

LINEN SPEAKER :: B.B.C. "OFFICIAL" CRYSTAL SET

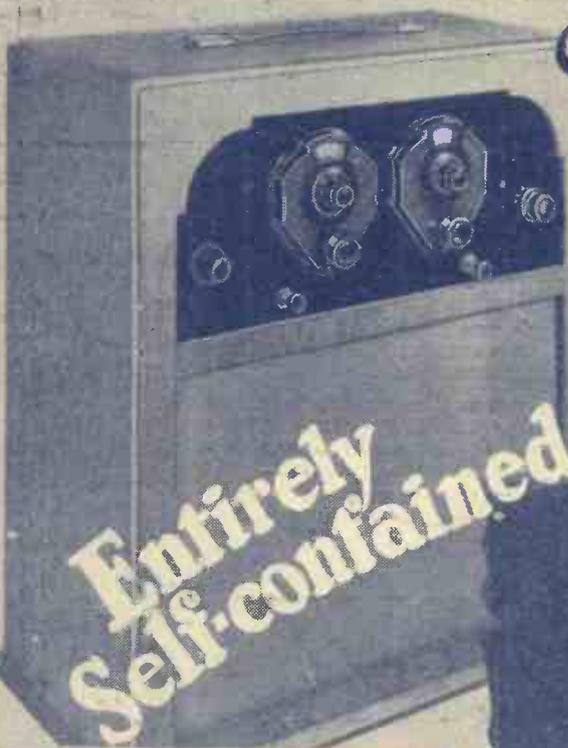
Amateur Wireless

Every Thursday 3^d

and
Radiovision

Vol. XV, No. 386

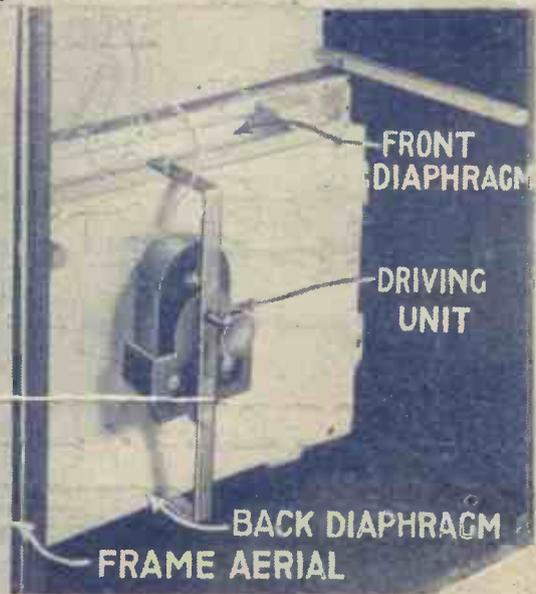
Saturday, November 2, 1929



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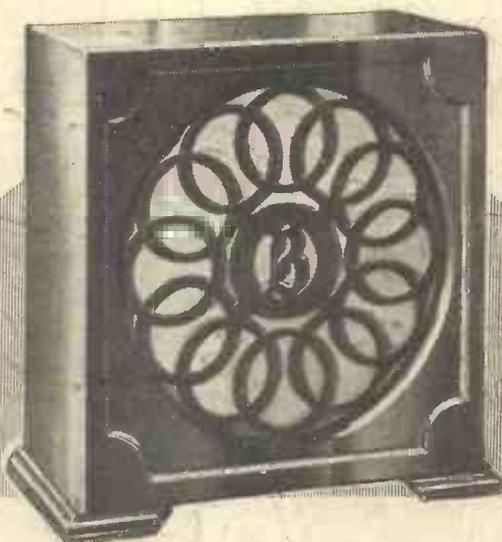
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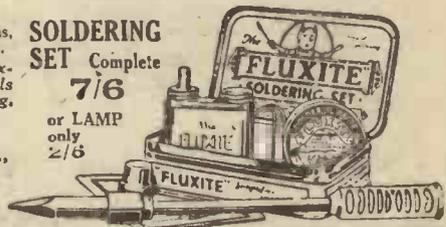
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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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When Critics Go Astray!—The "North Regional"—Lehar as a Listener—The People's Palace Again!—Radio for the Schools—Next Week

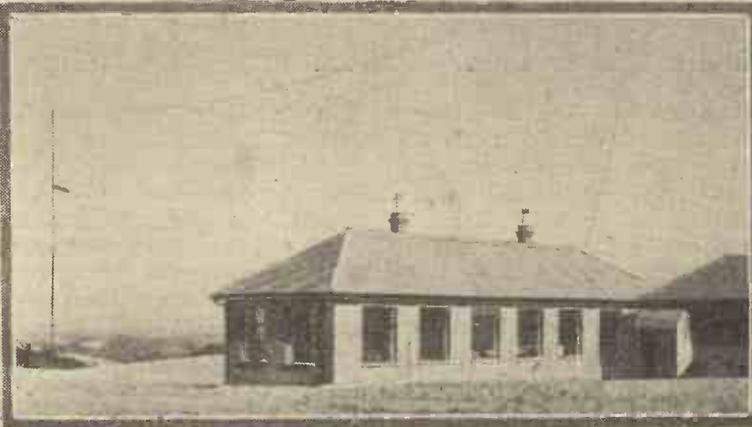
When Critics Go Astray!

—The broadcasting of Bernard Shaw's play, *Captain Brassbound's Conversion*, the other evening called forth a paean of praise from a well-known critic, who mentioned in his article that the broadcast started at 9.35, finished at 11.35, and was followed by dance music until midnight, which showed that he had studied the timing in the published programmes. But the broadcast started at 9.45 and did not end until 11.52, when the announcer apologised to listeners who had

been waiting for dance music and said that none would be given, as it was within a few minutes of midnight. Fortunate, perhaps, for the radio critic, that the play itself was not cancelled at the last minute!

The "North Regional"—A contract has been signed for the building of the North Regional broadcasting transmitter at Moorside Edge, near Huddersfield. The firm who was responsible for the erection of the building at the London regional transmitter at Brookmans Park will undertake the work. The building, which will be of brick construction, will take about a year to complete, and the layout will be very similar to that of Brookmans Park.

Lehar as a Listener—Most of us are familiar with the famous waltz, "The Merry Widow," and other works by the same composer—Franz Lehar—which are frequently broadcast. This being so, it is interesting to hear Lehar's own views on broadcasting. The composer is convinced that he owes his popularity to a great extent to the radio. "The radio is of priceless value to the creative artist," he said. "Many years ago, before broadcasting had reached its present development, I consented to the



The new B.B.C. receiving station at Tatsfield which is replacing the Keston listening post.

broadcasting of my musical comedies, as I realised that radio would become, and has become, a most important factor in our daily life. When I am sitting at home, with the loud-speaker in front of me, I get the sensation of the orchestra or vocalists being right opposite me, but hidden from view as though by a curtain."

The People's Palace Again!—Another series of those popular People's Palace concerts will be given by the B.B.C. at the

"Palace" in the coming season. Two of these concerts will take place before and six after Christmas. Mr. Percy Pitt (who is now music director of the B.B.C.) and Sir Landon Ronald will each conduct four concerts. A performance of a concert version of Humperdinck's fairy opera, *Hansel and Gretel*, is fixed for January 9, under Mr. Percy Pitt's direction; while a complete Wagner programme, also under Mr. Pitt, will be given on Thursday, February 13, in recognition of the anniversary of the death of Wagner, in

1883. Sir Landon Ronald will include many of his concert successes in his four programmes. Book the dates, either for listening-in, or for going to the "Palace" itself.

Radio for the Schools—In Germany the whole problem of school radio has been placed on a definite basis under Government supervision. As far back as 1924, the then German Secretary of State drew up a plan for the introduction of radio to the schools, and as a result of his efforts, over 8,000 German school teachers are to-day affiliated to the German School Radio Union. To give an example of the spread of the movement, Silesia has 24 schools, Westphalia 50, and East Prussia 66, all owning their own radio installations. In Prussia four hundred schools entered into negotiations for the purchase of apparatus!

The Short Waves—Now is the time to dodge all broadcast-band interference and go down to the "wavelets." Next week we are giving details of just the set you want—a world-wide short-wave receiver. Under the heading "Cutting Out Brookmans Park," Mr. W. James will have something of particular interest to say to those troubled with interference.

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By FRANK
ROGERS



THE WIRELESS EQUIPMENT OF R101



TWO wireless sets are carried on board the R101. One, of medium power, is intended to keep her in constant touch with her base, and the other, of low power, will only be called upon for landing operations, or in cases of emergency when the current is not available from the ship's mains.

The medium-power long-wave C.W. set works on a wavelength of 800 to 4,500 metres and can establish two-way communication easily up to a distance of 1,800 miles. The 220 volts A.C. are fed to the primary and there stepped to 6,000 volts and rectified. The special rectifying panels are mounted directly underneath the transmitter to the left of the operator.

Precautions Against Fire

The whole of the apparatus is cased in a gas-tight cupboard, somewhat resembling a fairly high sideboard. This is a precaution against fire. Even the make-and-break contact for telegraphy is inside the operator's desk, the plunger under his key working up and down through a gas-tight socket.

The wireless room is situated just above the control car and inside the hull, and its floor is of three-ply wood over the metal girders.

Because of the precautions taken against an explosion, it must not be thought that the set cannot be "got at" by the operator if anything goes wrong. It can quite easily, but the very act of opening the front automatically cuts off the current, and the whole set is at once dead. Thus there is no possibility of a spark igniting any stray gas. And when the cabinet is shut again the ventilating arrangements quickly dispels any gas.

The Wireless Installation

The wireless room is quite small, only 6 ft. square, and is shut in by two corridors running along each side. Noise will not penetrate the walls, as they are practically sound-proof. The room has no windows.

The low-power set has an input of 80 watts, and can be used for C.W., I.C.W., or telephony. Its wavelength range is from 500 to 3,000 metres. The power is supplied from batteries giving 12 volts in all. Apart from its uses mentioned above, it can be employed for I.C.W. communication with merchant ships on 600 or 800 metres by means of interrupter gear.

This set is suitable for two-way communication up to 200 miles on C.W. or I.C.W., and up to 100 miles on telephony.

The Aerial

The aerial is a trailer, 459 ft. long when the ship is sufficiently high, and shortened to 100 ft. when she is preparing to land. The aerial swings down below the hull for a few feet, then trails backwards for practically the whole of its 450 ft. The extreme end is provided with a 2-lb. lead weight.

C.W. and I.C.W. signals, and telephony can be received on a wavelength range of 300 to 20,000 metres.

Wireless engineers are always modest in their claims of what a set will do, preferring to state what they know to be easily provable. Captain Courteney, for instance, was forced down just near the Azores some time ago and established communication with a merchant vessel over a hundred miles away. He used an emergency aerial, and the set was operated under conditions likely to try it to the uttermost, yet it did more than was claimed for it. I feel we can safely say that R101's wireless will give it two-way communication over a far greater distance than the engineers are prepared to claim for it at present.

The chief work for the medium-power set is the reception of weather forecasts and the transmission of reports to its base. It is accepted airship practice that she should always be in communication with her base. Even when no forecast is expected for an hour or two, a test will be made every ten minutes or so to make sure that this contact can be made at any moment it is required.

Provision has to be made for sending out an SOS on the international wavelength of 600 metres in case of extreme emergency, and this can be done on the low-power set, of which the normal function is to carry on when for any reason sufficient current is not available from the ship's mains to work the other set.

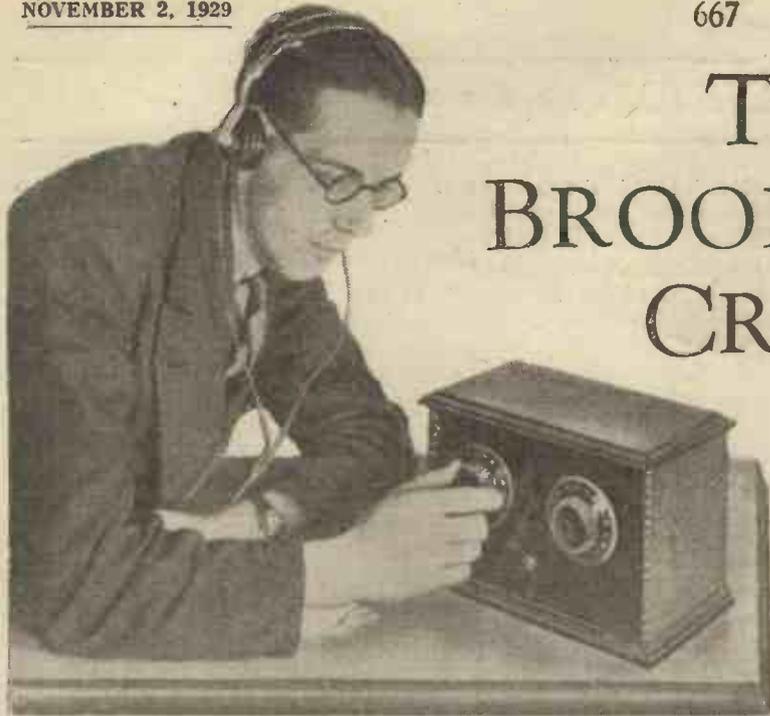
It is likely that an experiment will be made in the near future in receiving weather reports on the Fultograph system. If this proves successful, a considerable saving in time will be effected, for at present some minutes are required to receive and transcribe all the data the captain requires.

R101, whatever may be said in some quarters, has taken the air in a highly successful manner, and shown herself not lacking in speed and to be easily navigable. The 900 lb. of wireless equipment in her hull represents the best that science can provide, and is beyond a doubt the finest ever taken into the air. The wireless trials on the first flight were under the supervision of Flight-Lieut. R. F. Durrant, A.F.C., of the Air Ministry Wireless Department.

Her three operators, under the leadership of Mr. Keeley, who was on duty in R33 when she broke away from her moorings a year or two ago, will lose no time in accustoming themselves to the little peculiarities of their instruments and bringing their work to a high state of efficiency.

NEXT WEEK !
THE "WORLD WIDE
SHORT-WAVE THREE"

THE B.B.C. BROOKMANS PARK CRYSTAL SET



A Practical Receiver based upon the B.B.C. Recommended Circuit for Brookmans Park

IT was in the endeavour to provide a better broadcast service for all British listeners that the B.B.C. evolved the regional scheme. It was approved by an independent committee and afterwards submitted to the P.M.G. for his sanction.

The scheme has been greatly discussed all over the country and the first step has already been made in the erection of the new Brookmans Park station. As you may know, Brookmans Park embodies two complete independent transmitters and in a few months from now it is hoped to have

sets are not naturally selective because, unless special arrangements are made, the crystal itself exerts a damping influence and hence a "non-selectivity" influence upon the aerial circuit. For this reason many owners of existing crystal sets, consisting simply of one coil, tapped or in conjunction with a variable condenser, a pair of phones and a crystal detector, may find that both stations come in simultaneously, or at least with some degree of mutual interference.

The B.B.C. Circuit

It is to this end that the B.B.C. have gone carefully into the question of suitable crystal circuits. For instance, in a book entitled "Crystal Sets and the Brookmans Park Transmitter" a suggestion is made regarding loose-coupled tuning and a circuit is given which has been made up in the AMATEUR WIRELESS laboratory and the final result is illustrated herewith.

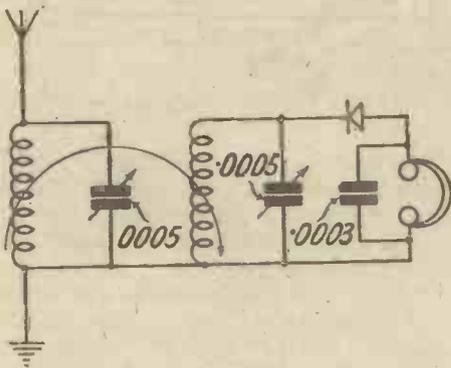
The AMATEUR WIRELESS Technical Staff have experimented with this set for some little time and have no hesitation in recommending it to all who have obtained the B.B.C.'s booklet and want to know how to make up in practical form this particular circuit shown.

The receiver here is a recommended design for all who do not wish to experiment at all, but who want to have a simple and safe set to follow in order to get good crystal reception under

the regional scheme. Of course, it would be possible to modify the layout of the set shown herewith, in order to fit it with parts at present owned; or, of course, low-frequency amplification could be added. But it is most strongly recommended that where a receiver is required which really will give good and selective working on Brookmans Park in the areas stated by the B.B.C. engineers, the present set should be made up and will be found entirely satisfactory.

Simple Construction

The following short constructional hints will be found useful by those who want to make up the set exactly as illustrated herewith. For convenience a blueprint has been prepared showing the construction of this simple crystal set. It will be a great help, particularly to those not well acquainted with set construction. In this particular set an important part is played by the coil coupling and the distance between the two



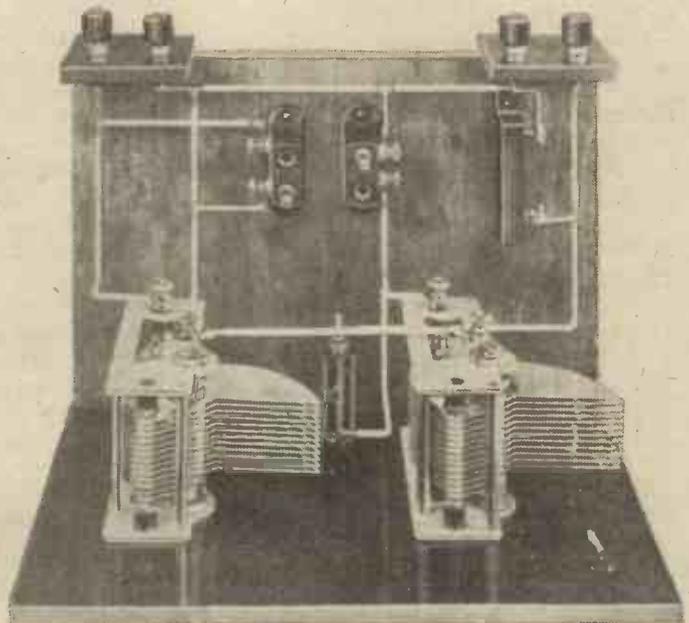
This is the circuit recommended by the B.B.C.

both working so that a "high power" alternative programme service will be obtainable from the same source.

The B.B.C. estimates that crystal reception will be possible in many cases at a distance of 60 miles or more, while excellent crystal reception will certainly be possible at anything up to 50 miles. The maximum possible range for crystal reception from the old 2LO was about only twenty miles.

Thus, over a very wide area, many people who formerly were unable to work a crystal set, will now come within crystal range of the new station, particularly in the south-east district.

The chief problem will be one of obtain-

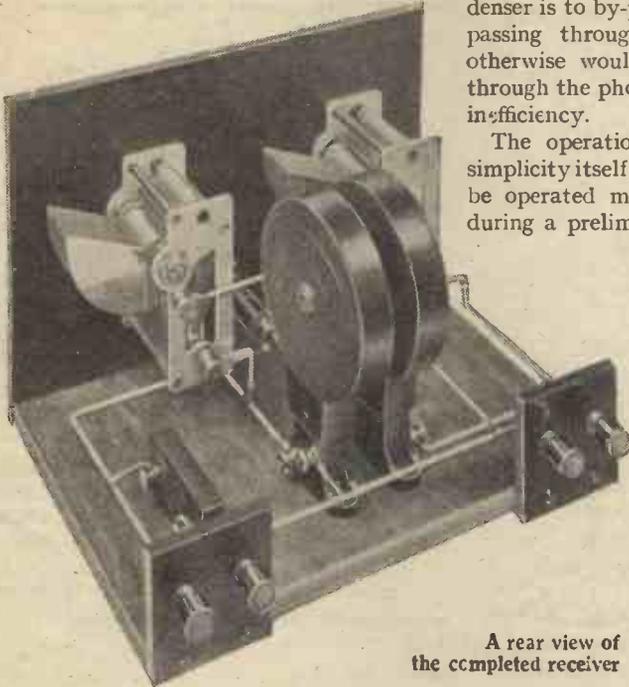


Here is a plan view of the practical receiver based upon the B.B.C. circuit

A. B. B. C. "OFFICIAL" CRYSTAL SET (continued from preceding page)

plug-in coils is very important to note. If you mount the two coil sockets exactly as shown in the blueprint you can't go wrong.

In addition the blueprint shows the exact drilling centres for all components, and you can use it as a template, simply by sticking the panel portion to the ebonite



A rear view of the completed receiver

with two or three spots of adhesive and using the blueprint as a guide to the marking of the holes before drilling. The coil sockets and fixed condenser on the baseboard may be similarly mounted with the print as a guide. Finally, as each wire is shown in its correct place, and is numbered for convenience, it is practically impossible to go wrong when it comes to making the connections.

Components Required

The following parts will be needed.

Two .0005-microfarad variable condensers, with dials (Trix, Burton, Lissen, Igranic).

Ebonite panel, 9 in. by 6 in. (Pilot, Becol, Raymond).

Two terminal strips, 2 in. by 2 in. (Pilot, Becol, Raymond).

Two baseboard mounting coil holders (Lissen, Lotus).

Crystal detector (Jewel Pen, type R040, R.I.).

.0003-microfarad fixed condenser (Lissen, Dubilier, T.C.C., Watmel).

Four terminals marked A., E., Phones+, Phones- (Belling-Lee).

A word or two may be said regarding the circuit itself, which is given herewith for the benefit of those who understand the symbols used in theoretical circuit diagrams. It will be seen that a loose-coupled tuning

arrangement is employed, that is the aerial is not connected directly to the crystal, but is coupled to a second coil, and both coils are separately tuned. The condensers each have a maximum value of .0005.

The other condenser in the circuit is a .0003 fixed condenser placed across the phone terminals. The purpose of this condenser is to by-pass any unrectified current passing through the crystal and which otherwise would take the metallic path through the phone leads and perhaps cause inefficiency.

The operation of the complete set is simplicity itself. The two condensers should be operated more or less simultaneously during a preliminary test, but subsequent experiment will show which is the best setting for each station. The aerial condenser, that is the left-hand one, will be found to give rather coarser tuning than the closed circuit condenser. It must be emphasised very strongly that a crystal set gives no amplification whatsoever. The actual signals heard are caused by the current picked up by the aerial.

