WITH GIFT BLUEPRINT OF SPECIAL SET

Amateur Wireless

And Electrics

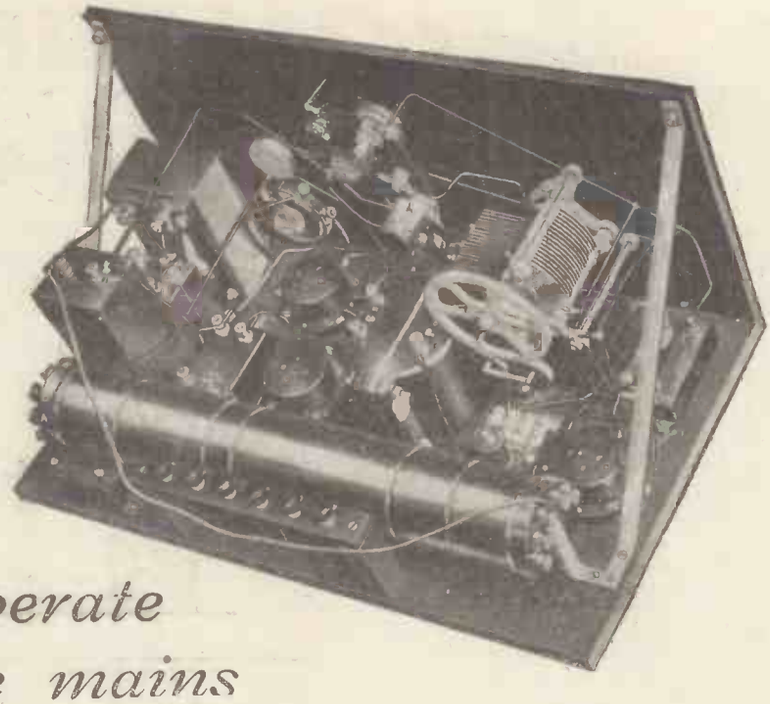
Every Thursday 3d

Vol. XI. No. 281 Saturday, Oct. 29, 1927

FREE FULL SIZE BLUEPRINT

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

You can easily build the D.P.1 Receiver shown here from the FREE constructional booklet provided. A 3-valver, operating direct from D.C. mains, it combines the simplicity of the battery-less receiver with superlative performance.



You *can easily build a receiver to operate direct from the mains*

Marconiphone have evolved it—you can build it—the perfect battery-less receiver for the home constructor. Simple to build, simple to operate, completely trouble-free and amazingly economical in running costs. There are four circuits from which to choose, two for D.C. and two for A.C. Mains, and every receiver in addition to its simplicity, presents superlative qualities of reproduction and tone. Send now for your FREE constructional booklet.

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K.1. 3-valve receiver employing the famous K.L.1 valves.

K.2. Similar to K.1, but in addition incorporates an H.F. stage.

For D.C. Mains

D.P.1. 3-valve receiver—simple to construct.

D.P.2. Similar to D.P.1, but gives greater range and selectivity by means of a neutralised H.F. stage.

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Please send me free constructional booklet, including blueprint for circuit _____

I am also enclosing _____ *for the following booklets* _____

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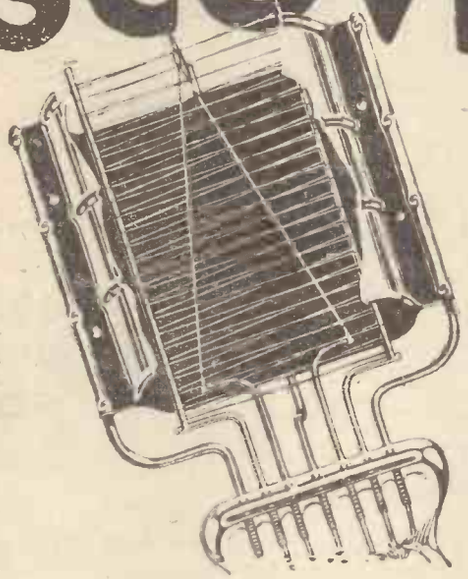
Town _____ *County* _____

AW

A REVOLUTIONARY DISCOVERY



WE are now in a position to announce the successful development of an entirely new series of B.T.H. 2-volt valves. The filaments of these valves are made of *nickel*, a material (never before used for this purpose) which we have found to possess, to an astonishing degree, certain properties and characteristics essential to the production of valves of the highest efficiency.

These new valves—known as B.T.H. Nickel Filament Valves—are definitely superior to all previous 2-volt valves, whether of B.T.H. or any other make.

Briefly, the use of nickel, together with new methods of treating the filament during manufacture, has enabled us to produce a valve possessing the following advantages :

The filament is very much longer than that of any other valve of corresponding type.

As a result the emission is considerably greater, giving a *longer useful life* than any other valve.

These claims may not convey much to you. You can only *prove* the superiority of B.T.H. Nickel Filament Valves by substituting them for the valves you are now using. The difference, however, will astonish and delight you, and is out of all proportion to the cost of the change-over.

B.T.H. Nickel Filament Valves are at present available in three types—all 2-volt—as listed below. Each of these valves will give you better results, *and for a longer period*, than any other make of 2-volt valves.

Ask your dealer for full details.

B. 210 H	B. 210 L	B. 215 P
High Frequency	*Detector*	*Power Amplifying*
Filament Voltage 2	Filament Voltage 2	Filament Voltage 2
Filament Amps . . . 0.10	Filament Amps . . . 0.10	Filament Amps . . . 0.15
Max. H.T. Voltage . . . 150	Max. H.T. Voltage . . . 120	Max. H.T. Voltage . . . 120
10s 6d	**10s 6d**	**12s 6d**

The above prices are applicable in Great Britain and Northern Ireland only.

B T-H VALVES NICKEL FILAMENT

The British Thomson-Houston Co. Ltd.

2840

Forging ahead

Cossor introduces 2 Volt Screened Grid Valves

Cossor 2-volt Screened Grid. Consumption ·1 amp.

22/6

Also 6-volt type. Consumption ·1 amp.

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AGAIN Cossor leads the way. Hitherto only 6-volt Screened Grid valves have been available. Now the exceptional efficiency and the enormous emission given off by the Kalenised filament has made possible the production of a 2-volt Cossor Screened Grid valve giving a far higher standard of performance. Current consumption has been reduced to one tenth of an ampere.

Use this wonderful new Cossor Valve in any Set where screened grid valves are specified—you'll get better results, increased amplification, improved stability with a considerable economy in maintenance. All Cossor Screened Grid Valves are fitted with standard double-ended caps. Build up a Receiver to utilise these new Cossor Valves now—you'll be thrilled at the ease in which you'll be able to pick up distant Stations at tremendous volume. The new Cossor Screened Grid Valve is Radio's latest—and greatest—development.

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Amateur Wireless and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Edited by BERNARD E. JONES

Vol. XI. No. 281 — Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E. — October 29, 1927

"All-wave Roberts Four"—International Show—Condolences!—Super-super Vernier!—"Economy Three"—Competition!

The "All-wave Roberts Four"

IN this issue we give the promised constructional details of the four-valver incorporating the "Roberts" system of neutralisation. Described by Mr. C. A. Oldroyd, the "All-wave Roberts Four" offers few constructional difficulties, and owing to its flexibility as regards the choice of components, it is one of those receivers which all enthusiasts can assemble with little expense. Let us know what you make of it.

An International Show

NEXT year, from March 10 to 25, an International Radio Exhibition will be held at Liège in the Palace of Arts. We hear that many of the stands are already booked and the show promises to be very much of an "international" nature!

Condolences!

"A BATH lady who had been deaf for years put on a pair of headphones and distinctly heard the wireless programme. Messages of sympathy have been received from all parts of the country."—*Sunday Pictorial*.

Consider Ourselves

WE do not wish to damp the ardour of those who favour Empire broadcasting, and who have at long last persuaded the B.B.C. to move in the matter. But please remember that there are literally thousands of listeners—mostly in out-of-the-way parts of the country such as Cornwall and Devon—who cannot get broadcasting satisfactorily on less than three valves. Something should be done for these as well as our friends over the seas.

A Bit Thick!

"AT a time when English was regarded almost as a slave vernacular, Welsh was the language of aristocracy," says the official report of a departmental committee which has been inquiring into Welsh education as affected by wireless broadcasting. The committee finds that Welsh, with its store of picturesque, national literature, and tradition, is in danger of ceasing to be a living tongue. "Nothing short of the full utilisation of the Welsh language in broadcasting," it says, "will meet the case."

CONCERNING "HOOK-UPS"

Some people, before they build up a set to a published description, first "try it out" in "hook-up" form. By this is meant that they gather together a collection of components having more or less the same values as those specified, and wire these up loosely on a bench to the circuit incorporated in the set they are thinking of building.

Then, according to whether the results given by the "hook-up" are good or bad, they either decide to build the set or to leave it alone. Now, this way of "testing out" a set is more than drastic—it is grossly unfair to the designer of the receiver. Certainly, if the "hook-up" works well there is no reason why the set itself, when built, should not give results as good or better, but the mere fact that the "hook-up" does not work, or works badly constitutes a very poor reason for condemning the original set.

For, besides the possibility of many poor connections and partial short-circuits which are likely to exist in such a rough arrangement, it is quite possible, as we have often emphasised, for the mere disposition of the various components relative to each other to have a great effect on the performance of a set, even though the original circuit is strictly followed.

Radio Competition

SUCCESS of long-distance commercial wireless is making some of the telegraph concerns wake up. One well-known cable firm has obtained a wireless concession in Greece, thereby fighting the competition with its own weapon. Another concern in America is planning the erection of half-a-dozen transmitters to assist its cables.

A Double Charge

WE are not sorry for "pirates" who are found out, but we realise that there may be a few unwittingly illicit listeners. It is rather unfortunate for these people that the Post Office always demands *two* summonses: first, for installing a set without a licence, and secondly for working a set without a licence. Does one ever work a set without installing it, and would not one summons cover both offences?

Super-super-Vernier!

A TUNER for a 5-metre transmitter which is being tried out at WGY is controlled by a vernier situated at a distance of nearly 300 ft. Not much chance of hand capacity upsetting tuning!

The "Economy Three"

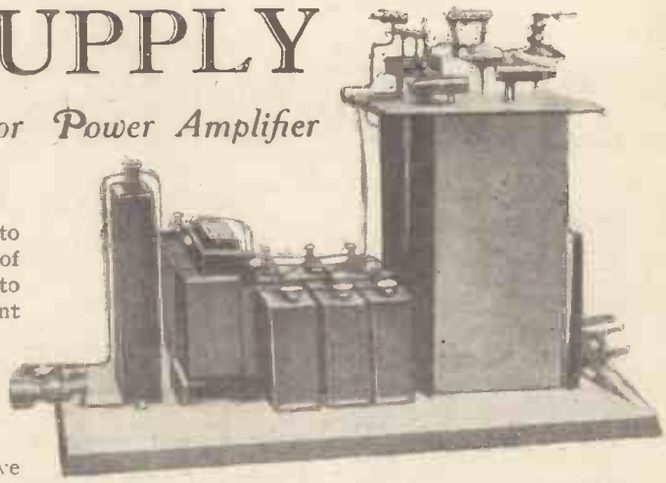
THE "Economy Three," fully described and illustrated on page 605 of this number, is a receiver which will recommend itself to large numbers of our readers. The modified form of Reinartz reaction which is employed is particularly sensitive and efficient and gives strong loud-speaker reception on several stations, while real purity is ensured by the use of R.C. coupling for both L.F. stages. This, however, entails very little sacrifice of volume, for when "R.C." valves are employed the volume on the local station is all that anyone could desire. Finally, as its name implies, the "Economy Three" is not expensive to build. A set which you have been waiting for.

PRINCIPAL CONTENTS

A CHEAP H.T. SUPPLY

Particularly for the Low-power Transmitter or Power Amplifier

By L. A. C. LAWLER (6LR)



AMATEUR transmitters who are the fortunate possessors of 200—250 volt A.C. mains will be interested in the "power" supply about to be described. Users of power amplifiers which require 300—350 volts will also be interested.

No transformer is required as the system automatically "doubles" the voltage from the mains—that is to say a voltage "doubling" rectifier is used. In practice, however, it will be found that in the case of 200-volt mains, for instance, the *useful* output voltage will be less than 400 volts owing to the resistance of the rectifier and smoothing system, together with certain other factors which it is unnecessary to go into in detail. An output of approximately 300 volts can, however, be expected on a load of 25—30 milliamps. With higher mains voltages the output will, of course, be greater.

The materials necessary are :

Six 2-mfd. 300-volt Mansbridge condensers (Dubilier).

One 2-mfd. 1000-volt Mansbridge condenser (Dubilier).

One 30-henry smoothing choke, 75 m.a. (Radielle).

Two 5-amp. cutouts.

One 5-amp. double-pole switch.

¼ lb. pure ammonium phosphate.

½ lb. pure aluminium wire (5 millimetre).

One ounce bicarbonate of soda.

Four strips of lead, 6 in. by ½ in.

Four test tubes, 8 in. by 1½ in.

Four terminals.

All the necessary parts for the rectifier—ammonium phosphate, aluminium, lead, test tubes, etc., can be obtained from J. J. Griffin & Sons, of Kemble Street, London, W.C.2, or the local chemist could arrange to obtain it.

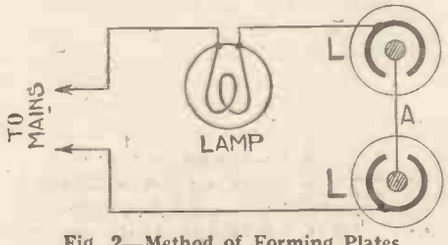


Fig. 2—Method of Forming Plates

The Rectifier

On examining Fig. 1, it will be seen that the rectifier is of the electrolytic variety. The writer has heard many opinions as to the efficacy of electrolytic rectification—some good—some bad, the bad ones mostly from persons who expect satisfactory results from a teaspoonful of electrolyte and an infinitesimal piece of aluminium. Actually it is only necessary to immerse a small part of the aluminium in order to get the necessary current output. The writer finds, however, that the use of large electrodes lengthens the life of the cell enormously.

Many arrangements have been tried with a fair measure of satisfaction. The one described, however, had been in use on an amplifier for 18 months before it was used for transmission. The same rectifier has been in use for nearly two years, with only one renewal of the electrolyte.

Making the Cells

Four cells are necessary. These consist of the four test tubes, which should be

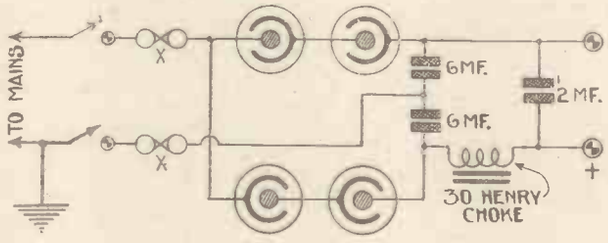


Fig. 1—The Circuit Arrangement

mounted in a wooden rack. If the cells are to be enclosed in a box, ventilation should be provided. Two ¼ in. holes will be sufficient.

Next obtain four corks to fit the tubes. Rubber stoppers are to be preferred, but are not necessary. Two electrodes are required for each cell, one aluminium, and one lead. The lead has a hole made at one end to take a terminal. A 6 in. length of aluminium is then cut off, and one end hammered flat. A hole is then drilled for the terminal. Two holes must be made in the corks, and the electrodes forced into them. The electrolyte for each tube consists of a dessert-spoonful of ammonium phosphate dissolved in sufficient water to come within 2 in. of the top. To this add a teaspoonful of sodium bicarbonate. One inch of medicinal paraffin is then poured on to the electrolyte, and the electrodes mounted in the tubes. Care must, of course, be taken to ensure that the electrodes do not touch.

Forming the Plates

The aluminium must next be formed. To do this, take two of the cells, connect the aluminiums together while the lead electrodes are connected across the mains in series with a lamp, such as is normally used on the house circuit. The arrangement is shown in Fig. 2. Leave the cells connected so for about a quarter of an hour. By this time the lamp will have dimmed to an almost imperceptible glow. Now take the other pair of cells and repeat the process. When this has been done, connect up as shown in Fig. 1. The earthed main is taken to the point between the condensers. The earth connection shown in the diagram is merely to indicate the earthed main. *On no account should this connection be made by the constructor.* The supply is already earthed, and any other earth connections to the house supply will cause the engineers endless trouble.

The means by which it is possible to discover which main is earthed, is simple : Connect one terminal of a lamp to earth, (don't use the gas bracket !), the other lead from the lamp is then connected to each of the supply wires in turn. The wire which lights the lamp is the "live" wire, and the other should, therefore, be connected between the condensers (*see* Fig. 3).

Fuses are provided in each lead from the mains, these are marked X in the diagram. The switch should be of the double-pole type. In lieu of this, however, a bayonet

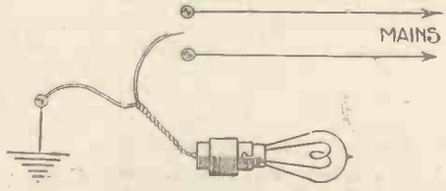


Fig. 3—Testing for Earthed Main

adaptor or 2-pin plug may be used.

If any part of the apparatus to which the H.T. supply is connected is earthed, the connection should be made only through a suitable condenser which is capable of withstanding the full mains voltage, as both sides of the H.T. are above earth potential.

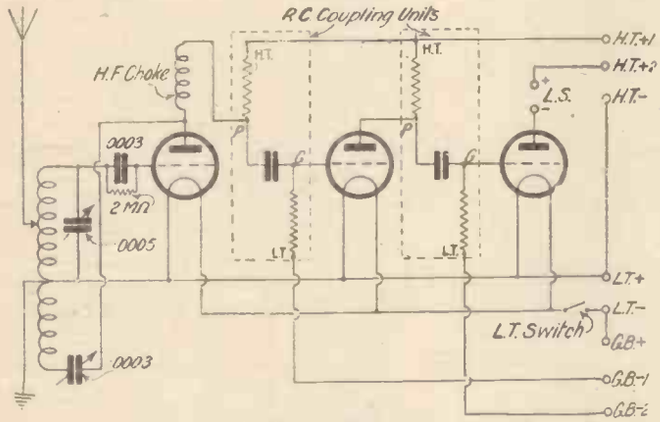
The rectifier which is in use at 6LR. gives the transmission a pure D.C. note.

The Economy Three

By R. J. O'CONNELL

THE "Economy Three," as the title implies, is a successful attempt to produce an attractive and powerful cabinet receiver at a moderate price.

With the coming of the long evenings, many readers of limited means will desire to possess a set capable of giving them a choice of programmes on the loud-speaker.



The Circuit Diagram

In order that any member of the family can operate it they will require a set that is simple to tune; the cost of construction must be low. To these readers the "Economy Three" is strongly recommended as the total cost should not exceed three guineas.

Circuit

After consideration of various circuits it was determined that the above results could most easily be obtained by using a really efficient detector valve, followed by two stages of resistance-capacity coupled low-frequency amplification.

As readers know, the Reinartz circuit is one of the most efficient detector valve arrangements known to wireless engineers, and it was, therefore, chosen for this set. The circuit used is shown by the diagram.

Components

In the following list of components the names of the makers of the parts used in the set, shown by the photographs, are given first. In accordance with the usual policy of AMATEUR WIRELESS, suitable alternatives are also given, but it should be remembered that the cost of the set was estimated at three guineas when using the first-mentioned parts. If alternatives are used, the cost may be more or even less.

