from the public supply. Thus they can dispense with the high-tension battery—a costly article, particularly if the receiver is a large one—the accumulator, which formerly required laboured journeys to the charging station at all-too-frequent intervals, and even the grid-bias battery if desired.

## High- and Low-tension from the Mains

This set is a "two," entirely self-contained, and takes both H.T. and L.T. "juice" from A.C. mains. In this particular instance the grid bias is obtained from an ordinary 9-volt battery, because in a receiver of this type the extra complication in order to obtain smooth D.C. G.B. from A.C. mains is hardly worth while. Grid-bias batteries are so cheap



The circuit diagram of the All-Mains Two

## "AN ALL-MAINS TWO" (Continued from preceding page)

Basically, and leaving out the mains eliminator part, the set is of the ever-popular "det. and one L.F. (trans.)" type, and transformer coupling has, of course, been employed in order to give a satisfac-

that the dual-range scope is obtained simply by short-circuiting one section of the winding for the short waves, both sections being in series for the long waves. There are two tappings on that portion of

the winding which is not short-circuited on the medium waveband, and by means of a flex connection which makes contact with either one or other of the tappings the degree of selectivity can be very easily controlled.

A leaky grid detector is employed with the lower end of the grid leak taken to a tapping on a potentiometer

winding across the filaments. The reason for this will be obvious when it is explained that both the valves employed are of the new A.C. directly-heated type, and it is therefore important to get a proper medium tapping for the grid leak.

An anti-motor-boating unit is inserted in series with the primary of the L.F. transformer, and will be found of inestimable advantage in getting the best out of the set without any tendency whatsoever towards uncontrolled L.F. oscillation. The unit consists simply of a 20,000-ohm fixed resistance in series with the primary winding of the L.F. transformer and a 2-microfarad fixed condenser between this junction point and earth.

### The Mains Section

Now for the mains-supply section. In the present set a Marconiphone power transformer (type M) is used and is arranged to provide double-wave rectification (in conjunction with a suitable rectifier valve) for H.T.; a separate winding with a centre tapping gives the necessary "juice" for lighting the filament of the rectifier, while yet a third winding provides .8 volts of A.C., which is taken direct to the filament of the receiving valves.

There is really nothing to go wrong, and the combination of power transformer, rectifier valve, and smoothing choke and condensers is comparatively cheap (much cheaper in the long run than batteries), and entirely safe and foolproof.

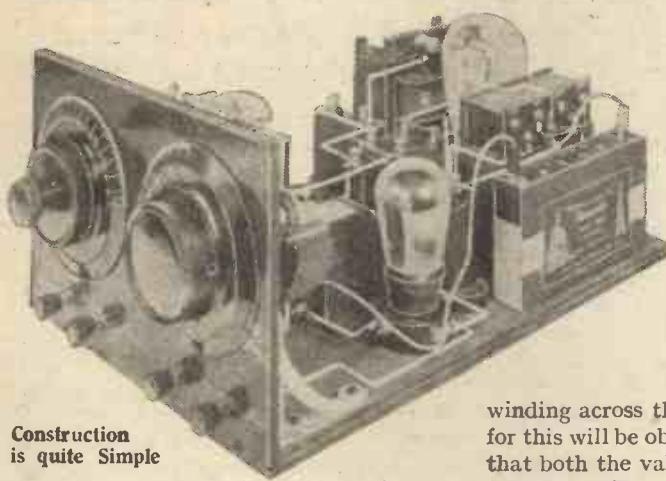
So far as the operation of the set is concerned, the panel carries a .0005-microfarad tuning condenser, the knob of the reaction control with which is mounted concentrically the wave-change switch, and terminals for aerial, earth, and loud-speaker.

At the back of the set is a flex connection which is taken to any convenient lighting point. No switching is needed, for there is no "juice" to waste. When you insert

the plug in the lighting socket the set works and when you remove it it stops working! If you care to do so, you can control the receiver by the ordinary lighting switch. The current consumption is not worth considering, for it is very small.

The only difference which the constructor should make when building up this set, as distinct from an ordinary battery-operated "two," is to take the most particular care to get the connections right first time. Of course, if you are careful to check the wiring over with a full-size blueprint, marking off in pencil each wire as its actual counterpart in the set is checked as O.K., you can't go wrong.

For the construction of this "two" you will require the following components, and for the guidance of those who want to make up the receiver exactly as described it should be explained that in each case the first-mentioned component is that used and illustrated in the original set.

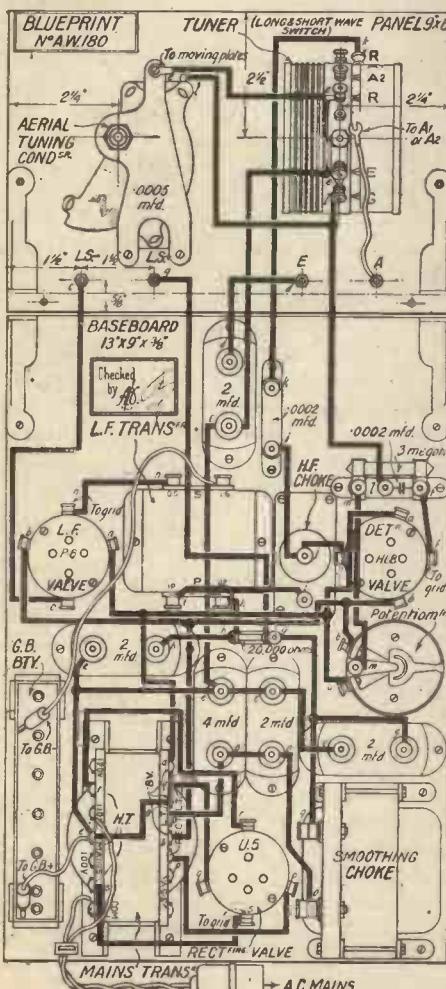


Construction  
is quite Simple

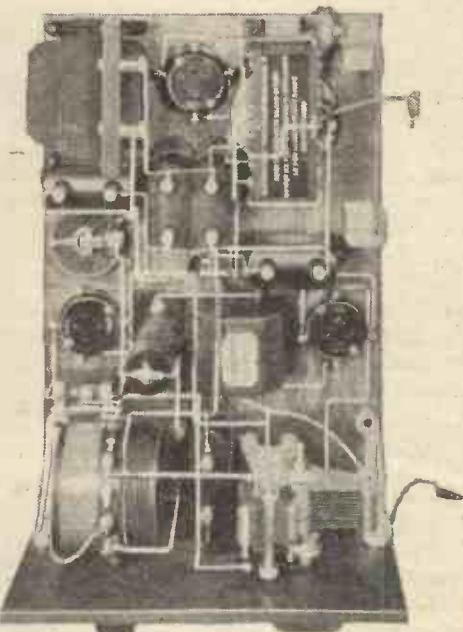
tory degree of loud-speaker strength.

Semi-Reinartz type reaction is employed and the tuner is of the dual-range type with incorporated moving reaction.

From the circuit diagram you will see



The wiring diagram. Blueprint available,  
price 1/-



—and the wiring is no more complicated  
than with an ordinary receiver

The alternatives are those which have, as near as possible, the same electrical characteristics and (in most cases) very similar dimensions.

Ebonite or bakelite panel, 9 in. by 6 in. (Raymond, Becol, Ebonart, Paxolin).

.0005-microfarad variable condenser (Igranic, J.B., Lissen, Polar, Ormond Burton).

All-wave tuner (Wearite, type WG2).

Baseboard, 13 in. by 9 in. (Pickett, Clarion, Camco).

Three valve holders (Burton, Lissen, Benjamin, Wearite).

.0002-microfarad fixed condenser with grid-leak clips (T.C.C. S.P. type, Dubilier, Mullard, Graham-Farish).

(Continued on page 576)

# CIRCUITS FOR YOU TO TRY

*From time to time our Technical Editor has described various circuits of particular interest to*

I RECEIVED an inquiry a few days ago from a reader who was anxious to try one screen-grid valve and one ordinary H.F. valve in conjunction with "Q" coils. He said that he felt that a circuit such as this ought to give him good selectivity with comfortable signal strength, which it undoubtedly will do. Moreover, if the apparatus is fairly well spaced there should be little danger of trouble from instability.

At any rate, a circuit of this nature is an interesting one to hook up, and the details given in Fig. 1 will make it clear as to how such an arrangement could be adopted. The aerial circuit contains one of the latest type of aerial coils, the QAA. This, as readers will remember, is a new form of tapped aerial coil, which gives better selectivity and better wavelength range than the older form of QA coil. The only difference in its use is that the aerial is connected to terminal No. 4 instead of to terminal No. 1, the same .0001 or a pre-set condenser being used in the aerial circuit.

This circuit feeds the screen-grid valve. This has been placed first in the circuit in order to avoid coupling between the later circuits and the aerial. It is sometimes found that alteration of the aerial or its capacity has an effect upon the neutralising of the ordinary form of H.F. circuit, and for this reason the neutralised stage has been placed second. Following the screen-grid valve is a QSG coil, a screen-grid transformer giving rather more selectivity than the tuned-anode arrangement.

The neutralising stage is placed third and feeds an anode-bend detector. It is becoming an axiom—as, indeed, it should be—that any receiver employing an appreciable measure of high-frequency amplification should utilise an anode-bend detector, because the grid detector overloads seriously if the signal strength is at all large. The L.F. stages are not shown. The detector may be followed by a resistance-coupled arrangement or, if desired, by transformer-coupled circuit, in which latter case it will be preferable to use either

an L.F. valve or one of the new special detector valves made by the Mullard Company. The reason for this is that the heavy negative grid bias causes considerable increase in the resistance of the valve, and this is liable to affect quality unless

*those who are experimentally inclined; on this page are two more which will repay investigation*

arrangement pure and simple, and is a development of the well-known dual-impedance system. Dual-impedance coupling is a system in which high-tension is supplied to the anode through a low-frequency choke. The L.F. voltages are bypassed to the next grid through a coupling with a choke, it will be understood, the usual leak being replaced with a choke. The values of the coupling condenser and choke are so chosen that a resonance occurs between the two in the bass regions, in consequence of which the ordinary tendency of the curve to fall away at about 200 cycles is arrested, and in place a slight resonance peak is introduced which keeps the curve fairly level down to quite low values of frequency.

Such an arrangement suffers from the disadvantage that no step-up is obtained, and the circuit shown in Fig. 2 illustrates a system in which the advantages of the dual-impedance coupling are retained together with a step-up effect. The H.T. supply to the valve is fed through a good

make of low-frequency choke, while the low-frequency impulses are passed through the coupling condenser on to the primary of a 6:1 transformer. For this purpose a good form of 6:1 transformer, such as the Igranic type J, should be used.

If the coupling condenser is made of the order of .05 microfarad we shall obtain a resonance between this coupling condenser and the primary inductance in the neighbourhood of 100 cycles per second. This will result in the bass being very well maintained, perhaps even slightly boosted, which will allow for the defects in the remainder of the amplifying system, including the loud-speaker. At the same time, owing to the fact that we have a 6:1 transformer, we shall obtain a large step-up so that the system, although apparently a little cumbersome at first sight, is one having considerable promise.

The arrangement can be used following a valve having quite a high resistance, with a correspondingly high amplification factor.

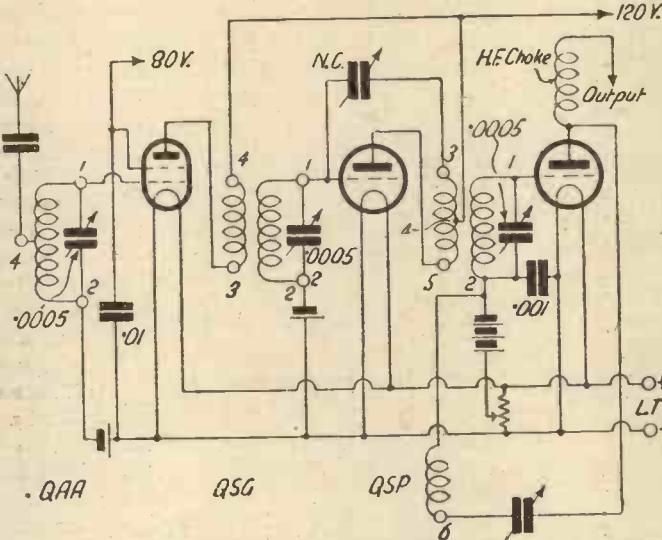


Fig. 1. A combination of screen-grid H.F. and ordinary H.F. valves used in conjunction with a "Q" coil

arrangements are so made that the actual resistance of the valve under working conditions is approximately that for which the transformer has been designed.

## A Dual-impedance System

Another circuit which is of interest is that shown in Fig. 2. This is an L.F.

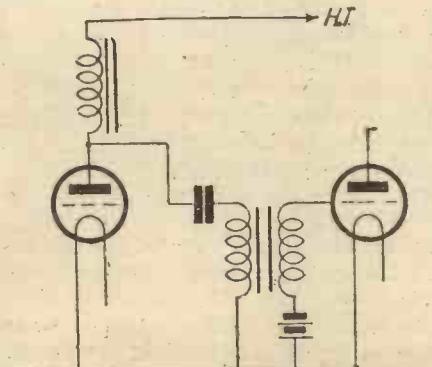


Fig. 2. A development of the dual-impedance system

# MY WIRELESS

*Weekly Tips,  
Constructional  
and  
Theoretical—*



# DEN BY W.JAMES

*For the  
Wireless  
Amateur*

### Metal-panel Matters

WHEN a metal front panel is used it is necessary to take steps which will ensure that only parts which are earthed shall make contact with the metal and that all other parts are insulated.

It is usually not very difficult to arrange that the various switches and tuning condensers shall have the side which makes contact with the panel at earth potential, but in an endeavour to effect this one or two weak points may be left. As an example I will take the case of a tuned anode circuit (Fig. 1).

Plates A of the variable condenser are connected to earth and plates B (the fixed ones) are joined to the anode of the shielded valve. The full voltage of the H.T. battery is, therefore, across this variable condenser, and the battery would be short circuited were the plates to touch.

This arrangement may correctly be termed a dangerous one, although when a good component is employed the chances of a short-circuit taking place are remote. Nevertheless, one would feel better satisfied with the circuit were a protecting condenser included in series (Fig. 2).

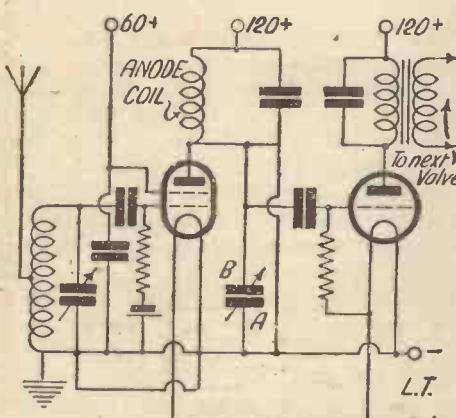


Fig. 1. A simple circuit for a metal panel

The safety condenser may have a value of .002-microfarad or more, and it need not necessarily be of the type having mica insulation. If this condenser has too small a capacity the tuning range of the circuit would be restricted and a poor condenser would reduce the amplification and have the effect of broadening the

tuning. Ordinary mica condensers have reasonably low losses, however, and may be used in this position.

### Cutting out the "Stray"

Tuning coils having a small stray field are popular just now and, indeed, I have found this type of coil to be practically essential for use in circuits with shielded valves. There are several forms of construction, and a particularly simple one is shown in Fig. 3.

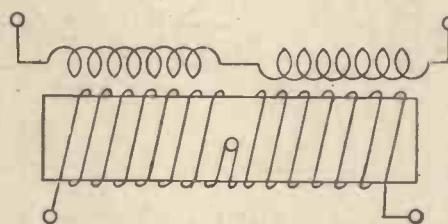


Fig. 3. Scheme of coil with small stray field

Here, one half of the coil is wound in the reverse direction from the other and the two halves have an equal number of turns. The efficiency of such a coil is naturally less than that of a coil having a straightforward winding and of the same bulk, but this is usually a matter of no great importance. What is important, however, is the distance separating the two halves.

It will be clear that if the two parts were widely separated the coil would have a relatively large stray field which is therefore reduced as the two parts are brought together. In practice a separation of about a  $\frac{1}{4}$ -inch is often employed with good results although it should not be thought that such a coil has no stray field. It is certainly small, and would be smaller still were the two parts wound even closer together. There is a practical side to the question, however, and a designer so adjusts the various factors that the best of all-round results are obtained.

### A Soldering Tip

There are occasions when, either because of lack of space or the need for economy, one is tempted to solder connecting wires to anode resistances or grid leaks instead of employing suitable holders. The practice of soldering wires is, however, not always to be recommended for the reason that unless great care is taken the heat

from the soldering iron will loosen the cap of the resistance or grid leak, or even disconnect the "internals" of the component. Grid leaks in particular should be handled carefully.

### That H.T. Spark

Many a beginner has felt there was perhaps something wrong with the wiring of his newly constructed receiver because a small spark is produced by brushing the high tension lead across the positive terminal of the battery. The spark is quite harmless, and is due to the large condensers in the receiver charging or discharging.

It is not unusual for three or four condensers of one or two microfarads each, to be included in an ordinary three-valve receiver, and, collectively, they will store quite a fair amount of electricity.

Anyone who has connected a 2-microfarad condenser across an H.T. battery and then placed a screwdriver between the terminals of the condenser will be familiar with the spark created. It is only to be expected that when the high-tension wire is drawn across the terminal of the battery sparks will be produced and they may give the

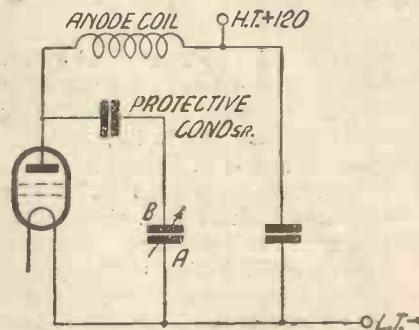


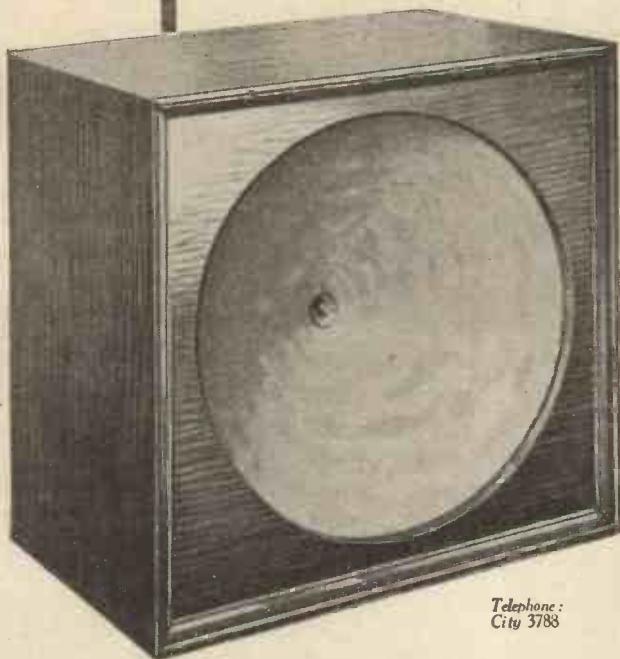
Fig. 2. A protecting Condenser for Fig. 1

novice quite a surprise until it is realised to what they are due.

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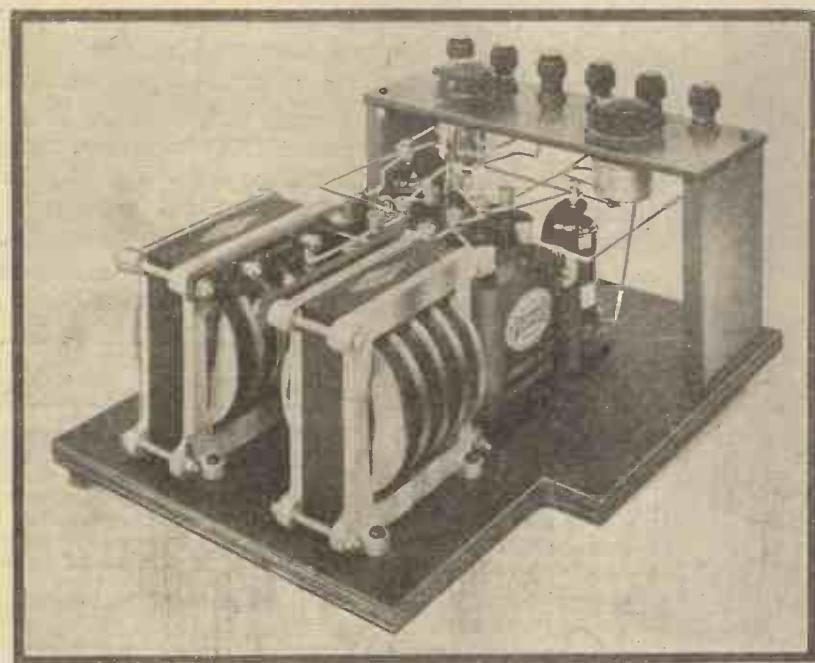
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PR 3	2	.095	15,000	8	L.F.
PR 4	2	.095	120,000	32	R.C.
PR 9	3.5-4	.063	18,000	14.	H.F. Det.
PR10	3.5-4	.063	10,000	8.7	L.F.
PR11	3.5-4	.063	88,000	40	R.C.
PR17	5-6	.1	18,000	17	H.F. Det.
PR18	5-6	.1	9,500	9	L.F.
PR19	5-6	.1	80,000	40	R.C.
PR20	2	.15	7,000	6	Power
PR40	4	.15	7,000	6	"
PR60	6	.1	5,000	6	"
PR120	2	.3	2,750	4	S.P.
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This efficient unit has been specially designed by W. JAMES, and can be built with ease by any reader of "Amateur Wireless." Full constructional details, together with many photographs and diagrams, are given in the "Wireless Magazine" for April.

THOSE who have a direct-current supply of electricity in the house for lighting, sometimes consider they are not so fortunate as those having an alternating-current supply.

Whilst it must be admitted that it is much easier and cheaper to obtain a supply of current for filament circuits, or for battery charging, from an alternating-current source, the user who has access to direct current of 200 volts or more is generally the more fortunate in the ease with which current for high tension may be secured.



This is the completed High-tension Unit for D.C. Mains complete in its metal box

**WIRELESS MAGAZINE**  
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# On Your Wavelength!

## A Wonderful Broadcast

THE broadcast of the funeral ceremonies of the late Marshal Foch was, I think, one of the most impressive wireless occasions that we have ever had. One thing, though, struck me as a very great pity. The commentator was absolutely first-rate, making one see every scene and every incident; but he spoke in French, and thousands of those who listened in this country must have been unable on this account to follow closely what was going on. On such an occasion one would have thought that the B.B.C. would have had its own commentator and have conducted its own broadcast of the proceedings. So far as I can make out, they simply relayed the broadcast by Radio-Paris, picking it up by wireless at Keston. I am almost sure that this was the case, since when I tuned in Radio-Paris direct I found C.W. interference in the background, and this same C.W. was distinctly audible when one turned to 2LO, 5GB, and 5XX.

## Try for These

There are some wonderful stations at work just now below 300 metres. If you have not a set of coils that will drop down to the lower portion of the broadcast band let me counsel you to beg, borrow, buy, or make them at once, if not sooner. I am not exaggerating in the least when I say that Turin, Hoerby (the big Swedish station), Cologne, and Nuremberg are receivable on favourable nights with the quality and, if the set is reasonably well furnished in the way of H.F. amplification, all the strength of the local. So powerful are Turin and Hoerby on good nights that full loud-speaker strength is obtainable with a three-valver, and if the first valve is of the screen-grid kind you probably won't have any need to use reaction. Other stations that can be quite marvellous below 300 metres are Flensburg, Kaiserslautern, Limoges, and Cork. Taking the broadcast band as a whole, the number of quality stations now receivable is wonderfully big.

## —and Some Others

In addition to those mentioned I find that real alternative programmes—that is, those providing music that can be listened to with genuine pleasure—are obtainable from Huizen (especially when he is using the long waves), Radio-Paris, Kalundborg, Motala, Hilversum, Budapest, Vienna, Brussels, Langenberg, Frankfurt, Stuttgart, and Barcelona. I don't mean that you will hear every one of these stations on any night of the week, but you will certainly find in normal circumstances that you have half a dozen or more first-rate foreign transmissions from which to choose. Fit a good high-frequency stage, if you

haven't already got one, and you can have all the variety that you want.

## Economy in DX

For real efficiency combined with economy in long-distance work I can strongly recommend a set of the type that I am using now, which contains only three valves. The first is a screen-grid H.F. amplifier, the second an anode-bend rectifier, and the third a pentode. The total filament consumption at 4 volts is only .35 ampere, whilst the H.T. drain is 17 milliamperes. This may seem a good deal, but it must be remembered that the set is used for producing a big volume of sound, and I don't know that you can manage with much less nowadays if you want first-rate quality.

I find that the pentode will take more grid bias than the characteristic curve would lead one to expect, which means that one can cut down the H.T. current considerably. Normally a pentode with 150 volts on the plate and screen grid, and given a bias of about  $7\frac{1}{2}$  volts negative, takes something over 20 milliamperes to its own cheek. Experiment shows that a good deal more grid bias can be applied without producing any trace of overloading or distortion.

## Another Saving

With a three-valve set of this kind one saves also in other ways. Screen-grid valves and pentodes are rather expensive, but if the whole set contains only three "toobs" there is clearly a big economy in components. In fact, all that one wants is two pairs of coils (one for the medium and one for the long waves), two .0005-microfarad variable condensers and one midget, a pair of H.F. chokes, three valve holders, a good low-frequency transformer, an output transformer, the usual fixed condensers, and an on-and-off switch. In addition to these, a volume control is also desirable, for the huge amplification available is often considerably more than one needs. The pentode is a delightful valve to use, since, owing to its enormous amplifying powers, quite a small applied grid swing produces a big output in the plate circuit. It is perfectly stable and gives a dead quiet background.

## An Error

I was very sorry to find the B.B.C. allowing the talk recently given on foreign affairs to include certain rather scathing remarks about the policy of a very distinguished man who is the leader of one of the great allied nations. "No politics" is supposed to be the rule of the B.B.C., and except that our own domestic affairs may be dealt with at election time this rule should be strictly adhered to. Everyone is

entitled to his own opinions about the governments of other nations, but it is certainly quite out of place to broadcast criticisms, especially as the B.B.C. is now a Government department. People sometimes forget that broadcasting knows no frontiers. Actually 5GB and 5XX are regularly tuned in by dwellers in countries all over Europe, and criticisms such as that referred to must give widespread offence.

## A Good Selection

The B.B.C. did us very well indeed in the matter of holiday programmes at Easter. Those responsible are to be congratulated on the way in which they exactly matched the holiday spirit by the choice of programme items. I am sure that the big output of light entertainment, variety, tuneful music, and humour was appreciated far and wide.

## "A Noteworthy Scientific Achievement"

The Postmaster-General is to be congratulated on his excellent summing up of the recent official tests carried out between the Baird Television Development Co., Ltd., and the B.B.C. The purport of his communication to the Baird Company indicates that we can look forward to real "seeing-in" in a relatively short time. With television as an ally, broadcasting will take on a new interest.

The other day I read an article in an American paper which questioned whether wireless broadcasting would be so effective if it were accompanied by television. Summing up the situation, the writer held that he who travels by the wireless with imagination for his guide may enter into those realms of gold which are closed to those who, seeing all, blindly seek a certainty.

## Doubly Girded

I am afraid, however, that the arguments put forward were far from convincing. Imagination is a wonderful asset to the individual when applied in the right direction, but to use that as an excuse for discounting television is certainly wholly wrong. To the amateur this new science opens up what may be regarded as a virgin field of investigation, and for that reason alone we shall welcome its appearance. Of late, I have been making a careful study of the problems involved and find that once the elementary principles are thoroughly understood "seeing by wireless" is really only slightly more complicated than sound reception.

## "Listening" With Your Eyes!

Have you ever *seen* speech or music? No, I am not taking flights into the realms

## On Your Wavelength! (continued)

of fancy, but am perfectly serious. My thoughts over the week-end had been centred round that very absorbing science which has been so much in the public eye of late, to wit television, and I was wondering how long we should have to wait before regular transmissions took place, so that it would then be in the public eye in more senses than one. I therefore turned on my favourite set (perhaps one of these days I shall let you into the secret as to which one this is), and having tuned in a fairly strong signal I substituted an ordinary neon lamp, just a simple beehive pattern, for the loud-speaker.

You should try this for yourself, as the previously audible signals now become visible, inasmuch as you can see the flickerings of the lamp in place of hearing the vibrations of the diaphragm. Whereas in this instance the flickerings were due to passages of music interspersed with speech, I knew that if I had been able to tune in the characteristic television note, the lamp flickerings would then have been reproducing the reflected light from the object being televised. Actually, this provides the gradations of light and shade that enable us to distinguish form, and all that remains is to arrange the series of light flashes over a surface or area corresponding to that occupied by the object we desire to see.

### **A Glowing Plate for a Canvas**

Put into more familiar language, this is the same as saying that a picture must be formed out of the succession of light and shade in just the same way as the artist forms his picture by a succession of brush touches on a canvas. In actual television practice this is effected at the receiver by employing a scanning disc having the same number of holes and running in synchronism with the disc at the transmitter. What we may regard as the canvas is the glowing plate of the neon lamp, it being borne in mind, of course, that the actual neon lamp is not like those we use as night lights, but has a comparatively large, flat, rectangular-shaped positive plate. Now, when the first hole of the transmitter disc explores a line across the object and lets the reflected beams of light fall in succession upon the "photo-electric microphone" so the receiver disc has a hole which explores a line across the glowing plate of the lamp, and it is seen bright in one spot and dark in another as it flickers.

### **Creating the Form**

With perfect synchronism between the transmitter and receiver discs the succession of lines build up an image identical in light and shade to the original form, the spread of the light impulses over a surface creating this form. Naturally, this process must be effected at sufficient speed to prevent the eye from dwelling on the mechanics of the

scheme, as thereby the light flashes are seen in their proper place, and not actually as a sequence. That is why the minimum number of complete picture scans is usually given as fifteen per second, corresponding to a disc speed of 900 revolutions per minute. Images viewed under these conditions are really excellent.

### **Needle Scratch**

The general use of electric gramophone pick-ups has created two great new "schools of thought." One huge section of pick-up users is in favour of the abolition of the irritating background noise caused by needle scratch. The other section, the minority movement, agrees with all these admirable sentiments, but expresses the view that any electrical or mechanical "damping" introduced for cutting out needle scratch must inevitably reduce the strength of high notes, harmonics, and sibilants of speech. The "minority movement" resigns itself to the awful presence of needle scratch, rejoicing in the more even response of their gear to all the musical frequencies.

### **Cutting it Out**

Naturally, the decision as to whether you will cut out needle scratch or not depends on the type of pick-up you use and its particular resonances in relation to the band of frequencies carrying the scratch. The use of a fairly "blunt" filter circuit which will shunt frequencies of the order of 6,000 cycles is the most effective weapon for cutting down the scratch without injuring the tone values too much. But the design of such a circuit is tricky, and the capacities of the condensers employed, etc., will vary according to the type of pick-up used and other factors. The easiest way is to shunt a condenser in series with a variable resistance across the pick-up leads, respective values being about .1 microfarad and 0-5,000 ohms. Variation of the resistance will then alter the amount of "damping" on the needle scratch as required.

### **Another Remedy**

Personally, I have used neither filter nor "integration" (shunt condenser) for some time in connection with my own pick-up. I don't buy any but the best records and endeavour to reproduce them as well as possible, neglecting the question of needle scratch. The blare of the brass and the high harmonics of the violin, as well as speech sibilants, come out very well and I am satisfied. Any kind of filter circuit is bound to cut these down; and I'd sooner have the scratch than that! If the gramophone companies made their records with a terrific resonance on musical notes around 6,000 cycles, then one could employ a filter on the reproducer to diminish this resonance, which would at the same time

cut out the needle scratch. But I am afraid that there are too many mechanical gramophones in use for the gramophone companies to do anything like this.

### **Sound Films**

The boom in talking pictures has resulted in a steady flow of engineers and programme builders from the B.B.C. to the film studios. R. E. Jeffrey, the B.B.C.'s chief dramatic producer, has moved his tent to Elstree, quickly followed by K. V. Wright, "O.C. Noises," and about half a dozen engineers. All these people have been absorbed by one producing concern only! Meanwhile, there is keen competition for the services of some of the leading B.B.C. engineers in both sound film and gramophone recording studios.

### **Fieldless Coils and Reaction**

In many sets nowadays astatic coils are used to prevent interaction effects and to minimise eddy current losses where screening is employed. A difficulty sometimes presents itself when the grid coil of the detector valve is of this kind and it is desired to make use of reaction. The trouble is, of course, that one half of the coil is wound in one direction and one in the other. The reaction coil tends, therefore, to ginger up one half of the coil and to do just the opposite to the other. I have come across several cases where friends who had made their own coils were very much puzzled by failure to obtain proper reaction effects. Investigation showed that the end of the grid coil remote from the reaction coil had been wound clockwise and the other end anti-clockwise, the reaction coil itself being wound clockwise. If the usual plate and grid connections are made, the reaction coil then exercises a reverse effect upon the end of the grid coil to which it is coupled and rather queer results occur. The rule is always to wind the reaction coil in the same direction as that of the grid coil to which it is nearest. If this is done and capacity control is used a short series of experiments will serve to determine the position for the reaction coil which gives the optimum degree of coupling.

### **An Unexpected Emergency**

Doubtless I had the sympathy of readers last week when I described how I was "let down" by the burning out of an anode resistance just when I had promised a special concert to some musical high-brows. I told you how I used a moving-coil milliammeter in the plate circuit, in place of the resistance. Well, I must crave still further sympathy—this time for a slip of the pen! Of course, I meant to say that I used a voltmeter, and not a milliammeter in place of the defective and now defunct anode resistance. It is certainly a tip worth remembering, for most enthusiasts have a high-resistance voltmeter.

THERMION.

# THE WIRELESS CONTROL OF MODELS

By MAJOR RAYMOND PHILLIPS

*Part Two—*

## THE RECEIVING GEAR

THE last article dealt with the construction of a simple "spark" transmitter arranged to function each time selected words are spoken into a special microphone. As there may be enthusiasts who would like to possess a radio transmitter fitted with a special microphone, and morse key, the latter can be inserted in the primary circuit of the small spark coil as shown in Fig. 1. When using the morse key it is advisable (for some experiments) to disconnect the microphone circuit, other-

the circuits of the receiver are so arranged that a morse key can if desired be used with the transmitter. Before giving constructional details of the special receiving apparatus, it will be well briefly to refer to various types of model electric locomotives suitable for wireless control. Many model electric locomotives are fitted with permanent-magnet type electric motor. This only involves the necessity of reversing the flow of electric current to the "conductor," and "outer" rails of a model railway in order to cause a model locomotive to run forwards, or backwards, as desired. It sounds like a fairly simple operation, but unfortunately it means introducing slight complications in a selector, or distant-control switch fitted in receiving apparatus.

### Sequence Control

For simplicity of control the better plan is to have a model electric locomotive (as shown in Fig. 2) fitted with "sequence" reversing mechanism. This involves switching electric current "on" and "off." The reversing mechanism fitted to such a model locomotive functions in "sequence," so that each time electric current is switched on to a model railway the locomotive will run forwards, or backwards in sequence. As the mechanism acts very rapidly, it is not a difficult matter to cause the model to run in the same direction on two successive occasions if desired, as it is only necessary to switch electric current "on," "off," and "on" again quickly. This type of locomotive is also fitted with a locking lever, so that the running position can be fixed if desired.

The construction of special receiving apparatus suitable for use with the microphone transmitter will now be described. The following components (some of which can be purchased "ready-made") will be required: coherer, de-coherer, relay, special selector, two ordinary electric-light switches (5-amp.), pneumatic dashpot device, eight large terminals, and about four yards of flexible electric-light wire.

The coherer can be purchased ready-made. A de-coherer simply comprises the movement of a 3-in. electric bell. A suitable relay can be purchased from almost any dealer in wireless apparatus, but an old G.P.O. type rewound with No. 36-gauge

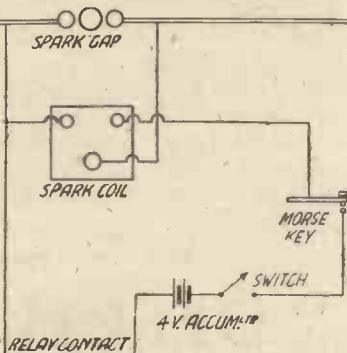


Fig. 1. Circuit for key control of transmitter

wise there would be a risk of signals being transmitted when not required.

Such a method is useful where a number of controls have to be effected in "sequence" and where it is necessary quickly to pass over contacts on a selector drum which may not at the time be required. For instance, the writer often found it necessary when manœuvring his well-known wireless controlled airship quickly to pass a

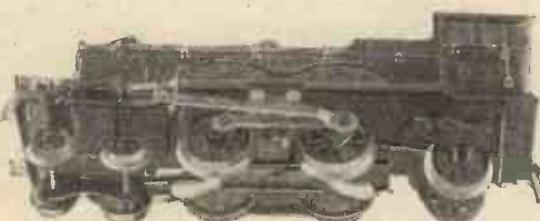
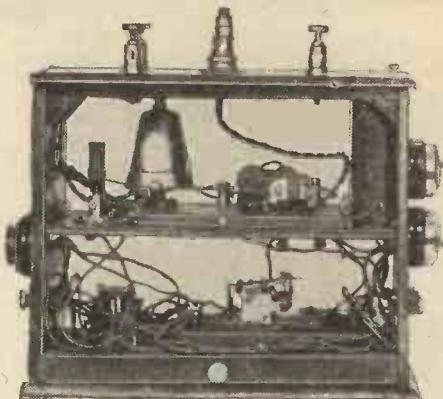


Fig. 2. Photograph showing under-carriage of model locomotive

series of contacts in order to select circuits connected with the different electric motors, so that steering and general control could rapidly be effected.

### Alternative Use

It will be necessary to construct special receiving apparatus for use with the microphone transmitter already described, but



The Complete Receiving Gear

enamelled copper instrument wire to a resistance of 100 ohms gives excellent results. A pneumatic magnetically-operated dashpot will have to be made specially. The device shown by Fig. 3 functions perfectly, and is fairly simple to make. An ordinary wooden block (such as is used for mounting electric light switches) 9 in. by 3 in. will provide a base, and the electro-magnet shown should have cores 1½ in. long by ½ in. diameter, and the bobbins be wound with No. 25-gauge enamelled copper wire.

The armature of the electro-magnet

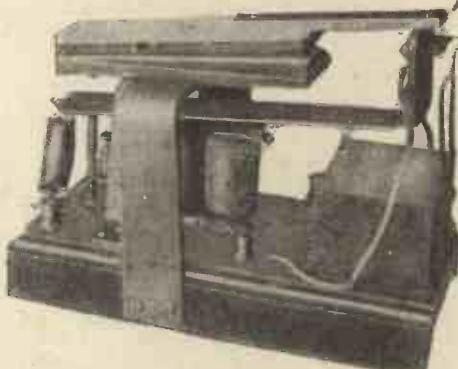


Fig. 3. The pneumatic "dashpot"

should be made of soft iron, 6 in. long by 1 in. wide by ¼ in. thick, and at one end (which should be bent at right angles) there should be fitted a piece of vulcanised fibre 1½ in. square by ½ in. thick. Two screw-threaded holes should be made in the fibre to accommodate two ½ in. No. 6B.A. brass screws, the latter to form contacts. The two spring contacts shown in Fig. 3 should be made of No. 26 gauge hard brass sheet, each contact being ½ in. wide. The main contact should be 3½ in. long. The shorter one (de-coherer contact) should be 3 in. long.

(To be continued)

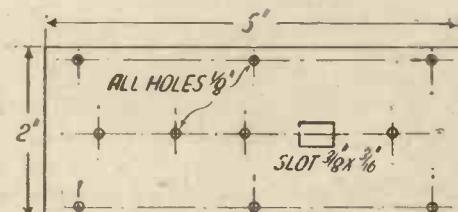


Fig. 4. Base for Selector

## For the Newcomer to Wireless : LOW-FREQUENCY TRANSFORMERS

WOULD you mind clearing up matters about low-frequency transformers? I was told the other day that they can give perfect reproduction, but in a book that I have just been reading, I find that they must always lead to distortion.

When was your book published?

Three or four years ago.

Then the writer was quite correct, for at that time even the best transformers were a long way from perfect.

And can we obtain real quality from them to-day?

Certainly we can, if we purchase first-rate components and use them as they should be used.

How do you mean?

The secondary of a transformer cannot contain more than a certain number of turns for various reasons; and obviously if we want a step-up ratio the primary must have a smaller number of turns.

That's quite clear.

Since you cannot increase the number of secondary turns it's plain I think that the only way of obtaining a big step-up ratio is to have a few turns on the primary.

That seems obvious.

The fewer the primary turns the

smaller the inductance of that winding.

I think I see what you are driving at. It comes to this; the bigger the step-up ratio the smaller must be the inductance of the primary.

Exactly, and this means that you cannot use a transformer with a big step-up to couple a high- or even a medium-impedance valve to the next one.

I don't quite follow that.

If there's not to be a suppression of certain notes the impedance of the primary winding must be kept high at all frequencies. Now the impedance of a transformer primary depends very largely upon its inductance and if the inductance is not big enough the impedance will be too small at low frequencies, with the result that there will be a suppression of the bass notes, for they will not be properly amplified.

Can you give me any kind of rule to go by?

Several!

Well, please fire away.

In the first place don't use transformer coupling after an anode-bend rectifier. You will find that the resistance-capacity method is better here. Next, if the makers state the inductance of the

primary when a normal current is passing I can give you a good rule of thumb.

What is that?

The minimum inductance value for good results is five times as many henries as there are thousands of ohms in the valve impedance. That is to say, if the rectifier has an impedance of 20,000 ohms you want a transformer with 5 by 20 or 100-henry inductance to follow it. Supposing that you want to couple note-mag. number one to note-mag. number two by means of a transformer and that the first has an impedance of 6,000 ohms, then a 30-henry primary is needed.

But supposing that they don't state the inductance value?

Then you are pretty safe in taking it that a 20,000 ohm valve is the highest that can be used satisfactorily with transformer coupling and that for this class you must not use a bigger step-up than about 3 to 1. For the 8,000-ohm type of valve a 4-to-1 transformer may be used whilst a 6-to-1 may follow valves of 5,000 to 6,000 ohms impedance. A really big step-up such as 8 to 1 can be used with advantage only after quite low impedance valves.

## FROM ACROSS THE "DITCH" JOTTINGS FROM MY LOG :: BY JAY COOTE

HAS it ever struck you to what extent radio has annihilated distance?

Recently, during a period when the Channel was blotted out by a bank of fog, it took some friends of mine almost an entire day to cross from Calais to Dover; on the same evening, when they called on me, I was able to switch them over to Brussels (their native city) by the mere turn of a wrist. Through the loud-speaker, the news bulletin which interested them was received as if the announcer had been in the same room, yet he was on the other side of the "ditch"!

On many evenings, instead of pottering around in an aimless manner, I devote some time to individual stations. In view of the fact that Radio Belgique is now playing with a higher powered transmitter, I have followed its programmes more carefully than hitherto. At the end of what is usually an excellent musical programme, you will be treated to a very remarkable series of announcements, inasmuch as they comprise the latest news items, political, social, or commercial, interlarded with advertisements and puffs. On one occasion following the details of a particularly gruesome murder, the announcer ended up with: "If you want to sleep soundly to-

night, drink a large glass of —" and followed the name of a well-known Belgian beer!

In this bulletin one finds references to tinned tomatoes, radio components, the names of seaside resorts at which you are invited to spend your holidays, and apparently contracts are made with advertising firms, for the same publicity is given out nightly.

Radio Belgique receives no subsidy from the State, and relies entirely on voluntary contributions. For this reason appeals are made to listeners to buy listening cards, the cost of which is 25 francs per annum (under 3s.) or entreats them to become patrons at the cost of 100 francs yearly.

By the way, all the transmissions from Brussels regularly close down to the playing of "La Brabançonne" on a gramophone record.

Another station to which I listened regularly during the last few nights is that of Frankfurt, of which, for some reason or other, the reception has gradually become weaker. Although the studio has a very full day, when I was last in that city, I ascertained that the bulk of the work is done by one announcer whose call, Frank-

furt-am-Main und Kassel must now be familiar to you all.

### "CUTTING OUT THE HIGH-TENSION BATTERY"

A Patented Circuit

WHEN our Technical Staff prepared the article "Cutting Out the High-Tension Battery" that appeared on pages 485 and 486 of our March 30 issue, we believed that the circuit on which the article was based was common property. Since publication of the article, however, Messrs. E. K. Cole, Limited, "Ekco" Works, London Road, Leigh-on-Sea, have courteously drawn our attention to the fact that the circuit in question is fully covered by their patent No. 262567. It follows, therefore, that readers may only construct the D.C. mains unit described in the article for purely experimental purposes, since only the patentees and their agents have the right to make and sell a unit built in accordance with that circuit.

We express to Messrs. E. K. Cole, Limited, our regret that, being unaware of their patent, we quite inadvertently used the circuit as the basis of our article.

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

WHAT beautifully expressive music is Grieg's! The holiday programme of the great Norwegian composer's works was incomparably rendered by the Wireless Symphony Orchestra, Kate Winter, and Maurice Cole. What poetry, what longing there is in "First Spring." And what grotesqueness in the "March of the Dwarfs." In pre-wireless days the multitude knew only "Peer Gynt." Now these

"That's what I asked you. Where do you live?"

"Ware!"

How the music-hall audience roared!

\* \* \*

It's quite a useful thing to barge into people whose work you criticise, or people well up in the world of wireless who criticise you! For instance, I had something to say about Lance Sieveking's production recently.

"I don't forget you wrote, 'Keep your hand out of the till,'" he said as we walked away from Savoy Hill, "but my next production will have an equally big caste."

Well, if the money's worth it, Lance, we'll break no more lances. (Oh, cheap! cheap!)

\* \* \*

Sieveking, by the way, made a spirited defence of those at the B.B.C. who work seriously and conscientiously on behalf of the listener. Productions that go over badly apparently hurt the producers as much as they hurt listeners. I have, however, paid tribute to the type of earnest worker at Savoy Hill.

\* \* \*

I was glad to hear from such an eminent expert as Professor Appleton that he and others supported my "clean radio" campaign. Apparently the comments in this page have been closely followed.

