"ALL-WAVE MAINS 3" : : A LINEN SPEAKER

Amateur Wireless And Electrics

SECOND BIG SHOW NUMBER

3d.

Vol. XIII. No. 329 Saturday, September 29, 1928

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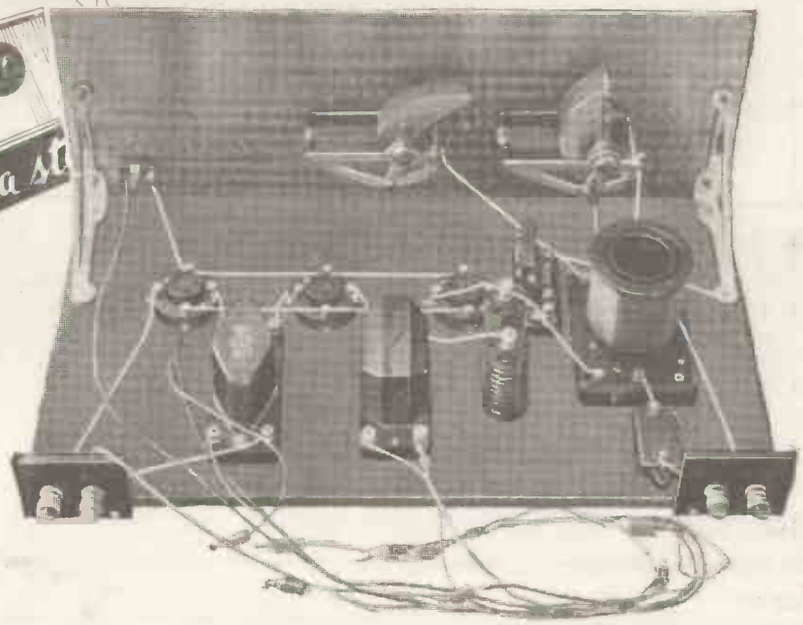

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Amateur Wireless and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Edited by BERNARD E. JONES

Vol. XIII. No. 329 Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E. SEPTEMBER 29, 1928

Uncle André's Successor—Fultograph Developments—A New Short-waver—The National Chorus—Broadcast Politics—A Screen-grid Four

Uncle André's Successor—Albert de Courville, who is to run a series of "hours" in place of André Charlot, will give his first show on October 9, when the first "air raid," as his hours are to be called, will be broadcast. As a result of a recent extensive tour, de Courville will be able to draw upon the variety resources of France, Germany, and America for his original entertainments. It will be interesting to see whether he makes as big a hit as did Charlot, who, by the way, has received 20,000 letters asking him to come back since he gave his final "hour."

Fultograph Developments—The company, Wireless Pictures (1928), Ltd., formed to exploit the Fultograph, has met with great success so far, in that the lists for the issue of 775,000 ordinary 4s. shares were so heavily over-subscribed that they had to be closed early on the morning of issue. The experimental picture broadcasts, which start in October, will be made from the long-wave Daventry station after midnight or before 3 p.m. in the afternoons. The B.B.C. emphasise the fact that only on condition that there is a distinct public demand will these picture transmissions be included in the regular broadcasting hours.

New Short-waver—Readers whose short-wave receivers can tune down as low as 25.6 metres will be interested to know that the Winnipeg station, CJRX, has now started a regular short-wave broadcasting service. The present time of operation is from 10.30 p.m. to 12.30 a.m. Greenwich time. The power of the short-wave plant is not yet known, but Mr. D. R. P. Coates, the manager of the station, anticipates that British listeners will be able to pick up the signals. Reports of reception should be addressed to the Manager, General Radio Office, Room 1018, Grain Exchange Building, Winnipeg, Canada.

National Chorus—Two thousand applicants have been heard by Mr. Stanford Robinson in connection with the formation of the proposed National Chorus of 250 singers. The first rehearsal will take place on September 28. The B.B.C. is well satisfied with the response from choral societies and individual choristers, but listeners must judge the merits of the new venture when the chorus gives its first broadcast in November.