One ebonite panel, 14 in. by 7 in. by ¼ in. (Paxolin, Peto-Scott, Ebonart or Camco).

One baseboard, 14 in. by 7 in. by ¼ in. (Camco).

One oak cabinet to take above panel and baseboard (Camco)

One terminal strip, 8 in. by 2 in. by ¼ in. (Camco, Peto-Scott, Ebonart).

Two fixed coil sockets for baseboard mounting (Lissen).

One .0005-mfd. variable condenser (Ormond, Centroid, Jackson).

One .0003-mfd. variable condenser (Ormond, Centroid, Jackson).

One on-and-off switch (Wearite, Trix, Lissen, Bulgin).

Three valve-holders (Lissen, Redfern, Benjamin).

Two resistance-capacity coupling units (Lissen, Dubilier, R.I. and Varley).

One .0003-mfd. fixed condenser (Dubilier or Lissen).

One 2-megohm grid-leak (Dubilier or Lissen).

One H.F. choke (Wearite, Lissen, Trix).

Eleven terminals (Belling-Lee).

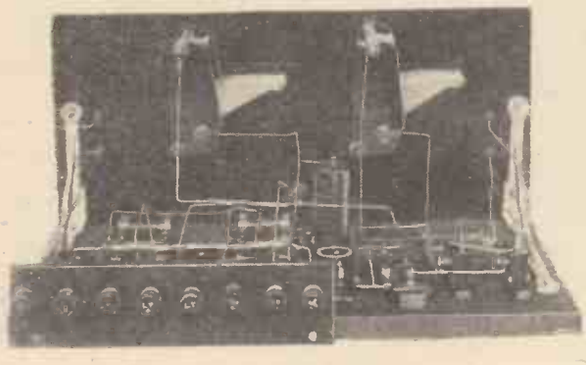
Connecting-up wire (Junit or Glazite).

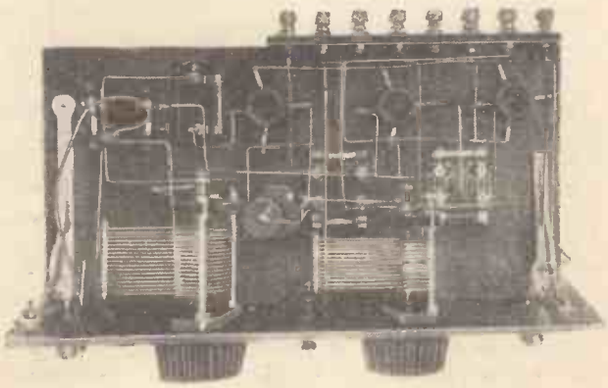
Mounting the Components

If the components mentioned first are used, the panel may be drilled according to the diagram, but should any of the parts be of other manufacture then the reader must assure himself that the dimensions shown will give sufficient clearance. After all the holes have been drilled, secure the panel to the baseboard and ascertain that both are a good fit in the cabinet. Next mount the components on the panel and baseboard as indicated in the diagram, after which the wiring may be commenced.

Wiring

In wiring up any set it is essential that the soldering iron be properly heated. If





Right: The simple Construction is apparent from this photograph

Left: A Rear View of the Economy Three

the iron is over heated it will require retinning frequently. In the construction of this particular receiver the writer used a Junit soldering iron which possesses the advantage of having a tinned sheath which is placed over the bit after it has been heated. This iron can be strongly recommended.

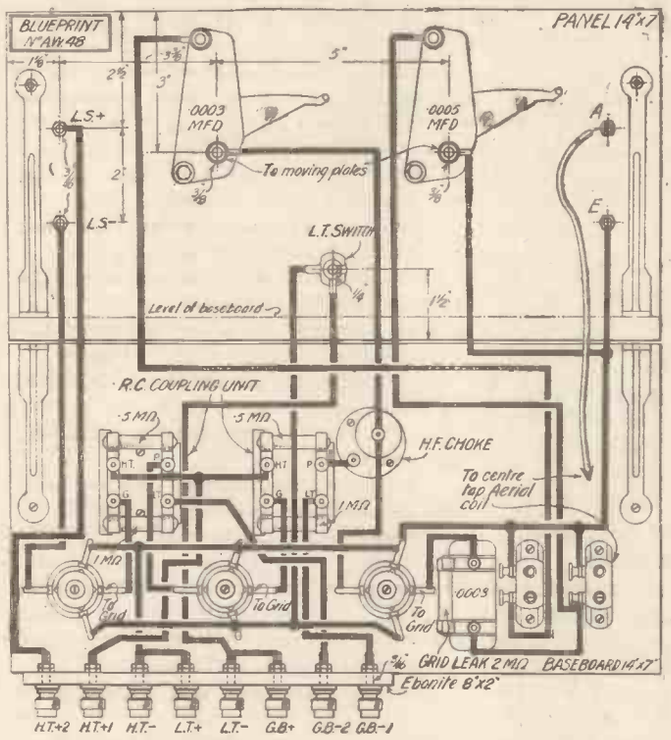
The wiring itself is quite simple, but readers are advised to obtain a copy of the blueprint (price, 1s.).

The filament circuit should be wired up first, then the resistance-capacity coupling units and lastly the variable condensers.

Valves to Use

This receiver is intended for use with 2-volt valves and all three valves should be of the same type, since no filament resistances are used.

In the original receiver two SS210 and one SS230 valves were used and these gave very satisfactory results.



Left: Wiring Diagram of the Economy Three (Blueprint available price 1/-)

Right: This Picture shows the Valves and Coils in position

Other 2-volt valves which will be found quite suitable are manufactured by Cossor, Marconi, Osram, B.T.H., Cosmos, Mullard, and Ediswan.

Testing

When the receiver has been completed the wiring should be thoroughly checked and tested before an actual test of reception is carried out.

Place the valves in their respective holders and connect up the low-tension supply and push in the on-and-off switch. Now connect up the high-tension battery, putting on a small voltage of about 3 volts, and note if any change occurs in the brightness of the valve. If the wiring is correct no change will be observed and the set is ready for use.

Results

During a short test, nine miles north of 2LO, very good results were obtained. Among the stations received at good loudspeaker strength were 5GB, 5XX, Radio Paris, Langenberg, Homburg and of course 2LO.

The coils used were Lissen centre-tapped. Other suitable coils are manufactured by Messrs. Gambrell Bros., A. H. Clarke and J. R. Wireless, Ltd.

More About the "Simpler Wireless" Special Three

ALTHOUGH nearly all the readers who have written to us regarding the "Simpler Wireless" Special Three which was described in No. 279 (Oct. 15) have had no difficulty in getting splendid volume and purity, some few have been troubled by a "hum" due to commutator ripple. This is not very surprising. As the set employs no smoothing chokes or condensers, depending entirely upon a "cancelling out" effect peculiar to the "Simpler Wireless" system, the "hum" at once makes its appearance if the conditions are not correct for complete "cancelling out."

The valves used are of considerable importance. With some valves the correct operating conditions for the complete elimination of the commutator ripple are not the best for the operation of the valve as rectifier or amplifier. As none of the valves at present on the market have been specifically designed for the "Simpler Wireless" system, those valves which work well when used in a "Simpler Wireless" set do so more or less by "accident" and have to be found by experiment.

This does not mean that only a few of the present valves are suitable. On the contrary, every R.C. valve that has been tried in the centre position of the "Special Three" has worked well there, as has also every power valve tried in the last stage. But with regard to the rectifier more care is necessary. Obviously, if the rectifying valve introduces any "hum" into the set it will be amplified by the two succeeding stages. Besides this, while the operating points of the two amplifying valves can be moved about considerably in order to secure complete "cancel out" without in any way affecting the quality of the reproduction, there is obviously only one point at which an anode-bend rectifier can be operated efficiently. If this point does not coincide with the "cancel out" point, the valve is not suitable for use as a rectifier in a "Simpler Wireless" set.

Valves

In this connection it may be of assistance to readers to mention that the Mullard PM1H.F. valve has been found an excellent anode-bend rectifier for the "Special Three." Splendid results, with a complete "cancel-out" of ripple, were obtained using all Mullard valves as follows: Detector, PM1 H.F.; first L.F. stage, PM1A; and in the last stage either a PM4 or a PM6. The best value of the anode resistance with these combinations was one megohm.

Readers who do not get excellent volume and quality without any appreciable "hum" with the "Simpler Wireless" Special Three are certainly not working the set to the best advantage. They are urged to write to us stating their difficulties, as we are particularly anxious that everyone who builds this set shall do so with the greatest success.

A Man of Ideas, by Miles Malleson, is being produced at 5SC on Saturday, October 29. The cast includes R. B. Wharrie, Tyrone Guthrie, and Alleyne Elliott.

Cryptic Weather Words —and Their Real Meaning

By DONALD W. HORNER

YOU can get plenty of interest instead of boredom out of the broadcast weather reports and the weather charts published in the press if you know the meaning of a few of the somewhat cryptic words use in the reports. Such words are only employed because they are a convenient form for the expression of otherwise long-worded descriptions.

Barometer Readings

First you must understand that the basis of meteorological readings and reports is the reading of the barometer and the level of the mercury in the glass. Most of us know that when "the glass is low" it foretells bad weather, and this is no more and no less than the expert means when he speaks of the "low pressure" and "cyclones" which have been such frequent and unwelcome visitors during the past summer. Your less technical "glass is high" or "glass is rising" is our "high pressure" or "anticyclone." Perhaps "cyclone" in itself is an unhappy choice of words, because to most people it means tearing gales, hurricanes, typhoons, whirlwinds, and other devastating winds, when the weather expert really means nothing more, may be, than a low glass and a drizzle of rain, hence the adoption in recent years by the Meteorological Office of the term "depression" instead.

When we announce that "a depression is approaching" we merely mean that the barometer reading (or "the glass") was low, say, 100 miles off this morning and only 50 miles away this evening. If that low-pressure area reaches us we get bad weather. On the other hand, if the "high pressure system," or area in which the barometer reading (otherwise again "the glass") is high, extends to us, we get good weather.

We ascertain the approach and direction of such high or low pressure areas because weather observers in various parts of the world, and especially in Western Europe and in ships out in the Atlantic Ocean, take barometer readings, and we collect their reports. If a report of a "depression" comes first from Iceland, and later from the North of Scotland, we may reasonably say that that particular depression is "approaching the British Isles." Most of the readings we get, or seriously consider, are from the Atlantic or Iceland, because in these directions the wind and the ice breed most of our nasty weather.

Isobars

Anyone who understands the term "gradient," or "grade," applied to a road or railway, can equally comprehend the word "isobar," and anyone who understands the rings marked on a contour map to indicate varying levels of ground, can read the meaning of the isobars marked in wavering rings on the weather charts.

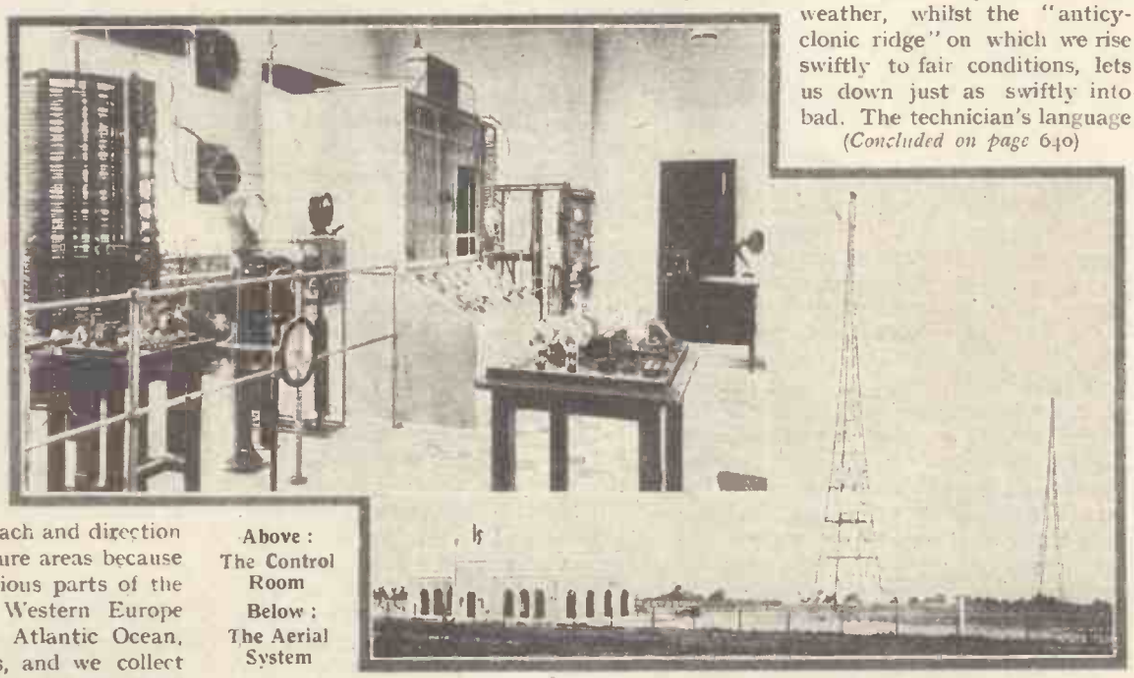
If you say a railway has a gradient, or rise, of "1 in 20" you mean the line rises 1 ft. for every 20 ft. it advances. On a map which is marked in metre or foot contours and is on a scale of, say, 1 in. to the mile, you know that if the contour rings are one inch apart the ground level rises or falls one metre or foot in one mile. So, exactly, the rings of isobars mark a rise or fall in the barometer readings at points of the wavering rings. If the rings are close together on the weather chart, it means that the difference in level is recorded at places close together, as it would mean in contour lines on the map. Just as the engineer says his grade or gradient is steep, so the meteorologist says "the gradients are steep for south-westerly winds," and gives them as such in his general inference.

After an area of low pressure, that is, low barometer, has passed away, the "glass" takes an upward bound and a short spell of fine weather ensues. This is known as an "anticyclonic ridge," meaning a narrow area of high barometer and fine weather. The brief periods of good weather we have enjoyed in the past summer were due to these ridges.

The large anticyclone, which slowly drives out all the depressions, forcing them to take another path, like that which appeared at the beginning of October last, is an example of the opposite kind, giving us a fair period which may sometimes continue for many days or even weeks together.

Just as a wave which rises in long gentle slopes is likely to descend similarly on the other side, or as one which rears up steeply in a "short seas" and is equally steep on the further side, so the "anticyclone" gives a well established period of fine weather, whilst the "anticyclonic ridge" on which we rise swiftly to fair conditions, lets us down just as swiftly into bad. The technician's language

(*Concluded on page 640*)



Above: The Control Room
Below: The Aerial System

Pictures of the new high-speed wireless telegraph station at Lima, Peru. This is a 15-kilowatt valve transmitter built by the Marconi Company to replace the old San Cristobal station.

LETTERS TO THE EDITOR

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

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

The Grenoble Station

SIR,—It may interest your readers to know that the power of the Grenoble station has just been increased from 500 w. to 1,500 w., and that it is most unlikely that any further change will be made in this respect, although there is still some talk of altering the wavelength. At present this station transmits relays from Lyons, Marseilles, Toulouse, and occasionally Paris, working from 8.30 to about 10.30 every Wednesday and Saturday evening. Next month they are commencing a regular service, transmitting every evening, including Sundays. The transmissions are exceptionally pure, and I should think the station would be well worth "raking in" at home. The wavelength is at present 278 m.

O. J. R. (Grenoble, France).

A "Mains" Point

SIR,—In No. 279, F.G.S., of Birmingham, fails to understand how, on a D.C. supply operated on the "three-wire system" the positive and negative mains can be simultaneously earthed in different houses. Perhaps the following may be of assistance. In the power station, virtually (though not actually) two dynamos generating at the same voltage, usually about 220, are connected in series. There are then two "outer" terminals between which a voltage of 440 exists, and to these are connected the two "outer" mains of the supply system. The cable, or bus bar, which connects a positive terminal of one dynamo to a negative terminal of the other to give the series connection is earthed *at the power station*, and is also connected to the third main cable, known as the "neutral." Throughout the distribution system lamps and quite small motors are made suitable for 220 volts and connected between either of the "outers" and the "neutral." Larger motors are wound for 440 volts and are connected across the "outers." For domestic supplies the "neutral" and one only of the two "outers" are brought into each house. As one "outer" is 220 volts positive and the other 220 volts negative with regard to earth, the apparent anomaly is explained.

Two important points arise in connection with this system which seem to be seldom mentioned. Owing to the fact that the "neutral" is earthed *at the power station only*, and to the voltage drop due to the resistance of the supply cables, which is quite considerable at times of heavy demand, in a house situated at some

(*Continued in next column.*)

distance from the power station, the actual potential of the "neutral" conductor may differ from the earth potential at that point by quite a considerable number of volts. This fact furnishes the reason why a condenser in the earth lead should *never* be omitted in the case of a radio set taking power from D.C. mains.

The other point is that when batteries are to be charged, or when any low voltage apparatus is to be operated through lamps or a resistance from D.C. mains on which one side is earthed, the order of connection should invariably be as follows: Unearthed or "outer" supply main to a single-pole switch. S.P. switch to a single-pole fuse. Fuse to lamp or other current-limiting resistance. Resistance to battery or other low-voltage apparatus, and from the last *a direct connection should be made to the earthed main* without the interposition of any fuse or single-pole switch. In no case should any connection be made to earth direct. The reason for this is that under these conditions the low-voltage apparatus will be at all times practically at earth potential, and is thus rendered safe as regards fire risks due to poor insulation or shock if it be touched If a fuse or switch is placed in the earth lead, and this blows, or is opened while the apparatus is still connected to the main on the other side, the whole of it is at once raised to the full mains potential, positive or negative, as the case may be, as regards earth, which is always undesirable and often dangerous, especially if left in that state.

—J. H. S. F. (Sidcup).

For the Newcomer to Wireless

How Walls Become Transparent

YOU know, there is one thing that has always puzzled me about wireless. Brown across the road doesn't have a mast and a wire in his garden, but uses what he calls a frame aerial. The frame is right inside his house, of course, and I can't see how these wireless waves of yours get to it. How on earth do they travel through the bricks and mortar of the walls?

Just look across at Brown's house. Can you see it?

Yes, of course I can.

But you are looking through solid matter. Glass is just as much a solid as bricks and mortar, but light waves have no difficulty in passing through it.

I know, but then glass is transparent.

Is it? Then what's the use of that glass thing that you have in front of your fire?

Oh, that's a fire screen.

It lets you see the cheerful glow, but keeps the heat from you if the fire becomes too fierce?

Yes, that's it.

In other words that screen is transparent to light waves, but not transparent to heat waves.