\* \* \*

We shall have to mind our pros and cons, for the wife of another radio professor tells me she reads us "first" each week. Frank criticism may rub some of the victims up the wrong way. Honesty is not the best policy if you desire to "keep in" with everybody. As it happens, I don't wish to keep in—or out—with anybody except the bulk of my readers. And this sort of unexpected tribute helps me in my attitude.

\* \* \*

Professor d'Andrade is another interesting personality who told me he had kept certain cuttings of mine. But the subject turned out to be—*spiritualism*! I wonder, by the way, whether we shall hear any more of those spirited and well-informed talks of his.

A young author who is doing enterprising work in the production line is Holt Marvel. He tells me that I "gave away" his identity. Did I? He ought to be proud of it if I did. He is certainly brimful of ideas, and I gather we shall soon be listening to more of his work.

\* \* \*

And, yea, verily, among others, whose names are familiar to readers, whom I met in the flesh was my old tried and trusted friend, Captain Eckersley. As a matter of fact, I got him to televise for the first time in history! But about all this I shall have to refer readers to my "secret history" book which I hope to write one day.

\* \* \*

Another chat I had was with R. E. Jeffrey. He believes a visual audience is essential to the temperamental radio artiste. I think Eckersley would dissent. So do I. Still, R. E. J. is frightfully keen on the future of "sight and sound" entertainment, and I wish him luck.

\* \* \*

Sullivan's *Ivanhoe* is little known. Why? Because it was "grand opera" and unlike the rollicking Sullivan airs that helped to pack the Savoy Theatre. Still, it is a beautiful opera, and one is grateful for the opportunity of hearing it.



Miss Jessie Matthews—as our artist sees her.

and other musical treasures are being disclosed to people whose musical souls were half-starved.

\* \* \*

Song recital by Olga Haley good. "Serenade" by Strauss has become a best singer. Oh, by the way, where did Esther Coleman get her translation of "I Love Thee"?

\* \* \*

Interesting, isn't it, to watch jokes grow?

"What's your name?"

"Watt!"

"That's what I asked you. What's your name?"

"Watt!"

And now the variation.

"Where do you live?"

"Ware!"



An impression of Jack Hobbs

FOR the benefit of those who did not have the opportunity of reading the constructional article last week which dealt with an up-to-date version of that ever-popular receiver "Britain's Favourite Three," it must be explained that so insistent has been the demand for new facts about this set that it was deemed advisable to produce an absolutely up-to-date version.

You may remember that the "Favourite" owed its inception to a competition which was held in AMATEUR WIRELESS in order to decide the most popular circuit. The "Favourite" was the result, and was published at the beginning of 1928 and it embodied everything that an amateur required for general-purpose reception,

#### A Popular Combination

At the time when it was produced high-frequency amplification had not been developed to the extent which it has been to-day. As most readers of AMATEUR WIRELESS will be aware, high-frequency stages, once the playthings of more or less experienced set operators, can now safely be included in the specification of general-purpose receivers.

Some very popular three-valvers have been described in AMATEUR WIRELESS, and these, while designed for the "wireless man in the street," have included what would once have been considered a difficult

both in outlay and in the continued expense, month by month, between a three-valver and a four-valver; in very many cases the necessity to own a "three" is quite clearly dictated. Well, if it is to be a "three," the next question which automatically arises is: is it to be used mainly for "family" work or for DX reception?

#### A Double-purpose Receiver

If the set has as its main duty to receive 5XX, 5GB, and the local station at good loud-speaker strength, but when the rest of the family has gone to bed paterfamilias likes to put up a good showing against some of the neighbours' super-hets and multi-stage screen-grid job *postes*, then an H.F. stage is essential. This, of course, means that there is only one low-frequency stage, and unless the circuit is carefully designed and the very best components are used, the home-broadcasting results may suffer.

On the other hand, if the three-valver is used just as an alternative to the gramophone and only Daventry and the local station are to be received at adequate volume, then two L.F. stages and no high-frequency stage is the obvious arrangement.

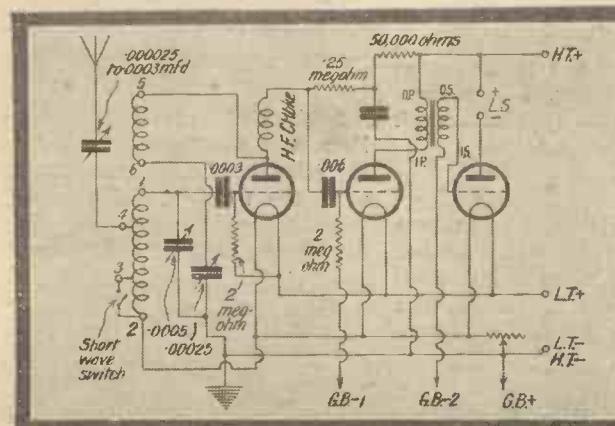
This is just what is done in the case of "Britain's Favourite Three," and, as we have said, when it was voted

(in 1928) to be the most popular circuit, screen-grid stages were not such an everyday matter as they now are.

With the additions described in the 1929 model it is in every sense an up-to-date three, capable of giving a good show without any unnecessary frills.

#### A Popular Type

As even the least technically-minded reader will gather from a cursory inspection of the photographs and theoretical circuit diagram, "Britain's Favourite Three" is of the ever-popular detector, R.C., and transformer-coupled L.F. type.



The Circuit of "Britain's Favourite Three".

stage to operate, namely, a stage of screen-grid H.F. amplification.

But there are still many reasons why three-valvers with two stages of amplification on the low-frequency side, and with no H.F. boosting whatsoever, are very popular, and why, if the voting were taken again, three-valvers without H.F. might conceivably not be swamped by their more distance-getting counterparts with one H.F. stage.

The whole question resolves itself on the point of economy, both as regards valves and running costs.

There is quite a big step of difference

# BRITAIN'S "FAVOURITE THREE"

UP-TO-DATE

Further Details :: How to ...

Those who take an interest in the working of their receivers will perhaps care to examine the various features obvious from the circuit diagram. The detector operates on the leaky-grid principle, and this is because at normal ranges and owing to the fact that there is no high-frequency amplifier preceding the detector, there is no tendency for the leaky-grid system to be over-loaded.

As is well-known, the great advantage of employing the anode-bend system, instead of leaky-grid rectification, is to be found when the input to the detector is already fairly large, and there is a danger that the proper functioning of the condenser and leak, in the leaky-grid system, might be upset by the comparatively heavy grid voltage.

#### COMPONENTS REQUIRED

Ebonite or bakelite panel, 16 in. by 8 in., and strip, 4 in. by 2 in. (Becol, Raymond, Paxolin, Radion).  
.0005-mfd. variable condenser, log mid-line type (J.B., Polar, Ormond, Burton, Burndept).  
.0025-mfd. variable condenser, log mid-line type (J.B., Polar, Ormond, Burton, Burndept).  
7-ohm panel-mounting rheostat (Lissen, Igranic, G.E.C., R.I. & Varley).

Push-pull switch (Lotus, Lissen, Trix, Wearite).  
Panel brackets (Bulgin, Camco).  
Dial indicator (Bulgin).

Three antimicrophonic valve holders (Benjamin, Lissen, Burton, Wearite).  
.0003—.00025-mfd. pre-set condenser (Formodenner type J, Igranic).

.0003-mfd. fixed condenser with series clip (Dubilier, Lissen, Graham-Farish, Mullard).  
2-megohm grid leak (Dubilier, Lissen, Graham-Farish, Mullard).

Six-pin coil and base (Tunewell, Lissen, Lewcos, Peto-Scott).  
High-frequency choke (Lissen, R.I. and Varley, Burndept, Polar, Tunewell, Trix).  
Resistance-capacity coupling unit (Dubilier, Lissen, R.I. & Varley, Graham-Farish, Mullard).

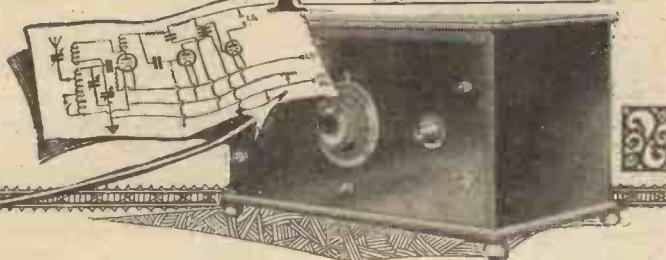
.50,000-ohm resistance (Graham-Farish, Lissen, Dubilier, Mullard, R.I. & Varley).

2-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Ferranti, Mullard).  
Low-frequency transformer (R.I. & Varley, Lissen, Philips, Mullard, Cossor, Igranic).

# VOURITE THREE"

DATE

Get Best Results



The various technical merits and demerits of each system have been discussed in the pages of AMATEUR WIRELESS, but it may be taken for granted that in a general-purpose receiver, such as this "Britain's Favourite Three," and where there is no amplification preceding the rectifier, the grid condenser and leak system is preferable. The values for the condenser and leak are conventional, being .0003-microfarad and 2-megohm respectively.

A little hint which may be appreciated is that with some detector valves and under certain working conditions slightly better sensitivity, though sometimes at the expense of purity, is obtained if the value of the grid leak is raised somewhat—to, say, 3 or even 5 megohms.

The values of the condenser and leak in the R.C. coupling system are also

Grid-bias battery clips (Bulgin). Two black and one red wander plugs (Clix). Baseboard, 16 in. by 9 in. (Pickett, Clarion, Camco). Connecting wire (Glazite). One yard of thin flex (Lewcoflex).

Seven terminals, marked : Aerial, Earth, L.T.+ L.T.—, H.T.+ L.S.—, L.S.+ (Bellng-Lee, Eelec, Igranic).

#### Six-volt Valves to Use with the Up-to-date "Favourite Three"

Make	Det.	1st L.F.	Power
Cleartron ..	CT25F	CT25	CT25X
Cosmos ..		DE50	
Cossor ..	610RC	610LF	610P
Ediswan ..	RC610	LF610	PV610
Marconi ..	DEH610	DEL610	DEP610
Mazda ..	RC607	GP607	P615
Mullard ..	PM5B	PM6D	PM6
Osram ..	DEH610	DEL610	DEP610
Six-Sixty ..	6075RC	6075HF	610P

conventional, that is, for an R.C. stage immediately following a detector valve.

The anode resistance used in conjunction with these components has a value of .25 megohm, and in series with this is the 50,000-ohm resistance, which forms part of the anti-motor-boating unit.

#### 1929 Modifications

The additions to the original 1928 "Favourite" are the following : The plug-in coils are scrapped in favour of a six-pin dual-range coil, and the wave-change switch is placed on the panel just below the centre tuning condenser; a pre-set condenser is incorporated in order to give the very best selectivity; this condenser is mounted on the baseboard and can be put in or out of circuit as required, simply by changing over a flex connection from one terminal to another; the third addition is an anti-motor-boating unit which enables a high value of H.T., a large power-valve or a mains eliminator to be employed without any fear of motor-boating.

As a matter of fact, possessors of old "Favourites" will find very little difference between the operation of the new set and the 1928 edition. Valves and battery details are, of course, relatively important. For the guidance of new constructors of the "Favourite" a table is given showing a selection of six-volt valves which will work very well in combination. As in most other receivers, 2- and 4-volt equivalents can be used and the final decision with regard to type rests almost entirely with the set user and the type of accumulator he has available.

It is recommended that about 120-volts H.T. should be used, in conjunction with a 9-volt grid bias battery, and about 3-volts negative G.B. being applied to the first L.F. valve.

It is opportune at this point to note that

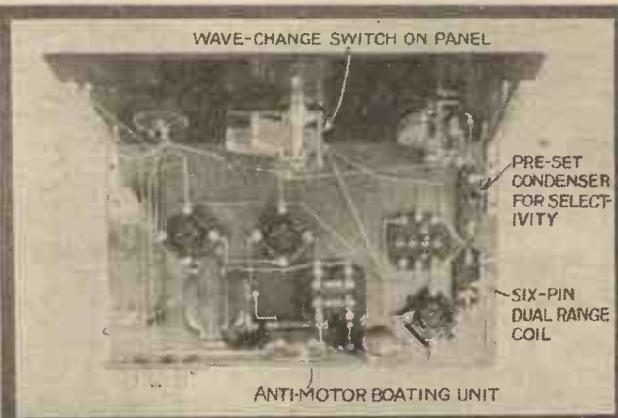
in the accompanying valve table, valves suitable only for ordinary requirements are given; that is to say, the last valve is of the normal power or large L.F. type, capable of dealing with a reasonably extensive grid swing, and giving an output for one of the larger cone type or smaller moving-coil loud-speakers.

There are, however, still larger power valves on the market, and in cases where exceptionally large output is required one of these may be used, provided that a corresponding alteration in H.T. and grid-bias voltage is effected.

A glance at any list of typical two-volters in this super-power class shows such valves as the Cossor 230XP, the Marconi or Osram DEP240, Mullard PM252, Ediswan PV225, Mazda P227, and Six-Sixty 230SP.

For a preliminary test, tune in the local station. To do this fully screw in the knob of the pre-set condenser and with the reaction condenser at practically zero, slowly rotate the main tuning condenser until the desired station is heard.

Then reaction may be adjusted until volume is at the required degree and the knob of the pre-set condenser can be slackened off a little, if desired, though there is really no need to do this in the case of local station reception, which is generally free from interference. H.T. and G.B. values can then be adjusted to a nicety and an attempt may then be made to tune



This picture shows the 1929 modifications

in some of the more easily receivable foreigners.

If interference from the local station seems to cover an unduly large section of the tuning scale, the knob of the pre-set condenser can be slackened off, thus reducing the capacity until the required selectivity is obtained.

The simple push-pull switch on the panel changes over from the long- to the short-waves and this is a convenient point which will be most appreciated by users of the former edition of the set and who may have had cause to grouse at the job of changing over the coils.

## "A.W." TESTS OF APPARATUS

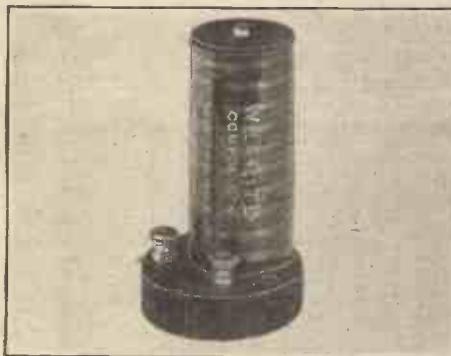
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.



### New Wearite H.F. Choke

THE Wearite H.F. choke has, since its inception, earned a good name for itself because it will operate in a reliable manner from below 20 metres up to wavelengths exceeding 2,000 metres. This shows that the value of inductance is sufficiently great and the self-capacity sufficiently small for efficient choking both on the high and the low wavelengths.

A new model of this popular component has recently been put on the market. This differs from the older form in that the two terminals are placed on the base instead of one being on the base and the other at the top of the former. Tests which we conducted on the old and the new type of choke indicate that the new type has a slightly higher self-capacity owing to the positioning of the terminals. This, however, is scarcely noticeable, being less than one micro-microfarad and in practice no difference in the operation of the instrument



New Wearite H.F. Choke

could be discerned over the entire working range.

As before, the finish and appearance of this choke are excellent. The makers, of course, are Messrs. Wright and Weaire, Ltd., of 740 High Road, London, N.17.

### An Automatic Time Switch

IT is very annoying to miss the beginning of a much-desired programme simply because one forgets to switch on the set at the proper time. Also, if a set is to be left in non-technical hands it is satisfying to know that it can automatically be switched on and off without any chance of the other controls being upset.

These two needs are supplied by the Setalite, which is an automatic time switch, manufactured by Setalite, Ltd., Morley House, Regent Street, London, W.1. It incorporates a clock-work mechanism which needs no special winding.

All that it is necessary to do in order to make the set operative in, say an hour and

a half's time, is to turn the knob on the front of the Setalite until the setting of 1-30 is obtained on the dial. This is all the winding that is needed, and the instrument then goes on ticking, until the proper period has elapsed, when two contacts are closed and the set is switched on.

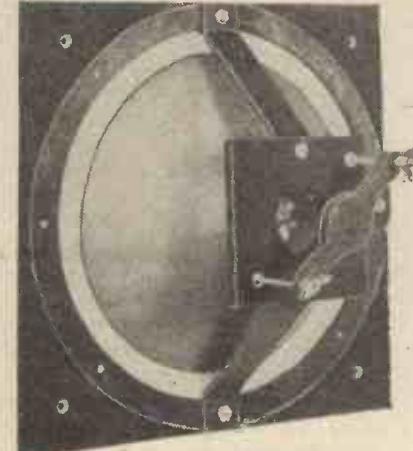


Setalite Time Switch

The Setalite is capable of switching either on or off at any predetermined time, and a simple push-pull switch on the side of the case arranges for it to switch on or off as required. We have tried one of these switches in conjunction with an ordinary set and have found that it gives a very satisfactory degree of accuracy.

### Floating-cone Unit

THE advent of the moving-coil speaker with its floating diaphragm has demonstrated the advantages of using a floating diaphragm with magnetic vibrating armature units. If a diaphragm is free to



A. W. Knight's Floating Cone

move at the periphery there is more chance that the motion will take place as a whole rather than in small segments.

We have recently tested a floating cone, marketed and submitted by Messrs. A. W. Knight and Co., of 180 Tower Bridge Road, S.E.1. This is simply and inexpensively made but is an efficient article of its kind and capable of giving good reproduction.

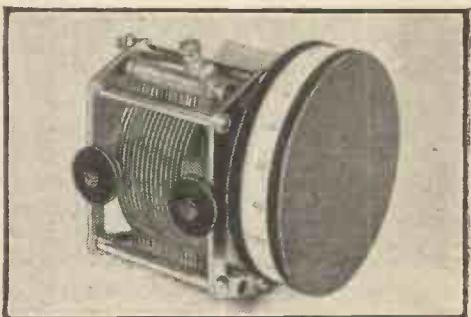
A 7½ in. cone is attached at the periphery to circular pieces of chamois leather and is finally clamped to a small baffle board having overall dimensions of 10 in. square. The baffle board is covered on the outside with green baize, so that it can be fitted if desired to a larger baffle without loss of signal strength or tendency to rattle.

During our tests we connected several units in position, in turn, and affixed an extra 2 ft. baffle; the results obtained were quite pleasing, the reproduction from high-class units being good and free from undesirable rattle, even when large volume outputs were obtained. This cone assembly can be recommended.

### Polar Ideal Condenser

THE Polar Ideal variable condenser is well-known as a robust instrument of high-class design fitted with a reliable and smooth slow-motion device working on an interesting and practical system of ball-bearing.

Readers will probably be interested to



Polar Ideal Condenser

know that this condenser may now be obtained with a drum dial, a form of control which has recently become popular owing to the neatness of such a fitment.

The drums of the Polar condenser consist of two insulated mouldings having a diameter of 2¾ in.; these are knurled to afford a suitable finger grip. Between the two drums a cylindrical ivorine scale is fixed and this rotates directly with the left-hand drum. The right-hand drum is attached to the slow-motion spindle giving a reduction of approximately 20 to 1.

Fitting this condenser to a panel presents no difficulty whatsoever. A portion of the panel must be cut away to take the neat escutcheon plate and allow the drum to project slightly. The actual condenser is held in position by drilling two holes on the panel on the left of the drum and placing screws through these into two brackets provided on the instrument.

The makers are Messrs. Wingrove and Rogers, Arundel Street, Strand.

# EXPERIMENTS WITH NEON TUBES That You Can Make

The Neon Tube has many peculiar characteristics which will well

**A**MATEURS who have experimented with neon tubes have found that they can successfully be used for many purposes formerly only served by the more costly

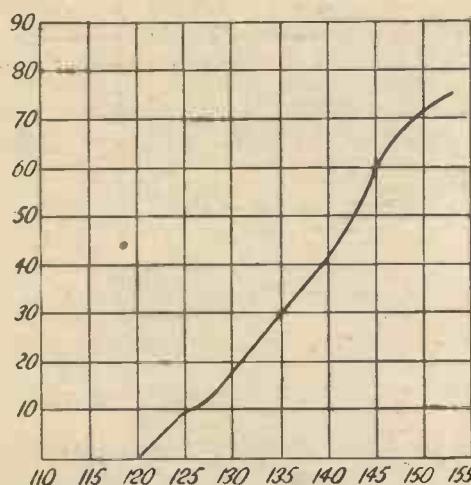
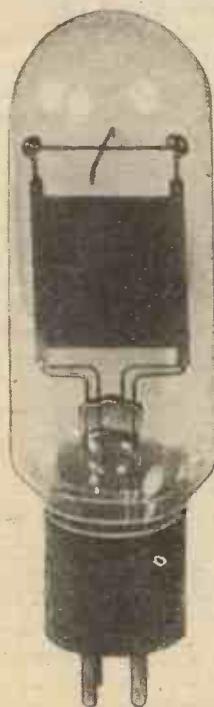


Fig. 1. Characteristic curve of neon lamp

three-electrode or two-electrode valve. It is intended here to give an outline of the properties and characteristics of neon

tubes with a view to helping the amateur to form an idea of what can be done with these lamps. It should be understood that the results are obtainable using any make of neon tube which operates on about 200 volts, the electrodes being of iron and situated fairly wide apart. There are several makes on the market, such as Philips and Osram, and a slight variation of the characteristic will, of course, be produced by using different types. This variation may be easily met by an adjustment of the resistance and capacity values in the figures of circuits shown.

In the neon tube a luminous ionised gas



The Raytheon neon tube as used for television purposes

discharge takes place between two metallic electrodes in a rarefied atmosphere of neon gas, which latter possesses a remarkably low-ionising potential and a comparatively high electrical conductivity. The neon lamp requires about 200 volts across its terminals. According to modern standards, the vacuum is an extremely soft one, pressure being equal to several millimetres, or even a centimetre of mercury. A slight trace of helium is also contained in the "space," and possibly also a very slight trace of hydrogen.

Contained in the brass cap of the lamp is a safety resistance, usually consisting of a quantity of fine wire wound on an earthenware or cardboard bobbin. This resistance must be removed before experiments are undertaken, as its presence would seriously interfere with the action of the lamp, particularly when dealing with high-frequency currents.

There is no need to damage the brass cap in removing the resistance : the cap is convenient for plugging the lamp into the standard bayonet lampholder. The best procedure is as follows : Grasp the glass bulb firmly in the left hand and carefully heat the brass cap in a small flame, being careful not to allow the flame to play on the glass. This has the double effect of melting the solder which secures the lead-in wires to the contacts, and of softening the cement which holds the bulb in the cap; so that it is a simple matter to grasp the

## HAVE YOU NOTICED

—that the standard values for leaky grid rectification are, in England : Condenser, .0003 mfd.; leak, 2 megohms; in France : condenser, .00015 mfd.; leak, 3 megohms? It would be interesting to know what are the standard values in other countries, why there should be differences, and on what reckoning the decision of the respective values has been arrived at.

repay investigation. This article gives some suggestions for its use

cap with a pair of pliers and pull off the cap gently, thus revealing the resistance. Remove the resistance, and after making suitable connections between the lead-in wires and contact lugs, fix the cap on again. If it is afterwards required to use the lamp across the ordinary lighting

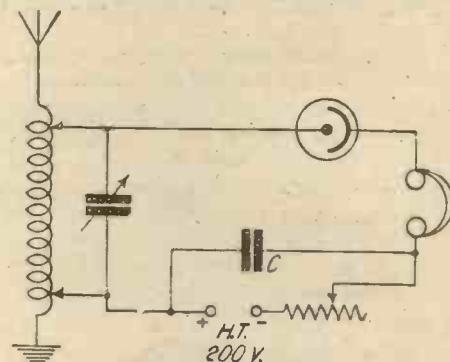


Fig. 2. A detector circuit using a neon tube

mains, an ordinary lamp should be used in series, since after removal of the resistance any overload in the current would blow the neon lamp if connected alone.

## Characteristics of the Neon Lamp

Fig. 1 gives the characteristic curve of a typical neon lamp. No two lamps have the same characteristic curve. The unsteadiness of the discharge position gives kinks in the curve. The extinction and lighting-up potentials are not identical, in that the discharge will not commence before a certain minimum potential is applied, but once the lamp glows the potential necessary to keep it alight may be lower than that required for starting the discharge.

In a lamp containing electrodes of unequal size the conductivity is not the same both ways, the lamp conducting

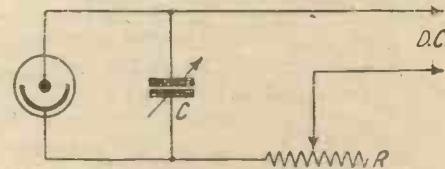


Fig. 3. Arrangement for production of oscillations

better when the larger electrode is the cathode. Should the lamp be inserted in its socket the wrong way round, the glow appears at the smaller electrode, and less

current passes through the lamp than when it is connected in the normal manner. A typical lamp tested in this manner, using about 200 to 220 volts, passed about 15.4 millamps in the normal direction, but only 12.8 millamps in the reverse direction. A neon lamp requires a smaller minimum ignition voltage when the smaller electrode is used as the cathode.

### Rectification by Means of a Neon Lamp

The properties already explained are all due to the fact that a neon lamp does not obey Ohm's law, and this fact, together

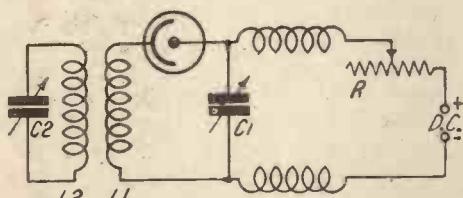


Fig. 4. Arrangement of neon lamp oscillator for a 300-metre wavelength

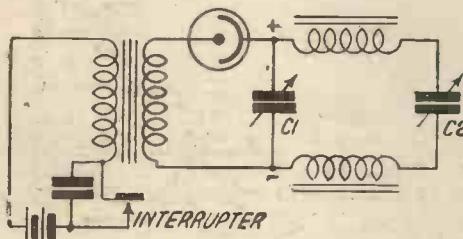


Fig. 7. Method of obtaining rectified H.T. from spark coil

with the power of partial unilateral conductivity, makes it possible to rectify, to a certain extent, oscillations occurring in a circuit. The rectification, however, is incomplete and is really inferior to a good crystal rectifier, and thus this use will not find a very extended application.

Fig. 2 shows a circuit suitable as a detector circuit. In series with a pair of telephones, a high variable resistance  $R$ , and a H.T. supply of 200 volts, is a neon lamp.  $C$  is a large capacity by-pass condenser. This condenser is absolutely essential. The resistance should be adjusted until the lamp glows very feebly and the receiver then tuned in the usual manner.

### Production of Oscillations

A neon lamp is capable of converting a D.C. supply into regularly pulsating current. Fig. 3 gives a suitable arrangement.

When the supply is switched on a rapid series of pulses will pass through the lamp, when the resistance is adjusted so as to cause the lamp just to glow. The frequency of the discharges depends on the rate at which the supply current through the resistance  $R$  can charge up the condenser  $c$  to the ignition potential of the lamp. It will be readily seen that decreasing the resistance increases the frequency of the pulsations, and, also, the smaller the capacity of  $c$ , the higher will be the discharge frequency. Any frequency may be obtained from, say, one pulse every two

or three seconds up to about 20,000 per second by suitably adjusting  $R$  and  $c$ . The potential drop in  $R$  should be approximately equal to the potential drop in the lamp for best results.

These pulsations are really detached uni-directional surges, and not sinusoidal oscillations; therefore, we must expect an enormous number of harmonics to be present. Cause a lamp to pulsate at about 15,000 per second, and listen on a heterodyne receiver, and a strong C.W. note will be heard on a wavelength of about 20,000 metres; then tune the receiver down, and we come to harmonics of two, three, four, and five times the fundamental wavelength. The higher the frequency tuned—i.e., the lower wavelengths—the more congested these harmonics become. Below 400 metres the harmonics are feeble, but come in in very rapid succession.

### Maintenance of Oscillations

If an oscillatory circuit, coupled to the neon lamp circuit, be tuned to one of the short-wave harmonics, this harmonic will predominate more strongly than the others. Fig. 4 gives an excellent arrangement for a neon lamp oscillator to generate oscillations of 300 metres wavelength. Connect the neon lamp to produce the pulsations, as in Fig. 3, except that an inductance  $L_1$  is put in series with the lamp. Adjust  $R$  and  $C_1$  so as to cause the lamp to pulsate at as high a frequency as possible. The inductance  $L_1$  must be of such a value that in conjunction with  $C_1$  it will tune to the desired frequency—1,000,000 per second—although, strictly speaking, the circuit  $L_1C_1$  is not really a tuned circuit owing to the inclusion of the lamp.

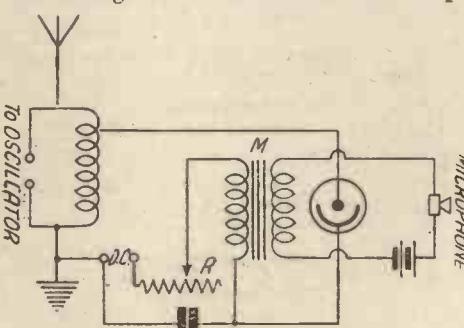


Fig. 5. Neon lamp as modulator

Once the circuit  $L_2C_2$  has been tuned to 1,000,000 per second a slight adjustment of  $C_1$  or  $R$  will bring a harmonic into exact synchronisation with  $L_2C_2$ . The coupling between  $L_1$  and  $L_2$  must be tight. High-frequency chokes may be inserted in the supply leads as shown in Fig. 4, though the resistance  $R$  may be high enough to keep the oscillations out of the supply leads.

To use the arrangement as a transmitter

a tuned-aerial circuit should replace  $L_2C_2$ . Each aperiodic discharge from the lamp gives a kick to the circuit  $L_2C_2$ , which oscillates in its own natural period until the next kick is produced to keep the oscillations going. If the lamp is discharging at the rate of 20,000 per second and the circuit  $L_2C_2$  is tuned to a frequency of 1,000,000, a kick is administered to  $L_2C_2$  once every fifty oscillations, and so, if  $L_2C_2$  possesses low H.F. losses, practically undamped oscillations will be sustained in it.

### The Neon Lamp Transmitter

Only very small power is available with

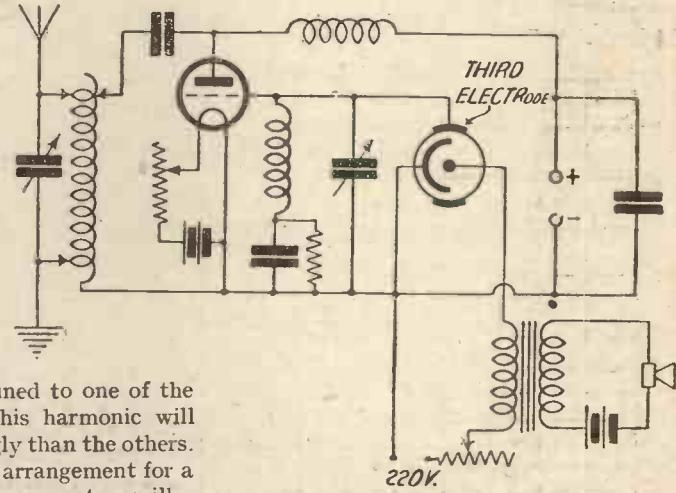


Fig. 6. Another modulator circuit

a neon lamp circuit, as standard lamps consume only 5 watts; since they pulsate only at almost extinction point, about only 1 watt is available for use. If the lamp is overrun on about 400 volts the glow will change to a pale violet colour. This enables the lamp subsequently to pulsate on higher power, because once the lamp has been overrun it requires a considerably higher voltage to work it afterwards, and also this overrunning causes it to pulsate on a higher fundamental frequency and to give stronger harmonics. The oscillatory properties of a neon lamp, then, are greatly improved by about twenty minutes' overrunning.

It is highly important that the supply current be absolutely regular and constant. The frequency is not determined by a tuned circuit—the fundamental lamp frequency, that is—but is chiefly a function of the supply circuit and the large condenser in the lamp circuit. Should small variations occur in the supply current, the fundamental pulsation frequency of the lamp will vary. These variations are enormously magnified in the selected harmonic, and hence the necessity of keeping the supply constant.

### The Neon Lamp as a Speech Modulator

The susceptibility of the oscillations to any variations has a great advantage in

(Continued on page 574)

## Notes for Newcomers.

### THE SCREENED GRID THREE

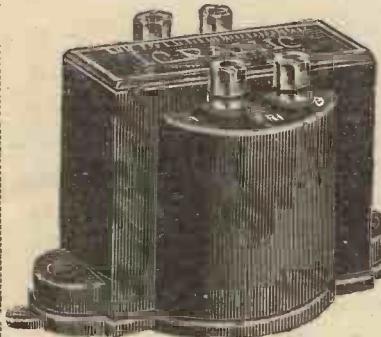
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# Can We Amplify on Short Waves

## Some Considerations of a Possible New Method

MATHEMATICS are troublesome things to the average man at the best of times, and indeed the amateur prefers, as a rule, to leave such matters strictly alone, confining his attention to the actual practical results obtained. Nevertheless, there are undoubtedly occasions on which a mathematical analysis serves a very valuable purpose.

Perhaps one of the most interesting examples of this is that of Maxwell's theory of light. Long before the end of last century, Clerk Maxwell evolved his wave theory of light, which he worked out to fit in with the facts known in those days. Having decided the general principle upon which he thought light radiations were operating, he investigated the subject and made a complete mathematical analysis. This went far ahead of practice in those days, and not only predicted numerous effects concerning light waves which were ultimately found to be true, but also foretold the existence of wireless waves.

He said we should find that such ether vibrations which we now know as wireless waves would be capable of production, that they would obey the same laws as light vibrations, due allowance being made for the difference in frequency, and he gave various estimated theories regarding their operation. It was not until the beginning of this century, many years after the first predictions, that wireless waves were actually produced and found to conform to the laws which Clerk Maxwell had laid down for them. Still, in those days the full significance and the enormous applications of the new vibrations were not realised, and it remained for Marconi to make the first practical utilisation of the new discoveries.

So to an increasing extent the pure mathematicians have started the engineers thinking. The mathematical mind is quite distinct from that of the engineer or physicist. A mathematician

can deal entirely in symbols and formulae, and can deduce from them other formulae which upon examination may indicate an entirely unsuspected state of affairs. The engineer or physicist in his turn investigates the practical way of carrying out the new methods disclosed, and in general he prefers to carry a mental physical picture of what is happening, using mathematics more as an aid than as a primary structure on which to build his ideas. The net result, however, is generally progress, for even if the mathematics prove incorrect, owing to insufficient knowledge regarding the assumptions or for some other unforeseen cause, a train of thought is started which usually results in an interesting development.

### Divided Opinions

The problem of amplification of the very short wavelengths has been exercising the minds of radio engineers for some considerable time past. Opinion is very much divided on this subject. One school stoutly affirms that, although a high-frequency valve can be made to hand on high-frequency energy with no serious loss of volume—i.e., so that it is not definitely worse than a simple detector arrangement—it cannot be made to give any appreciable amplification effect over a

reasonable wavelength band. Others, on the other hand, claim that with correctly designed apparatus and careful construction, real amplification is possible, although this may not be of a very high order. Even an amplification of 2 or 3 serves to give a margin of reserve over and above the ordinary detector circuit, which makes tuning easier and tends to minimise the disadvantages of fading.

### Possibilities

Any suggestion that an amplification of the order of 10 to 15 is possible would seem, on the face of it, ludicrous. Yet a recent detailed analysis on the operation of the standard three-electrode valve, published by F. M. Colebrook (Journal I.E.E., vol. 57, page 157), indicates that there are certain unsuspected effects taking place by the utilization of which we may obtain a distinct amplification on these high frequencies.

The first thing that emerges from the analysis is that the maximum amplification is obtained from a valve not quite at the point where the anode circuit is tuned to resonance, but at a point where the impedance of the anode circuit is slightly inductive. This effect is almost negligible at ordinary broadcast frequencies, but on short waves the difference is appreciable. This does not mean that there are two tuning points, for the apparent tuning point will be that where maximum signal strength is obtained, and one automatically tunes the condenser until this maximum amplification is produced. The fact remains, however, that at this point the circuit is not really tuned, but is slightly undertuned, so that the impedance is inductive.

When this is the case a resonance effect occurs between the anode circuit and the internal capacity of the valve, and, due to this, the voltage developed on the output may be more than  $m$  times the input,  $m$  being the

(Continued on page 569)



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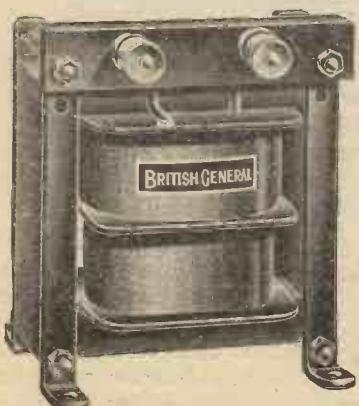
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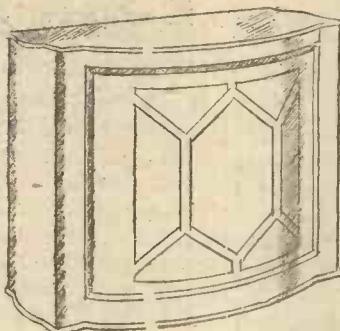
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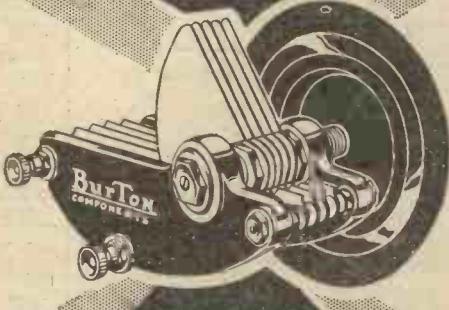
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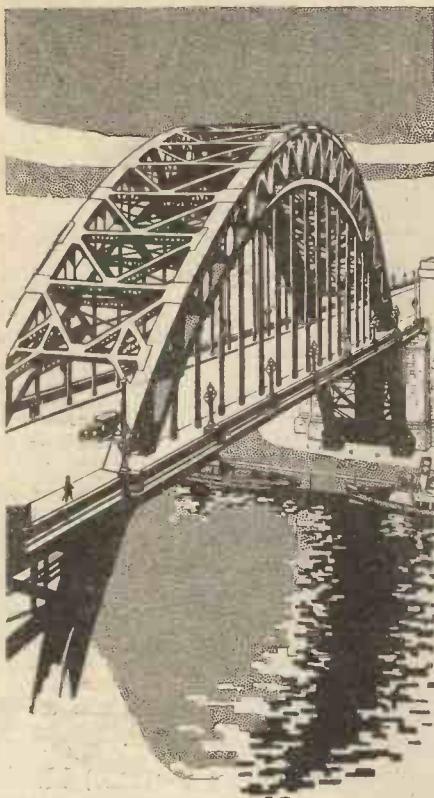
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## PRECISION INSTRUMENTS

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LISTENERS to 2LO and 5XX will be given an opportunity of hearing Mrs. Baldwin on April 28, when she is to make an appeal on behalf of the National Birth-day Fund for Maternity Services.

The concert to be given at Queen's Hall on April 12 and to be conducted by Sir Henry Wood will consist entirely of Wagner music. The soloists for the evening are Walter Widdop and Tatiana Makuschina.

On April 18 a special broadcast version of the *Nine O'Clock Revue* is to be given from 5GB. Morris Harvey, part-author and one of the principal stars in the original production at the Little Theatre, London, will be responsible for its presentation before the microphone. The performance will be repeated on April 20 for the benefit of listeners to 2LO and 5XX.

Act I of Richard Strauss's opera, *Der Rosenkavalier*, which opens the Covent Garden opera season on April 22, will be relayed to 2LO and 5XX. During the following weeks 5GB listeners will also be given opportunities of hearing excerpts from some of the performances.

Mr. George Allison on April 13 will deliver a running commentary on the international football match, Scotland v. England, which is being played on that date at Hampden Park, Glasgow; it is to be relayed to both 2LO and 5XX.

A polite satire, entitled *Square Pegs*, by Clifford Bax, is the title of one of the short plays to be found in the 5GB evening entertainment on April 20; it will precede *The Dear Departed*, a comedy of lower middle-class life, by Stanley Houghton.

Wagner's romantic opera, *The Flying Dutchman*, has been chosen as the work to be broadcast from the London studio on April 24; the cast includes Miriam Licette, Harry Brindle, Hughes Macklin, John Armstrong, Arthur Fear, and Evelyn Arden. The performance will be conducted by Percy Pitt.

*Spanish Shawls*, a novel entertainment specially written for the "mike" by Edmund Wynschenk, a Birmingham solicitor, will be presented at the 5GB studio on April 17. To use the author's own words, "the book with lyrics has been taken from the Spaniards when they weren't looking!"

Short-wave experimenters should be interested in the programme offered by the Cardiff station on April 13, for on that evening they will hear E. U. Ridgway and his partner, Frances Gayton, who are believed to be the first artistes to broadcast across the Atlantic on five metres!

Mabel Constanduros is responsible for another comedy *en casserole*, entitled *The*

*Dragon's Bride*; it is to be heard from Belfast on April 22. In this short play she will herself take the part of Ju-Jube, a village maiden, and will be supported by Harold Clements as Liquorice, a deep-dyed villain, and Olive Groves as a princess.

The Belfast Wireless Orchestra is probably making more appearances in outside halls than any other B.B.C. orchestra. On a recent visit to Londonderry to give a concert in the local Guildhall, a journey of nearly one hundred miles had to be undertaken by road through some of the wildest parts of Ulster.

In Scotland it is necessary to employ at least one stage of H.F. amplification if 5XX is to be received at loud-speaker strength. The B.B.C. admits that in districts where there is no prepondering signal from 5XX, it is not possible, without some form of directive aerial system, to render a set sufficiently selective to receive 5XX free from interference by Zeesen without seriously impairing the quality of reproduction.

An idea which is proving popular in Scottish broadcast programmes is that of a "musical tour" of the country north of the Tweed, each town, village, or district visited being marked by the rendering of some song or melody closely associated with it.

Some districts on the south side of Glasgow are being troubled just now by a peculiar fading of the transmissions from the local B.B.C. station. No solution of the problem has yet presented itself, but it is noticed that the fading is usually at its worst between 6 and 8 p.m., while there is no trace of it during the morning transmissions.

A dispatch from Rome states: plans for a powerful wireless station which will transmit and receive has been approved by a commission which is acting as a provisory Government of the Vatican. The Papal wireless will enable the Vatican to communicate with the whole world and have a power equal to the Italian station at Saint-Paul.

On March 29 the wireless station of the Eiffel Tower began to broadcast on a shorter wavelength, 1,470 metres, in the hope that its reception would be improved and Radio Paris and Daventry would not be impeded in their service. The new wavelength will be used until the Ministry of Posts, Telegraphs and Telephones publishes its study of the most suitable wavelengths for the Eiffel Tower.

According to a report issued recently by George Engles, director of the American National Broadcasting and Concert Bureau, musicians in the United States owe more than a third of their income to wireless. Out of a total of £6,000,000 spent on music in the United States during the past year, his statements show that the broadcasting companies have contributed fully £2,500,000.

**"CAN WE AMPLIFY ON SHORT WAVES?"**

(Continued from page 566)

amplification factor of the valve. In other words, we can obtain a greater amplification from the circuit than that given by the valve itself. It should be remembered that we are dealing with ordinary three-electrode valves, which have an appreciable capacity between anode and grid, and it is due to this that the resonant effect is obtained.

There is nearly always some qualifying factor which has to be taken into account. In this case it is a fairly serious one, apart from any question of stability and avoidance of self-oscillation. The anode circuit of the valve has a very marked effect upon the input circuit. We are accustomed to regard the input circuit, i.e., the grid-filament circuit, of the valve as of practically infinite impedance. Where grid current is actually flowing, as in the detector circuit, this, of course, is not the case, as has been pointed out in certain recent articles, but for pure amplification, where we bias the valves if necessary with a negative voltage to avoid any flow of grid current, we usually assume that the input impedance is infinite.

This, however, is not the case, the input impedance being not only finite, but relatively low under normal conditions. At the point where the maximum amplification occurs on short waves the effect is to introduce a relatively low resistance across the grid circuits. In a particular instance considered of amplification at 28.3 metres the shunt was as low as 300 ohms, the damping effect of which would be enormous and would prevent the tuned circuit connected across the grid and filament from developing any appreciable voltage whatever.

**A Cause of Failure?**

Indeed, it is probable that this unsuspected shunt-resistance effect has been the cause of the failure to obtain satisfactory amplification on short waves hitherto. Not only would it prevent any development of the resonance effect just discussed, but it would prevent the first circuit from tuning satisfactorily, and thus nullify the effect of the amplification from the valves, if any, right at the commencement.

The difficulty may be combated by methods ordinarily used to minimise the effect of shunt-resistance across tuned circuits, but such methods usually result in such a loss of signal strength as to render the gains of other causes of no avail. Whether this is the case or not in the present instance remains to be seen, but if it does not prove to be so, then we can look forward to a new system of short-wave amplification which may conceivably give results superior to any yet obtained.

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# LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

## Linen Speaker Improvements

SIR.—Very many congratulations on the linen-diaphragm loud-speaker. It is wonderful. Your readers might be interested to hear how I overcame its two defects, namely ugliness and ungainly size. I screwed four twisted oak legs to the inside of the large frame and made the speaker into a table! Five-inch boards placed round the inside of the same frame between the legs act as a good baffle. The top was covered with fine-mesh wire netting to make a level-surface. Over the top is then placed a "table cloth" of dark brown velvet. Light objects, such as a vase of flowers, can then be put on the "table," and the speaker is entirely disguised. K. L. D. (Richmond).

by the local stations on Sunday, as this would seriously interfere with the small-set owner searching abroad.

H. S. H. (London, W.)

SIR.—I am glad to see that AMATEUR WIRELESS is at last taking up the cudgels on behalf of the Sunday listener. I hope you will get Mr. Moseley interested in the subject, because his views are noticed even by those at Savoy Hill. I am one of thousands who don't want to listen to religion at all, and I object most strongly to the best part of Sunday evening being devoted to it. Fortunately, I possess five valves, and have all Europe to choose from; therefore, I have least right to growl; but, then, if I hadn't been driven out of my own country to find entertainment I wouldn't need five valves.

C. S. (Birkenhead).

## Organ Broadcasts

SIR.—I would ask your permission to support your contributors, Mr. Sydney Moseley and also Mr. J. B. Ingles, of Hawick, in their endeavour to get better broadcast organ music.

W. E. C. in his recent letter raises serious doubts as to whether he really knows anything about organs and organ music, in spite of his forty years of critical listening all over the world.

Recently I heard the Stoll organ, and this, in my opinion, would be far more suitable to broadcast. The gentleman who plays this organ is undoubtedly a musician, not a musical conjurer. The organ itself, too, is really an organ—unlike most cinema instruments.