If the aerial and earth arrangements are not efficient, if the crystal setting is bad, or if the phones themselves are not responsive, then the results will be disappointing. It is no use relying on cheap components to give good results with a crystal set.

Coil Sizes

So far as coils are concerned a little safe experimenting may be needed in order to get the best results in any particular locality. For our test a No. 50 coil was used in the aerial socket, that is the left-hand one, and a No. 60 coil in the right-hand socket. Some conditions may necessitate a 50 coil in each socket while in other cases a 40 coil may be needed in the aerial socket in conjunction with a 50 or 60 coil in the right-hand socket. The degree of selectivity is varied largely by the coupling ratio between the two coils.

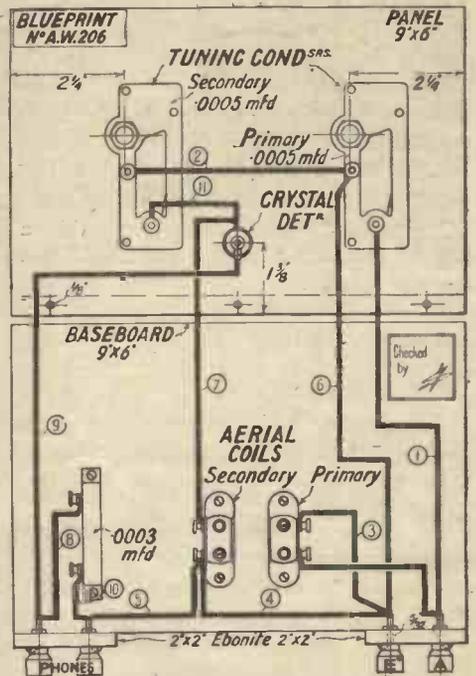
For the long waves two 200 coils, or one 150 and one 200 coil will usually be found satisfactory. A semi-set type of crystal detector is employed which obviates much of the need for "cat-whisker scratching" and therefore removes one of the bugbears of old-fashioned crystal sets.

External from the set itself are one or two factors, already mentioned, which vitally affect reception. Aerials play such an important part in crystal reception

that this fact cannot be stressed too strongly.

Use a Good Aerial

Occasionally, one hears of good reception on freak indoor aerials, but the best results are always to be obtained with a properly erected outdoor aerial, usually having an average height of about 20 ft. Thick stranded copper wire should be employed in order to cut down the resistance and the insulators should frequently be cleaned.



The wiring diagram. Blueprint available, price 6d.

The lead-in is very important and here the wire should be taken into the house by means of one of the many insulators on the market. Bare wire should not be run through window sashes and care must be taken that the window is not shut down upon the insulated lead-in wire, as the insulation may be frayed and a short will occur.

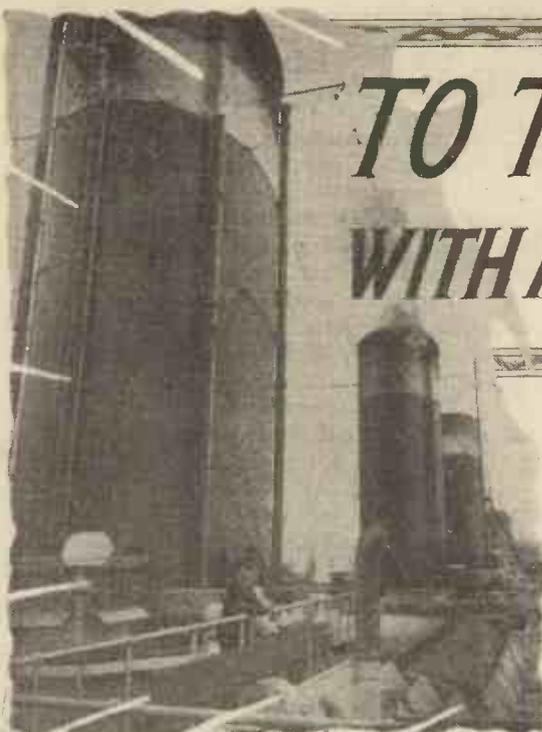
The importance of a short low-resistance earth wire cannot be stressed too strongly. Many crystal set troubles can be traced to a faulty earth or earth lead.

Some of Moscow's disused churches have been transformed into restaurants for the use of State workers; they have also been equipped with loud-speakers for the broadcast of musical entertainments and talks during meal-times.

A new aeronautical wireless transmitter has been established at Jask (Persia) on the England-India air route. This station, which will use the call-sign RVI, is intended exclusively for civil aviation purposes.

TO THE WEST INDIES WITH A SHORT-WAVE SET

A personal account by members of the Oxford University Expedition



WE, in this account, are the members of an expedition sent out under the auspices of Oxford University to study tropical conditions in British Guiana from a naturalist's point of view. As such, we found ourselves in a pretty strong radio position on board ship and were able to take with us an "Eddystone Scientific Four" receiver.

On sailing from the London docks, one of the very first things thought of was how on earth to amuse ourselves in the course of a three weeks' voyage across the Atlantic. The short-wave set was, of course, taken into account, and a sort of understanding was reached that, so soon as we could, the captain should be approached for his permission, and as soon after that as possible the set should be erected. "Ocean disease" didn't keep us below too long. The captain was asked on the first evening, and seemed not only very reasonable, but even keen on the thing, which was a good omen.

An aerial—quite the worst one ever erected—was slung from a stubby little derrick down on to the games deck and a portion of the ship's metal "chassis" was scraped bare to provide an earth. When the set was connected up we heard almost at once a Dutchman telephoning volubly on 16 metres at about strength R5, the time being about 15.00 G.M.T. This undermined my prestige a lot as I told the captain that it was Bandoeng, a piece of information he duly published, and I found it a little hard to issue an official *dementi* when I found it to be Kootwijk! However, all was well, because on Wednesday I actually did hear PLF; so no harm was done! At 6 p.m. (Greenwich) that night 5SW came in in great style and, as the night advanced, had a neck-and-neck rivalry with WGY.

The fifth day out from port was marked by the enthusiasm of the captain and the turn of the scale. He realised that our aerial was as vile as vile could be, screened by mighty erections of steel, and proceeded to help to erect a far better thing, which came down from a lanyard almost

at the top of the funnel to the deck awning on its outboard side. The aerial then came in under the awning to where the set was situated, almost under the top end of the wire. This new aerial thus formed a sort of vertical "L," leaning drunkenly against the funnel. At about noon, before its erection, I had managed to hear PLF weakly, and later W8XK came over R3. With the new aerial 5SW was well up to R8-9, and his hand concert was enjoyed by many on board.

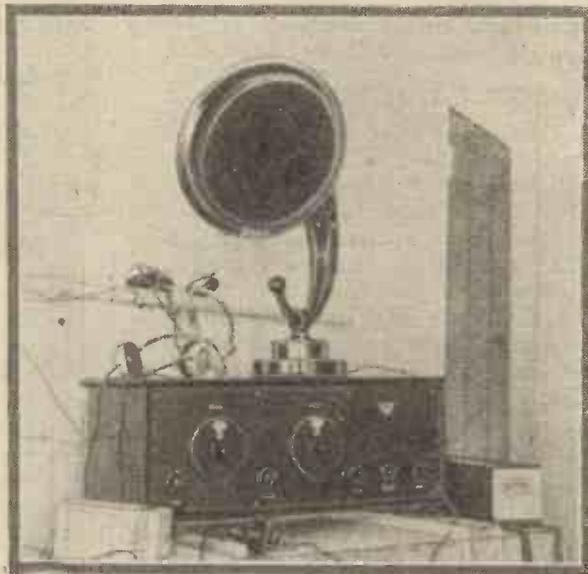
The next day was also successful. PCJ let us hear from him to the tune of R7-8, 5SW seemed a little discouraged and could only manage a strength of R6 before making "Big Ben" strike midnight at 9 p.m. ship's time. He managed, however, to shoot out his Greenwich pips at 6 o'clock with such strength that they reached the officer of the watch on the bridge quite safely!

On the eighth day of our voyage the American coast effect was most marked. At 23.00 G.M.T. the 14 mc. amateurs were very strong. W2CRB, W2NV, W2PE, W3ARY, W3AUO were those logged. The commercials WEA, WES, WIK, WIY were tremendous. On the broadcast band four carriers were heard, one station was just audible R1-2 (dance band) and another quite good with a soprano solo R2-3 (unidentified, perhaps KDKA). 5SW was, of course, taking his long week-end off.

The ninth day was amazingly good, except for the sloppy Sunday programmes, which we can't believe the American public likes. The worst atrocity was "The

Last Rose of Summer" *fortissimo* from WGY. It was part of the Atwater, Kent Hour, and if anything could dissuade one from buying an excellent radio set I should think this would. They capped this by promising another orgy of sentiment next Sunday! W8XK was a formidable rival. His strength is just as impressive as that of W2XAD.

The second half of our voyage proved more interesting in every way than the first. A week ago, when we were half-way through our voyage, we were some 1,600 miles from the coast of North America and some 2,200 from England. Since then we had been steaming steadily south-west at a rate of about 300 miles a day, until we reached Barbados on the thirteenth day. After leaving Barbados we had called at the islands of Grenada and Trinidad, finishing the journey by steaming down some 100 miles off the coast of Venezuela to Georgetown, British Guiana. So, as regards the position of transmitting



The short-wave set used on the trip

stations, we had been steadily steaming away from 5SW, and therefore at first approaching the American stations a little, then moving along at a constant distance
(Continued at foot of next page)

For the Newcomer to Wireless: LOUD-SPEAKER POINTS

I HAVE a horn loud-speaker which I installed rather more than a year ago. It used to be very good indeed, but now I find it not up to standard.

What are the symptoms that you notice?

Well, first of all, it does not produce anything like the volume that it did.

You are using the same kind of output valve as you were originally, I suppose?

Yes, in fact, no alteration has been made in this particular receiving set during the time.

Is there anything else?

Yes, the quality of its reproduction is not what it was, and if I do increase the volume by using reaction, it has a distinct tendency to become harsh and even to "crack" on certain notes.

Have you had the permanent magnets seen to since you bought it?

No, I can't say that I have.

Well, I expect that that is the whole cause of the trouble.

Don't they retain their magnetism indefinitely?

Magnets made of very special steel are exceedingly long-lived, but those used in many loud-speakers are apt to become weaker as time passes.

What is the effect?

When a loud-speaker goes out new, its diaphragm is adjusted so that the best working is obtainable when the steady pull from the magnets is normal. When the magnets lose their force, the diaphragm does not respond as well as it should. There is, therefore, a falling off in signal strength.

What about the harshness?

This, again, occurs because, owing to the reduced pull upon it, the diaphragm is now not properly balanced, so to speak, and its movements are not exactly what they should be.

How does one get magnets attended to?

Send the loud-speaker to the makers, or to a firm which specialises in loud-speaker repairs and adjustments. The cost will be quite trifling.

Does the same thing apply to cone-

type loud-speakers?

Certainly, for there again permanent magnets are used.

Are there any other possible ways in which the loud-speaker can be injured so as to spoil its performances?

Yes, in the horn type the shape of the trumpet is very important, and should this be badly dented, reproduction may be affected adversely.

What about cones?

It is exceedingly important that the cone should not be deformed by warping, denting, bending, and so on.

Why?

The little nipple in the middle of the face of the cone into which the reed of the movement is secured must be absolutely central and the hole through it must be perfectly in line with the reed. Supposing that the cone does become deformed, the nipple is often slightly displaced, with the result that its hole is no longer perfectly aligned with the reed. Harshness is then quite likely to result.

"TO THE WEST INDIES WITH A SHORT-WAVE SET"

(Continued from preceding page)

from them, and finally leaving them directly astern. Our results were not at all what would be expected by studying our track-chart, especially on the short waves. The irregularities were more striking than the variation which we had expected due to our position, and these seem to have been caused both by unexpected atmospheric effects and by the absorption of near-by islands covered in tropical vegetation.

The U.S.A. Long-Wave Stations

One of the most interesting and most consistent results obtained has been the reception of the American long-wave stations on the broadcast band. Although we were never closer to the coast of the U.S.A. than 1,500 miles, almost every night at least a dozen good powerful carriers were audible, and three stations were heard pretty well. The best performer was WPG (Atlantic City, N.J.). He is alleged to use only 5 kilowatts, and yet is one of the best heard in England during the winter months, while for us, 1,600 miles away or further, he provided regular R₄ reception.

The effect of atmospheric was very interesting. Until we were 150 miles north-east of Barbados they were quite innocuous and unnoticed, although we were told about three days before by the ship's operator that he found them troublesome on 18,000 metres. At that point, however, they began to be noticeable on the broadcast band, and at Barbados they were definitely bad, though not to the point of

being unbearable, and the short waves were completely unaffected. At Grenada they were a little worse, while at Trinidad, and off the coast of Venezuela, they made things quite impossible on the 400-metre band, and even affected the short waves in so far that they provided rather a troublesome steady rushing background, though this could in no way be compared with the sharp reports on the higher wave.

When we were over 2,000 miles from 5SW, and his signals had been steadily declining for the last few days, we had quite come to the conclusion that he would take rather a back seat. As usual in matters of short waves, we were absolutely and entirely wrong. The whole trouble about 5SW is his lazy week-end habits, which are

inclined to make anything in the nature of a continuous study of his transmissions impossible, added to which is the fact that by West Indies time his transmissions are so early in the afternoon that one is either ashore bathing, and so misses his programme completely, or else only hears the very end of it. At Barbados we were told that 5SW came over pretty well.

Skip Distances

Looking back on our results, it would seem pretty certain that, whatever the skip distance of 15 megacycles may be, it is certainly not as much as 1,500 miles, as W2XAD was perfectly up to strength at that distance. Further, the only effect, bar this question of skip, that distance has on the short waves is that the further one is from the transmitter, the more pronounced and steeper is the daily curve, the sharper is the peak, and the greater the difference between the strength of a station, whatever its wavelength; at its daily maximum and its daily minimum. Finally, a powerful short-wave set such as ours can be depended on to receive at least three broadcasting stations every night at full phone strength, wherever it is in the world and, unless under very adverse conditions, at loud-speaker strength; the further one is away from civilisation, too, the more welcome this entertainment becomes, and goes a long way towards getting rid of that feeling of losing touch, as was rather well demonstrated on the last day of our voyage, when, off the coast of Venezuela, we heard a very good eye-witness account of the *Graf Zeppelin* flying over New York.

HAVE YOU NOTICED

—how San Sebastian, with its lady announcer and her "Atencion," has disappeared lately from the log of the average set owner?

—how the French programmes are inundated with advertisement announcements? Imagine this in the interval of a highly tragic play being broadcast from a B.B.C. station. The announcer suddenly bursting out with, "A good appetite, ladies and gentlemen! This will be your lot if you drink So-and-So's cocktails!" Yet this is what was sent out recently from one of the French stations.

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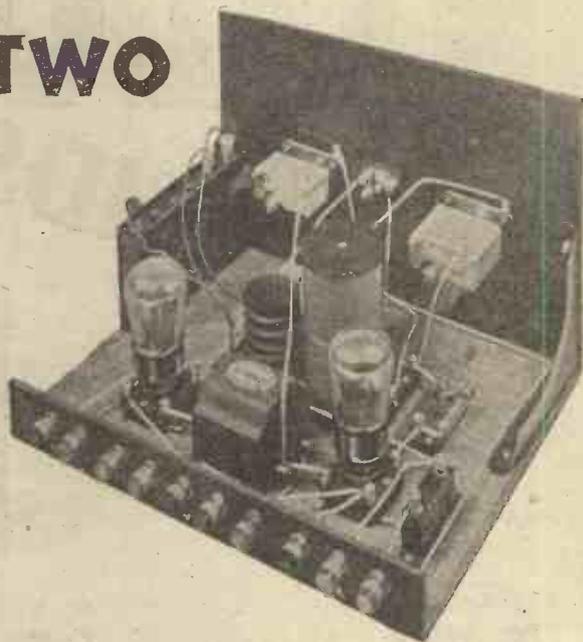
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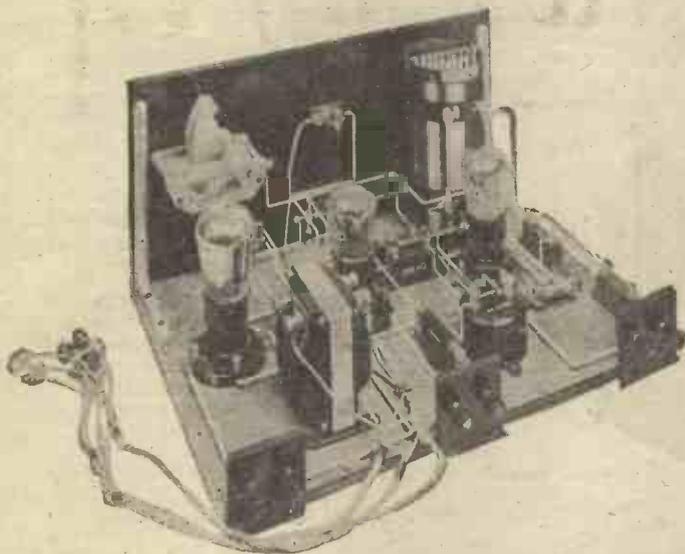
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THE COMMUNITY THREE



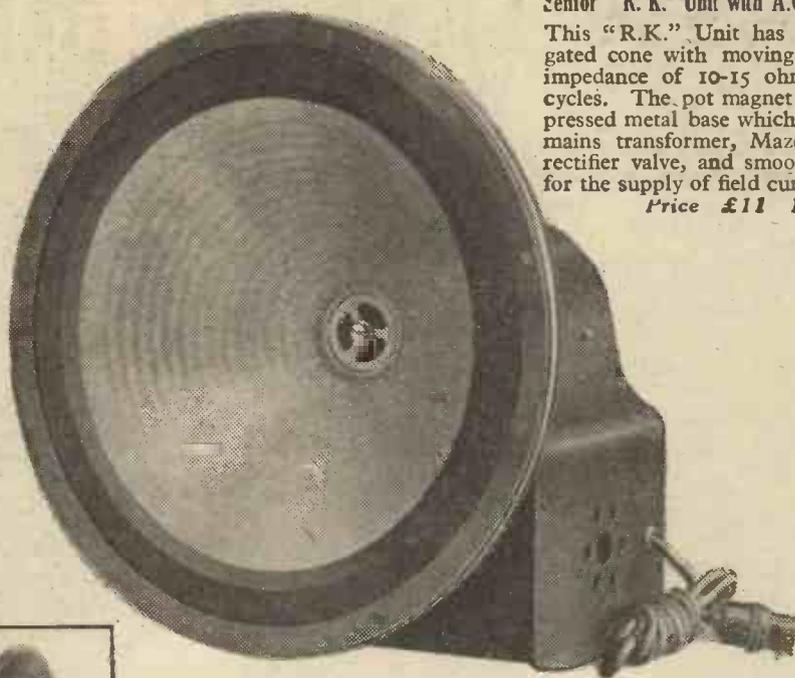
A first-class broadcast Receiver that will give a number of alternative programmes and also an efficient amplification for the electrical reproduction of gramophone records. This set will meet every need of the average listener.

FULLY DESCRIBED IN THE NOVEMBER

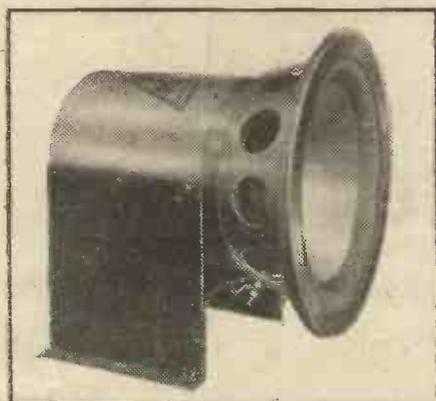
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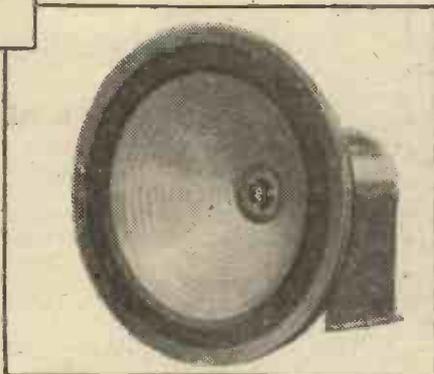


Senior "R. K." Unit with A.C. Field Excitation. This "R.K." Unit has a 10 in. corrugated cone with moving coil having an impedance of 10-15 ohms at 50/4,000 cycles. The pot magnet is mounted in a pressed metal base which also contains a mains transformer, Mazda U.U. 60/250 rectifier valve, and smoothing condenser for the supply of field current.
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On Your Wavelength!

Musical Experts

THERE was a time when the leading and the lesser lights of the musical world regarded radio and broadcasting as being mechanical inventions of the devil! Times have changed, however, and with the improvement in the quality of reproduction the musicians were won over to "our side" one by one. Indeed, some of these musicians have even gone a step further and ventured into the technical side of radio—a very fit and proper thing to do, in my opinion. But a little knowledge is a dangerous thing! I was present at a lecture given a few evenings ago by one of these converted musical enthusiasts and was astounded to hear the worthy gentleman drop technical "bricks" by the dozen.

Transformers and R.C.

The particular subject which seemed to inspire him the most was that time-honoured theme, "Transformers versus Resistance Coupling." After dwelling upon the "time-constant" of R.C. coupling condensers, he assured the audience that grid current flowed continuously in the grid circuit of the output valve, unless signals were very weak. And so, he deduced, this current was stored up in the R.C. coupling condensers, taking an appreciable time to discharge and affecting the reproduction quality unfavourably. I need hardly tell my readers that grid current does *not* flow almost continuously, unless signals are so loud as to overload the valve or if insufficient grid bias has been applied. There should be no grid current flowing at all in the grid circuit of the power valve or in the grid circuits of any other L.F. stage. Many high-quality super receivers, notably the "South Kensington" set, have a sensitive galvanometer in the grid circuit of the last valve in order to detect the slightest flow of current.