An interesting statistical exhibit at the German Radio Show showing the numbers of listeners in the chief countries of the world. The U.S.A. with 7,500,000 listeners, England with 2,519,072 and Germany with 2,284,248 have the largest discs.

Broadcast Politics—Asked whether he heard Mr. J. H. Thomas in the recent broadcast discussion between Mr. J. H. and Mr. R. D. Blumenfeld, a candid listener is reported to have answered: "I picked it up in the middle and thought I had got on to Moscow!" We heard the discussion from beginning to end, and we should be prepared to sink our differences of political opinion to hear similar discussions.

Continental Relays—Without making a song about it, the B.B.C. is quietly introducing listeners to a taste of long-distance land-line relaying from the Continent. A recent Sunday-night concert from Ostend went down very well, as did the first of three talks by Mr. Vernon Bartlett from Geneva. Those who missed the first two should listen on September 27 for the third talk. As the new system of cables between 2LO and the Continent is now practically complete, there is more than a little significance in the recent meeting at Berlin of the Union Internationale de Radiophonie. Listeners will hear many Continental programmes from 2LO shortly.

Coming: A Screen-grid Four—Ever since the first screen-grid valve was introduced the AMATEUR WIRELESS Technical Staff has concentrated on the design and development of receivers incorporating screen-grid valves; next week readers are to have the benefit of an absolutely up-to-date four-valver, which is really the culmination of an extensive series of screen-grid hook-ups of every description. The screening is extremely simple and need not deter any constructor from starting his new wireless season with a receiver worthy of the new valve it incorporates. For the less ambitious constructor and for those of more moderate means the AMATEUR WIRELESS Technical Staff will describe next week an all-wave two-valver that combines simplicity of construction with an exceptionally good performance.

PRINCIPAL CONTENTS

My Wireless Den

Some Weekly Notes for the Amateur by W. James

HERE is a time, trouble and (not least!) ha'penny saving tip; use the T.C.C. type of fixed condenser. You can easily fit grid-leak clips on this type, thus saving a grid-leak holder and two wires. In the series/parallel type, too, where three terminals are provided, the grid leak may be joined either across the fixed condenser or to one end of it. With this latter connection the grid leak may be put between the grid and filament of a valve thus making an R.C.C. arrangement, or is suitable for use after a tuned-anode circuit. You will get the idea if you glance at Fig. 1.

Look Before You—Test

I was testing a moving-coil loud-speaker the other day; it rattled very badly—horribly in fact. Of course, I straightway put my trusty voltmeter across the H.T. battery—which was one of the accumulator type so often lauded nowadays. The voltage was O.K. and there was nothing left for me to do, but run over the set. This done and no fault found I was beginnng

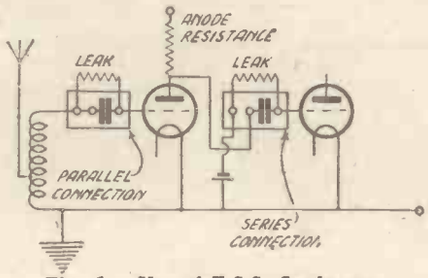


Fig. 1.—Use of T.C.C. Condenser

to murmur unprintable things under my breath when my eyes falling on the H.T. accumulator once more, I immediately saw the cause of the trouble. The case of one of the cells had cracked and the electrolyte had leaked away, making the cell act as an exceedingly high resistance. I had to look no further for the cause of the bad quality! Truly there are more things in wireless than. . . . But the moral is, I think, always to look before you test.

'Ware Cheap Wire!

Why will some amateurs employ cheap wire for battery connections? This is an offence which I find very difficult to pardon. The insulated covering of cheap wire soon wears through in places and if two bare portions make contact—well, there will be a flash, a smell of burnt rubber and a listener who will presently realise that he is a considerably poorer man.

Fixed Condensers

I notice, with pleasure, that more attention is now being given to the voltage rating of fixed condensers. At last it has been recognised that capacity is not the only factor that must be accurately ascertained and clearly stated.