I might add that I hold no brief whatever for the Stoll apart from expressing my appreciation of the performance of their organ and its player.

G. H. G. (Croydon).

## Sunday Programmes

SIR.—Regarding "Thermion's" suggestion re church services via wireless, I maintain (1) that all licence-holders under the present conditions are really entitled to alternative programmes or a return of 5s. on their licences; (2) if we are to have alternative programmes they should be really alternative.

It naturally follows, then, that although any who may be so inclined may have a broadcast church service on the one wavelength, those who are not so inclined need not at the same time be obliged to listen to it, but instead may be amused without having to seek this from foreign stations or go without.

Nor do I favour too much broadcasting

SIR.—The Sunday programmes are very good as they are. To be of any use a service must come from a church. Studio services are paltry. 5GB and 2LO need not have them simultaneously, however. What about a little *real* organ music (not cinema piffle) that the B.B.C. often give when the breadwinners are at work! But, for heaven's sake, don't give the B.B.C. a chance to inflict Jack Payne's pains on us. Let us have one day of comparative peace!

P. P. P. (London, N.).

## Linen-diaphragm Speakers

SIR.—Allow me, as one of your regular AMATEUR WIRELESS readers, to congratulate you on the huge success of the "Linen-diaphragm Loud-speaker." I built one a week after it was published in AMATEUR WIRELESS. Previously I had been using a good make of horn-type loud-speaker, which I exchanged for a Blue Spot unit. As soon as I connected the unit and switched on I was quite satisfied at parting with my horn speaker. Volume, as well as the fine bass, is a credit to this fine speaker. I used three-ply oak for the baffle, and completed the speaker by adding a fret-work front. No more horn loud-speakers for me.

W. H. G. (Newport).

## Appreciation

SIR.—Thanks for information re amplifier. The trouble is now remedied. Let me also thank you for the great help your excellent articles have given me. They are just what the amateur wants.

S. F. (Altrincham).

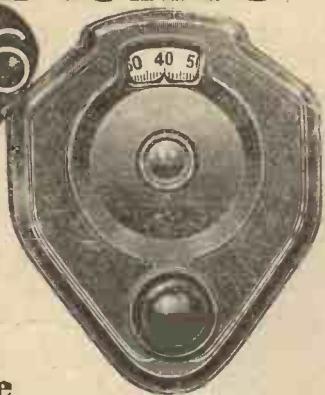
# BROADCAST TELEPHONY

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

Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)	Kilo- Metres	Station and Call Sign	Power (Kw.)
<b>GREAT BRITAIN</b>								
25.53 <i>II,751</i>	Chelmsford	(SSW) 15.0	201.3 <i>I,030</i>	Radio Lyons	1.5	276 <i>I,080</i>	Turin	7.0
243.0 <i>I,230</i>	Newcastle (5NO)	1.0	301 <i>937</i>	Bordeaux (PTT)	0.5	333 <i>900</i>	Naples (Napoli)	1.5
258.1 <i>I,161</i>	Leeds (2LS)	0.13	305 <i>932</i>	Marseilles (PTT)	0.5	387 <i>775</i>	Genoa	3.0
270.3 <i>I,109</i>	Sheffield (6LF)	0.13	322 <i>930</i>	Vitus (Paris)	2.0	443.8 <i>672</i>	Rome (Roma)	3.0
288.5 <i>I,040</i>	Bournemouth	(6BM) 1.0	336 <i>892</i>	Petit, Parisien	0.5	450 <i>658</i>	Bolzano	0.3
288.5 <i>I,040</i>	Bradford (2LS)	0.13	354 <i>846-7</i>	Algiers (PTT)	2.0	504.2 <i>595</i>	Milan	7.0
288.5 <i>I,040</i>	Edinburgh	(2EH) 0.35	370 <i>811</i>	Radio LL, Paris	1.0			
288.5 <i>I,040</i>	Hull (6KH)	0.2	382.2 <i>785</i>	Toulouse (Radio)	9.0			
288.5 <i>I,040</i>	Dundee (2DE)	0.13	400 <i>749</i>	Mont de Marsan	0.4			
294.1 <i>I,020</i>	Liverpool (6LV)	0.13	414 <i>724</i>	Radio Maroc	(Rabat) 2.0			
294.1 <i>I,020</i>	Stoke-on-Trent	(5ST) 0.13	448 <i>668</i>	Paris (Ecole Sup., PTT)	0.7			
294.1 <i>I,020</i>	Swansea (5SX)	0.13	473 <i>635-7</i>	Lyons (PTT)	5.0			
302.6 <i>991</i>	Belfast (2BE)	1.0	1,470 <i>203</i>	Eifel Tower	8.0			
311 <i>994</i>	Aberdeen (2BD)	1.0	1,478 <i>371</i>	Radio Paris	8.0			
323 <i>928</i>	Cardiff (5WA)	1.0						
358.9 <i>838</i>	London (2LO)	2.0						
378 <i>793</i>	Manchester	(2ZY) 1.0						
396 <i>757</i>	Plymouth (5PY)	0.13						
401 <i>748-3</i>	Glasgow (5SC)	1.0						
482 <i>622</i>	Daventry Ex.	(5GB) 25.0						
1,562.5 <i>I,92</i>	Daventry	(5XX) 25.0						
* Relay stations.		† Relays 2LO.						
<b>AUSTRIA</b>								
248 <i>I,209</i>	Linz	0.5	210 <i>I,370</i>	Flensburg	1.5			
277.8 <i>I,080</i>	Salzburg (under construction)	0.5	240 <i>I,250</i>	Nürnberg	4.0			
354.2 <i>847</i>	Graz	0.5	250 <i>I,200</i>	Kiel	0.7			
456 <i>694</i>	Klagenfurt	0.5	250 <i>I,200</i>	Cassel	0.7			
456 <i>694</i>	Innsbruck	0.5	263.2 <i>I,140</i>	Cologne	4.0			
520 <i>577</i>	Vicuna	20.0	267.8 <i>I,120</i>	Muenster	1.5			
<b>BELGIUM</b>								
220 <i>I,360</i>	Chatelineau	0.25	272.7 <i>I,100</i>	Kaiserslautern	1.5			
250 <i>I,200</i>	Schaerbeek	Brussels	280.4 <i>I,070</i>	Königsberg	4.0			
275 <i>I,090</i>	Ghent	0.5	283 <i>I,067</i>	Breslau	4.0			
280 <i>I,070</i>	Liège	0.5	326.4 <i>919</i>	Gleiwitz	0.0			
312 <i>970</i>	Arion	0.25	330 <i>909</i>	Bremen	0.75			
612 <i>580</i>	Brussels	10.0	361.9 <i>829</i>	Leipzig	4.0			
<b>CZECHO-SLOVAKIA</b>								
265 <i>I,70</i>	Kosice	2.0	374.1 <i>802</i>	Stuttgart	4.0			
278 <i>286</i>	Feriby (testing)	12.0	391.6 <i>766</i>	Hamburg	4.0			
299.3 <i>I,060</i>	Bratislava	4.0	421.3 <i>712</i>	Frankfurt	4.0			
342 <i>873</i>	Prague (Praha)	5.0	455.9 <i>654</i>	Danzig	0.75			
432.3 <i>694</i>	Brunn (Brno)	2.4	458 <i>654</i>	Aachen	0.75			
<b>DENMARK</b>								
339 <i>883</i>	Copenhagen (Kjøbenhavn)	1.0	462.2 <i>649</i>	Langenberg	25.0			
1,155 <i>259</i>	Kalundborg	7.5	476 <i>630</i>	Berlin	4.0			
<b>ESTHONIA</b>								
408 <i>735</i>	Reval (Tallinn)	1.3	537 <i>559</i>	Munich	4.0			
<b>FINLAND</b>								
374 <i>800</i>	Helsingfors	(Helsinki) 0.8	566 <i>530</i>	Augsburg	0.5			
1,601 <i>159</i>	Lahti	20.0	568 <i>530</i>	Hanover	0.7			
<b>FRANCE</b>								
30.75 <i>9,755</i>	Agen	0.25	577 <i>520</i>	Freiburg	0.7			
200 <i>I,500</i>	Fécamp	0.3	1,050 <i>182</i>	Zeesen	20.0			
211.3 <i>I,420</i>	Beziers	0.1	1,050 <i>182</i>	Norddeich	10.0			
233 <i>I,260</i>	Bordeaux (Radio Sud-Ouest)	2.0						
245 <i>I,224</i>	Lille (PTT)	0.8	31.4 <i>9,554</i>	Eindhoven	(PCJ) 25.0			
252.1 <i>I,190</i>	Juan-les-Pins	0.4	38.8 —	Kootwijk	(PCL) 32.0			
253 <i>I,185</i>	Montpellier	0.25	837 <i>889</i>	Huizen (until Wed. 12.40 G.M.T.)	5.0			
254 <i>I,180</i>	Rennes (PTT)	1.0	1,073 <i>279-5</i>	Hilversum	(ANRO) 5.0			
255 <i>I,175</i>	Toulouse (PTT)	1.0	1,152 <i>162</i>	Huizen (after 5.40 p.m. and on Sundays)	5.0			
268 <i>I,118</i>	Strasbourg	0.8	1,152 <i>162</i>	Scheveningen-haven	5.0			
274 <i>I,692</i>	Limoges (PTT)	0.5						
<b>GRAND DUCHY OF LUXEMBOURG</b>								
1,280 <i>234.2</i>	Radio Luxembourg	0.25	548 <i>548</i>	Budapest	15.0			
<b>HOLLAND</b>								
83.4			548 <i>548</i>	Budapest	15.0			
<b>HUNGARY</b>								
1,073 <i>279-5</i>			548 <i>548</i>	Budapest	15.0			
<b>ICELAND</b>								
833.3 <i>900</i>			833.3 <i>900</i>	Reykjavik	1.0			
<b>IRISH FREE STATE</b>								
222.2 <i>I,355</i>	Cork (5CK)	1.5	411 <i>733</i>	Dublin (2RN)	1.5			
222.2 <i>I,355</i>			411 <i>733</i>	Dublin (2RN)	1.5			
<b>ITALY</b>								
276 <i>I,080</i>			276 <i>I,080</i>	Turin				
333 <i>900</i>			333 <i>900</i>	Naples (Napoli)				
387 <i>775</i>			387 <i>775</i>	Genoa				
443.8 <i>672</i>			443.8 <i>672</i>	Rome (Roma)				
450 <i>658</i>			450 <i>658</i>	Bolzano				
504.2 <i>595</i>			504.2 <i>595</i>	Milan				
<b>JUGO-SLAVIA</b>								
308.3 <i>973</i>			308.3 <i>973</i>	Zagreb (Agram)	1.25			
452 <i>664</i>			452 <i>664</i>	Belgrade	4.0			
582 <i>515</i>			582 <i>515</i>	Ljubljana	5.0			
<b>LATVIA</b>								
520 <i>567</i>			520 <i>567</i>	Riga	2.0			
<b>LITHUANIA</b>								
2,000 <i>150</i>			2,000 <i>150</i>	Kovno	15.0			
<b>NORWAY</b>								
242 <i>I,240</i>			242 <i>I,240</i>	Rjukan	1.0			
297 <i>I,030</i>			297 <i>I,030</i>	Notodden	0.7			
305 <i>820</i>			305 <i>820</i>	Bergen	1.0			
387 <i>775</i>			387 <i>775</i>	Fredrikstad	1.0			
459 <i>653</i>			459 <i>653</i>	Aalesund	1.0			
496 <i>604</i>			496 <i>604</i>	Oslo	1.5			
500 <i>600</i>			500 <i>600</i>	Tromso	1.0			
568 <i>550</i>			568 <i>550</i>	Hamar	0.7			
<b>POLAND</b>								
314 <i>955</i>			314 <i>955</i>	Cracow	1.5			
336 <i>890</i>			336 <i>890</i>	Posen	1.5			
416 <i>721</i>			416 <i>721</i>	Kattowitz	10.0			
456 <i>658</i>			456 <i>658</i>	Wilno	1.5			
1,305 <i>215</i>			1,305 <i>215</i>	Warsaw	10.0			
<b>PORTUGAL</b>								
817.5 <i>945</i>			817.5 <i>945</i>	Lisbon CTIAA (Wed. and Sat.: 10—midnight)				
<b>ROUMANIA</b>								
805 <i>757</i>			805 <i>757</i>	Bucharest	4.0			
<b>RUSSIA</b>								
825 <i>363.5</i>			825 <i>363.5</i>	Moscow (PTT)	25.0			
925 <i>323</i>			925 <i>323</i>	Homel	2.5			
1,000 <i>300</i>			1,000 <i>300</i>	Leningrad	20.0			
1,444 <i>207</i>			1,444 <i>207</i>	Moscow	30.0			
1,635 <i>178</i>			1,635 <i>178</i>	Kharkov	15.0			
<b>SPAIN</b>								
277.8 <i>I,080</i>			277.8 <i>I,080</i>	Barcelona	(EAJ13) 2.0			
309 <i>970</i>			309 <i>970</i>	Oviedo (EAJ19)	0.5			
348 <i>857</i>			348 <i>857</i>	Barcelona (EAJ1)	3.5			
370 <i>803</i>			370 <i>803</i>	Seville (EAJ5)	0.5			
400 <i>750</i>			400 <i>750</i>	Radio Espana	1.0			
401 <i>744</i>			401 <i>744</i>	San Sebastian (EAJ8)	0.5			
426.7 <i>703</i>			426.7 <i>703</i>	Madrid (EAJ7)	3.0			
456 <i>658</i>			456 <i>658</i>	Salamanca (EAJ22)	0.55			
<b>SWEDEN</b>								
261 <i>I,149</i>			261 <i>I,149</i>	Hörby	10.0			
265 <i>I,130</i>			265 <i>I,130</i>	Trollhattan	0.4			
333 <i>900</i>			333 <i>900</i>	Falun	0.5			
346.8 <i>865</i>			346.8 <i>865</i> </td					

# Brownie

3/6



**the  
'DOMINION'  
Slow Motion Dial**

A Vernier Dial at 3/6! Bring your set up-to-date by fitting this slow motion dial. The mechanism is of special non-back-lash construction which makes very fine tuning easy. Finished in smooth black or beautifully grained mahogany bakelite, this unique dial gives high-class finish to every set in which it is included.

# Brownie

wireless

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with our DUAL RANGE COILS  
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CLARION THREE  
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SCREEN-GRID  
CIRCUIT COILS

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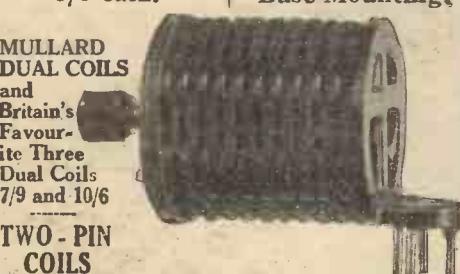
H.F. Choke  
Massive All Purpose  
5/9 each.  
for Panel Mounting,  
Valve Holder  
Base, or 6 - pin  
Base Mounting.

MULLARD  
DUAL COILS  
and  
Britain's  
Favourite  
Three  
Dual Coils  
7/9 and 10/6

TWO - PIN  
COILS  
all types  
from 1/6

Illustration of our Cossor Circuit Dual  
Aerial Coil, showing base mounting  
and switch control.

TURNER & CO. 54 STATION RD., LONDON : N.11



## WHICH MAINS WIRE IS EARTHED?

READERS may recall that information was given under the above heading in a recent issue, regarding the testing of the mains for polarity and earthing. It should have been stated that when testing for the polarity of the mains, one wire of the lamp adaptor should be connected to one wire of the lamp-holder, thus leaving one wire from the adaptor free and one wire from the lamp-holder free. These two wires should be kept well apart and after plugging a suitable lamp in the lamp-holder the adaptor should be inserted into one of the lamp sockets of the house. The two free wires should then be dipped into a glass of ordinary tap water. Bubbles will be seen to rise from the ends of both wires, but more bubbles will be seen to rise from the end of the wire which is negative.

Having determined the polarity and marked the house-lamp socket accordingly, the next step is to find out which main is earthed.

### Negative or Positive?

One wire of the lamp socket should be connected to an earthed object such as the lead covering of the mains or a water pipe, whilst the other wire should be connected to the negative main of the house. Provided there is a lamp in the holder and the lamp does not light the negative main is earthed. If the lamp lights then possibly the positive main is earthed. To make sure, connect the unearthing wire to the positive main, leaving the other flex still connected with earth. If the lamp does not light then the positive main is earthed. If the lamp does light, then it may safely be assumed that neither main is earthed. In every case the lamp should be rated at the full voltage of the mains and should light up at full brilliancy.

If the lamp only lights up at half brilliancy the mains should be treated as though neither main is earthed. If the lamp lights at full brilliancy on one wire and very dully on the other, then there is a faulty earth on the mains at the time of testing, and the mains should still be treated as though neither main were earthed. If your negative main is earthed you may certainly consider yourself lucky to a certain degree, but when in doubt treat them as though neither main were earthed. This means placing a large capacity fixed condenser between the earth terminal of your receiver and the actual earth wire. The condenser should be either .5 or 1 microfarad capacity and should be capable of withstanding double the voltage of the house mains.

Finally, when testing or using the house mains always work on the house side of the house fuses, and not on the supply side of the house fuses.

Let "Amateur Wireless"  
solve your problems



## EVERY VALVE SET USER NEEDS A **WATES** "three-in-one" **VOLT-AMP** RADIO TEST METER

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0-6 VOLTS  
0-30 MILLIAMPS

R.M. 5,000 ohms.

Can be used as  
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**Three in One**  
M.B.

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Finest Irish Linen, Dope, Brackets,  
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BLUE SPOT (adjustable) Unit, 25/-  
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or BANTAM THREE, Oak 11/6, Mahogany 13/6

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Messrs. A. F. Bulgin & Co., of 9-11 Cursitor Street, London, E.C.4., have issued an interesting booklet illustrating and describing a selection of foreign-made components which Messrs. Bulgin import direct from all parts of the world. The list number of this booklet is 125, and readers can obtain copies on application.

# OUR INFORMATION BUREAU

**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

## Indoor versus Outdoor Aerials.

Q.—I have been informed that if I erect and use an indoor aerial I shall stand a better chance of getting distant stations than I do at present with an outdoor aerial. I have a four-valve set, with one stage of what is known as H.F. amplification, and was assured by those from whom the set was purchased that this set would be capable of getting foreign stations on my speaker. I can only get about two foreign stations and only three British stations, the latter being London, 5GB, and 5XX. Can you account for the apparent paradox regarding an indoor aerial being better for foreign stations when my outdoor aerial will not get them?—F. K. (Fulham).

A.—This "apparent paradox" is easily explained. When using an outdoor aerial close to a broadcasting station the amount of energy actually picked up by the outdoor aerial from the local station is sufficient to swamp out all weaker signals. By using an indoor aerial the amount of pick-up from the local station is considerably reduced, thus permitting the selection of signals from more distant stations. This is practicable only in sets having at least one H.F. stage to offset the reduced pick-up of the aerial. In some cases quite good results can be obtained with a plain detector set and

an indoor aerial, but most satisfactory results are obtained when a stage of H.F. is used.

—A. L.

## When Asking Technical Queries

**PLEASE write briefly  
and to the point**

A Fee of One Shilling (postal order or postage stamps) 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.

## Wavemeter Calibrating.

Q.—I have a buzzer wavemeter covering from 250 to 500 metres. Will you tell me how

to calibrate and use it?—S. M. (Blackheath).

A.—Tune in any station working between the wavelength limits you mention, and set the wavemeter buzzer in operation. Turn the tuning dial of the wavemeter until the sound of the buzzer is heard in the phones or loud-speaker with the greatest intensity. If the buzzer can be heard over a great range of adjustments, move it farther away from the set. When you have decided with which wavemeter setting the buzzer is heard at the greatest strength make a note of the reading. Do this with as many stations as practicable. Now either make a table showing the relation between the wavemeter readings and wavelength or draw a graph showing this. In order to pick up a station with the aid of the wavemeter, set the latter to the reading corresponding to the wavelength of the desired station, and set the buzzer in operation. Then alter the tuning of the set until the buzzer is heard most strongly, when the set will be tuned to the station. Cut off the buzzer and listen for the station itself. To find the wavelength of an unknown transmission which has been tuned in, adjust the wavemeter until it is most strongly heard, and then find the wavelength corresponding to the wavemeter reading.—R.

# player's please



BEGG NO. 154011

NCC 207

# DISPOSAL SALE

of High Grade Electrical and  
Wireless Apparatus by the  
**R.A.F. and G.P.O.**

**METERS** — Milli-ammeters, all ranges, 15/- to 22/6. 0 to 500 volts, 45/- Weston Meters, all ranges to 1,600 volts. Elliott, etc., Testing Sets, E.108, 4 ranges, amps, and volts, 45/- A.C. Hot Wire, 3/amp, 4/- Frequency Meters, various ranges. Capacity Meters, £8; Wheatstone Recorders, £12; Multi-Micro Calvins, 60/- Res. Boxes, 17/6; Hydrometers, 1/6; Relays, 6/6; Remote Switches, 15/-; 12 in. Spark Coils, £10. Anodes Converters from A.C. or D.C. Mains for outputs of 400 to 800 watts. H.T. Generators in stock, 50 watts to 2 kw. Weston 50/- Micro Ammeters for Grid Bias testing, 35/- only.

**TRANSMITTERS.** R.A.F. 1 in. Spark with A.T.I. and all fittings, in polished mahogany case. Cost £15. Sale, 15/- each; 100 watts, 25/-; 250 watts, 50/- 2-Valve Aircraft ditto, with Osram valves. Speech or Morse, 40/- each. No. 1 Tapping Keys, open type, with massive contacts, 6/- each. Transmitting No. 51 K.D. with aluminium cover, double contact, fine work, 7/6 each. Morse Practice Sets with Buzzer and Key on Mahogany panel, 8/6 each. Morse Recorders, for making picture machines, 35/- each. Spark Gaps, 2/- Artillery Electric Toches and Battery, 2/6.

**TRANSMITTING VALVES.** 6 volt 40, 100, 200, and 250 watts, from 4/6.

**WAVEMETERS** by Townsend, Paul, Silvertown, Gambrill, and Marconi, from 15/-.

**LOUD-SPEAKERS.** R.K. Cones fitted B.T.H. Moving Coil, 100 surplus at only 7/6 each. Marconi L.S. Magnets, 6v, for moving coil cones, 20/- Gramo. Motors. Genuine Panatone Motors, run direct off mains supply, fitted Turntable, etc. Few only 37/6 each. Worth 24 10s. Chokes, Round's Output L.F. Chokes by Marconi, for feed from power amplifiers. Latest model, 7/6. Condensers. New Sterling, 2 mfd., genuine Mansbridge Condensers to 440 volts, at reduced price of 2/10 only.

**L.T. ACCUMULATORS.** Celluloid, 2 volt 20 amp., 3/-; 4 volt 20 amp., in case, 6/3; H.T. in Ebonite, 1,000 m/a hours; 60-volt, 19/6; 90-volt, 29/-; 120-volt, 39/-; 3-v. Inert Dura, 1/3; Cell Fillers, 1/6. Hydrometers, 1/- Petrol Testers, 2/6.

**NEW CINEMA ARC LAMPS,** 50/-. Leitz Lab. Arc Lamps, 5 a., 55/-.

**INSULATORS.** H.T. in porcelain and ebonite, from 6d. each. Empire Insulating Cloth for Coils, Chokes, etc., 1/2 roll of 100 sq. in. 4-Pin Plug and Sockets, 8d. pair. 2-Pin do. Wall Plug and Baser, 5 amp., 10d.

**MARCONI AERIAL ADJUSTERS,** 30 to 300 Micro-henrys, 4/6. Heavy Rubber Insulated Lead-in Wire, copper strand coil, 2/- doz. yards, 3/22 V.R. Cable, 50 ft. coils, 1/-. Silk Flex, 1/6 doz. yards.

**52 PETROL-ELECTRIC GENERATING SETS.** Air Force Portable, 1 kw. 50/70 volts 20 amps., from £20. 150 Electric Bench and Portable, 110 and 220 v. Drills, from £3 10s. Electric Hand Blowers, 220 v., 17/6. Immersion Heaters, 110 and 250 v., 3/6. Electric Saucepans, 5/-; 12 v. Carburettor Heaters, 2/6.

**RECEIVERS.** New R.A.F. Aircraft 3-Valve semi-portable, 1 Det., 2 L.F., 3 anti-ping Holders, Remote Control, Variable Condenser, and Rheostat. All tested on Broadcast, 27/6. R.A.F. 5-valve ditto, with Valves £4. Or fitted in polished Mahogany Cabinet with S.M. Dials, £6 10s. Burndepot 6-valve Super-Het, with valves and 2 frame aerials. New and O.K., £18 10s. List £45. 3-valve L.F. Amplifiers, 30/- Twin Loudspeaker Wire per 100 yds., 3/- 2-Pin Wall Plugs and Sockets, 10d. Remote Tuning Controls, fitted 2 varia-condensers and rheo, 2/- each.

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## "EXPERIMENTS WITH NEON TUBES."

(Continued from page 564)

that one can obtain extremely sensitive modulation by inserting the secondary of a modulation transformer in series with the supply leads. Fig. 5 gives a suitable circuit for neon lamp modulation. Although the neon lamp may be no better as a modulator than the ordinary three-electrode valve, yet it is certainly much cheaper and is capable of giving excellent results.

### How It Modulates

Across the aerial circuit is shunted the lamp in series with the secondary of a modulation transformer M and a high-tension supply. Adjust the resistance R until the lamp glows feebly. When the microphone is spoken into the potentials set up across the transformer vary the conductivity of the lamp, owing to its nonlinear characteristic, causing a varying damping effect on the aerial circuit. Another and preferable circuit arrangement is shown in Fig. 6. Here a third electrode is formed by neatly sticking a coat of tinfoil to the outside of the bulb by means of shellac varnish. The tinfoil should cover the whole of the bulb, but on no account must it be allowed to touch the cap of the lamp or any other conductor at earth potential. Bind a piece of copper wire round the bulb so as to make good contact with the tinfoil. This wire should then be connected to the grid of the oscillator valve.

When the lamp glows the bulb-space becomes semi-conductive, and the capacity effect of the outer coating with the interior forms an excellent conducting path for H.F. currents. The most effective modulation is obtained by using a tuned grid circuit and shunting the absorption modulator across this. By adjustment of the grid circuit tuning condenser a very flexible control of the extent of modulation is obtained. The polarising potential for the neon lamp may be derived from the oscillator high-tension if desired.

### Rectified H.T. from a Spark Coil

Fig. 7 gives the connections for obtaining H.T. supply from a spark coil, and is suitable for use with C.W. and telephony transmitters. The condensers should be built to stand very high peak voltages. When the interrupter of the coil "makes" the circuit only a low voltage of a certain polarity is set up in the secondary, and this is insufficient to drive any current through the lamp. At "break," however, a high potential is set up across the secondary, and this easily passes through the lamp and charges up condensers C<sub>1</sub> and C<sub>2</sub>. Since only the "break" currents get through the lamp, and these are always of the same polarity, it follows that the condensers are charged with D.C. Probably two neon lamps will have to be connected in series, as one lamp may not stand a back-voltage of more than 200.

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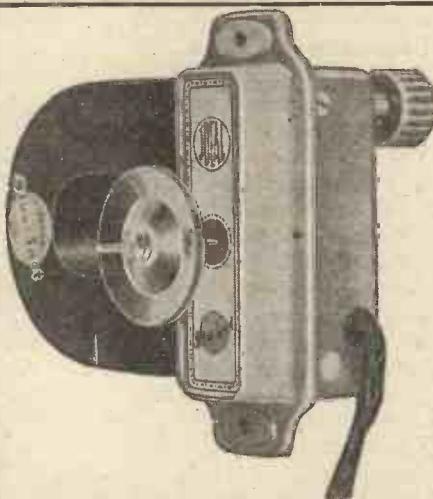
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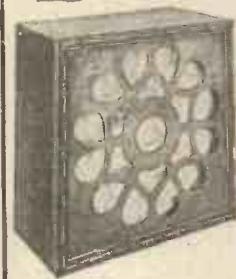
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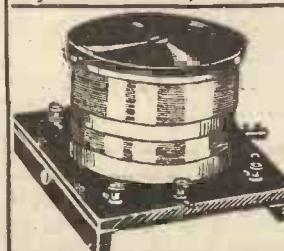
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(Continued from page 550)

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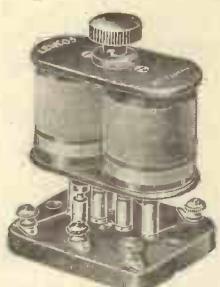
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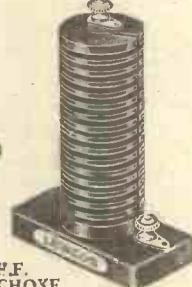


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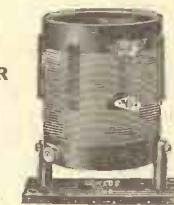


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Dual Range Tuner, W.G.2, as used in FERRANTI Circuits 15/-

### ALL FROM THE MAINS TWO

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AMATEUR WIRELESS, APRIL 20, 1929

TWO SETS: "£5-5-0 PORTABLE" & "STABILITY 4"

# Amateur Wireless

and  
Radiovision

Every Thursday 3<sup>d</sup>

Vol. XIV. No. 358

Saturday, April 20, 1929

The advertisement features a man and a woman sitting outdoors on a grassy hillside. The man is wearing a dark suit and hat, holding a briefcase. The woman is wearing a light-colored coat and hat. Above them, large stylized text reads "The £5-5-0 PORTABLE". At the bottom left, the text "INEXPENSIVE & EFFICIENT" is visible. At the bottom right, the text "BLUEPRINT AVAILABLE" is visible.



# The basis of perfect reception

**WRITE FOR ONE OR MORE  
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- R.33 High Frequency Choke.
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Q Coils.

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"QSG" H.F. Transformers for Screened

Grid Valves.

Dual Range Coils unscreened.

R.45a Sheet illustrating range of Lewcos Radio Products.

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Q.A.A.	:	15/-
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**H.Q. LOUD**  
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'Don't Forget to Say That You Saw it in "A.W."'

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12s. 6d.  $9\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2}$ , for  
6 milliampere emission.

These batteries represent the finest  
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hour of service for low power  
receiving sets.

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FOR satisfactory and economical service you  
must use H.T. Batteries of correct capacity.  
The following table is a useful guide to the  
battery you should install:

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7s. 6d.  $9\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{1}{2}$ , for 6 milliampere  
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These batteries are good value for money, and at the  
stated emission satisfactory service is guaranteed.

The "POPULAR" Series.  
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In brown metal containers.  
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These units have large capacity  
cells and will give economical service  
with power valves requiring  
heavy emission of current.



"SUPER 1" Super Capacity  
45 volt. 21s.  $4\frac{1}{2} \times 8\frac{1}{2} \times 8$ , for  
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These batteries will give reliable service  
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The Ever Ready Company provides  
a suitable and reliable Battery of  
any voltage for every set. Ever  
Ready Batteries are convenient,  
trouble free, give purity of tone,  
and are the handiest form of H.T.  
supply.

# EVER READY

Reg'd.

## BRITAIN'S BEST BATTERIES

APRIL 20, 1929

No. 358. Vol. XIV

# Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

— Editor: BERNARD E. JONES —

Technical Editor: J. H. REYNER, B.Sc., A.M.I.E.E. :: Research Consultant: W. JAMES :: Assistant Editor: H. CORBISHLEY

## Controversial Politics!—and Politics by Wire—People's Palace "Pops"— Elstree Rivals Savoy Hill—Fultograph and Weather—KDKA Television

**Controversial Politics!**—The series of political broadcasts organised by the B.B.C. is certainly having its effect. Following the first political speech a prominent daily paper came out with a glaring poster "An Amazing Broadcast." Well, the B.B.C. won't need any outside defence. We've asked for these controversial speeches, and in the opinion of AMATEUR WIRELESS, it is far better to have them, and to have daily papers fighting over the effects on the following day, rather than to have continued with the dull uncontroversial stuff that was put out before the rule was changed. Controversy keeps the papers alive, and the same medicine is good for the microphone.

**—and Politics by Wire**—Moreover, the microphone isn't having the monopoly of politics. Great strides are being made in the land-line relays of political speeches, as was described recently in AMATEUR WIRELESS. Baldwin and Neville Chamberlain have, on several occasions, addressed audiences in other halls by land-line and loud-speakers (with wireless-type amplifiers), but in no case has the number of unseen audiences exceeded nine. But now we have Lloyd George's speech to no fewer than twenty-eight centres, the land-line arrangements necessitating about 3,000 miles of route wire. Apparently the big political leaders pin faith to the loud-speaker, and they have not been loth to take advantage of the microphone.

**People's Palace "Pops"**—The B.B.C.'s series of orchestral concerts from the People's Palace in the East End of London seems to be going very well. An AMATEUR WIRELESS representative, who was at the Palace during a recent broadcast, found the arrangements very similar to those employed on previous occasions, and there is no doubt but that the hall is quite good acoustically. It is, as so many



A new use for radio! This armoured car, designed for the rough roads of India, has a complete transmitter and receiver. It is here seen being tested in London.

people have said, to be regretted that the locality of the hall is against the possibility of having the same kind of "gate" as would obtain were the concerts held elsewhere: but for the "mike," environment must take second place, and acoustics come first! Incidentally, Landon Ronald seems to be putting in some very hard work, which is well justified by results.

**Elstree Rivals Savoy Hill**—They are going great guns at Elstree's "talkie" studios. The studios themselves are

formidable rivals to anything that the B.B.C. has done in this respect, and although those now being constructed are only temporary, one is 70 ft. long, 40 ft. wide and 25 ft. high. Two more giant rooms, which will be as big as anything in Hollywood, will be started in a month or so. The talking-film engineers are adopting the flannel draping which the B.B.C. people appear largely to have dropped.

**The Operas**—The opening night of the opera season is April 22, and on that occasion Act I of *Der Rosenkavalier* is to be given from the Royal Opera House, Covent Garden, to 2LO and 5XX. It is a fact worth noticing that arrangements have been made whereby during the season, listeners to 5GB will also be

given the opportunity of hearing excerpts from the operas. Wagner's romantic opera, *The Flying Dutchman*, is being produced in the Savoy Hill studios on April 24, the cast including many "stars," but it will be heard from 2LO only.

**Fultograph and Weather**—The secret was disclosed in these columns recently that Fultograph apparatus has been tried out in high circles, namely, at the Royal Airship Works at Cardington. A weather chart was recently prepared and transmitted via Fultograph to the Royal Meteorological Society at South Kensington, and following this a general inference and weather forecast was also sent. We have seen both the chart and the printed report, and both are excellent. As is well known, the "straight line" test is most severe on wireless picture machines of the Fultograph type, and there are plenty of such tests in weather charts!

**KDKA Television**—Here's a tip, "listen" for KDKA's television broadcasts on 63 metres, between 10 and 11 G.M.T., on Mondays, Wednesdays and Fridays; speech on 25 metres; 60-hole disc; turning left to right, at 1,200 r.p.m.

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# CAPT. A. G. D. WEST LEAVES THE B.B.C.

*Research Chief Turns Over to Radio Gramophone and Talkies*



Capt. A. G. D. West

THE B.B.C. has been suffering heavy losses lately, particularly on its engineering "front." The advent of talking films has attracted many engineers and several of the leading "programme" people, including R. E. Jeffrey, the producer, to the rather more prosperous parish of Elstree (Herts), which is England's Hollywood (Cal.). The latest important move is that of Captain A. G. D. West, the B.B.C. research chief, who has just resigned in order to take up an important position on the technical side of the H.M.V. Gramophone Company.

Captain West will be chiefly remembered by listeners in connection with the many startling "stunts" he carried out in the early years of broadcasting, such as the first American broadcast relay, the transmissions from aeroplanes, railway trains, divers' helmets and the like, but most of his work has been carried out "behind the microphone." I met Captain West when the original B.B.C. Development Department was formed at the end of 1923, the first year of British broadcasting. He had come to the B.B.C. after having been a Wrangler with distinction in the mathematical tripos at Cambridge and achieving 1st class honours at the London University in his stride. He also worked with Sir Ernest Rutherford and Professor Appleton at the Cavendish Laboratory for a year. Captain West served in all three services during the war, but was concerned particularly with radio work in the R.A.F. When peace "broke out," he went to Cambridge.

#### The Development Department

When the B.B.C. first commenced broadcasting, the stations were actually operated by the radio manufacturers who had erected them. Birmingham, for instance, was maintained by the Western Electric Company, and London and Newcastle by the Marconi Company. Broadcasting officially commenced in November, 1922, but the actual B.B.C. engineering staff numbered only about half-a-dozen for many months.

In about the middle of 1923, the engineering organization began to get into shape and take over the operation of stations from the manufacturers. There came the necessity for an experimental section and Captain West was called in to investigate certain problems and form his own Development Department. At the end of 1923, his "flying squad" was formed and I had the honour of being appointed his assistant. I am now appointing myself his "Boswell"!

#### The First Relay

One of the first problems of Captain West's department was the design of a "wireless link," to be used for relaying American broadcasting. In those days, the reception of a weak station on a 100-metre wavelength was no easy matter, screen-grid valves, neutrodynes and low-loss coils not being general at that time. Nevertheless, a receiver which included six H.F. valves, transformer coupled, was successfully used, the stability being maintained by careful design and the use of low-capacity sausage-shaped valves. It seems a great pity that this type of valve, with its obvious advantages, should be abandoned in favour of the type of valve and holder that has now become standard.

I well remember the days—and nights—we spent in a cold little hut at Biggin Hill Aerodrome, playing about with this elaborate transatlantic receiver. Unfortunately, the signals of the distant KDKA did not become steady or strong until the London station had closed down and a relay was impossible. However, on the last day of 1923, half-an-hour's relay of KDKA was carried out and we heaved a sigh of relief and went home!

#### Stunts

After the first relay came any amount of stunts, and Captain West kept J. A. Murray and myself busy in all kinds of awkward places, from aeroplane cockpits to the top of Big Ben tower. Transmissions had to be relayed by wireless from the Old Vic. to Savoy Hill owing to the unsatisfactory land-line, and a short-wave transmitter was erected on the roof of a public house next door to the theatre. The impulses from a microphone in the footlights were radiated from this aerial and picked up on a superheterodyne at Savoy Hill.

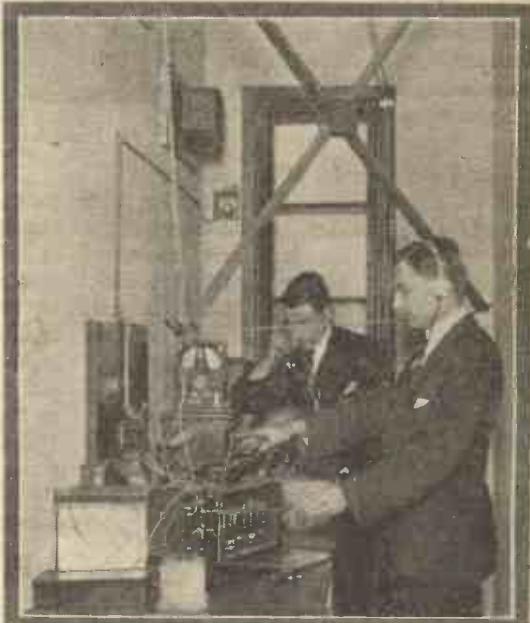
Another more straight-forward stunt was the picking-up of the song of the nightingale. This particular effort was especially

interesting in that it was indirectly the "cause" of all the fading and dissolving technique of modern radio plays.

It was found necessary to set a number of microphones in the woods at Oxted, and switch on the particular microphone which was nearest to the singing nightingale. Clicks and noisy changeovers from one microphone to another could not be permitted, and the duplication of microphone amplifiers meant the transport of much additional gear to the spot. Thereupon, the fade or dissolve from one microphone to another was evolved and successfully used for the first time at Oxted.

#### Research

The constant expansion of the engineering side of the B.B.C. made it necessary for a sub-division to be made in the experimental design and research work carried on by the Development Department. Captain West was appointed chief of a new section, Research, and I (his faithful Boswell!)



Capt. West engaged in research work for the B.B.C.

followed him. Studio acoustics, reverberation of auditoriums, measurements of microphone, amplifier and loud-speaker efficiencies now formed the programme of the department

One of the first inventions of Captain West after taking up the question of acoustics, was the practical supply of an artificial echo on transmissions from highly damped small rooms. It seems a pity that the B.B.C. are to lose the services of such an experienced and enterprising research worker as Captain West.



# ECONOMY WITH FIBRE NEEDLES

## How To Make a Simple Cutter

A USEFUL little device for cutting fibre needles may easily be made from a piece of wood and an old Gillette razor blade. The fibre needle is much better than the ordinary steel needle, especially for gramophone purposes; but of course, when these are used a cutter is needed if economy is to be studied so that the needles can be re-cut. As a rule, a needle can be cut and re-set as many as four times. The important thing to see to is that the cutting angle is correct.

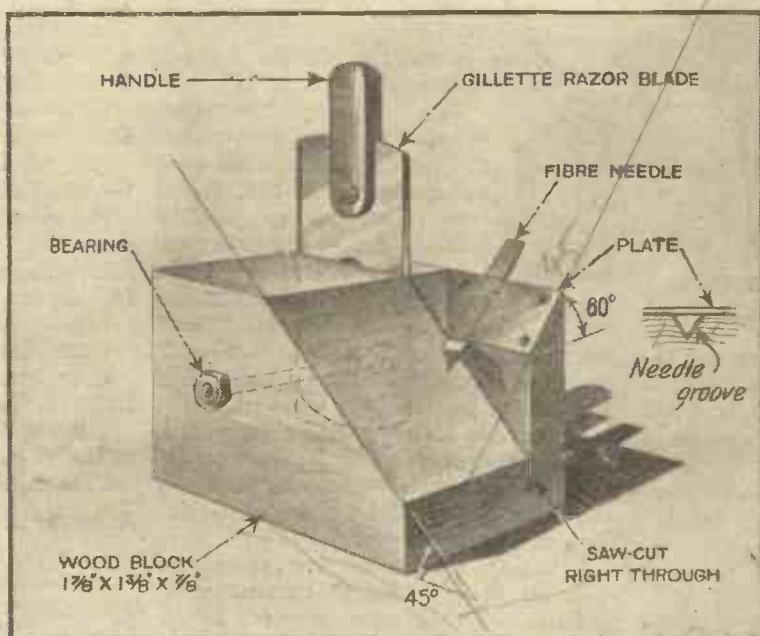
First, take a block of wood,  $1\frac{1}{8}$  in. by  $1\frac{3}{8}$  in. by  $\frac{3}{8}$  in., and take a cut out of this at an angle of 45 degrees, as shown in the drawing. Also make a saw-cut as indicated, and a bevelled edge at an angle of 60 degrees with a V cut for the needle to sit in. The accuracy of this last detail is important, but the work is quite easy to do if care is taken. The razor blade is pivoted in the sawcut and held by means of a screw and

nut. A small link pinned over the bevelled needle rest will allow the needle to be inserted in the groove and held in position for cutting. The razor is then just drawn down and a perfect cut is made at the

correct angle. The wood used for the block should be preferably hard and a piece of oak or mahogany will do for the purpose.

A small handle should be attached to the razor blade to make the gadget easy to handle. The blade may be removed at any time for resetting or replacing with a new blade. It will be found that with this device the cut will be perfectly sharp and there will be no burred edges at any point of the needle. For the rest of the details the drawing is quite easy to follow and self-explanatory.

Owing to the fact that with this cutter an extremely fine cut may be made, it will be possible to make a maximum number of cuts before the needle is finished with. As this cutter trims the needle at the correct angle, it is also important that when the needle is used, it should be set in the pickup at the correct playing angle and this should be at 60 degrees to the surface of the record.



A pictorial diagram showing the construction of the cutter

## "THE £5 : 5 : 0 PORTABLE" (Continued from preceding page)

particular set and, above all, having the advantage of conventionality, it can be made up without any additional difficulties by those who are accustomed to making ordinary receivers. Moreover, the arrangement of the receiver components in this way allows of ample battery space in the cabinet.

The tuning of the set is carried out with the aid of the special portable coil which has been developed for use in receivers of this type, and which will be a standard feature in AMATEUR WIRELESS portables. It was, you may remember, used in the Arcadian Portable, described in AMATEUR WIRELESS, Nos. 354 and 355. This coil has the advantage of covering both the medium and the long wavebands, by an external switch on the panel, and an incorporated reaction coil gives smooth control of oscillation on both bands. It has been designed by the AMATEUR WIRELESS Technical Staff for the job in hand. Apart from being very efficient and convenient in use it is compact.

With the aid of the blueprint which can be used to show the drilling centres, the panel can be drilled and the terminals, two

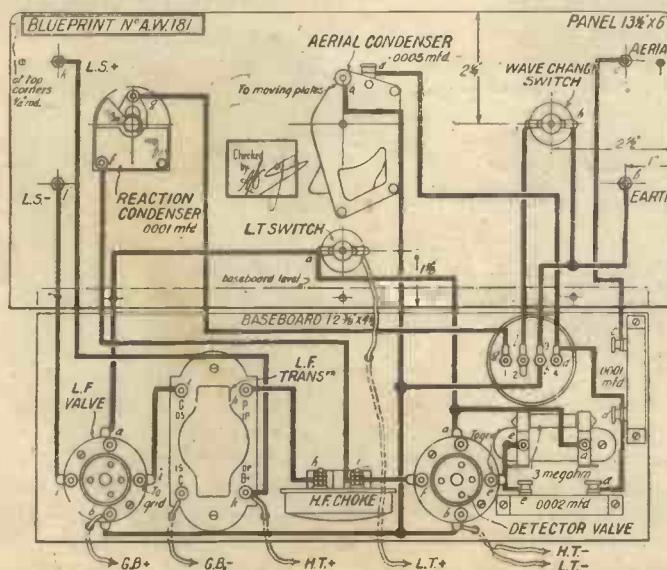
switches and two variable condensers mounted thereon. All the parts can be mounted on the baseboard and there is no need to leave the positioning of any to a later stage in order that the wiring can be more easily carried out.

Rigid insulated wire is advisable for making the point-to-point connections, because in a portable set, which is apt to be subject to bumps and jolts, connecting wires in the inside of the set are apt to touch. This might cause short circuits were bare wire used for connections, and, of course, the extra trouble entailed by the baring of the ends of covered wire when connecting up is very small.

In our next issue some further constructional particulars, including the details of the case together with operating notes and a test report, will be given.