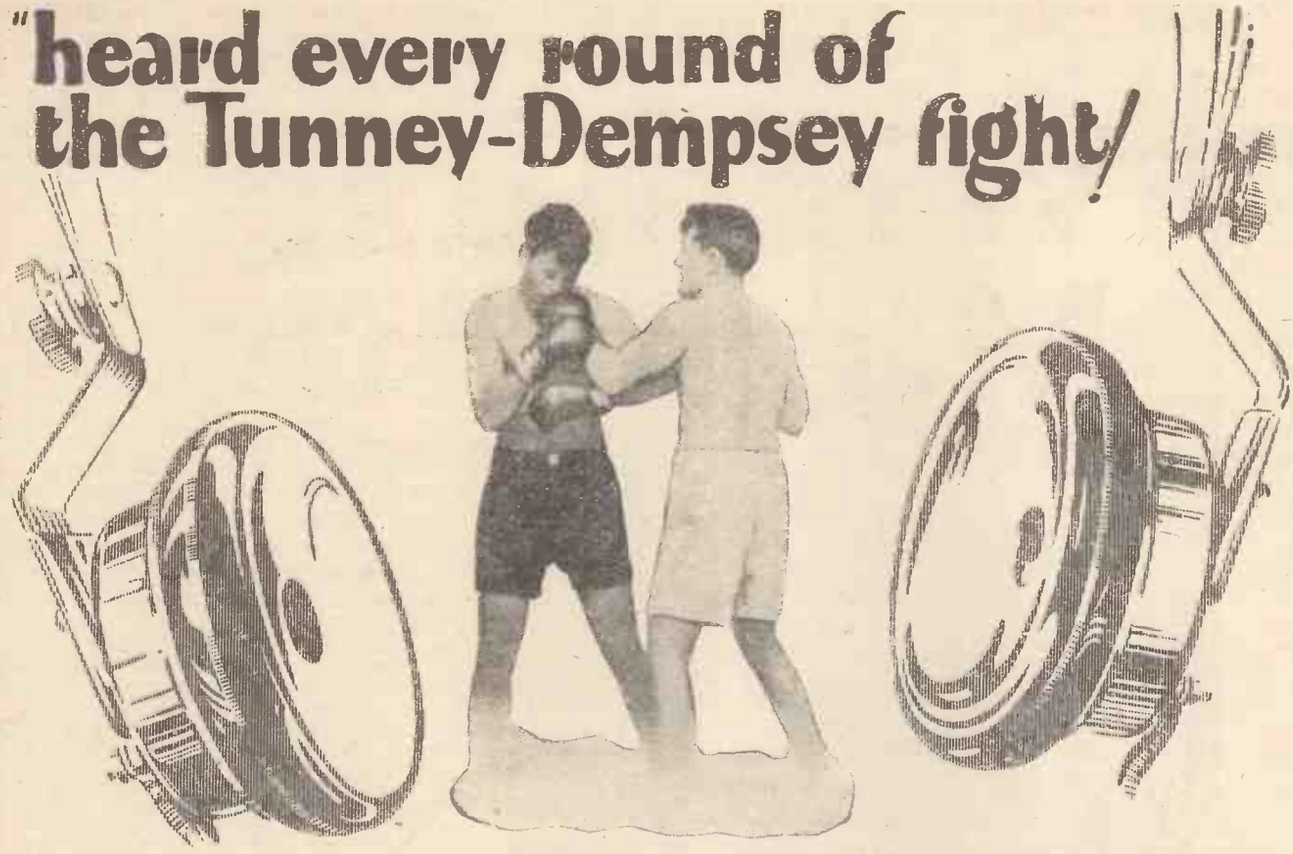
I hadn't thought of it in that way.

Then lead glass is perfectly transparent to light, but practically opaque so far as X-rays are concerned. In fact it is used by X-ray operators to protect them from evil effects.

Then light, heat and X-rays are all caused by waves?

Yes, they are all due to waves which travel not through the air but through the ether at the pretty little speed of 186,000 miles a second. Wireless waves travel at the same speed. Whether it produces the effect that we know as light, heat, X-rays or wireless all depends upon the number of times that the wave moves up and down or oscillates in a second. That's all the difference there is between them. And different substances are transparent to different kinds of waves. Now you see how it is that wireless waves pass through walls just as easily as light waves through glass.

"heard every round of the Tunney-Dempsey fight!



A word about the Ediswan Local Station Eliminator.

No set is complete without this new Ediswan wavetrap. It cuts out the local station sharply and totally and allows you to reach out for other stations within the capabilities of your set.

Your local wireless dealer can supply

25/-

Read this remarkable testimony to— EDISWAN VALVES!

London.

"I constructed a four valve short wave receiver and purchased four Ediswan valves . . . Since then I have tuned in 2XAF on 14 occasions out of 15 attempts.

This morning, using three pairs of headphones, I again tuned in 2XAF and heard every round of the Tunney-Dempsey fight, the reception of which was clear, loud and absolutely excellent and the best I have received, and I should like you to know that this result lies in the functioning of your Ediswan valves." W.J.B.

During October, LAST YEAR, a similarly remarkable testimonial to Ediswan Valves was published from Mr. C. L. Ashhurst, Norwich, and two friends, who heard every detail round by round, of the great Dempsey v. Tunney fight.

Letters like this speak more than pages of advertising.

WHAT SET?

WHICH VALVE?

Say what set you have—or the set you are going to build—and we will tell you the valves to use. Post the description to us with the coupon—TO-DAY.

To The Edison Swan Electric Co., Ltd., (Publicity), 123/5 Queen Victoria Street, LONDON, E.C.4.

Particulars of my set are attached. Send me your valve booklet marked up with the valves you recommend.

"A.W."—29.10.27

Name.....

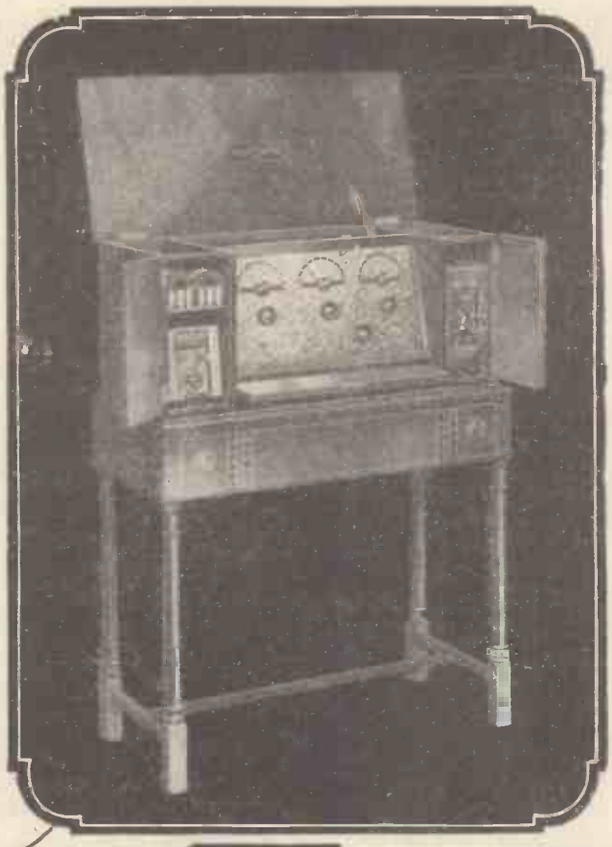
Address.....

.....

V. 62

EDISWAN VALVES

Clearest, Strongest, Last the Longest



MET-VICK
(COSMOS)
Wireless Sets and components
for the new season

The illustration shows the new Met-Vick 5 with the eliminators contained in the side cupboards. It can be plugged into a lighting circuit just like any other electric appliance. If used with H.T. and L.T. batteries these can be accommodated in the cupboards. The circuit employs two phase-balanced and stabilised H.F. stages before the detector, and two resistance-coupled L.F. stages.

Operation is extremely simple, the local station can be easily cut out and a wide range of alternative programmes obtained. Special attention has been paid to running costs, which are remarkably low.

The Met-Vick 5 is a really beautiful instrument, and while a distinct advance on any 1926 model it still remains at a reasonable price. Obtain Leaflet 4117/9.

MET-VICK

BATTERY ELIMINATORS

"Met-Vick" Battery Eliminators are supplied in two models. The H.T.-G.B. Model can be used on various supply voltages of 40-100 periods. Grid Bias tappings are provided at 5, 10, 15 and 20 volts. A high voltage (up to 250 volts) can be applied to the last valve. The L.T. Model gives an output of 5 amperes at 4 volts without hum.

List 7117/8

A.N.P. (Astatic-Non-Parasitic) COILS

These new "Met-Vick" products provide a clever solution of a difficult problem. They overcome, simply and efficiently, the three difficulties associated with H.F. amplification, namely, Magnetic coupling between coils, Stabilisation, and Parasitic Oscillation.

List 4117/8

RESISTANCE COUPLING UNITS

"Cosmos" ("Met-Vick") Resistance Coupling Units are well known to all wireless enthusiasts. The "V" type can now be obtained fitted with new "Met-Vick" A.C. Valve-holder. The latter is also supplied separately.

List 7117/8

Have you seen the new Met-Vick A.C. Valves? Obtain Lists 4117/3 and 7117/8.

The various literature mentioned above gives full details and prices. Ask for your copies.

METRO-VICK SUPPLIES, LTD.

(Proprietors: Metropolitan-Vickers Elec. Co., Ltd.)

155 Charing Cross Road, LONDON, W.C.2

See them on Stands 34 and 35 Manchester Radio Exhibition October 24th to November 5th

R
P67

On Your Wavelength!

The Sydney Relay

FROM the point of view of the listener, the B.B.C. relay of the 2FC (Sydney) broadcast on Sunday, October 16, was not a success, but this should not discourage the Corporation from making further attempts as and when the opportunity is given to them. On that particular evening, at the time at which the relay was taken from Keston, the atmosphere was at its worst, and even the short waves suffered not only from static interference, but also from high-speed fading. As a matter of fact, later, conditions considerably improved, and by the time the B.B.C. transmitters had decided to close down until the sacred service the 2FC broadcast was being received by the Keston engineers in a highly satisfactory manner.

Other Stations Available

Considering that London and 5XX were free until 7.55 p.m., and that Daventry Experimental was not due to come on the air before 8 p.m., it appears to me that there can be but little elasticity in the B.B.C. organisation if, on these special occasions, some departure cannot be made from the fixed schedule. A transmission to be heard from a station some 12,500 miles distant is not of daily occurrence, and there is no doubt that the Sydney studio, in view of the time at which the broadcast was made, had gone to considerable trouble to please us.

Taking this into consideration, I cannot see the reason for which, if the early part of the transmission was unsatisfactory, our home stations could not have stood by for some little time and later, when conditions improved, have given British listeners a further instalment of the Australian programme—even though the broadcasts for the day are fully mapped out. With its existing organisation, it must be surely in the power of the B.B.C. to cope with such an emergency.

Good Reception Later

It is public knowledge that on Sunday, October 16, the Keston engineers were holding the 2FC transmission for some considerable time, and that when our transmitters went off the air were satisfactorily passing the broadcast to their own officials at the Savoy Hill headquarters by landline. The British listening public, in fact, could easily have been given a further thirty minutes of the Australian broadcast!

The Important Grid Leak

Not so very long ago one of the first points that we looked to in a set which was faulty in any respect was the grid leak and possibly the condenser. The improvement in these components has been such that of late there has been a tendency to overlook these important components. Yet the fact remains that a defect in this portion of the circuit is capable of producing the most extraordinary results. I came across a case only the other day where a set, a simple four-valver in construction, gave the most unhappy results. There appeared to be H.F. all over the place. Indeed, the low-frequency valves seemed to consider that they could do the job of the high-frequency stages better than their own, and there was a most unholy mix-up. All I could obtain from the set—which, by the way, was a portable—was a series of squeals with occasional bursts of faint music in the background.

A Wonderful Difference

I tried the usual methods of diverting errant H.F. into its proper channel, with partial success; but after obtaining something like reasonable working from the set I measured the grid leak, and found that it was 4 megohms instead of 2, while the condenser was also incorrect in value. The replacement of the grid leak by one of the correct value made an incredible difference. All the other correcting devices could be removed again leaving the only alteration, that of the grid leak, and the set then proclaimed itself in stentorian tones as thoroughly satisfied with life. Indeed, I could hardly credit the difference in the set due to this very simple cause, yet a reversion to the old grid leak reintroduced all the trouble.

Thus, although we have become accustomed to a much greater reliability in these small components, yet we should not lose sight of the fact that they are liable to break down occasionally, and if they do they are capable of producing an awful lot of trouble.

Does Yours Howl at You?

Some short-wave sets have peculiar little ways of their own. One that I know used to behave itself perfectly well so long as only one note-magnifier was in use, but went on simply anyhow when a second was brought into action. If a short-wave set howls at you when you move your hands or if you find that touching the receivers of the telephones alters the tuning or produces plocks or squeaks, you may be pretty sure that the trouble is caused by high-frequency impulses getting through into the low-frequency department. Shunt the primary of each transformer with a small fixed condenser and use another across the phones. This is sure to improve matters, though on very short waves—20 metres and below—you may possibly find that the trouble crops up again. In this case try the effect of fitting an 80-turn choke in each of the phone leads. Whatever you do shunt every part of your high-tension battery with large fixed condensers. The absence of these may give rise to most unpleasant effects.

An Interesting Development

They are making a good deal in America just now over a novel collector system which is a good deal different from that consisting of a high wire suspended out of doors and an earth plate. Instead of hanging the aerial up, it is buried underground.

This buried aerial, or antenna to give it the name that it bears in its own country, is the result of prolonged investigations into the question on the elimination of atmospherics made by Professor J. H. Rogers. In a recent communication he states that burying the aerial produces practically no diminution of signal strength, though it does reduce atmospheric interference, even in thundery weather, to something altogether negligible.

In America they know something about atmospherics, for normally they are far worse over there than we ever know them here. We have complained little enough about conditions during the present apology for a summer, but when you come to think of it, things have hardly ever been bad enough to spoil reception of the local station, as they often are in the States.

There are many forms of buried aerial which give successful working. I hope to try one or two of them out in the near future and to give you the results of my experiences with them. If the buried aerial is as good as it is said to be, it should be a considerable help towards obtaining a lessening of the wipe-out effect of a powerful local station, for it apparently gives a higher degree of selectivity.

I am wondering, though, what results it will give in localities where there are power stations or electric trams or railways. In such cases earth noises are often very troublesome, and burying one's aerial would seem rather like "asking for it."

A Useful Tip

The advice to keep all battery leads as short as possible in order to avoid direct pick-up effects is very sound, but it cannot always be followed. Many wireless users find it convenient to keep their accumulators in a corner of the room some distance away from the set, and to bring leads from the battery to a plug point in the wall. When this is done, direct pick-up effects can be eliminated by making use of twin lead-covered cable between the battery and the plug point. The casing of the cable should be earthed. Long leads

On Your Wavelength! (continued)

however, have one very bad fault, quite apart from the question of direct pick-up; always the cause of a considerable potential drop. If therefore your filament batteries are at some distance from the receiving set it is quite likely that you will need less resistance in your rheostats or fixed resistors than that shown in the maker's figures in order to obtain the correct filament potential. The longer the leads the stouter in any case should be the wire employed.

Where Did That One Go?

Many people have tried to solve the mystery of what happens to lost pins. So many are manufactured every year, and by all calculations the whole country should be covered to about one foot deep by this time with those that have been lost. An equally perplexing problem is what happens to small wireless parts. I suppose in my time I must have bought more than a gross of valve legs. When I build a new set I dismantle the old one and put all its useful parts into various boxes. There is on my workshop table a box labelled "Valve legs," but when I opened that box recently in quest of one of these I found that it contained nothing but emptiness. In fact, I cannot find a valve leg anywhere. B.A. nuts I always purchase by the gross. So far as I can see, I must have lost about a million of them in the last three or four years in my small house. Sackfuls of screws, washers, valve pins, and even such things as fixed condensers, grid-leaks, complete valve-holders, and 12-in. lengths of B.A. studding have simply disappeared into the void.

An Interesting Point

A curious point was raised the other day at an inquest following a film factory fire. The district surveyor stated that a hole made in one of the walls had not been reported to him and went on to say that there was a statutory obligation to give notice to the district surveyor of any hole, however small it might be made in the wall of a house or other building. This is the first that I, and I expect a good many other people, have heard of any such regulation, but there seems to be no doubt that it exists. It refers, I take it, to a hole made through a solid wall and not to one drilled through a window frame.

The majority of wireless lead-in wires from aerial and earth are probably taken through tubes let into the woodwork and not passing through the bricks and mortar or the stones of an outside wall. There must, however, be a certain number of cases in which the actual wall has been drilled for the purpose of passing a lead-in tube and it seems that wherever this is done a report should have been made to the surveyor. Listeners would therefore probably be wise to safeguard themselves by making reports if holes have been made through the actual walls and not merely through the window frames.

Have You Heard Him?

I expect that most readers who have short-wave sets will have heard Mr. Gerald Marcuse broadcasting from 2NM, though he often keeps such unholy hours that only those who burn the midnight or wee small hour oil are likely to pick him up. The other Sunday, though, I found him hard at work at 5 p.m. relaying 2LO's programme to India in particular and the East in general. The quality of the transmission was extraordinarily good and excellent results have already been achieved, good reception having been reported from many parts of India as well as from Colombo, Penang and other places. Mr. Marcuse has quite got the B.B.C. announcer's professional manner. I was immensely ticked with his concluding words: "Good afternoon, everybody. *Good* afternoon." Meanwhile when are those experiments from Chelmsford going to begin? The B.B.C. has, or can obtain, so much data from the work done by Mr. Marcuse as well as from KDKA, 2XAF, 2XAD, PCJJ, 2FC and Radio Malabar that it should have at any rate, a nice start when the work is really taken in hand.

What the Grid Battery Did

We have had such a dose of atmospherics this summer and autumn that one is really quite startled if one picks up the telephone on any evening without hearing ear-splitting crashes. The noises seem to have become for the present at any rate, almost part and parcel of wireless reception. I had been suspecting, though, that the crackles produced by one of my sets were not due to genuine atmospherics. They sounded very much the same, but for the last day or two they had been getting worse and worse. On such occasions one naturally suspects the batteries. The H.T.B., L.T.B., and G.B.B., were all run over with the voltmeter and found to be up to the mark.

There was nothing wrong with the high-tension battery connections, so the accumulator was next suspected. Comparatively few people realise how noisy an accumulator can become if there is a loose or dirty connection between its cells, or if the L.T. leads are making bad contact with the terminals. The source of the trouble, however, was not in the accumulator, and the grid battery remained. So far as could be seen all the wander plugs were a good tight fit, but careful investigation showed that in the case of the positive one appearances were deceptive. Both the plug and socket were dull and this was sufficient, when a good deal of L.F. amplification was used, to produce noises of a kind that has to be heard to be believed. When I say that a milliameter in the plate circuit of the last valve gave quite a big jump whenever a crackle occurred you will realise how bad they were.

Week-end Short-wave Programmes

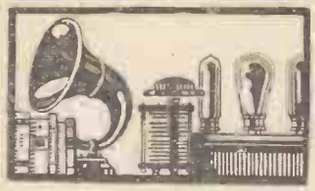
Some interesting announcements were made by two of the most important American short-wave stations the other night, about their week-end programmes for the near future. WGY gave out through XAF that the following transmissions would be made on Saturdays and Sundays. On Saturdays 2XAD will be at work from 6.30 p.m. to 9.30 p.m. Greenwich Time. 2XAF will come on from 11.25 p.m. onwards. KDKA announced that he would transmit on both 62.5 and 26 metres on Sundays from 11 p.m. onwards. I am very glad to hear that 2XAD and 2XAF are going to give us these Saturday evening programmes, for during the summer there was nothing to hear as a rule until the small hours of Sunday morning.

Short-wave enthusiasts are pretty well provided for now, for they have both Radio Malabar and the Australian stations during the afternoons and the Americans come on at reasonable hours during the evening. PCJJ is to be heard on most Tuesdays and Thursdays and not infrequently on Saturdays. The other night I found him doing a test on a Wednesday which continued until the small hours of Thursday morning. Curiously enough this station is usually much stronger with me in daylight than he is in the hours of darkness. Have you ever caught him conducting two-way working with Bandeong? He often does this, during the afternoons, and both stations are well heard.