Grid Current

If grid current is allowed to flow, the time-constant effect that our musical friend was talking about comes into action. If transformers are used the effect of grid current flowing through the secondary windings is to load these windings with a current for which they were not designed. And this gives bad quality in the same way as the maltreated R.C. coupling condenser!

The Super-het.

If you haven't wrecked your old super-het., try it on and around the Brookmans Park transmission. I hope you'll be as agreeably surprised as I was. Working with a frame aerial, this gives me all the selectivity I desire, and with the detectors converted from leaky condenser to anode bend the quality is quite good.

Talking about super-heterodynes, I notice that this type of receiver is still immensely popular in France. Here, and in America, the super-het. has gone out of fashion almost as quickly as it came in! I say "out of fashion" because there really wasn't anything so radically wrong with the circuit to merit such a hurried abandonment. True, super-hets. were complicated, rather difficult to build, and invariably gave poor quality. The moving-coil loud-speaker "came in" and showed up the bad super-hets. in no uncertain light, exposing the lack of high musical frequencies, which were suppressed by the intermediate-frequency transformers. But super-hets. can be made to give good quality, especially if the intermediate-frequency transformers are not too sharply tuned. As for the popularity of the super-het. in France, I cannot understand it. The problem becomes all the more knotty when one discovers that the average French commercial super-het. gives deplorable quality.

'Ware Cheap Flex!

I wonder how many people realise the dangers of using poor quality flex wire? I was testing a receiver the other day and was puzzled by the failure of the set to come up to expectations. It was a simple three-valver having an H.F. (screen grid) stage, followed by a detector and low-frequency valve. This is a combination known to give good results, but in the actual receiver under test there was something lacking. After a careful check over of the circuit I decided that the only thing to do was to get down to it and make a thorough test.

One of the first tests which I put on a receiver which is not up to scratch is a megger test. This consists in the measurement of the insulation resistance between the various parts which are supposed to have an infinite resistance. It is really surprising what a number of portions of a receiver do not have an infinite resistance where they should have. One will find leaks from the baseboard or leaky valve holders or leaks across coils or condensers to a more or less serious extent, and as often as not it is found that one of these leaks is causing the trouble.

Leaks That Don't Matter

For example, if we have a leak across a variable condenser connected across the tuning circuit, then extra damping is brought into the circuit. There are other places where a leak does not matter, such, for example, to take a silly case, as a leak of two megohms across the two filament contacts of a valve holder. But, to get on with the story, I meggered the various parts and found, rather as I had suspected,

some very distinct leaks across the tuned circuit.

Now about some variable condensers one is prepared to believe evil. There are, on the other hand, some about which one hesitates before assuming that they can be faulty. These condensers were of the latter variety, and I was loth to believe that they were developing a leak of the relatively low order which I discovered. I tested all the other components, however, and began to wonder whether I had really struck a dud condenser. I therefore disconnected the condensers in question and tried their insulation resistance, which, as I half expected, I found to be infinity. Where, then, was the leak?

To cut a long story short, I found, on looking over the set again with a super-critical gaze, that there was some twisted flex in the circuit in such a position that it was across the tuned circuit. Ordinary rubber-covered flex it was; the sort of thing one straggles about sets without very much thought. Yet an investigation of this showed that it had a leak of something like $\frac{1}{2}$ megohm in its bad places and 2 or 3 megohms in the rather better places. I therefore yanked the flex out and inspected it for poor insulation. I was disappointed to find that there were no breaks visible in the insulation, and at first glance the rubber appeared perfectly good. It was not until I examined it more closely that I realised that the rubber had become perished and porous and that this was causing the leakage. So, 'ware old flex!

The New Voice

This note is being written on the morning after the night before—that is to say, on the morning following the ether début of the new 2LO. It was a hectic evening, for my telephone bell started shortly after four o'clock and would, I think, have kept going until midnight if I had not at length left the receiver off its hook in despair. Friend after friend rang up to say that he was being completely swamped and could I do anything to help. You see, I happen to live just sixteen miles from Brookmans Park and in this locality the transmission comes in with something like a punch. This morning I have heard many more sad stories. Owners of some rather antiquated sets receive 2LO at all settings of their dials from 0 to 180; others, who were previously suffering from a certain amount of wipe-out from 5GB, now get a high-power duet. Even with quite modern receivers there is no question that the swamping within a very large radius from Brookmans Park is appalling. Honestly, I don't think that

:: :: **On Your Wavelength! (continued)** :: ::

the present power can possibly be used—otherwise the station will defeat its own ends.

Too Much Power?

Though the great majority of listeners regard the local station as their staple provider of entertainment, very few of those who possess valve sets do not thoroughly enjoy an occasional trip abroad. That this is so is shown by the fact that most designers and manufacturers are careful to make their apparatus so that they will bring in a number of foreign stations. It is surely a backward step in wireless that anyone nowadays should be tied to the local. The valve user is, in fact, no better off than the crystalite, except that he can use a loud-speaker

Worse to Come

But, though probably few people realised it, Brookmans Park let us down very lightly on the first night, for his modulation was clearly very shallow; certainly nothing like what it was during some of the preliminary tests. When some of these were in progress I found it a most difficult business to induce the needle of the milliammeter in the output circuit to remain steady. Though I was using anode-bend detection with a valve of modest impedance, a high plate potential and suitable grid bias, the detector was clearly being overloaded. On Brookmans Park's first whole night one could obtain with the same apparatus terrific volume from the station without a quiver of the tell-tale needle. If Brookmans Park gives us anything like full modulation there will be some queer happenings to record; and if he doesn't use full modulation he won't get the service radius that should be expected from 30 kilowatts. I am wondering very much what effect he is having upon reception conditions on the other side of the Channel. We shall hear, I suppose, in a few days; but meantime I don't mind wagering that Stuttgart, amongst others, is having a rather thin time of it.

The Quality Question

On this first evening the quality from 2LO was superb; but don't jump rashly to the conclusion that it will always be so. Marvellous reception is possible at moderate range from a high-power station using shallow modulation. It is when the modulation is made more deeply indented that the fireworks begin. Personally, I have always found it no easy matter to obtain absolutely first-rate quality from 5GB, though my distance from him is a matter of forty miles. The trouble is that you get sudden big grid swings on certain notes (particularly those of the piano) with which it is very hard to cope. For even modest loud-speaker strength in a small room a small power valve with 150 volts

on the plate and a 9-volt grid bias is inadequate, and when you want volume enough to fill a decent-sized room you may find that a super-power output valve suffers from overloading at intervals which is more than annoying. High power with full modulation introduces into wireless reception problems that are by no means easy to tackle.

Super Pentodes

One of the most interesting types of valve introduced this year is the super-power pentodes; which can deal with something astonishing in the way of volume. The standard pentode with 150 volts on its plate and a grid bias of $7\frac{1}{2}$ to 9 volts negative can handle pretty useful signals, but it is not hard to overload it if there is much high-frequency amplification or if the detector is coupled to the output valve by means of a transformer of fairly high step-up ratio. The super-pentode is designed for plate voltages up to 300, with as much as 200 on the priming grid. The possible grid bias is 30 volts or more and the amplification factor is over 80. What all this comes to is that one small valve, consuming less than .3 ampere of filament current and requiring a plate voltage no higher than 300, can handle all the volume that the biggest super-power triode can take, though the latter would eat vastly more filament current and would need a much bigger plate voltage. I have always been a great believer in the pentode, and I feel that this new type of valve marks a very big advance in wireless reception.

Wavetraps

Now that the new 2LO is exercising such a swamping effect in many districts, I expect that there will be a huge demand for wavetraps of various kinds. Readers who are affected will find that the trapping problem provides a field for very interesting experiments. There is little doubt, I think, that the series-rejector type of trap is the most effective for general use. It is an easily made addition to the set, since it requires nothing more than a coil and a variable or adjustable condenser. The great thing about the trap is to get its tuning just wide enough to trap the unwanted station, and not so wide as to wash out numbers of other stations on either side. It must also absorb so much energy from the unwanted signal that little or nothing comes through to the receiving set. This means that a low-

resistance circuit is necessary. What is interesting is to try out various numbers of turns on the coil with greater or smaller capacity in parallel.

Baird Television in Ireland

No doubt, Irish radio users have heard the mysterious noises which fill the ether from 11 to 11.30 a.m. via the London broadcasting station, but unless their sets were reasonably powerful it would not be possible to turn the noise into intelligible light signals and thus get the benefit of the Baird television transmissions. However, television will soon be nearer home in that country, for the Baird Company has now secured from the Government the right to broadcast from the Dublin station. I had heard some time ago that negotiations were in progress for the concession, and with the intimation of official permission arrangements to use the station for the purpose of television broadcasts are being proceeded with, and in about six weeks' time "faces" should be on the air. It is expected that the time to be occupied out of each day's programme will be an hour.

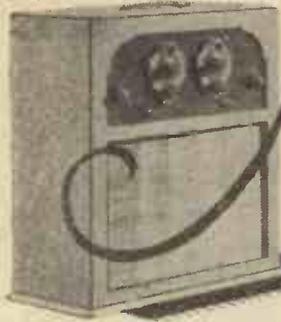
A Reversal of Movement

With regard to the interesting experiment of passing printed matter before the scanning disc, I was rather amused, yet puzzled, during the course of one demonstration which I witnessed. The writing in the form of a news bulletin, instead of moving along from right to left in the usual manner, moved from left to right, and really the letters and words looked most peculiar. Not being well versed in the technicalities of the system, I made inquiries as to the cause and found that the trouble arose entirely from mounting the disc in the televisor the wrong way round on the motor shaft.

Just picture for a moment what had happened. The actual object is scanned by a spot of light which moves from right to left and bottom to top, or, in other words, starts in the bottom right-hand corner and finishes at the top left-hand corner. According to the position of the projector lamp on the right or left of the scanning disc motor, so the disc will be made to revolve clockwise or anti-clockwise to produce this effect, bearing in mind that the focusing lens reverses the light-spot direction. Now, at the receiving end we have a disc revolving in front of a glowing neon plate, and in consequence the motor direction and disc spiral must be so arranged that we reproduce a similar condition of light-spot travel. It is now seen that turning the disc from back to front will cause the light spot to commence scanning on the left instead of the right, and this brings about the reversal of movement of anything being televised.

THERMION.

NEXT WEEK:
W. JAMES on Cutting
Out Brookmans Park



More about "The Music Leader"

This Self-contained Four-valver was the subject of a Free Blueprint presented with No. 384. Below are the constructional details of the Linen-diaphragm Speaker and Frame Aerial

THE "Music Leader" is an entirely self-contained transportable receiver which consists, as has been said, of the following five sections: the receiver unit, the cabinet, the frame aerial former, linen-diaphragm loud-speaker, and battery compartment. The receiver unit is made up in the conventional way with panel and base-board, and was fully described in last week's AMATEUR WIRELESS.

In an earlier issue (No. 384) was given away a valuable free blueprint of the complete "Music Leader." Those who are fortunate enough to have made sure of this issue will find that the blueprint is an immense help in the construction of the "Music Leader." For those who have not the print at hand, but who, of course, obtained their copies of the first two issues dealing with the construction of the "Music Leader," a reproduction of a portion of the print is given on the next page.

The portion reproduced deals with the linen-diaphragm loud-speaker, frame aerial former, and cabinet, the construction of which is now to be described. The linen-diaphragm loud-speaker will be dealt with first of all.

This linen speaker is a simplified edition of those which have already been published in many issues of AMATEUR WIRELESS. At the outset reference should be made to

the note which was published at the conclusion of last week's article dealing with the valid patent now held by Messrs. Ultra Electric, Ltd., on all linen-diaphragm loud-speakers.

The position is that the linen-diaphragm loud-speaker is now a patented article, but we have great pleasure in announcing that Ultra Electric, Ltd., give permission through us for any AMATEUR WIRELESS reader to make up an experimental model of this type of loud-speaker for his own use. Naturally the greatest objection is held against anybody making and selling a linen-diaphragm loud-speaker, whether for the "Music Leader" or any other purpose, except under the special licence obtainable from Messrs. Ultra Electric, Ltd., Ultra Works, 661-663 Harrow Road, N.W.10.

Ultra speakers of many types are available, and one of the smaller models can easily be fitted into the "Music Leader." This point will be of great interest to those who do not wish to go to the trouble of making up the linen speaker themselves. A photograph on the following page shows how the Ultra speaker is fitted in the "Music Leader."

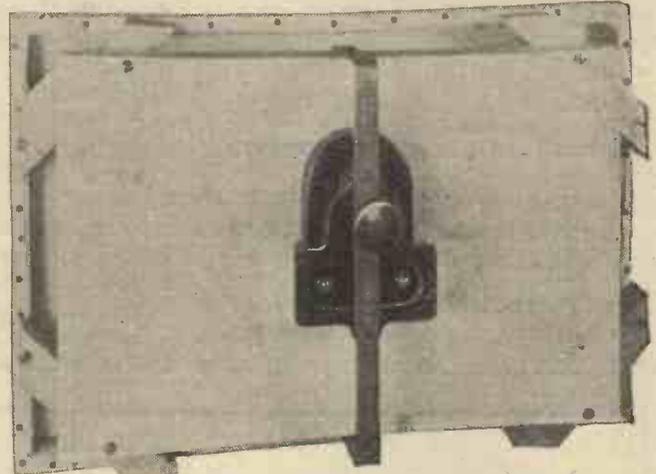
The home-made speaker is very simple to construct. It consists essentially of two frames, one $14\frac{1}{2}$ in. by $9\frac{1}{2}$ in., and the other 8 in. by 12 in. The wood used has the dimensions $\frac{3}{8}$ in. by $\frac{7}{8}$ in. The two frames are made up and strengthened with corner pieces. Each frame is then covered with linen, which is tacked round the edge.

The following procedure is then similar to that adopted with all other linen-diaphragm loud-speakers. Readers who have previously studied these constructional articles will find their knowledge of great assistance.

The centre of each diaphragm is located by the simple process of drawing diagonals and a small hole is made at the exact point of each. The hole is then button-hole stitched round to prevent the threads from

spreading. The special loud-speaker collar is then put in place, so that the two diaphragms are clamped together at their centres.

Each diaphragm is then doped with "Collodion Meth"; 10 oz. are required. This dope has been found to be very successful, though the aeroplane dope sold under the name of Titanine-Emallite has also been used in previous AMATEUR WIRELESS linen-diaphragm loud-speakers. The dope is simply painted on with a brush, and while the diaphragms are still wet, the two frames are drawn apart and the distance pieces are placed between. They

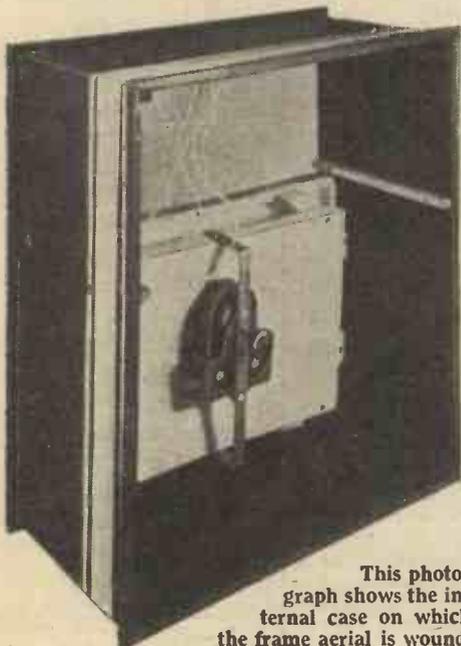


A photograph of the complete speaker

are then secured by passing fine screws through each corner. The assembly of the two frames and the method of inserting the distance pieces can be clearly seen in the blueprint.

The following points *must* be noted if success is to be obtained with a linen speaker. Only the best-quality linen should be employed, such as finest Irish linen. The linen we used was called "Webb's Irish Linen." The frame should be made strongly and stretched apart carefully so that the material is not split. Finally, the doping must be done thoroughly.

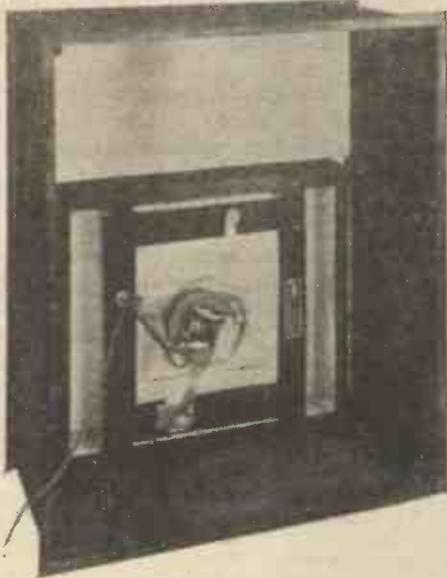
The loud-speaker unit is mounted on a metal strip bracket attached to the smaller frame. This is a brass strip, 12 in. long by $\frac{1}{2}$ in. wide and $\frac{1}{8}$ in. thick. One of the accompanying photographs shows how the double L bracket supports the unit. Inspection will show that a slot is cut in the



This photograph shows the internal case on which the frame aerial is wound, and the linen speaker

“MORE ABOUT THE ‘MUSIC LEADER’” (Continued from preceding page)

brass strip at each end so that the strip and loud-speaker unit may be varied slightly in position on the smaller frame. This enables the unit to be mounted to the best advantage. The metal mounting strip is held in place by two wood screws with flat washers placed under their heads.



This photograph shows the Ultra-air Chrome speaker fitted to the “Music Leader.” It may be obtained ready made

A preliminary trial will enable the best setting to be obtained, and then the screws should be tightly clamped down.

The Frame Aerial

The frame aerial turns are carried on a light wooden former measuring 16 7/8 in. by

14 7/8 in. by 7 3/8 in. This has fillets of wood along each edge, as will be obvious from the blueprint and the photographs, while two fillets on the inside of the former support the receiver baseboard. All the dimensions of the former are given in the blueprint, and it is therefore unnecessary to repeat them here.

All the frame aerial turns are in the same direction, and all are of No. 28 d.c.c. wire. For convenience, the blueprint of the receiver, which was given free, shows a schematic diagram of the frame aerial turns connected to the actual components in the set.

There are two windings, each of 19 turns, and two windings each of 9 turns. Wires Nos. 41, 40, 37, 38, and 39 connect up toappings on the frame, as is clearly shown on the blueprint. The connections are actually made by means of short flexes, as you can see from the bottom photograph on page 677.

Assembly

The case can be obtained complete from the Messrs. Clarion Radio Furniture. It has the inside dimensions 16 1/8 in. by 15 in. In the front are cut two apertures, one 5 1/2 in. by 13 3/8 in., for the receiver panel, and the other 13 3/8 in. by 9 in., for the loud-speaker front, which should be covered with fancy gauze.

When the receiver is assembled the frame aerial former should be slipped inside the cabinet, the set portion should be slid in and supported on its fillets, and the frame aerial loud-speaker and battery flexes should be connected.

The question of batteries will be gone into in further detail next week, when also

will be given complete operation notes, so that the best results may be obtained from this ingenious transportable set.



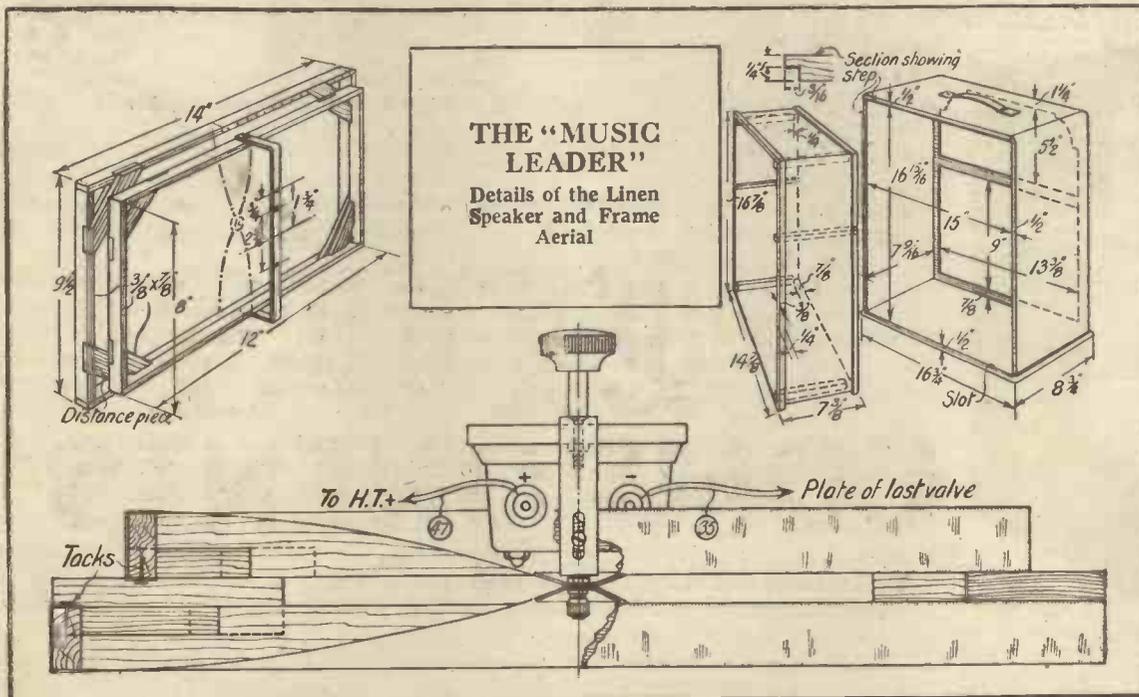
The unit is supported on a metal strip

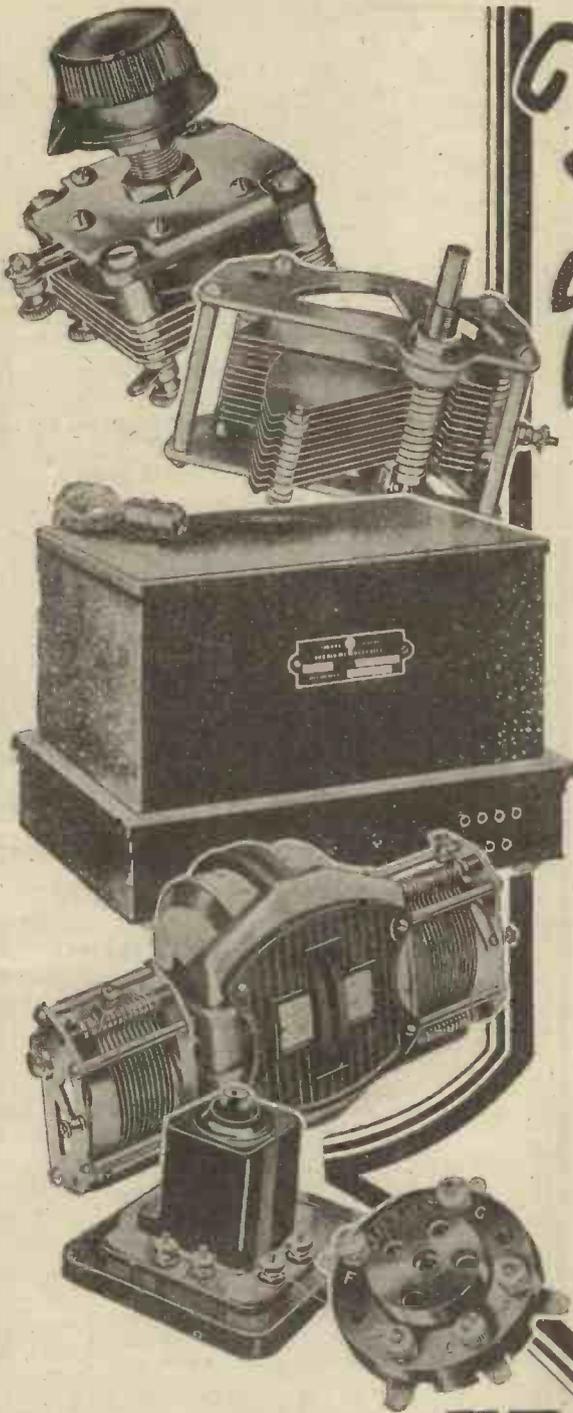
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M. B.