Do you know that the type that is usually connected across the high-tension circuits of receivers will not stand, for any length of time, a greater working voltage than, say, 160? They are definitely not suitable for the smoothing circuits of mains units where the voltage may be 300.

The insulating material used in the ordinary type is too thin to stand the strains of the higher voltages. In properly designed models the dielectric is thicker and they are hence more bulky. You will have to pay for the safety factor but it will repay you one hundredfold.

Condenser Insulation

The insulation used in these condensers is, as you probably know, specially treated paper. One might think that a dielectric such as mica might be used with advantage, but when paper condensers have been used for years in high-tension power circuits where the working voltages are measured in thousands, I do not think that we wireless fans, with our two or three hundreds of volts, need worry!

Mica is more essential for small condensers where low losses and accuracy are essential.

Charging at Home

The army of those who charge their own accumulators at home from the mains, instead of taking them to the local electrician, is growing rapidly. I am glad of this, but I feel that I must give a word of warning; many of these "home chargers" are not doing their job thoroughly—they are neglecting their accumulators.

For instance, everyone knows that distilled water should be used to restore the level of the electrolyte in the cells. But, because this is not always available, these "home-chargers" often use tap water!

Howling

There is nothing more nerve destroying than a good powerful, continued, "I-have come-to-stay" howl from the loud-speaker. But the thing to do is to keep cool, throttle the volume down, tell the family (politely, of course) to go for a walk if they dislike it, and then start a systematic search.

In a case which I dealt with recently the howl was stopped by reversing the connections to the secondary winding of the inter-valve transformer. As a rule it is not good practice to eliminate a howl by reversing connections in this manner for the quality may be impaired. But when the howling is known to be caused through an almost discharged H.T. battery, one is perhaps

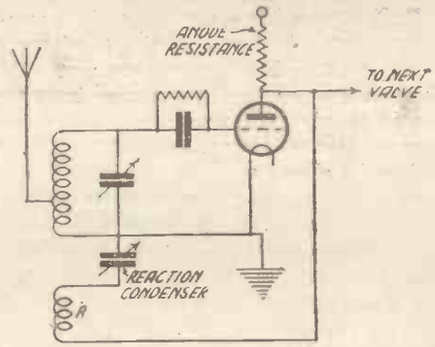


Fig. 2.—A Circuit Employing Magnetic Reaction

justified in making use of it, to obtain a few more hours' music.

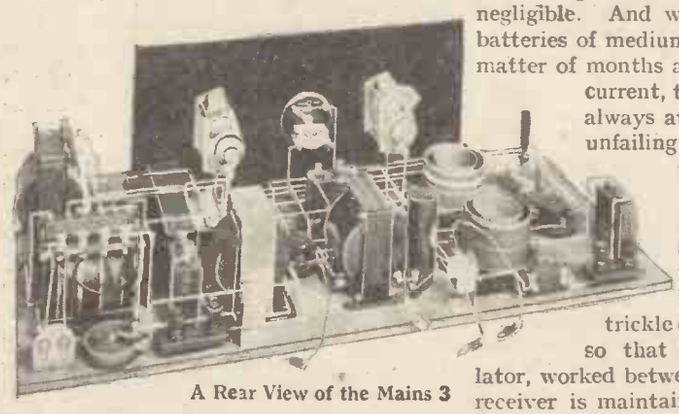
Value of Reaction Condensers

Reaction condensers are often specified with a value of .0001-microfarad capacity, but it is a fad of mine to employ a larger value where possible. And this is for why; I have found that the reaction circuit is less likely to interfere with the tuning of the grid circuit when the reaction condenser is a large one. Again an H.F. choking coil can then be dispensed with because of the large capacity of the reaction condenser, in comparison with the stray capacities in the anode circuit.

A large reaction condenser cannot always be used but I always endeavour to proportion the circuit so that one of at least .0003-microfarad can be employed. A smaller reaction coil (R in Fig. 2) is, of course, then required.

The ALL-WAVE MAINS 3

EVERY listener with an A.C. mains supply has an easily convertible source of power for both the high- and low-tension supplies of his wireless set. For the H.T. supply a maximum of 120 volts D.C., with a current consumption of, say, 30 milliamperes, can be withdrawn from the mains at a fraction of the cost of one B.O.T. unit per hour.