A Felt Want

Can anybody tell me of a valve that is really non-microphonic when used as rectifier? I have tried a great many, but I have not yet found one that is ideal in the short-wave set. When one gets down to minute wavelengths and uses a certain amount of L.F. amplification, any microphonic tendency that a valve may possess when used as rectifier, seems to be shown up to a horrid degree. I expect that there are quiet valves and that I have not been lucky enough to come across them. If any reader can put me on to a really good rectifier I will see that he is awarded without delay the most noble Order of the Biscuit (with grid-leaks).

THERMION.

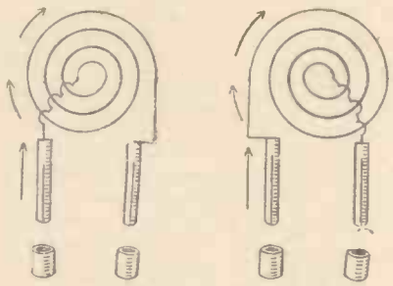


PRACTICAL ODDS & ENDS

Plug-in Coils

VERY often experimenters, when testing a set employing plug-in coils of the type having two legs or two sockets instead of one leg and one socket, turn the coil round to save the trouble of changing the leads over.

This procedure does not alter the direction of the current round the coil. The diagram will make it clear to anyone in



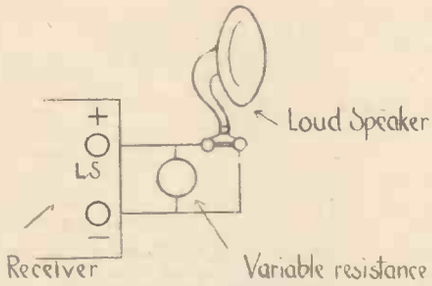
Direction o Coil Windings

doubt about it. The direction is of great importance when two coils are coupled together. C. M. B.

Simple Volume Control

IT often happens that with one L.F. stage the loud-speaker volume is inadequate, but when a second stage of L.F. is added the volume is too great.

If this state of affairs cannot be remedied by changing the type of coupling, as, for example, from transformer to R.C. coupling, then the only thing to do is to use the extra L.F. stage and reduce the volume. This can be done by slightly detuning, but



Simple Volume Control

this is not a process which can be recommended.

A better plan is to connect a variable resistance, such as the Dubilier Duvolcon, across the loud-speaker terminals. Then the resistance of the loud-speaker windings and the variable resistance are in parallel. When the volume control is set at such a value that its resistance is greater than the resistance of the loud-speaker windings, most current will flow through the loud-speaker. But when the resistance of the volume control is lower than that of the L.S. winding, the greater part of the current will be diverted from the L.S. winding through the volume control.

Provided that the resistance value of the loud-speaker lies between the minimum and maximum resistance values of the volume control, a loud or soft rendering can be obtained at will. J. B.

Non-soldered Connections

SOMETIMES a piece of apparatus from which a connection is to be taken will not stand the heat of the soldering iron. In such a case the connection is made to a nut and screw, the wire being wound round the threaded part of the screw.

The task is simplified if the wire is first shaped into a loop as shown, which can be slipped on to the screw. A loop can be made

Efficient Non-soldered Connection

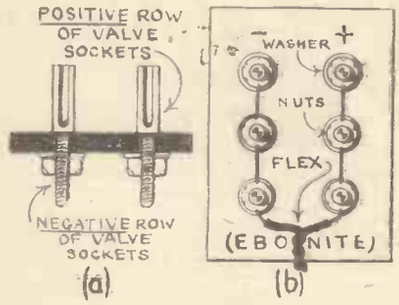
at the end of a piece of wire by bending it round a drill and pinching the ends together with a pair of pliers. The drill is chosen of such a size that the loop formed will just slip on to the screw. M. C.

Plug-in Phone Connector

WHEN connecting extra pairs of phones in parallel it is annoying to have to fiddle with terminals; a much easier way is to use a plug-in connector. To make one similar to that shown in the sketch, you need as many pairs of valve sockets and valve pins as you have phones, a piece of scrap ebonite, and a length of twin flex for extension leads from the set.

Mount the sockets on the ebonite in two parallel rows (shown sectionally at A), securing each with a washer and nut. Join up all the positive sockets with one flex lead (after removing the insulation) and all the negative sockets with the other lead, as shown at B. Secure the wires firmly by screwing a second nut on to the stem of each valve socket and tightening it up in opposition to the first.

The final step is to connect valve pins to the ends of your phone leads in place of the usual tags. You can then plug as



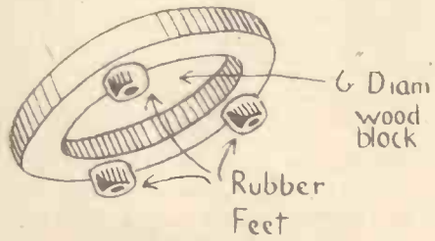
A Plug-in Phone Connector

many pairs of phones as you require into the sockets on the connector. Any of the phones can be instantly removed or re-connected. W. O.

Neat Loud-speaker Stand

SOME types of loud-speaker, when resting on a polished surface, are apt to cause unsightly scratches and markings. What is required in such cases is a non-scratching stand on which to rest the loud-speaker.

Shown in the sketch is a simply-made stand which can be assembled for a few pence. A 6-in. hollow, circular block, such as every electrical stores can supply, has



Neat Loud-speaker Stand

three small rubber stops screwed on one side, approximately equally spaced round the circumference.

The base of the loud-speaker is thus raised from the polished surface and the rubber stops enable it to be placed in any convenient position without fear of scratching. B. J.

THOSE CURVES!

Some Interesting Facts About a Controversial Subject

By J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E.

"HAVE you seen the new curve for the Orfli-Gud transformer?" said one man at the Exhibition.

"No, I don't think so," was the reply, 'what about it?"

"Well you ought to see it! It is about the biggest piece of faking I have ever seen. They worked the scales all up so that the curve comes out nearly a straight line,

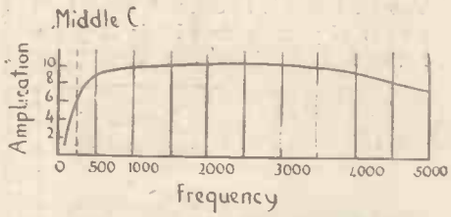


Fig. 1—This Curve appears reasonably good at first sight. Note where middle C comes, however

whereas if you draw it out properly it looks perfectly awful. I know because I tried it."

"Let's have a look at it anyhow," said the other man and they went off together to the particular stand where they inspected the performance curve of the said transformer together.

As the first speaker had pointed out, the scales were not uniform and it certainly did appear that they were imparting some fictitious value to the particular curve, making it appear better than it really should be. After some time they waylaid the attendant of the stall and taxed him with gross dishonesty for representing the performance of the transformer in this manner. The assistant threw up his hands and collapsed on the floor. The two

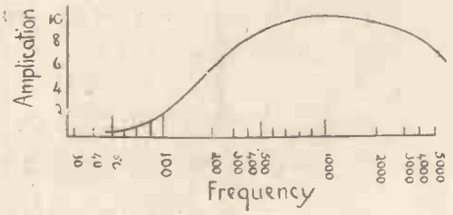


Fig. 3—This Curve is the same as Fig. 2 but the frequency scale is figured differently

inquisitors took this as an admission of dishonesty and went away thinking that the world was really a very wicked place, but that they were clever enough to see through it.

An Increasing Tendency

The question raised by the two inquiring youths is one of some importance. There is an increasing tendency to use special scales in plotting curves of performance, more particularly with reference to low-frequency devices such as transformers, chokes, etc. There is some question as to whether the use of such special scales is better than the straightforward system, and above all, whether this is done with an attempt to deceive or not. By using a peculiar scale, one can usually make a curve have any desired shape, within reason, so that a really bad curve could be made to appear very good by suitable arrangements. Are these special scales put to dishonest use? The answer to this question can be given at once. It is quite definitely "No." There are several reasons underlying the adoption of special scales and although, at first sight, they appear to be complicated and less straightforward than they might be, yet actually they give us a better indication of what is really happening than is obtained with what appears to the reader a more straightforward curve.

Frequency

The frequency scale was the first to come under the eye of the reformers and it is now generally admitted that the plotting of a frequency on a simple direct scale does not give a correct interpretation of the results. This arises from the distribution of musical frequencies in octaves. We are all familiar with the expression "an octave higher," and indeed the expression is so common that it is difficult to explain it in any other way. We can play a variety of notes on the piano all of which have the same musical value, as it were, except that they occur in different parts of the whole register. We can take, for example, middle C on the piano and we can play upper C or lower C, all of which have the same musical value, but which are different in pitch. They are said to be octaves of each other, the word "octave" meaning eighth. There are seven whole tones in a scale, the eighth note being the octave.

The whole musical range consists of some 7 octaves covering frequencies ranging from 27 cycles per second (the lowest A on the piano) up to 3,480 cycles per second (the top A on the piano). In addition there are sometimes pedal notes on the organ going down as low as 16 cycles per second, while in order to obtain faithful and natural quality, particularly on orchestral instruments, it is necessary to reproduce harmonics which have frequencies extending as high as 6,000 cycles per second. We can confine our attention for the present, however, to the piano range.

Not Equal Divisions

This range of frequencies of some 30 to 3,500 cycles is not divided into equal portions, but into 7 octaves. The peculiarity about the octave is that the frequencies of the two notes are connected by a ratio of 2-1. Thus if we play the different A's on the piano, we obtain frequencies of 27.1, 54.25, 108.5, 217, 435, 870, 1,740 and

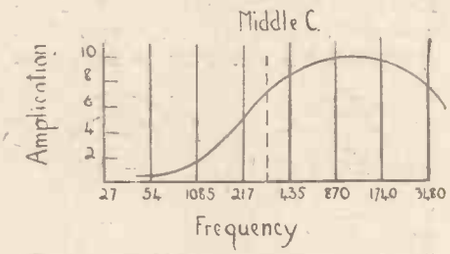


Fig. 2—This Curve gives a better idea of what is happening

3,480. Thus we see that the first three-and-a-half octaves all occur below about 250 cycles per second while the second three-and-a-half octaves range from 250 to 3,500 cycles per second. Indeed, middle C on the piano has a frequency of 256 cycles per second, and it is known as middle C since it effectively divides the three-and-a-half bottom octaves from the three-and-a-half top octaves.

Yet it will be clear that we have by no means an even distribution here, for the frequency range in the top three octaves is fourteen times as great as that at the bottom.

Fig. 1 shows a curve of a transformer plotted on an ordinary basis and it will be clear that it begins to cut off somewhere in the neighbourhood of 300 cycles, but we cannot get very much estimate of what its

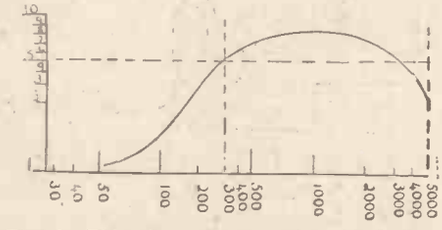


Fig. 4—This gives a good idea of the performance. Little variation of strength can be detected over a range of 250 to 5,000 cycles

performance is in the lower register since these all lie below 300 cycles and here the curve is uncomfortably crowded. Fig. 2 shows the same curve plotted against the octaves. Here the performance of the transformer can be gauged very much more easily since we now have the low-

(*Concluded on page 630*)

BROADCASTERS OF THE MONTH

ALMA VANE.—A favourite singer at most stations, especially in Aberdeen, where she recently scored a big success. Has been heard in most of the B.B.C. variety programmes and studio performances of musical comedies.

DENIS NOBLE.—One of the best-known members of the B.N.O.C., besides being an ever-popular studio broadcaster, his favourite operatic roles are in "Carmen," "The Magic Flute," and "Le Coq d'Or." He sang, too, during the recent "Prom." season.

AURIOL JONES.—This gold-medallist Welsh pianist, of Queen's and Albert Halls; broadcast in the "Proms." She was pianist in the W. H. Squire Trio at the Coliseum, and played before their Majesties at the first Royal Command Performance.

FREDERICK THURSTON is a famous clarinet soloist and permanently attached to the orchestra of 2LO, besides being heard at chamber-music concerts. He will be remembered for his recent performance in the big Villiers Stanford programme.

HELEN ALSTON.—A favourite artiste in revues at 2LO. She has appeared with immense success at the London Coliseum and other big variety halls; she has appeared in musical comedy and on the concert platform.

AYLMER BUESST.—Conductor of many of the B.N.O.C. performances and tours, Mr. Buesst is an Australian. He is equally well known for his classical concerts at Queen's Hall, as in the symphony studio programmes at 2LO.

ROBERT RADFORD.—Besides being one of the finest bass singers in the world, Mr. Radford is also a director of the B.N.O.C., in whose repertoire he has played so many roles. His finest performances, perhaps, are in "Tannhauser," "Mastersingers," and "Romeo and Juliet."

IVY ST. HELIER.—Here we have one of the brilliant stars of the London Coliseum programmes. Miss St. Helier is a constant broadcaster in the variety programmes at 2LO. One of her recent wireless successes was in the revue, "Come Over the Aether."

"STAINLESS STEPHEN."—This intriguing pseudonym belongs to Mr. Arthur Clifford, one of the best entertainers on stage or ether. Like "John Henry," he too hails from Yorkshire. We have all enjoyed his playlets, "Oscillating Oscar" and "One Punch Liquorice."

"A.W." TESTS OF APPARATUS

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

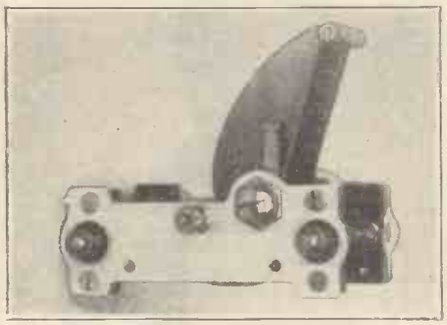
Trix S.L.F. Condenser

THE Trix S.L.F. condenser is a robust and electrically efficient instrument. The specimen which we tested possessed ample mechanical strength with a comparatively light framework.

Although small and light aluminium end plates are employed, it was found almost impossible to distort the condenser; this is always a point worthy of consideration in a cheap condenser. Both the fixed and moving vanes are made of brass and sufficiently fixed to ensure rigidity.

At one end of the rotating spindle there is a bush of fibre material which tends to give desirable smoothness to the motion, while a copper pigtail ensures good electrical contact between the moving vanes and the aluminium end plates to which one terminal is attached. The fixed vanes are connected to an insulated terminal at either end.

On test, the maximum and minimum



Trix S.L.F. Condenser

capacities proved to be .00044 and .000019 microfarad. The minimum is thus satisfactory, but the maximum should be increased slightly to bring it up to its rated value.

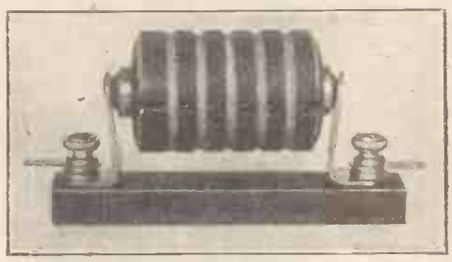
The Trix condenser is marketed by Eric J. Lever (Trix) Ltd., 33 Clerkenwell Green, E.C.1.

Interchangeable H.F. Choke

THERE are difficulties in designing an H.F. choke operating equally efficiently over a very wide wavelength range; one which will operate successfully on wavelengths below 100 metres is often useless on wavelengths above 1,000 metres.

To overcome this difficulty a range of three Lisenin chokes has been designed which will fit a standard holder. The sample tested by us proved to have a choking range from wavelengths below 50 metres up to 400 metres; a second choke is designed to operate up to 1,000 metres, whilst the third works efficiently on the higher wavelengths up to 3,000 metres.

The winding in the first choke is placed in five slots cut in an ebonite former and well spaced from each other to ensure a low self-capacity for the windings. No difficulty was experienced in removing (or inserting) the choke from its holder, the



Lisenin H.F. Choke

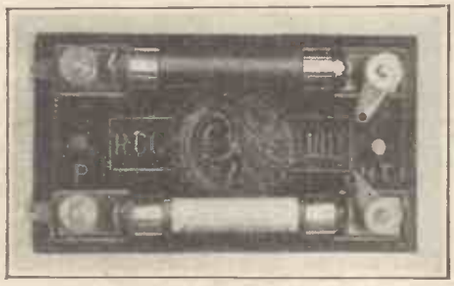
contact being firm and electrically efficient. The manufacturers are the Lisenin Wireless Co., Connaught House, 1a Edgware Road, Marble Arch, W.2.

Carborundum R.C. Unit

SIMPLICITY and neatness are the two characteristics possessed by the Carborundum R.C. unit, which consists of a small rectangular ebonite base in which the coupling condenser is situated, whilst two sets of clips attached to terminals hold the secondary, grid leak, and anode in position. The terminals, in place, have clips in an accessible position, whilst soldering tags are also provided.

The coupling condenser proved to have a capacity of .001, whilst the anode and grid resistances had values of 300,000 and 350,000 ohms respectively .

With a coupling condenser of this size, the grid leak should have a slightly higher



Carborundum R.C. Unit

resistance; this, however, did not seriously affect the performance of the coupling unit when placed in the valve circuit, and good reproduction was obtained. This unit should prove of assistance to the constructor, and can be recommended to readers.

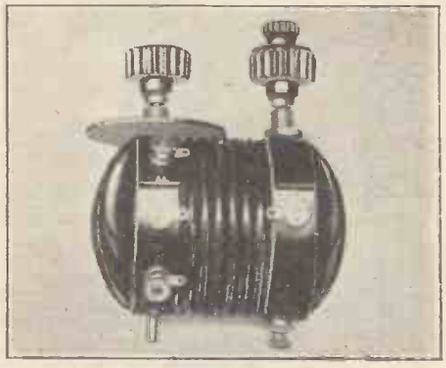
It is made by the Carborundum Co., Ltd., Trafford Park, Manchester.

Imperial All-wave Tuner

AN Imperial All-wave tuner sent in for test is a very compact and well-finished tuner designed to cover an unusually large wavelength range. The difficulty of obtaining a smooth and efficient control of reaction throughout the range has been overcome by tapping the reaction coil in order to obtain better regeneration on the shorter waves.

The switch controlling the number of turns on the reaction coil is actuated by a small knob fixed to a spindle which passes through the centre of the main reaction spindle.

A range from 150 metres up to approximately 5,000 metres is obtained by means of an inductance wound in slots in the outside ebonite former; seven tappings are taken to a switch mounted inside the tuner and controlled by a knob and dial on the outside.



Imperial All-wave Tuner

The tuner can also be employed in a tuned-anode circuit, in which case the range is from 150 metres to 3,000 metres. Two aerial terminals are employed, one being for use on high wavelengths and the other on lower wavelengths. An interesting point is that the unit is made to plug into sets designed for use with two-pin plug-in coils, a plug and socket being fitted for this purpose at one end of the tuner. Two reaction terminals are placed at the other end.

On test the tuner gave good results throughout the tuning range; the reaction was even and allowed of the utmost amplification being obtained prior to falling into a state of oscillation. This exceptionally neat and efficient component can be recommended to readers. Further particulars can be obtained from the Wireless Apparatus and B.C. Co., 256 Narborough Road, Leicester.

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

THE announcer to my mind was too apologetic in regard to the last Australian transmission. It is true that there were a good deal of atmospherics about, but to the ordinary listener like myself it was an immense achievement. To hear the "Coo-ee"—the real stuff!—was a privilege which I am sure I shall always relate in my doddering old age. Besides that, the magic words "Sydney . . . calling," were as plain as if someone were calling from across the other end of the room. "Noises off" notwithstanding. Australia was there right enough!