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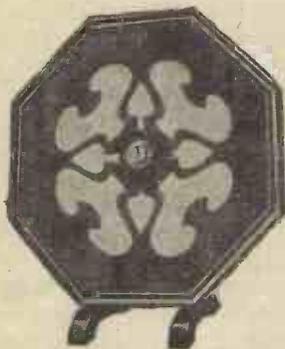
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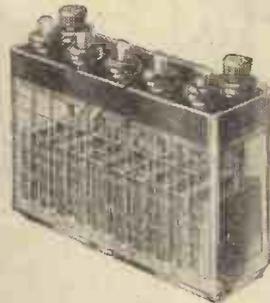
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DETECTOR VALVE COMPARISONS

Many listeners wonder what are the respective merits of 2-volt and 6-volt valves. It can be shown that for certain purposes the former is the better and in this article our Technical Editor explains what considerations apply.

A FRIEND of mine said to me the other day: "Do you know, it's a funny thing that I often find a 2-volt detector valve gives me much better results—or, at least, appreciably better results—than I can obtain with a 6-volt valve. I prefer to use 6-volt valves in my set because I've always got the feeling that, if you are prepared to spend a little more in your filament consumption, then you can reap the benefit in your set."

I agreed that this was so in the ordinary course of events and that for many purposes it was worth while utilising the slightly larger size accumulator in order to use valves having a longer filament with a consequently greater emission.

"But," my friend resumed, "I always find that the 6-volt detector valve does not seem to be as good as the 2-volt. I have an arrangement for putting in a series-resistance so that I can run the 2-volt valves off the 6-volt accumulator in company with the others and I seem to get definitely better results with the two-volt detector. Is this my fancy or is there some reason for it?"

A 2-volt Valve Best!

I assured him that the effect he noted had a scientific explanation and that it was not just his imagination. It is a fact that is not always realised that the 2-volt detector valve operates more efficiently than a 4-volt or 6-volt. The reason for this can fortunately be explained in a fairly simple manner if we are content to regard certain aspects of the problem only. Any complete analysis, of course, is a much more complicated question, but if it is shown that this superiority exists under certain circumstances, then it is reasonable to assume that some similar contributory cause is at work in other circumstances.

Anode-bend Detectors

Let us therefore consider a simple anode-bend detector valve. We have the filament acting as a source of emission and for purposes of detection we apply a negative bias to the grid to repel the electrons which are emitted from the filament so that the number of electrons which shoot through the grid to the anode is only relatively small. A signal applied across the grid and filament

then acts differently according to the direction of the applied voltage. If this is

Fig. 1. Perfect detector characteristic

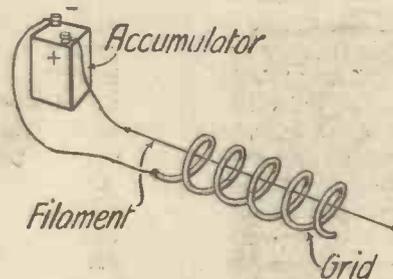
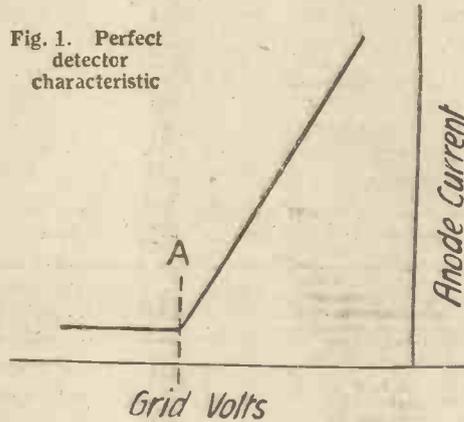


Fig. 2. Effect of voltage drop in filament

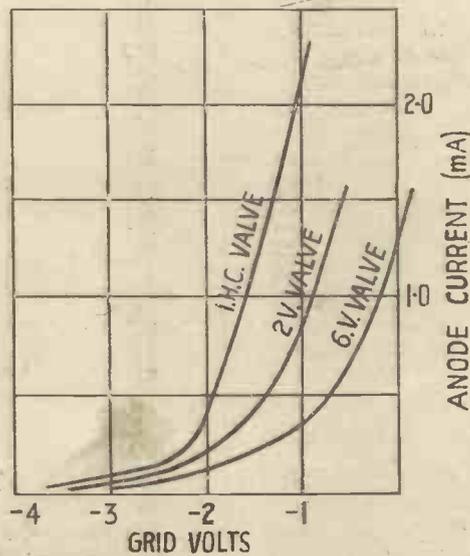


Fig. 3. Curves of different detector valves

such as to make the grid more negative, then it has very little effect, for the current has already been reduced almost to zero and a small additional negative bias will not have very much influence. If, on the other hand, the voltage is such as to make the grid less negative, then the choking effect of the negative charge on the grid is reduced and the electrons are liberated as it were, and rush across to the anode, causing a relatively large change in the current.

The Perfect Detector

Our perfect detector would have a characteristic somewhat as shown in Fig. 1. We should bias it to the point A when it will be seen that any change of voltage on the negative side causes no alteration to the current, whereas a change on the positive side causes a marked increase in the anode current. Such a detector would be a perfect one because it would pass no current in the reverse direction at all and therefore the rectification efficiency would be quite good whether the applied signal was small or large. If, in addition, we can obtain a fairly straight characteristic, then we get distortionless rectification.

Let us now consider an actual valve. We have a filament of wire as shown in Fig. 2 and we have grid wires surrounding the filament. Let us assume that when the grid is 2 volts negative, with respect to the filament we cause the anode current to be reduced nearly to zero. This is the condition of affairs that we adopt in our anode-bend rectifier. We make the grid negative by connecting a small battery between the grid and one side of the filament, usually the negative end. Therefore, if we put 2 volts on the grid, the grid is correctly biased with respect to the negative end of the filament.

The filament, however, is carrying a current and therefore there is a voltage drop across it. In other words, the potential between the grid and filament is continually varying. As we approach the positive side, so the difference in potential gets less and less and in fact the grid may even become positive with respect to the filament. Therefore, although when we

(Continued at foot of next page)

NEW CALLS FROM THE AIR

Jottings From My Log

By JAY COOTE

HAVE you heard Bucharest? The new transmitter is now on the air nightly, and as its power is 12 kilowatts in the aerial it is not a difficult task to pick up its programmes, although its wavelength of 394 metres places it in the immediate neighbourhood of Frankfurt. With a frame aerial, however, it is possible to separate them. It is also unfortunate that the Roumanian transmitter should be compelled to share this wave with the Norwegian relay Frederiksstad, but I take it that the powers-that-be may devise a plan by which one or the other will be permitted to move. Bucharest has engaged a lady announcer—their popularity is gaining ground weekly—and her voice and enunciation are all that can be desired. You will hear her call "Radio Bucuresci" clearly preceding announcements made in Roumanian and French. As an interval

signal—for the present, at least—the ubiquitous gong has been adopted.

Although at the time of writing I have seen no published detailed programmes, when I picked up the transmission a few nights ago I heard some excellent singing, with full orchestral accompaniment; in fact, I felt sure that a relay was being taken from the local Opera House.

A New Arrival

A fresh arrival to be found and logged is Radio Leuven (Louvain, Belgium), the new 8-kilowatt station erected by the Belgian Peasants' Association (Boerenbond), and of which the bulk of the announcements, talks, and so on are put out in the Flemish language. For the present, you will only hear broadcasts on Sundays, Tuesdays, and Thursdays between 8.15 and 10.15 p.m. G.M.T.

Again, notwithstanding its power, some trouble may be experienced, as the transmission is carried out on a wavelength which is common to Bremen; but, so far as I could judge, on a recent occasion Louvain was working slightly lower.

Strasbourg, by the way, I have definitely logged on 268 metres; the 364-metre wavelength allotted to this city will only be used by the new high-power transmitter under construction at Brumath.

On the other hand, Radio Catalana (EAJ13) recently disappeared; it was previously testing on 268 metres, or thereabouts. I may be mistaken, but I am under the impression that this Spanish station has taken a mighty leap upwards, and that he is to be found on about 465 metres, immediately under PTT Lyons, with whom he has violently collided on several evenings.

"DETECTOR VALVE COMPARISONS" (Continued from preceding page)

started off we were correctly biased, in other parts of the filament we are by no means working at the correct point.

Let us assume for example, that the filament is a 6-volt one. Then at the left-hand end we have the correct bias of 2 volts. At $\frac{1}{3}$ of the way across, the voltage on the filament is 2 volts positive with respect to the negative end and, therefore, the difference in potential between the grid and this part of the filament is $-2 + 2$ which is 0. As we go a further distance along to say $\frac{1}{2}$ of the way across, the filament is now $-2 + 4$, in other words 2 volts positive, and at the extreme end where we have the full 6 volts, we are 4 volts positive. It will at once be clear that the mean position here is not anything like the operating condition we require, for with positive voltage on the grid, there is no restriction on the electrons and quite a large anode current will result.

The result is that the effective characteristic we plot for a 6-volt valve connected with -2 volts on the grid is the aggregate of a number of characteristics of innumerable imaginary valves, each of which has a point for a filament and each of which has a slightly different bias ranging between -2 and $+4$ volts.

The aggregate of all this is a characteristic which is not sharp, but falls very gradually. The individual characteristic of each part of the filament is fairly steep and the bottom end is fairly sharp. Where we consider the aggregate, however, taking into account the number of portions of the filament where the grid is positive, it will be clear that this sharpness is destroyed

and we get a gradual curvature. This is not what we require, for we are departing all the time from our perfect rectifier which has an absolutely sharp bend.

Looking into the matter again, it will be clear that the smaller the voltage drop on the filament the less does this effect become. If the total voltage drop on the filament is only two volts, then our effective grid bias varies between -2 and 0. If we could make the filament of the valve have no voltage drop at all, then we should obtain an ideal result, for the grid bias would re-

Wireless Wit

AN American widow, being anxious to conceal the fact that her late husband had been electrocuted as a murderer, always explains that "he occupied the chair of applied electricity at one of our public institutions."

AN absent-minded man's wife asked him to take down a recipe that was to be broadcast. He did his best, but he tuned in two stations at once. One was the right one and the other was broadcasting physical exercises. This is what he gave his wife afterwards:—

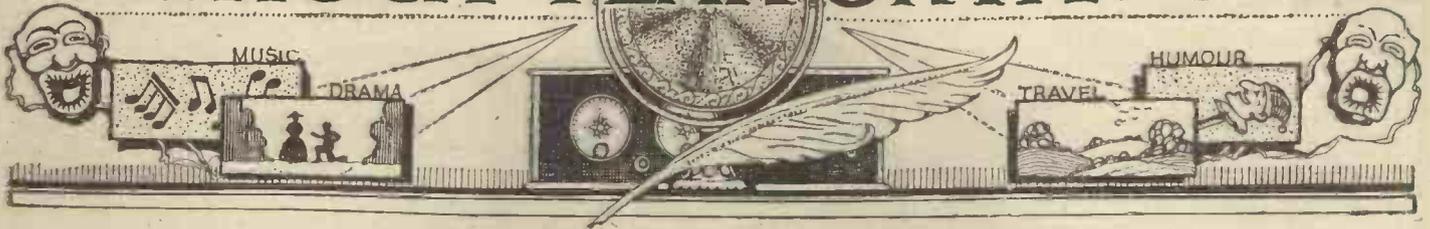
"Place one cup of flour on shoulders, raise knees and depress toes, mix thoroughly with half-cupful of milk. Inhale quickly one teaspoonful baking-powder, lower the legs, and mash with two boiled eggs in a sieve. Exhale and sift into a bowl. Lie flat on the floor and roll the white of an egg backwards and forwards until it boils."

main the same for all parts of the cathode and this is what we obtain in the case of a valve with an independently heated cathode such as is used for mains operation to-day.

In order to emphasise these points, three curves have been taken and are reproduced herewith. The first of these is for an AC/HL valve having an independently heated cathode so that the cathode itself is at the same potential relative to the grid the whole way. It will be seen that the curve is fairly sharp. Secondly, we have a simple 2-volt valve of the HL type and this will be seen to be worse than the independently-heated cathode valve, but at the same time still reasonably sharp. Thirdly, we have a 6-volt valve of similar type and it will be seen here that the effect previously described is well in evidence, namely that the curve is now much more gradual and therefore the valve would not make anything like such a good detector. Moreover, the characteristics move over to the right as we increase the filament voltage due to the effect of a positive grid as already described.

Consequently, for ordinary purposes, the smaller the voltage drop on the filament, the better the valve is as a detector. As was pointed out earlier in the article, this explanation has been limited to the anode-bend rectifiers for the sake of simplicity. It is quite possible, however, to show that other forms of rectifier operate in much the same way, for they all depend upon the difference in voltage between the grid and filament and this, as we have seen, varies from point to point, because of the voltage drop on the filament itself.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

H. G. WELLS'S aside was one of the most amusing things I have heard for a long time. Brilliant talk, but rather too abstract for the general listener.

I feel I must deal with some of the interesting letters that have reached me regarding the band problem.

As I imagined, not every reader agrees with the list that I printed a little time ago of the relative merits of our dance bands.

Here, for instance, is J. C. Hickling (N.W.8). Do you agree with this corre-

"would give the plum to Mr. Jack Payne."

Richard P. Lynn (Sunderland) gives his list of bands in order of merit as follows:—

1. Ambrose's Band.
2. Piccadilly Players.
3. Ambassador's Club Band.
4. Teddy Brown's Band.
5. Billy Francis's Band.
6. Cafe de Paris Blue Lyres.
7. Jack Payne's Orchestra.
8. Piccadilly Grill Band.
9. Bertini's Orchestra.

But he mystifies me by going on to say, "None of these bands can be compared with Elizalde's Band. The Piccadilly Grill Band makes too much noise. Jack Payne begins and ends like a symphony. The other night, at 10.15, Sir W. Davies, in his sermon, said: '... if you're not too tired.' Well, we were. By the way, we still get 'intervals' of dead silence."

I have always insisted that the Sunday services from the studio were better in several ways than those broadcast from outside.

In the first place, they are better balanced, they keep to time, and the B.B.C. can choose speakers who can get over. An example was Father C. C. Martindale, who departed from the usual dogmatic address and gave a thoughtful, earnest talk. The hymns were well chosen, the speech was good, so was the singing, and it finished to time.

Why cannot we always have services like this?

Sunday again was full of services and Bible reading, etc. In all good faith, I would like to warn the B.B.C. that they are overdoing this uplift business.

The News Bulletin again is badly run. After the announcement one wonders what is going to be the most interesting item of the day. It is usually a piece of foreign news which is of little interest to the average listener. For instance, the other night (Sunday) there was a long opening interview with one of the many Afghanistan kings.

I venture to think that not two listeners in a hundred were interested.

Glad to have Flotsam and Jetsam back

again. It is good policy to go away for a bit, as they did.

Muriel George and Ernest Butcher got away with it. The only thing that seems to be "samey" is the jazz.

"Smoke Rings" was entitled "A Bachelor's Retrospect," but this was merely a repetition of those sickly, sentimental love songs. Ugh!

The light-music concert by the Birmingham Studio Orchestra, conducted by Frank Cantell, is always acceptable. One point regarding announcing, however. Was it necessary to announce each of the short songs of the short suite entitled "On Jhelum River," by Woodforde Findon, which, by the by, the announcer called "Geelan." I was under the impression that it was "Yeylum."

If a deafening din is a criterion of successful broadcasting, then the palm goes to the special old-time vaudeville programme. In representing the realism of those days the producer was photographic (or phonographic), rather than artistic. The yells were so overdone and head-splitting that I switched off. I dare say a good many others did the same.

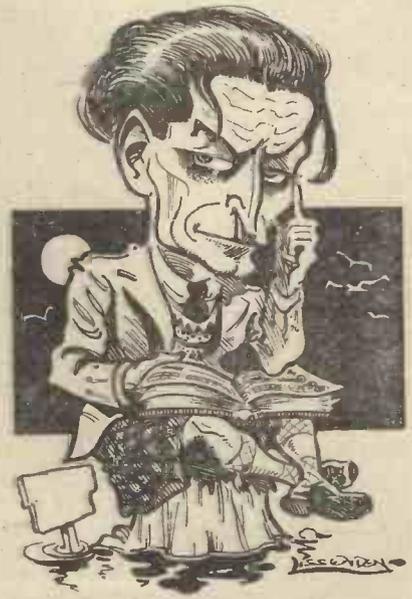


Paul England—an impression

spondent's list, which he places in order of merit?

1. Ambrose's May Fair Hotel Band.
2. Jack Payne's B.B.C. Orchestra.
3. Ambassador's Club Band.
4. Cafe de Paris Blue Lyres.
5. Billy Francis's Band.
6. Piccadilly Players.
7. Bertini's Orchestra.
8. Piccadilly Grill Band.
9. Teddy Brown's Orchestra.

Another correspondent, A. M. Hankinson (Coventry), although not a lover of jazz,



Lissenden's idea of Compton Mackenzie

NINETY-NINE out of every hundred gramophone records nowadays are electrically recorded. The reason is that by the electrical process recording is easier and more sound detail is put on to the disc. The wax itself has certain very definite limitations, but the old-fashioned mechanical recording process, which necessitated large trumpets in the studio, did not even enable the limits of the wax to be approached.

Now, with a good microphone, a simple two- or three-stage amplifier and a steady cutter, it is possible for any gramophone manufacturer to produce results fully up to the record limitations. And some of the results achieved in the more recent recordings of the big manufacturers are literally amazing.



**THE
NEW
"A.W."
AMPLIFIER**

logical way of reproducing from modern records. But there is more in it than logic. There is a big point which will be appreciated by all except the owners of very "super" gramophones.

If one has a very indifferent gramophone it is cheaper to convert it for electrical reproduction than to bring it up to date in the mechanical way.

There are two courses available. One can simply replace the soundbox with a good pick-up, and connect this to the low-frequency side of the radio set; or a special little amplifier can be made up for the job, using the same batteries.

The expense of the separate amplifier is not great; as with most wireless sets, it is the battery and loud-speaker equipment which is more expensive than the components in the set itself. But, off-hand, it may not be obvious why the low-frequency side of the receiver is not entirely suitable for the gramophone work and why the expense of the additional amplifier is justified.

The first point is that in order to use the amplifier side of the wireless set a switching device will be needed to change over from "radio" to "gramophone" and *vice versa*, and this may introduce complications into the receiver itself which may affect its performance. For instance, in order to make proper use of all the valves

available it is the general practice to arrange the switching so that when the gramophone pick-up is being used the detector valve is converted into an amplifier. This means that the switch must be in the

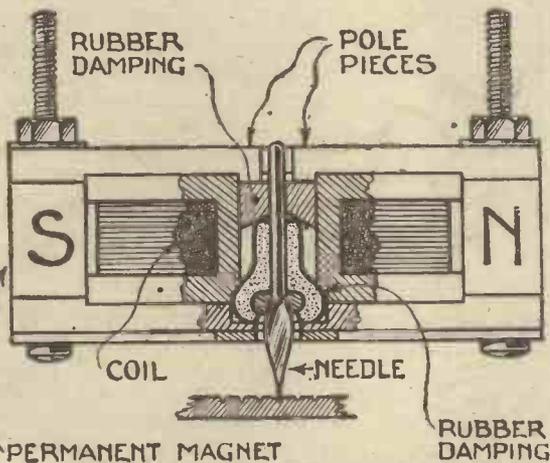
grid circuit of the detector, and unless the wiring and layout are carefully arranged considerable losses may be experienced.

A Separate Amplifier Desirable

This does not, of course, apply to other AMATEUR WIRELESS receivers which have been specially designed to be used for radio or gramophone work. In these cases the layout is so arranged that no loss is introduced by the presence of the switch. But if an amateur inexperienced in set design attempts to incorporate a radio-gramophone switch in his set there is a danger that he may adversely affect the working of the radio section.