A Rear View of the Mains 3

To do this a transformer, some form of rectifier and a smoothing system have to be installed, the initial cost of which is in the neighbourhood of five pounds. But the subsequent running costs are practically negligible. And whereas the best of dry batteries of medium capacity run out in a matter of months and deliver but a small current, the generating station is always at one's service with an unfailing and robust source of power.

For the L.T. supply the listener has three alternative methods of utilising his A.C. mains. In the first case, a trickle charger can be installed, so that a "floating" accumulator, worked between the charger and the receiver is maintained in a fully charged condition by renewing the energy from time to time. Secondly, a metal rectifier in conjunction with electrolytic condensers can now be arranged for the complete elimination of the accumulator, in the same way that a high-tension eliminator dispenses with an H.T. battery by converting the A.C. input to the required D.C. output.

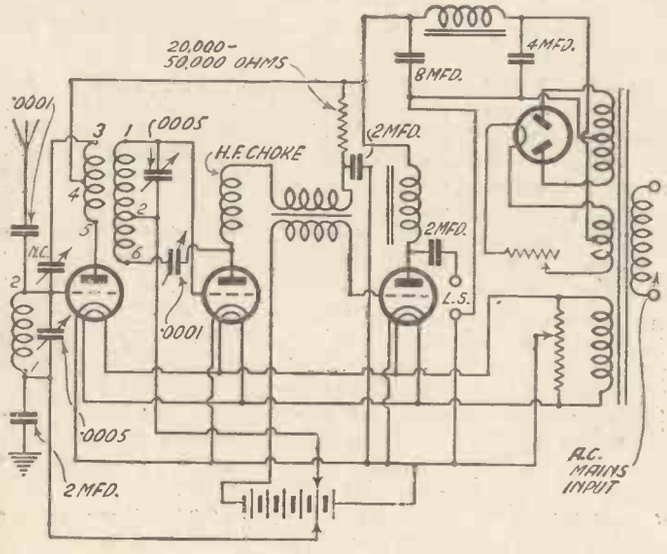
The third way, and at present the most definitely satisfactory way, is to use special valves having filaments brought to the required operating temperature by independent heater elements.

Thus it will be seen that the means are available for the running of a wireless receiver almost entirely from the mains. Even the grid-bias battery can be eliminated by one of several methods, though it is doubtful whether the expense of such a procedure would be justified.

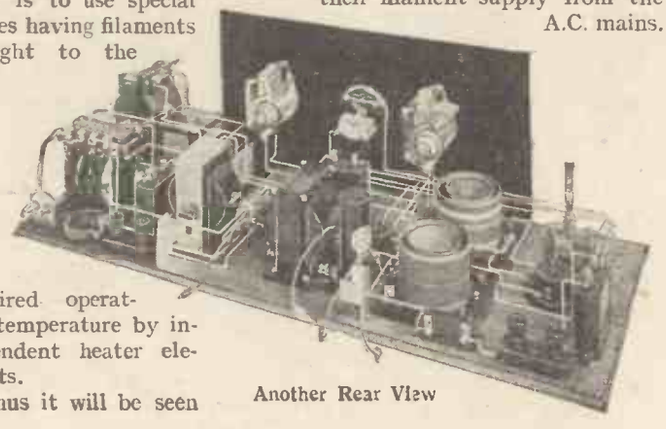
Readers can look forward to a wide and varied range of A.C. receivers this winter, for we are convinced that the present utility of A.C. mains is vastly underestimated. Not that we stand alone in this conviction, for the leading radio manufacturers are all concentrating on the design and production of mains components and mains valves.

The "All-wave Mains 3" illustrated herewith is the first of the AMATEUR WIRELESS series of mains receivers, and as such is particularly interesting to those who, having A.C. mains, wish to make the best possible use of them in supplying power to the wireless receiver.