◆ ◆ ◆

The event of the week for music lovers was undoubtedly the National Symphony Concert. I am sorry to hear that the People's Palace held comparatively speaking, a small audience, but that was only to be expected. The place itself is the finest hall in the East End, but it is situated midway between two stations—Stepney Green and Mile End. So that some of our delicate music lovers preferred to listen at home. Nevertheless the B.B.C. is justified in holding some of these concerts at this well-known "Palace" if only for the good work for music that the East End hall has rendered.

◆ ◆ ◆

Rienzi, Lohengrin, Tannhauser, The Mastersingers, Tristan, Siegfried, Parsifal,—what a feast for the lovers of Wagner — and they are legion. The vocalists, Miriam Licette and Walter Widdop — were in tip-top form while the National orchestra must have pleased Mr. Percy Pitt who, no doubt, was listening in!

◆ ◆ ◆

After this big feast, enough to satisfy the most musical Oliver Twists, we had a half-an-hour of that accomplished pianist, Irene Scharrer—sandwiched, it is true, by Flotsam and Jetsam. Now I will say this. That if the B.B.C. shut down for the rest of the year the fare provided on this night alone would more than justify the modest annual fee it charges us.

◆ ◆ ◆

Talking of Flotsam and Jetsam, they rely rather too much on their old repertoire. This they justify under the heading of "Requests" but they should remember that the non-requests, who are in an overwhelming majority, never trouble to write at all. They should give us new stuff like the play on "The Three Blind Mice" à la Mendelssohn, and as it would be sung in opera.

◆ ◆ ◆

I referred recently to Mr. Anthony Asquith's broadcasting voice. I have since heard him again—and I think he talks rather like a film. His talk flickers. Like this: "The sequence—is composed—of shots. The camera—is said—to pass. It is said—to trick . . . etc." Somebody ought to give this engaging young man a hint or two in elocution.

Rather over-lapping, wasn't it, having Mr. Percy Scholes, the B.B.C. music critic, and Mr. Basil Maine, talking not only the same evening and on the same subject but within three-quarters of an hour of each other. Both are interesting but you can have too much of this sort of thing. Can you not?

◆ ◆ ◆

A little gem of a thing was *Wun-tu*—or *The Seventh Heaven*—a Chinese fantasy by Frank Cochrane and Dion Titheradge. I remember Mr. Cochrane—if I mistake not—in *Chu-Chin-Chow* and this little play had rather the atmosphere of the old war-time success. But it was absolutely spoilt by an anti-climax which you would have thought anybody would have noticed. The song at the end is absolutely unnecessary and the curtain should fall when Mee-Woo and his wife discover the Seventh Heaven. The characters were splendidly enacted. Mel Sydney as the servant absolutely fitted the part, while Frank Cochrane was the Chinese letter-writer to the life. Maurice Evans, as a young fisherman, and Gwen Frangcon-Davies were an admirable pair of misguided love-birds. I should like to hear this little thing again with the improvement I have suggested.

◆ ◆ ◆

It was announced as "a great variety programme"—and so it was. There was Josephine Trix who is certainly at the head of that curious crowd of syncopated songsters, Edna Thomas who sings negro spirituals quite appealingly, Harry Hemsley as a child-impersonator, Ivy St. Helier, mimic, Niel Kenyon, the Scots comedian, and Clapham and Dwyer. Harry Hemsley, as the announcer, was by far and away more successful than other attempts which have frequently been made to utilise artists in this way.

2,000 Headphones 80 Loud-speakers!

A Wonderful Installation at the Lambeth Hospital. The pictures show the control panel with automatic starting gear and the gramophone pick-up

PRESENTED FREE WITH "AMATEUR WIRELESS", N°281, OCT. 29, 19

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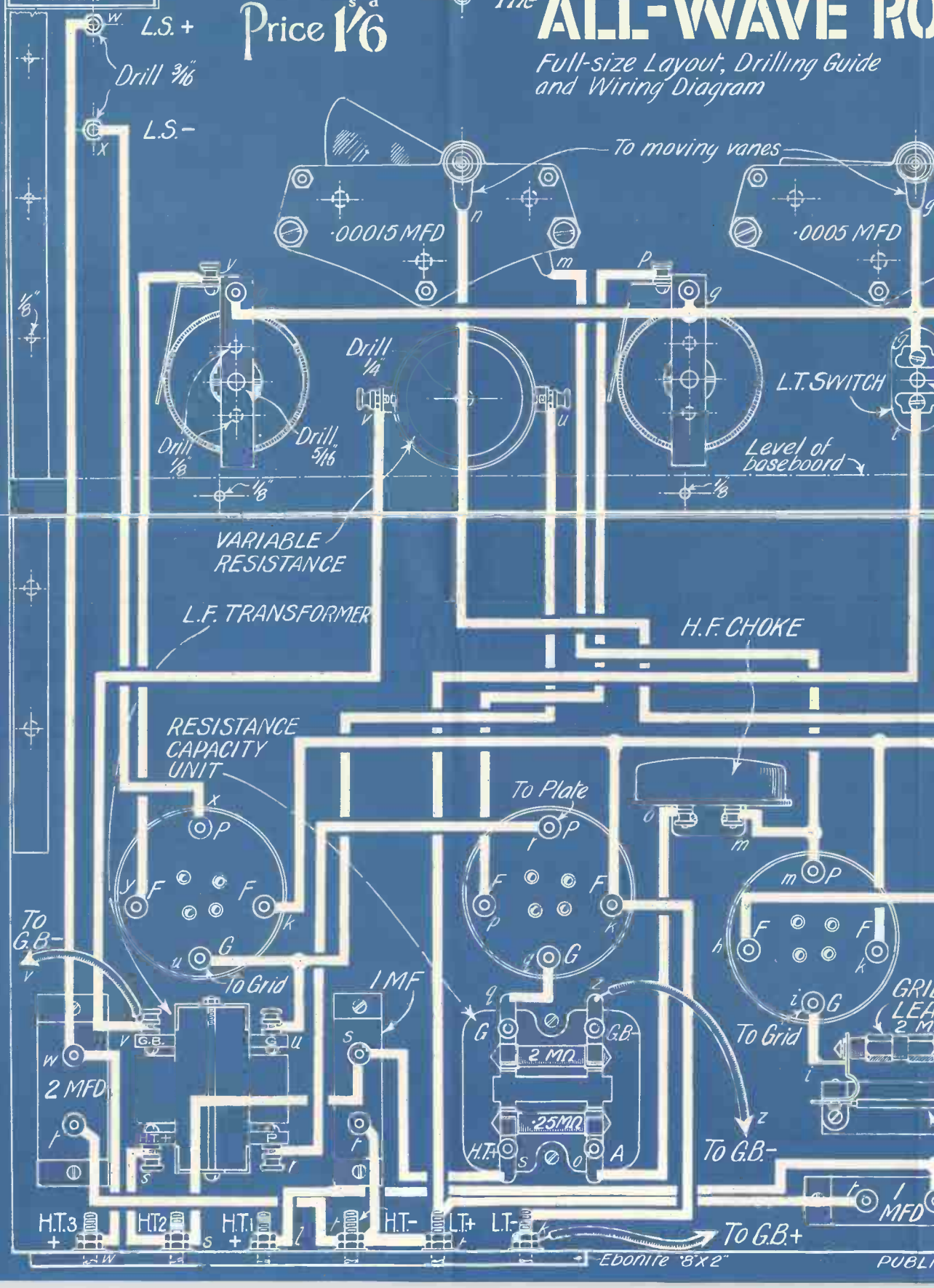
Price 1/6

The ALL-WAVE RO

Full-size Layout, Drilling Guide and Wiring Diagram



PUBLI

27.

BERTS FOUR

For full constructional details see "Amateur Wireless" No 281.

Amateur Wireless And Electrics

PANEL 26"x8"

AERIAL 1

AERIAL 2

EARTH

Drill 3/16

To moving vanes

Use template for drilling

·0005 MFD

Drill 3/8"

BASEBOARD 26x10½x½"

·0001 MFD

REACTION COIL

To Plate

Wooden panel support

AERIAL COIL HOLDER

H.F. TRANSFORMER

GRID CONDENSER ·0003 MFD

NEUTRALISING CONDENSER

Checked by

In wiring up join all like letters together

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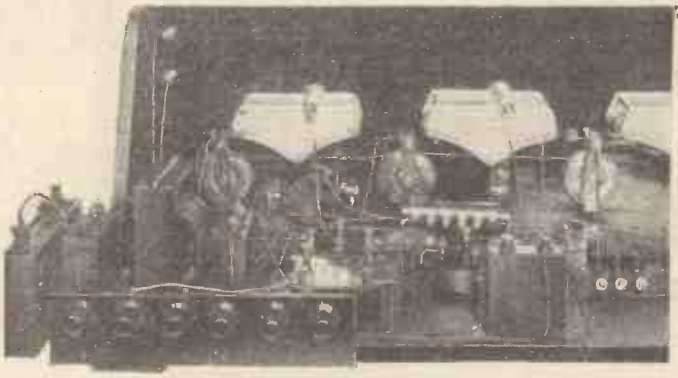


The L.F. End of the Receiver

THE ALL-WAVE R

A Special Receiver Designed by C. A. Oldroyd incorporating the Essential Features of the Famous Roberts Circuit which provides Stable H.F. Amplification

Dr. Walter van B. developed the

GREAT claims are made for the designs of many receivers, and often quite correctly; but the question is: "Will the amateur be able to bring his set to the pitch of perfection of the model built and adjusted by the designer?"

After all, most of us are just amateurs,

COMPONENTS REQUIRED

One 26 in. by 8 in. panel (Becol, Redfern or Peto-Scott).
Two .0005 variable condensers (Igranic, Cyldon or Formo).
One baseboard 25½ in. by 10½ in. by ½ in.
One .00015 or .0003 variable condenser (Igranic, Bowyer-Lowe, or Keystone).
Two mounting bases for Xllos aerial and H.F. transformer coils (Igranic or Rothermel).
Four valve holders (Nomic, Lissen, Benjamin or R dfern.
One H.F. choke (Igranic, R.I. and Varley, Lissen or Wearite).
One R.C.C. coupling unit (Dubilier, Ediswan, or Lissen).
One L.F. Transformer (Igranic Pacent Super audio former, Lissen, or Marconiphone).
One Volume control (0 to 1 megohm, approx.) (Igranic, Lissen or Marconiphone).
Four filament rheostats or baseboard mounting resistors, to suit valves used (Igranic, Lissen, or Loriostats).
One switch (Igranic, Yaxley-Rothermel, or Lissen).

in the true sense of the word. We admit we lack the skill of the trained radio engineer, but if a set is carefully built there is no reason why it should not give as good results in either range or volume as a professionally constructed receiver of the same type.

From the amateur's point of view, the ideal set must be simple to build—without straining the pocket-book too much—the layout must be flexible, in case we wish to use up some of our old material, and the set must have a minimum number of soldered joints; for many of our fraternity who have not much experience prefer the spanner to the soldering iron.

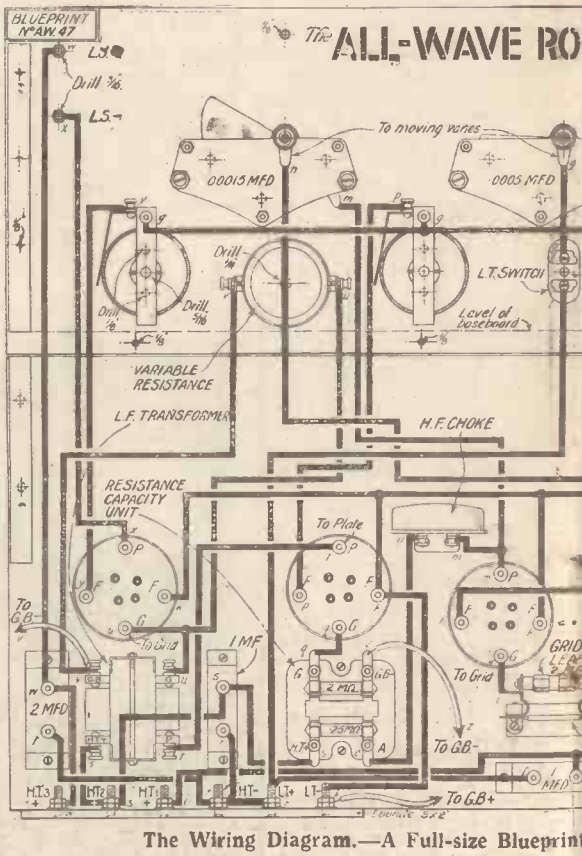
The writer aimed at such a design in the set described here; he is quite aware that he has by no means approached the ideal in set building. Still, the "All-wave Four" should appeal to novice and the more experienced alike.

Selectivity

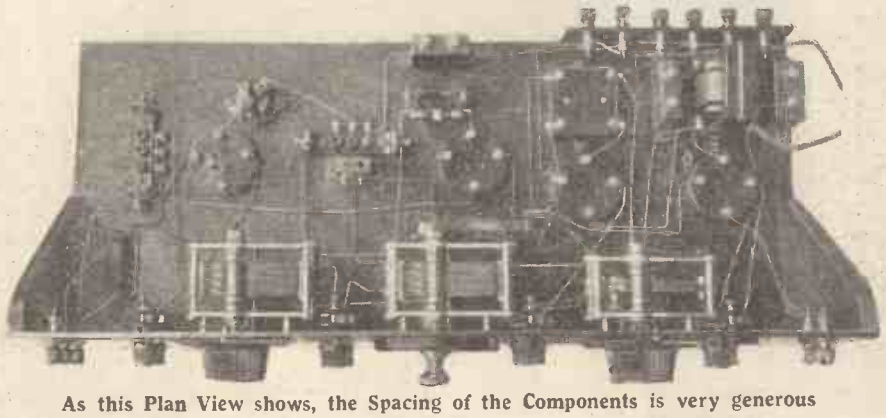
To increase both selectivity and volume, when receiving distant stations, an H.F. stage precedes the detector; this is almost a standard arrangement in four-valve sets nowadays. The H.F. transformer has a split primary for neutralisation. This system works very well and has enjoyed great popularity in America for some years. Our cousins across the pond call it the "Roberts" circuit, after Dr. Roberts, who is said to have developed this type of receiver.

The progress made in set construction in less than three years can be gauged by comparing the early "Roberts" type of receiver with the "All-wave Roberts Four" described here. One must bear in mind that the American set covered the broadcast band only, while the "All-wave Four" can receive practically everything of interest to the amateur, from short-wave transmissions to wavelengths well above the Daventry range.

This flexibility is, to a great extent, due to the new Xllos coils and H.F. transformers. The designer of these coils has struck a happy medium; they are efficient and yet possess the compactness and interchangeability of our old friend the plug-in coil. The windings are protected by a thin



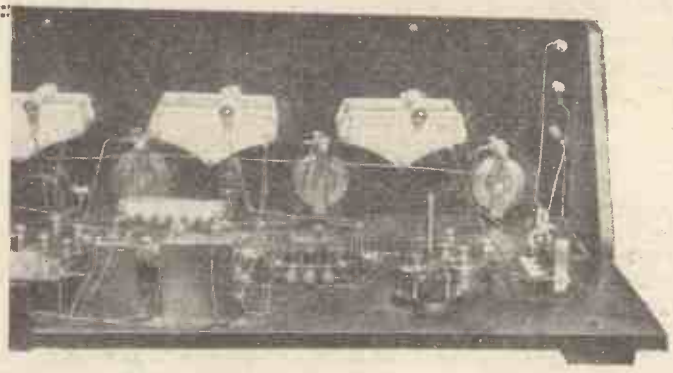
The Wiring Diagram.—A Full-size Blueprint



As this Plan View shows, the Spacing of the Components is very generous

ROBERTS FOUR

This Set is the Subject of the Full-size Working Blueprint which is Presented Free with Every Copy of this issue of "Amateur Wireless"



The H.F. End of the Receiver

Roberts, who Circuit

bakelite casing; connections can be speedily reversed, as the contact pins are screwed into bushes fitted inside the container.

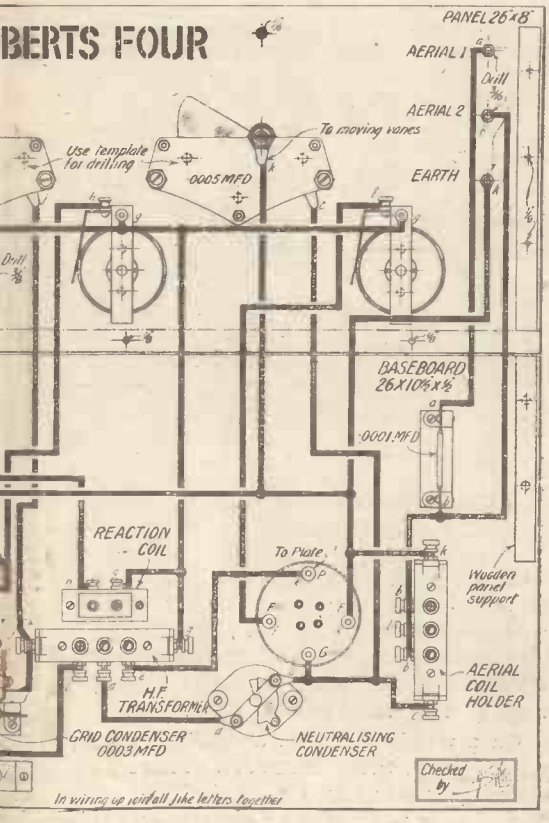
The layout of the set is not as compact as it can be made, but generous spacing of components makes for easy assembly and wiring—a point which will not fail to appeal.

Between aerial and centre-tap of aerial coil a .0001-microfarad fixed condenser is connected to give increased selectivity on the broadcast band (terminal A 1 in the Blueprint). When receiving a long-wave station such as Daventry, it will be found better to connect the aerial direct to the centre-tap (terminal A 2). The aerial circuit is tuned by a .0005 variable condenser. In the set described Igranic square-law condensers were used throughout, but any reliable make can be substituted if the constructor happens to have some suitable material at hand.

The centre-tapped aerial coil is plugged into a special mounting base; a second base of this type is needed for the H.F. transformer. The casing of the latter contains three windings: the primary, a balancing winding connected to the primary, and the secondary. The circuit diagram shows how the primary is split into two sections: the primary itself, marked P, and the balancing or neutralising winding, N. The free end of the latter goes to one side of the balancing condenser, the other side of the balancing condenser is connected to the grid of the H.F. valve.

The balancing condenser (Igranic Microcondenser, baseboard-pattern) has a fairly big voltage across it, since on one side goes to earth while the other is connected to H.T.+1. It is therefore advisable to test the balancing condenser for insulation, with a battery and a pair of phones, before mounting it in the set.

The secondary of the H.F. transformer is again tuned by a .0005-microfarad variable condenser; reaction is controlled by a variable condenser of either .00015 or .0003-microfarad capacity. In the original set the reaction condenser had the lower value, yet a .0003-microfarad condenser may be preferable, as the size of the reaction coil can then be somewhat cut down.