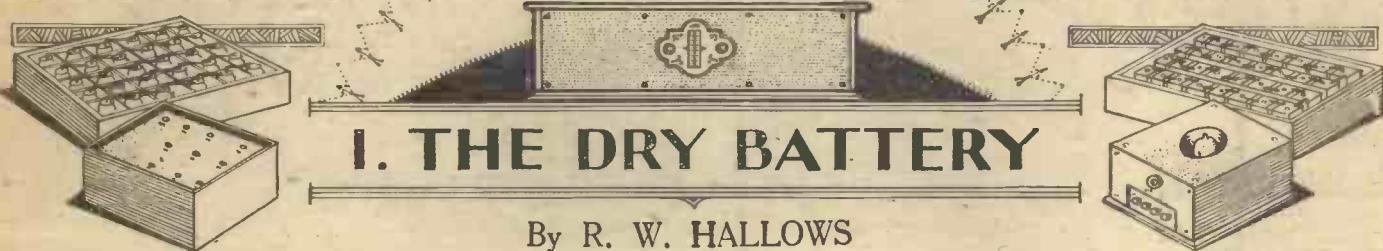
Readers in the London district who contemplate making up this set are advised to see it for themselves where it is displayed in the Somerset Street windows of Messrs. Selfridge & Co., Ltd.

In future, except in the case of imminent peril, ships at sea are not to use the SOS signal; in circumstances in which help is required, but no immediate rescue is asked for, the letters XXX are to be transmitted.



The Wiring Diagram. Blueprint available, price 1/-

# SOURCES OF H.T. SUPPLY



## I. THE DRY BATTERY

By R. W. HALLOWS

**I**N this series of short articles I am going to sum up briefly the points for and against the four commonly-used methods of high-tension supply—the dry battery, the wet Leclanché battery, the accumulator, and the battery eliminator. Not only the beginner who contemplates installing a valve set, but also the old hand who may think of making a change in his H.T. supply system, may find them of use, since they embody the results of long practical experience and of extensive laboratory tests.

### Satisfaction with Dry Batteries

One meets many people who swear at, rather than by, the dry high-tension battery. I am going to be so bold as to say that I have never yet come across a case of unsatisfactory results with this type of battery in which the user had not himself to



Some typical dry H.T. batteries

blame for his trouble, or was not more deserving of the hard words uttered than was the component that moved him to wrath. Though I touch wood as I write it, I make extensive use of dry H.T.B.'s, and in the last five years I have not had one single instance of trouble traceable to a faulty battery or of failure on the part of a battery to give long and faithful service. The whole secret of success with the dry-cell high-tension battery may be summed up in seven words: it must be up to its load.

### Modern Conditions

At one time of day when we all used, because there was nothing else, the bright-emitter general-purpose valve, we thought in plate volts and gave no heed at all to the plate circuit milliamperes. This was quite natural since the plate-filament resistance of the valves was high; about one milli-

ampere per valve throughout the set was a normal high-tension load. This being so, a high-tension battery made of tiny cells sufficed for any ordinary set and makers naturally put on the market numbers of batteries of a capacity which, though small, was quite sufficient for all ordinary needs. These batteries were made up of the same cells that were used for flashlamp refills, cells measuring on the average  $\frac{3}{4}$  in. in diameter by  $2\frac{1}{8}$  in. in height. Five or six years ago no other kind of dry-cell H.T.B. was generally obtainable.

Batteries with cells of the size mentioned thus became the standard components and the pity of it is, that though valves have altered enormously, many people still fail to realize that any other kind of battery exists.

With the exception of the R.C. valve all modern triodes have a much lower plate-filament resistance than the original G.P. valves. Of the tetrodes, the screen-grid valve uses about four times as much plate current as these early bright emitters and the space-charge grid valve may require a great deal more. A single pentode passes normally about as much plate current as from fourteen to twenty old G.P. valves.

### The Question of Size

Now the dry Leclanché cell in its most up-to-date form is a very efficient piece of electrical apparatus; but it has naturally its limitations. Just as a little boiler can deliver only a moderate quantity of steam though the pressure may be quite high, so the small dry cell can supply but a modest amount of current if it is to do itself justice.

The dry cell is in some respects very like a boiler. The fuel in its case is zinc instead of coal. One of the most important characteristics of this kind of cell is that when it is placed under load, the internal resistance rises, with a resulting fall in the terminal voltage.

The standard cell of the dimensions already mentioned cannot possibly supply economically more than 5 milliamperes of current for about three hours out of the twenty-four. Ask it to do more than this and you are courting trouble from two

different sources. First of all its life will be short and, secondly, during an evening's reception, a big fall in the voltage will take place. Short life means naturally frequent renewals and therefore undue expense. A heavy drop in voltage means "end-of-the-evening" distortion due to the fact that the plates of the valves, and particularly the output valve, in the set are starved, whilst the grid bias remains almost unchanged.

If you double the load upon a dry cell, you do much more than halve its life.

### Fit the Battery to the Set

The sound rule is always to make the battery fit the receiving set with which it is used. If it does so the voltage drop during an evening's run is small and the life of the battery is long. If it does not . . . well, perhaps now you see what I meant when I said that the man who found dry-cell H.T.B.'s troublesome had himself to blame.

Whatever you do, ascertain as soon as possible the load put on the H.T.B. by your set. Should you not possess a milliammeter, buy one or borrow one. When the load exceeds five milliamperes, but is less than eight, a double capacity battery may suffice, though a treble will be a better investment. A treble capacity battery can undertake loads between the latter figure and about 12 milliamperes; above this the largest capacity H.T.B. made is by far the most economical investment.

But the use of undersized dry batteries is not the only source of high-tension supply troubles. There are many who plump for the cheapest article offered, irrespective of quality. To them I would say that our country is regarded by foreigners as the happy hunting ground of the dumper. Batteries made on the Continent and of a quality so appalling that they could find no market elsewhere, are exported to us—and they sell like the proverbial hot cakes.

If you want freedom from trouble with dry H.T. batteries do not be above taking a word of advice from one who has tested out the majority of the patterns now on the market.

Buy batteries that are big enough; buy those turned out by first-rate makers and you will have little cause to quarrel with the dry-cell battery for high-tension supply.

# MY WIRELESS

*Weekly Tips,  
Constructional  
and  
Theoretical—*

## Screen-grid Voltage

THE manufacturers of shielded valves recommend that when the anode voltage applied to the valve is 120, the shield voltage shall be 60 or 80 volts according to the type. I have found, however, that because there are differences as between one valve and another, and between circuits, it is quite desirable when the best possible results are sought for to regulate the screen voltage. The recommended voltage may be used to commence with, but the effect of increasing or reducing it should always be tried.

## "Quiet" Detectors

Valves having a high magnification factor are often used for detection with the result that a bad contact in the valve, or a slight defect in its design, may give rise to microphonic noises or howling. It is therefore quite essential to employ a "quiet" valve for detection, as any disturbances which originate here are greatly magnified by the low-frequency amplifier. In portable receivers in particular, great care has to be taken to select suitable specimens.

The non-rigid valve holders are not always sufficient to prevent a shock being transmitted to the valve and additional means have sometimes to be employed before satisfactory results can be obtained. A rubber band which fits tightly over the bulb is a help in minimising a certain type of howling, but sometimes it is necessary to surround more than one of the valves with cotton wool. However, I have no doubt the time will arrive when the manufacturers will be able to guarantee that all valves will be quiet in operation.

## A Strange Whistle

A few days ago I was trying a receiver which was supplied with high-tension current from a mains unit. This unit was built into the receiver, with the result that a certain amount of coupling might have been expected. It appeared from my tests, however, that there was no coupling between the transformer and chokes of the eliminator, and the transformer and output choke of the set.

What I did find, however, was a form of capacity coupling. This produced a rather high-pitched whistle. It was not very loud,

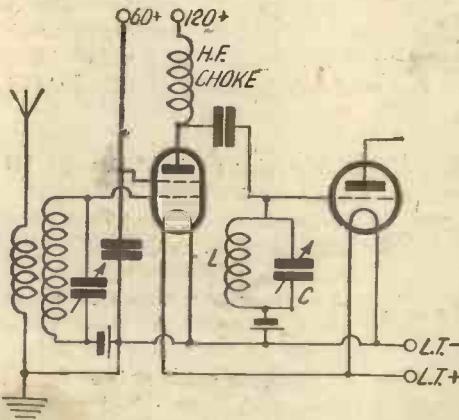


*For the  
Wireless  
Amateur*

but still, it could be heard during silent periods in transmissions. Various things were tried, but it was not until the detector valve itself was covered with tin foil and earthed that the noise disappeared. The coating of the inner glass wall of the bulb of modern gettered valves is responsible for peculiar effects at times, but earthed tin foil can often be relied upon for shielding.

## H.F. Troubles

One of the reasons, I find, for instability occurring in sets having a stage of H.F.



A stable H.F. circuit

amplification is poor filtering of high-frequency currents. The best practice is to provide an anode filter circuit, which may comprise a resistance and by-pass condenser or some other form of filter which will limit the amount of H.F. current flowing through the H.T. circuits.

In this connection I can recommend the circuit shown above. Here the anode current for the high-frequency amplifying valve (which in this instance is of the screen-grid type), has to pass through a high-frequency choke and the tuned-anode circuit LC is joined between the anode of the valve and its filament.

A fixed condenser is, of course, employed in series with the tuned circuit in order to prevent the anode coil from short circuiting the H.T. This circuit has a number of advantages in addition to the one already

mentioned. Anode bend rectification may be employed with ease and this method is shown in the diagram.

## Winding a Frame

When constructing an ordinary tuning coil or high-frequency transformer one employs wire of such a gauge that the best results will be obtained. Sometimes the object is to produce a coil having the lowest possible losses, or perhaps, to build the most effective coil of a certain bulk.

A frame aerial is really only a tuning coil of relatively large dimensions. As a rule, the sizes are fixed by other considerations, such as the space occupied by the receiver proper, its batteries and loud-speaker. It is, therefore, necessary for the designer so to arrange the windings of the frame aerial that the best advantage will be taken of the amount of room available. But here a difficulty often crops up.

The wire employed must be sufficiently strong and well insulated for the purpose. This may prevent one from using the best gauge of wire as determined by electrical efficiency, but fortunately, the amateur is able to obtain quite good results on frames of normal size by using a stranded wire. This wire may be purchased in lengths of 100 feet and may be recommended for the medium wavelength winding of a frame aerial.

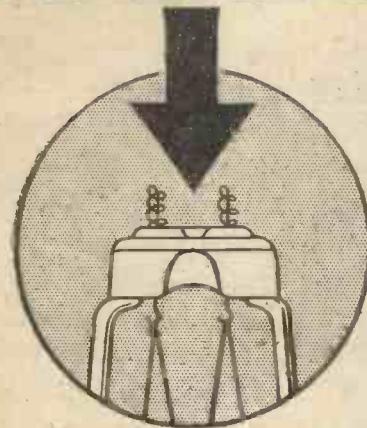
## Radio in the Garden

Those who cannot afford a portable receiver to take into the garden during periods of fine weather should not overlook the fact that even lengthy extension leads fitted to the loud-speaker will be satisfactory provided an output transformer or filter circuit is used. These two parts prevent the flow of the high-tension current through the extension leads and loud-speaker and, therefore, remove the chief difficulty.

It is not advisable to employ a twisted pair of flexible wires unless they are relatively short as the capacity may have the effect of lowering the tone of the reproduction. I have heard people remark that a good deal of power must be lost because of the resistance of lengthy extension leads, but as a matter of fact, the losses are negligible when the loud-speaker is of the usual high resistance type.

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# PORTABLES —

## HOW TO CHOOSE, BUY, BUILD & OPERATE

Over 100 portable sets, with details of circuits, wavelength ranges, dimensions, weights and prices are described in the illustrated supplement of the May Number of "Wireless Magazine." Special articles include "How to Get Best Results from a Portable," by the Assistant Editor, "Designing a Portable," by W. James. "THE WAYFARER," a portable designed by J. H. Reyner, illustrated below.

Some of the other features are:—How will Broadcasting Affect the General Election? by B.B.C. Officials—What Are Alternating Currents? Amp and Professor Megohm Discuss some Fundamentals—Russia's Revolutionary Radio, by J. Godchaux Abrahams—THE TWINFLEX, a modern reflex two-valver without crystal detector—GRAMO-RADIO SECTION—THE AT-HOME THREE, a complete installation for £11, etc. etc.



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# On Your Wavelength!

## The Portable Set

THE bright weather of the last few days has brought out all the portable sets—and the dull programmes have sent them in again! Many listeners have set forth in their cars and on their boats down the river with portable sets to carry music wherever they go, so to speak.

Of course, the great demand is for dance music. Who has been down the Thames, for instance, without hearing dozens of gramophones blaring out "Sonny Boy" or its equivalent? Personally, I regard this type of music on the river as anything but an attraction, and am probably in the minority when I hope that the B.B.C. will not add to the jazz plugging. On the other hand, light orchestral music, trios, and military band broadcasts would be very acceptable, and would probably replace the noises created by some of the wheezy gramophones. If the cost of extended daytime programmes of this type proved too great, then broadcasts of selected records would be a good alternative. One of the most enjoyable symphony concerts I have ever heard was picked up one summer evening at the end of a little pier on Coniston Lake. My pipe, my rod, and my portable set seemed to be in harmony with the beautiful surroundings, and the dramatic power of Brahms was enhanced by the grandeur of the mountains. Now, if it had been jazz . . .

## Bad Business

Please don't think that I'm a jazz hater! I simply hold the humble opinion that jazz is more in place in the drawing-room, with the carpet pulled back, than in the beautiful surroundings of the open country, river, and lake. Possibly I am hopelessly out of date, and that the present discontent of the portable radio set manufacturers will eventually force the B.B.C. to flood the countryside with "Sonny Boy" at twenty-minute intervals, as is happening in America. Let us hope that the B.B.C. will compromise by broadcasting daytime concerts of light orchestral music and as few ballads as possible. "The Floral Dance," "Cherry Ripe," and similar songs have been "plugged" far too often.

## Talking Films

The "talkies" seem to be booming in London, at any rate. The great technical battle of the "gauges" is coming to an end, the sound-on-strip film systems beating the synchronised gramophone record and other types of sound recordings. Photographic recording and reproduction of sound has been brought to a high state of efficiency, and the quality of this type of recording now surpasses that of the disc. The weakest link of the chain is still the loud-speaker. But, apart from technical

considerations, the battle was almost won on broken records, and cases of the wrong records being sent with the right film! Then again, the "cutting" and editing of talking pictures made on disc systems was almost impossible.

## B.B.C. Losses

One hears almost daily news of B.B.C. people going over to the "talkies." Captain A. G. D. West, the head of the B.B.C. Research Department, has not gone by the same route, but instead has joined the H.M.V. Gramophone Company. Captain West will be remembered by listeners in connection with the first American broadcasting relays, the nightingale, and all kinds of "stunt" broadcasts, from aeroplane concerts to talks from the Flying Scotsman footplate and the murky depths of the Thames. His work, however, has been mostly very much "behind the microphone," many problems of which he has effectively solved. Captain West will be in charge of the electrical side of the H.M.V. Company's activities, which are to be greatly extended in the near future.

## Synchronism and Isochronism

I see that the recent renewed interest in television has given rise to further arguments on the question of synchronism. Judging from a demonstration that I had the opportunity of witnessing the other day, this problem appears to have been solved in an ingenious and effective manner in the Baird system. From conversations I have had and articles I have read, however, I find that it is not so much the details of working that call for comment as the effects produced when perfect synchronism is absent. A word on this matter would therefore appear to be reasonable.

Where people often stumble is in confusing synchronism and isochronism. We can have two mechanisms in isochronism and yet not in synchronism, and there is a distinction which should always be borne in mind, especially where television is concerned. If two machines are running in isochronism it means that they are running at identical speeds, but are out of step. An accurate clock in the British Isles is in isochronism with another accurate clock in the U.S.A., but obviously they register different times at the same instant, and hence are not in synchronism. To achieve synchronism, speed and phase must be identical; that is, the clocks should register the same time at the same instant.

## What to Remember

In a photo-telegraphy system, absence of synchronism evidences itself as a diamond-shaped picture for consistent above or below normal running, or in a wavy

effect if a mixture of the two. Coming to television, we find that the effects of phase relationship are frequently misunderstood. If the speeds of the transmitter and receiver scanning discs are identical, but there is a phase difference, it will be found that actual definition is unaltered. There is no blurring of the image on the screen, but merely a displacement. It then only becomes necessary to "frame" the picture correctly on the screen. The effect can be said to resemble what happens on a cinematograph screen when a picture appears showing a scene with the head of an actor at the bottom of the screen and his feet at the top.

Lack of isochronism will evidence itself as a distorted or blurred image, but not always lack of synchronism. If we bear in mind that we can have isochronism without synchronism, but never synchronism without isochronism, then there will not be any difficulty in comprehending the true state of affairs. To achieve the best television results the synchronising methods employed should be practically automatic in action, and the simplicity of Mr. Baird's arrangement contributes in a large measure to its success. The use of a separate channel for communicating a synchronising current adds to the complication of working, and by dispensing with this the British inventor has made a big step in the right direction.

## Radio Jerks

An American doctor, I see, has just been telling the world that the early morning physical exercises—the daily dozen, they call them over there—broadcast by wireless stations are far from being as health-giving as many people imagine. He does not believe in the rude awakening that ensues when an alarm clock, set to rouse the sleeper in time for his morning exercises, goes off with its horrid explosion of sound in the early hours. Here I cordially agree with him, for I must confess that in the old proverb I have always been more struck by the folly of the early worm than by the luck of the early bird. The doctor goes on to say that radio jerks so far from making the United States a nation of athletes, bid fair to turn our horn-rimmed cousins into a race of nervous wrecks. We haven't yet had the early morning daily dozen over here, and personally I don't very much mind whether we have them or not, so long as they don't bring in a law making participation in the revels compulsory.

## Valve Rumours

A non-wireless paper contained an announcement the other day that we might expect in the not far distant future high-frequency amplifying valves with amplification factors in the region of 1,000 to 2,000.

## On Your Wavelength! (continued)

I have heard similar rumours from time to time, and I am far too old a bird to say that anything is impossible in wireless. Still, somehow, I don't see such valves reaching the practical stage, at any rate, until a great many more ether waves have flowed round our aerials. It is one thing to make a valve with a huge mag. factor and quite another to be able to get out of it the amplification that in theory it ought to be able to give. You can quite easily rig up, for instance, two H.F. stages in cascade, each provided with a triode with an amplification of 20. But you will not get out of the two anything like an overall magnification of 20 by 20 or 400, neutralise you never so wisely. So also with the screen-grid valve. It gives a wonderful degree of amplification, but it does not quite live in practice up to its theoretical magnification factor.

### *An Obstacle*

There are several very serious obstacles in the way of the practical use of huge H.F. amplification. Perhaps the most important of these is that, when reception conditions are such that with a moderate degree of amplification one would call them practically ideal, there is always in reality a great deal of parasitic and other forms of interference in the background, though we may hear nothing of them. Increase the magnification and up they come. There is, in fact, much the same difference between the broadcast band tested by a normal set and by one with huge amplification as there is between a drop of water seen first with the naked eye and then under the microscope. Another point not always realised is that the rectifying valve is distinctly limited as regards the amplitude of the oscillations with which it can deal. We have long been told that the grid-leak-and-condenser rectifier "packs up" under the influence of big grid swings, and we have been led to believe that the anode-bend rectifier could deal with almost anything that you like to apply to it. This, however, is not so, for even with a single H.F. stage the local station at medium range may overload an anode-bend rectifier on occasion.

### *We Still Need It*

For years now in these columns I have been begging makers to turn out a specialised detector valve. There are one or two on the market to-day, and very good they are, so far as they go. It is still, though, an exceedingly difficult feat, as any who have experimented in the matter know only too well, to obtain anything like perfect and undistorted rectification of strong signals. The valve that I have in mind would be specially designed for the anode-bend system. Its amplification factor would be quite low, for it is rectification, and not amplification, that we want primarily from the detector valve. It must, though, have a

pronounced lower bend and a very long straight portion in its characteristic, so that no distortion may be produced when the local station is modulating deeply and is producing some pretty pronounced peaks. The screen-grid valve now gives me high-frequency amplification satisfying all my wants; with either the pentode or the low-impedance output valve and proper L.F. circuits, first-rate audio-frequency amplification is obtainable. Once our rectification is as good as our H.F. and L.F. magnification, there will be little to grumble about in wireless reception.

### *Can You Spot It?*

Now, then, you fault-finding experts, here is a little problem for you. The set is a three-valver with a screen-grid valve coupled by the parallel-feed method to an anode-bend rectifier which is followed by resistance coupling and a low-impedance output valve. On the Monday night when I went to bed it was working perfectly; on the Tuesday afternoon when I pushed the loud-speaker plug into the jack nothing but large chunks of silence issued from the spout of the instrument. The batteries were right up, all the valves were in good order, and there were no disconnections anywhere in the wiring inside or outside the set. What is that you say? Oh, no, the aerial was *not* earthed.

### *A Simple Matter*

I wonder just how long that fault would have taken most beginners and not a few old hands to spot. Though he hates to blow his own trumpet, your "Thermion" tracked it down in about a minute. Forward the milliammeter! Connect it into the common H.T. negative lead. Remove all the H.T. wander plugs except those connected to V<sub>1</sub>. Current is shown to be passing. Try the same experiment with V<sub>3</sub>. Again the juice is there. But what of V<sub>2</sub>, the detector? The insertion of its wander-plug all by itself produces never a quiver of the milliammeter needle. Another valve is substituted; the result is the same. When this kind of thing happens the first thing to look at is always the filament circuit. Here there is no rheostat or fixed resistor and the wires running to the filament terminals are obviously as they should be. Just to make sure, try an old bright-emitter valve (a most useful possession for testing purposes, since it lights up so obviously) or a flash-lamp tester in the holder. There is no answering gleam. Since the wires are as they should be, the holder must be at fault. Examination discloses a break in one of the spring connections between the valve socket and the filament negative terminal.

### *A Short-wave Improvement*

The short waves have been considerably below par all through the winter, for only

on occasional nights has anything like first-rate reception of distant stations been possible. We seldom had anything like the big signal strength that we used to associate with short-wave transmissions a year or more ago, and fading was almost invariably a great nuisance. At the present moment there are signs of a very distinct improvement in short-wave reception. The daylight stations PLE and PLF (formerly ANE and ANH) at Bandoeng, in Java, can be picked up almost whenever they are working, and after dark quite a number of Americans are coming through extraordinarily well. If your short-wave set has been laid up now is the time to bring it out.

### *Still At It*

Though there is undoubtedly much less of the oscillation nuisance than there used to be, Ham-Handed Henry and Oscillating Oswald still show us at times what they can do if they try. But the worst person of all is he who oscillates good and plenty right through some particularly interesting programme from the local station. One of this fraternity absolutely spoilt a fine concert for me and hundreds of others a few nights ago, and I can't really think that he enjoyed it very much himself. There is no excuse nowadays either for the squealer or for the squeaking set. If your apparatus begins to misbehave itself, as sets will at times, refusing to function without howls, for heaven's sake don't begin a long series of experiments, using the local station's wavelength, during the evening programme. If you really feel that you must locate the trouble without delay let me counsel you to go down to the bottom of the broadcast band and to make your adjustments with the help of one of the powerful transmissions that you will find down there.

### *A Spring Clean*

For years now Mrs. "Thermion" has been urging me to turn out the shelves of the several cupboards which are devoted to my wireless bits and pieces. For years I have been promising to do so, and for years junk has been steadily accumulating. Fired with sudden energy the other day, I undertook the task. I really did. We wireless folk are a curious race. We find it difficult to give or throw anything away. There is always a feeling that if we do so it will be just the very bit or piece that we shall want when we tackle the next radio job. And so our shelves harbour an increasing stock of components that grow steadily more and more out of date. We shall never use the things; then, why not get rid of them. You will find, as I find, that there are any number of youngsters whose enthusiasm outruns their purses to whom you can give your unwanted stuff with the certainty that it will be thoroughly appreciated and put to useful purposes.

THERMION.

# The Subtleties of Volume Control

By W. JAMES

THE maximum amount of output to be obtained from a receiver is fundamentally determined by the arrangement of the last stage in the set. By the last stage is meant the valve or valves, its power supply, and let us not forget, the loud-speaker with its filter circuit or transformer.

It does not matter how many amplifying valves are included in the receiver—one can only fully load the last stage. Thus, the set may comprise a detector valve in addition to the last stage; in this instance probably only the local station and perhaps 5XX or 5GB will be heard at the maximum possible strength. I am assuming, of course, that the receiver is used at a place not too far from the local station in order that the last stage may be fully loaded.

The addition of a further low-frequency amplifying stage, or of a high-frequency stage, cannot possibly alter the amount of the volume to be obtained from this station without distortion. These additional valves magnify the weaker signals, however, with the result that more distant stations may be heard at the full strength. The point I particularly wish to bring out is this: that when the same type of output valve, output circuit, loud-speaker and power supply are used, the maximum amount of volume to be obtained without distortion is identical, regardless of whether the set includes low-frequency or high-frequency magnification. The only difference in performance will be in the number of

stations to be heard at the full strength.

All this is rather obvious, but yet the listener with a three-valve set does occasionally expect to obtain more volume from,

automatically limited provided a reasonable life is expected from the battery. Therefore, when it is remembered that an ordinary power valve may easily be fully loaded when it is used in a two-valve receiver for the reception of the local station, it is obvious that a volume control must be employed to limit the input to the last stage of a receiver having more than two valves.

There are many methods for controlling volume. I have discussed de-tuning and the effects of varying the amount of reaction when a condenser control is used in previous articles. The other methods depend upon the arrangement of the valves and the couplings employed.

Any control must obviously be so connected that it affects the strength of the signal applied to

the grid of the last valve. A variable resistance or other device connected to the loud-speaker itself may be used to cut down the volume, but it certainly cannot be recommended, as there is no control over the input to the valve which may therefore be greatly overloaded.

The best position for a volume control depends upon the type of receiver. When the set includes a detector and two low-frequency stages the control is best connected to the inter-valve coupling between the detector and first low-frequency stage. There are several satisfactory schemes. Thus, when a resistance-coupling is employed, as in Fig. 1, the anode resistance or

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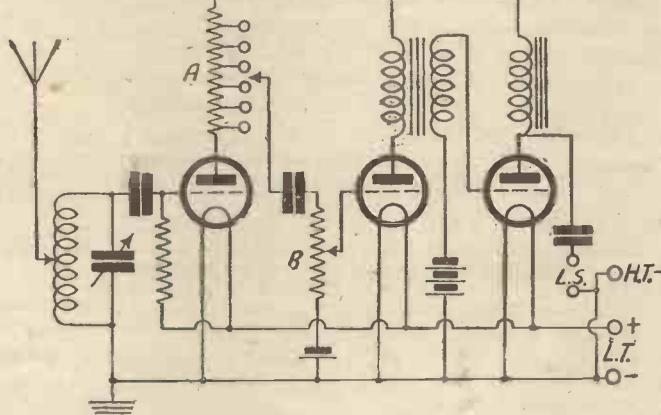


Fig. 1. Volume control for resistance coupling

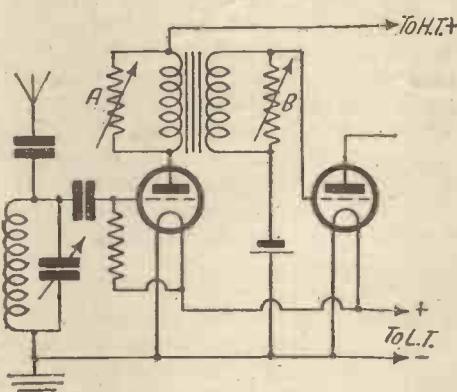


Fig. 3. In this case adjustable resistances are placed across the transformer

say, the local station, than another listener having only a two-valve receiver. He may, of course, appear to obtain greater volume because he has a reserve of power, but if he does, and the two output circuits are identical, it must be accompanied by distortion as the result of overloading.

More power output without distortion can only be obtained by increasing the high-tension and grid bias, or by fitting a larger output valve or a combination of valves for parallel or push-pull working. But in many instances the high-tension has to be obtained from a dry battery and then the size of the output valve is auto-

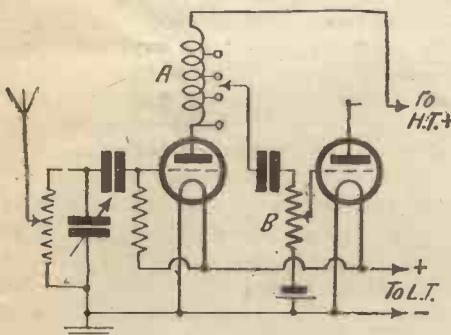


Fig. 2. With choke coupling the choke may be tapped

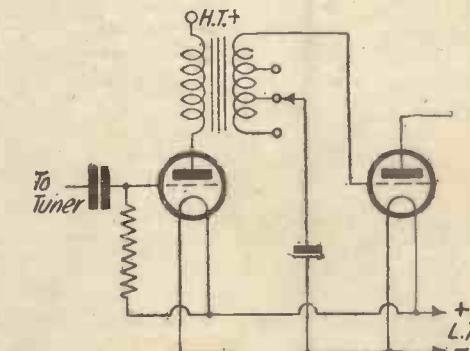


Fig. 4. Here use is made of a grid-bias transformer-secondary tapping

## For the Newcomer to Wireless:

### LOCAL CONDITIONS

CAN you tell me why it is that though Robinson and I use exactly the same kind of receiving sets he receives many foreign stations at much greater strength than I do, whilst some of the more distant ones that he gets simply do not come in at all on my set?

That is one of the queerest problems in wireless. We know that reception is affected by local conditions though there is still considerable uncertainty about the actual causes of the differences in range and signal strength that are found in various localities.

Can you tell me something about them?

One thing does seem pretty certain. In the great majority of cases we find that greater all round signal strength is obtained from an aerial at or near the top of a hill than from one in a neighbouring valley.

Why is that?

It is probably due to the fact that the aerial down below is to some extent screened by the hills on either side of the

valley. You know, for instance, that my own set is pretty good, though my aerial is down in the valley. You remember the night that I took it up to Smith's house on the hill?

Rather. You were astonished at the improvement in its performance.

I was. In fact I found that I was what I should call half a valve better. I mean that when I substituted a triode for a screen-grid H.F. valve the set did just as well in Smith's house as it usually does in mine.

Then if your house is on low-lying ground I suppose it is best to have as high an aerial as possible?

In theory, yes, but don't forget that a very high aerial is an excellent collector not only of signals that you do want, but also of atmospherics and other parasitic noises as well as of spark signals. One has to compromise, as in so many other wireless matters.

What other causes are there of different behaviour in different houses?

One of the commonest, though it is not always realised, depends upon the nature of the soil.

How do you mean?

If clay happens to come very near the surface, almost any kind of earth connection will give reasonably good results. Suppose, however, that there is a thick layer of chalk or gravel, even a large earth plate well buried may prove inefficient. Not everyone knows how important it is to get down to the clay subsoil.

I have heard that underground veins may affect reception.

It has been proved that they certainly can and that even large systems of buried waterpipes and so on may have an adverse effect. It is quite possible that metallic veins may be responsible for some of the blind or partially blind spots that occur. Sheffield presented the B.B.C. with a very difficult problem, possibly owing to the big slag heaps in the locality which contain large quantities of metal.

## "THE SUBTLETIES OF VOLUME CONTROL"

(Continued from preceding page)

the grid leak may be tapped. The two arrangements are indicated in the figure, at A and B respectively (H.T. filter circuits are omitted for simplicity) and it should be noted that the whole of the anode resistance, or grid leak, is included in the circuit.

The quality of the reproduction is not changed by either of these schemes, and there is little to choose between them from an electrical point of view, but it is probably easier in practice to arrange a potentiometer type grid leak.

When a choke-coupled stage is used between the detector and first low-frequency valve the choking coil may be tapped, or

the grid leak as before. A tapped choke is indicated in Fig. 2, and it should be noted that the whole of the choke is included in the anode current.

#### Transformer Control

Sometimes a transformer is employed to couple the detector valve with the first low-frequency valve. An adjustable resistance connected across the primary winding as in Fig. 3 may then be used with every satisfaction. A suitable resistance would have the maximum value of about 100,000 ohms. Alternatively, an adjustable high-resistance with the maximum value of about 500,000 ohms may be connected across the secondary winding, but it is better to employ a resistance joined across the primary. This resistance will carry a certain amount of current and should, therefore, be of suitable construction.

A further scheme is indicated in Fig. 4. Here the secondary winding of the transformer is tapped and a switch is employed to connect the grid bias to one of the tapings. I do not recommend this scheme, because a special transformer must be used and further, its frequency characteristics will change with the amount of the secondary included in the circuit. Probably the best arrangement when a resistance-coupled stage is used is that which includes a potentiometer type of grid leak. A suitable component is not very expensive and occupies only a little space. It is sometimes necessary to take particular care with the wiring or hand-capacity effects may give trouble. Thus, for example, when the sliding

contact is connected to the grid and the spindle is of metal, a howl may be produced if the fingers touch the spindle. The grid-connecting wire should, therefore, be as short as possible and a knob of generous size be employed.

The methods described above are the more important ones suitable for employment in sets of the detector and one or two low-frequency type. When a high-frequency stage is used other methods of control may be advisable.

WOS, Jefferson City, Missouri, is said to be the only state-owned radio station in America.

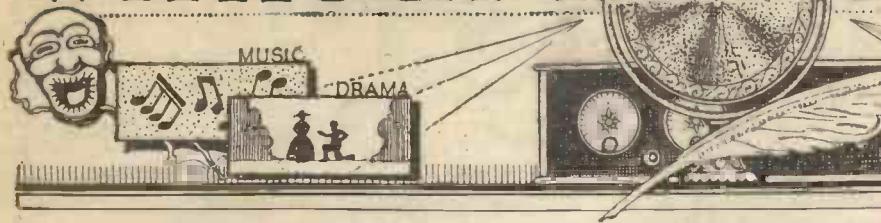


An impression of Arnold Eagle, the conductor of Shepherds Bush Pavilion Orchestra



Julian Rose, the famous Hebrew Comedian—a caricature

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney Sweeny*

I WAS interested in the appeal on behalf of the Aylesbury After-Care Association which was made by Lady Ampthill. I wrote about this subject of Borstal two or more years ago, and I remember, when my book came out, that it was suggested that my sketches on the convict of to-day would be of interest to listeners.

However, I was told that the subject was "too morbid"! But, as in so many other instances, there has been a change of mind.

The Salvation Army Service from the Congress Hall, Clapton, was a rather different affair from those services I used to hear in East London thirty years ago. But the "congregational song" was the same: "Just as I am, without one plea." Very nicely rendered, too.

How extraordinarily popular is Jack Hylton with his band. The relay from the London Palladium, however, showed clearly that visual audiences have more of the game than listeners.

Jack in the limelight, with full effects, gets over well when you see him. I heard and saw him do the "Babette" number quite effectively, but he cannot really sing for "nuts," and the uninitiated listener may well have wondered what all the fuss was about. No doubt, television will come to Jack's aid.

And, by the way, half an hour of dance music in the middle of an ordinary programme—by Jack Payne (or by anybody else, for that matter)—does not amuse those of us who don't dance, and who consequently feel a certain sameness about these hotch-potches. After hours, certainly; but not on Saturday nights between 7.30 and 8 o'clock, when the majority of ordinary listeners want a little variety in the programme.

Now, what could be more popular than the People's Palace concert by the B.B.C. Symphony Orchestra, well conducted by Sir Landon Ronald and Percy Pitt? From "William Tell" to "Les Preludes" the programme was full o' plums. And with Megan Thomas as vocalist and Poulishoff as the pianist—what more do you want!

I heard 'em all a-laughing at our Mabel

as I came through the door. Wonder how she keeps up her form.

The first of de Courville's "Gay Sparks" gave us many laughs and fair entertainment, and a good many sketches, but is bound to compare it with Charlot's

Charlot was quite good; but then, perhaps de Courville has something up his sleeve.

Thanks are due to "Gay Sparks" for giving us the opportunity of hearing Imito. Here is real talent. His bird imitations were excellent. Let's have more of him and his family of farmyard *habitues*.

Fred Duprez was most emphatically not at his best. As a solo turn Duprez is quite good. In the revue he did not have enough to do, and when we did hear him he sounded restrained and totally unlike his usual self.

"Harold"—my tame lowbrow—has a lot to write this week about our friend Sir Walford. He writes:

"Sir Walford Davies, in his talk at 9.15 last Tuesday night (an unearthly hour for a music lesson) said that a friend of his recently had asked exactly what he (Sir Walford) was aiming at in his talks. I agree with the friend. A talk on musical technique is totally out of place in the late evening. If it were given in the afternoon, so that school children could listen and derive benefit therefrom, it would be much better."

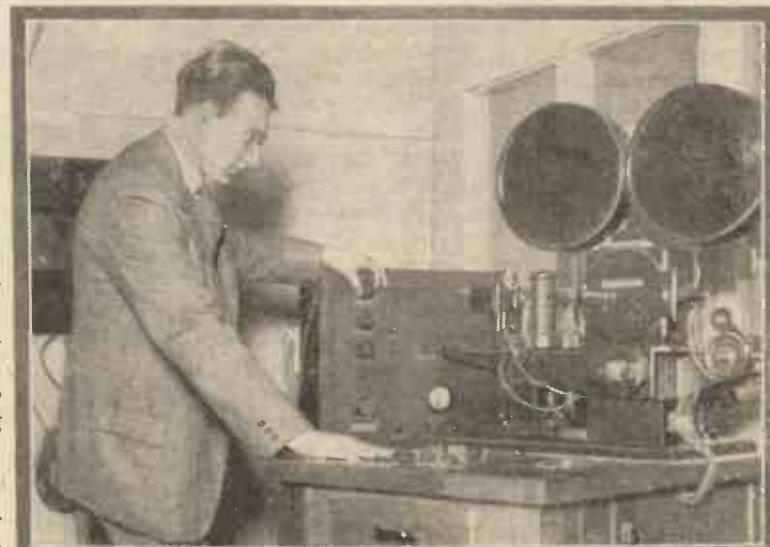
As a matter of fact, Sir Walford is on in the afternoon. Indeed, he appears to be going strong.

A correspondent who signs himself "Ten Years a Motor-

Reader," writing from a seaside resort, that my criticism of certain wireless comedians is unfair.

"Over the Easter holidays I had occasion to see a certain wireless turn and, remembering your criticism of it in the past, settled down with a certain amount of scepticism. However, I found their antics—rather than their wit—extremely funny. May I add that you cannot really do a turn of this description full justice unless you *see it*."

I myself have made this reservation when criticising comedians. However, my correspondent finishes up on a note of hope: "When we get television perhaps this difficulty will be overcome!"



A NEW "TALKIE" STUDIO. One of England's largest "talkie" studios has been built at Elstree. The photograph shows the interior of the sound-recording cabinet

# The STABIL

## A Loftin-White Receiver Embodying "C

towards the bottom end of the tuning range where the voltage induced from primary to secondary is greater by reason of the higher frequency of the current. In consequence, we obtain a transference of energy which decreases as the wavelength increases somewhat as indicated in Fig. 1 (p. 594). If, however, we arrange a capacity tapping in the circuit we can obtain the reverse state of affairs, for the voltage developed across the condenser increases as the frequency is reduced, this being exactly the opposite to the voltage developed across an inductance or transferred across a mutual inductance such as is constituted by the primary and secondary of a high-frequency transformer.

### Constant Reaction

The effect of a capacity coupling therefore, is to transfer energy in increasing quantities as the wavelength is increased, giving an arrangement similar to that shown by the dotted line in Fig. 1. If the two effects can be balanced accurately we can obtain a transfer of energy over the whole scale.

This in itself may not be a particularly important matter. Its advantage in practice is that we can put in a small reaction control which is adjusted to give an operating point relatively near to the oscillation point, so that the receiver is in a state of liveliness, and this control then does not require to be altered in tuning from one station to another. The original "M.C." Three and "M.C." Four possessed this property to quite a marked extent and it was possible to tune in one station

after another by merely rotating two dials without any reaction control. A further somewhat important aspect of the question however, arises from the methods adopted to stabilise the receiver.

Oscillations in a high-frequency amplifier

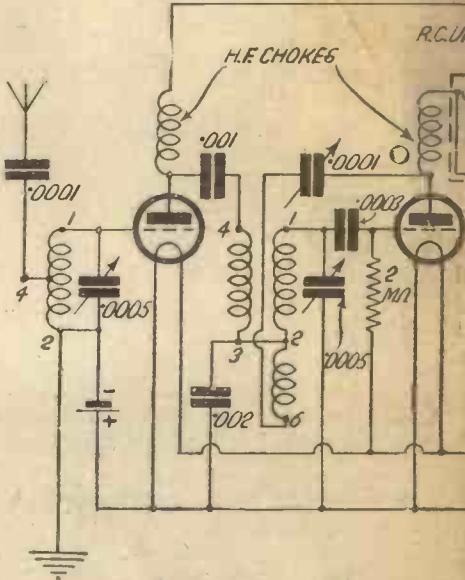


Fig. 3. The C

occur because of the feedback which is transferred through the internal capacity of the valve. This feedback depends, to a large extent, upon the nature of the anode circuit. It will be quite clear, without going into detail, that energy transferred back in this manner may be such as to coincide with the energy already in the

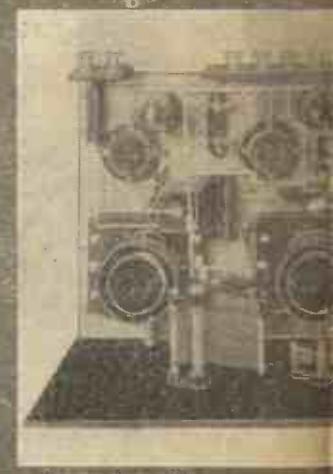
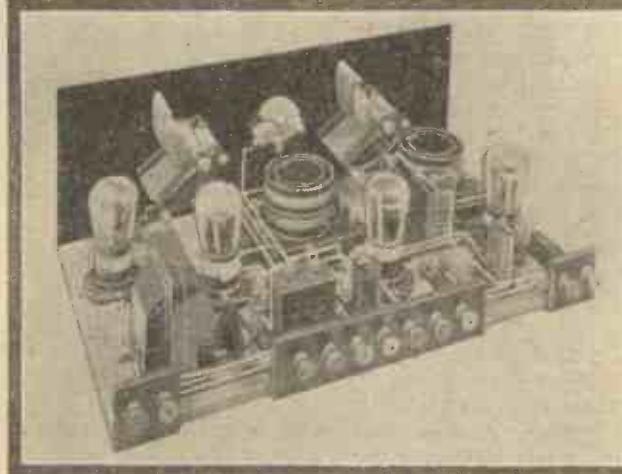
**I**HAVE often been asked whether it is possible to produce a receiver similar to the old "M.C." receiver, utilising "Q" coils. The "M.C." receivers which were popular about two years ago have many adherents even in these days of screen-grid valves and other modern practices, and the view which is expressed is that if these receivers can be brought up to date by the use of dual-range tuning arrangements such as are provided by the "Q" coil, they would then be quite up to present-day standards.

The matter has accordingly been put to the test in the Furzehill laboratories and I found that it was possible to obtain good results using standard types of "Q" coil. The results were slightly below the old standard, this being due principally to the fact that for best results somewhat critical values of magnetic and electric coupling must be used in the high-frequency transformer. This would have necessitated the design of a special "Q" coil for the purpose and I felt that this would be undesirable. Since I could obtain quite good results without any difficulty on the standard QSP coil, I felt that this would be the more satisfactory solution.

### The Loftin-White Principle

The Loftin-White principle embodied in the M.C. receivers and in the present version consists in the use of a combined magnetic and capacity coupling in the high-frequency transformer. This is done for the following reasons.

An ordinary transformer having a magnetic coupling operates more efficiently



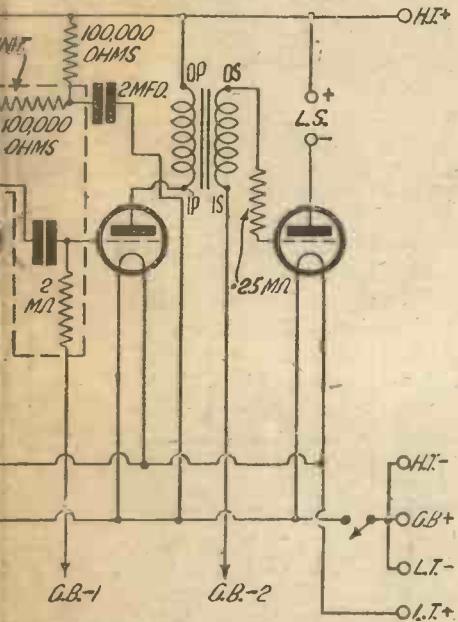
These three photographs show practically all t

# LITY FOUR

**Q" Coils.** By J. H. REYNER, B.Sc., A.M.I.E.E.

grid circuit, in which case a reaction effect is obtained, or it may be in such a direction as to oppose the grid circuit in which case additional damping is introduced.

This condition of affairs is exactly the same to the reversal of the direction of



Circuit Diagram

reaction in a simple reaction circuit, and in practice we can actually obtain either of the two conditions or any condition intermediate between them. It is thus possible to obtain a point at which the feedback neither helps nor opposes the grid circuit, but has no effect whatever.

Which of the three possible conditions

occurs depends upon the anode circuit. Where the anode circuit is inductive, that is to say, possesses in general the characteristics of a simple coil, the energy feedback is positive and self-oscillation or a tendency thereto will result. If the anode circuit is resistive, the feedback has no effect whatever while if it is capacitative, the feedback is negative and damping is introduced instead of any tendency to oscillation. It may not be quite clear how the anode circuit can pass through these various states, but we can consider a simple tuned circuit.

### Stability

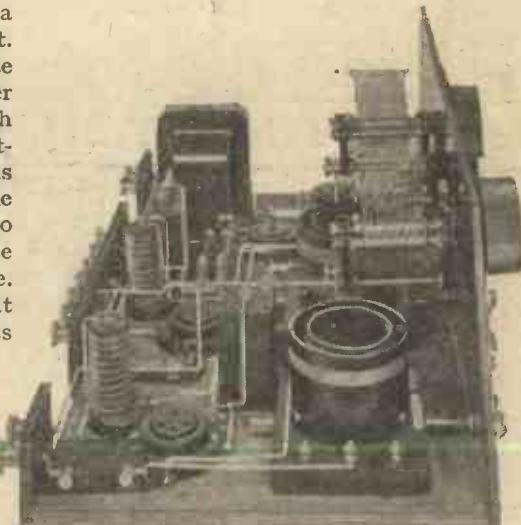
If we vary the frequency of the current, then at low frequencies the effect of the condenser is small and most of the current flows through the inductance, giving us a predominantly inductive anode circuit. When the frequency is tuned to resonance with the circuit, both the coil and condenser have equal effects and tend to balance each other out leaving us solely with the resistance of the circuit. The circuit is thus purely inductive or nearly so, while at the higher frequencies the current prefers to flow mainly through the condenser and the circuit becomes predominantly capacitative. Thus, with an ordinary circuit like this, at the tuning point and above it, the circuit is stable while on the other side the circuit tends to be unstable and may actually burst into oscillation.