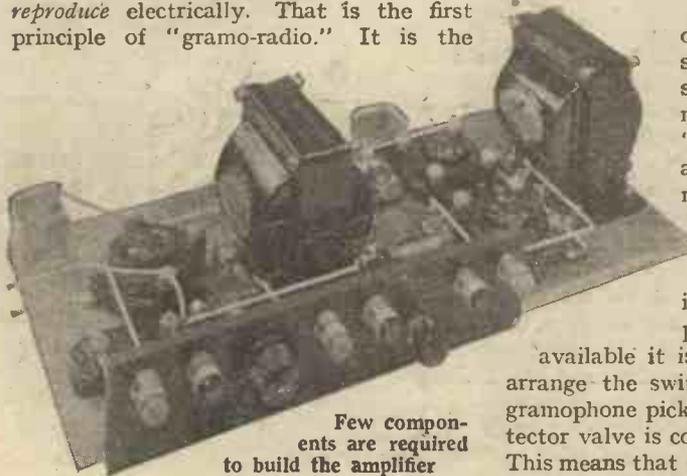
The use of a separate amplifier obviates this difficulty.

The further we go into the design of a radio amplifier and a gramophone amplifier the more we begin to see essential differences. The amplifier on the L.F. side of a radio set has to give a reasonable output from a minute input; on most stations the detector output is not considerable. In the case of an electric gramophone the output

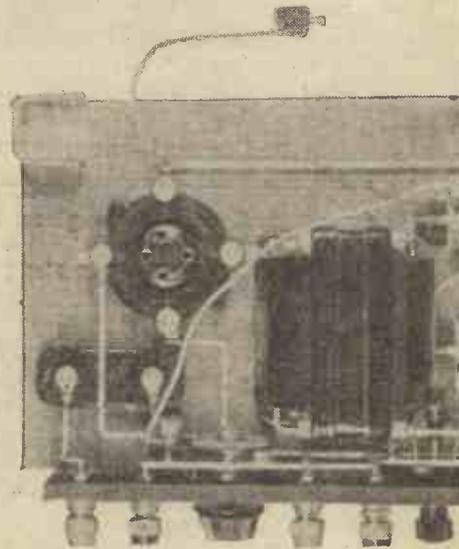


A sectional diagram showing the working principle of the Lissen pick-up

Obviously, then, electrical recording cannot stop at that. If detail is put on to a disc which cannot be faithfully reproduced by a mechanical gramophone, then the natural way to get better results is to reproduce electrically. That is the first principle of "gramo-radio." It is the



Few components are required to build the amplifier





and if the amplifier is to be used for real "super" volume, which it will adequately provide, then a 6-volt P625 should be used. For normal working with a 6-volt valve a DEL is suitable.

A split-secondary transformer is used to couple the first low-frequency amplifier to the push-pull combination. The centre-tapping of the transformer secondary is taken to the grid bias maximum tapping. A point which deserves special notice in this circuit is that little fixed resistances are placed in each grid lead. Each resistance has a value of 100,000 ohms, and the purpose of

is, generally, required to be greater than is the case with radio reproduction. Good mechanical gramophones are capable of providing great volume. Moreover, the input may be quite large, the voltage swing from some makes of pick-up being as much as one volt. This swing is applied direct, as a rule, to the first L.F. valve grid.

Unless the radio amplifier is altered to suit these new conditions the whole equipment will be overloaded and overworked.

Generally speaking, a gramophone amplifier requires to have larger output valves, heavier intervalve couplings and needs to be operated with a greater value of H.T. It is the last factor which is the most expensive, and which deters many people from making use of electrical reproduction.

Push-pull

There is a solution, however. Instead of using a very large super-power valve in the final stage of amplification, and allowing it to consume colossal filament and anode current, one can place two much smaller valves in a push-pull arrangement. This has the advantage of allowing a maximum

output to be derived with the expenditure of less H.T.

A suitable gramophone amplifier need not have more than two stages, if worked with the average pick-up. The pick-up can be coupled direct or through a simple condenser arrangement and volume control to the grid of the first valve.

This first stage is, of course, transformer-coupled to the push-pull arrangement, although there are choke and resistance arrangements which obviate the need for tapped-primary and tapped-secondary transformers. The output is generally arranged through the medium of a tapped primary transformer. Usually, it is easier, nearly as cheap, and even more efficient to use proper transformers specially wound for the job.

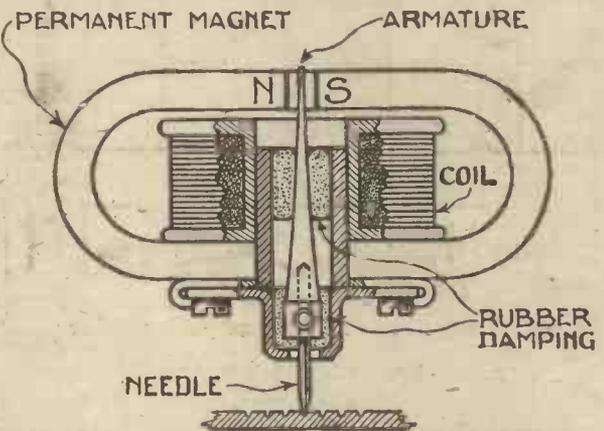
For the benefit of those who wish to take advantage of electrical reproduction the AMATEUR WIRELESS Technical Staff have made up a useful little two-stage push-pull amplifier, and this is illustrated by the accompanying photographs.

The amplifier is made up on the lines already described, as will be gathered from a short technical description of the circuit.

The pick-up, which is in practically every case of the magnetic type, is coupled to the amplifier through a .005-microfarad coupling condenser, partly shunted by a high resistance. This resistance is actually the winding of a 1-megohm potentiometer, and the slider is connected to the grid of the first L.F. valve. This valve can conveniently be of the ordinary L.F. type. In the case of two-volters, a DEL valve is suitable,

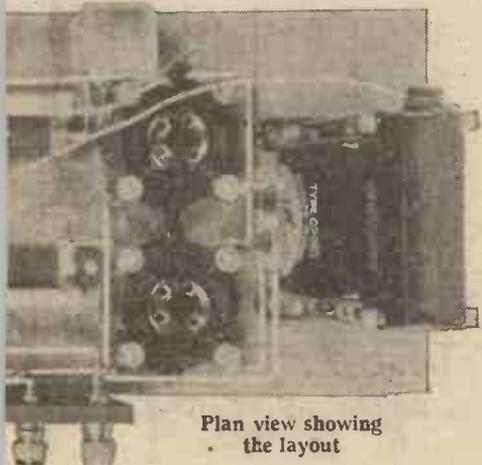
these "stoppers" is to prevent parasitic oscillations set up by the use of unmatched valves in the push-pull arrangement.

It is advisable, if possible, to have the

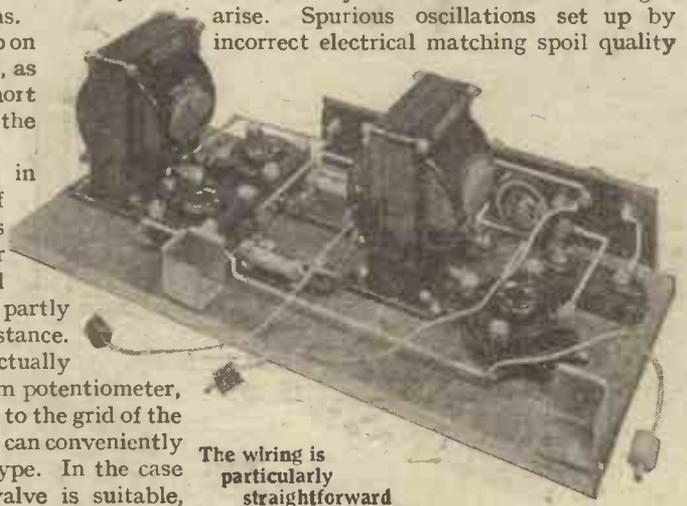


Here is another sectional drawing of a pick-up of a slightly different type—the Amplion

push-pull valves matched. Many manufacturers are prepared to supply two power valves specially matched for this work, but the presence of the fixed resistances obviates any little troubles which might arise. Spurious oscillations set up by incorrect electrical matching spoil quality



Plan view showing the layout



The wiring is particularly straightforward

“PLAY YOUR RECORDS WITH A PICK-UP” (Continued from preceding page)

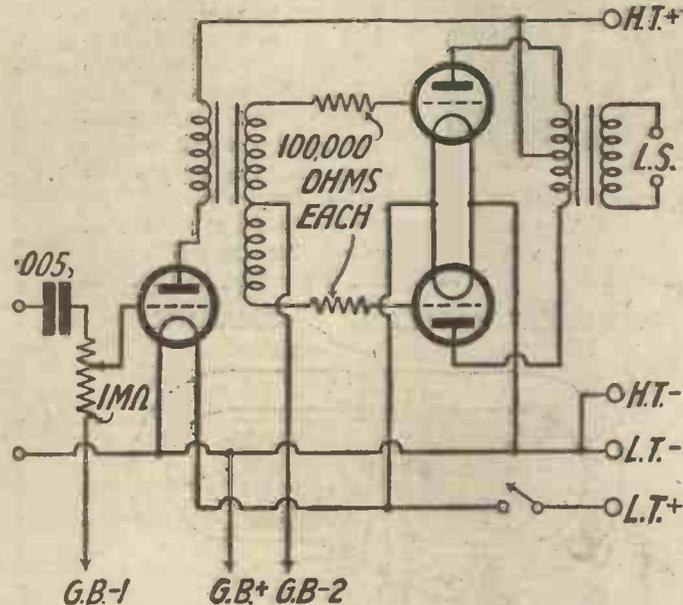
and tend to heat the valves and shorten their lives.

For 2-volt working a DEP215 pair should be used, while the corresponding 6-volters are P625's. Two LS5a's can be used, with a preceding P625, where very great output volume is required.

Components

The components required are simple and not expensive, as shown by the following list.

- Two grid-leak holders (Lissen, Ediswan).
- Two grid leaks 100,000 ohms each (Lissen, Ediswan).
- Six terminals marked, Input +, Input -, L.T.+, L.T.-, H.T.-, H.T.+ (Belling-Lee, Burton).
- Connecting wire (Glazite).
- Three wander plugs marked, G.B.+, G.B.-1, G.B.-2 (Belling-Lee, Eastick).
- One yard of flex (Lewcoflex).
- Grid-bias battery, 16-volt (Ever Ready, Siemens).



The circuit of the New "A.W." gramophone amplifier

- Baseboard, 14 in. by 6 in. (Pickett, Raymond).
- Ebonite strip, 9 in. by 2 in. (Bacol, Raymond).

Three anti-microphonic valve holders (Igranic, Lotus, Benjamin, W.B.).

.005 - microfarad fixed condenser (Dubilier, T.C.C., Lissen, Watmel, Trix).

1-megohm variable resistance (Igranic "Mego-stat," Rotorohm).

Filament switch (Lotus, Bulgin, Lissen, Igranic, Burton).

Push-pull input transformer (Feranti type A.F.5 (c), Varley, R.I., Igranic).

Push-pull output transformer (Feranti type O.P.3 (c), Varley, R.I., Igranic).

tension terminals, the filament switch and the two high-tension terminals. The grid-bias battery is placed on the baseboard as shown.

In addition, a blueprint of this amplifier can be obtained from the Blueprint Dept. of AMATEUR WIRELESS, price 1s., post free. This is particularly helpful in showing the exact positions of each component, for the print is full size.

There is no panel, nor is any really needed, for the complete amplifier can easily slip into a compartment in the gramophone and will take up only the space occupied by a few records.

A terminal strip carries the two input terminals, the volume control, the two low-

The baseboard carries the remainder of the components, namely, the two transformers, three valve holders, .005 coupling condenser, two 100,000-ohm stopper resistances and the G.B. battery clips.

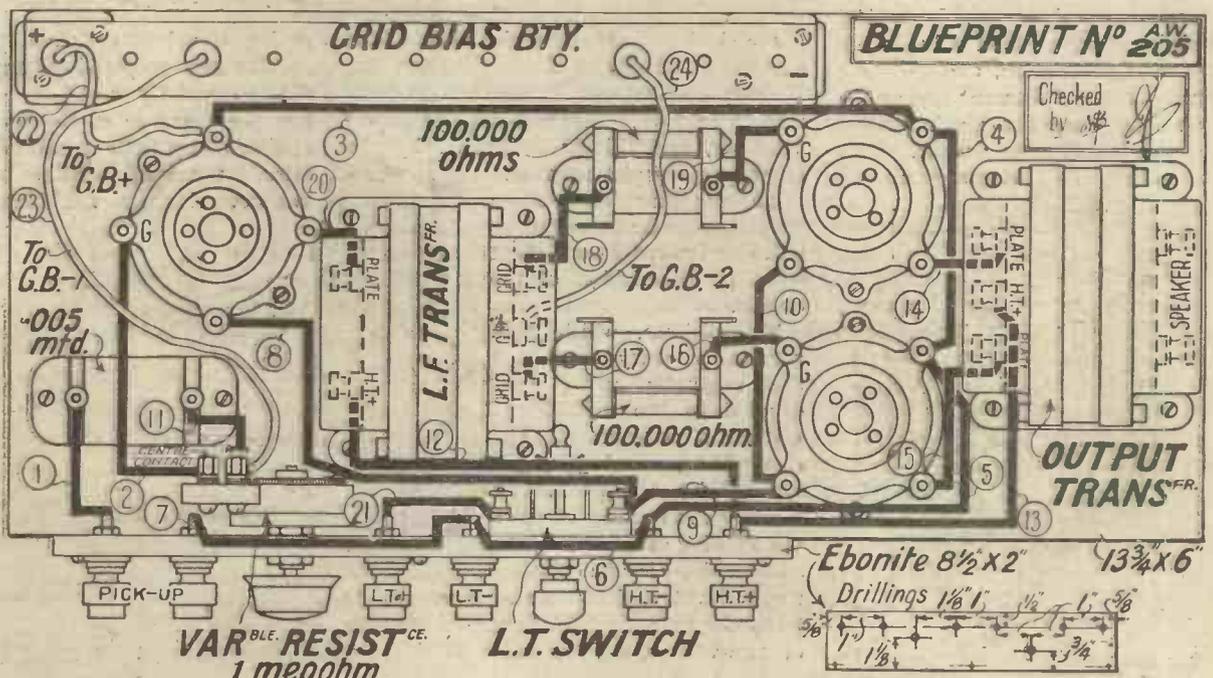
These parts can all be mounted with the aid of the print, which also shows the whole of the wiring. The layout is particularly neat in this amplifier, and undoubtedly part of the success is due to the neatness of the arrangement of the components. It is not, perhaps, generally realised how much depends on layout and neat wiring, even on the low-frequency side. Some of the wires are only half-an-inch or so in length.

Check over the wiring very carefully, for it is easy—and expensive—to make mistakes in any set.

When the amplifier is all ready for working, a suitable place should be found for it, either in the gramophone compartment, or else adjacent to the batteries with which it will be used. It should be borne in mind that it is always better to have the H.T. and L.T. leads long rather than to carry the pick-up leads for any considerable distance.

Battery Power

About 120-150 volts H.T. will be ample with output valves of the DEP or P625 class, and a 16-volt grid-bias battery will be suitable in order to provide an adequate biasing range. On an actual test in the AMATEUR WIRELESS Lab. it was found that 14 1/4-volts G.B. was needed for the push-pull stage when approximately 150 volts H.T. was applied to the anodes. The bias for the first valve under these conditions was 3 1/2.



The wiring diagram. A full-size Blueprint is available, price 1/-



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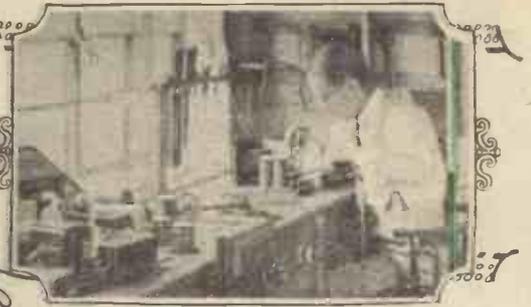
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My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

“Setting” Anode Bend

THE importance of carefully setting up a detector of the anode-bend type cannot too strongly be emphasised, as small changes in grid bias or high-tension, or both, may greatly affect the results. Valves of the same pattern are usually found to vary by a fair amount about the bottom bend, with the result it is necessary to try various values of bias or H.T. before finally deciding that certain values are the best. A point to note is that a finer setting is to be obtained by adjusting the high-tension voltage in small steps than the grid bias. This will be clear when it is remembered that a volt change in the grid circuit may be equivalent to 15 or 20 volts change in the anode voltage, according to the magnification factor of the valve. Valves sometimes change during use, and it is therefore advisable to check up an anode-bend detector from time to time. Some valves are, of course, much better detectors than others, as they have a sharper curve, and when two or three valves of suitable types are available they should be compared. Too much reliance ought not to be placed upon the valve-maker's curves as to the shape of the bottom parts, as they may vary by a large amount.

Making Signals Weak!

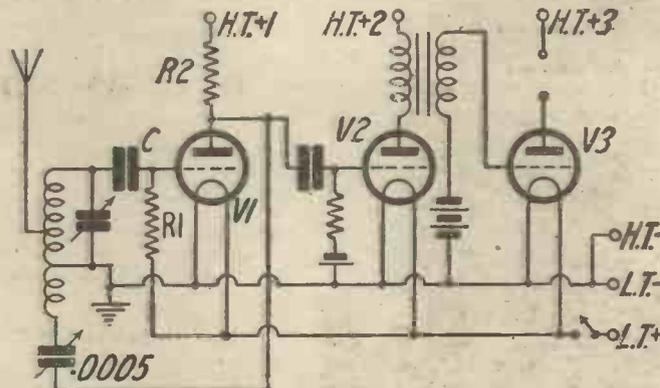
How best permanently to reduce the volume from a set of the local station type without spoiling the quality is something of a problem to those listeners who find the strength of Brookmans Park much greater than that of the old London station.

Detuning in many instances is not satisfactory, as not only is the station heard over the greater part of the tuning range, but the quality is not too good when the set is tuned well to one side of the tune point. Something is needed, then, for cutting down the magnification, and, obviously, the less expensive the part used, the more acceptable the scheme will be.

When a transformer is used a grid leak of fairly low resistance will cut down the volume if it is joined across the secondary winding. Use one having a resistance of

about 250,000 ohms; but it may be necessary to fit one having a still lower value, such as 100,000 ohms. The addition of a grid leak across the secondary (not in the grid lead) will lower volume without spoiling the quality. In fact, if the transformer happens not to be a very good one, the quality may be improved.

If the intervalve coupling is of the resistance type, the best method is to lower the value of the anode resistance, and when a leaky-grid detector is employed, a grid leak of .5 megohm, instead of the more usual 2 or 3 megohms, will not only reduce the volume, but improve the quality as well. There are occasions when a different type of valve may be fitted with success, but as valves are expensive it would be better to explore alternatives before making a change.



A circuit showing points at which variations may be made in order to accentuate the treble

Raising the High Notes

A question I am sometimes asked is how to increase the relative strength of the higher audio notes. This is a question that would not have been asked a few years ago, but now that good resistance and transformer couplings are available there is usually plenty of bass.

Lack of high notes means loss of brilliance and clarity. If the word *hiss* were broadcast it would be heard without the strong “iss,” and speech as a whole would be less intelligible. The high notes are important, and when they are relatively weak the first step to take is to look at the condensers in the set.

Is there one across the loud-speaker? If so, listen to the reproduction when it has been removed. Then try the effect of using a .5 megohm grid leak at R1 in the

accompanying diagram and a grid condenser *c* of .0001 microfarad instead of the more usual .0003 microfarad. Finally, if the set has a resistance-coupled stage, as at R2 in the figure, reduce the value of the anode resistance if it is above 100,000 ohms.

These changes will strengthen the high notes, but it is possible to effect a still further improvement if this is necessary. Fit a valve of low impedance in the second stage—that is, at V2—and alter the grid bias to suit. This will give the transformer a rising characteristic and therefore increase the relative strength of the higher notes.

The low notes will, incidentally, also be strengthened a little, but probably not to the same extent as those of higher frequency. Thus the quality of the reproduction may be changed by various alterations and the quality made acceptable.