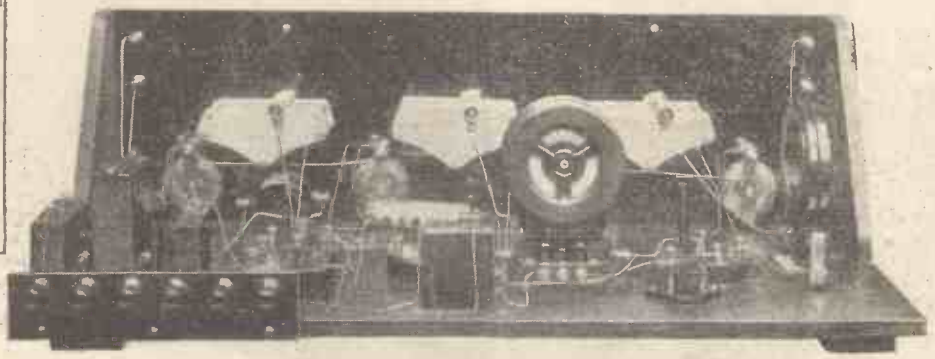
t of this is Presented Free with this issue

COMPONENTS (Continued)

One .0001-microfarad fixed condenser (Igranic, Dubilier, or Lissen).
One .0003-microfarad fixed condenser (Igranic, Dubilier, or Lissen).
One 2-megohm grid leak (Igranic, Dubilier, or Lissen).
Two mounting bases for fixed condensers (Igranic).
One 2-microfarad fixed condenser (T.C.C. or Lissen).
Two 1-microfarad fixed condensers (T.C.C. or Lissen).
One split-primary H.F. transformer, B.B.C. wavelengths (Igranic or Rothermel).
One split-primary H.F. transformer, Daventry range (Igranic or Rothermel).
One centre-tapped X1los coil (No 1) broadcast wavelengths (Igranic or Rothermel).
One centre-tapped X1los coil (No 4) Daventry range (Igranic or Rothermel).
Plug-in coils for reaction.
One neutralising condenser, Micro-condenser baseboard type (Igranic, Peto-Scott or McMichael).
Terminal strip and terminals (Igranic or Lissen).
One baseboard-pattern coil mount for reaction coil (Lissen).

The reaction coil R is a plug-in coil placed close to the H.F. transformer.

The first L.F. stage is resistance-capacity coupled; for convenience a Cosmos unit has been fitted. The choke in the anode lead of the detector must be a good make and have sufficient inductance if the set is to give good results on the Daventry waveband.



This Rear View shows the Neat Arrangement of the Components

"THE ALL-WAVE ROBERTS FOUR"

(Continued from preceding page)

The last L.F. stage is transformer-coupled; an Igranic-Pacent Super-audio former was fitted, and gave very good results. To control the volume a variable high resistance, having a range of 0 to 1 megohm, is shunted over the secondary of the transformer. The 1- and 2-microfarad fixed condensers shunted across the H.T. battery should not be omitted if the high-tension current is taken from a dry battery.

In the original set four panel mounted rheostats were fitted to control the filament current but it was found that they need not be touched when once adjusted. To get a "cleaner" panel layout, fixed or adjustable resistors can be mounted on the baseboard. Loriostats have always given satisfaction in the writer's hands; they are small, and can be tucked away in a convenient corner or any small space.

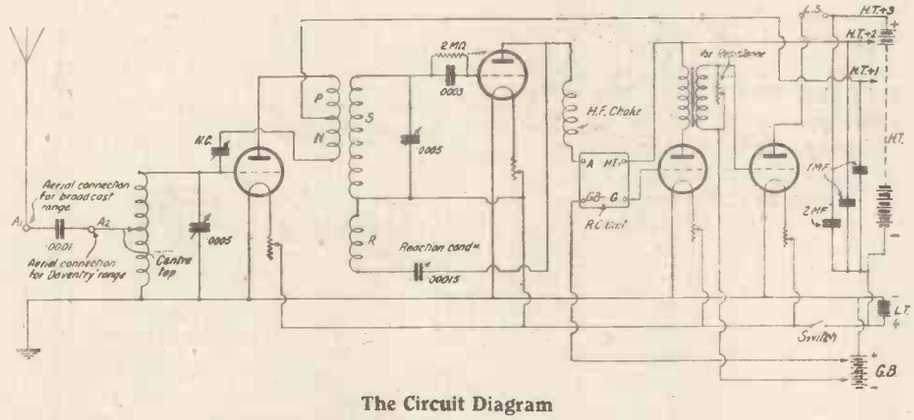
Vernier dials such as the Igranic Indigraph or National (Rothermel) are a great convenience on a selective set; but, since the knobs and dials supplied with the condensers are of generous dimensions, it is quite possible to manage without a vernier control.

The drilling plan of the panel is given by the diagram; the holes for the fixing screws of the variable condensers should be marked off from the template supplied. If baseboard resistors are used the holes indicated for filament rheostats will not be required.

Home-made wooden panel brackets hold the latter at right angles to the sub-panel. If a commercial bracket is preferred, the Igranic adjustable angle brackets or Magnum aluminium brackets can be used.

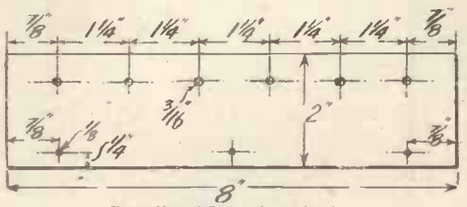
The general arrangement of the set is shown in the photographs, which illustrate the set in both plan and elevation. The wiring diagram gives a detailed dimensioned baseboard layout. The width of the baseboard can be considerably cut down if a Cosmos unit provided with a valve-holder is used, instead of the separate unit and valve-holder.

To facilitate the coil connections, these have been shown in the enlarged photograph which shows the H.F. end of the set, and also in the wiring diagram. Aerial coil and H.F. transformer are held in the special coil mounts supplied for Igranic Xllos coils; for the reaction coil a standard baseboard-pattern coil mount is provided.



The Circuit Diagram

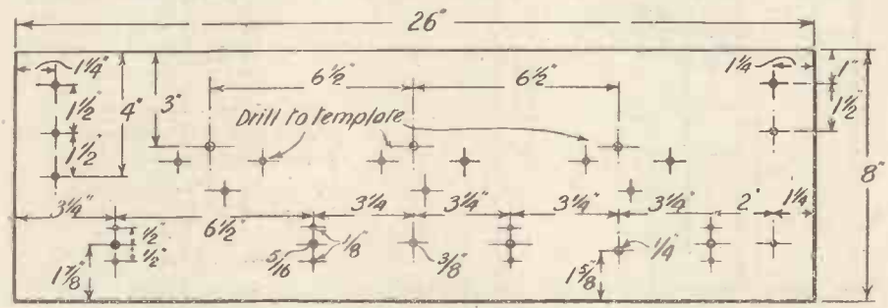
The placing of the components forming the L.F. side of the receiver is shown in the other enlarged photograph, and the dimensions of the terminal strip are given in the diagram.



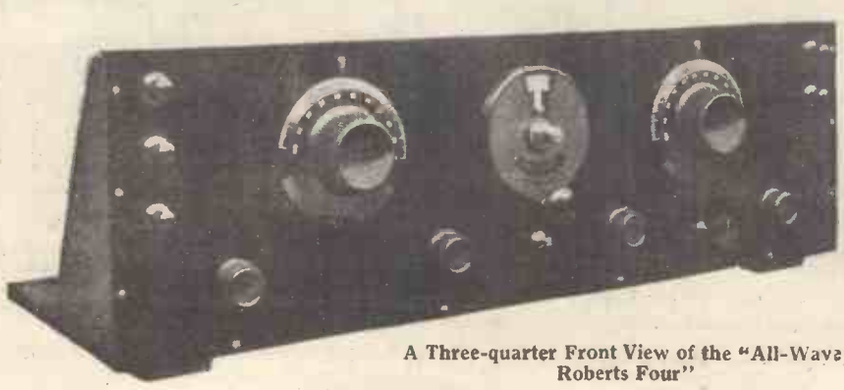
Details of Terminal Strip

The wiring is straightforward and calls for no particular comment. Glazite or Junit wire will be found quite suitable to make a good and neat job.

Six-volt Cosmos valves were used originally in this set, namely, DE55 as H.F. and first L.F. amplifier valves, a SP55/B as detector, and a SP55/R as the power valve. Other standard valves of similar type, such as Cossor, Mullard, B.T.H., Osram, Marconi, Ediswan or Six-Sixty, proved just as efficient, the six-volt valves scoring slightly over the two-volt types.



Panel Drilling Diagram of the "All-wave Roberts Four"



A Three-quarter Front View of the "All-Wave Roberts Four"

On a standard P.M.G. aerial, and with a good earth, the constructor will have no difficulty in bringing in the majority of the B.B.C. main stations and a large number of Continental ones. Tuning is fairly critical, and will be found sufficiently sharp to separate adjacent stations.

The Xllos coils and H.F. transformers used in this set have a comparatively small field, so that screening could be dispensed

(Concluded on page 632)

BE A RADIO MISER

THE IMPULSES your aerial receives from foreign stations are doubly precious because of their weakness. You must arrange your receiver so that none of the energy is lost. You must guard against leakage. You must be miserly in the way you save each minute portion. This means more than using good radio parts—it means using the one make of parts that have been conspicuously notable for their low loss qualities for many years—LISSEN

ECONOMISES H.T.

By putting a Lissen 2 mfd. Mansbridge Condenser across your H.T. Battery (1 mfd. will do, but larger size is better) you will lengthen its life by 10 per cent.

LISSEN Mansbridge Type Condensers

2 mfd. **3/6** 1 mfd. **2/6**

Other capacities

.01	**1/9**	.25	**2/-**
.05	**1/9**	.1	**1/9**
.025	**1/9**	.5	**2/3**

A specially moulded solid insulating case totally encloses each Lissen Mansbridge Condenser.

STRONGER SIGNALS

There is not a square inch of superfluous ebonite in this Lissen Valve Holder. That means low capacity, and therefore stronger, clearer signals. Shown ready for baseboard mounting, but can also be used for panel mounting by bending springs straight. Patented. Previously 1/8. NOW **1/-**

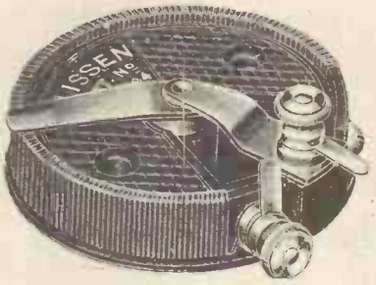
NEVER LEAK or VARY

Lissen fixed condensers are accurate to within 5 per cent. of their marked capacities. They never leak, they never vary. Less than a year ago they were being sold at twice the price—and since then they have been still further improved. You can't buy a finer condenser.

LISSEN Fixed Mica Condensers

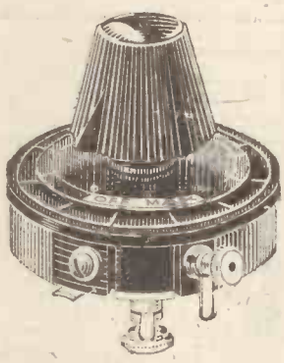
.0001 to .001, **1/-** each (much reduced).
.002 to .006, **1/6** each (much reduced).
A pair of clips is included free with every grid condenser.

NOW COSTS 1/- LESS



The baseboard type of Lissen Resistor is now reduced from **2/6** to **1/6**. This type has, of course, no knob, dial, or pointer, but is provided with 2 holes for screwing to baseboard. 7 ohms Rheostats : 400 ohms Potentiometer, (Previously, 2/6), now, **1/6**.

ALSO REDUCED



LISSEN PANEL TYPE RHEOSTATS

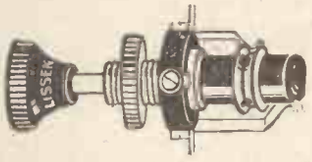
The wires do not loosen, the arm keeps in perfect contact—nothing ever goes wrong.

Rheostats 7 and 35 ohms .. (Previously, 4/-).	Now **2/6**
Potentiometer 400 ohms .. (Previously 4/6).	„ **2/6**
Dual Rheostat 35 ohms .. .. (Previously 6/-).	„ **4/6**

ABSOLUTELY SILENT

Lissen Leaks are absolutely silent in use; their resistances never alter. This was proved some time ago by exposing them to the rain and sun on our factory roof.
All resistances. Previously 1/8. NOW, **1/-**

SAVE CURRENT

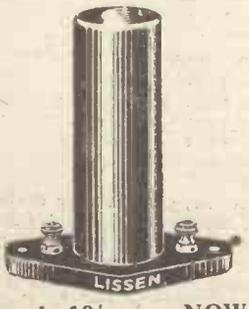


Energy is often lost at the switch points. These Lissen SWITCHES are designed to prevent energy leaking away while they do their work efficiently. There is one for every switching need—each one is very neat.

	Now
LISSEN TWO-WAY SWITCH .. (Previously 2/9).	**1/6**
LISSEN KEY SWITCH .. .. (Previously 2/6).	**1/6**
LISSEN REVERSING SWITCH .. (Previously 4/-).	**2/6**
LISSEN SERIES PARALLEL SWITCH (Previously 3/9).	**2/6**
LISSEN FIVE-POINT SWITCH .. (Previously 4/-).	**2/6**
LISSEN D.P.D.T. SWITCH .. .. (Previously 4/-)	**2/6**

HERMETICALLY SEALED WOUND IN 30 SECTIONS

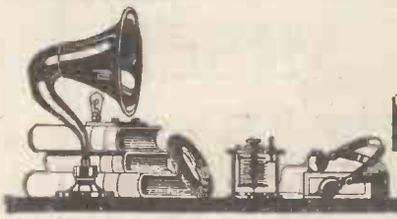
LISSEN H.F. CHOKE



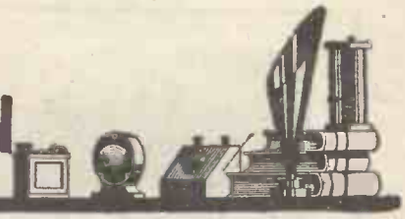
Previously 10/- NOW **5/6**

WHEREVER RADIO PARTS ARE WANTED USE LISSEN

LISSEN LIMITED, 16-20, Friars Lane, Richmond, Surrey Managing Director: THOMAS N. COLE L. 259a



OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc. on separate sheets containing your name and address. See announcement below.

The "Simpler Wireless" Special Three.

Q.—*In the article in "Amateur Wireless," No. 279, describing the construction of the "Simpler Wireless" Special Three, it is stated that the value of the anode resistance will vary for best results in different cases. What, exactly, determines the best value?—P. T. (Brighton.)*

A.—The best value to use depends upon the impedance of the centre valve and upon the amount of grid bias required by the last valve. For a given valve in the last stage the higher the impedance of the centre valve the greater should be the anode resistance and vice versa. For a given valve in the centre position the more grid bias required by the last valve the higher should be the anode resistance and vice versa. In practice, if best results are obtained with the grid of the last valve made as positive as possible by means of the appropriate potentiometer, a lower value anode resistance should be tried. If the set works best with the potentiometer set to make the last grid as negative as possible, a higher value anode resistance would probably be an improvement. —J. F. J.

Neutralising.

Q.—*What is the simplest way to convert an unneutralised tuned-anode H.F. stage to incorporate some method of neutralising?—G. B. L. (E.5.)*

A.—Possibly the simplest way, and certainly one of the best ways, would be to replace the present anode coil by another coil having the same number of turns, but a tapping at the electrical centre of the coil (such a coil being known as a "centre-tapped" coil). Take the H.T. positive lead which at present goes to the end of the tuned-anode coil farther from the plate of the H.F. valve to the centre tapping on the new coil and connect the free end of the coil to the grid of the H.F. valve through a suitable neutralising condenser. —G. N.

Advantages of Counterpoise.

Q.—*A counterpoise aerial is stated to be much more efficient than a connection to the ground. What are the chief advantages of a counterpoise as compared with those of the usual earth connection?—D. C. S. (Bradford).*

A.—For one thing a low resistance is a very desirable feature throughout the aerial system and, however much care may be taken, in the case of an ordinary earth connection, by far the greatest proportion of the aerial circuit resistance will be there. A counterpoise, by enabling the whole aerial circuit to be continuously metallic, considerably decreases the resistance of the circuit. Apart from this, a counterpoise, if correctly erected, acts as an efficient "earth screen" and eliminates losses due to the unequal conductivity of the ground immediately below the aerial. Quite apart from the advantages of increased efficiency already mentioned, a counterpoise often provides the only practicable remedy in cases of interference by electric machinery, etc., when such interference is due to earth currents. —N. F.

Grid Bias.

Q.—*As grid bias is now almost invariably used in the case of L.F. valves, how is it that it is never employed on the H.F. side? H.F. and L.F. valves work in exactly the same way—the difference is only in the frequencies with which they have to deal.—N. G. (Glasgow).*

A.—In the H.F. stages valves are employed which have much higher amplification factors than ordinary L.F. valves. Generally speaking, the higher the amplification factor of a valve the less grid bias it will require. In the case of practically all H.F. valves, a very little grid bias is quite sufficient, and this may be applied by putting the filament rheostat or fixed resistor on the negative side of the filament, thus obviating the necessity for a special grid bias battery.—N. F.

When Asking Technical Queries—

PLEASE write briefly and to the point

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

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

Aerial Insulation.

Q.—*Is it really of any advantage to use more than one insulator at each end of an aerial wire? I have seen aerials with two or three insulators connected in series at each end, but it does not seem likely that the signal currents could break down the insulation of a single insulator.—R. V. D. (Lewes).*

A.—Certainly a single good insulator provides enough *insulation* for a receiving aerial, but it must be remembered that the insulator also forms the dielectric of a condenser which is virtually connected between aerial and earth. The object of using several insulators in series at each end of the aerial is to reduce the leakage through capacity. Especially is it advantageous to do this at the free end of the aerial.—G. N.

Listener-in (during temporary breakdown): I wonder what's wrong now, Ma?

His Ma: Perhaps they've cut the supply off because you haven't paid your licence.

Filter Circuit.

Q.—*I wish to connect up my loud-speaker to my set through a filter circuit so that the current from the H.T. battery does not flow through the loud-speaker windings. Of what does the filter circuit consist?—O. S. N. (Grimsby).*

A.—All that is required is an L.F. choke coil and a large condenser of, say, ½ microfarad or more capacity. Connect the choke coil across the loud-speaker terminals of the set and then connect the loud-speaker across the choke coil with the condenser in series with one of the leads to the loud-speaker.—N. F.

Signals without H.T.

Q.—*I have a two-valve set and find that when I pull out the plug from the H.T. battery signals do not cease right away, but become weaker and take an appreciable time to fade away. Why is this?—B. M. (Hounslow).*

A.—Doubtless you have, in your set, a large-capacity fixed condenser across the H.T. terminals. The purpose of this condenser is partly to act as a reservoir and smooth out any inequalities in the H.T. supply. The effect you mention is excellent testimony to the fact that the condenser is well up to its work. Sufficient energy is being stored in the condenser to allow the set to work for some little time after the H.T. battery has been disconnected.—G. N.

Interference from Railway.

Q.—*At present I am using a crystal set and experience no interference from an electric railway which runs close behind my house. I am now thinking of going in for a set with three or four valves, but my friends tell me that if I do so I will not be able to hear anything for interference from the railway. What do you think about it?—F. J. N. (Manchester).*

A.—It is true that in some cases interference from an electric railway is so severe as seriously to mar wireless reception. Occasionally, too, this type of interference is so persistent that nothing seems able to cure the trouble. While we could not, therefore, guarantee you freedom from interference we can assure you that such cases as we have mentioned are few and far between. What we advise you to do before buying or building a set is to get a friend with a valve set to try it out at your house. If at first some interference is experienced it may prove possible to eliminate it by using a counterpoise instead of a direct connection to earth.—G. N.