The only battery in the receiver is a 16-volt grid-bias unit, which at a renewal cost of a shilling or two every eight months or so does not appear to warrant a mains substitute. There is no external high-tension or low-tension supply to this receiver due to the incorporation of an H.T. eliminator, supplying 120 volts 30 milliamperes to the anodes of the valves, and the use of special mains valves deriving their filament supply from the A.C. mains.



The Circuit Diagram



Another Rear View

"THE ALL-WAVE MAINS 3" *(Continued)*

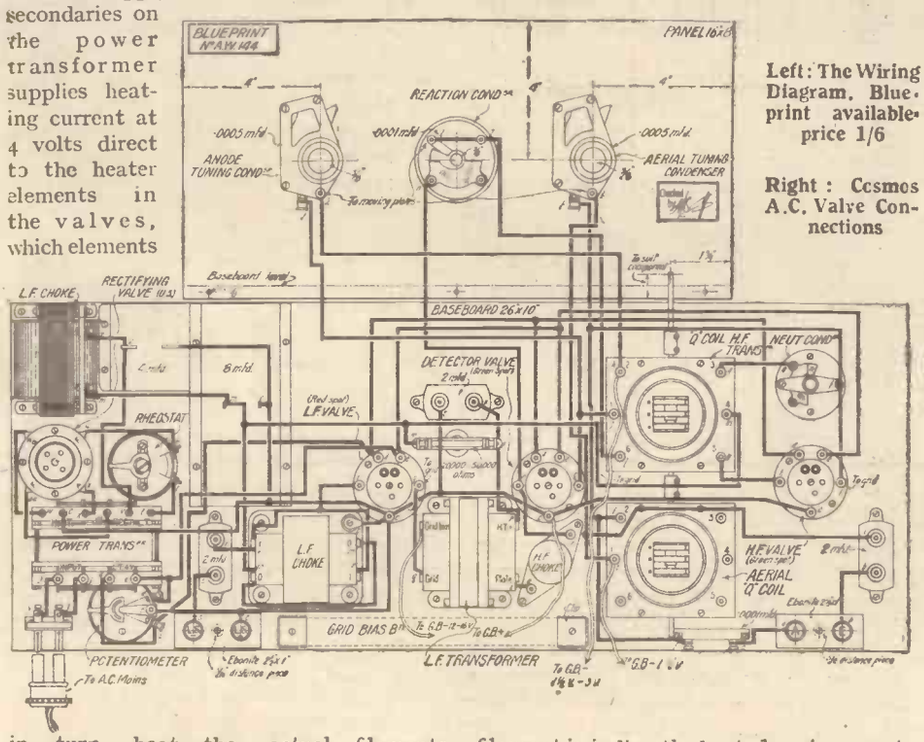
When the plug from the receiver is inserted in the mains socket the valves are automatically supplied with H.T. and L.T. thus completely dispensing with all battery troubles.

The receiver consists of a three-valve circuit, high-frequency amplifier, detector and low-frequency amplifier, with "Q" coils for the aerial coil and high-frequency transformer. Associated with the receiver are the mains components, comprising a power transformer, with three secondaries, smoothing choke and condensers and three Cosmos A.C. valves.

No smoothing system is required for the filament supply, because one of the three secondaries on the power transformer supplies heating current at 4 volts direct to the heater elements in the valves, which elements in turn heat the actual filaments.

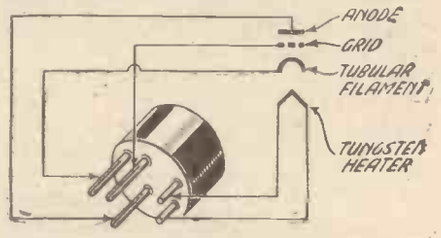
The cathode (*i.e.*, the filament) of the Cosmos A.C. valve consists of a nickel tube coated with a mixture of barium and strontium oxides, and operates at a dull red heat. This cathode is heated by means of a hairpin of tungsten placed inside the tubular filament, but insulated from it with porcelain.