It may be thought that it should be possible to weaken the coupling to such an extent that the circuit never actually bursts into oscillation. This

is quite feasible, but the energy transfer at the other end of the scale would then be so small that the receiver would be hopelessly insensitive.

With an ordinary arrangement, the circuit is most lively at the bottom end of the tuning scale and if we so arrange the coupling that there is no tendency to self-oscillation at this point, reception at the top of the scale would be very poor indeed, and an enormous quantity of reaction would have to be applied. It is here that the constant-coupling system is of use for if we can arrange the constant energy transfer over the whole scale and furthermore arrange the coupling to be such that no oscillation occurs then we have not only a stable receiver, but one which is uniformly sensitive throughout the wavelength scale.

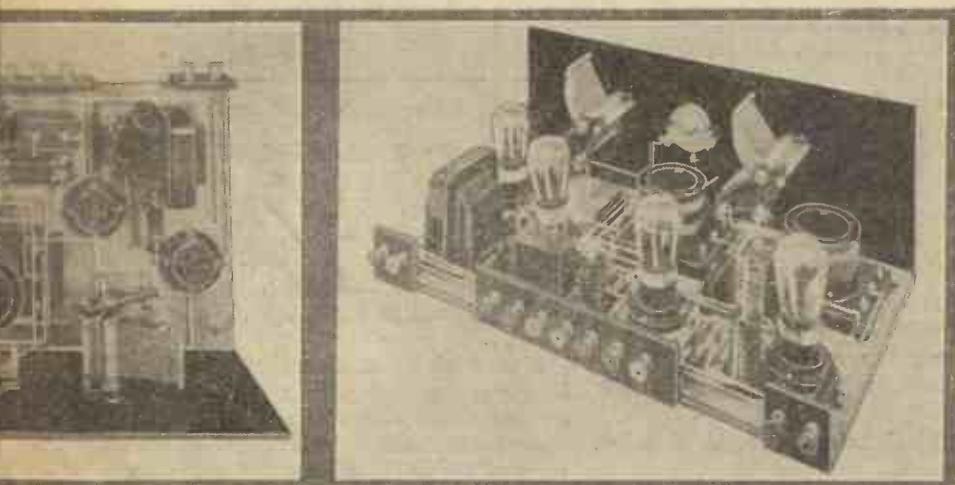
The basic circuit by which this is accomplished is shown in Fig. 2 (p. 594.) H.T. to the H.F. valve is obtained through an H.F. choke. The high-frequency currents are passed through a fixed condenser on to the primary of the transformer which is coupled to the secondary in the ordinary manner. The primary current, however,



An end view of the "Stability Four"

having passed through the primary winding does not go straight to earth, but is caused to pass through a fixed condenser which also forms part of the secondary circuit. Voltages are induced in the secondary, therefore, from two causes.

Firstly, there is the magnetic induction between the primary and the secondary windings, while secondly, the primary current in passing through the coupling condenser C sets up voltages which are automatically introduced into the secondary circuit. We thus have voltages introduced from both magnetic and capacity coupling and as we have seen, these can be so balanced that we can so arrange matters that the two effects balance and give us a nearly constant coupling.



The constructional features of this fine receiver

# Old Tenants and New Lodgers

JOTTINGS FROM MY LOG

:: By JAY COOTE

EVEN in the broadcasting world, leases expire and are renewed or granted to new owners. Such is the case of Montpellier (France) which, after having limped along for some months, suddenly gave up the ghost and blossomed out afresh as a unit of the P.T.T. provincial broadcasting system. That it has not yet got into its full stride is demonstrated by the fact that its transmissions have not yet been placed on a regular basis, and it has not yet been definitely included in the Ecole Supérieure net. You can, however, pick it up now and again in the region of 253 metres, but its wavelength is wobbly, for at times you will find it above Rennes, at others below PTT Toulouse.

These three stations are difficult to identify individually as they devote the major part of the day to relaying the Paris broadcast, and seldom work on their own. Lack of funds prevents their claiming their independence from the mother station or of giving any display of local initiative. Owing to its numerous provincial parasites, to-day PTT Paris is unable to put out a concise call. If you are lucky to tune in at

the moment the Paris station opens its transmission you will hear a rapid volley in French which, unless you are a linguist, may prove a puzzle. The Paris announcer rattles off the following in double quick time: "Ici les stations radiotéléphoniques du réseau de l'Etat de l'Ecole Supérieure des Postes et Télégraphes de Paris et les Postes de radiodiffusion de la Tour Eiffel, Lille, Rennes, Toulouse, Limoges, Lyons, Bordeaux, Grenoble et Marseilles," after which, I take it, he falls back breathless in his arm-chair!

### Eiffel Tower Interference

Talking of Paris reminds me that the Eiffel Tower has again been experiencing trouble, as shoals of protests have reached the authorities in regard to the interference caused by its transmissions. La Tour for some time has been anxious to reduce its wavelength to 1,470 metres in order to give itself more elbow-room, and thus free itself from its immediate neighbours. At first sight, the choice of wavelength would appear to be an unfavourable one, in view of its close proximity to that on which the

Le Bourget Aerodrome operates, but in practice it has been found that the two transmissions are clear of each other. To alleviate further the trouble experienced by Paris fans, the authorities have decided to curtail the Eiffel Tower broadcasts in the near future. The station will be silent from midday to 2 p.m., from 5 to 7 p.m., and the evening concert will terminate at 8.40 p.m.

Listeners to WGY (Schenectady) and to KDKA (East Pittsburg) or to their respective short-wave stations may be given the opportunity of hearing messages exchanged with the Byrd Antarctic Expedition. These U.S.A. stations broadcast on alternate Saturday nights, KDKA at 6 p.m. and WGY at 5 p.m. G.M.T. As it is thought that the general public may be interested in these communications, KDKA (East Pittsburg) has made arrangements to rebroadcast the replies from members of the Byrd Expedition. KDKA operates on 306 metres and its short-wave relays on 24.5, 26, 63, and 65 metres; WGY on 380 31.4, and 21.96 metres.

## "THE STABILITY FOUR" (Continued from preceding page)

The value of the phasing condenser  $C_1$  is so adjusted as to make the whole anode circuit just capacitative so that the circuit is completely stable throughout the whole range. The smaller this condenser is made, the more stable does the arrangement

(Raymond, Becol, Ebonart, Paxolin).

Two ebonite strips, 2 in. by 2 in., and strip 8 in. by 2 in. (Raymond, Becol, Ebonart, Paxolin).

Cabinet, 18 in. by 7 in., with 10 in. baseboard (Miscellaneous Trading, Clarion, Camico, Pickett).

Two .0005-microfarad variable condensers (Burton, Lissen, Ormond, Utility, J.B., Polar, Igranic).

.0001-microfarad reaction condenser (Dubilier, Burton, Lissen, Ormond, Utility, J.B., Polar, Igranic).

Four valve holders (Lotus, Benjamin, Lissen, Burton, W.B., Wearite).

Q.A.A. coil (Lewcos, Lotus, Wearite, Stone).

Q.S.P. coil (Lewcos, Lotus, Wearite, Stone).

Filament switch (Lissen, Benjamin, Trix, Wearite).

Two .002, one .0001 and one .0003-microfarad fixed condensers (Lissen, Dubilier, T.C.C., Mullard, Graham-Farish).

Two high-frequency chokes (Wearite, Lissen, Lewcos, Dubilier, R.I. & Varley).

One 2-megohm and one .25-megohm grid leak (Dubilier, Lissen, T.C.C., Graham-Farish).

Two grid-leak holders (Lissen, Dubilier, Graham-Farish).

Resistance-capacity coupling unit (Graham-Farish, type 2, R.I. & Varley, Mullard, Dubilier, Lissen).

100,000-ohm resistance with holder (Graham-Farish, R.I. & Varley, Mullard, Lissen, Dubilier).

2-microfarad fixed condenser (T.C.C., Lissen, Dubilier, Ferranti, Mullard).

Low-frequency transformer (Lissen,

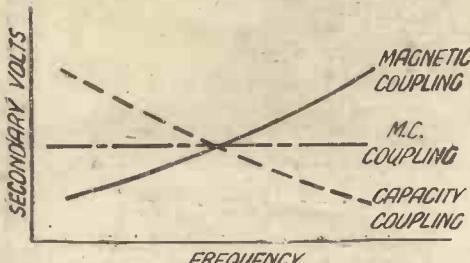


Fig. 1. If the magnetic and capacity couplings are equal a level curve is obtained

become, but it also loses efficiency; if desired a pre-set condenser may be employed in place of the fixed condenser used. A condenser having a value of .001 has been used in the actual receiver, but the value of this is a matter for experiment.

This briefly is the underlying principle utilised in the present receiver, the full circuit of which is shown on the preceding pages (Fig. 3).

### Components Required

The following is a list of components required to build the set:

Ebonite or bakelite panel, 18 in. by 7 in.

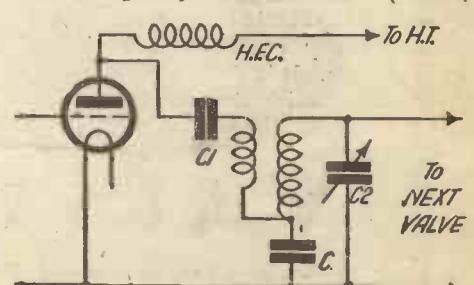


Fig. 2. A practical Constant-coupled Circuit

R.I. & Varley, Ferranti, Mullard, Phillips.

Eleven terminals marked Aerial, Earth, L.T.+, L.T.-, H.T.-, H.T.+, G.B.+, G.B.-1, G.B.-2, L.S.+, L.S.- (Eelec, Igranic, Belling-Lee, Burton).

Connecting wire (Glazite).

1 1/2-volt cell (Siemens G.T., Lissen, Ever Ready).

Next week full constructional details will be given together with a reduced reproduction of the blueprint of the layout. In the meantime readers who desire to have a copy of the full-size blueprint may obtain this from the offices of AMATEUR WIRELESS 58-61 Fetter Lane, London, E.C.4., price 1s. 6d.



A better Valve at a lower Price—Dario are the only valves at half-price which are GUARANTEED LONG LIFE.

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General Purpose,	5/6
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R.O.C., .06 amp.	5/6
Super-Power, .18 amp.	2/6
Super H.F. & R.O.C.	
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Pentodium, .3 amp.	21/-

FOUR VOLTS	
General Purpose,	5/6
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R.O.C., .07 amp.	5/6
Super-Power, 1 amp.	7/6
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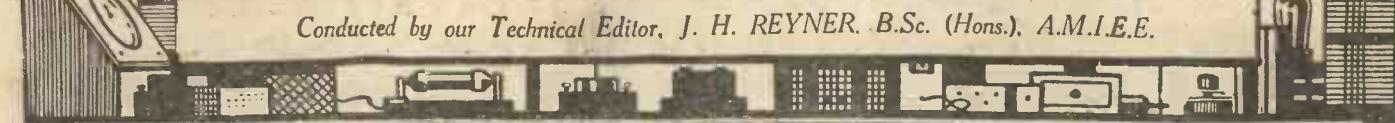
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SPOT  
66A Unit  
**21/6**

## "A.W." TESTS OF APPARATUS

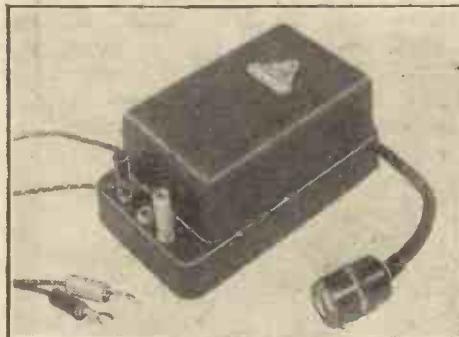
Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.



### The TeKaDe Trickle Charger

WE have recently tested a very interesting metal trickle charger known as the TeKaDe; this is made in Germany and is marketed in this country by Dr. Nesper Ltd., Colindale Avenue, Hendon. Some idea of its compactness may be gauged from the fact that its overall dimensions are as follows: 5¾ in. by 3 in. by 2½ in. high. The secondary voltage is applied to a special form of metal rectifier with which we have not previously had experience. This comprises a series of sheets of thin foil in contact with a treated metal plate. The rectifier is provided with large cooling fins in order to work at a low temperature. The output is taken to three terminals so arranged that either 4- or 2-volt accumulators may be charged.

We found that the charging was approximately .5 amp. at both 4 and 2 volts. If a 6-volt accumulator is charged on the 4-volt tap, the current falls to .26 amp. The efficiency is approximately 18 per cent., but when it is considered that the mains consumption is only 12 watts or approximately one-fifth of the power taken by an ordinary electric light lamp, the unit may be termed economical. Although during



TeKaDe Trickle Charger

our tests, the unit was made to charge for a number of hours on end, the rectifier and transformer remained noticeably cool. This instrument can be recommended to readers.

### A Simple Battery Filler

MANY readers must have experienced the difficulty of filling small Leclanché cells with solution; this process, in fact, may occupy a considerable time owing to the care needed to prevent spilling the electrolyte.

We have received a very useful device known as the Easeful filler, made by the Leyton Battery Co., of Walthamstow, London, E. This article consists of a large bottle, fitted with a large-diameter

cork into which two tubes are fitted. One of these bends over in the form of a spout, whilst the other acts as a valve control. To use the device the glass container is filled with the electrolyte and placing a finger on the top of the valve tube, the container



Easeful Battery Filler

is inclined until the spout rests above the cells to be filled; then by removing the finger from the valve the liquid pours out and can be stopped at a moment's notice by replacing the finger.

Although primarily designed for filling Leclanché cells, this article has other uses which will suggest themselves to readers. All those who are troubled with this difficulty should obtain one of these fillers.

### Ready Radio H.F. Choke

ALTHOUGH many well-designed general purpose H.F. chokes will operate efficiently on the ultra-short wavelengths below 100 metres, it is often considered advisable for maximum results on these wavelengths to utilise a separate choke having a lower natural inductance and, more important still, a lower self-capacity. Provided the inductance exceeds a given value, the efficiency of the choke on the ultra-short wavelengths depends almost wholly on the self-capacity.

We have recently tested a short-wave choke, manufactured by the Ready Radio Supply Co., of 159, Borough High Street, S.E.

We found that the inductance value was 17,000 mics., which in practice is sufficient to give adequate choking. This was confirmed by a test made over a wavelength range extending from below 15 metres up to 100 metres. The first peak occurred just below 100 metres, indicating that the component was ceasing to function at this wavelength.

This little component should appeal to readers.

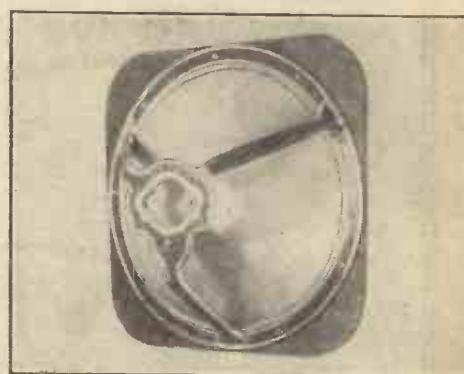
### Squire Large Cone Unit

A GREAT deal of technical matter has been written on the correct sizes for cone and moving-coil loud-speakers. Some assert, particularly in the case of a moving coil loud-speaker, that a small-diameter cone is preferable, while others say that if the cone material can be made sufficiently rigid, the larger varieties will give the better results.

We have recently completed a test on a Squire aluminium cradle frame fitted with a woven cone having a diameter of 16 inches.

Surrounding the aluminium frame is a small wooden baffle designed to be used in conjunction with a larger baffle, the recommended size being some 3 ft. by 2 ft. by 2 ft. 6 in. We tested the assembly with the recommended units, and found that these could easily be fitted, the design of the chassis having been well thought out. With the particular cone supplied the speech was inclined to be slightly muffled, but there was no doubt that the reproduction had both life and body. The sensitivity was up to standard.

The manufacturers also provide special paper for building up this type of diaphragm to go with the cradle frame; one may



Squire Large Cone Unit

therefore try the effect of various types of paper. The maker is Frederick Squire, 24 Leswin Road, N.16.

**Knight's Floating Cone Unit.**—Last week, on page 562, we gave a test report on a most satisfactory floating-cone unit manufactured by Messrs. Knight & Co., of 6 Chapel Street, London, E.C.2. It is to be regretted that the address was incorrectly given in the report. The correct address is that above, and was correctly stated in Messrs. Knight's advertisement on page 574 of the same issue.

## BROWN'S H.Q. THE WORLD- FAMOUS SPEAKER



Previously sold at £6.  
**NOW 3 GNS.**  
or 11/8 down and 5 monthly payments of 11/8.

### BROWN'S BABY SPEAKER

SPLENDID TONE AND AMAZING VOLUME.  
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### BLUE SPOT UNIT 66K WITH NEW MODEL BLUE SPOT CHASSIS

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For charging 2v. and 4v. Accumulators.

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A 4 - volt  
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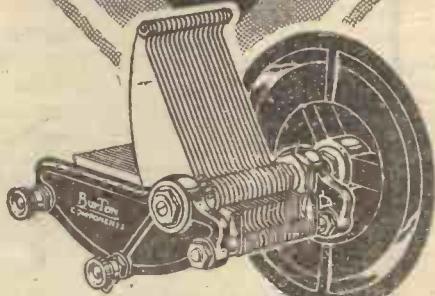
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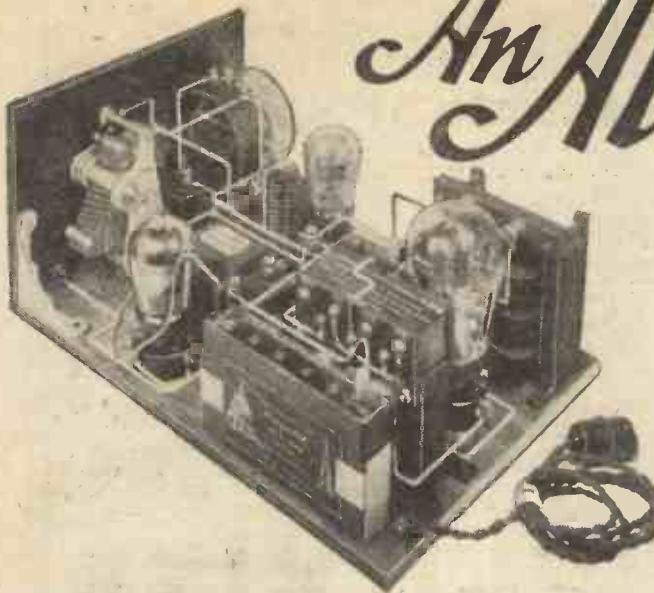


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# An All-mains Two

Last week a technical description was given of the working arrangements of the All-Mains Two, a simple transformer-coupled two-valver obtaining both H.T. and L.T. from A.C. mains. Here are some concluding constructional notes and hints on operation

more convenient to screw in place and wire up most of the baseboard parts before the panel components are added. No difficulty should be experienced in completing the baseboard assembly providing the blueprint is used as a guide both for positioning and wiring up the components.

#### Assembling the Components

A brief explanation of the layout, which may at first seem rather complicated, may be helpful. Between the aerial coil and condenser is situated the .0002-microfarad fixed reaction condenser and the 2-microfarads condenser in series with the earth lead. These components are placed side by side.

Then, in a row, looking from the front end of the baseboard we have the detector valve (with the grid condenser and leak in front of it), the H.F. choke in the detector plate circuit, the L.F. transformer and, finally, the L.F. valve.

At the back of these is a second group of components, also almost in a line. These are, from left to right, the potentiometer (to the moving arm of which is taken the lower end of the 3-megohm grid leak) and at the back of it one of the 2-microfarad smoothing condensers. Next are two 2-microfarad fixed condensers in parallel, forming a 4-microfarad bank. In front of these is a 20,000-ohm fixed resistance which forms one part of the anti-motor-boating unit. The 2-microfarad fixed condenser which forms the second part is just at the back of the L.F. transformer.

At the back of this group of components, from left to right, are placed the smoothing choke, rectifier valve, power transformer and grid-bias battery.

Wiring up should be carried out with rigid insulated wire, such as Glazite in order to prevent the possibility of short-circuits. When the wiring is complete carefully check it over in conjunction with the blueprint and, if you feel capable of doing so, with the theoretical circuit diagram.

#### Operation

So far as operation is concerned the receiver can be treated very much as though it were a straight-forward detector and one L.F. set, deriving H.T. and L.T. from batteries and accumulators respective-

ly. There is no switching to be done, for in order to bring the receiver into operation it is necessary simply to insert the mains plug into a light point. The anti-motor-boating unit should effectively prevent the possibility of L.F. instability.

On the receiver side a point which will be noted is that the tuner is provided with two tappings, namely A1 and A2 and a flex lead can be taken to either one or the other, according to the degree of selectivity required. The tapping A1 gives the greater number of turns in the aerial coupling. The changing from the short to the long waves and *vice versa* is obtained simply by pushing and pulling the centre knob of the

Simply insert  
the mains  
plug into a  
light point



tuner. The larger rotating knob, of course, is the reaction control.

#### Valves to Use

So far as valves are concerned the Marconi or Osram directly-heated valves are those for which the receiver has been particularly designed. The H.L. .8 valve should be used as a detector and the P. .8 as an L.F. valve.

Owing to a printing error, it was, in some copies of AMATEUR WIRELESS No. 356, not made clear that the price of .4 and .5-microfarad Dubilier paper dielectric fixed condensers is 2s. 6d., as stated in the advertisement of Messrs. Dubilier on cover iii of that issue.

**A** FEATURE about this set which will appeal to constructors is that without sacrificing neatness of layout, or complicating the construction in any way, the mains section is kept quite distinct from the receiver section, although both are mounted on the baseboard. A list of components was given last week to serve as a guide to those who are making up this set. Although the cost of this set may appear to be relatively higher than an ordinary two-valver, it should be born in mind that there are no batteries to purchase.

#### The Mains Section

The mains portion comprises, primarily, a transformer carrying a number of tappings, a rectifier valve, a smoothing choke and the requisite number of large capacity smoothing condensers. As explained last week the tappings on the transformer (one winding of which, of course, is connected directly across the mains) provide full voltage H.T. to the rectifying elements of the valve, a supply of alternating current L.T. to the filament of the rectifier valve and, finally, 2.5-amps at .8-volts for the filaments of the receiving valves. If you care to glance at the theoretical circuit diagram the whole arrangement will be made quite clear.

Now, so far as construction is concerned a blueprint will be found a great asset to this particular instance and, of course, as usual, one is obtainable for this set from AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. The price is 1/- post free.

#### The Layout

The first use to which it can be put is as a drilling template for the panel. The panel, of course, carries simply the aerial tuning condenser (on the right looking from the front) the aerial tuner and, below, four terminals for aerial, earth, and loud-speaker respectively. All these parts can be mounted, but the panel should not, at this stage, be attached to the baseboard. In this set it will, indeed, be found much

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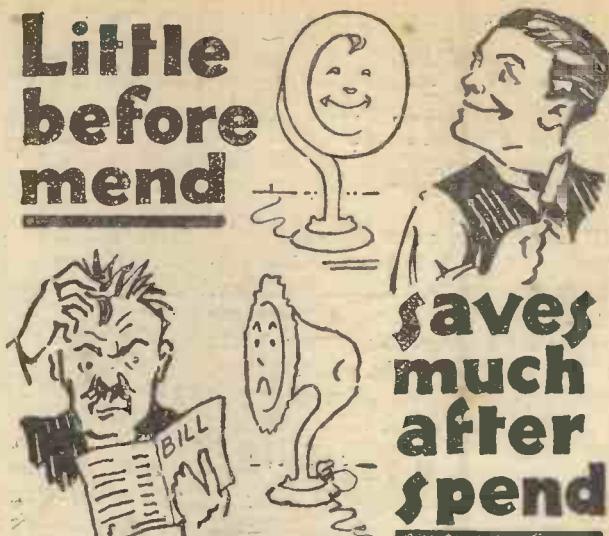
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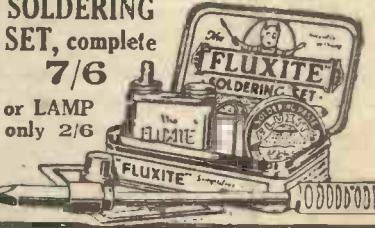
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# THE WIRELESS CONTROL OF MODELS

## PART TWO—THE RECEIVING GEAR (Concluded)

By MAJOR RAYMOND PHILLIPS

THE pneumatic arrangement of the "dashpot" simply consists of small bellows similar to those made for piano players. Any dealer in piano player components will supply the bellows. The latter should be mounted as shown in Fig. 3 (No. 357). A hole drilled in the top of the wooden part of the bellows, and fitted with a wooden

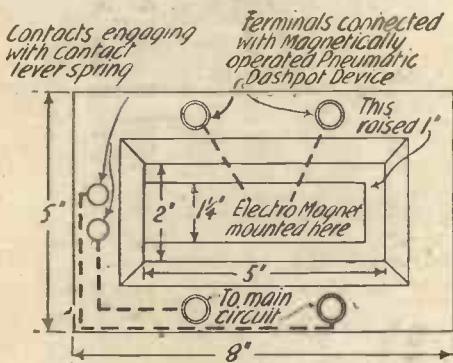


Fig. 5. Details of selector base

plug, is useful for adjusting the admission of air to the bellows, as a small slot can be cut at the side of the plug, and enlarged as desired. The object of the bellows is to retard the upward movement of the armature of the electro-magnet, and so close for a period a circuit connected with the selector electro-magnet. This is necessary, otherwise there would be a risk of the selector not functioning correctly.

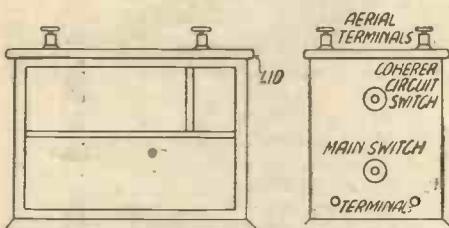


Fig. 8. Details of receiver case

The construction of the special selector should not present any serious difficulties. When commencing the construction it will be necessary to cut a brass plate 5 in. long by 2 in. wide by  $\frac{1}{16}$  in. thick as shown in Fig. 4 to form a base for mounting the various components. The brass plate should be mounted upon a wooden base, and four terminals fitted to the base, and wired up to the selector electro-magnet, and contacts respectively as shown in Fig. 5.

The magnet of the selector (Fig. 6) should be  $1\frac{1}{4}$  in. long with a soft iron core  $\frac{1}{2}$  in. in diameter. The latter should be drilled to allow a soft iron rod  $\frac{1}{16}$  in. diameter to pass freely through the centre of the core. At one end of the round rod there should be secured a soft iron armature  $\frac{7}{8}$  in. by

$\frac{1}{8}$  in. The electro-magnet should be wound with No. 25-gauge enamelled copper wire.

### The Selector Mechanism

The mechanism of the selector is quite simple. It consists of a brass contact lever 3 in. long by  $\frac{1}{2}$  in. wide by  $\frac{1}{16}$  in. thick, tapered at one end to which is secured a piece of .005 in. hard brass sheet to form a rubbing contact with two other contacts mounted on the wooden base. An actuating lever  $1\frac{1}{2}$  in. long by  $\frac{1}{4}$  in. wide made of brass sheet  $\frac{1}{16}$  in. thick is loosely secured to one end of the round soft iron rod which passes through the core of the electro-magnet. It will be observed on reference to Fig. 6 that the soft iron rod is bent at right-angles at one end and passes through a slot cut in the brass plate, forming a base for the components of the selector. One end of the actuating lever is V-shaped to engage with a double V-cut in the contact lever. A small spiral spring made of No. 28-gauge hard steel wire is secured to the other end of the actuating lever, and the brass plate. It will be apparent that when the electro-magnet of the selector is energised, the actuating lever will engage with the contact lever causing the latter to move in either direction, thus opening or closing a circuit connected with the two contacts mounted on the wooden base. The whole arrangement is clearly shown in Fig. 7.

### The Case

The remaining parts for the receiver comprise a case and the coherer.

It is advisable to construct a case to accommodate a sheet of glass at each side, as it is well to be able to watch the mechanism in operation:

The size of the case should be 18 in. long by 14 in. wide by 14 in. deep, and it should be fitted with a removable partition (see Fig. 8). The upper half should contain the coherer, decoherer, relay, and 3½-volt dry battery, the latter an ordinary pocket-lamp battery.

The lower portion of the case should contain the magnetically operated pneumatic dashpot device, and the special selector. Four holes should be drilled in the top of the case to accommodate four large terminals; the latter being arranged to hold two aluminium rods  $\frac{1}{4}$  in. diameter by 4 ft. long to form an aerial. The top of the case should have a hinged lid.

Two holes should next be drilled in each end of the case to accommodate four terminals for connecting to an accumulator, or other source of electrical energy and (in the case of a model electric railway) to the "conductor," and "outer" rails of a model railway.

Two 5-amp. switches are fitted at each end of the case. These are for insertion in the coherer and main circuits respectively.

The remaining components, consisting of a brass pedestal and brass spring contact for a vertical type of coherer, can be made. For a pedestal it is only necessary to

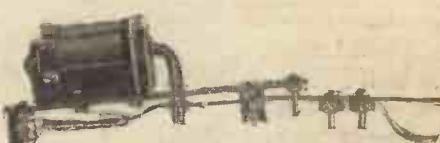


Fig. 7. The selector magnet with contacts

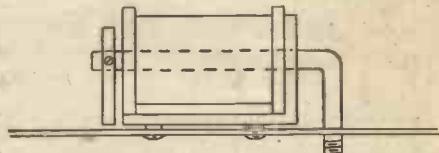


Fig. 6. The selector electro-magnet

solder a piece of round brass rod  $\frac{3}{4}$  in. long by  $\frac{1}{2}$  in. diameter in the centre of a brass disc  $1\frac{1}{2}$  in. diameter by  $\frac{1}{8}$  in. thick.

When the soldering is completed it will be necessary to drill a hole  $3\frac{1}{32}$  in. diameter down the centre of the pedestal to admit the support or shank of the coherer. Another hole should be drilled and screw threaded transversely through the shank of the pedestal so that a No. 6B.A. screw,  $\frac{1}{2}$  in.

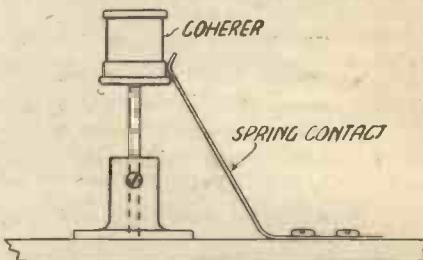


Fig. 9. Method of mounting coherer

long, can be inserted to hold the shank of the coherer. Three  $\frac{1}{8}$  in. holes should then be drilled in the base of the pedestal for the purpose of securing it to the partition in the case containing the components. A brass spring contact  $3\frac{1}{2}$  in. long by  $\frac{1}{2}$  in. wide should next be made by cutting the size required from a piece of No. 28-gauge hard brass sheet. The whole arrangement is shown by Fig. 9.

All components are now ready for assembling. It will be well to commence by securing the coherer pedestal, and spring contact in position on the wooden partition of the case by the brass wood screws already described. When this is done the coherer should be placed in position, and the decoherer, or tapping device (i.e. electric

(Concluded at foot of page 602)

## TO HOME CONSTRUCTORS!

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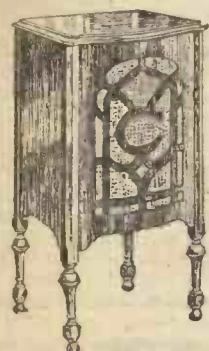
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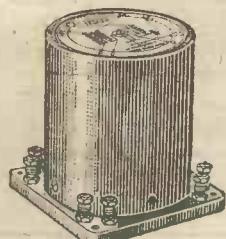
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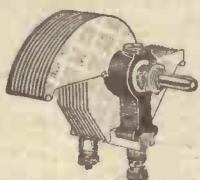
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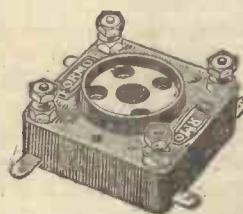
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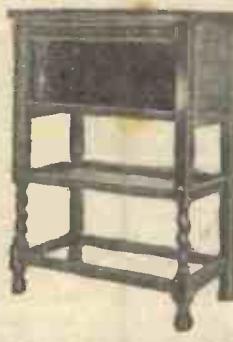
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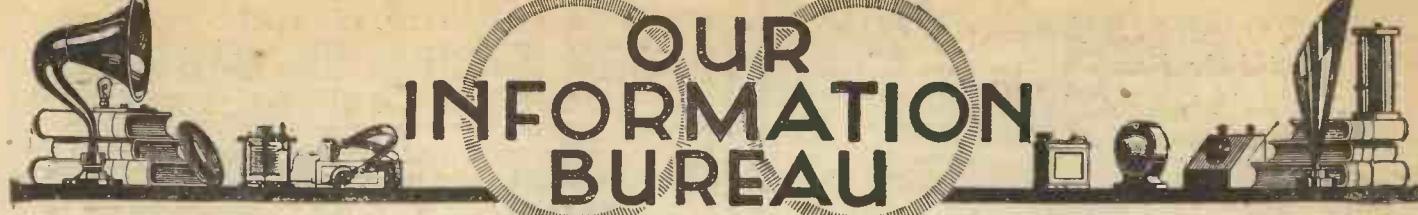
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#### Loose Material in Valves.

Q.—I have some cheap foreign valves which, although still functioning quite well, have developed a rattle inside when shaken. I have traced the cause to a small deposit inside the bulb and this appears to be a strip of metal. Am I likely to do any damage if I continue to use these valves?—J. B. (Wandsworth).

A.—The strip inside the bulb is not a part of the electrodes but is a small piece of magnesium which did not become used up in the exhausting process. Originally this magnesium was attached to one of the valve electrodes, but has become dislodged and has fallen off. Do not shake the valve more than you can help as this loose piece of magnesium may touch two electrodes at once and so cause a "short." Should you take the valve out of the set at any time see that the piece of magnesium is at the bottom of the bulb before replacing the valve in use.—C. L.

#### Home-made Sets

Q.—I have a four-valve home-constructed set which I now wish to sell in order that the cash so obtained can be expended for the building of a five-valve set. I know that a royalty is payable in respect to patents and I have no wish to evade the payment of this, but I do not know to whom I should address a letter for guidance in this

matter. Can you assist me in this respect?—W. A. (Cardiff).

A.—You should address a letter to Marconi's

## When Asking Technical Queries

**PLEASE write briefly and to the point**

A Fee of One Shilling (postal order or postage stamps) 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.

Wireless Telegraph Co., Ltd., Marconi House, Strand, London, W.C.2, and state in your letter that you have a four-valve home-built

set which you wish to sell. Further, request information regarding what royalty fee is required and any other details which will facilitate your selling the set.—L. C.

#### Poor Earth.

Q.—I find that when I disconnect my earth wire from my receiver I get much louder signals and better results than with the earth wire connected. Can you account for this and suggest how I may get the better results with the earth lead connected. Without the earth lead the set is very prone to oscillation when tuning.—G. D. (Sevenoaks).

A.—Your experience points to the earth lead having a high-resistance. You should try to find a better earth connection and in this respect we should suggest a sheet of copper about 2 ft. square sunk at least 4 ft. below the surface of the ground. Several lengths of insulated copper cable should be soldered to the earth plate and all of them should be taken direct to the earth terminal of the set. Be sure to use copper wire for the earth leads and also for the aerial, as this ensures a reasonably low-resistance and therefore good results. Using a smaller aerial tuning coil or reversing the connections to the reaction coil may also improve matters.—C. L.

## "THE WIRELESS CONTROL OF MODELS" (Continued from page 600)

bell movement) should be so mounted that when it functions its hammer strikes the coherer, or else there is a loose connection somewhere in the wiring.

The relay should be mounted either at the side or behind the decohering device.

In the lower portion of the case the magnetically-operated pneumatic dashpot device and selector should be mounted alongside of each other. Everything will now be ready for wiring.

Ordinary electric light twin flex is excellent for the wiring. A wiring diagram is shown by Fig. 10.

When the wiring is completed it will be necessary first to test out the whole apparatus electrically.

The 4-volt accumulator which supplies electric current for operating the various mechanisms should be fully charged and the dry battery in good condition. Being assured of these important matters, the switch inserted in the coherer circuit being closed, the selector should function instantly each time two of the aerial terminals are short circuited.

The apparatus is now ready for a wireless test. Should the apparatus fail to function, it will generally be found that either there are insufficient filings in

the coherer, or else there is a loose connection somewhere in the wiring.

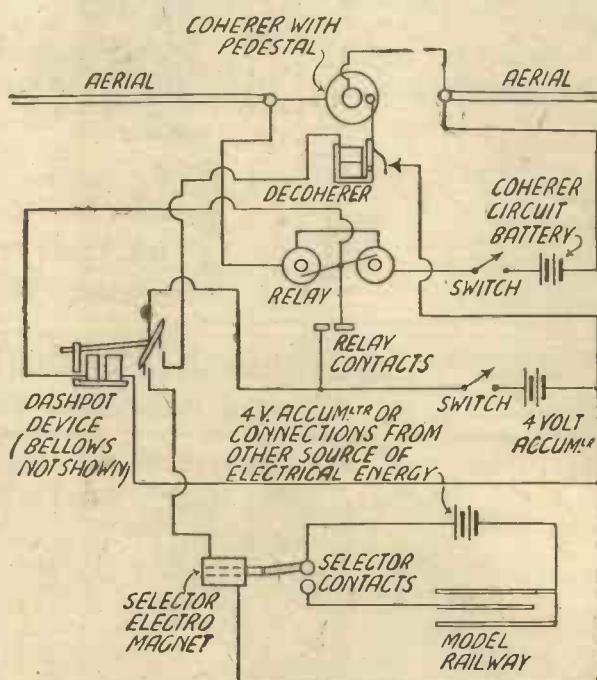


Fig. 10. The circuit arrangements of the Receiving Gear

Assuming everything is in order, and the transmitter described in previous articles

is ready for use, it will be well to carry out the first wireless test by tapping the Morse key in the transmitter, when the receiving apparatus should instantly function. When this is done, and if everything is satisfactory the microphone fitted to the transmitter can be tested by speaking the word "stop" in a loud voice near the diaphragm. The receiver should then instantly function the same as when tested in the ordinary way. It will be found that best results are obtained when the aerial rods are opposite and parallel to one another.

If it is desired to control a model electric train, the locomotive of which is fitted with a "sequence" reversing mechanism, it is only necessary to connect the remaining two terminals of the receiver with the "conductor" and "outer" rails of a model railway, and close the switch (secured to the receiver) inserted in the main circuit, when some extremely interesting effects can be produced by shouting the words "ahead," "stop," and "back," in sequence into the microphone of the transmitter.

(CONCLUSION)



ON April 8 the north regional studios were removed to Broadcasting House, Manchester, which comprise, in addition to the necessary offices, a concert hall, two storeys high, with a gallery for an audience of about eighty people. In the same building accommodation has been found for a dramatic and sound-effects studio and the necessary echo-room.

Listeners should not miss the vaudeville programme to be broadcast by 2LO and 5XX on April 27, for during the entertainment they will hear the Albert Sandler Trio, Ronald Frankau, Claud Hulbert and Enid Trevor, Deslys and Clark, and Clara Evelyn, the musical-comedy star.

On the occasion of the Newspaper Press Fund Dinner, to be held at the Mayfair Hotel on April 23, the London station will relay the Prime Minister's speech proposing the toast of "Journalism." On this evening Sir James Barrie's manuscript of his short play *The Twelve Pound Look* is to be auctioned by Sir Herbert Morgan, and the sale will be included in the broadcast.

On May 1 Billy Mayerl will pay a return visit to the Savoy Hill studio to give another illustrated talk on the playing of dance accompaniments.

*A Mad Mummer's Bright Dream*, by Charles Brewer, with Tommy Handley in the part of Mummer, should prove a lively entertainment on April 23; he will be assisted by a strong cast.

*The Eternal Waltz*, a musical burlesque by Leo Fall, is down for broadcast from 2LO and 5XX on May 3; the book is by R. E. Jeffrey.

In a Festival of Music and Drama to be given at Canterbury Cathedral during the week August 19 to 24 the B.B.C. will provide the orchestra, of which the conductor is to be Dr. Adrian Boult. Apart from choral, orchestral, and chamber concerts, the dramatic side of the festival will include *Everyman*, acted outside the Cathedral, and Marlowe's *Dr. Faustus*, presented by the Norwich Players from the Maddermarket Theatre.

It is expected that within the next few weeks experiments in broadcast television on the Baird system will be made through the Königswusterhausen transmitter. In the meantime Berlin (Witzleben) is testing the Mihaly Telehor apparatus for the transmission of cine films, on a frequency of 9,000 kilocycles.

According to a Vienna wireless journal, a transmission from Rosenhuegel was picked up at Chicago, Illinois, U.S.A., on February 26 last. The American fan states that he was using a 14-valve receiver!

Although attempts were made by several European transmitters, Vienna was the only short-wave station able to secure two-way communication with the Zeppelin airship on its recent flight across Southern Europe. Messages from Dr. Eckener, its commander, were received on 1,020-metres.

Announcements are now made from PCJ (Hilversum) in the Dutch, German, French, Spanish, and Portuguese languages.

Arrangements have been made for the regular relay by the Italian broadcasting stations of performances from the Scala Opera House, at Milan; the Royal Theatre, Turin; the Carlo Felice, Genoa; the San Carlo Theatre, Naples; and the Royal Opera House, at Rome.

Since the opening of the Turin and Genoa broadcasting stations the number of registered licences in Italy has attained 60,000; it is computed, however, that there exist in the country nearly one million pirates, and drastic steps are to be taken to induce these illicit owners to legalise their status as wireless listeners.

The new short-wave transmitter to be erected at Rome will possess a power of some 12 kilowatts in the aerial. It has been decided to adopt two wavelengths, namely, 25 metres for transmissions destined to the Italian colonies in Africa and 80 metres for Europe. The 50-kilowatt high-power broadcasting station to be installed in the capital will be supplied by the Radio Corporation of America towards the end of the coming summer.

It is proposed that a Scottish Council for School Broadcasting should be set up, consisting of twenty-two members representing the various bodies dealing with education in Scotland.

The musically inclined of Messrs. Harland & Wolff's employees are proving themselves capable of providing a Belfast wireless programme from their own resources. The Queen's Island Military Band is the only flat-pitch military band, in the country, and is already well known on the ether, while the Male Voice Choir has gained distinction at many contests.

In view of the dissatisfaction of Edinburgh listeners regarding the quality of transmissions, the B.B.C. point out that there is a system of lines available on a 24-hour basis between Glasgow, Dundee, and Edinburgh. Hence, if the transmissions of 5XX as received at Edinburgh are unsatisfactory, due to fading, interference or other causes, the London programme can be taken from the relaying receiver at Dundee or Glasgow, or a local programme substituted.

More than 500,000 letters were received from protesting listeners when the Federal Radio Commission ordered a reduction in the broadcasting time of station WGY at Schenectady.



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## WIRELESS IN PARLIAMENT



From Our Own Correspondent

MR. DAY asked the Prime Minister whether, in view of the increasing public interest in broadcasting, consultations had taken place this year with the leaders of the opposition parties of the House with a view to broadcasting the forthcoming Budget speech.

Mr. Baldwin said he had no reason to think, since the question was last raised, that there was any change in the general feeling of the House that the broadcasting of its proceedings was undesirable.

Sir W. Mitchell-Thomson informed Mr. Day that the present number of wireless receiving licences issued free to blind persons under the Wireless Telegraphy (Blind Persons Facilities) Act, 1926, was 14,372, representing a remission of licence revenue of £7,186 a year.

## TRADE NOTES

SUBSTANTIAL reductions have recently been made in the price of Cyldon condensers, and a folder giving details and the latest prices may be obtained from Sydney S. Bird & Sons, Cyldon Works, Sarnesfield Road, Enfield Town, Middlesex.

Price reductions have been made in connection with Siemens H.T. batteries for portable sets, we are informed by Siemens Bros. & Co., Ltd., of Woolwich. The price of the 126-volt battery, type 1075 has been reduced from 30s. to 25s. and that of the 108-volt type 1077 battery from 25s. to 21s. 6d. It should also be noted by constructors of portables that the length of the well-known 60-volt popular type battery has been increased from 8½ inches to 9¾ inches.

Garnett Whiteley & Co., Ltd., makers of Lotus sets and components, inform us that they have now taken offices at 125 High Holborn, London, W.C.1. The London representative of the firm is Mr. W. J. Holland.

The Mullard Wireless Service Co., Ltd., of Mullard House, Denmark Street, London, W.C.2, have issued a number of leaflets for insertion in readers' Mullard catalogues. These leaflets, replacing the leaflets VR47, 54 and 55, and VTR17, which should be destroyed, deal with the PM6, PM1HF, PM256, and DO/40 valves respectively. Two new leaflets have also been issued giving details of the DFA9 and DO/20 valves.

A constructor's chart for building up the Ferranti type No. 5 A.C. H.T. supply unit (giving an output up to 200 volts and 100 millamps as required), has been issued by Ferranti Ltd., Hollinwood, Lancashire.

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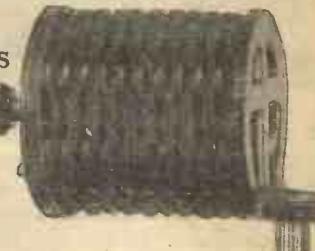
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## LETTERS TO THE EDITOR

*The Editor does not necessarily agree with the views expressed by correspondents.*

### The "Home and Abroad Two"

SIR.—I am sending an appreciation of the "Home and Abroad Two." I have just finished it and get such good results, having had KDKA within about an hour of wiring up the set.—R. (Battersea).

### "Britain's Favourite Three"

SIR.—Having waited a week to see the details of the 1929 "Favourite," I hasten to congratulate you on a fine set. I have been using the 1928 "Favourite" since its publication and welcome the no-coil-changing idea.—T. (Tipton).

### 5XX Programmes

SIR.—Your correspondent "British Six" (Penzance) says he imagines I have a number of stations at my disposal. Such is not the case. I have a two-valve set and, except at lunch-time, I use only one valve and headphones.

My set is tuned to 5XX, and I rarely try to receive any other station. The only times I have heard foreign transmissions have been relays from Daventry from the sets of friends a few times.