THE REAL SOLUTION

TO THE BATTERY CHARGING PROBLEM

Philips Battery Charger Type No. 1009 ensures accumulators being maintained at full capacity from the electric light mains.

There is no complicated mechanism. A small control in the output lead enables either H.T. or L.T. accumulators to be charged.

The Unit is quite simple to use, reliable and no fear of overcharging with the consequent damage to the plates. Philips Battery Charger Type No. 1009 is supplied for any voltages from 100 to 260.

See Stand No. 24 at the Manchester Radio Exhibition.

PHILIPS

For Radio

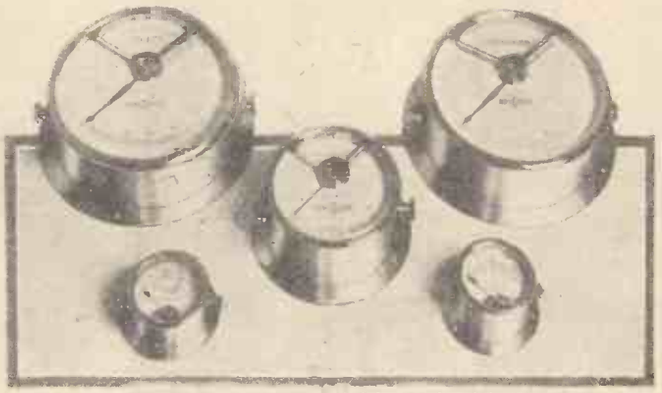
MAINS WORKING

The Sixth Article on Coupling the Receiver to the Mains

By H. J. BARTON CHAPPLE
Wh.Sc., B.Sc. (Hons.), A.M.I.E.E.

AS far as grid bias to the grids is concerned this is also an easy matter and the usual battery can be dispensed with. Referring once more to Fig. 18 (No. 279) it will be noticed that three resistances R_4, R_5, and R_6, have been inserted between the valves in the filament circuit. Now there is a constant fall of potential along the whole of this circuit from the positive main terminal to the negative, consequently B is at a negative potential with regard to A, and so on for R_5 and R_6. Thus joining the grid of V_2 to any point on R_4 will automatically give it a negative voltage with reference to its own filament, the value of this voltage depending upon the resistance value and current flow, and similarly for the other valves.

It often happens that these resistances can be dispensed with and the grid connection taken to the adjacent valve filament leg, or, for intermediate voltages, tappings can be made on to the adjacent filament rheostats. The enunciated details thus provide ample evidence that any form of regulation is possible with the series working of valves, so we can now proceed to discuss the arrangements for actually joining up the required circuits.



Instruments are essential for Mains Working

When dealing with H.T. smoothing devices we saw that it was necessary to include chokes and condensers as shown in Figs. 10 and 12 but experiment has shown that some mains in addition to the normal fluctuations carry high-frequency currents. To suppress these, H.F. chokes need to be included in the smoothing circuit, this being particularly the case where the valve filaments are fed from the house supply. On the ordinary broadcast wavelengths two No. 75 coils will probably suffice, but on the longer wavelengths these must be exchanged for No. 200 or 250 coils—one in each main. Added to this it will be a wise precaution to insert fuses at the main's input terminals so that if short circuits do happen to take place then the apparatus will be protected.

If it is decided to incorporate lamp resistances to cut down or split up the voltages for the complete unit then a fairly straightforward arrangement for, say, a three-valve circuit is depicted in Fig. 19. Care must be taken to ensure that the electric lamps will allow the desired current to pass both for H.T. and L.T. and the inclusion of an extra variable resistance will repay the extra cost involved, it being remembered that this resistance must carry the current required for a considerable period without overheating.

It will be noticed that in the circuit shown, about 160 volts is given to the last valve and about 80 volts to the first two valves with 240-volt mains. If lower voltages are desired more lamps can be inserted in series with the three shown. As far as grid bias is concerned the requisite secondary connection of the L.F. transformer is joined to the filament leg marked +4 (assuming 4 volts for each valve) thus giving a bias of 4 volts as far as the filament of the last valve is concerned. It may be found necessary to increase this value and this is effected by joining to the point marked 0; or when rheostats or intermediary resistances are employed in the manner shown in Fig. 18, intermediate voltages can be secured.

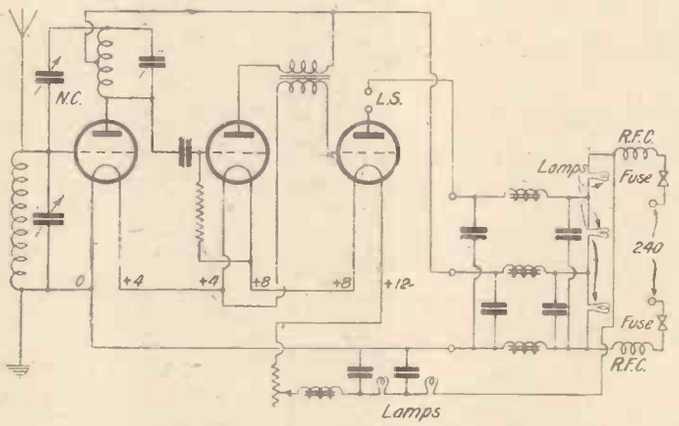


Fig. 19.—A Three-valve Mains Circuit

The iron-core choke for the filament circuit can be similar to those used for the H.T. side, provided it carries the filament current. Minor modifications of the scheme shown are of course possible but to get the best out of the whole arrangement it is advisable to use an ammeter of low resistance or a voltmeter of very high resistance (or both if at all possible) in order to make the adjustments accurately and not overrun the valves.

Coming to the question of maintenance costs, for a system such as this actual figures are somewhat misleading owing to the variety of charges made by different electricity supply companies, and the current consumption of the valves employed. An imaginary case will be taken, however, so as to indicate the simple calculations which must be made. Let us assume that the filament circuit takes .25 amperes such as would be approximately given by a 60-watt metal-filament lamp and a 50 c.p. carbon filament lamp in series, minor adjustments being made on the resistance. On the H.T. side it would be possible to arrange three 25 c.p. carbon-filament lamps in series, so that the current consumption is about 100 milliamps.

This gives a total of .35 amperes taken from the supply mains at 240 volts, that is, 84 watts, or reckoned in Board of Trade units, about one twelfth of a unit. At 4*d*. a unit this gives three hours running for a 1*d*. but with many companies the charge is made by allotting a fixed charge plus a 1*d*. a unit for all power consumed. This would give twelve hours running for 1*d*. which is clearly a very economical arrangement and worthy of the attention of all readers.

Under certain circumstances, however, there is a more economical arrangement than the one described where we saw that separate smoothing circuits with their associated resistances are used for the high-tension and low-tension supplies respectively. Since the current required for the filaments is in excess of that required for the plate circuit, it should be possible to arrange for the resistance in series with the filament to be tapped at appropriate points in order to furnish the H.T. potentials. In any ordinary receiver the accumulator and H.T. battery are in series or joined together at one common point, and it is only considerations of convenience and cost that necessitate two different types of supply for the necessary power. With the mains, however, such questions of

(*Continued on page 638*)

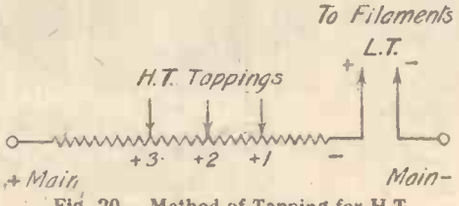


Fig. 20.—Method of Tapping for H.T.

RADIOGRAMS

ON Sunday, October 30, at 6 p.m., a further attempt will be made to relay 2FC Sydney (Australia) by all B.B.C. stations.

The Civil Service Choir are issuing (post free 6d.) a special souvenir programme of the concert they are giving at the Central Hall, Westminster, on November 2, and which 2LO is relaying. The programme includes Honegger's *King David*, overture to *Don Giovanni* (Mozart) and Granville Bantock's Sappho Songs. The choir will be assisted by the Wireless Symphony Orchestra. The soloists include Elsie Suddary, Dorothy D'Arsay, Leonard Gowings and A. Hibbard, all of whom are known to listeners.

The Ku Klux Klan now owns and operates its own broadcasting station, WTFF at Washington, D.C. It is a fifty watt station and its programmes, which are controlled by the "Fellowship Forum," the Ku Klux Klan weekly, are transmitted on 204 metres.

When forced down at sea an aeroplane is unable to send out distress signals because its trailing aerial is rendered useless. Engineers of the U.S. Naval Bureau have now devised a kite which will hoist the aerial in such cases of emergency. It is proposed to make it standard equipment on all U.S. naval planes making long-distance flights.

On the occasion of the meeting of the Seven Seas Club at Anderton's Hotel, London, on October 28, sea shanties sung by the members will be relayed to 2LO and 5XX.

The second half of the West-Ham *v.* Cardiff City match on November 12 will be broadcast from 2LO.

On November 8, listeners to 5GB are to hear the first broadcast performance of *The Seal Woman*, a Gaelic folk opera in two Acts by Margaret Kennedy Fraser and Granville Bantock. The caste will be the one which appeared at the first production of this opera at the Repertory Theatre, Birmingham, in 1924.

In connection with the Middlesex Hospital 33rd Annual Smoking Concert, a broadcast of Lord Jellicoe's speech and an entertainment by various stars will be relayed from the Queen's Hall, London, on November 18.

The Bournemouth station will devote its evening programme on November 5 to *The Blind Beggars*, a comic opera by Offenbach, and a performance of Rhodes's *Bombastes Furioso*, a famous burlesque first produced at the Theatre Royal, Haymarket, in 1810.

DO YOU KNOW?

1. **Which is the "C" battery of a valve set?**
2. **How many fundamental vibration frequencies a properly cut quartz crystal possesses?**
3. **What is another name for E.M.F.?**
4. **Which is Porto Rico's broadcasting station?**

Puzzle your friends with these queries; the answers will be given in next week's issue of "A.W."

Answers to Last Week's Queries: (1) Manganese peroxide. (2) To control the wavelength of the transmitter. (3) Mr. Gerald Marcuse. (4) A three-electrode valve, "audion" being a common American term.

Mabel Constanduros, Grace Ivell, and Vivienne Worth will contribute to a variety programme which John Henry will *compère* at the Newcastle studio on November 3.

A short play entitled *Riders to the Sea* by the Irish dramatist J. M. Synge, will be broadcast from 5GB on November 1.

The Elgin National Watch Company (Elgin, U.S.A.), which possesses its own observatory, has recently erected a short-wave wireless transmitter to be utilised mainly for the broadcast of accurate time signals. It operates on 33.5 metres, the call sign being WBNT.

In order to raise funds for its broadcasting service, *Radio Berne*, on the occasion of a fête to be given on November 19 at the Schanzli Kursaal in that city, will allow visitors to broadcast through the microphone private messages to their friends and relatives abroad. The "radiograms" are limited to fifteen words, including name and address, the fee being five Swiss francs. Listeners to the Berne station between 10 and 11 p.m. on that date may pick up communications of personal interest to them.

The high-power station under construction at Laibach (Jugo-Slavia), according to reports from Belgrade, will be formally opened at Easter, 1928.

Express passenger trains on the Moscow-Minsk (Russia) main line have now been equipped with both wireless telephony transmitting and receiving apparatus. The service is at the disposal of railway staff and passengers.

The new 5-kilowatt Dutch broadcasting transmitter, erected at Huizen (Zuider Zee), was formally opened by the Netherlands Minister of Transport and Waterways on October 22 last. In order to avoid interference it will transmit on two wavelengths, namely, on 1,840 metres until 7 p.m. and on 1,950 metres after that hour. The broadcasts are taken alternatively from a Hilversum studio and a new one recently opened at Amsterdam. The advent of the new transmitter will not affect the older established Hilversum (ANRO) service, to which station, according to a Dutch report, the PCJJ short-wave transmitter is to be transferred from Eindhoven. For the purpose of effecting this change, it is stated that the experimental station will suspend its transmissions for some four to six weeks.

During the Radio Exhibition at Paris, concerts will be relayed to the PTT (Paris) and Eiffel Tower transmitters.

As a result of recent negotiations, a decision has been taken to exchange broadcast programmes between Warsaw, Prague, and Vienna. The German authorities having decided to join this group with a view to an interchange of entertainments, it is expected that the Leipzig studio will shortly be associated with one of these S.B. transmissions.

"Those Curves"

(*Continued from page 616*)

frequency portion of the scale taking up its proper proportion. Two hundred and fifty-six cycles actually occur in the middle of the scale showing that we are duplicating the real effect.

A Log Scale

The disadvantage of this arrangement is that it is difficult to estimate other frequencies than those specified. Yet this scale in which the frequency doubles itself at each division is a particular form of logarithmic scale and we can actually plot the curve against frequency in the ordinary manner if we use what appears to be a distorted scale. In others words, the actual distance measured along the axis is not proportional to the frequency itself, but to the logarithm of the frequency and in such cases we obtain an exactly similar curve to that shown in Fig. 2 with the advantage that we are able to read off the amplification at any frequency we desire. Fig. 3 shows such a curve; and it will be seen to correspond exactly to that as shown in Fig. 2. Such a curve has a real true musical value and shows up the defects of the transformer far better than an ordinary curve.

This question of the uneven frequency scale has been in vogue for some time now. The Ferranti transformer, for example, was advertised with a curve of this nature over two years ago, and the value of logarithmic scale for frequencies is becoming appreciated. There is another form of scale, however, relating this time to the amplification. One normally assumes that whatever scale is used for the frequency, the actual voltage amplification obtained on the combination of valve and transformer will give a satisfactory indication of its performance. Yet on reflection this is not found to be the case.

Amplification and Sound

Everything depends upon the human ear. If the ear were a very sensitive arrangement and could respond accurately to small differences in strength, then an actual scale of voltage amplification would be suitable. As a matter of fact, however, the ear tends to allow for considerable variation in strength. A variation in intensity of less than 10 per cent. cannot be detected by the most accurate ear even with a rapid change. If two notes of the same pitch, but 10 per cent. different in intensity, are switched on one after the other no difference can be detected. As the difference in the intensity increases so sensitive ears can determine some difference, but a variation of as much as 50 per cent. can be tolerated even by a critical ear.

Now referring to the curves which have already been drawn it will be seen that at 500 cycles the actual amplification is about 10 per cent. less than the maximum, and at 250 cycles it is about 50 per cent. Does this necessarily mean that we are going to notice 50 per cent. difference in the low tones? As a matter of fact we are not, and the ear will only appreciate a very small falling-off at 250 cycles due to this apparently large discrepancy.

Various experiments which have been carried out by numerous research engineers have shown that we get a better indication of the sensation of sound by plotting the voltage amplification on a logarithmic basis again. In other words, the difference in apparent intensity of two sounds is proportional to the ratio of the sounds and not to their difference. In consequence if we plot the amplification against the logarithmic scale as well as the differences between, the different portions of the curve will not be so marked, but we can obtain a better indication of what the music would actually sound like when amplified by the particular combination of transformer and valve under test. The Fig. 1 curve has been plotted again in Fig. 4 with both frequency and amplification to a logarithmic scale. This shows the transformer as tolerably good over a range of which is a fair representation of its performance in average practice.

Thus it will be clear that the use of these apparently distorted scales really tends to give a better indication of what is happening than would be obtained by the use of plain straightforward scales.

"The All-wave Roberts Four"

(*Continued from page* 622)

with. For the same reason, no trouble is likely to be experienced through direct pick-up when using the receiver close to a station.

After the set had been carefully neutralised, the setting of the neutralising condenser was found to hold good for both broadcast and Daventry ranges; no adjustments had to be made when changing over from one waveband to another.

At a distance of over 150 miles from Daventry the volume given by the set, even during the daytime, was such that reaction could be dispensed with altogether; later in the evening Radio-Paris came in with good volume.

In a later article full particulars will be given for the construction of a plug-in unit which enables the amateur to change the "All-wave Roberts Four" into a short-wave set suitable for the reception of America and other short-wave transmissions. This addition does not in any way call for alterations in either wiring or layout.

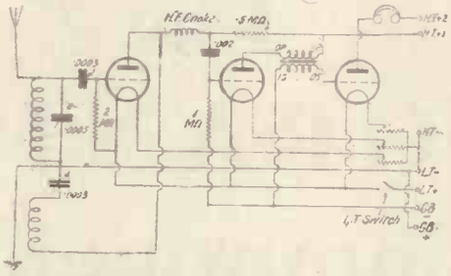
A New Company

THE business of Eric J. Lever has been turned into a private limited company, which will be known as Eric J. Lever (Trix), Limited. The offices and showroom are situated at 33, Clerkenwell Green, London, E.C.1, and the factory is at Eyre St. Hill, Clerkenwell.

The objects of the company are to take over and develop the business of manufacturers of and dealers in wireless apparatus, including the well-known "Trix" products, which has been carried on for many years by Eric J. Lever at the above address.

The "Victory Three"

COMBINING great volume with good all-round loud-speaker reproduction, the "Victory Three" incorporates a modified Reinartz circuit. This is reproduced here, and in its practical interpretation, the AMATEUR WIRELESS technical staff have produced a receiver which, judging from readers' reports, is an unqualified success.



Circuit Diagram of "Victory Three"

Fortunately, there is available a full-size blueprint, price 1s., from this office, and this, together with a copy of AMATEUR WIRELESS, No. 251, in which a full detailed description appears, should enable constructors to duplicate this successful receiver with the certainty of good results.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Oct.	30	Symphony concert to celebrate the fiftieth season of the People's Concert Society.
,,	31	*Old Heidelberg*, a play by Wilhelm Meyer-Forster.
Nov.	1	English comic opera programme.
,,	2	*King David* (Honegger).
,,	3	Variety programme.
,,	4	Symphony concert. Bridge hand.
,,	5	Military band concert.

DAVENTRY (5GB)

Oct.	30	Religious service relayed from a ward at the General Hospital (from Birmingham).
,,	31	A military band concert.
Nov.	1	*Riders to the Sea*, a play by J. M. Synge.
,,	2	*The Way of an Eagle*, an arrangement of the popular play by Ethel M. Dell.
,,	3	*The Blue Peter*, a comic opera in one act by A. P. Herbert.
,,	5	A Scots programme.

BOURNEMOUTH

Oct.	31	Hallowe'en, a programme in three phases.
Nov.	2	A concert by the Municipal Orchestra, conducted by Sir Dan Godfrey.
,,	5	*Bombastes Furioso*, a burlesque tragic opera in one act.

CARDIFF

Oct.	31	Hallowe'en, an orchestral and vocal concert.
Nov.	2	*A Breath of Fresh Air*, a play in one act.
,,	3	In "Lotus Land," an orchestral and vocal programme.

MANCHESTER

Nov.	1	Special concert on behalf of the Manchester stations's Wireless for the Blind.
,,	2	*Manchester Evening Chronicle* programme.

BROADCAST TELEPHONY

NOTE.—*In the following list of transmissions these abbreviations are observed : con. for concert ; lec. for lecture ; orch. for orchestral concert ; irr. for irregular ; m. for metres ; Kc. for kilocycles and sig. for signal. Unless otherwise stated, all times are p.m. (G.M.T.)*

GREAT BRITAIN

London (2LO), 361.4 m. (830 Kc.): 12 to 2.0, con.; 3.15 to 4.0, transmission to schools; 3.30 to 5.45, con. (Sun.); 4.15, con.; 5.15 to 5.35, children; 6, dance music; 6.30, time sig., news; music, talk; 8.10, music; 9.0, time sig., news. (8.50 Sun.), talk, con. Dance music daily (exc. Sundays) from 10.30 until midnight.