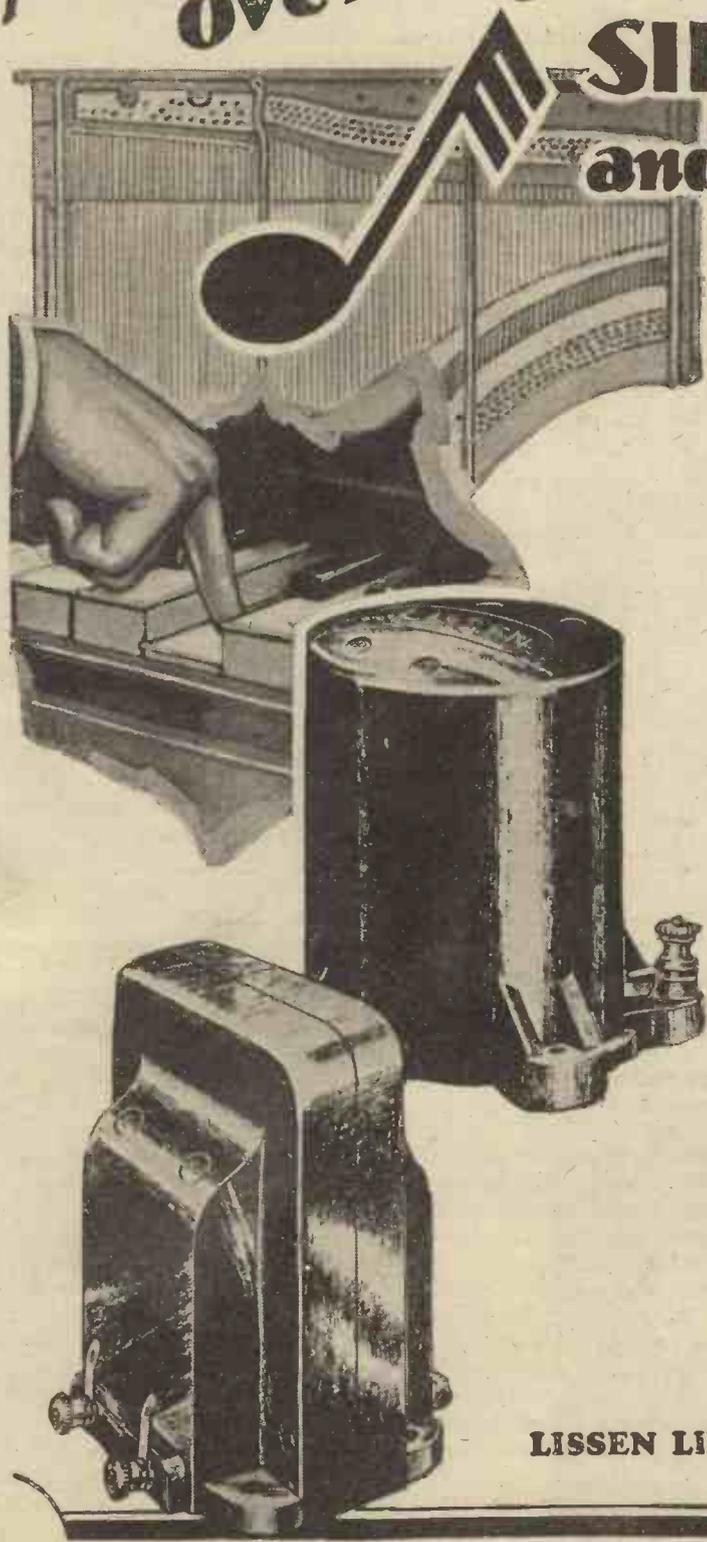
Reaction Condensers which “Short”

A fault that sometimes develops is a short-circuit in the reaction condenser. Perhaps, as the result of wear, the plates touch in one position, or maybe dust has collected. In any case, when the condenser has one of its sets of plates joined to the high-tension circuit and its other set to negative, a short-circuit will cause a current to pass through the reaction and anode circuits. This current may

be sufficient to damage such parts as a transformer or high-frequency choke that may be included in the circuit, and will certainly do the battery no good, even if it does not quickly discharge it. There is a simple and effective safety device, however, that may be included in the circuit. It is a fixed condenser, which should be joined between the reaction condenser and the anode of the valve. The fixed condenser should have a capacity of three or four times that of the reaction condenser—or, say, .002 microfarad. When this “safety” condenser is included in the reaction circuit, the only result of a short-circuit in the reaction condenser will be violent oscillation and probably noise. No parts will be damaged, however, as the fixed condenser is stopping the flow of a direct current from the H.T. battery.

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This Super LISSEN Transformer is made in two ratios, $3\frac{1}{2}$ to 1 and also $2\frac{1}{2}$ to 1. The $3\frac{1}{2}$ to 1 is suitable for use in either the first or the second stage of an L.F. amplifier, or can be used in cascade for both stages, and with practically any valve. The $2\frac{1}{2}$ to 1 transformer is suitable for use after a high impedance rectifier valve without fear of distortion or loss of high notes and overtones. The price is the same for both ratios

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"A.W." TESTS OF APPARATUS

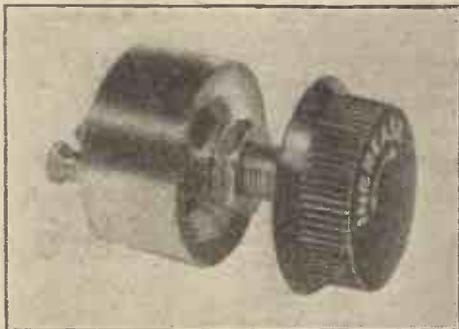
Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

Regenstat Power Resistance

VARIABLE power resistances are particularly useful components, especially for use with all types of mains apparatus, allowing independent voltage adjustments to be made by the turn of a knob. Such a resistance must be capable of passing fairly heavy anode currents without any appreciable alteration of ohmic value.

We recently tested a Regenstat power resistance having a rated range of 250 ohms to 4 megohms and stated to be capable of dissipating power up to 10 watts. The resistance material of this component is contained in a sac housed in a metal container and compressed by rotation of the knob in a clockwise direction. A single hole only is necessary for fixing to a panel.

The resistance range of the sample tested proved to be from 120 ohms up to $1\frac{1}{2}$ megohms. The maximum value is thus below that claimed by the makers, although for mains work this is not of any consequence as the working resistance seldom exceeds 500,000 ohms. Continuing with our test, we passed currents through the resistance up to 100 milliamps with a voltage drop of 100, giving a dissipation of 10 watts.



Regentone variable resistance of the compressed-sac type, for power work

The makers are the Regent Radio Supply Co., Ltd., 21 Bartlett's Buildings, Holborn Circus, London, W.C.

Eastick Connectors

MESSRS. J. J. EASTICK & SONS, of 118 Bunhill Row, E.C., are probably well known to readers as makers of the Eelex plugs, sockets, and connectors. The experience gained by the firm during the time which they have been manufacturing small articles of this nature has led them to make various modifications to comply with the requirements of up-to-date apparatus.

The latest types of connectors are not only fully up-to-date, but ingeniously constructed rendering them handy and reliable in use. One of the most important requirements in any plug-and-socket system is that it should make a good electrical joint. The Eelex plugs are split into four sections and so shaped at the ends that they glide with ease into the socket but at the same time make good electrical contact with the socket.

Another improvement in these small accessories is the extra shrouding fitted to the sockets which overlaps the insulated shrouding on the plugs and thus completely obscures any metal work. The importance of this cannot be over-estimated in these days of high mains voltages when very often a chance contact with metal work may result in a nasty shock.

The method of fixing a wire to the plugs and connectors has also been improved and special precautions taken against a possibility for the lead not to pull out by holding it in with a grub screw.

One may obtain these components from Messrs. Eastick in any shape or colour of plug and socket which a wireless engineer could need. It may be added that the finish and workmanship are very good.

A Useful Switch

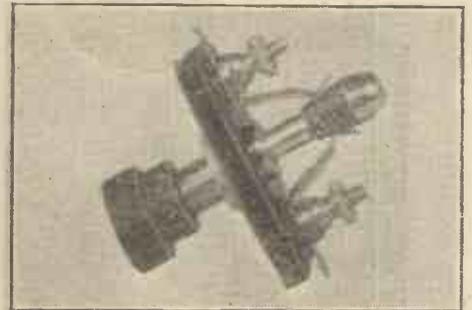
PUSH-PULL switches have become so popular with constructors that many varieties are available. Unfortunately one cannot always be assured of obtaining the right type of article and one which originally appears perfect electrically and mechanically may soon develop faulty contacts, a most undesirable type of fault in any set.

A small, neat, push-pull switch submitted for test by The Wireless Supplies Unlimited is a component on which much thought has evidently been expended. The makers of this "Unlimitex" product have probably benefited by the faults of other push-pull switches and produced an article which should certainly prove reliable.

In appearance the component closely resembles the standard type of switch; two springs with a soldering tag and terminal are attached to a small rectangular piece of insulating material through which the operating spindle slides. When the article is mounted on a panel, a polished black insulated knob and a suitably engraved celluloid plate are alone visible.

It is in the shaping of the springs and the spindle that the successful design of the

switch depends. In this case substantially thick springs are employed with curved bearing surfaces, so that contact does not occur between them and the spindle at a single point only, but over an increased surface area. In the "off" position, the springs are less extended than in the "on" position, and are therefore at rest during the major part of the day and should in consequence, retain their pressure for long periods. Due to the gradual tapering of the insulated bush on the spindle and the



A well made switch for L.T. or coil switching; made by Radio Supplies Unlimited

rounding off of the metal bush, the action of the switch is quite smooth and yet provides a definite on and off position. This component is well-finished and, being reasonably priced, should appeal to readers.

The makers are Radio Supplies Unlimited of 278 High Street, London, E.15.

THE NEW BELGIAN HIGH-POWER STATION

UNDER construction for some months, the new Louvain (Belgium) broadcasting station gave its first transmission on Sunday, October 6. It has been erected by the N.V. Radio and financed by the Belgian Boerenbond (Peasants' Association). The broadcasts are made on 339 metres with a power of from 8 to 10 kilowatts in the aerial. As it is mainly destined to the Flemish-speaking districts, all announcements are made in that language, the call being "Radio Leuven." For the present, transmissions will only be made on Thursdays and Sundays from 8.15 to 10.15 p.m. G.M.T., but in the course of a week or so broadcasts will also be carried out on Sunday mornings.

Radio Leuven has decided to offer to its listeners relays of concerts from Amsterdam, as well as religious services from St. Rombouts Cathedral, at Mecheln, whence will also be heard carillon recitals by the Chevalier Jef Denijn.



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By
W. JAMES

H.T. JUICE

AND SOME UNUSUAL SOURCES

The second and concluding article reviewing the available methods of obtaining H.T. current

EVERY amateur has, I expect, used dry batteries for the high-tension circuits at some time or other, and is therefore aware of the difficulties met with from time to time. Most dry batteries, it is true, give a reliable service, but certain of them are

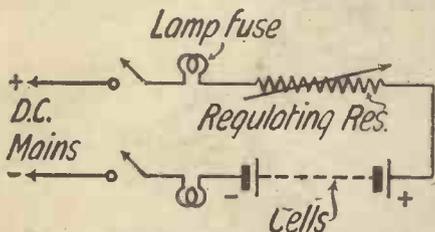


Fig. 1. Charging H.T. accumulator from D.C. mains

troublesome, as well as variable in their behaviour.

Who has not had the experience of connecting a new battery (not a freshly-made one) only to hear crackling noises, perhaps motor-boating, and to find the broadcast weak and distorted. These, incidentally, are the signs of a high-resistance battery. Perhaps one of the connections inside the battery is faulty or one of the cells may be defective. This one bad part is sufficient to render the whole battery useless, as one is seldom so fortunate as to be able to make good the fault or to cut out the defective cell.

Quite apart from troubles with new batteries that should be perfectly satisfactory, however, one is always faced with deterioration. The voltage of a battery falls after it has been used for a time; its resistance increases, and it is no longer able properly to supply the circuits with current unless, of course, they are fitted with filter circuits. Even then the variations in the resistance that occur are troublesome, as noises may be heard from the loud-speaker.

As the voltage of the battery falls, the performance of the set drops below normal. The magnification is less; more reaction must be used in an endeavour to maintain the volume. Therefore, the quality suffers. Further, the time soon arrives when the amount of the power output to be obtained from the last stage decreases. All that users of dry batteries can do to obtain more uniform results is to employ batteries having a large capacity. Naturally, they are more costly to purchase, but if account be taken of their capacity, they will be found rela-

tively much cheaper than smaller types.

Those who run a set having four or five valves, or who employ a good power valve in the output stage, sooner or later consider other sources of high tension. If they have a household supply of electricity, they probably build a mains unit or perhaps invest in a battery of accumulators and a charger. High-tension accumulator batteries are fairly popular just now, and it must be admitted they are quite useful if looked after. Some types soon wear out. Surface leakage is the trouble in many instances. The cells will not hold a charge for very long because of the leaks. I once had a battery of accumulators which would discharge in a few days if left. The filled-in tops were conductive. Sometimes a cell would fail and have to receive special treatment.

On the whole, however, accumulators are satisfactory. If of recent design and of

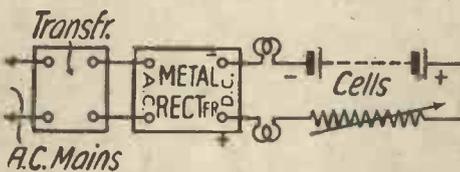


Fig. 3. Charging arrangement with metal rectifier and transformer

reasonable capacity, they should not be at all troublesome. They are particularly useful for laboratory purposes. When the household supply is of direct current at low

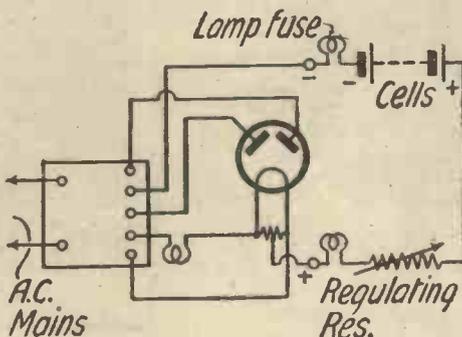


Fig. 4. Charging arrangement with valve rectifier and transformer

voltage, it may be used for charging, the amount of the current being regulated by a resistance, but only part of the battery, as a rule, may be charged at one time. A suit-

able arrangement is given in Fig. 1, where a lamp fuse, switch, and regulating resistance are indicated. An ammeter may be used in a circuit of this description, or one may estimate the charging current by the brightness of the flash-lamp bulb included in the circuit.

It is advisable to insulate the battery whilst it is being charged.

When the supply is of alternating current, a rectifier must be included in the circuit in order that current flowing in one direction only shall pass through the bat-

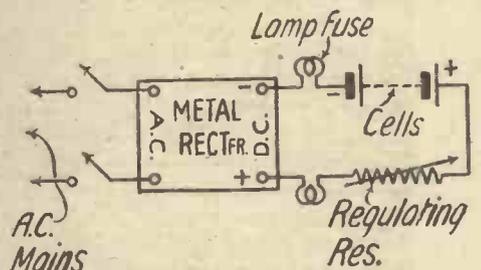


Fig. 2. Charging from A.C. mains through a rectifier without transformer

tery. A half- or a full-wave rectifier may be used, and it is not essential to employ a transformer. Perhaps the cheapest method of charging is by means of a dry-metal rectifier of the Westinghouse pattern connected as in Fig. 2; but when this arrangement is used particular care must be taken that the set be disconnected whilst charging. Failure to attend to this point may result in damage to the parts in the circuit. The adjustable resistance indicated may very well be of the "power" type of compression resistance, having a value of from 200 to 2,000 ohms.

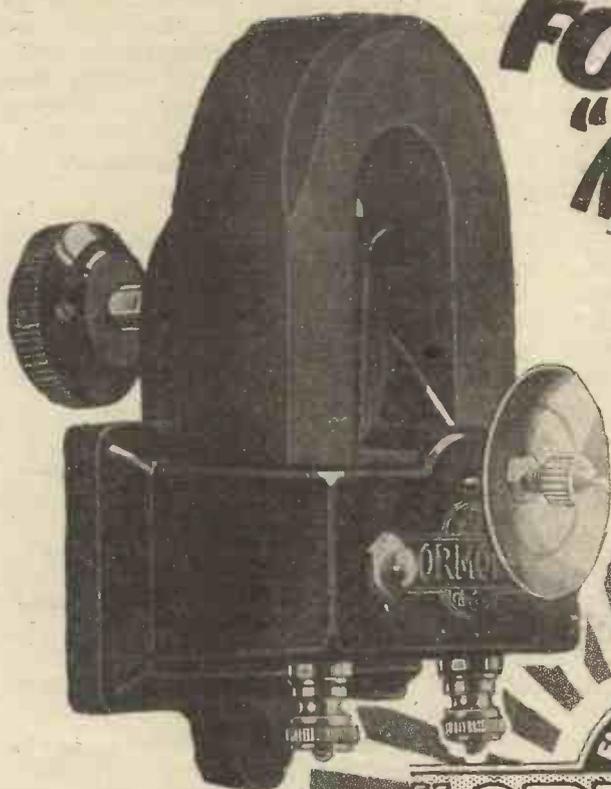
For greater safety a transformer should be employed, as in Fig. 3, as it prevents a direct contact between the mains and the battery or set. It may be home-constructed from No. 4 stallooy stampings built to provide a core 1 in. thick. The primary winding may have the following numbers of turns of No. 30 enamelled wire:

Voltage of Mains.	Turns on Primary.
200	1,400
220	1,540
240	1,680

A secondary winding of 2,000 turns of No. 30 enamelled wire tapped at 1,800, 1,600, 1,400, and 1,200 will provide a maximum of 280 volts A.C. approximately, and will therefore be suitable for various rectifiers and batteries, but the current must be limited to 100 milliamperes or thereabouts, or the transformer will heat up. There is a right and a wrong way of connecting a half-wave rectifier in a charging circuit, and this point should be

(Continued on page 694)

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FOR THE
"MUSIC LEADER"**



**THE ORMOND
ADJUSTABLE
4-POLE
LOUD SPEAKER
UNIT**

Specified for use with the "Music Leader" linen-diaphragm loud-speaker as described in this issue.

Punch—Purity—Power

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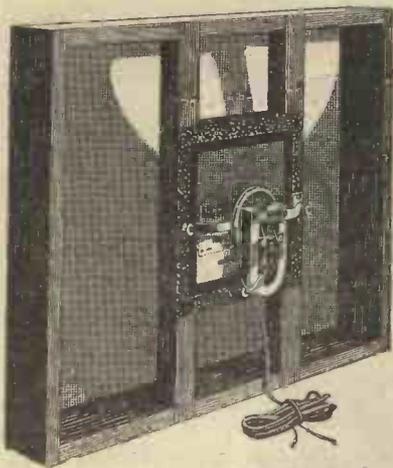
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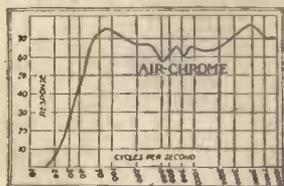
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Type L	12" x 10" x 3 1/4"	42/-
Type K	14" x 14" x 5 1/4"	52/-
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In attractive cabinets from £3.19.6



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Telephone: Willesden 1616-7

"H.T. 'JUICE'—AND SOME UNUSUAL SOURCES"

(Continued from preceding page)

attended to. It is possible to use machines and other devices for charging from a direct-current source of low voltage but most of them are rather too costly or need too much attention to be popular with amateurs. Valve rectifiers may also be used as indicated in Fig. 4, but as a rule it is cheaper and better to connect a filter to the rectifier for smoothing, and to arrange for various voltages by fitting suitable resistances or potentiometers.

It is, of course, a little more difficult to provide definite voltages from a mains unit than a battery of accumulators, but when accuracy is of importance an adjustable resistance may be used for regulating the voltage. A usual filter for smoothing direct

need not be joined through a choke. Many suitable chokes are marketed, and when choosing one care must be taken that the current-carrying capacity is sufficient and the resistance not too high. A great deal of inductance is not needed, but when the total smoothed current is in excess of, say 30 milliamperes, it is advisable to divide the circuit. Thus the last stage, which passes most current, can be supplied through a choke of medium inductance, as the smoothing afforded will be adequate. The other stages, which pass a comparatively small current, can be supplied from a separate smoothing circuit having a choke of high inductance. This choke may be of the same size as the one employed in the circuit of the last valve, but as it has less current to carry, its winding may be of finer wire. Therefore the inductance will be greater and also the resistance.

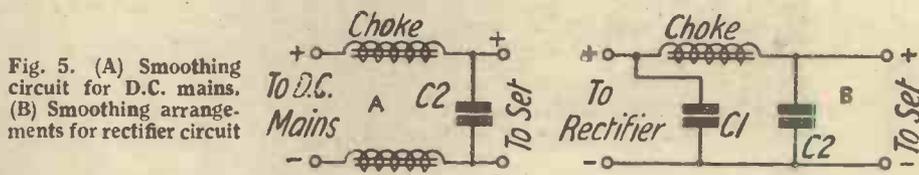


Fig. 5. (A) Smoothing circuit for D.C. mains. (B) Smoothing arrangements for rectifier circuit

current main supplies is indicated in Fig. 5A. It will be seen to be rather different from that fitted to a rectifier, Fig. 5B. The essential difference is that a condenser is not used across the input when the supply is from direct-current mains, but that one is used, as at cr, when the supply is from a rectifier. The two choking coils shown in Fig. 5A may not be required. One of them will often suffice and it is therefore advisable when trying a circuit of this type to put a choke first in one main wire and then the other, as one may find the smoothing is satisfactory with one of the connections.

In certain instances, two chokes, as indicated, must be used. Much depends upon how the D.C. mains are earthed. One main is usually practically at earth potential, and it is this main which, as a rule,

Suitable connections are indicated in Fig. 6, A and B, where choke CH1 has a large current-carrying capacity and a medium inductance, and CH2 a small current-carrying capacity and a high inductive value. Thus CH1 may be of 20 henries and CH2 of 50 henries. Condensers of 4 microfarads are usually suitable at cr and c2, but sometimes an 8-microfarad condenser must be used at c2.

LOUD-SPEAKER PERFORMANCE

FOR purity on the low notes, combined with a reasonable balance between the higher and lower ranges, many listeners swear by the moving-coil type of speaker, though their preference is to some extent offset by adherents of the balanced-armature and similar speaker models working on a purely magnetic drive. Certainly some excellent results were produced by non-moving-coil instruments at the recent exhibition.

To a certain extent, lack of balance in reproduction may be due to losses occurring in the intervalve and output couplings, and should not therefore be put down to the fault of the speaker. In order to overcome or counter-balance such defects, it has recently been proposed to use two separate power valves in the last stage of the amplifier and to couple these to a common loud-speaker through different transformer windings, one of which is designed to favour the higher and the other the lower notes. By adjusting the two valves independently the final output can be given the desired tonality and any intermediate resonance effect or loss made good.