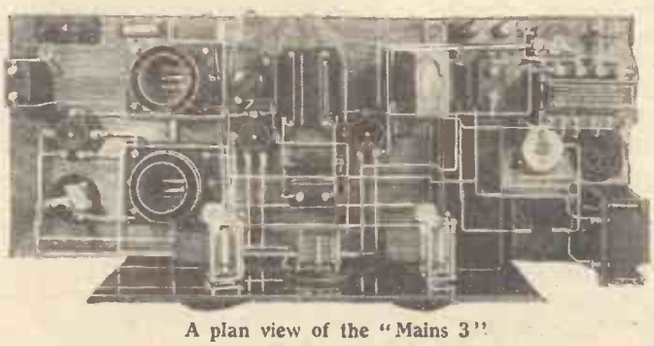
The cap of the valve is provided with five pins, and the connections to these are shown by the diagram. The grid and anode are connected to the normal pins and the tubular filament to one of the filament pins. The tungsten heater connections are brought out to two short pins replacing the usual second filament pin. The tungsten heater consumes one ampere at four volts A.C., and passes on its heat derived from the mains to the tubular filament. No hum is developed, because the active filament is indirectly heated. Any variations in heat due to variations in the mains supply are not effective so far as the actual filament is concerned.



Left: The Wiring Diagram. Blueprint available price 1/6

Right: Cosmos A.C. Valve Connections

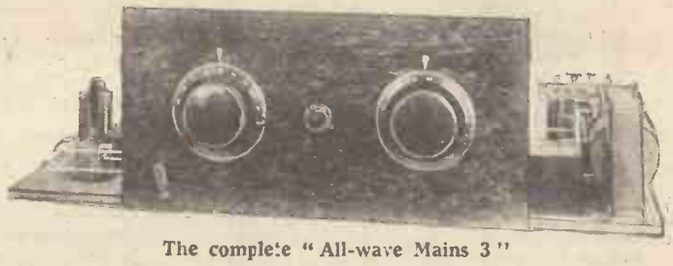




A plan view of the "Mains 3"

Due to the size of the filament, exceptionally good characteristics are obtained with these A.C. valves. Two types are made, AC/R (red spot) for power stages and AC/G (green spot) for other stages. The power valve has impedance of 2,000 ohms, but an amplification of 10. The general-purpose valve has equally attractive characteristics—amplification factor 35, impedance 17,000 ohms.

The simplest way of explaining the complete receiver is to examine the circuit diagram. On the right is shown the power transformer, with its primary and three secondary windings. The primary is shunted across the mains, the voltage of which is then transformed to three different voltages through the secondaries. The



The complete "All-wave Mains 3"

smallest secondary, shown at the bottom, is a four-volt winding, supplying A.C. to the three heating elements of the valves.

The two other secondaries are for the U5 rectifying valve, which contains two anodes on either side of an A.C. heated filament. Both the valve secondaries are centre-tapped.

The two outers of the smaller one go to the filament of the A.C. rectifier and the centre tap then becomes the H.T.+ connection. The two outers of the larger valve secondary go to the two anodes of the rectifier, the centre tap forming the H.T.— connection.

The power transformer thus delivers an unsmoothed four-volt A.C. supply to the receiving valve heater elements and an unsmoothed 130 volt D.C. supply for the anodes of the receiver valves. But the H.T. supply is not immediately of use and has to be passed through the smoothing system, consisting of a 4-microfarad reservoir condenser, a smoothing choke and an 8-microfarad smoothing condenser. After this a 120-volt smooth D.C. supply emerges which can be utilised as a source of potential for the anodes of the A.C. valves.

The three-valve receiving circuit is a straightforward one, consisting of a "Q" aerial coil tuned by a .0005-microfarad variable condenser, followed by an AC/G valve acting as an H.F. amplifier coupled through a "Q" coil H.F. transformer to a second AC/G valve, acting as an anode-bend detector, coupled through a low-frequency transformer to an AC/R valve.

Details of the circuit can be summarised as follows:

Aerial tuning: The "Q" coil connections No. 1 and No. 2 are reversed. A .0001-mfd.