All I can say about foreign programmes is that what I have heard of them—except for the relays—I can very well do without. I don't like the whole of the British programmes, but some of the things I dislike are enjoyed by others, and the many appreciations I have heard have been made by listeners who, like myself, listen to 5XX and 5GB programmes.

—A. M. H. (Coventry).

### Sunday Broadcasting

SIR.—I am an interested reader of "Thermion's" columns which appear in AMATEUR WIRELESS, and usually I am in agreement with suggestions he makes from time to time regarding broadcasting.

But there is one point on which, I think, a certain amount of unintentional unfairness appears; that is, the extension of broadcasting hours on Sunday.

The unfairness lies in the lack of consideration (to my mind) for the amateur transmitter, who would, in that event, lose the only remaining time of freedom left to him for daylight research. I think you will agree that we are entitled to a certain amount of thought, as we pay considerably more for our licences.

If all B.C.L.'s were technicians and capable of building and operating highly efficient receivers, then everything would be O.K., but, as it is, there are still crowds of crystal sets about, and with these—well, in my own case, I cannot key even a 5-watt transmitter without wiping out my neighbours on either side, who are

both using crystal sets purchased about 1923.

I would like to have "Thermion's" views on this, but I think you will realise that we are not unreasonable in pleading for the retention of the little time we do have on Sundays.—G2AX (London, N.).

### Public Broadcasts

SIR.—It has been suggested that broadcasting theatres should be opened. I think perhaps the following experience may be of interest. I have control of a public hall in the centre of Portsmouth and applied to the magistrates for permission to hold concerts on Sunday nights. This was refused, but I was allowed to reproduce the B.B.C. programme between the hours of 8 and 10 p.m. The result was a complete failure.

On the first Sunday about 270 attended. The service came from St. Martin-in-the-Fields and was followed by a good concert. The set employed was quite a good one. By the end of the evening I formed the opinion that, whatever might be the suitability of the programme for home reception, it was perfectly hopeless for public reception. There are nearly always long intervals between the items, which would hardly be noticed if one is reading a book, but which are very noticeable in a public hall. The charitable appeal, news and weather report are all exceedingly dull.

That my opinion was shared by the audience is proved by the fact that on the second Sunday only about half the number turned up, and on the third and last Sunday the audience had dwindled to 40. Of course, if I had had the freedom to reproduce any programme I liked, the result might have been different, but I do not think that any public broadcasts are likely to be very popular until the broadcasting authorities realise that people want wireless for amusement—not for education nor religion—and also realise that it is desirable to shorten breaks between items.

—F. P. (Southsea).

### Our Best Comedian?

SIR.—I notice with regret in your issue dated March 30 that Mr. Moseley considers Leonard Henry our first comedian. I had to re-read the paragraph to make sure that my eyes did not deceive me, and I consider it a great insult to Tommy Handley. Had Mr. Moseley heard his choice of comedians last week and again this week, I feel sure that he would have altered his opinion.—N. S. (Leicester)

We much regret that in the advertisement of Messrs. Partridge & Mee, which appeared in our issue of March 30, the block of the Heavy Duty choke appeared upside down. If readers will refer to the article in the same issue on "How to Obtain H.T. Supply from the Mains" they will see the correct way of mounting this choke.

**BLUEPRINTS**

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of all these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

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Everyday (D, 2 Trans) .. WM52  
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Standard Coil Three (HF, D, Trans) .. WM117  
Festival Three (D, 2LF-dual Imp.) .. WM118  
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The Q3 (D, RC, Trans) .. WM124  
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**FOUR-VALVE SETS (1s. 6d. each)**

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Universal Short-wave Adaptor .. WM182

Buzzer Wavemeter (6d.) .. WM121

H.T. Unit for A.C. Mains .. WM125

Lodestone Loud-speaker .. WM126

James H.T. Unit for D.C. Mains .. WM133

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and H.T.) .. WM80a 1/6

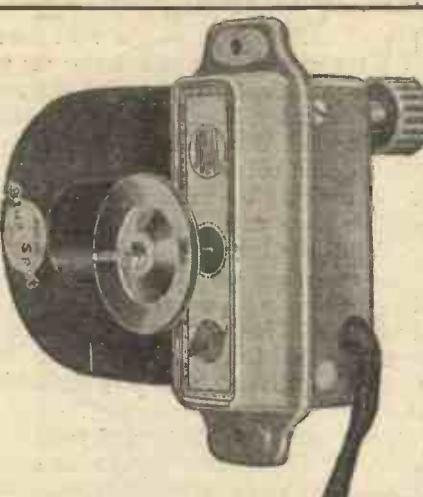
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Dual Coil, 7/9. P.M. 10/6. Six-  
pin Bases. 2 -.

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23/0. Ampilon A.C.2, 21/-.  
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5/6. Colven Master 3 Star Dial,  
Coil Unit 15/-.

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Dual Wave Tuner 15/-, H.F.  
Choke 6/6. S.W. Choke 4/6.  
2-way Switch 6/-, 3-way Switch  
7/-, Loading Coil 7/6. Titan  
Coil Unit 15/-.

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Rigid ALUMINIUM CRADLE, FLOATING CONE,  
CLAMPING BOARD ASSEMBLED AND SPARE **15/6**

Our model 97 is supplied assembled complete with duplex woven floating  
cone, clamping board AND a Kit of Parts for making Kraft cone.  
Diameter of cone 91 in.

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CABINET and BLUE SPOT UNIT 66K **50/-**

(Genuine Ideal Adjustable)

The lot post free (U.K.)

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any other). 2 meg, 1/-, 25 meg, 1/-, 2 G.L.K. Holders,  
1/-, R.C.C. Unit Lissen, 4/-, 100,000 ohm res. with holder,  
5/6. 2 M.F.D. Dubiller, 3/6. Lissen L.F., 8/6, complete  
with L.T. switch, 2 Strips, Handsome panel 18x7.

11 Engraved Terminals, Connecting Wire, Base-board 18x10. CARRIAGE PAID U.K. £5

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("A.W.") 9.3-29)  
2 Polar .0005, No. 3, at 5/9. .0001 Reaction 4/-  
2 Dual range G.T. Coils, (Tunewell), Anode, 10/6; Aerial,  
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H.F. Choke, Peto-Scott, 5/6. H.F. Choke, Lissen, 5/6.  
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22, 4/- each. Touchstone Coils,  
30/- pair. C.T. Coils, 3/6, 5/3.  
Q.C. Q.A., 15/-; Q.S.P., 21/-.  
Q.A.R., 21/-. Q.A.A., 15/-; Q.S.G., 21/-.  
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Q.A., 15/-; QSP 21/-.  
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Adjustable Unit

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(144 pages). 1/- refunded on  
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RIGID ALUMINIUM CRADLE, FLOATING CONE.

CONE KIT FOR **15/6**

Our model 97 is supplied assembled complete with duplex woven floating  
cone, clamping board AND a Kit of Parts for making Kraft cone.

Diameter of cone 91 in.

OR COMPLETE WITH HANDSOME OAK

CABINET and BLUE SPOT UNIT 66K **50/-**

(Genuine Ideal Adjustable)

The lot post free (U.K.)

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Kit of Parts and Valves,  
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**A.W. SPECIAL COUPON (64)**

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YOU CAN buy ONE of the following for

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H.F. Choke, Silk Loud-Speaker Cord, 9-volt Grid

Bias, Fair Panel Brackets, .0001 Reaction, 2 mid.

Mansbridge, 100 ft. Insulated Aerial, 4- or 5-way

Battery Leads, 30 ft. Coloured Connecting Wire

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Nickel Terminals, 60X Coil, Permanent Detector,

Battery Switch, .0003 and 2-meg. Leak, 6-pin Coil

base, 12 yds. Twin Flex. 100ft. Indoor Aerial.

## CHIEF EVENTS OF THE WEEK

### LONDON AND DAVENTRY 5XX

- April 22 Covent Garden opera.  
 " 23 St. George's Day programme.  
 " 24 *The Flying Dutchman*, an opera by Richard Wagner.  
 " 25 *St. Joan*, by George Bernard Shaw, Part 1.  
 " 26 *St. Joan*, by George Bernard Shaw, Part 2.

### DAVENTRY EXPERIMENTAL 5GB

- April 21 An orchestral programme.  
 " 22 *The Flying Dutchman*, an opera by Richard Wagner.  
 " 25 B.B.C. orchestral concert, relayed from the People's Palace.  
 " 26 Covent Garden opera.

### CARDIFF

- April 27 A popular request programme.

### MANCHESTER

- April 26 A programme of musical comedy memories.

### ABERDEEN

- April 22 A variety programme.

### BELFAST

- April 22 *The Dragon's Bride*, a musical comedy in casserole, by Mabel Constanduros.

An attempt is being made to provide Greece with a broadcasting system; a monopoly is to be offered to a concessionnaire for a period of twenty years, at the end of which the transmitters would pass into the hands of the State. The scheme calls for the erection of a high-power station at Athens.

Radio Paris has been equipped with a Fultograph picture transmitter and broadcasts are experimentally carried out daily at 6.15 p.m. G.M.T.

### BURY YOUR CONTACT TROUBLES WITH THIS CLIX SPADE.



Patented.

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EACH

CLIX Spade Terminals are obtainable either nickel or lead-plated. The latter, for use with accumulators, offers less resistance to the flow of L.F. current, and is not easily affected by acid.

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## WITH THE AIR MAIL TO INDIA!

### Wireless Communication en route

WIRELESS is playing a vital part in the organisation of the new air mail service to India, inaugurated on the morning of Saturday, March 30, when G-EBLF (the Imperial Airways liner *City of Glasgow*) left Croydon outward bound for Paris and Basle, carrying the mails on the first stage of their seven days' journey.

As full particulars had appeared in the Press regarding the itinerary of this airliner, its time of departure, and the arrangements made for wireless communication *en route*, a good many wireless enthusiasts doubtless followed the progress of the flight by radio.

Those who are able to read Morse may have picked up the inter-aerodrome message in C.W. on 1,400 metres from GFK, the Croydon air-port "route service" station, informing the Continental aerodromes that the huge twenty-seater Argosy machine had duly departed with its passengers, baggage, and mail.

Even listeners who are unacquainted with the language of dots and dashes could follow the subsequent conversations in radio-telephony on 900 metres between the pilot of Imperial LF and the operators at Croydon and the Continental aerodrome stations.

W. O.

The series of talks for bee-keepers broadcast from the Scottish stations last year proved so successful that a further and more elaborate series has been arranged for 1929 in collaboration with the Scottish Bee-keepers' Association. The talks will be given fortnightly on Thursday evenings.

"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

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SELF-CHARGING, SILENT, ECONOMICAL  
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Zines, New Type, 104, doz.      1/2 doz.  
Sample doz. (18 volts), complete with bands and electrolyte 4/1, post 9d. Sample volt. 6d. Illustrated booklet free. Bargain list free.

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WARRICK RADIO, ARTISTIC FRETTED FRONTS.  
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Amateur Wireless

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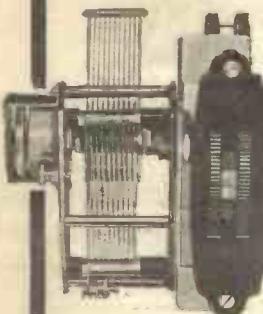


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A small variable condenser for panel mounting '00005, '0001 or '0002 **5/6**



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This set incorporates the latest developments in Receiver design—full constructional details free on request.

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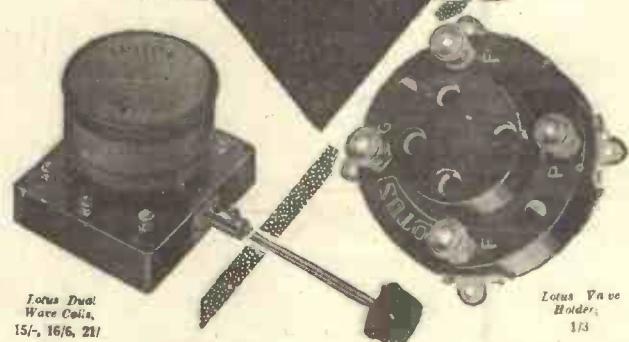
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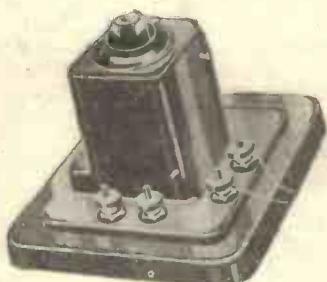
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(1925) Ltd., Dueon Works, Victoria  
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231/V

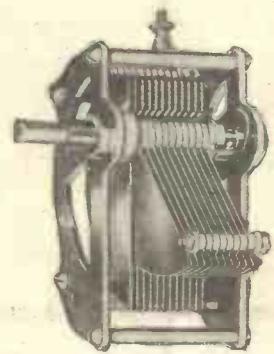
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Lotus Dual Wave Coils,  
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for 2 rooms.



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Your set will do all that the designer claims for it if you use Lotus Components.

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Section C of our Catalogue—free on application—gives full particulars of our complete range of these famous products.

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These Chokes have a huge iron circuit, adequate inductance, and Low Resistance.

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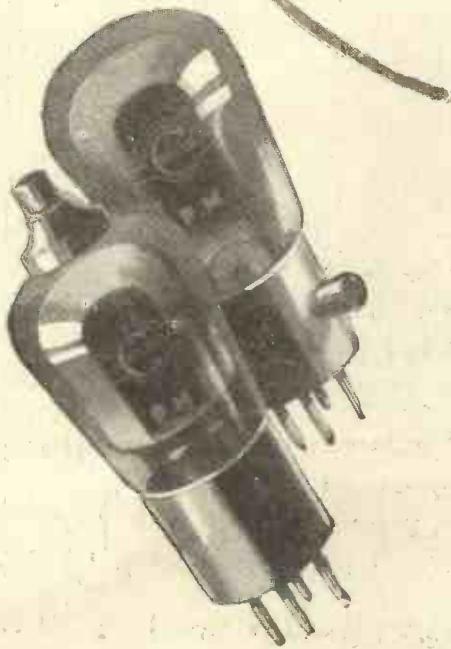
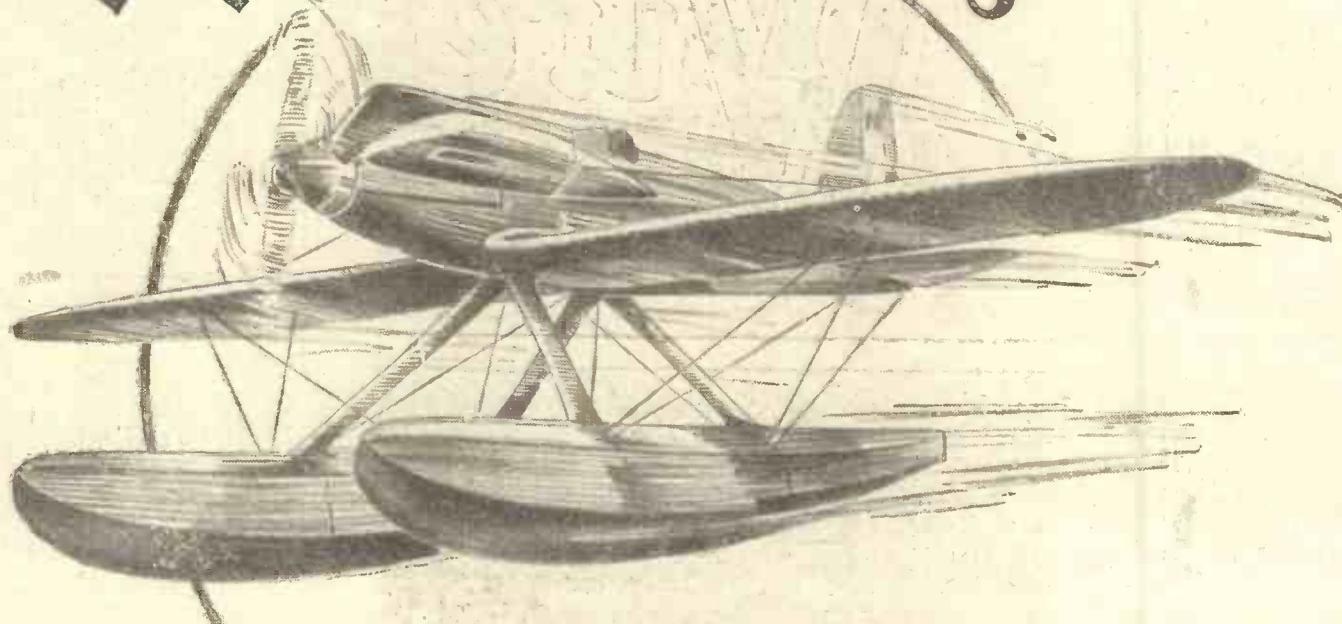
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621



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Because months of patient research have been devoted to their perfection, Mullard Pentone and Screened Grid valves break all records for super-efficient performance. They have the lowest current consumption combined with the highest efficiency of any valves of their type on the market.

We have never used the public as our research department. We wouldn't risk losing even one of our friends to satisfy an experiment, certainly not after all the years we've been together, up and down every European broadcasting station.

You can take our word for it, Mullard Pentone and Screened Grid Valves are perfect to the last detail, modern to the minute. Otherwise they wouldn't be stamped with the Mullard P.M. monogram.

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thousands of satisfied owners. Ask your dealer to demonstrate the Blue Spot 101 to-day.

It is driven by the Blue Spot 66K unit which is also obtainable for constructors as a separate unit, price 25/-.

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In the Cossor Screened Grid Valve all the inherent weaknesses of valve design have been eliminated. By means of the wonderful new Cossor system of construction—illustrated here—each element is rigidly secured top and bottom. Even under the hardest blow individual movement is impossible. The Cossor Screened Grid Valve is

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Noises in a valve are generally due to loose elements. In the Cossor Screened Grid Valve the elements *cannot* become loose because they are rigidly braced together and because every joint is scientifically welded. The Cossor Screened Grid Valve is

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**BREAK-PROOF !**

For any Screened Grid Receiver choose Cossor. Accept no substitute—for there is no adequate substitute for the Cossor system of Interlocked Construction.



**Technical Data.**

Cossor 220 S.G. (2 volts, .2 amps.) and 410 S.G. (4 volts, 1 amp.). Max Anode Volts 150, Impedance 200,000, Amplification Factor 200, Grid Bias 1.5 volts at max. anode Volts.

Price (each) **22/6**

A. C. Cossor Ltd., Highbury Grove, London N.S.

# Cossor Screened Grid Valves— HAVE INTERLOCKED ELECTRODES



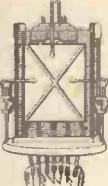
**1.** Here you see the double length of Cossor filament famed for its colossal emission. Note the seonite bridge holding it rigidly in position.



**2.** Around the two stout grid supports is wound the first grid, electrically welded at twenty-five points.



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# Cossor Screened Grid

**BRITAIN'S STRONGEST AND MOST  
DEPENDABLE SCREENED GRID VALVE**

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# Amateur Wireless

## and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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### Television to Come—Portable Set Licences—Free Radio—A Gipsy Told Me!— A Popular Set—D.F. on Ships—How Much to Broadcast?—Holidays at Home

**Television to Come**—As was always the case, and without great justification, television developments in this country have been shrouded with mystery. Therefore at present we cannot give any definite details, but from a reliable source we learn that negotiations are going on between Baird and the B.B.C., and it is hoped that actual broadcasts may be made in the very near future. There is, of course, a certain amount of technical ground work to be covered, and quite a deal of the difficulties which Baird has successfully overcome have been described from time to time in AMATEUR WIRELESS.

**Portable Set Licences**—It is welcome news, as announced recently, that the P.M.G. has sanctioned the use of one portable set without additional licence by the owner of a permit for a set at a fixed address. The only snag is that when a set is used away from the home address, the owner must carry the licence with him, and produce it if necessary. This somewhat savours of motorists' driving licences, which serve very little purpose, even for identification. Nevertheless this concession is well worth having and one can't expect officialdom to descend to practicality!

**Free Radio**—Some good work is going ahead in the provision of free wireless sets in mining areas where distress is particularly acute. This is possible by means of co-operation between the B.B.C. and the Central Council for Broadcast Adult Education. Altogether, free sets are being supplied in twelve localities in South Wales and about the same number in Durham and Northumberland. Efforts are being made to interest the local residents and it is suggested that they should form listening groups for discussion.

**A Gipsy Told Me!**—There is a little bit of romance attached to a new song which was included in a recent De Courville revue, *Gay Sparks*. This is one of the first



A NOTABLE "O.B."—Major Segrave before the microphone on the occasion of his speech on arrival at Southampton. He broadcast his impressions of "speeding."

songs written by Mr. Jack Mosdell, a clerk in a Government office. He took up song-writing in his spare time on the advice of a fortune teller who told him that he would succeed in this direction, although he had never before attempted to write a song.

**A Popular Set**—Our Technical Department has received so many requests for information regarding the fitting of the most up-to-date improvements to that popular set "Britain's Favourite Two" that they are at present engaged on a new version. The 1929 "Favourite" will be published in an early issue. Keep a look out for it!

**D.F. on Ships**—Radio direction-finding equipment is standard on so many ships that it is apt to be forgotten, and its marvels overlooked. Yet here we have a report from the master of a ship fitted with modern D.F. equipment and it is nothing but a paean of praise. The particular apparatus employed incorporates a very small frame aerial in the chart room, and the master states that every passage would take longer were he not aided by radio.

**How Much to Broadcast?**—The annual statement of the National Broadcasting Co. (in America) states that 9,000,000 dollars was expended by that company during 1928 for artistes' fees, wire network and general overhead expenses. Conservative estimates place the weekly revenue of the N.B.C. from commercial accounts at more than 200,000 dollars. This sum does not include entertainment which must be supplied by the advertiser.

**Holidays at Home**—The correspondent in a daily paper has found a new reason to grumble at B.B.C. talks! He says that a recent broadcast talk on the merits and beauty of Switzerland as a holiday resort should not have been given. "We are doing our best to boost our own holiday resorts," says this correspondent, "and it seems somewhat short-sighted if not definitely unfair to give talks on Continental attractions."

Well, that's as good a reason to grouse as any!

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**A New S.W. Tester**—The Vienna short-wave transmitter carries out tests every Tuesday and Thursday on a wavelength of 49.4 metres; in the course of a week or ten days this experimental programme will be extended to Wednesdays and Saturdays. It had been hoped to carry out a simultaneous broadcast of the Vienna evening concerts with Rosenhuegel and the new short-wave station, but its close proximity to the high-power transmitter is causing trouble.

# BROADCAST ARTISTES IN PICTURE



**VERA GILMAN.**—A favourite and frequent broadcaster. This clever young actress was heard on April 13 in the revue, "Hip-Hip-Hoo Radio." Both as singer and actress, she has scored in many popular productions.



**LEFF POUISHNOFF.**—This brilliant pianist has had an almost spectacular career since his early appearances at Queen's Hall. In his early broadcasts he was known as the "mystery pianist." He has just given another series of recitals.



**MAY BLYTHE.**—One of the best known of the B.N.O.C. stars, she has probably broadcast more than any other singer. Her principal roles have been in "Hansel and Gretel," "Cavalleria Rusticana," and "Carmen."



**CECIL BAUMER.**—A famous pianist known by his many appearances at the great classical concerts. Recently, following on many earlier broadcasts, he gave a series of recitals from 2LO.



**HELEN OGILVIE.**—Frequently heard of late from 2LO and provincial stations, Miss Ogilvie is a member of the Carl Rosa Opera Company and was heard in its first broadcast of "Faust." She possesses a wide range of tone and a clear diction.



**MAURICE JACOBSON.**—A clever pianist and composer, and holder of the Stanford Scholarship; his works include many songs and orchestral works. Best known are his setting of Vaughan Williams Mass in B minor, and the Beggar's Opera Fantasia.



**MARY OGDEN.**—A well-known Manchester singer, famous in oratorio work. She has broadcast in Rossini's "William Tell" and many other musical programmes.



**EDWARD CLARK.**—The popular musical director of Newcastle station, Mr. Clark has had a wide Continental and British musical experience. He was closely connected with a season of the Russian Ballet.



**MAUD COUPER.**—One of the earliest of all broadcast elocutionists, Miss Couper has won fame in Scotland for her treatment of real Scottish humour. She is always a favourite at London Scots gatherings.

# THE STABILITY FOUR

*A Loftin-White  
Receiver Embodying  
"Q" Coils*

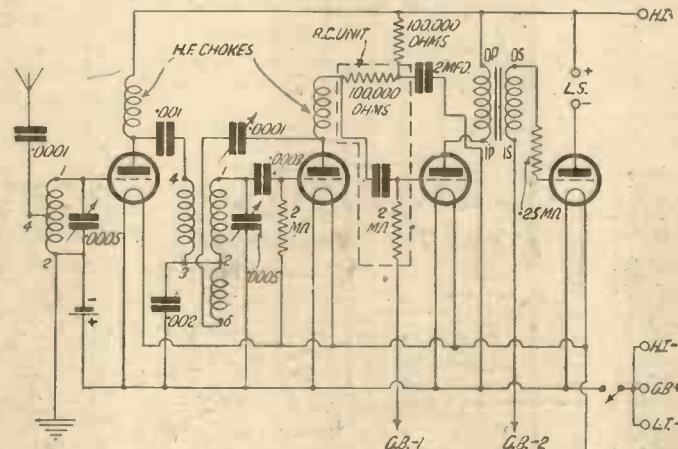
By  
**J. H. REYNER,**  
*B.Sc., A.M.I.E.E.*

THE aerial circuit is coupled by the use of a "QAA" coil, this being the new form of "QA" coil having a centre tap arrangement so that the aerial can be connected to a tapping on the coil instead of across the whole coil. By this means, both the wavelength range and the selectivity are somewhat improved over the older form of "QA" type. Any reader, however, who possesses a "QA" coil can utilise it in this position if he wishes, in which circumstances the aerial is connected, through its pre-set condenser, to terminal No. 1 instead of terminal No. 4.

In the anode circuit we have the H.F. choke and a phasing condenser, whence the currents are led through to a primary winding of a "QSP" transformer. A .002 fixed condenser is inserted as a coupling condenser in series with the .0005 tuning condenser. The value of this coupling condenser determines the extent of the capacity coupling. In the present instance this value was chosen because with the value of magnetic coupling given by the "QSP" coil the reaction demand was approximately constant. Reaction is obtained by capacity control, the winding between terminals 2 and 6 being utilised as is usual in the case of the "QSP" coil.

Following the detector, there is a resistance-coupled stage while the final stage is

*Last week the principle upon which this receiver, which provides constant reaction effects, operates was described. In the article below an explanation of the circuit is given, together with the necessary information for the construction of the actual set as shown by the photographs.*



This is a reproduction of the circuit diagram shown last week

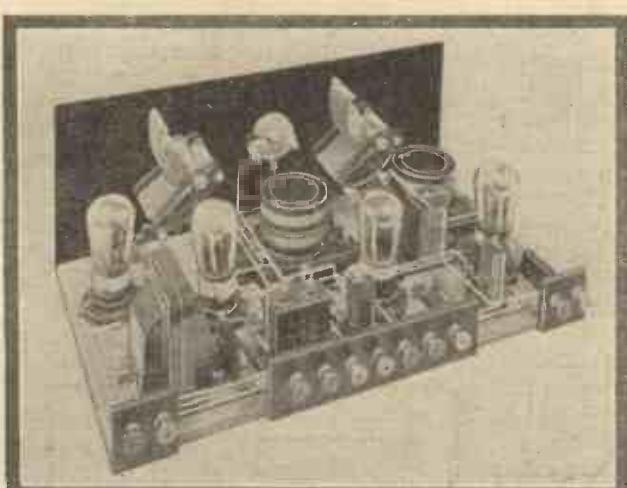
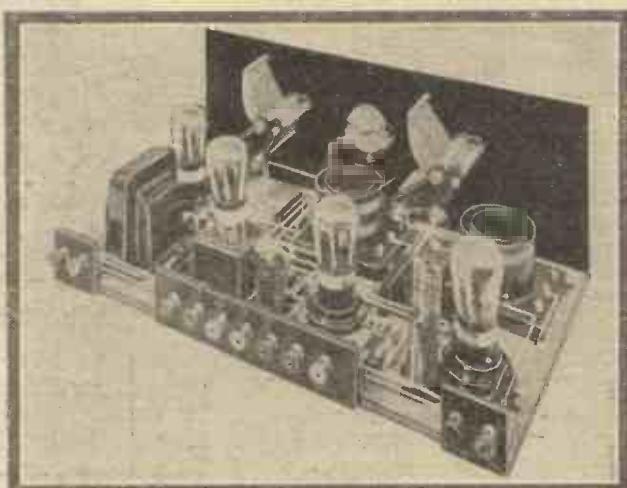
transformer-coupled, a Lissen Super transformer being used in this instance. Despite its relatively low price, this instrument has a really super performance, and, in fact, the principal difficulty I had with its use was that it was rather too good and gave me trouble due to battery feedback when the arrangement was used on an eliminator.

To obviate this, a stopper circuit has been connected in the detector lead consisting of a 100,000-ohm resistance with a 2-microfarad condenser shunting it to earth.

The circuit is thus generally of a straightforward character, the principal advantages in use being (first) the circuit does not require any neutralising, while at the same time it gives a good measure of high-frequency amplification, enabling distant stations to be obtained with greater ease and local stations to be cut out by means of these two tunes, and (second) a uniform transfer of energy over the whole scale so that the reaction adjustment is tolerably constant. This constancy has been arranged to apply principally to the short-wave band and it will very probably be found that the reaction adjustment is not so good on the long waves. This, however, is again due to the use of a standard "Q" coil, for, as has already been pointed out, it was not considered advisable to produce a special coil for this particular purpose.

Both the "QAA" and "QSP" coils are standard items and can readily be obtained from any dealers. It has been found in certain instances that the reaction control is not as constant as is desirable, in which case slight variations of the value of the .002 coupling condenser may be tried. This condenser must not be reduced seriously

Two pictures  
of the rear  
of the  
"Stability Four."  
Other photo-  
graphs appeared  
in last week's  
issue



## "THE STABILITY FOUR" (Continued from preceding page)

or the tuning range of the circuit will be affected. It may be increased if necessary without serious effect, the larger the condenser, the less being the capacity coupling.

### Batteries and Valves

The receiver should be connected up to the batteries in the customary way, the voltages being as follows: Either two, four, or six volts may be used for the L.T., depending upon the valves in use, while a voltage of 100 to 120 is satisfactory for the H.T., there being only one H.T. tap. Grid bias should suit the valves in use, but for most purposes, a bias of 3 volts on the first L.F. and 9 volts on the second L.F. will prove satisfactory.

The valves to use are not critical. An H.F. valve of the ordinary medium resistance type (20,000 to 30,000 ohms) gives the best results in the H.F. stage. The detector should be a resistance-coupled valve having an A.C. resistance of the order of 40,000 to 80,000 ohms. An L.F. valve should be used in the first L.F. stage, following which we may place a power or super-power valve in the last stage. The

selectivity, rendering the tuning of the circuit sharper. The actual current consumption of the particular model described was only 7 millamps with a 100-volt battery using the following valves:

H.F. ...	B.T.H. HF210
Det. ...	Mullard PM1A
1st L.F. ...	Osram HL210
2nd L.F. ...	B.T.H. P227

### Tuning

The method of tuning is to set the right-hand dial approximately to the position required; increase the reaction setting slightly until the receiver is just oscillating or just about to oscillate. Then, on rotating the left-hand dial, the point at which the receiver is in tune will at once be observed as the signal strength and mush will come up at one particular point. The reaction control may then be slackened off slightly and the station tuned in in the normal manner. On the long waves in particular it will be found that there is very little "pull" between the circuits. This means that if the detector circuit is allowed to oscillate by increasing the reaction

control, then as the H.F. dial is moved through the tuning point, the note of the oscillation only varies very slightly, indicating that there is very little coupling between the circuits.

On the short-wave position, somewhat more pull will be found; the H.F. circuit makes quite an appreciable difference to the note and for this reason a little more care must be taken in the tuning. The tuning operation, however, will in general be found very simple because there is no neutralising adjustment and the receiver once con-

structed is ready for operation without preliminary adjustment of any sort. Slow-motion dials, incidentally, will be found a very valuable aid in tuning if it is desired to search for distant stations. For ordinary purposes, plain dials are satisfactory.

It will have been observed that a grid bias of  $1\frac{1}{2}$  volts is included in the H.F. stage. This not only reduces the current taken from the H.T. battery which might otherwise be somewhat high for the H.F. valve, but it also materially increases the

### Test Results

On test, I found the receiver behaved well. Although the reaction control was

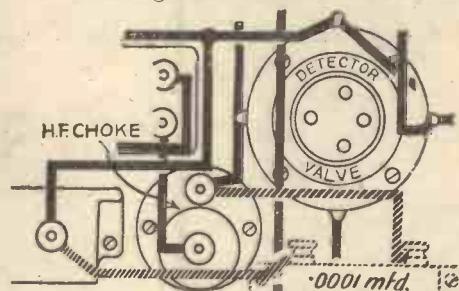


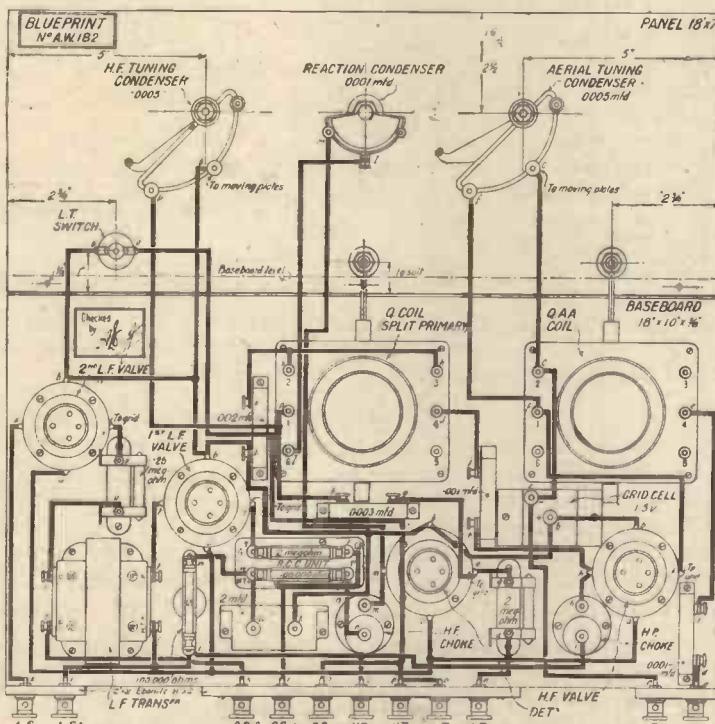
Diagram showing connection of fixed condenser from anode of detector to L.T. negative not quite constant, it was sufficiently so to enable me to tune in a number of stations without any alteration to the reaction control. This, of course, was after dark. The selectivity is of a fair order, it being possible to tune the local station out without much difficulty. This selectivity is assisted by the grid bias on the H.F. valve and also by the use of the "QAA" coil. If extreme selectivity is required, the H.F. valve in the first stage should be replaced with an R.C. valve.

There are now so many stations operating that it is a fairly easy matter to tune in a number of foreign programmes at good loud-speaker strength. Instead of giving a test report of the total number of stations received on the set, therefore, I have simply chosen a few stations which were received sufficiently well to be at good loud-speaker strength during daylight. The test was actually made on a Sunday afternoon and

### TEST REPORT

	Wave-length reading	Dial reading
LONG WAVES—		
Radio Paris	... 1,750	165
Daventry	... 1,562.5	150
Eiffel Tower	... 1,470	142
Kalundborg	... 1,155	103
Hilversum	... 1,073	92
SHORT WAVES—		
Daventry Junior...	... 482	165
Langenberg	... 462	160
London	... 359	120
Huizen	... 337	115
Cologne	... 269	70

the wavelengths and dial settings given will serve as an indication of the approximate tuning position at which various stations may be expected. The dial readings are only given for the H.F. dial, the aerial dial being similar, but the actual setting varying with different aerials. It should particularly be noted that this test report only applies when condensers of the same type as those used in the original set are employed. The receiver will work with other types of condensers, but the stations will not tune in at the same dial readings.



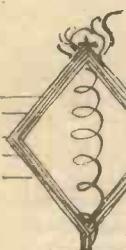
The Wiring Diagram. Blueprint available, price 1/6.

makers will recommend suitable grid-bias voltages and these should be followed, but in general about 3 volts on the first stage and 9 on the second, unless a super-power valve is used, in which case the last valve should have 12 to 15 volts bias.

It will have been observed that a grid bias of  $1\frac{1}{2}$  volts is included in the H.F. stage. This not only reduces the current taken from the H.T. battery which might otherwise be somewhat high for the H.F. valve, but it also materially increases the

selectivity, rendering the tuning of the circuit sharper. The actual current consumption of the particular model described was only 7 millamps with a 100-volt battery using the following valves:

H.F. ... B.T.H. HF210  
Det. ... Mullard PM1A  
1st L.F. ... Osram HL210  
2nd L.F. ... B.T.H. P227



# THIS MODERN MUSIC

is not really poisonous

By BAYNHAM HONRI




"GOOD evening, listeners all—especially invalids!" says Sir Walford Davies at the commencement of his musical lectures, and one million non-musical listeners promptly switch off their sets. I know that this happens, because I was at one time exceedingly unmusical and regularly committed this sacrilege. That is to say, I played no musical instrument and was incapable of absorbing any music

a matter of fact, to carry out a series of reception quality tests of 2LO's transmissions over a period of months. I had to listen.

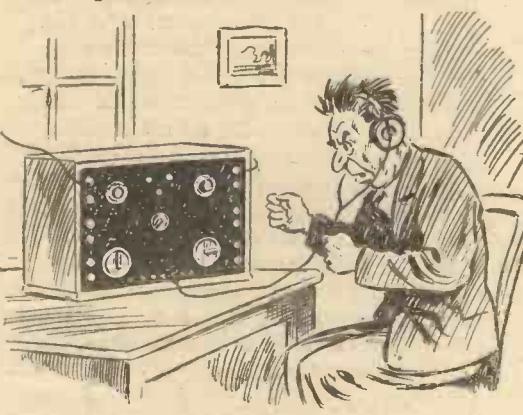
able to digest the bread, cheese, and beer without shuddering. And yet, in the parallel case of music, it is being done nightly by way of the loud-speaker.

### Spoon-feeding the Classics

Night after night I listened to music of all kinds, classical—ancient and modern, jazz and military band, hearing the same pieces played time and time again and gradually becoming aware of the existence of those particular classics which come in the "hackneyed" category. I began to find that the less familiar music, which required some effort of the brain, gave me much more pleasure than such compositions as Rachmaninoff's "Prelude," that cheery musical description of a man being buried alive. The recurring themes in symphonies began to interest me, and I realized the dramatic power of, for instance, Tchaikovsky's Fourth Symphony and the charm of Elgar's very English music. For a time, Edward German was a "best seller," so far

### The Moderns

The tendency of modern composers is to treat melody as quite a secondary consideration to tempo and phrasing. (Musical listeners will probably have given me up in disgust, so it hardly matters if I don't use the correct technical terms.) That is why it is so difficult to listen to at first. Generations of melody makers have drugged our musical senses to anything which is the least bit out of the ordinary. Chinese music doesn't mean a thing to us, and yet, to the good people who regularly listen to it, it is probably as dramatic as Tchaikovsky or as sentimental as Ketelby. It is, indeed, a difficult matter to get out of the musical rut, but if one really tries a new musical diet in carefully graduated doses, a new musical pleasure will be discovered.



"I had to listen . . ."

except that of the order of "In a Monastery Garden" and "Yes, We have no Bananas." So you see that when such an ignorant person as myself ventures to express any opinions on music, they will be from the point of view of the "man in the street," and will be unbiased by a musical education. Sir Walford Davies has always had three "bees in his bonnet"—Bach, Brahms, and Beethoven; I don't suppose he has ever listened to a dance band sympathetically. In fact, it was probably his unsympathetic references to jazz which turned us away from listening to his lectures.

### The Aftermath

The result of this course of forced musical culture left me in mid-air. At least, that is what I thought at the time, for I still obtained a great deal of pleasure from listening to jazz music, especially when it was composed by a new man named Gershwin. It is this "middle" stage of musical appreciation which has been reached by the majority of radio listeners, who are, in spite of themselves, far more musical than that poor unfortunate "man in the street." The appreciation of good music is much the same as the appreciation of good food. There is, first, the bread-and-cheese and beer stage; secondly, the lemon sole and Chablis taste; and lastly, the gourmet's judgment of good caviar and bad champagne. It would seem impossible for the gourmet, with his very sophisticated palate, to be

### Ultra Modern

It is the caviar-and-champagne stage that seems to upset most of us. Bartok, Constant Lambert, Schoneberg, and the later Stravinsky works seem to be as colourless and potent as vodka. I can't say that I understand or fully appreciate these composers, particularly Bartok. But I am willing to try to understand Bartok, and



Chinese music is probably as dramatic as Tchaikovsky or as sentimental as Ketelby

I am quite sure that a great deal of pleasure and musical mind-broadening will be the result of such an effort, even if it be unsuccessful. Constant Lambert's "Rio Grande," with its curious drum breaks and syncopated piano, interested me as much as (Concluded in third col. of next page)

# MY WIRELESS

# DEN BY W.JAMES

*Weekly Tips,  
Constructional  
and  
Theoretical—*

## Loud-speaker Position

A RECEIVER is generally installed in a corner of a room or in some position where it is conveniently placed as regards the aerial and earth. Very often I find the loud-speaker is put by the side of the receiver, or even on top of it, regardless of the fact that the quality of the reproduction is dependent to no small extent upon the position of the loud-speaker with reference to the furnishings of the room.

This is a point that is often overlooked. It is surprising how the quality may change as the loud-speaker is moved about the room, and a position can generally be found which is convenient and where the best all-round results are obtained. By the way, have you listened to a loud-speaker in the bathroom? If not, do so, and then listen outside the bathroom with the door open, and then partly open, noticing the changes in the quality!

## Anchoring L.F. Transformers

Many makes of inter-valve transformer are provided with a terminal or other connection that is joined or fastened to the metal case of the instrument. It is provided in order that the user may conveniently connect the case to earth or an equivalent point, such as the negative side of the low-tension battery, as it is found that low-frequency howling and instability may often be prevented by this means.

The question therefore arises as to whether all transformers should be provided with a metal case that may be earthed. Numbers of them are not, but have a moulded cover. Their manufacturers have evidently decided that it is not essential to provide a metal cover which may be earthed, and practical experience indicates that stability, and freedom from howling, are not dependent upon the employment of this form of cover when only one transformer is included in a receiver. When two or more are used, the metal cover may be an advantage, but I have found that no general rule can be made. Everything depends upon the arrangement of the set or amplifier, the amount of the amplification, the types of valves employed, and other factors. I have even found instances where the best results were to be obtained by *not* connecting an earthing wire to the case of the transformer.



W.JAMES

For the  
Wireless  
Amateur

## Improving Selectivity

I am often asked how the selectivity of a receiver may be improved without much trouble or expense, and I always reply that this can be done by connecting a fixed condenser in the aerial circuit. This fixed condenser should be joined between the aerial and the coil included in the aerial circuit (Fig. 1).

A good value to try is .0001 microfarad. The inclusion of a fixed condenser of this capacity in the aerial circuit may reduce the signal strength by a small amount. This will probably not matter so far as the local station and Daventry are concerned, but may be serious when receiving the more distant stations. It is, therefore, advisable to have two aerial terminals, one of which

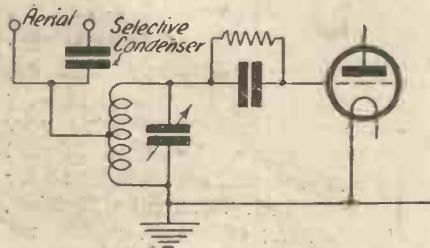


Fig. 1. An arrangement by means of which the degree of selectivity is very easily controllable

is joined directly to the coil and the other through a fixed condenser.

## A Mains Point

receivers which are supplied with their filament and high-tension current through suitable apparatus from alternating-current mains are very common in America and will no doubt in time be popular in this country. They have the great advantage that when once they are satisfactorily installed maintenance is negligible.

Occasionally a new valve has to be fitted, however, and according to my experience this should be carefully effected. I have found that a hum may be heard from the loud-speaker when the grid pin of the valve is a relatively loose fit in the holder. It is, therefore, wise to open each of the pins in order that all contacts shall be good ones.

**NEXT WEEK:  
A SHORT-WAVE ADAPTOR**

The grid circuit of a mains-operated valve is very liable to collect small alternating voltages which, being magnified by the receiver, will be heard as hum.

## Arranging the Earth

A question which is very often asked is what is the best size of earth wire to employ? Sometimes I find a relatively thin connecting wire is used between the receiver and the earth connection and on other occasions I have noted that a thick wire or a conductor such as 7/20 is used. Personally, I employ a stranded cable in order that the actual resistance of the earth circuit shall be as low as possible.

A covered conductor is considered rather better than a bare one and it should, of course, be treated as an extension of the aerial. Do not fasten it to walls and do not lead it into the house too close to the aerial wire. As I have before mentioned, I generally prefer to use a buried earth plate rather than a water pipe for the actual earth.

## "THIS MODERN MUSIC"

(Continued from preceding page)

Gershwin's "Rhapsody in Blue," the jazz classic. Stravinsky's "Soldier's Tale" is really a fantastic ballet and did not broadcast well; nevertheless, having some idea of the grotesque dancing and figures that "went with" the music, I obtained quite a lot of entertainment and not a little amusement. You should bear this in mind when listening to ballet music in particular. Stravinsky's "Firebird" is relatively easy, as is his "Petroushka," the composition in which he successfully imitates a street organ by clever orchestration.

## Sympathy

The object of my article is to show that a non-musical person can obtain a great deal of enjoyment and pleasure from the more advanced classical and modern music, and from the advanced and specially orchestrated jazz, if he will only listen sympathetically. You can take it from me that there is something in it, even if it only takes us out of the quagmire of sugared melody into which we have been sinking. I must stop. There's a barrel organ outside playing "Sonny Boy"!

# BANISH INTERFERENCE

GET AWAY FROM YOUR NEIGHBOUR'S  
SCREENING WITH A P.R. MAST

Everybody knows that to have a high aerial is to get extra powerful signals. The difficulty of fixing up a high aerial is banished if you fit a

## P.R. PATENT STEEL WIRELESS MAST

**26** Feet high. In 3 sections of 1½ in. Steel tube tapering to 1 in. Carriage, London, 1/6; Midlands, 2/6; elsewhere, 3/6. Weight 24 lb. Two masts for 28/-.