B. A. R.

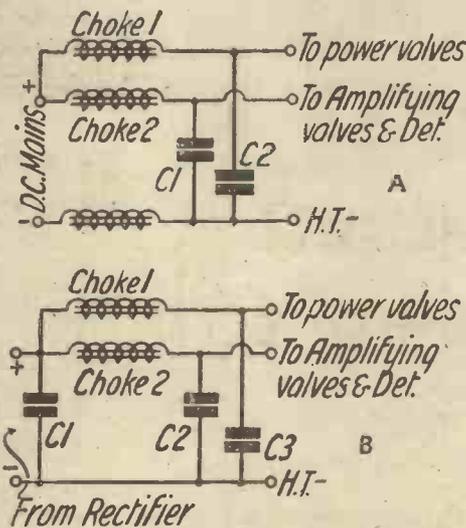
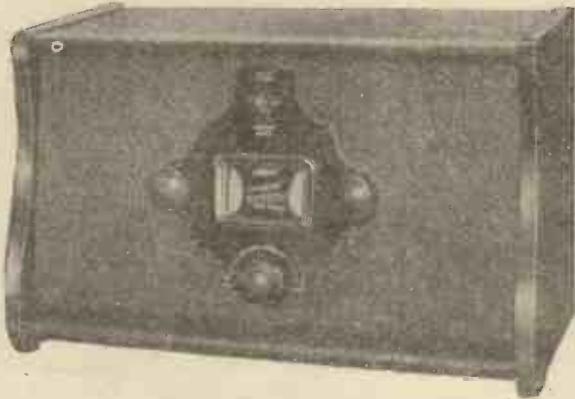


Fig. 6. Two smoothing circuits for when anode current is heavy

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B.A.9	1.9v	0.05	General Purpose	5/6
B.C.9	1.9v	0.1	General Purpose and Power Valve	5/6
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Same Types in 4 volts, also Pentode, and Screened Grid

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5-PIN VALVEHOLDER

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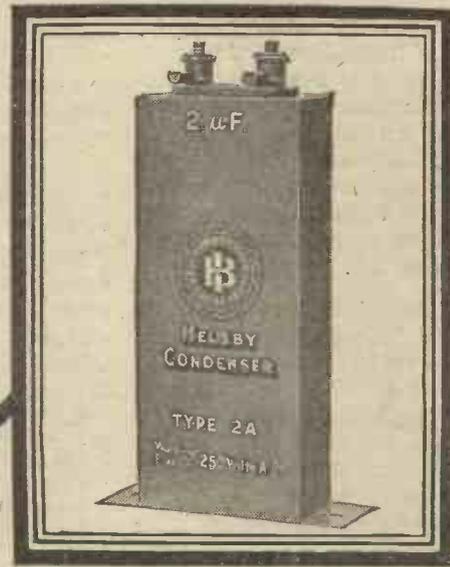
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"RADIOGRAMS"

(Continued from page 696)

According to decisions taken by the International Consultative Committee for the Technique of Radio-Electric Communications, which recently held a conference at The Hague, Holland, the wireless wavelengths have been re-classified as follows: Long waves, from 3,000 metres and upwards; medium, from 200 to 3,000 metres; intermediate, from 50 to 200 metres; short, from 10 to 50 metres; and ultra-short, below 10 metres.

Recognising the rich opportunities which John Buchan's "Huntingtower" affords for microphone presentation, the Scottish stations of the B.B.C. have commissioned a radio adaptation of the novel. Two adaptations from the works of Sir Walter Scott are other features of current Scottish broadcasting—one a scene from "Redgauntlet," and the other based on "The Highland Widow."

"Ici Station Radiophonique Paris Experimental" is the call of a new short-wave transmitter in France, working daily at 9 p.m. on 31.65 metres. Broadcasts are also made on Sundays at 3 p.m. As the power has been increased to 1 kilowatt, the programmes are being heard in many European countries.

Local subscriptions are being raised at

Lille (France) to defray the expense of erecting a new 12-kilowatt broadcasting station in that city. Lyon-la-Doua, the P.T.T. station serving the Lyons district, has been rebuilt and is now testing on higher power.

As Hamburg has now reverted to its winter-time schedule, early risers in Great Britain may pick up a time signal from the German station at 4.45 a.m. G.M.T., weather forecasts at intervals, and a concert of gramophone records at 6.20 a.m.!

Notification is given that it has been found necessary to change the call signal of the new wireless fog signal at Sule Skerry Lighthouse, situated some thirty miles north of Cape Wrath, from KSG to MSG.

The new 20-kilowatt Algiers broadcasting station, now the most powerful transmitter in French North Africa, has started its initial tests on 368 metres. As it is to be officially opened only in 1930 in connection with the centenary celebrations of the Algerian colony, for the present the new plant will be used exclusively for the evening programmes.

Trieste, the latest transmitter to be added to the Italian broadcasting net is said to be testing on 248 metres.

Radio Luxembourg, the new private broadcasting station operated by the *Compagnie Nationale de Radiodiffusion* in

the Grand Duchy of Luxemburg can now be heard clearly in the United Kingdom on almost every evening between 10 and 11 p.m. on a wavelength of 223 metres. It will be found sandwiched between the Flensburg and Cologne transmissions and can be recognised by an oft-repeated call in French, German, English, and Italian.

Recent statistics in America show that about one-third of the radio receivers sold are made in Philadelphia.

The radiobeacon station established at Sule Skerry (Orkney Islands) has recently been brought into operation and may be heard transmitting in I.C.W. morse on a wavelength of about 1,000 metres. The characteristic signals emitted by this station consist of several repetitions of the call-letters MSG, followed by a long dash and the call-sign sent again once.

Nearly fifty new short-wave commercial stations are stated to be in process of erection in different parts of Brazil. All these transmitters will be equipped for C.W. working, and have been allotted call-signs, the first two letters of which are PP, PR, PU, PV, or PY. Some of the call-signs are four-letter combinations, and therefore among the very few exceptions to the rule of three-letter call-signs for land stations which was adopted when the new Washington regulations came into force at the beginning of this year.

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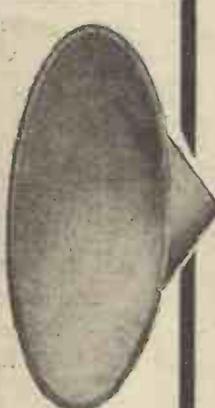
Fit a P.R. Moulded Paper Cone to your speaker and you will be positively amazed at the difference. Double the volume and much greater purity in tone. All the notes come out in their correct value. No resonance—no "drumming"—just pure and real music.

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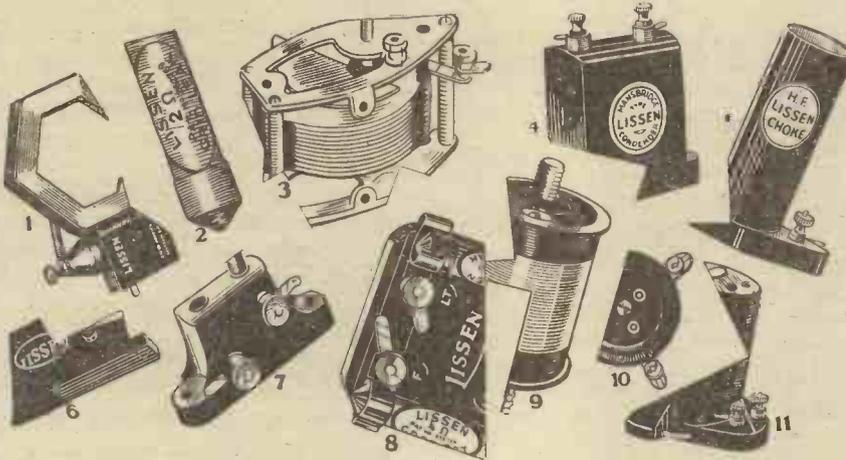
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20 Prizes of £1 each**

Here is a jumbled picture of 11 Lissen components.

CAN YOU NAME THEM?

Post your answer to-day. You can lose nothing, and you may WIN THE BIG PRIZE. Someone must win this—WHY NOT YOU?

Our sole desire is to introduce into every home the LISSEN ALL-BRITISH Wireless Catalogue for 1929-30, and we regard this as a more interesting method of advertising our goods than by ordinary advertisements.



SIMPLE RULES

1. Write a list of the Lissen components on a sheet of paper with your name and address, also the name of this paper. Also write a few words as to why you consider Lissen's All-British Components are the best.
2. Competitors must be 16 years of age or over.
3. Competitors will be invited to make a small purchase from our catalogue of Lissen's All-British Components. (Money refunded if goods not satisfactory.)
4. No employee of the firm will be eligible.
5. Points will be awarded for accuracy, compliance with the rules, and merit. 1,000 points or nearest wins the first prize.
6. Independent judges will make the final awards. They will not be connected with this firm, and their names will be made known to all competitors, who must agree to abide by their decision.

Closing date will be announced later.

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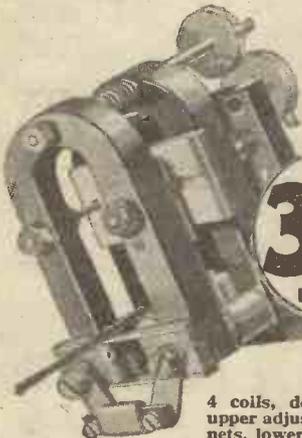
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LET YOUR EAR - CONVINCING YOU



HEAR it but ONCE. Your ear will convince you there is no other reproducing unit, irrespective of price, to equal the Wates Star—its superlative tonal beauty and the amazing verve and sparkle of its performance. The Wates Star has been deliberately built for those who desire something more than the glut of "built down to a price" units can provide. True its cost is considerably higher—BUT by RESULTS alone and from the sensational interest caused at the Show, there is little doubt that those who do not inspect the Wates Star are missing Radio's "Best Yet."

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 LOUD SPEAKER UNIT

Your set is only as good as its speaker!



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36/-
 PRICE

4 coils, double magnets, upper adjustment for magnets, lower adjustment for armature. Works on newly discovered principle.

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THE L.F. TRANSFORMER
 for perfection in wireless reception combined with full scale amplification and pure tonal quality.

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 All post paid and supplied with money-back guarantee if dissatisfied within 7 days.

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 Clerks: 7139.

You **MUST** have the
"WIRELESS MAGAZINE"
 Every Month Price 1/-

"RADIOGRAMS"

(Continued from page 698)

The Spain-Argentine-Uruguay radio telephony service was officially opened at Seville on October 12 last. From Seville speech is conveyed by landline to Madrid, whence via radio it is sent to the Argentine, the extension to Monte Video (Uruguay) being made by a cable laid on the bed of the Rio Plata. A further step in the world's radio telephony system will be carried out by linking up Buenos Aires and New York.

Several Scottish talk periods are to be devoted to the vexed question of the Scottish Highlands, such well-known authorities as Mr. Evan McLeod Barron, Sheriff Macmaster Campbell, Cameron of Lochiel, and Miss I. F. Grant being booked to speak on various dates.

Now that most of the Glasgow programmes are being relayed by the Aberdeen station, the short weather forecast for farmers, which has been a feature of the Glasgow programme for years, is being extended to cover all Scotland and will be transmitted from all Scottish B.B.C. stations. The bulletin is prepared by the Central Meteorological Office of the Air Ministry at Renfrew.

Despite suggestions that the real reason of the visit to Glasgow of the wireless detector van is in connection with a search for a site for the Scottish Regional Station, it is learned that since its arrival in the city the number of licences taken out at the various post offices has exceeded 100 per day more than the usual average.

The B.B.C. has done not a little to foster community drama in Scotland, and now it is setting to work to temper enthusiasm

with the fruits of experience. It is almost invariably in production, and not in acting, that amateur companies fail, and Miss Elizabeth Orphoot, who is the official coach on play production to the Scottish Women's Rural Institutes, is therefore to conduct a series of talks on "Simple Play Production."

The Scottish Football League has resolved that applications to broadcast any league match must not be granted in future. It is understood that the ban will not affect any permissions already granted for league games.

Tests made with the new 60-kilowatt Oslo transmitter have demonstrated that on the allotted wavelength of 493 metres the extended area expected for crystal reception of the broadcasts has not been attained. It is thought that this failure is due to the geological conditions of the site, and steps are being taken by the Norwegian authorities to obtain a more favourable wavelength. There is a strong possibility that 1,071 metres allotted to Drontheim may eventually be chosen.

Although, at various times, it has been stated that the Irish Free State is shortly to erect a high-power broadcasting station, it would appear that the Post Office authorities have recommended the scheme, but no step can be taken in the matter until it has met with the approval of the Minister of Finance.

The high-power short-wave transmitter at Malabar, on the Island of Java, is the only station in the world which does not use aerial masts; the aerial is slung between two high mountain peaks, the transmitter being installed in the valley.

"RADIO-LEGS"
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CLIPS ON TO ANY SET IN A MOMENT!

"Radio-Legs" converts any set or table gramophone—no matter what size—in a second or two into a pedestal model. Firm as a rock. Beautiful finish—oak or mahogany.
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15/6

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is *aerial energy*.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Chelmsford (6SW) 15.0		588	1,049	Radio Lyons ...	0.5	*385	779	Genoa (IGE) ...	1.0
*200	1,500	Leeds (2LS) ... 0.13		238.5	1,049	Mont de Marsan ...	0.3	*441	680	Rome (Roma) ...	3.0
*242	1,238	Belfast (2BE) ... 1.0		304	1,020	Limoges (PTT) ...	0.5	453	662	Bolzano (IBZ) ...	0.3
*188.5	1,040	Newcastle (5NO) 1.0		304	985	Bordeaux (PTT) ...	1.0	*501	600	Milan (Milano) ...	7.0
288.5	1,040	Swansea (5SX) 0.13		305.6	987.7	Agen ...	0.25	YUGOSLAVIA			
288.5	1,040	Stoke-on-Trent (6ST) 0.13		309	970	Radio Vitus ...	1.0	*321.4	977.3	Zagreb (Agram) ...	0.7
288.5	1,040	Sheffield (6LF) 0.13		*316	950	Marseilles (PTT) ...	0.5	*433	693	Belgrade ...	2.5
288.5	1,040	Plymouth (5PY) 0.13		326.5	918.9	Grenoble (PTT) ...	0.3	506	530	Ljubljana ...	2.5
288.5	1,040	Liverpool (6LV) 0.13		331.4	905	Peut Parisien ...	0.5	LATVIA			
288.5	1,040	Hull (6KH) ... 0.13		164	824	Algiers ...	1.0	*525	572	Riga ...	3.0
288.5	1,040	Edinburgh (2EH) 0.35		163	815	Radio LL (Paris) ...	0.5	LITHUANIA			
288.5	1,040	Dundee (2DE) 0.13		*381	788	Radio Toulous: ...	8.0	*1,935	755	Kovno ...	7.0
288.5	1,040	Bournemouth (6BM) 1.0		411	723	Radio Maroc (Rabat) ...	2.0	NORWAY			
288.5	1,040	Bradford (2LS) 0.13		447	671	Paris (Ecole Sup. PTT) ...	3.0	540	1,250	Rjukan ...	0.18
*301	995	Aberdeen (2BD) 1.0		408	640	Lyons (PIT) ...	5.0	*288	1,058	Notodden ...	0.6
*310	968	Cardiff (5WA) ... 1.0		1,350	222	Tunis (Kasbah) ...	0.6	*365	820	Bergen ...	1.0
350	848	Brookman's Park 30		1,458	205.76	Eiffel Tower ...	12.0	*394	767	Frederiksstad ...	0.7
*377	797	Manchester (2ZY) 1.0		*1,725	174	Radio Paris ...	12.0	458	662	Tromsø ...	0.1
*393	753	Glasgow (5GC) 1.0		GERMANY							
*473	626	Daventry (5GB) 25.0		*218	1,373	Flensburg ...	0.5	*313	959	Cracow ...	0.5
*1,534	293	Daventry (5XX) 25.0		*227	1,319	Cologne ...	4.0	*335	896	Powson ...	1.2
AUSTRIA											
*246	1,220	Linz ... 0.5		*231	1,283	Muenster ...	3.0	385	779	Wilno ...	0.5
*283	1,058	Innsbruck ... 0.5		*239	1,256	Nurnberg ...	2.0	*408	734	Katowitz ...	10.0
*352	851	Graz ... 7.0		*240	1,220	Kiel ...	0.35	*1,411	212.5	Warsaw ...	8.0
*453	666	Klagenfurt ... 0.5		*248	1,220	Cassel ...	0.25	ROUMANIA			
517	581	Vienna ... 15.0		*253	1,157	Gleitwitz ...	2.0	*301	767	Buchares: ...	12.0
CZECHO-SLOVAKIA											
*203	1,139	Morava-Ostrava 10.0		*259	1,154	Leipzig ...	1.5	RUSSIA			
*279	1,075	Bratislava ... 12.5		*270	1,112	Kaiserslautern ...	0.2	*351	855.5	Leningrad ...	1.0
*293	1,022	Kosice ... 2.0		*276	1,085	Koenigsberg ...	2.5	*427	702.5	Kharkov (NKO) ...	4.0
*342	878	Brunn (Brno) 2.4		*283	1,058	Magdeburg ...	0.5	483	627.5	Homel ...	1.2
*487	677	Prague (Praha) 5.0		*283	1,058	Berlin (E.) ...	0.5	*825	364	Moscow (PTT) ...	20.0
BELGIUM											
*35.5	1,273.5	Charleroy (LL) 0.25		*319	1,048	Stettin ...	0.5	1,080	283	Tifis ...	10.0
246.1	1,212.6	Schaerbeek-Brussels 0.2		*311	941	Dresden ...	0.2	1,000	300	Leningrad ...	20.0
250	1,200	Ghent ... 0.5		*325	943	Bremen ...	0.35	1,000	0	Moscow Popoff ...	40.0
94	1,121	Liege ... 0.1		*380	833	Breslau ...	1.5	*1,304	230	Kharkov ...	4.0
312	963.4	Arlon ... 0.25		*372	806	Stuttgart ...	1.5	1,431	202.5	Moscow (Kom) ...	40.0
339	887	Louvain ... 8.0		*390	770	Hamburg ...	1.5	SPAIN			
*609	590	Brussels ... 1.0		*418	716	Frankfurt ...	1.5	251	1,793	Almeria (EAJ18) ...	1.0
DENMARK											
*281	1,067	Copenhagen (Kjbenhavn) 0.75		*453	662	Berlin ...	1.5	314	956	Oviedo (EAJ19) ...	0.5
1,153	260	Kalundborg ... 7.5		*456	657	Danzig ...	0.2	*349	860	Barcelona (EAJ1) ...	8.0
ESTHONIA											
*297	1,010	Reval (Tallinn) 0.7		*533	563	Aachen ...	0.3	*368	815	Seville (EAJ5) ...	1.5
FINLAND											
*221	1,355	Helsingfors ... 0.9		*500	536	Langenberg ...	13.0	403	743	San Sebastian (EAJ8) ...	0.5
*1,790	167	Lahti ... 40.0		*500	536	Munich ...	1.5	*424	707	Madrid (EAJ7) ...	2.0
FRANCE											
31.65	—	Radio Experimental (Paris) 1.0		*575	521.7	Augsburg ...	0.2	453	662	Salamanca (EAJ22) ...	1.0
175	1,774	S. Quentin ... 0.1		*1,635	183.5	Hanover ...	0.35	465	645	Barcelona (EAJ13) ...	8.0
211.3	1,220	Héziers ... 0.1		2,100	142	Freiburg ...	0.35	SWEDEN			
221	1,364	Fecamp (Radio Normandie) 0.5		2,290	131	Zeesen ...	3.0	231	1,307	Malmö ...	0.6
237	1,265	Nice (Juan-les-Pins) 0.5		GRAND DUCHY							
258	1,263	Bordeaux (Radio Sud-Ouest) 1.0		223	1,346	Luxembourg ...	3.0	231	1,307	Malmö ...	0.6
130	1,256	Radio Nimes ... 0.25		HOLLAND							
*253	1,175	Toulouse (PTT) 1.5		31.4	9,554	Eindhoven ...		*257	1,760	Hoerby ...	10.0
*265	1,130	Lille (PTT) ... 0.7		*293	1,004	Hilversum (untl) 5.0 p.m. G.M.T.) ...	0.5	270	1,122	Trollhattan ...	0.45
268	1,121	Casablanca ... 0.3		*1,071	820	Hilversum (untl) 5.40 p.m. G.M.T.) ...	0.5	*322	931	Goeteborg ...	10.0
208	1,121	Strasbourg ... 0.3		*1,011	820	Scheveningen- Haven 5.0 (from 10.30 a.m. to 5.40 p.m. B.S.T.) ...	0.5	322	932	Falun ...	0.5
*212	1,103	Rennes (PTT) 0.6		HUNGARY							
*263	—	Montpelier (PTT) 0.2		550	545	Budapest: ...	20.0	*436	689	Stockholm ...	1.5
ICELAND											
				*1,200	250	Reykjavik ...	1.0	*542	554	Sundsvall ...	0.6
IRISH FREE STATE											
				*225	1,337	Cork (IFS) ...	1.0	*770	389	Ostersund ...	0.6
				*415	725	Dublin (2RN) ...	1.0	1,200	250	Boden ...	0.6
ITALY											
				243	1,209	Trieste (testing) ...	1.0	*1,348	222.5	Motala ...	30.0
				*274	1,094	Turin (Torino) ...	7.0	SWITZERLAND			
				*30.3	908	Naples (Napoli) ...	1.5	*403	743	Berne ...	1.0
								*451	653	Zurich ...	0.63
								466	644	Zurich (during afternoon) ...	0.63
								680	442	Lausanne ...	0.6
								760	395	Geneva ...	0.2
								1,010	297	Basle ...	0.2
								TURKEY			
								*1,200	250	Stamboul ...	5.0

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.



In addition to their own extensive range, PETO SCOTT offer YOU every known Radio Receiver or Component. The list given below merely illustrates our terms for a few well-known lines and we ask you to fill in the coupon, or send us a list of your requirements, for which we shall be pleased to quote for cash or on our famous system of

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The Music Leader (described in this and last week's issues). For complete kit, including Cabinet, Valves, Batteries, and all requisite accessories, send only 25/-, balance in easy instalments.

Music Lover's Gramo-Radio (described in September 28 and October 5 issues). Complete kit contains exact parts as specified. Cabinet and drilled Panel. Full-size Blueprint free with complete kits. Send only 33/9; balance in 11 monthly instalments of 19/2. Valves, gramophone motor, and accessories extra.

New Osram Music Magnet. Send only 16/6; balance in 11 monthly instalments of 16/6, valves included.

1930 Mullard "Orgola" Kit, including Cabinet and Valves. Send only 20/-; balance in 11 monthly instalments of 20/-.

Cosser 1930 Three-valve Kit. Send only 16/-; balance in 11 monthly instalments of 16/-.

The Brookman's Three (see "Wireless Magazine," October issue). Complete kit, including Cabinet, Panel, and Valves. Send only 18/11; balance in 11 monthly instalments of 18/11.

Regentone, Ekco and all leading makes of H.T. Eliminators, from 4/7 down.

Celestion Z.20, in Oak. Send only 14/3; balance in 11 monthly instalments of 14/3. In Mahogany, 15/2.