Aberdeen (2BD), 500 m. (600 Kc.). **Belfast** (2BE), 306.1 m. (980 Kc.). **Bournemouth** (6BM), 326.1 m. (920 Kc.). **Cardiff** (5WA), 353 m. (850Kc.). **Glasgow** (5SC), 405.4 m. (740Kc). **Manchester** (2ZY), 384.6 m. (780 Kc.). **Newcastle** (5NO), 312.5 m. (960 Kc.). Much the same as London times.

Bradford (2LS), 252.1 m. (1,190 Kc.). **Dundee** (2DE), 294.1 m. (1,020 Kc.). **Edinburgh** (2EH), 288.5 m. (1,040 Kc.). **Hull** (6KH), 294.1 m. (1,020 Kc.). **Leeds** (2LS), 277.8 m. (1,080 Kc.). **Liverpool** (6LV), 297 m. (1,010 Kc.). **Nottingham** (5NG), 275.2 m. (1,090 Kc.). **Plymouth** (5PY), 400 m. (750 Kc.). **Sheffield** (6FL), 272.7 m. (1,100 Kc.). **Stoke-on-Trent** (6ST), 294.1 m. (1,020 Kc.). **Swansea** (5SX), 294 m. (1,020 Kc.). **Daventry** (25 kw.), high-power station, 1,604 m. (187 Kc.). Special weather report, 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 (Sun.); relays 2LO.

Daventry Experimental (5GB), 491.8 m. (610 Kc.). 15 kw., from 3.0 onwards.

IRISH FREE STATE

Dublin (2RN), 319.1 m. (940 Kc.). Daily 6.0; (Sundays, 8.30) until 10.30 p.m. Relays Cork.

Cork (6CK), 400 m. (1 kw.). (750 Kc.). Relays Dublin (exc. Sundays).

CONTINENT

AUSTRIA

Vienna (Radio Wien), 517.2 m. (5 kw.) and 577 m. 6.30 con.

Relays: **Graz**, 357.1 m. (750 w.); **Klagenfurt**, (750 w.) 272.7 m.; **Innsbruck**, 294.1 m. **Linz** (under construction).

BELGIUM

Brussels, 508.5 m. (1.5 kw.). 5.0 orch. (not daily), 8.30, talk, 9.0 con., news.

CZECHO-SLOVAKIA

Prague, 348.9 m. (5 kw.). Con., 7.0 (daily).
***Brunn**, 441.2 m. (3 kw.). 6.0, con. (daily).
***Bratislava**, 300 m. (500 w.).
***Kosice**, 1,865 m. (kw.). 6.30 con., testing.
* Relays Prague.

DENMARK

***Copenhagen**, 337 m. (700 w.). Sundays, 9.0 a.m. sacred service; 7.0, con. Weekdays: lec., con., news; dance to 11-0 (Thurs., Sat).
* Relayed by **Kalundborg** (7 kw.) 1,153 m.

ESTHONIA

Reval, 408 m. (2.2 kw.) from 7.0, con.

FINLAND

Helsingfors, 375 m. (1.2 kw.), from 5.0, con.

FRANCE

Eiffel Tower, 2,650 m. (12 kw.). 6.30 a.m., markets (exc. Sun. and Mon.); 11.20 a.m., time sig., weather; 6.0 talk; 7.10 weather, con.; 8.15 lec.; 10.20 weather, T.S. Relay PTT, Paris, Sat., 9.10 to 11.0, and weekday afternoons.

Radio-Paris (CFR), 1,750 m. (3 kw.). Sundays: 12.0 sacred service; 12.45, con.; news; con.; 8.15, news, dance. Weekdays, 8.0, 10.30 a.m., news, con., 12.30, con., markets, weather, news; 4.30, markets, con.; 8.0 time sig., news, con.

L'Ecole Sup. des Postes et Telegraphes (PTT), Paris, 460 m. (5 kw.). 1.15 to 3.0 (relay of Sorbonne University); 9.0 con. (daily).

Le Petit Parisien, 340.9 m. (500 w.). 9.15, con. (Tues., Thurs., Sat., Sun.).

Radio L.L. (Paris), 370 m. (250 w.). Con. (Sun., Mon., Tues., Wed., Sat.), 9.30.

Biarritz (Côte d'Argent), 200 m. (250 w.). 7.0. con. (Irr.).

Radio Vitus (Paris), 302 m. (150 w.). 9.0, con.

Radio-Toulouse, 391 m. (3 kw.).. 8.45, con.
Radio-Lyon, 291 m. (1.5 kw.). 8.20, con.
Strassburg (8 G.F.), 222.2 m. Con., 9.0 (Irr.).
Radio Agen, 297 m. (500 w.). 8.30, con.
***Mont de Marsan**, 400 m. (300 w.), con. 8.30.
Bordeaux (Lafayette), 279 m. (2 kw.). Con. 5.0, 9.0 (weekdays), 2.30 (Sun.). Relays PTT, Paris, 8.30 (Sat.). No transm. on Mon.
***Lyon-la-Doua**, 476.2 m. (1 kw.).
***Lille**, 286 m. (600 w.). Own con. (irr.).
***Marseilles**, 300 m. (500 w.).
***Grenoble**, 278 m. (1½ kw.). (Wed. and Sats.).
***Toulouse**, 260 m. (500 w.) (exc. Sun.).
***Rennes**, 279 m.
***Limoges**, 273 m.
Montpellier, 252.1 m. (200 w.). 8.45 (Wed., Fri.). For news, relays Marseilles.
Beziers, 158 m. (700 w.). 9.0 (weekdays only).
Juan-les-Pins, 230 m. (100 w.). 8.30 con.
Bordeaux (Radio-Sud-ouest), 238 m. (1 kw.). 7.25 con. (Thurs.).

* Relays of PTT, Paris.

(*Continued on page* 636)

BROADCAST TELEPHONY

(Continued from page 634)

GERMANY

Berlin, on 483.9. Throughout-day. Relayed by Stettin (236.2 m.).

Konigswusterhausen (LP), 1,250 m. (8 kw.). 10.30 to 1.50 a.m., con. (Sun.); 2.0, lec. (daily). 7.30, relay of Berlin (Vox haus) con., or from other German stations (daily).

Breslau, 322.6 m. (4 kw.). 6.0 lec.; 7.30, con. Relay, Gleiwitz, 250 m.

Dortmund, 283 m. (½ kw.). See Langenberg.

Frankfort-on-Main, 428.6 m. (4 kw.). 5.0 to 5.15 a.m. (exc. Sun.), physical exercises; 7.30 a.m., sacred con. (Sun.); 3.30, con.; 7.0, lec., con., weather. Relay: Cassel, 272.7 m.

Hamburg, 394.7 m. (4 kw.). Relayed by Bremen (252.1 m.), Hanover (297 m.). Kiel (254.2 m.), Sundays: 8.15 a.m., sacred con.; 5.0 con., 6.0 con. Weekdays: 4.45 a.m., then from 8.0 a.m. throughout day.

Konigsberg, 329.7 m. (4 kw.). 7.0, con. Relay: Danzig, 272.7 m.

Langenberg (Rhineland), 468.8 m. (25 kw.). Relays Muenster, Dortmund, Cologne or Dusseldorf (daily). Throughout day.

Leipzig, 365.8 m. (4 kw.) Relays Dresden (275.2 m.). 7.15 con.

Munich, 535.7 m. (4 kw.). Relayed by Nuremberg, 303 m. (4 kw.) and Augsburg, 566 m. 5.30, con. (weekdays).

Muenster 241.9 m (1.5kw.). See Langenberg.

Norddeich (KAV), 1,800 m. 10.15 a.m., 9.30.

Stuttgart, 379.7 m. (4 kw.). 10.30 a.m., con. (Sun.); 5.30, time sig., news, lec., con. (daily); Relay: Freiburg, 577 m. (1½ kw.).

GRAND DUCHY OF LUXEMBURG

Radio Luxemburg, 217.4 (250 w.). Con. 1.0 (Sun.), 9.0 (Tues.). (Irr.).

HOLLAND

Hilversum (ANRO), 1,060 m. (5 kw.). Sundays: 8.10 a.m., sacred service; 12.10 and 1.10, con.; 5.35, church service; 7.40, weather, news, con. Weekdays: 11.40 onwards.

Scheveningen-Haven, 1,950 m. (2½ kw.). Throughout day. Markets, Stock Ex.

Eindhoven (PCJJ), 31 m. (Tues., Thur.), 6 p.m.—midnight.

Huizen, 1840 m. until 7 p.m., 1950 m. from 7.30 p.m.

HUNGARY

Budapest, 556 m. (3 kw.). 7.0 con.

ITALY

Rome (IRO), 450 m. (3 kw.). 7.30, news, weather, con.; 9.15, late news.

Milan, 315.8 m. (4 kw.). 7.15 to 10.0, con.

Naples, 333.3 m. (1½ kw.). 7.30 to 10.0, con.

Como, 500 m. (5 kw.). 7.0 to 10.0 (temp.).

NORWAY

Oslo, 461.5 m. (1.5 kw.). 6.15, con.

Bergen, 370.4, m., (1 kw.). 6.30, news, con.

*Fredriksstad, 434.8 m.

*Porsgrund, 502 m. (1½ kw.).

*Tromsoe, 500 m.

*Hamar, 566 m.

* Relays Oslo.

POLAND

Warsaw, 111.1 m. (10 kw.). 7.30.

Cracow, 422 m. (4 kw.). 7.30.

Posen, 280.4 m. (1.5 kw.). 7.30.

RUMANIA

Bucharest, about 1,600 m. (5 kw), Testing.

RUSSIA

Moscow (RDW), 1,450 m. (15 kw.). 4.30 p.m., con. News. 10.0, chimes from Kremlin.

Moscow Popoff, 675 m. (5 kw.). 4.30 daily.

Leningrad, 223.9 m. (10 kw.). 5.0 and on 1,000 m.

Kharkov, 477 m. (4 kw.) 8.0 daily.

SPAIN

Madrid (EAJ7), 375 m. (3 kw.). Con., daily. 9 or 10 con.

Madrid (Radio Espana), 400 m. (2 kw.). Irr.

Madrid (Radio Madrilena) (EAJ12) 297 m.

Barcelona (EAJ1), 344.8 m. (2 kw.). 6.0 to 11.0 (daily).

Barcelona (Radio-Catalana) (EAJ13), 462 m. (2 kw.). 7.0 to 11.0, con., weather, news.

Bilbao (EAJ9), 438 m. (500 w.). 7.0 con.

Bilbao (Radio-Vizcaya) (EAJ11). 418 m. (500 w.). 8.0 to 12.0, con. (daily).

Cadiz (EAJ3), 400 m. (550 w.). 7.0 con.

SWEDEN

Stockholm (SASA), 454.5 m. (1½ kw.). 10.0 a.m., sacred service (Sun.); 5.0, sacred service; 6.0, lec.; 8.15, news, con., weather. Dance (Sat., Sun.), 8.45. Relayed by Motala. 1,320 m. (40 kw.) and some 28 small stations.

SWITZERLAND

Lausanne (HB2), 680 m. (600 w.). 7.0.

Zurich, 588 m. (600 w.). 10.0 a.m., con. (Sun.); 5.15, lec., con., dance (Fri.).

Geneva (HB1), 760 m. (750 w.). 7.15, con.

Berne (411 m. (1.5 kw.). 7.30, con.

Basle, 1,100 m. (250 w.). Relays Berne.

"Useful Current Control Unit."—In one of the "Odds and Ends" illustrated and described on page 518 of the October 15 issue under the above title, there is shown a rheostat in use as a battery resistor and on-and-off switch. This particular device is a Burton, a patented component made by the firm of C. F. & H. Burton, Progress Works, Bernard Street, Walsall.

An illustrated description of the World's **Largest Motor Liner, "Saturnia,"** is given in this week's *English and Amateur Mechanics* (3d.). There is also an interesting illustrated account of the fine model **"Killingworth" Locomotive made by George Stephenson about One Hundred Years Ago.** Other interesting items include "MAKING YOUR OWN FIREWORKS FOR NOVEMBER 5," "AN ELECTRICAL INDICATOR FOR DEAF PERSONS," "A HIGH-SPEED ENGRAVING MACHINE," "SPACE-SAVING FURNITURE FOR THE SMALL HOME," "THE MOTOR MECHANIC'S WORKSHOP," ETC., ETC.

Advertisers Appreciate Mention of "A.W." with Your Order

"MAINS WORKING"

(*Continued from page 626*)

adaptability do not arise and, provided the necessary attention is given to design, the H.T. and L.T. supplies can form one complete circuit across the mains.

Now what is the principal consideration if this method is adopted? Thereby that the chokes and resistance will handle adequately the current demanded by the system without over-heating or damage to the wire. Readers will no doubt remember that this scheme was adopted for "The Lamp-socket Three" described in Nos. 335 and 336. Complete details for making and assembling the required apparatus were given, together with the construction of a three-valve receiver arranged to be supplied from the unit. Due to considerations of rectified power, valves consuming the smallest filament current must be utilised in receivers, in the majority of cases, when alternating current mains are installed in the house, as will be shown later in the section devoted to A.C. With a D.C. supply, however, such limitations are not met with, although naturally from questions of running costs the lowest current consumption should be aimed at.

The skeleton arrangement is shown in Fig. 20, where, for the purpose of illustrating the principle, it is assumed that an absolutely steady voltage is given by the mains and smoothing apparatus is hence not included. A resistance of suitable size is inserted in series with the valve filaments, also in series, so that the fall of potential along the resistance enables the desired H.T. tappings to be made to the plates of the valves, the current also passing through the filaments.

This method thus enables the extra current required for the H.T. supply with its associated resistance to be dispensed with, thus making for simplification in the complete installation. Before proceeding with the details of this arrangement, however, it will be necessary to analyse carefully what is actually happening in mains and receiver circuits of this character.

(*To be continued*)

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

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

Blueprints

Full-size Blueprints, each one being a photographic contact print, from the draughtsman's original design, and produced on stout paper, are now available of the following sets.

	No.	Price, post free. s. d.
ONE-VALVE SETS		
One-valver for Frame Aerial	W.M. 4	1 0
One-valve All-wave Reinartz	A.W. 2	1 0
All-in-all One-valver	A.W. 13	1 0
Hartley DX One-valver	A.W. 27	1 0
Alpha One*	W.M. 26	1 3
Reinartz Plug-in One-valver	A.W. 46	1 0
TWO-VALVE SETS		
Safeguard Two	A.W. 3	1 0
Two-valver, embodying K.L.1 Valves	A.W. 5	1 0
One-control Two	A.W. 6	1 0
Wide-world Short-wave Two	A.W. 11	1 0
All-wave Two-valver	A.W. 15	1 0
Loftin-White Two*	W.M. 20	1 3
Reinartz Two	A.W. 21	1 0
Remote-control Two	A.W. 23	1 0
One-dial Two	W.M. 23	1 0
Empire Short-wave Two	A.W. 28	1 0
Screened-trap Two	A.W. 31	1 0
"Next-step" Receiver	A.W. 34	1 0
Girdle Two*	W.M. 30	1 3
Centre-tap Two	A.W. 42	1 0
Mains-fed Two	W.M. 37	1 0
THREE-VALVE SETS		
One-knob Three	W.M. 3	1 0
Continental Three	W.M. 7	1 0
Shielded Searcher	W.M. 8	1 0
Victory Three	A.W. 9	1 0
Regulator Three	A.W. 12	1 0
Hi-mu R.C. Three*	W.M. 9	2 3
M.C.3 Star	A.W. 16	1 0
Wave-catcher Three	W.M. 19	1 0
Excelsior Three	A.W. 20	1 0
Split-primary Three	A.W. 24	1 0
Lighthouse Three	A.W. 29	1 0
Purity Three-valver	A.W. 33	1 0
A Modern Tuned-anode Three	A.W. 35	1 0
Tetrode Three, for Shielded Valves	A.W. 36	1 0
Alternative-programme Three	A.W. 38	1 0
A "Mains" Three-valver	W.M. 34	1 0
Screened-grid Three	W.M. 21	1 0
"Simpler Wireless" All-from-the-Mains Receiver	A.W. 41	1 0
"Simpler Wireless" Special Three-valver	A.W. 44	1 0
"Home Station" Three	A.W. 45	1 0
The "Economy" Three	A.W. 48	1 0
Five-guinea Three	W.M. 29	1 0
Dominions Short-wave Three	W.M. 39	1 0
FOUR-VALVE SETS		
Paradyne Four	W.M. 2	1 6
M.C. Four	A.W. 8	1 6
Distance Getter	A.W. 10	1 6
Household Four	A.W. 17	1 6
DX Four	A.W. 18	1 6
Revelation Four	W.M. 24	1 6
Auto-selector Four	W.M. 35	1 6
"A.W." Gramo Radio	A.W. 40	1 6
All-purpose Four	A.W. 43	1 6
FIVE-VALVE SETS		
1927 Five	W.M. 6	1 6
Two-volter's Five	W.M. 11	1 6
Individual Five	A.W. 25	1 6
Exhibition Five	W.M. 33	1 6
SIX-VALVE SETS		
Nomad Six	W.M. 31	1 6
SEVEN-VALVE SETS		
Simpladyne Seven (Super-het.)	W.M. 22	1 6
AMPLIFIERS		
All-broadcast Amplifier	W.M. 10	1 0
Two-valve D.C. Mains Amplifier	W.M. 14	1 0
Gramophone Amplifier	W.M. 32	1 0
Range Extender (H.F. Amplying Unit)	W.M. 38	1 0
PORTABLE SETS		
Springtime Portable Two-valver	W.M. 12	1 6
Countryside Four	W.M. 17	1 6
Motorists' Portable Four-valver	A.W. 14	1 6
M.C. Three Portable	A.W. 22	1 0
Handy Three	W.M. 27	1 0
Holiday Portable (three-valver)	A.W. 32	1 0
Club Portable (three-valver)	A.W. 30	1 0
CRYSTAL SETS		
Crystal Set for the R.C. Enthusiast	W.M. 13	0 6
Fonotrol Crystal Set	W.M. 14	0 6
Hi-lo Crystal Set	W.M. 18	0 6
Two-programme Crystal Set	W.M. 25	0 6
Alternative-programme Crystal Set	A.W. 39	0 6
MISCELLANEOUS		
Loud-speaker Tone Control and Filter Unit*	W.M. 1	2 3
Heterodyne Wavemeter	A.W. 7	1 0
Made-to-measure Wave-trap	A.W. 19	0 6
New Current Supply Idea	A.W. 26	1 0
DX One-valve Unit	A.W. 37	1 0

*With a copy of "Wireless Magazine" complete.

Send a Postal Order to-day to **BLUEPRINT SERVICE**
AMATEUR WIRELESS
58-61 FETTER LANE, LONDON, E.C.4

"Cryptic Weather Words"

(*Continued from page 607*)

in fact means no more than the old weather saw:

Long foretold, long last;
Short notice, soon past.

The most troublesome of all areas of low pressure from the forecaster's viewpoint, especially in summer, is the "secondary" or thunderstorm depression. The main area of low barometer passes away and everything seem to point to fine settled weather. Suddenly a cut in of cold air on the edge of the anticyclone causes a "secondary" and instead of the expected fine weather, we experience a series of violent thunderstorms!

PREPAID ADVERTISEMENTS.

Advertisements under this head are charged THREEPENCE PER WORD, minimum charge THREE SHILLINGS.

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