**34** Feet high. In 4 sections of 1½ in. Steel tube tapering to 1 in. Carriage, London, 2/-; Midlands, 3/-; elsewhere, 4/- Weight, 34 lb. Two masts for 40/-.

### The "Super" Mast

**42** Feet high. In 5 sections of heavy 1½ in. Steel tube tapering to 1 in. A real bargain. Carriage, London, 2/6; Midlands, 3/6; elsewhere, 4/6. Weight, 46 lb. Two masts 55/-.

**P.R.** are made of British Steel in MASTS 9 feet lengths, from 1½ in., tapering to 1 in., and are supplied with cast-iron bed plate, steel ground pegs, stay rings, galvanised steel flexible wire stays cut to lengths, pulleys, bolts, and fullest erecting instructions. No further outlay necessary.

### NO HOLES TO DIG ONE MAN'S JOB

Any intelligent man can assemble and erect a P.R. Mast in a couple of hours. The Mast being tapered, it is easy for anyone to raise it from the ground into position. The wire is sent cut to size—a saving of endless worry.

Minimum Radius 3 ft. 6 in. The easiest Mast to erect.

**GUARANTEE.**—Money refunded if not satisfied and the Mast is returned within 7 days. The simple instructions are so clear, that mistakes cannot be made.

### PAINTING.

Any protective coating applied before dispatch gets so damaged by the Carriers that it is essential to paint the Mast before erection. All P.R. Masts are sent out oxide-finished ready for painting. One coat of P.R. Colloid covering applied—a 10 minutes' job—to all parts of the Mast when ready to erect sets dead hard in an hour and protects it against all weathers.

### PRICE OF ACCESSORIES.

P.R. Colloid Covering sufficient for a Mast—with brush, 2/6. Halyard Log Line—Ryland's patent rot-proof: For 20-ft. Mast, 1/6. 34-ft., 2/- 42-ft., 2/6. Per 100 ft., 3/-. Note.—Double length supplied to make lowering of Aerial easy.

### A HIGHLY EFFICIENT AERIAL.

P.R. Aerial is made of 14-28 High Conductivity Pure Copper Enamelled Wire—each strand insulated from its neighbour to give the highest signal strength obtainable. 100 ft., 4/3; 50 ft., 2/3.

**THE ONLY VALVE WITH A WRITTEN GUARANTEE AS TO PERFORMANCE & LIFE.**

*Don't Forget to Say That You Saw it in "A.W."*

# THE TWO BEST THINGS EVER OFFERED TO YOU

And both are British made to the hilt. Both are sent you on the money-back-if-not-satisfied principle.

We don't want you to keep anything you buy from us—as you can easily understand it PAYS US BETTER for you to return the goods than harbour spleen. We want you to be satisfied and give us the CHEAPEST ADVERTISEMENT—tell your friends we play the game.

We have sold more goods through people telling each other they WERE SATISFIED than by all the advertisements we have paid hundreds for.

You have seen our advertisements for more than two years—you have doubted mail order houses—yet reason it out—could we keep on spending hundreds in advertising unless we had THE GOODS ???

We still, and always will, stick to our guns. Try one—no risk—if not fully satisfied that it equals your favourite at any price, your money will be refunded by return. You are the sole judge.



H.R.H. THE  
PRINCE OF  
WALES

says:  
"SUPPORT  
BRITISH  
INDUSTRY."

### LIST OF DULL EMITTERS

Type	Fil. Volts	Amp.	Imp. Ohms	Amp. Fac.
PR 2	2	.095	28,000	13
PR 3	2	.095	15,000	8
PR 4	2	.095	120,000	32
PR 9	3.5-4	.083	18,000	14
PR10	3.5-4	.063	10,000	8.7
PR11	3.5-4	.063	88,000	40
PR17	5-6	.1	18,000	17
PR18	5-6	.1	9,500	9
PR19	5-6	.1	80,000	40
PR20	2	.15	7,000	6
PR40	4	.15	7,000	6
PR60	6	.1	5,000	6
<b>POWER</b>				Power
<b>7/6</b>	Each Post 4d.			
<b>SUPER POWER</b>				"
<b>12/6</b>	Each Post 4d.			S.P.
PR120	2	.3	2,750	4
PR140	4	.2	2,500	4

**GUARANTEE.** All valves dispatched under guarantee of 7 days. All valves carefully packed and breakages replaced free.

Tell us your set—we will send correct Valves. Matched Valves 1/- extra. All orders executed by return of post.

### RADIO PRODUCTS

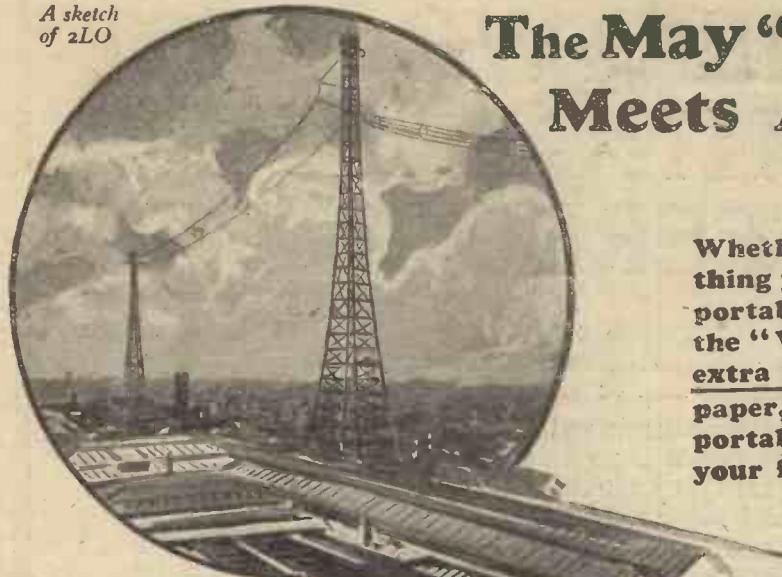
Sent  
C.O.D.  
if desired.

Telephone  
City 3733

17-58 PATERNOSTER SQUARE  
LONDON E.C.4

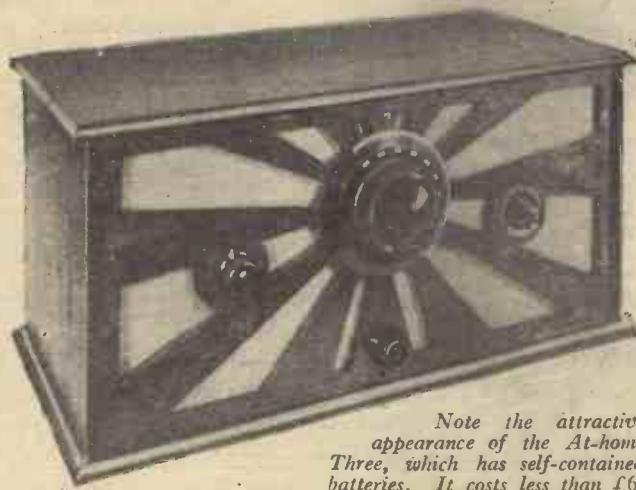
Opposite Post  
Office Tube.

A sketch  
of 2LO



*Do you know that to get the best results from a portable the edge of the frame aerial must be pointing in the direction of the broadcasting station? Many other practical points of this kind are discussed in the May "Wireless Magazine."*

No matter how much you know about radio, you will always find many articles in the "Wireless Magazine" that you will understand and appreciate. Amongst its 45 features this month there are articles to suit everybody's tastes—a disclosure of Russian broadcasting activities, details for building four fine sets, a radio detective story, hints for decorating a linen-diaphragm loud-speaker, etc., etc. You cannot fail to find something of particular interest to yourself.



*Note the attractive appearance of the At-home Three, which has self-contained batteries. It costs less than £6.*

**By using the Special Coupon to be found in every issue of the "Wireless Magazine" you can get for half-price a full-size constructional blueprint of any set!**

## The May "Wireless Magazine" Meets All Your Portable Needs !

Whether you intend to build or buy, everything you want to know about the modern portable is dealt with in the May number of the "Wireless Magazine" which includes an extra 16-page Supplement, printed on special paper, giving details of more than 100 portable receivers now on the market. Tell your friends about this great number!

### THREE SPECIAL PORTABLE ARTICLES.

#### GETTING THE BEST FROM A MODERN PORTABLE. By D. Sisson Ralph (Assistant Editor).

THE WAYFARER. A Five-valve Portable Super-het described by J. H. Reyner, B.Sc., A.M.I.E.E. (Technical Editor).

HOW I SHOULD DESIGN A PORTABLE. By W. JAMES Research Consultant



*Here you see J. H. Reyner's Wayfarer—A portable five-valve Super-het which weighs only 27lb.*

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Valves to Use in Your Set  
Wavelengths of the European Stations

In Tune with the Trade!  
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Leaves from A Listener's Log. By Jay Coote  
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The Twinflex. A Modern Reflex Two-valver without Crystal Detector  
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How the Law Acts When Your Aerial Collapses!  
Speeding News by Air and Radio, Too!

The Dominions Four. Converting It to A Short-wave Super-het

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Building Your Own Gramophone

The Best Dance Records. By H. T. Barnett

Planning your Aerial. By E. H. Chapman, M.A.

The Music Listener. By C. Whitaker-Wilson

The Horse-power of A Kilowatt

Broadcast Music of the Month. By Studius

Novelties and New Apparatus Tested

Reaction—A Mixed Business!

Reference Sheets. Compiled

by J. H. Reyner, B.Sc.

**Get Your Copy of "Wireless Magazine" To-day—Price 1/-**

# On Your Wavelength!

## The Regional

AFTER taking a look at the new regional station at Brookman's Park, not yet completed, I feel justified in venturing the opinion that this station will be the "last word" in broadcast transmitter design. Machines, switchboards, and quite a lot of apparatus are already in the buildings, and the actual transmitting gear will soon be assembled. The whole outfit will be entirely self-contained, current being generated by dynamos driven by oil engines, and oil being supplied to the engines from a huge gasometer-like tank. There is a studio in the building which will be used for tests and emergencies.

## Disguised!

For some reason or other the B.B.C. haven't been encouraging callers at the Brookman's Park station, and the "Press" are, for the moment, strictly not admitted. Therefore, in order to find out the position of things for your especial benefit, I *really* had to assume the disguise I have often referred to in my lighter paragraphs. No, I'm not joking this time! I *did* assume a disguise, and I *did* succeed in passing the "guards" and having a good look inside the mysterious building. I won't say what the "disguise" was, because the B.B.C. may read this paragraph—and I may want to use it another time!

## The B.B.C. Rush

As I have said before, quite a number of B.B.C. people, particularly from the engineering side, have turned over to talking picture activities. The successful negotiation of half a dozen contracts has put the spark to the gunpowder with a vengeance. Rumours of huge salaries to be earned elsewhere have had effect. The production manager of one film-producing firm has told me that he has had between thirty and forty applications for jobs from B.B.C. engineers as the result of a small announcement in the Press that his firm contemplated entering the "talkie" field. By the way, I didn't tell you that all the best people say "talker" now—"talkie" is a relic of a past age.

The chief sound engineers of half a dozen production units already formed have been taken from one B.B.C. experimental section alone. The meetings of the "sound section" of the Society of Motion Picture Engineers will be like a reunion of B.B.C. people, now become hated rivals!

## L.F. Troubles

Funny—isn't it—how often in wireless we cast aside some circuit or component only to re-discover it later on and to return to it full of enthusiasm. Low-frequency

circuits are a very good case in point. It was proved to us conclusively by experts that transformers did, must, and always would distort. We hurled our transformers on to the rubbish heap in order to fit R.C. couplers. Then super-experts showed that R.C. had a little way of suppressing certain frequencies. Meantime, transformer designers were busy, and before long they produced components guaranteed to deal faithfully with any sound from the roar of a lion to the squeak of a bat. The transformer came into favour again, but we all nodded wisely and said that where you had two L.F. stages only one of them must be transformer coupled. And we told each other just why this was so. There certainly was distortion if two transformers were used, but very few have really understood why it came about. Actually transformers, if of first-rate quality, were blameless; the nasty noises were due to something quite different.

## Back Couplings

When a common source of H.T. is used we provide the valves of the receiving set with a very simple way of metaphorically putting their thumbs to their noses and laughing at us. In saying "common," by the way, I am referring to the fact that they all shared it, though matters are made very much worse if it is also common in the cheap and nasty sense. The resistance of this H.T. source is at the root of the trouble, for it serves to link up valve with valve in a way not contemplated by the designers of sets. The result is that we get an undesirable feed back or reaction effect which may have most unpleasant results.

## Theory and Practice

The detector valve may be quite a nuisance in this way. In theory its plate circuit contains only D.C. and audio-frequency oscillations. In practice a certain amount of radio-frequency oscillations generally manage to find their way through. With the kind help of a common H.T. source we may find the first-note-magnifying valve oscillating quite happily at radio-frequency. In this case there is no howling, but reception is very woolly and the loud-speaker emits a distinct plock whenever the finger touches or leaves the grid terminal of the valve holder. Then note-mag. number one may become back-coupled to note-mag. number two to such an extent that audio-frequency oscillation occurs, and we get either a howl or that disgusting succession of pops which is known as motor-boating.

## The Remedy

You can sometimes cure L.F. howling or motor-boating by the simple process

of wiring a fixed-resistance with a value of about a quarter of a megohm between the grid of each low-frequency valve and its normal connection. This is a cure of a kind, but it does not strike at the root of the trouble, and the best way really is to prevent, rather than to cure. Your set may be quite blameless when the batteries are new, supposing that it works from a dry H.T.B., but as time goes on quality becomes steadily worse and worse. You put the distortion down probably to the fact that the plate voltage is declining, whereas it is due not so much to that as to the rising resistance of the common H.T.B. which may reach astonishingly high figures. I have known a 44-cell battery, which still showed over 40 volts on a good meter, develop a resistance of nearly 5,000 ohms—quite enough to cause all kinds of L.F. worries. You can end your L.F. troubles and improve the quality of almost any set by simply fitting de-coupling circuits consisting of a suitable series resistance with a path to earth, *via* a fixed condenser, for oscillations. The effect is to keep oscillating currents clean out of the source of H.T. supply and thus to prevent undesirable couplings.

## Short-wave News

I mentioned recently that short-wave conditions were showing a very marked improvement. At the time of writing they are about as good as they have been for twelve months or more. On any afternoon when he is working you can be pretty sure of picking up PLE from Bandeong in Java, whilst W2XG, the American end of the transatlantic telephone service, is to be heard very powerfully on a wavelength that varies from time to time. I have had beautiful reception lately from W2XAD, the 19.56 metre relay of WGY, as well as from W2XO, which transmits the same station's programmes on 21.96 metres. KDKA is nearly always to be picked up by way of W8XK on 25.24 metres, and W2XAF which relays KDKA on 31.46 metres, is excellent unless interfered with by a miserable C.W. signal that for some unexplained reason appears to have adopted the same wavelength. The Nairobi station, 7LO, is easily picked up, as a rule, on 31 metres. There are several good transmissions from the Continent, the best of which are Döberitz (AFK) and Madrid (EAR110).

## A Good Combination

For short-wave work just now I am using a grid-leak-and-condenser detector, followed by a pentode valve, with transformer coupling between the two. This I find an exceedingly good combination, for it gives one splendid signal strength, with none of the noisy background that one is apt to get

## On Your Wavelength! (continued)

even with the most carefully designed two-stage note-magnifier. This combination gives me really good loud-speaker reception of a number of American stations on any favourable evening, and it is delightfully easy to work with, since there is only one tuning control and a reaction condenser. This short-wave set has also a larger set of coils, which enables it to be used for reception of the local station.

**The Portable Licence**

The concession made by the Postmaster-General to portable-set owners will be very much appreciated, except possibly by those who have already taken out a second licence and cannot get their money back! The new regulation is that, provided that you already have a licence for a stationary set at home, you need not take out another for the portable, but if you are using the latter away from home you must carry the licence with you and produce it when requested to do so by duly authorised officials. Picnic parties, therefore, may receive visits, since the local lists obviously won't show the names of motorists who have come from some little distance. The best tip, by the way, is not to carry the licence in your pocket, but to gum it inside the case of the portable. It will then always be at hand when asked for, instead of having been left in the pocket of one's other coat.

**A Television Society Lecture**

Although it is of recent birth, I was made to realise the other evening that the Television Society is a very live one. I paid a visit to the Engineers' Club and listened to a paper by Mr. J. Cameron Rennie entitled, "Some Notes on Exploring." Lord Angus Kennedy was in the chair; and prior to the lecture proper an informal discussion took place, and it was a delight to see the earnestness with which members participated.

In introducing his topic, Mr. Rennie formulated some rather novel lines of thought, and compared and contrasted the five human senses—feeling, tasting, smelling, hearing, and seeing—in their relationship to exploration. The first three are very limited in their scope; but, since the last two depended upon wave motion at high frequencies for their action, it was suggested that possibly in some hitherto unrevealed fashion, feeling, tasting, and smelling may be governed by wavelengths at a frequency bordering on zero! In connection with the human eye, it has to be educated to perform its natural function in an efficient manner, but when we turn to the television eye, namely, the photo-electric cell, it does not lend itself to such a process. It cannot take in a whole scene, but has to be made to explore it spot by spot at a rapid speed. This is where the

exploring or scanning disc comes into being, since it enables a spot of light to traverse the object being televised and thus permit the cell to convert the varying-light intensities into electrical pulsations.

**Exploring or Scanning?**

The lecturer lodged a plea for the use of the word "exploring" as against "scanning" where television is concerned, attributing the latter word to American origin. It is surprising how the term which is first applied to describe a new process shows a tendency to remain, and since scanning was used initially it is now adopted fairly extensively. A Chambers's Dictionary seems to offer little solution to the difference between the two terms, for scan is given "to examine carefully, to scrutinise," and explore is given "to search for the purpose of discovery, to examine thoroughly." We are so often apt to use the word scan in the relation of a quick glance that it is small wonder that it has been applied to television, for obviously the object being transmitted is disintegrated by the spotlight at a rapid rate. On the other hand, whereas a quick glance by a person is sure to miss detail, our television eye will not fail in this respect; so perhaps the palm should be awarded to "exploring." Official television terminology will, no doubt, settle this question in the near future.

**Have You Ever Thought of It?**

Has it ever occurred to you how astonishingly cheap is the wire of which we use so many yards in making those sets which for some queer reason are called wireless? For coil making one buys a pound reel of, say, No. 26 double-cotton-covered wire for about four shillings. That reel contains some three hundred yards of wire, drawn with astonishing exactness to a standard diameter and covered with two layers of cotton insulation. To make a 60-turn coil on a 3-inch former we need roughly 15 yards of wire, or one-twentieth of a pound, of which the cost is rather over twopence. Even of the very fine wire, which must be queer stuff to handle in the making, one gets an almost miraculous amount for one's money. When you buy No. 36 d.c.c. at 9s. 6d. a pound you obtain well over a mile, whilst No. 45, which sells at about 22s. 6d. enamelled or £2 16s. double silk covered, runs out to eight miles to the pound.

**ADAPT YOUR SET  
TO THE SHORT WAVES  
WITH THE UNIQUE  
ADAPTOR TO BE  
DESCRIBED NEXT WEEK**

**For Cone Users**

The cone type of loud-speaker is deservedly very popular, for if it is given a fair chance by the use of the right kind of valves in the right kind of receiving set it provides reproduction of wonderful quality. Cones, however, do repay a little attention now and then. On this point I speak with experience, for I have an old friend now that by the exercise of a little care I have kept in every bit as good condition as when it was first acquired. First of all, don't forget that permanent magnets are not really permanent. They tend in course of time to lose a certain amount of their original strength. When this happens the instrument may become overloaded with a volume considerably smaller than it could originally handle with ease. Re-magnetising costs only a shilling or two, and it is well worth while to have it done periodically.

**Another Trouble**

Here is another point that may be found useful. One of my cones, whose magnet was known to be in first-rate condition, began to "zizz" when certain notes were being reproduced at fair strength. I knew that no overloading was taking place within the receiving set, so that obviously something was wrong with the loud-speaker itself. On examining the mechanism, I found that several small screws had worked a little loose; probably owing to the constant vibration to which they are subjected. When these had been tightened up all signs of the trouble disappeared.

**Wireless Plays**

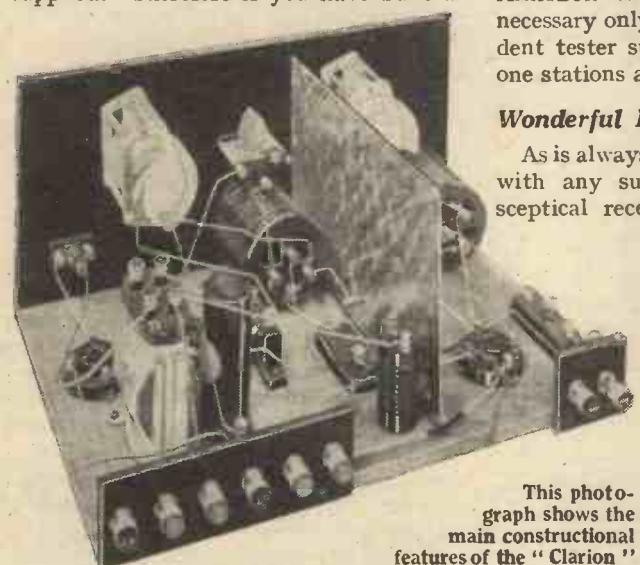
I am glad to see that a good deal more attention is being paid nowadays to the choice of plays that are really suitable for broadcasting. Heaps of modern dramatic works don't fit in a bit, mainly because they rely so much upon stage effects, which, of course, one cannot have—except the "noises off" part of them—from the loud-speaker. Shakespeare has always been a favourite with wireless folk, and though they haven't realised it, the reason is largely that Shakespeare had to write for a stage which had little or nothing in the way of effects. In his day, at the old Globe Theatre, the scenery consisted at times of a blackboard upon which was chalked up "This is the sea shore of Bohemia" or something of that kind. Shakespeare relies, then, mainly upon his dialogue, and that is why his plays broadcast so well. One or two excellent modern playwrights are engaged, I hear, on plays written particularly for broadcasting, and very special attention will be paid to their production. I am sure that all listeners will look forward with the greatest interest to hearing the results. THERMION.

# CUTTING OUT 2LO IN LEICESTER SQUARE

**FURTHER SU  
WITH The C**

I t is always gratifying to hear of readers' success with our sets. Correspondence of this nature forms, of course, quite a considerable portion of the daily post bag, and we always prefer letters which laud their praise in plain facts and, preferably, give a station log, rather than those which talk in vague terms of wonderful reception and, after all, are rather empty paens of praise.

The AMATEUR WIRELESS Technical Staff likes to have reception reports, whether good, bad, or indifferent, because this is one way in which a census can be taken of readers' opinions and popular demands supplied. Therefore if you have built an



This photograph shows the main constructional features of the "Clarion."

AMATEUR WIRELESS set,  
do not hesitate to write  
to AMATEUR WIRELESS  
about it

The "Clarion Screen-grid Three" is a case in point. This was designed, given a thorough testing, and described in AMATEUR

The *Clarion Three* was tested at the London workshops of Messrs. Raymond, within a mile of the London aerial and in an area wherein 5GB and 5XX are only faintly received on most sets, owing to shielding of the aerial. Although the aerial wire is about 60 feet from the ground, the proximity of neighbouring roofs gives it an effective electrical height of only a few feet.

With the Clarion attached to the business end of the aerial however, conditions were found to be entirely different. Both the long and the short-wave Daeventry's came in at good loud-speaker strength and quite free from any kind of interference. Greatly to the surprise of the operators, Radio Paris was also received on the loud-speaker without any interference and with excellent strength against a background of silence. The test was made early in the evening when not many foreigners were on the air. On the short waves it was notable that Langenberg was received well enough to provide a complete evening's programme had this been so desired.

WIRELESS, Nos. 352 and 353. As it was felt that this was an average-man set and somewhat out of the ordinary on account of the good performance it could put up, and yet at the same time be simple to build and operate, we diverged somewhat from our usual course and placed the set in the hands of an enthusiastic AMATEUR WIRELESS reader, living in the London area. This test report was published in AMATEUR WIRELESS, No. 353, and it is necessary only to repeat that this independent tester succeeded in receiving thirty-one stations at full loud-speaker strength!

## **Wonderful Results**

As is always the case, the results obtained with any super-performance set receive sceptical reception on the part of a few

ption on the part of a few amateurs who still cling to old-fashioned receivers and ideas, and never take the trouble to modernise either and realise what amazing results can be obtained with the aid of present-day constructional facilities.

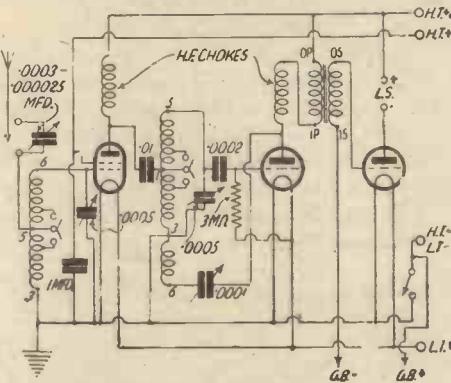
The "Clarion Three" has met with a most enthusiastic reception from ordinary listeners and from wireless dealers. Quite a large

proportion of the reports received regarding the "Clarion Three" have been from dealers who have sold kits and parts for making up the "Clarion" to AMATEUR

WIRELESS readers. They, in their turn, have received appreciation from the purchasers on account of a good investment for a little money and have passed the appreciations on to us.

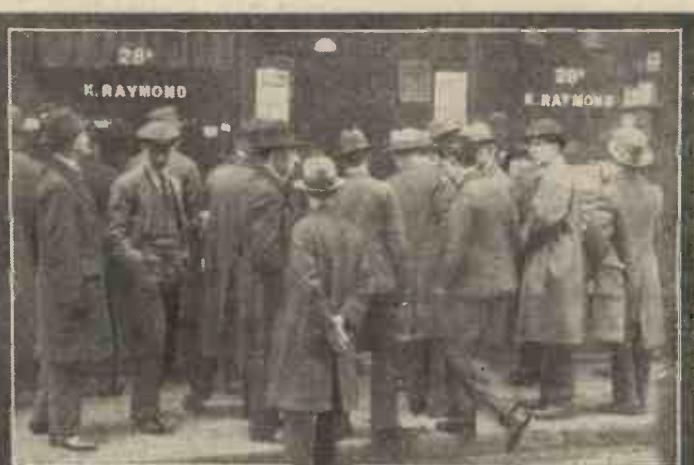
To take just one instance, Messrs. K. Raymond, of 27 and 28a Lisle Street, London, W.C.2, have made a speciality of the "Clarion" largely on account of the fact that they have found this to be one of the very few sets that get distant stations while London is working! And this at a distance of one mile from 2LO!

In consequence, the "Clarion" is being used largely as a demonstration receiver, and every day during programme time



### The circuit of the "Clarion Three"

there is a large crowd gathered round the Lisle Street Depot judging the "Clarion" for themselves. Recently, at the request of Messrs. Raymond, some members of the Technical Staff tested the set while



The interest that the "Clarion Three" has continued to arouse is evident from these photographs taken outside a well-known London wireless dealer's a few days ago.

# HOW IT HAPPENED!

IN recounting an experience which befell me quite recently I do so to warn others of what might happen should they do the self-same thing as I did.

or L.T. circuit through the receiver. Nevertheless with the H.T. battery connections in place and the valves in position in the set I was unfortunate enough to blow up four perfectly good valves.

A reference to Fig. 1 will make things quite clear. I was

with the copper screen and point marked *a*.

The result was disastrous for although the L.T. switch was "broken" the valves blew.

A glance at Fig. 2 will make clear the complete path for the H.T. current through the valve filaments. Many alternative connections for the battery system sugges-

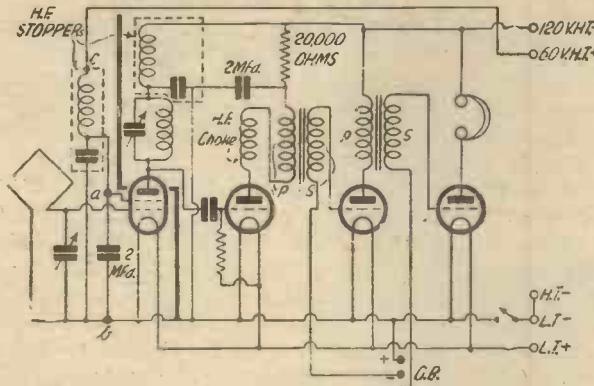
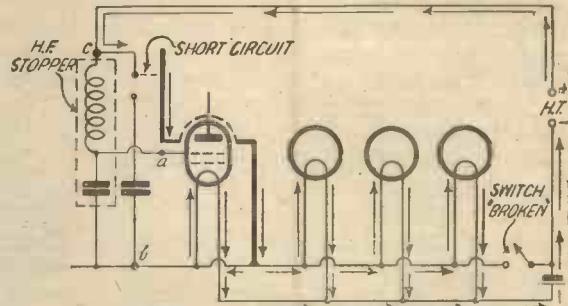


Fig. 1 (left). The circuit with which tests were being made

Fig. 2 (right). The path of the H.T. current is shown by the arrows



It all happened like this. I was conducting some experiments with a new screen-grid valve portable and as I did not want the trouble of disconnecting the entire set of connections to the batteries and withdrawing my valves each time I tried an experiment, I merely switched off the valve filaments and took very good care to see that no straggling wire from the H.T. supply side of the set came into contact with the positive L.T. feed wire.

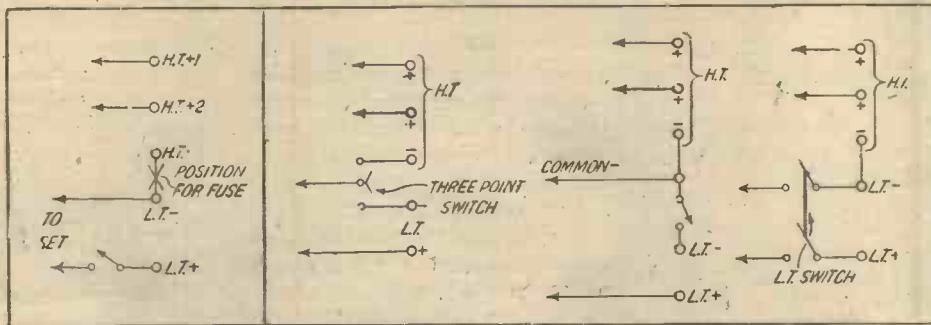
The circuit I was testing was that shown by Fig. 1. From this it will be seen that when the filament switch was broken no current could pass from the H.T. circuit

experimenting with the 2-mfd. condenser between *a* and *b* to find its best position in circuit. It had already been connected between points marked *a* and *b* and I was trying it between points marked *a* and *c*. This position did not seem so satisfactory as position *a* and *b* and in trying to disconnect and wire up again to this position one end of the wire came in contact

twice shy, is a motto I shall remember for some months to come. A few alternative systems of battery connections are shown by Fig. 4.

A final word of advice to owners of screen-grid valve sets. Fit a safety fuse between the negative H.T. wanderplug of the battery and the negative H.T. terminal or wire on the set.

ADSUM.



Figs. 3 and 4. How such an accident can be prevented is shown by these diagrams

## "CUTTING OUT 2LO IN LEICESTER SQUARE"

(Continued from preceding page)

London was working, and succeeded in obtaining stations quite free from interference.

Another reason why the "Clarion" is popular is because it necessitates the very minimum of components for the maximum in the way of results. As a matter of interest it is perhaps opportune to give the components list.

As with all AMATEUR WIRELESS sets, a blueprint has been prepared to assist constructors of the "Clarion Three," and this can be obtained, price 1s., post free, from the Blueprint Department of AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

It will be remembered that when the "Clarion Three" was first published, Messrs. Selfridge & Co., of Oxford Street, London, W.1, thought so highly of it, that

## "Clarion Three" Components

Ebonite panel, 14 in. by 7 in., and two strips, one 6 in. by 2 in. and one 2 in. by 2 in. (Becol, Raymond, Ebonart, Radion).

Baseboard, 14 in. by 9 in. and cabinet (Pickett).

Two .0005-microfarad variable condensers (Polar No. 3, Formo, J.B., Burndept, Lissen, Burton).

.0001-microfarad reaction condenser (Burton, J.B., Lissen, Polar, Ormond).

Two dual-range centre-tapped coils, one aerial coil and one anode coil with reaction (Tunewell).

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

Three valve holders (Lotus, Lissen, W.B., Benjamin, Burton, Formo).

Pre-set series aerial condenser (Formodenser Type J., Igranic).

.1-microfarad fixed condenser (Lissen, Dubilier, T.C.C., Mullard).

.01-microfarad fixed condenser (Dubilier, type 610, Lissen, T.C.C., Mullard).

.0002-microfarad fixed condenser (Dubilier, Lissen, T.C.C., Mullard).

3-megohm grid leak (Lissen, Dubilier, T.C.C., Mullard).

Screen-grid H.F. choke (Peto-Scott).

H.F. choke (Lissen, R.I. & Varley, Polar, Trix, Wearite, Burndept).

L.F. transformer (R.I. & Varley, Ferranti, Lissen, Philips, Igranic, Marconiphone, British General).

Screen, 8½ in. by 6 in. (Parex, Peto-Scott).

Eight terminals marked, Aerial, Earth, L.T.+, L.T.-, H.T.+1, H.T.+2, L.S.+, L.S.- (Belling-Lee, Eelex, Igranic, Raymond).

One yard thin flex (Lewcoflex).

One red and one black wander plug (Clix).

Quantity of No. 16 gauge bare connecting wire (Lewcos).

Two slow-motion dials (Brownie).

they authorised us to inform readers that they themselves would have pleasure in sending a blueprint, gratis and post free, to every reader making application. We understand that Messrs. Selfridge still have a limited number of blueprints available, and readers may obtain one by addressing a post card to the Radio Department, mentioning AMATEUR WIRELESS, or by making a personal call.

So far as the operation of the complete set is concerned, there is nothing at all to worry about in this. The panel carries an on-off switch, which controls the filaments of all valves, two tuning condensers, the dials of which can be set practically in step, and a midget reaction condenser, which, in most cases, is used simply as a volume control. Simplicity itself!

**Let "Amateur Wireless" solve your problems**

# WITHOUT FEAR OR FAVOUR



*A Weekly Programme Criticism by Sydney A. Moseley*

HAVE you been to the People's Palace concerts. You *should* go. The best and cheapest concerts in the country. Every listener should make it a point to go to an occasional B.B.C. outside transmission. Besides being a change, you hear quite a lot.

So far as the Mile End concerts are concerned, here are a few points: Percy Pitt



Dora Maughan  
—a caricature

and his ear. What's wrong with it? Any way, a habit not to be encouraged—if it is not too late. Apparently he felt the fullest confidence in the violas, for he had his back to them most of the time. Refreshment arrangements too stupid for words. Can't the B.B.C. see to this? You have to line up and buy tickets, estimating the amount you propose to spend!

The idea of bringing Miriam Licette down for one song only is difficult to understand—particularly since there are no encores. I suggest that notice of there being no encores in either half should be clearly stated in the programme.

Walter Widdop had a good reception. He is a real broadcasting artiste, since he lets us know what he is singing about. How do you think both these popular artistes look in the flesh? Go and see!

Was Segrave's talk really impromptu? Sounded much too good for it. What a wonderful thing it is to get into intimate

touch with these men of the moment. What memories our grandparents would have had of Pitt, General Gordon, Dickens, etc.

Let us remain conscious of this wonder of ours which was denied our forebears.

Regimental marches with brief descriptions by Walter Wood, quite interesting, but I didn't much care for the Glasgow Singers.

The correspondent who asks the Editor to interest me in the Sunday programmes must be a new reader. (He is none the less welcome because of that!) If not, he has surely overlooked my repeated criticism of the very thing he wishes me to criticise. However, we shall persevere with our task of reforming the seventh-day programmes. Let us not have to depend on Continental programmes!

I was not able to hear the second "Gay Sparks," but everybody has been telling me that it was splendid. "One of the most entertaining hours I've heard yet" is one emphatic opinion. Charlot appears to have scored a bull's-eye this time.

"Memories of Leslie Stuart" was staged superbly by the Birmingham station. It was a treat to hear again such undying tunes as "Dolly Daydream" and "Lily of Laguna"—and played and sung so well.

Couldn't you imagine how the middle-aged folk were enraptured? Couldn't you hear them saying: "Ah! You can't beat the good old songs. This modern—(sniff!)—jazz can't be compared with them." Of course, that irredeemable friend "Harold" has his point of view. He says:

"All those slow, mournful songs about 'fair lilies' give me the creeps. What the public needs is good solid rhythmic peppy syncopation—and then some."

Need I say he belongs to the moderns?

Foden's Motor Works possess a versatile brass band. They do not confine themselves to the usual overtures and selections, but reach out to other musical fields. Ronald Whitehead, who was the vocalist in a recent programme, has a bass voice of depth and purity. Did you hear him sing "Drinking"?

Charlot's Charity Hour was welcome, although it consisted merely of a re-hash of old numbers, some of which have been played so often that we know them inside out.

I still hear good accounts of Vernon Bartlett's talks. His is a difficult job in all conscience, and that he has been able to make good up to now is all to his credit.

I wonder if any listeners are intrigued by the personalities of those who deliver the lessons on Sunday afternoons. The speakers remain anonymous, but I have good reason to believe that many well-known men are very willingly brought in for this purpose. One is an ex-Prime Minister.

Not long ago I remarked in these columns on the unsuitability of Philip



W. H. Berry as Lissenden sees him

Brown's Dance Band which often accompanies variety from 5GB. According to recent correspondence on this matter, my point of view was shared. However, my latest correspondent asks me to revise my opinion because "they are showing marked improvement these days. In fact, their standard is now so good that they remind one of a certain snappy little combination which used to broadcast from the Savoy."

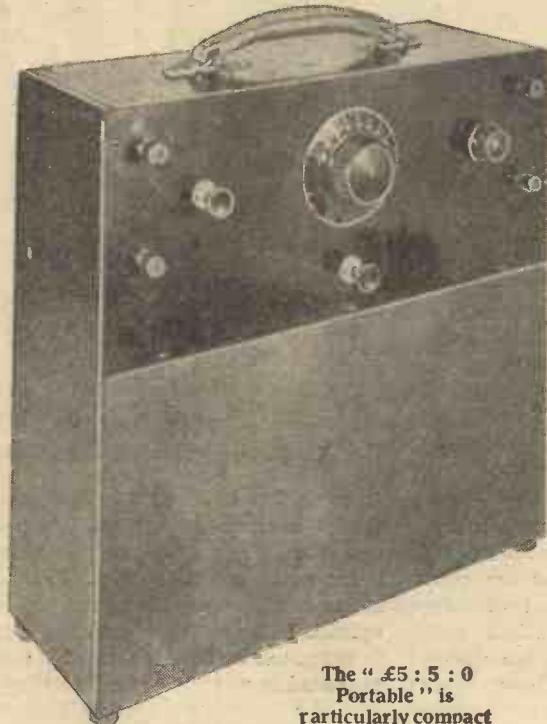


**T**HE appeal of the portable is in no sense an inexplicable one. It is, in fact, simply an extension of the enthusiasm which every true lover of wireless discovers when he has the opportunity to take his receiver out of doors.

The "£5:5:0 Portable," the receiver section of which was described last week, is an ingenious little receiver which, apart from its attraction on account of the low initial cost, fills a definite niche which, we believe, has not yet been covered in portable receiver design; that is to say, although it is a portable and can be used out of doors with equal facility to that provided by a set incorporating a frame aerial, it can be used as a transportable or even as a sometime indoor set, on account of the fact that an outdoor aerial is employed.

#### Small Size

A convenient feature is the smallness of the dimensions of the containing case. This can easily be constructed from  $\frac{1}{2}$ -inch



The "£5:5:0 Portable" is particularly compact

## MORE ABOUT THE MAKING THE CABINET : AERIAL E

wood. The overall dimensions are  $13\frac{1}{2}$  in. by  $13\frac{1}{2}$  in. by  $4\frac{3}{4}$  in. One of the larger sides of the cabinet is a lid by means of which access can be gained to the back of the receiver and the battery compartment. On the other side of the cabinet is the receiver panel which, of course, as mentioned last week, is  $13\frac{1}{2}$  in. by 6 in. The internal dimensions of the battery compartment are, roughly,  $12\frac{1}{2}$  in. by 7 in. This allows of the fitting of an H.T. battery, amply able to stand up to the job of supplying anode juice for the detector and power valves, and also the provision of an adequate accumulator and a grid-bias battery.

The baseboard on which the main components of the receiver are mounted forms a shelf which is mounted on small wooden ledges at each side of the receiver cabinet. The baseboard has the dimensions  $12\frac{3}{8}$  in. by  $4\frac{1}{2}$  in. and this, with the panel, slides easily into the cabinet and forms a complete unit.

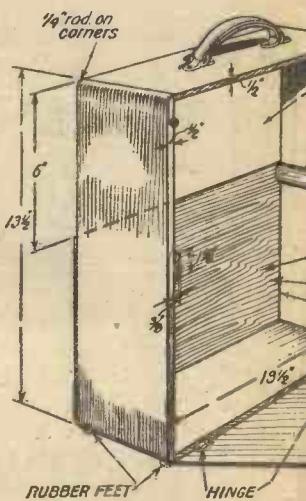
#### Advantage of Separate Aerial

For the reasons enumerated last week, neither frame aerial nor special loud-speaker is incorporated in the cabinet. If any further argument be needed it remains only to be pointed out that the addition of a loud-speaker considerably increases the cost of a portable receiver, and as most enthusiasts have loudspeakers of their own in use in conjunction with a home set, the construction of a special instrument for the job is not always necessary.

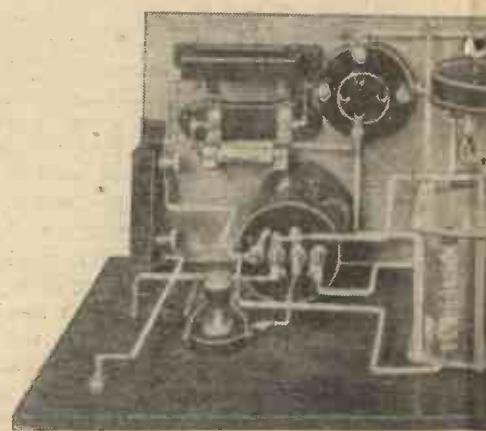
Of course, for those who want to make the "£5:5:0 Portable" a somewhat more ambitious receiver, many types of loud-speaker can be modified to suit the dimensions of the present portable. A loud-speaker of the type which is eminently

suited for the "£5:5:0 Portable" receiver is the linen-diaphragm loud-speaker described in AMATEUR WIRELESS, No. 355. A blueprint is available for this unit and by slight modification of the dimensions of the cabinet a linen-diaphragm loud-speaker could easily be added. Most listeners, however, who make up the "£5:5:0 Portable" will prefer to use it in conjunction with some impromptu form of aerial slung up just wherever convenient.

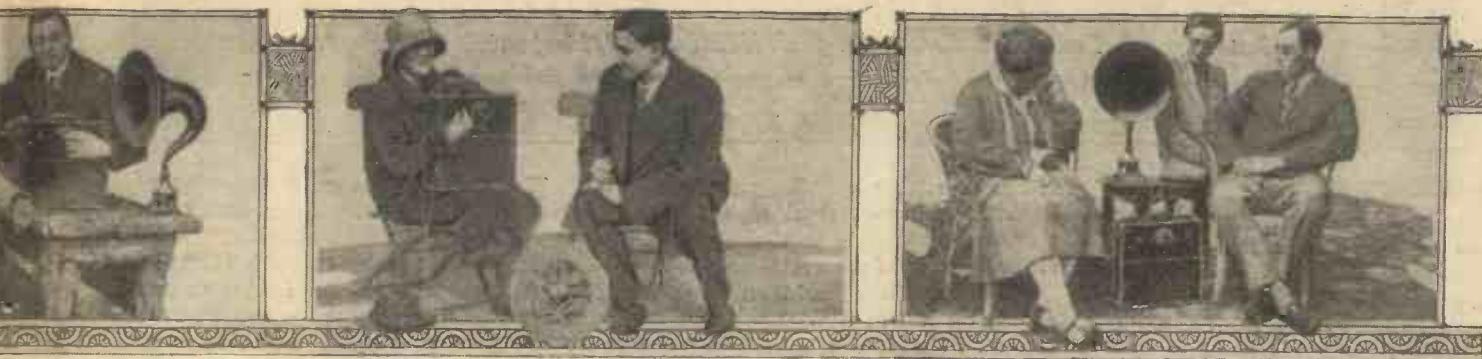
Really the aerial difficulty is very often largely exaggerated when discussing the working of out-of-doors wireless. Of course



This diagram shows all the n



This is a plan view of the actual receiver



## £5:5:0 PORTABLE EFFICIENCY : VALVES AND TUNING

it is not to be expected that a two-valver will be worked on the fringe of what the B.B.C. calls the service area of any main station. To get the best from any two-valver, portable or otherwise, and even with the best of outdoor aerials, it should be worked generously within the allotted range.

More particularly is this the case with portables from which fair volume is expected even perhaps at the expense of spartan purity.

### A Suitable Aerial

For the aerial it is safe to carry a small reel of about 30 ft. or 40 ft. of wire, preferably insulated. Bare wire, with insulators,

is rather more troublesome to erect in a hurry, whereas insulated wire can be slung about almost anywhere required. Bare wire is, however, perhaps better for the earth lead as there are many occasions (such as when working a portable on the river and so on) when a direct earth can easily be made.

### Batteries and Valves

Batteries and valves are always an important point in a portable because to some extent there must be a compromise between valves capable of dealing fully and adequately with the job in hand and the batteries which can be carried to supply their requirements; of course, the two limits in this respect are size and weight.

An accompanying table gives a selection of suitable two-volt valves and most users of this portable will prefer to use two-volters if for no other reason than that a two-volt accumulator is, of necessity, smaller, capacity for capacity, than a six-volt accumulator.

Four- or six-volt valves can, of course, be used and there may be some listeners who will prefer to do so in order that they may use the same valves as are used in a home set and possibly even the set accumulator.

So far as valve types are concerned the detector should be a general-purpose valve with an impedance of about 20,000 ohms. Grid condenser and leak rectification is employed and the detector stage is followed by an efficient medium-ratio L.F. transformer.