Celestion C.12, in Oak. Send only 10/4; balance in 11 monthly instalments of 10/4. In Mahogany, 10/9.

Ultra Air Chrome U.12. Cabinet Model Loud-speaker. Send only 7/4; balance in 11 monthly instalments of 7/4. All Chassis and Cabinet Models also available.

B.T.H. R.K. Unit (for 6-volt accumulator or D.C. mains). Send only 11/7; balance in 11 monthly instalments of 11/7.

Exide 120-volt H.T. Accumulator, type W.J., in Crates. Send only 6/11; balance in 11 monthly instalments of 6/11.

Standard Wet H.T. 144-volt Battery, 10,000 m/a, absolutely complete. Send only 7/2; balance in 11 monthly instalments of 7/2. All parts for these batteries available.

All goods sent Carriage Paid. Everything available for cash if preferred.

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CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)
Nov. 5 A vaudeville programme.
" 6 Carnival, by Compton Mackenzie.
" 7 Running commentary on a speedway meeting.
" 8 B.B.C. symphony concert.
" 9 Speech by the Prime Minister at Lord Mayor's Banquet.

DAVENTRY EXPERIMENTAL (5GB)
Nov. 4 Carnival, by Compton Mackenzie.
" 6 "5GB Calling," Clapham and Dwyer's 1929 Concert Party.
" 7 "Magneshah," a salty tale of the East, told by Dorothy Eaves.
" 8 A vaudeville programme.

CARDIFF
Nov. 4 The Barber of Bath, an operetta by J. Offenbach.

A concert was held in New York recently to amuse members of Byrd's Antarctic Expedition. The voices of the artistes, it was later reported, were heard across the 10,000 miles of land and sea and ice almost as plainly as though they had been in the next room. The concert was broadcast by KDKA.

An analysis by the Electrical Division of the American Department of Commerce reveals that there is a receiving set to every twelve persons in America. There is a set to every fifty-three persons in Europe. In the world as a whole there is a receiver for every eighty-eight persons.





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Loud-speaker Crystal Sets How to Make and Manage Them

Provides working instructions for building a number of highly efficient crystal sets; making an attachment for simple connection to existing wireless set; and designs for crystal sets embodying the crystal loud-speaker system.

Wireless-controlled Mechanism For Amateurs. By Raymond Phillips

This book is an illustrated practical guide to the making and using of short-range wireless control apparatus, and it has been written so simply that it can be understood by any enthusiast possessing an elementary knowledge of wireless.

The Practical "Super-het" Book

Explains what the Super-het is, what it does, how it works, and how to build up a number of super-het sets made of tested, British-made components.

The Short-wave Handbook By Ernest H. Robinson (5YM)

Describes in very simple language the wireless apparatus used in short-wave work, shows how to make it and how to use it, and explains the technical principles with which the beginner will need to become acquainted.

The Practical Wireless Data Book

The intelligent novice, and particularly the home constructor and the keen wireless amateur who is always rigging up different circuits and experimenting for progress, will find this Data Book extremely helpful.

The Wireless Man's Workshop By R. W. Hallows, M.A.

Written by a practical home constructor, this book—containing much useful wireless information—enlightens readers on the selection and right methods of using the tools and materials used in constructing wireless sets.

The Book of the Neutrodyne. By J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E.

CONTENTS: Why Neutralising is necessary; Systems of Neutralising; Difficulties Encountered in Neutralised Circuits; How to obtain Good Selectivity Without Loss of Quality; Design of High-Frequency Transformers; Lay-out in Neutralised Receivers; Some Suitable Circuits.

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BROWNIE

LETTERS TO THE EDITOR

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

Loud-speaker Unit Adjustments

SIR,—Our attention has been drawn by a customer to a short article which appeared in your columns recently dealing with the adjustment of the 66K Blue Spot unit. By removing the dust-cover and adjusting the damping it was stated that a displacement of the armature can be corrected.

Whilst, no doubt, this "tip" was given by the writer in good faith, and he, together with others, is quite capable of carrying out this and possibly other minor adjustments, we have found by experience that it is in the interests of users in general to allow us to make such adjustments as and when required. For this reason the units are sold in a sealed condition under guarantee and, provided the unit is returned to us intact, it becomes automatically the subject of free service and attention.

F. A. HUGHES & Co., LTD.
(London, W.).

Coil Comparisons

SIR,—The letters previously published by you from A.W. (Manchester) and "Novice" (Kingston) are of much interest to me. As an amateur of six years' experience and one who has built many wireless sets incorporating various types of coils, I still think the two-pin plug-in style the best.

Apart from the unlimited choice of wavelengths and reaction variations, if, as in my case, the local station comes in at the bottom (zero) end of the condenser and 5GB near the other end, a larger coil brings the experimental station where the local was originally, incidentally cutting one out and increasing the strength of the other owing to less capacity.

My present outfit is rather novel, although simplicity itself.

It comprises leaky-grid detector followed by three stages of L.F., the first and third being transformers and the second being resistance-capacity, and plug and jack switching is used so that it can be tried as a one-, two-, three-, or four-valve set. It is also possible entirely to cut out the R.C. unit in order that two transformers only can be used. Using a loose-coupled aerial, grid and reaction condenser controlled, I can tune from 18 metres up to 2,000, or over if necessary, just by changing some of the coils—about four changes for the whole scale.

C. (Liverpool).

Is the Regional Scheme Possible?

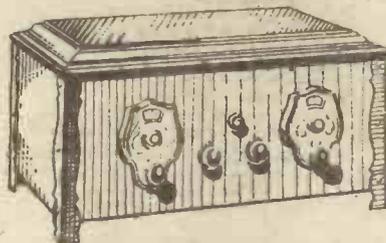
SIR,—May I draw your attention to certain criticisms by R. W. Hallows on page 565 of No. 384, which I consider are unjust and denote a selfish point of view

(Continued on page 704)

3 VALVE S.G. RECEIVER

Still the finest set on the market. Supplied with Coils, 3 suitable Valves (Mullard P.M.12, Triotron Detector and Power).

£5 12s. 6d. cash, carriage and packing free. Or with "N. & K." Cone Loud Speaker, 120 volt Ever Ready H.T. Battery and Oldham I.V.D. Acc., £7 15s. 6d. (Long Range Coils given free with this lot.)



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We absolutely guarantee this Set to receive at least eight different stations, but the general report from satisfied customers is 12 to 15 different stations at full L.S. strength.

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 Clix Plug and Socket can
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Write for descriptive
 leaflets of Clix 2 in Var-
 ieties for perfect con-
 tact.

"LETTERS TO THE EDITOR"

(Continued from page 703)

on his part. Please let me enlighten you
 with the other side of the position.

On the south coast, as, no doubt, you
 are aware, wireless reception conditions
 have hitherto not been of the best as
 regards home stations. We have had to
 rely solely on 5XX, but with the coming of
 Brookmans Park the position is very
 different for us—at least, if the test trans-
 missions are anything to judge by. Let
 Mr. Hallows remember that this station is
 not only for London, but south and south-
 east England; also, he has had two years
 of alternative programmes at good strength,
 while we have to rely on one and must
 wait yet for ours. J. H. S. (Bognor).

The "Ranger"

SIR,—Being a regular reader of AMA-
 TEUR WIRELESS since No. 1, I think
 you will probably be interested to hear of
 the performance of one of your sets. I
 constructed the "Ranger," and am pleased
 to say that it lives up to its name, as its
 range seems to be limited only by atmos-
 pheric conditions. I have already re-
 ceived about sixty or seventy stations at
 various times, and have never used the
 phones. I added a filter output recently,
 which is the only material point in which
 I differed from the original.

C. (Port Erin, I.O.M.)

Are We Progressing?

SIR,—I should very much like to reply
 to the letter by F.P. (Liverpool) under
 the above heading, which appeared in your
 paper of October 12.

The remarks made by F.P. are certainly
 very logical, at first sight, and would
 make it appear to the newcomer to wireless
 that we had only advanced in certain
 directions and had definitely lost ground
 in others.

To take the general question raised by
 his letter, "Are the results any better?"
 (referring to the use of modern apparatus),
 I venture to suggest that quality, not only
 due to the improved manufacture of trans-
 formers, but also to modern circuits, the
 use of grid bias (which in the early days
 was more of a novelty than the usual
 practice), improved valves capable of deal-
 ing satisfactorily with a much larger input,
 and speakers having a more uniform fre-
 quency response, have made the L.F. side
 of the receiver considerably purer and more
 powerful.

Also, with regard to the range of a
 receiver, he must remember that in the old
 days the loud-speaker was hardly ever
 used—at least, so far as DX work was
 concerned—and we considered that we had
 done quite well if we could only just
 understand the announcements or speech
 of a foreign station. Nowadays we do not
 consider that we have truly captured a
 station unless every word is intelligible at
 a foot or so away from a loud-speaker.

(Continued on page 707)

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Brookman's Park

The Tunewell Cut-Out is a wonderfully
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10/6 12/6

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| 34ft. | Tapering 1 3/4" to 1". Carriage: London 2/-; Midlands 3/-; Elsewhere 4/-. Weights 40 lbs. | 15/- |
| 40ft. | Tapering 1 1/2" to 1". Carriage: London 2/6; Midlands 3/6; Elsewhere 4/6. Weights 50 lbs. | 24/- |

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Outfit includes complete equipment, viz.: Best British Steel Tubes in sections, Mast Rings, ample galvanised Stay Wire cut to convenient lengths, Pulley, Cleat, solid Metal Foot Rest and strong galvanised Stay Fasteners. Our masts are stayed at 4 ground points (not 3) which ensures permanent stability.

Accessories: Best MANILLA Rope Halyards (will not rot) 60 ft., 1/6; 100 ft., 2/6. Special anti-rust paint (sufficient for one mast), 1/6. Coppered Earthing Tube, 1/9. C.P. special aerial has 14 strands of No. 28 gauge Enamelled high conductivity pure copper wire, 100 ft., 3/9.

Money refunded if upon examination you are not completely satisfied and return the mast within 7 days.

C. P. MAST CO.
 48 High Street, Penge, S.E.20

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

"Juice" from the Mains.

Q.—Being interested in the construction of a mains unit similar to that described in "Amateur Wireless," No. 319, and possessing 100-volt D.C. mains, I should like details of the current passed by 100-volt carbon-filament lamps.—A. K. (Essex).

A.—Owing to there being a slight voltage drop across the smoothing-circuit choke, the output from the unit you mention for H.T. purposes will be less than 100 volts maximum. We give a list of 100-volt standard carbon-filament lamps and the current each passes: 50 c.p., 2 amp.; 32 c.p., 1.3 amp.; 16 c.p., .6 amp.; 8 c.p., .3 amp.; 2½ c.p., .1 amp.—L. A. C.

Crackling Noises.

Q.—I experience crackling noises in my receiver, and although I have tested every component for continuity and have checked all connections, the noises still persist.—F. L. (Rednal).

A.—Although the components appear to be satisfactory in a continuity test, there is no doubt that one of your parts is defective. First of all, disconnect your loud-speaker and test the set with a pair of phones. If the noises

cease, then the insulation between the winding of the speaker has become impaired. If the

**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 for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

trouble still exists, replace the L.F. transformers in circuit, one by one, with another

that is known to be in working order. Should this solve the trouble, then the insulation of one of the transformer windings has become defective. If either of the foregoing do not enable you to rectify the trouble, and the crackles appear to be recurring at constant intervals, then suspect a choked grid circuit. Replacing grid leaks or re-wiring the grid circuits to each valve should enable you to trace and rectify the fault.—L. C.

Crystal Set and Flat Tuning

Q.—I have an old crystal set and get quite good results from Brookmans Park and 5XX, with two pairs of phones. My complaint, however, is that the set is rather unselective. Can you advise me in the matter?—J. B. (Stratford).

A.—The fact that a crystal is used for "detecting" is sufficient to prevent the receiver from being selective. The crystal itself, being connected with the phones across the tuning circuit, causes damping and flat tuning, and the only way in which greater selectivity can be obtained is to use loose-coupled aerial tuning. Some arrangements for getting selectivity from crystal circuits are given this week in an article "The B.B.C. Brookmans Park Crystal Set." This article will assist you.—C. L.

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Super Reinartz One	AW127
Long-range Hartley	WM54
Special One	WM116
Reinartz One	WM127
A.1	WM153

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Wide-World Short-wave (D, Trans)	AW11
Rover 2 (HF, D)	AW53
General-purpose 2 (D, Trans)	AW55
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Ace of Twos (D, Pentode)	AW143
Home Two (D, Trans)	AW146
Globe DX Two (SG, D)	AW157
East to West Short-wave Two (D, Trans)	AW159
Auto Two (D, Trans)	AW174
All Mains Two (D, Trans)	AW180
Loud-speaker America Two (D, Pentode)	AW190
Talisman Two (D, Trans)	AW194
Hyper-selective Two (D, Pentode)	AW198
Q-coil 2 (D, Trans)	WM62
Crusader (D, Trans)	WM69
Flat-dweller's 2 (HF, D)	WM76
Two-Daventry Two (D, Trans)	WM97
Tetrode Short-wave Two (SG, D)	WM99
Key-to-the-Ether Two (D, Pentode)	WM107
Meteor Two (D, Trans)	WM114
Clipper Two (D, Trans)	WM135
Twinflex (Reflex)	WM138
Continental Two (D, Trans)	WM143
Stay-put Two (All AC, D, Trans)	WM155
Ether Ranger (D, Trans)	WM156
A.B.C. 2 (D, Trans) with copy "W.M." 1s. 3d.	WM160
Brookman's Two (D, Trans)	WM162

THREE-VALVE SETS

All these 1s. each, post free.

Hartley DX (D, RC, Trans)	AW63
Miniature Hartley Three	AW101
Three-valve Mains Receiver (HF, D, Trans)	AW109
British Station Three (HF, D, Trans)	AW122
Simplicity Screen-grid Three (HF, D, Trans)	AW132
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Knife-edge Three (D, RC, Trans)	AW201
Talisman Two-three (D, RC, Trans)	AW203
Five-guinea 3 (HF, D, Trans)	WM129
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Pole-to-Pole Short-wave (D, RC, Trans)	WM89
Glee-singer Three (D, 2 RC)	WM92
Aladdin Three (HF, D, LF)	WM95
All-wave Screened-grid Three (HF, D, Pentode)	WM110
Gramophone Three (D, 2RC)	WM115
Standard Coil Three (HF, D, Trans)	WM117
Festival Three (D, 2 LF-Dual Imp)	WM118
Wide-world Short-wave (SG, D, Trans)	WM120
New Year Three (SG, D, Pentode)	WM123
The Q3 (D, RC, Trans)	WM124
Lodestone Three (HF, D, Trans)	WM129
Simple Screen Three (HF, D, Trans)	WM131
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At Home Three (D, 2RC)	WM141
Short Wave Link (D, RC, Trans)	WM142
Binowave S.G. Three (SG, D, Trans)	WM152
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Overseas Short-wave (HF, D, 2 Trans)	AW133
Facility Four (HF, D, 2 RC—Q-coil)	AW154
Broadcast Picture Four (HF, D, 2RC)	AW163
The Orchestra Four (D, RC, Push-pull)	AW167
All Europe Four (2HF, D, Trans)	AW173
Stability Four (HF, D, RC, Trans)	AW182
Clarion All-electric Three (SG, D, Trans A.C. Rectifier)	AW200
*Music-lover's Gramo-radio (SG, D, RC, Trans)—1s. 6d.	AW202a
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Simplicity (HF, D, 2 Trans)	WM49
Trapped 3-4 (D, 2RC Paralleled)	WM61
Q-coil 4 (HF, D, Trans, RC)	WM71
Screened grid 4 (HF, D, 2RC)	WM77
Five-pounder Four (HF, D, RC, Trans)	WM91
Frame-aerial Four (HF, D, 2RC)	WM85
Touchstone (HF, D, RC, Trans)	WM109
Reyner's Furzehill Four (SG, D, 2 Trans)	WM112
Economy Screen-grid Four (SG, D, RC, Trans)	WM113
Binowave Four (SG, D, RC, Trans)	WM119
Standard-coil Four (HF, D, 2RC)	WM122
Dominions Four (2SG, D, Trans)	WM134
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Music Player (HF, D, RC, Trans)	WM144
Arrow (SG, HF, D, Trans)	WM154
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All-wave Lodestone Five (HF, D, RC, Push-pull)	WM146

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Adaptor for above (see miscellaneous list)	AW67a
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Adaptor for Short-wave Super 6	AW67a	-/6
H.T. from A.C. Mains	AW73	1/6
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"LETTERS TO THE EDITOR"

(Continued from page 704)

I am sure he must agree that there is a great difference in strength between these two conditions of reception.

Another point which he does not appear to have considered is that the number of receivers tuned to any one wavelength definitely reduces the strength of signals received on such wavelength. With improved apparatus the number of people listening to foreign programmes is considerably more than it was only a matter of a year ago—this chiefly owing to the introduction of the screen-grid valve, which F.P. regards merely as a toy.

I am at a loss to understand what he means when he speaks of dead-end losses. To quote his words, "nowadays one never hears mention of dead-end effects; not because such phenomenon is non-existent, but just because it seems easier to have a tapped coil in some corner behind the panel." I think the two chief methods of connecting the aerial to the set in these days are by means of a centre-tapped aerial coil or transformer, or by means of a "Q" coil. In neither case is there any dead-end loss, as the full coil is used, although centre-tapped, and with the "Q" coil the long-wave winding is connected in parallel with the short-wave winding when receiving on the short waves (the coils being placed in series for the long waves). This, as a matter of fact, is equivalent to increasing the gauge of wire used for the short wave band.

There is, however, one point in F.P.'s letter with which I am to a great extent in agreement, i.e., that in order to reduce damping, and so obtain maximum selectivity, our coils should be wound with larger section wire. J. L. (Liverpool).

A Helpful Varley Publication—A section catalogue just published by Oliver Pell Control, Ltd. (Varley), of 103 Kingsway, should be in the possession of every amateur. Each section deals with some specific line of complete sets or components, and listeners can have any one section which interests them or, of course, the complete catalogue. There are five sections, covering the whole Varley range—coils, resistances, transformers, chokes, R.C. couplers, pick-ups, and so on. The receivers range from a two-valver to an all-electric gramophone. In conjunction with the section catalogue has also been issued a most comprehensive instruction book, relating particularly to Varley components and giving very many helpful circuit diagrams, layouts, and much data. This is really the best instruction book of its kind we have seen for a long time, and it should be in the possession of every reader. The publication is nominally priced at 1s., but it may be obtained free of all cost on mention of AMATEUR WIRELESS.

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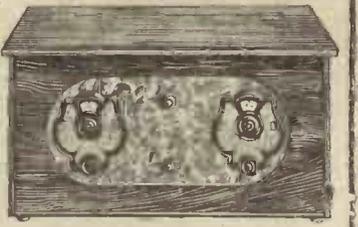
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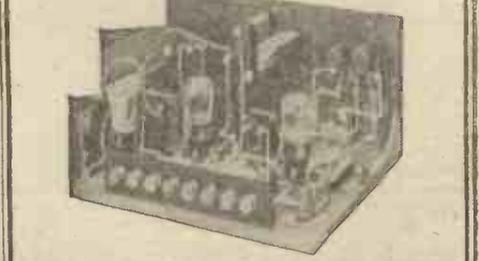
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A group of four new short-wave transmitters recently erected at Pontoise, which lies some fifteen miles to the north-west of Paris, will work C.W. Morse on a number of wavelengths ranging from 14.2 to 40.3 metres. These stations have been allotted the call signs FYA, FYB, FYC, and FYD respectively.

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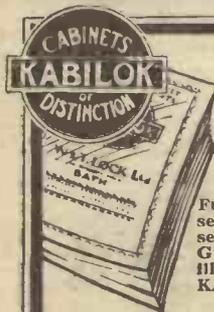
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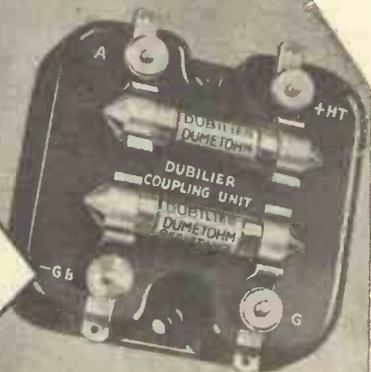
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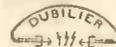


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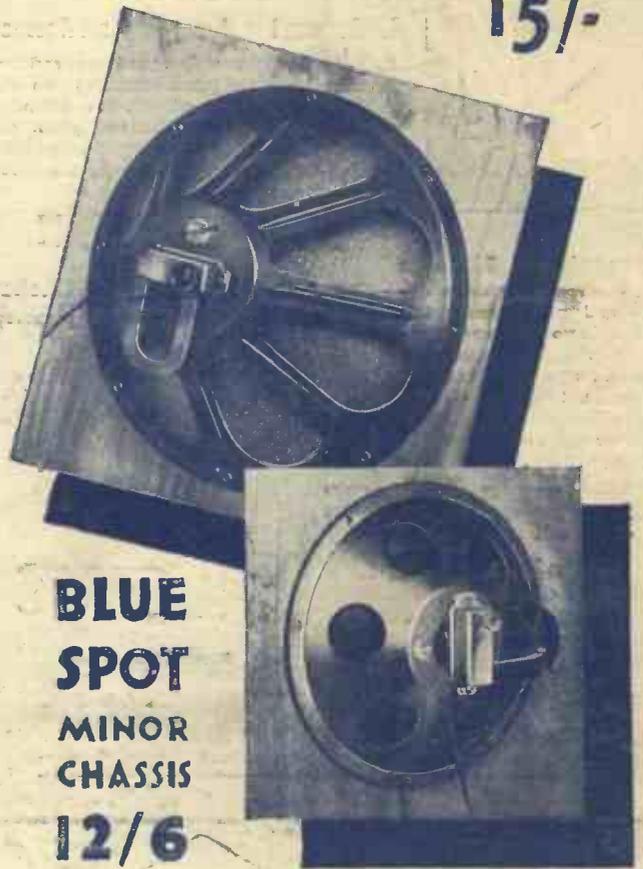
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