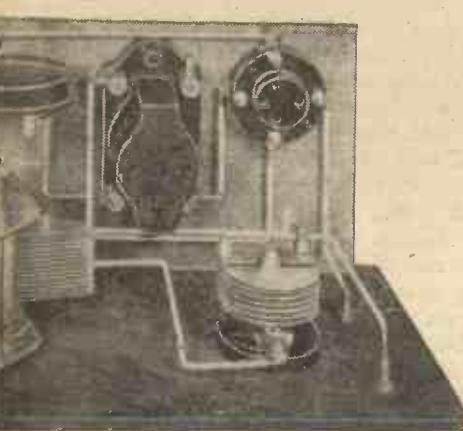
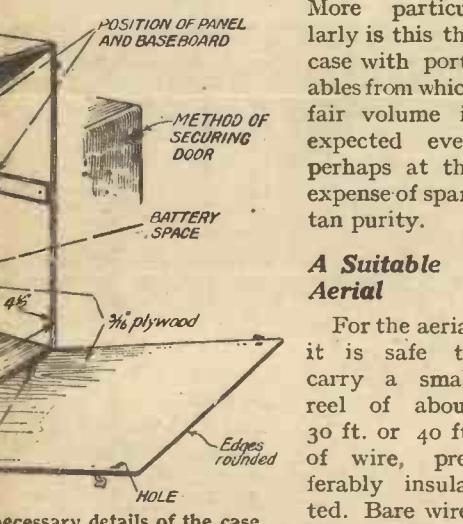
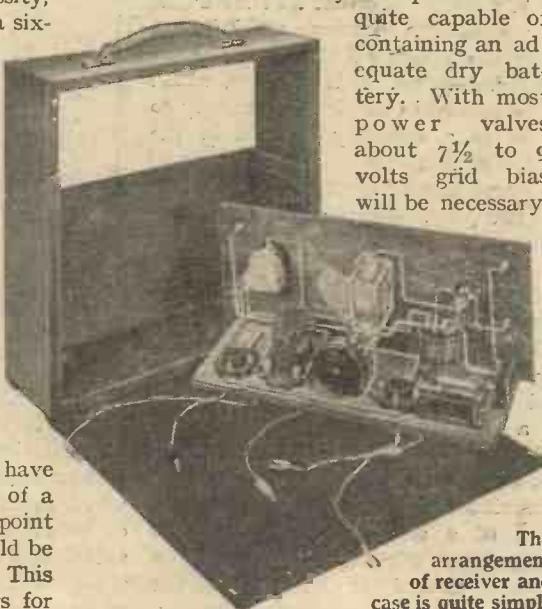
As is well known, these two factors have a primary bearing on the selection of a valve for a detector stage. The great point about the power valve is that it should be economical in filament consumption. This presents no great problem nowadays for

valves of the D.E.P. class, capable of dealing with an adequate grid swing take no more than .15-amp. filament current. Larger valves, say of the DEP240 type, are really hardly necessary in a portable set.

### SUITABLE TWO-VOLT VALVES to use with THE "£5:5:0 PORTABLE"

Make	Detector	L.F.
COSMOS . . .	SP16/G	SP18/RR
COSSOR . . .	210HF	220P
EDISWAN . . .	HF210	PV215
MARCONI . . .	HL210	DEP215
MAZDA . . .	GP210	LF215
MULLARD . . .	PM1HF	PM2
OSRAM . . .	HL210	DEP215
SIX-SIXTY . . .	210HF	215P

A value of 120-volts H.T. should be given to the anodes of the valves, and, as mentioned, the battery compartment is quite capable of containing an adequate dry battery. With most power valves about  $7\frac{1}{2}$  to 9 volts grid bias will be necessary.



A portion of the "£5:5:0 Portable"

The arrangement of receiver and case is quite simple

## "A.W." TESTS OF APPARATUS

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

### **Handy Battery Tags**

SOON as the construction of a set has been completed, one is apt to make connections in a slipshod manner using ordinary copper wire bent round at the ends to make connections with the accumulator. Perhaps the high-tension battery is treated with more respect by fitting some form of wander plugs.

Now, although this type of connection to the accumulator is all right for experimental work, the ends of the copper wire are ultimately liable to corrode and cause bad contacts or breaking of the wire altogether. It is preferable in the first place to fit proper tags to the L.T. leads.

Some useful connectors have been submitted by Messrs. Lectro Linx Ltd., 254 Vauxhall Bridge Rd., S.W.1. These are made in two forms, one being a spade tag with the slot cut in the side and the other a tag with a central hole. In order to guard against corrosion, these components may be obtained with a lead coating on a brass foundation in place of the normal nickel plating. This is a good feature and should aid in preventing corrosion.

### **Jelectro Acid Solidifier**

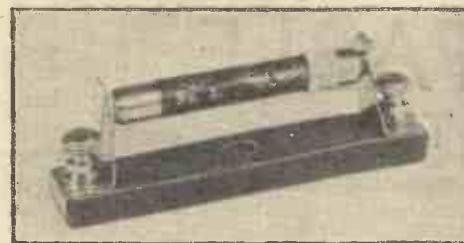
SELDOM do even careful people manage to handle accumulators without spilling some acid at one time or other. It may be only a drop or two, but this is quite sufficient to harm clothes or other articles with which it comes in contact. Although unspillable accumulators are made, even these may not always be fool-proof. It was, therefore, with interest that we tried a new liquid preparation known as Jelectro, made by the Jelectro Laboratories, Edgware Road, London. This solution, which may be obtained in bottles, has merely to be added to a quantity of acid in the proportion of three parts of acid to one of Jelectro and the solution will ultimately solidify to a jelly. It is important, in order to ensure proper solidification, to see that the acid has a specific gravity of 1250.

It follows that in solidifying an accumulator, one should first pour the acid out into a suitable container and adjust the specific gravity by adding concentrated acid or distilled water as required. Then having taken a careful measurement of the quantity of acid available, add a third of the amount of Jelectro.

We carried out these instructions with the acid of a small two-volt portable accumulator and, after mixing the solution thoroughly, poured it back into the accumulator. It was then left overnight, and in the morning proved to have solidi-

fied in a most satisfactory manner. No liquid whatsoever remained and it was, therefore, impossible to shake any of the electrolyte out of the container.

The accumulator was then charged and placed on a test discharge. The figures indicated that it was behaving in a satis-



Microfuse Safety Fuse

factory manner, the jelly electrolytic apparently functioning as well as the liquid.

### **Microfuses**

MOST readers have experienced the misfortune of burning out a set of valves, yet such a calamity might have been avoided by the use of suitable fuses. It is, indeed, safe to prophesy that at no very distant date every receiver will be adequately fused. The reason this is not done at the present time may be that fuses for radio use are not always obtainable.

We have just tested a device known as the Micro-fuse, manufactured by Messrs.



Airmax Dual-range Coil

Microfuses, Ltd., of 3 Finsbury Square, E.C.2. This component is made in the form of a cartridge somewhat similar to a grid leak and fits in a special holder. The sample which we tested is rated to blow at a current of between 15 and 20 millamps—a value sufficiently low entirely to safeguard the slenderest of valve filaments. When tested in our laboratories, this sample actually blew approximately at 14 millamps.

The construction of the component is interesting for in order to obtain a very fine metal surface without tendency for this surface to break due to insufficient mechanical strength, a fine glass rod is coated with a metal deposit and this itself forms the fuse. Such a device is quite fool-proof and fully protected by an outer glass casing.

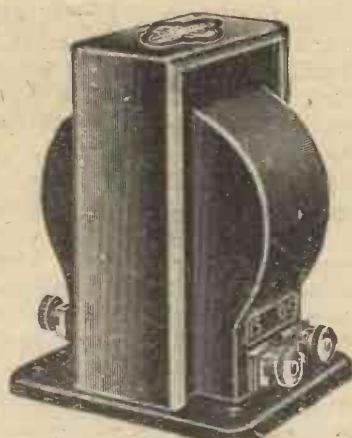
### **Airmax Dual-range Coil**

DUAL-RANGE coils have enjoyed considerable popularity during the past season and indeed it is likely that this will continue during the coming season. Users of wireless apparatus feel naturally indisposed to change coils when tuning from one wavelength band to another; therefore any device which overcomes the necessity for changing is regarded in a favourable light.

One of the most popular of the circuits utilising the dual-range coils has been the "Mullard Master Three Star," and it is not surprising therefore that in addition to the specified coils, other manufacturers should design inductances for use with this circuit. One of these inductances, an Airmax dual-range coil, designed specially for the "Master Three Star," has been submitted for test by Messrs. J. Dyson & Co., Ltd., 5-7 Goodwin Street, Bradford, Yorks.

In this coil, the grid and reaction windings are placed in 10 slots on an hexagonal air-spaced former. The reaction windings, which occupy two of these slots, are placed in between the short- and long-wave windings. The change-over from one wavelength range to another is accomplished by a push-pull switch, and this fitted on to the panel by drilling one hole, forms a support for the coil. The ends of the winding are taken out to six terminals numbered in the standard manner for the "Master Three Star."

As in the standard circuit, the aerial is led to the coil through a .0001 fixed condenser. We carried out a number of tests, using the coil in an actual "Master Three Star" circuit, and were quite favourably impressed with the performance, except that the wavelength ranges do not appear to be quite correctly chosen. For example, with an average size outside aerial, the range of the low wavelengths extended from 300 metres to 580 and on the high wavelengths from 1,100 metres up to 3,300 metres approximately. In both cases the minimum wavelengths are rather higher than usual. Used with a 30 ft. indoor aerial, the minimum short-wave position gives 280 metres and the long-wave position 1,050 metres.



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**17/6**

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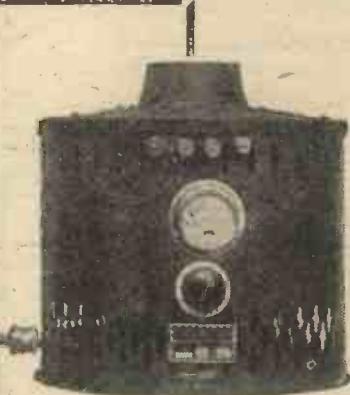
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# RADIOGRAMS

ON Tuesday, April 30, the London Zoological Society will celebrate its centenary, and in honour of this birthday anniversary a special broadcast will be carried out by the B.B.C. It has not yet been decided which particular cages the "mike" will visit, but listeners may expect to be switched over to the lions' den, the sea lions' enclosure, the haunts of the laughing hyena, and possibly, amongst others, the parrot house.

Ebe Novarini, who is only eighteen years of age, and a newcomer to the Birmingham microphone, will give a violin recital from Daventry 5GB on April 30. Ebe Novarini obtained a scholarship at the Royal Conservatorio of Music in Milan when only seven years of age, and has given recitals before members of the Italian Royal House.

Two plays, *The Ghost of Jerry Bundler*, by W. W. Jacobs and Charles Rock, and *The Boatswain's Mate*, by W. W. Jacobs and H. C. Sargent, will be heard by listeners to Daventry 5GB on May 11.

The well-known pianist, Harriet Cohen, will give a recital at the B.B.C.'s People's Palace concert to be broadcast on May 2.

The Daventry 5GB vaudeville programme on May 6 includes the following

artistes: Ronald Frankau (entertainer), The Gay Pair (light songs and duets), Victor Sheath (banjo), Angela Maude (character songs), and Philip Brown's Dominoes Dance Band.

From 5GB on April 29 listeners will hear the band of the Chatham Division, Royal Marines. The conductor is Lieut. P. S. G. O'Donnell, whose brother is the conductor of the Wireless Military Band.

*Moonshine* is the title of a new "radio show" by Charles Brewer, of the Birmingham staff of the B.B.C., which will be broadcast from 5GB on May 10. Sketches by Edwin Lewis will also be given, and other popular artistes who will take part in this programme are: Vera Gilman, Edith James, Harry Sennett, Brian Victor, Alfred Butler, and Harry Saxton; also Jack Venables and Walter Randall at the pianos.

Another of the popular "old folks" programmes will be given from the 5GB studio on May 11. The soloist is William Bennett (bass). The Birmingham Studio Chorus, conducted by Joseph Lewis, will also take part in this broadcast.

Listeners to Newcastle on April 28 will hear the Newcastle-on-Tyne Philharmonic Orchestra, conducted by Edgar L. Bainton.

The solo artistes will be Grace Angus (soprano) and Evelyn Barrow (pianoforte).

Wales is at present the only country possessing a separate Priory of the St. John Ambulance Association, and Cardiff will broadcast a programme in honour of this Order on May 8, which will include four scenes illustrating its history and work throughout the centuries.

Adolphe Hallis (pianoforte) and Kate Winter (soprano) will take part in the National Orchestra of Wales Symphony Concert to be broadcast from the Assembly Room, City Hall, Cardiff on May 9 at 7.45 to 9 p.m. The popular concert at the same time on May 11 will also be relayed.

On April 30 the Newcastle station will endeavour to give listeners an impression of the atmosphere of a village inn; the conversation, dancing, etc., and doings in the back parlour will be faithfully conveyed through the microphone to the ears of listeners.

All Northern stations on April 28 will broadcast a service from the Sheffield Cathedral; the address will be given by the Vicar of Sheffield, Archdeacon J. Russell Darbyshire.

A Russian programme, including gipsy songs sung by Marova, songs of the Ukraine, and Russian dances, is to be given from Belfast on May 6. The Radio Singers and the station orchestra will also take part in this concert.

Demand is made by listeners to the Glasgow station for a musical lunch-time programme, such as that transmitted by other stations between 12 noon and 2 p.m. The present transmission of music—from 11 a.m. till noon—is suitable only for the unemployed, it is argued.

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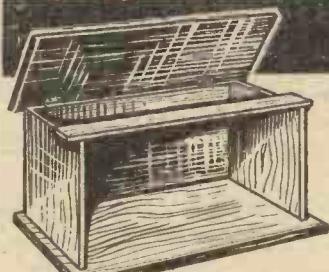
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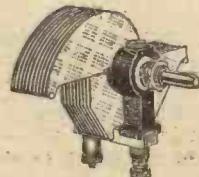
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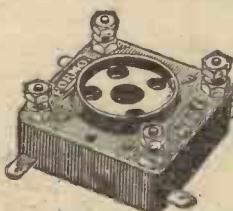
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# SOME RECENT LOUD-SPEAKER DEVELOPMENTS

*Although the loud-speaker is now such an excellent instrument it is realised that there is still possibility of improvement, and constant attempts are being made therefore to effect this. In this article Morton Barr describes some lines of development which are receiving attention*

A PART from the valve, the loud-speaker may fairly be regarded as the most ingenious appliance used in wireless reception. It has, of course, a larger record of development than the valve, tracing its origin back to the original earpiece receiver used some fifty years ago in the beginning of line telephony.

Compared with the first telephone receiver, the modern "loud" speaker owes almost as much to the gramophone industry as it does to wireless. In fact, in a recent High Court action dealing with patent rights in the cone-type of speaker it was admitted that the first large-diaphragm or "hornless" reproducer was designed for use with a gramophone.

The difference between the gramophone model, driven by a stylus from a record, and the modern loud-speaker as used for broadcast reception lies chiefly in the power handled by the latter, the energy output from a modern power amplifier

being so much greater than the drive given by a stylus moving over a record.

The development of instruments capable of dealing with a large volume of sound has taken place along two distinct paths. The first method depends upon the use of various designs of horn to act as a sound amplifier, whilst retaining a comparatively small diaphragm. The second relies upon an increased size of diaphragm adapted

to radiate the sound directly to the air.

The moving-coil type of instrument is a comparatively modern development, in practice, though the broad idea in itself dates back for many years. The same remark applies to the use of both reed-

mum per cycle, with respect to both plates, instead of becoming positive and negative alternately. In operation the outer plates pull at the biased membrane successively in opposite directions, thus setting it into vibration at a frequency corresponding to that of the output current from the set.

Since the static loud-speaker is voltage-operated, as distinct from, say, the moving-coil type of instrument, part of the biasing voltage can be provided by rectifying the speech frequency currents as amplified by a pair of push-pull amplifiers. The additional voltage so produced is then combined with the ordinary H.T. supply to the power amplifiers. With this arrangement a static speaker can be operated from a 120-volt battery, or from ordinary D.C. mains where it is not possible to use a step-up transformer.

In the ordinary cone-type of speaker one of the difficulties is to design a diaphragm that will respond with equal efficiency throughout the whole range of audible frequencies. In general a perfect response can only be obtained either at the lower frequencies or at the higher, but not for both.

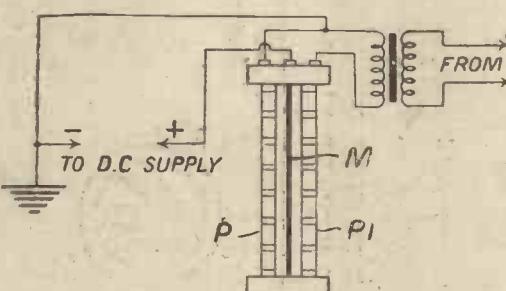


Fig. 1. Diagram explanatory of the principle of the electrostatic speaker

driven diaphragms and to the recent appearance of the electrostatic type of speaker.

In some respects, particularly as regards simplicity of construction, the electrostatic type of speaker offers many distinct advantages. Its chief handicap has been the necessity for using a comparatively high biasing voltage, though this disadvantage disappears when a mains-supply unit is available.

### Electrostatic Speakers

The construction and operation of a modern form of electrostatic loud-speaker is illustrated diagrammatically in Fig. 1. The sound-reproducing surface consists of a tightly stretched metal membrane M mounted centrally between two perforated plates P, P1.

The energising current derived from a power amplifier is applied across the two outer plates as shown. In this type of instrument a steady biasing potential is also applied to the membrane. If this were not done each complete cycle of the applied frequency would vibrate the membrane twice—i.e., at the crest and trough of each wave—instead of once, and thus give rise to a false frequency response.

However, by means of a biasing voltage from the D.C. supply the membrane M is constantly kept at a positive voltage, which varies from a maximum to a mini-

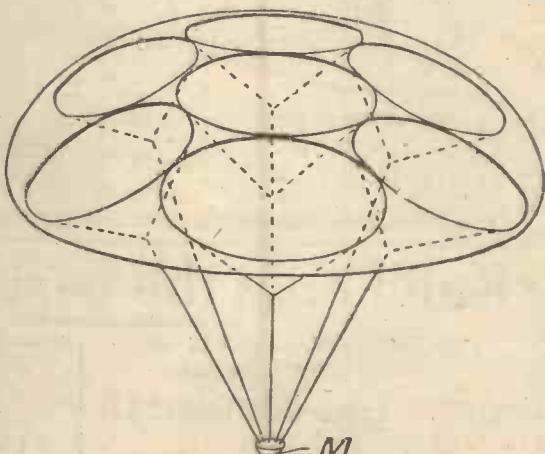


Fig. 3. This is a scheme for a multi-cone loud-speaker, again with the idea of covering all frequencies

Fig. 2 illustrates one method which has recently been proposed to overcome this difficulty. It consists in using two separate cone diaphragms A B fed either in series or in parallel from the set and mounted

(Continued on next page)

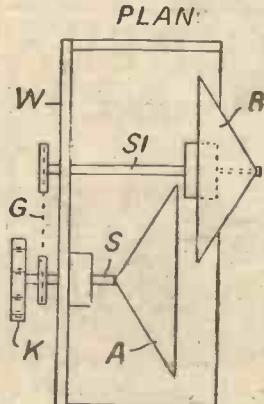


Fig. 2. An attempt that has been made to cover the whole range of audible frequencies

face to face so as partly to overlap, as shown clearly in the plan and elevation.

The spindle  $s$  of the cone  $A$  is secured to a partition wall  $w$  of three-ply wood, which is resonant to the lower range of frequencies, and therefore imparts this quality to the cone. The cone  $B$ , on the other hand, is supported by a heavy rigid column  $c$ , firmly clamped to a fixed base plate  $r$ , so that it responds mainly to the higher range of frequencies. The combination therefore covers the entire musical range.

The overlap of the two diaphragms centralises the sound, and merges both speakers into one apparent output. Simultaneous adjustment can be made from a single knob  $K$ , the two spindles  $s$ ,  $s_1$  being connected by the chain gearing shown at  $G$  in the plan view.

#### A Multi-cone Speaker

Fig. 3 illustrates another arrangement which has recently been protected for overcoming the same difficulty. Here the solution has been sought by utilising, in place of one large diaphragm, a number of small cones, symmetrically arranged around a common driving movement.

It will be seen that no fewer than seven cones have been grouped together, each cone being individually energised by its own separate spindle from the magnetic drive  $M$ .

In connection with this arrangement it is pointed out that when a single large diaphragm is used its effective vibrating area is dependent upon the particular frequency to which it is responding at any moment. For instance, at high frequencies only a limited area near the centre of a large cone is actually in vibration.

Now by increasing the number of cones the central portion of each cone is set into vibration by a high note. Actually the total area so affected is then larger than in the case of a single large cone, so that a louder response is obtained.

For the lower notes an increasingly large vibration area becomes necessary. In fact, a cone of four or five feet diameter is desirable in theory though such a size is hardly practical for ordinary use on account of mechanical and other difficulties.

Where a large-sized cone is used the natural resonance of the vibrating surface comes into play and tends to produce a drumming noise. But by substituting a number of smaller-sized cones, mounted in combination, the natural or resonant period of the system remains the same as that of each separate unit, so that the "drumming" effect is no longer heard.

For Whitsuntide the Lille (France) Radio Club has organised a two and a half days' visit to London and Daventry; it is expected that a large number of French radio fans from the northern districts of France will take this opportunity to inspect the B.B.C. high-power transmitter.



This illustration shows the 1927 type Cossor Melody Maker after conversion. The original dials may be used if desired though the latest pattern Cossor Slow Motion Dials are recommended.

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# CABINET MAKING AT HOME



A Hobbies Cabinet built from the parts shown below

**T**HE primary points to consider when deciding on the details of a cabinet for the housing of a wireless set are the dimensions of the panel and baseboard. If the receiver is already built, there will be no difficulty about this, but when the cabinet is to be constructed before building the set it will be advisable to go thoroughly into the details of the proposed panel and baseboard sizes before ordering the timber or set of parts for the cabinet.

In cases where the batteries or mains unit are to be housed as well as the receiver, the overall dimensions of these accessories must be obtained beforehand, so that there will be no possibility of the cabinet being found too small after it is built.

The foregoing may seem obvious and not worth mentioning, but it is very easy to make a miscalculation in regard to the principal measurements of the woodwork and perhaps find the cabinet too small after many hours' labour and a substantial portion of one's pocket money have been spent on its construction.

#### Parts Available

Sets of wood parts for the building of American-type cabinets to take panels 9 in. by 6 in., 12 in. by 6 in., 14 in. by 7 in., 16 in. by 8 in., 21 in. by 7 in., and 24 in. by

8 in. are obtainable from Messrs. Hobbies, of Dereham, Norfolk, and the only work required, apart from securing the base, sides, back, and small top strip together by means of glue and nails or screws, is to hinge the lid to the back portion and round off the upper edges of the base and top in order to give a good appearance to the finished article. A small rubber foot may be fastened near each corner of the underside of the base if the cabinet is to stand on a polished surface.

Before staining and polishing, it will be advisable for the sake of appearance to fill in the holes left above the heads of the nails or screws with putty or plastic wood, so that when staining and polishing is completed the holes will not be noticeable.

Staining and polishing can be carried out in a very simple manner by utilising one of the Lightning polishing outfits obtainable from Messrs. Hobbies.

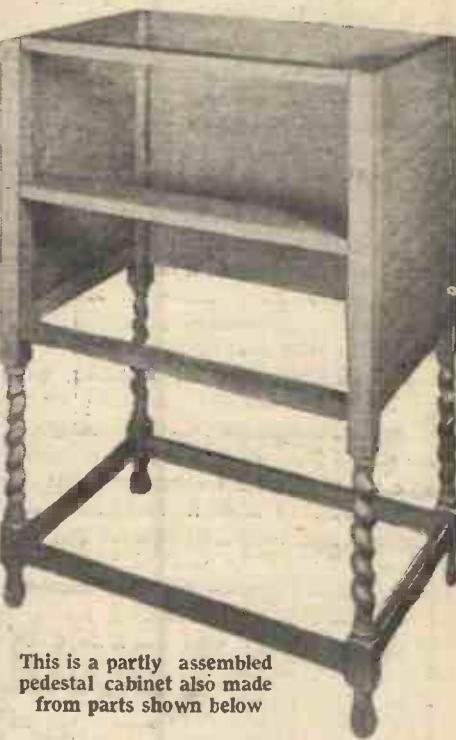
If the work is carefully done, the finished cabinet will have the appearance of a professionally made article, and as timber of first-class quality is provided, the life of the cabinet should at least equal that of the set itself.

Messrs. C. A. Osborn, of 21 Essex Road, London, N.1, are supplying sets of machined parts ready for making pedestal cabinets with compartments for both wireless set and batteries or mains unit.

The accompanying photographs show the parts of one of these cabinets, and also a

*Parts for Cabinets are now obtainable ready for assembling and finishing. This article gives some hints on the procedure*

By ARTHUR YORKE



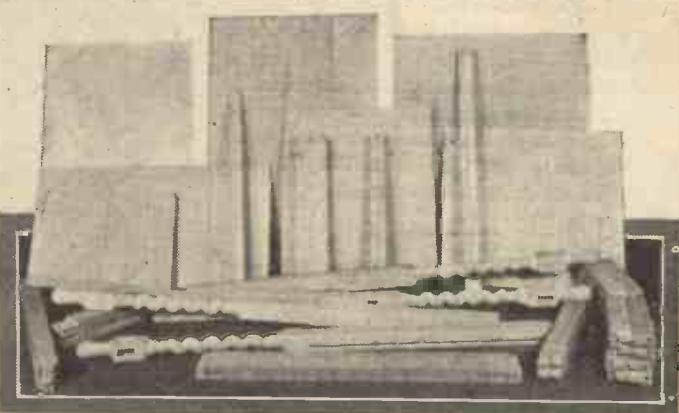
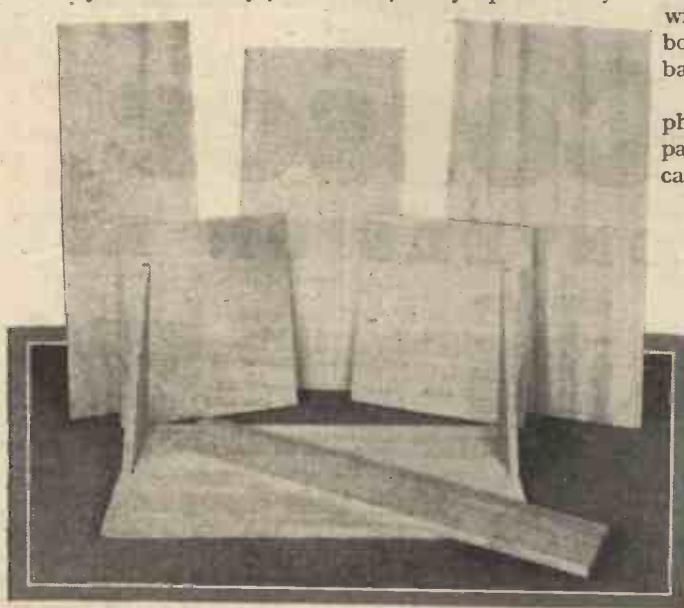
This is a partly assembled pedestal cabinet also made from parts shown below

cabinet in course of construction, this particular example taking a panel 21 in. by 8 in.; smaller sized panels may, however, easily be accommodated by fitting wood strips at each side of the panel or by employing a plywood vignette.

#### The Tools Required

The parts supplied by Messrs. C. A.

(Continued on page 635)



Here are the parts for constructing the Hobbies and Osborn Cabinets as described in the text

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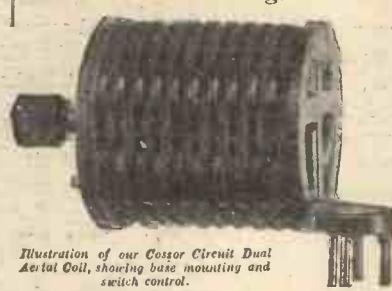


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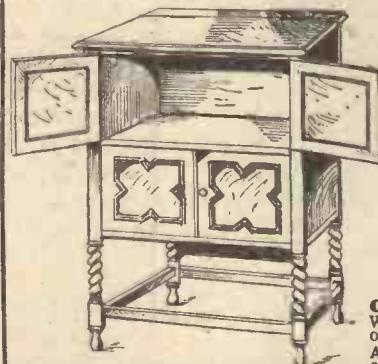
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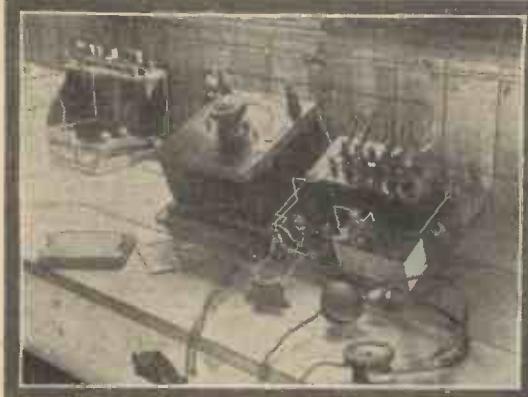
# SECRETS OF THE

# TEST ROOM

One of the most important duties performed by AMATEUR WIRELESS for readers is that of advising on the choice of components and apparatus. This is done by reporting upon new apparatus as

ONE of the fairest tests which can be made on any piece of apparatus is that of time. If the instrument gives the required results and continues to do so in use, then it is entitled to be considered satisfactory.

The nature of the tests and the time involved depends upon the apparatus in question. Some apparatus is such that it is



A photograph of the test bridge in use at the Furzehill Laboratories

possible to make a test of its suitability almost immediately, while other apparatus requires a more prolonged test and may perhaps be required to be put into operation for a certain length of time in order to see how it behaves in practice. One of the objects of the test room, however, is to devise methods of examining apparatus which will show up any defects as rapidly as possible and will enable a fairly accurate gauge of the quality of the particular apparatus to be determined without the necessity for a prolonged trial.

### Many Different Methods

It is not necessary or desirable to go into considerable detail, but there are cases where the general method employed is of interest to readers, while in certain other cases the actual form of the results may require some explanation. A particular example of this is the testing of high-tension batteries where we quote a milliamper-



it appears under the heading of "A.W. Tests of Apparatus." The present series of articles is intended to illustrate some of the methods employed in testing the more usual types of components

hour figure based on the mean discharge rate. This has been the subject of a certain amount of confusion and the matter will be dealt with more exhaustively in a future article in this series. The present article deals with one of the simplest forms of test, that of small condensers, whether fixed or variable.

Condensers for radio purposes fall in three classes. The first of these is the very small capacity used for neutralising or some such adjustment which involves the measurement of capacities of the order of 1 or 2 micromicrofarads at the minimum. The second class comprises capacities used for tuning purposes and fixed condensers used for a variety of purposes such as by-passing, blocking, coupling and the like. The third class is the large-capacity condenser, fixed in value, which is used principally for by-passing and for filtering and smoothing generally.

Each of these three types requires its own particular method. The first and second can both be measured by similar methods, slightly greater precautions having to be taken when measuring the very small capacities and for such values, a bridge method is customarily adopted.

### The Wien Bridge

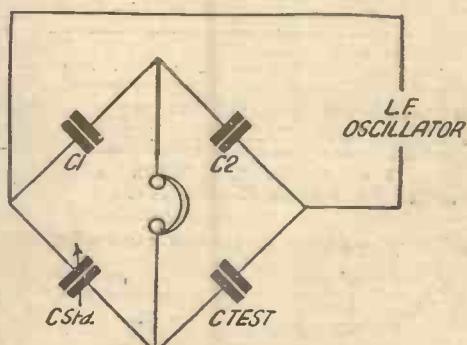
The arrangement is known as a Wien bridge and is shown by the diagram. There are two fixed capacities  $C_1$  and  $C_2$  which are known as ratio arms, while the third and fourth arms of the bridge contain the unknown capacity and the standard calibrated variable condenser respectively. Alternating current is applied across two terminals of the bridge and a pair of telephones is connected across the other two. Without going into detail, it will be clear from the symmetry of the figure that if the two ratio capacities are made equal, then a point of balance will be obtained when the standard capacity is equal to the unknown capacity and all we have to do is to vary

the standard capacity until a balance point is obtained. In this position no sound is heard in the telephones.

It is not always practicable to obtain the required results with a 1:1 ratio such as this, but it is quite an easy matter to make one of the ratio capacities greater than the other by a predetermined amount when the standard will be the same number of times greater or less than the condenser under test, and it is only necessary to multiply by a simple factor in order to obtain the required results.

### Precautions Required

The arrangement is quite simple in theory but in practice there are minor difficulties to be contended with in obtaining accurate results. In the first place, the wave form applied must be a pure sine wave as far as possible, although this is not so important in the case of the capacity bridge as in certain other bridges which have to be used in measurement work. Secondly, capacity effects to earth must be avoided or nullified as far as possible.



Circuit of Wien Bridge

The presence of the body introduces a capacity to earth, the disposition of the apparatus all affects the problem and in general the layout of the bridge is usually found to be most important. Where the apparatus is correctly arranged, the minimum is a true silent point and is very (Continued on next page)

sharply defined. Where the bridge is badly designed, the minimum is not definite and the sound never actually dies away. It is necessary to make a guess at the balance point by trying to estimate the point of minimum sound and this is a much more difficult operation than determining an actual silent point.

A further difficulty which is often encountered is that the quality of the note may change as one passes through the minimum point and this renders the actual determination of the minimum difficult again. This effect can be entirely obviated by a correct arrangement of the components and some considerable time must usually be spent in experimenting with a bridge before it can be put into commission. More particularly is this important where the very small capacities have to be measured accurately—for here quite a small capacity to earth may introduce a large error.

### Large Capacity Measurement

Very large capacities are measured by a different form of bridge which will be discussed in a future article. The photograph accompanying this article illustrates the bridge in use at the Furzehill laboratories. On the left can be seen the standard variable condenser, while on the right at the back can be seen the ratio arms. A pair of telephones is connected in position by means of a plug and jack; a special pair of sensitive telephones being used for this and several other bridges. A condenser can actually be seen on test, while on the table just in front of the apparatus is a fixed standard mica condenser used for checking the accuracy of it.

### "CABINET MAKING AT HOME"

(Continued from page 632)

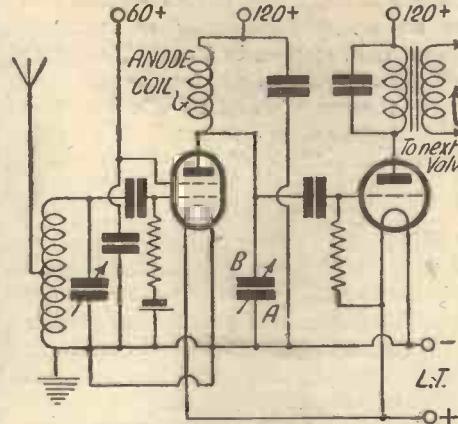
Osborn are rough machine finished, all joints being shaped ready for cleaning up and fitting, while the surface of the timber excepting the lid portion, is smooth planed ready for sand-papering. The lid of the

cabinet is supplied already sandpapered.

Little difficulty should, therefore, be encountered in glueing up and finishing these cabinets—it is, in fact, quite interesting work—but it should be understood that to produce a well-finished article such tools as a good plane, saw, and shooting block are essential, in addition to the usual screwdriver, hammer, etc.

### METAL-PANEL MATTERS

It should be noted that, owing to a draughtsman's error, in the circuit given



A simple circuit for a metal panel

on page 552 ("A.W." No. 357) the H.T. was shown "Shorted" through the anode coil to L.T. negative. The correct diagram is given herewith.

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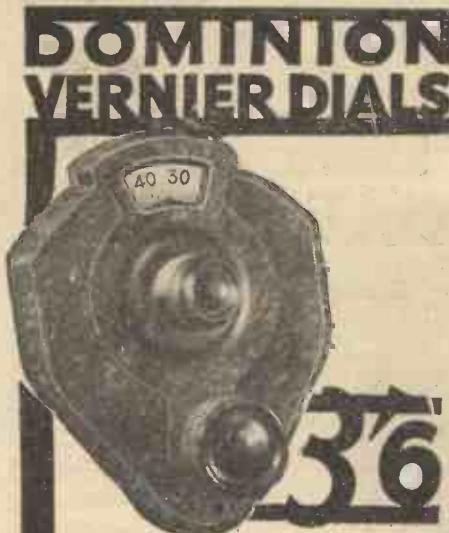
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## LETTERS TO THE EDITOR

*The Editor does not necessarily agree with the views expressed by correspondents:*

### A Good Valve Combination

SIR,—My own experience is similar to that of "Thermion," page 555. I use a screen-grid, an R.C. detector, and a pentode.

I get far more volume than I need, and I find a volume control at the H.F. end an absolute necessity. It is also necessary to use an anti-motor-boating arrangement and an H.F. stopper in the R.C. coupling unit. I use about 80 volts on the auxiliary grid of the pentode and 20 volts negative grid bias. The set is quite small, and I save H.T. considerably. W. J. F. (Redruth).

### Exponential Horns

SIR,—May I endorse the points raised in the article "About Exponential Horns" in No. 356 and amplify them by stating that a solution of the domestic loud-speaker of the future may be found in a re-entrant exponential horn used in conjunction with a miniature moving coil unit. Such a loud-speaker, only requiring a moderate power input both to the field and moving coil, would give realistic reproduction of good volume. Having had an opportunity of hearing a direct comparison made between a Schlenper loud-speaker (moving-coil type with a large diaphragm of stretched duralumin) and a Western Electric Co. 555W loud-speaker (moving-coil type with an exponential horn), I was greatly impressed by the increased output given by the latter for equal power input.

It is doubtful whether the full benefit of the exponential horn can be utilised with the average moving-iron type of unit.

G. B. S. (West Ealing).

### Linen-diaphragm Loud-speakers

SIR,—It is surely unnecessary for F.S. to confine tone-deafness to inhabitants of these islands. The jazz band originated in America, and is quite popular on the Continent! The linen loud-speaker may not be up to a first-class M.C. worked under laboratory conditions; but how many, outside laboratories and F.S.'s home, are? The linen speaker is probably quite as good as the average listener's operative conditions can take advantage of. As F.S. himself says, the ordinary O-V-2 or I-V-2 cannot deal adequately with a moving-coil loud-speaker with 120 volts H.T. Besides, even the M.C. has its disadvantages. It requires large input, its magnet system has to be energised (unless the relatively insensitive permanent-magnet type is used), and many M.C. instruments are sadly deficient in the upper register, while diaphragm resonance and the weight of the coil produce abundant problems for the designer.

The moving coil is unexcelled in its own

sphere, but it is not yet entirely suitable for average operating conditions—medium power sets with medium voltages.

G. W. P. (Woking).

### Sunday Programmes

SIR,—Regarding the letter of your correspondent C.S. (of my native town of Birkenhead) on the subject of Sunday programmes, he says that he is "one of thousands who don't want to listen to religion at all." He must have an enormous circle of acquaintances. I fancy that if we were to demand details of these "thousands" he would be mightily hard pressed to name a dozen actual cases. I used to think I knew hundreds of people who liked a certain class of music. When I came to count them I found they totalled five!

Since C.S. gets some three-and-a-quarter hours of "entertainment" on Sunday, it seems rather weak that he and his "thousands" cannot turn their sets off for three-quarters of an hour and have a little peace and quiet. Three-quarters of an hour per week, mark you! On six nights per week he can have well-nigh any kind of "entertainment" he fancies.

Does C.S. realise that the mere fact of Sunday's existence is due to the religion which he seems to dislike? Had it not been for religion there would be no Sunday.

Surely C.S. must realise that those who arrange programmes cannot suit every single listener, and since they know far better than he (or she), I think he should bow to the majority with better grace.

M. E. P. (Coventry).

The third annual Netherlands Radio Exhibition will take place in the Scheveningen Kurhaus on May 26.

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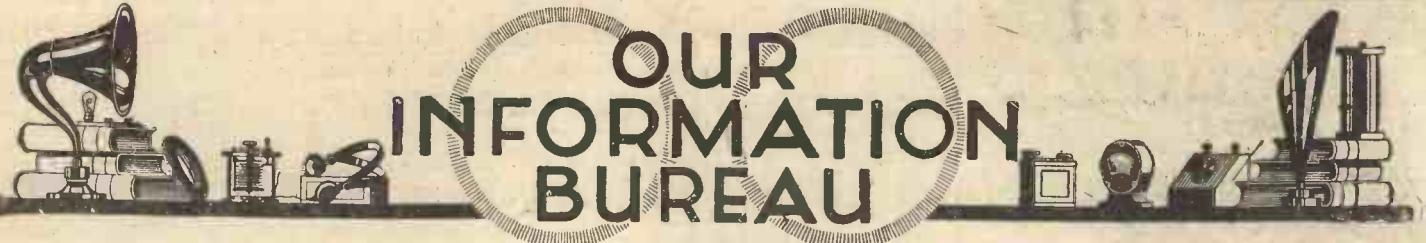
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# OUR INFORMATION BUREAU

**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

## Troublesome Oscillation.

Q.—I have built a four-valver using a screen-grid H.F. stage, and experience difficulty in getting rid of oscillation. The H.F. stage is completely screened and the coils are wound astatically. The wiring has been checked for good spacing and all wires kept as short as possible. I have done everything I can think of to eliminate the trouble, yet as soon as the aerial and H.F. circuits are in tune the set will persist in oscillating. Can you suggest a reason for this and method of overcoming the difficulty? I would mention I have wound my own coils and I am sure these are quite efficient and cover the desired wavebands. —F. D. (Dover).

A.—It is more than possible that your coils are too efficient for the receiver in question as it appears that your aerial circuit oscillates freely as soon as the anode circuit is brought near to its resonant tuning point. A way of overcoming the difficulty is to use a finer gauge of wire for either the aerial coil or the anode coil, or both, or failing this we would suggest that you try the effect of connecting a grid leak of .25 megohms (250,000 ohms) across the grid filament circuit of the H.F. screen-grid valve. The latter is a cure, but rather a drastic one in that it is liable considerably to flatten

tuning. The best course to follow is to rewind your coils with thinner wire. Some experiment-

gauge will result in excessive damping.—A. L.

## Portables and Screen-grid Valves.

Q.—I have a portable set in which a screen-grid H.F. valve is incorporated. Originally the set was designed for use with a double-ended S.G. valve, but with the advent of the new single-ended valves a suitable ordinary type valve holder has been substituted. Since this change I notice that the receiver is inclined to "hoot" at the slightest provocation and if allowed to continue this hoot resolves itself into a roar. Can you explain this and suggest a remedy?—D. K. (Brighton).

A.—If you have used an ordinary fixed valve holder and not one of the anti-microphonic or spring-type holders, then this accounts for your trouble. Screen-grid valves are prone to microphonics as are most valves. In the case of the later single-ended S.G. valves, it seems nearly impossible to use a solid-type valve holder, especially in a portable. This latter statement is open to criticism, but it appears to cover the trouble in your case. We have tested quite a number of S.G. valves in portables, and find that in most cases it is very advisable to use a spring-type valve holder.—C. B.

## When Asking Technical Queries

**PLEASE write briefly  
and to the point**

A Fee of One Shilling (postal order or postage stamps) 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.

ing will be necessary in this direction to ensure the very best results as the use of too fine a

# Player's Please



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NCC 207

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LONDON AND PAVENTRY (5XX)

- |       |    |   |
|-------|----|---|
| April | 28 | A programme of oratorio.  |
| "     | 29 | Covent Garden opera.  |
| "     | 30 | De Courville's Hour.  |
| May   | 3  | <i>The Eternal Waltz</i> , a musical burlesque :<br>music by Leo Fall, book by R. E. Jeffrey. |

DAVENTRY EXPERIMENTAL (5GB)

- |       |    |  |
|-------|----|--|
| April | 30 | An Edward German programme.            |
| May   | 1  | Plantation songs and negro spirituals. |
| "     | 2  | A vaudeville programme.                |
| "     | 3  | Covent Garden opera.                   |
| "     | 4  | <i>The Poxover of Zenda</i> .          |

MANCHESTER

- April 30 A programme by the band and pipers of the Queen's Own Cameron Highlanders.

NEWCASTLE

- April 30 *Here's Tae Yo!* an evening in a village inn.  
May 4 North of England Musical Tournament,  
relaxed from the City Hall

The Sheffield station is now transmitting on the national common wavelength of 288.5 metres (1,040 kilohertz), which is ultimately to be adopted by practically all British relay stations.

That the hunt for wireless "pirates" still proceeds in Scotland is indicated by the occasional cases which come before the courts. The latest offender to be brought to justice was a Lossiemouth master baker, whose omission to take out a receiving licence cost him £3.

## The Original COSSOR MELODY MAKER



SPECIFIED COMPONENTS:  
2 Ormond .0005, 2 do. S.M. Dials, 6 T.C.C. Condensers, 2 B.B. Clips, 1 B.B. Rheostat, 3 Dubilier Leaks, 3 Lotus V.H., Ferranti A.F.3, 2 Switches, 9 named Terminals, Glazite, 9-v. Grid Bias, splendid D.S.C. wound Coil on Pirite former, Drilled High-grade 21 x 7 Polished Panel and Strip, Wood Screws.

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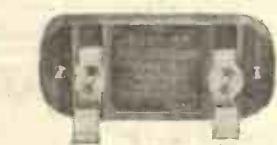
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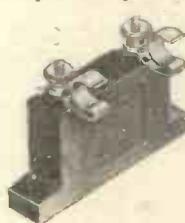
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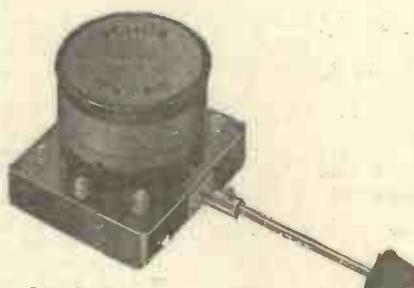
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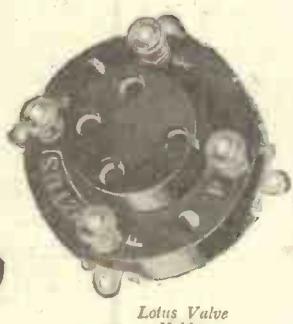
.01 to .1	- each	2/-
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.25 and .3	- each	2/5
.4 and .5	- each	2/5
1.0	- each	2/6
2.0	- each	3/5

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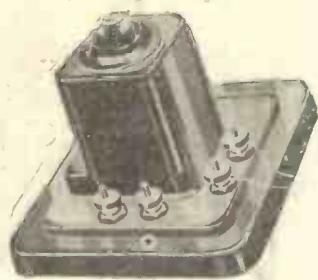
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will make the best  
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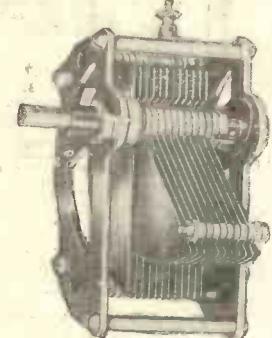
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