(*Continued on page* 450)

AN EVENING AT KESTON

"A.W." Visits The B.B.C. Listening Post

ABOUT a quarter of a mile beyond Layham's Farm, between West Wickham and Keston, in Kent, the two huts forming the B.B.C.'s Listening Post rise in lonely state, far from the madding crowd and the maddening interference of electric supplies, local oscillating fiends, and local stations. We came upon the Listening Post (writes a member of the AMATEUR WIRELESS staff) one night early this month, when we motored down, upon the invitation of the B.B.C., to see for ourselves just what goes on at this remote link of Savoy Hill.

Silhouetted against the evening sky was the big single-wire aerial, which we afterwards learned was in daily use for the reception of the Continental stations. Lights inside the bigger of the two huts seemed to welcome us—so we ventured in, to be made thoroughly at home in a very short time by the youthful, but extraordinarily enthusiastic assistant, of Mr. J. A. Partridge, the man who runs the whole show, and whom we were to see later.

Current Supply

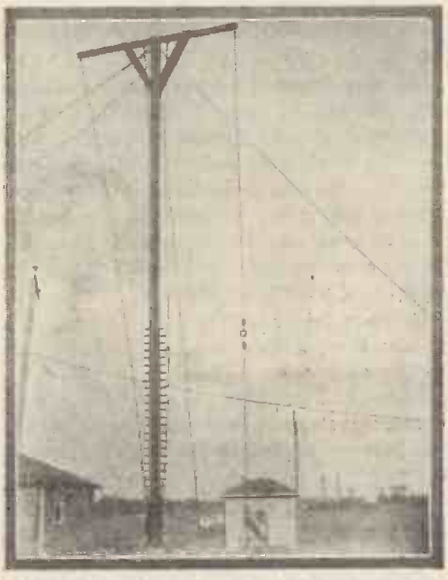
Then followed an interesting and enlightening tour of the premises. The main hut comprises a large instrument-room, where the standard broadcast receiver, short-wavers for Transatlantic reception, and other receiving gear is housed; a small workshop—indispensable even to these hardened engineers!—and an office, where all the charting of the B.B.C. and Continental wavelengths is done.

In the small hut near by the charging plant and banks of storage cells are housed, for the whole of the electric power, both for lighting and running the receivers, is generated on the spot. Part of the scheme of things in a listening post of this description is to avoid as much electrical interference as possible.

So that whereas the presence of power lines would be, to say the least of it, a potential source of interference, the local generators can be switched off at will. As a matter of fact, all the charging of the "floating" accumulators is done during the day.

Through a window in the main hut we could just see what looked like a counterpoise earth, but on stepping outside to make a closer examination we saw a Beverage aerial. This consists of a 300-ft. length of wire, raised 9 ft. off the ground, pointing in the direction of America, from whence the short-wave 2XAF and 2XAD stations are picked up.

The transmitting hut and aerial of 2XAD, the Schenectady relay of the G.E.C., which transmits on 15, 22 and 26.8 metres



The aerial and feeder hut of 2XAF, the 32-metre station at Schenectady. The aerial consists of a 50 ft. vertical wire with an ammeter and two inductances half-way down

For the reception of the Australian short-wave stations there is another Beverage type of aerial, 100 ft. long and raised 2 ft. off the ground. These two aerials, with the 100-ft. long single-wire broadcast wire suspended on two 60-ft. masts, are all the B.B.C. engineers use at the present time.

Perhaps a 60-ft. high aerial does not strike the reader as being anything wonderful to describe; true, but how many 60-ft. aerials are erected on a site 540 ft. above sea level, with the nearest railway station over three miles away, and with the distant Biggin Hill aerodrome and a clump of trees behind a few cottages as the nearest neighbours?

With such absence of shielding and absolute seclusion, quite a modest aerial will bring in practically the whole world if necessary!

At 6,000 Miles!

The fun began when Mr. Partridge joined us, for he at once sat down at a three-valve short-waver (one of the Igranic neutrodynes, similar to the "Three Continent Three," by J. H. Reyner, AMATEUR WIRELESS No. 285) and, after clamping pairs of phones on his own and our willing heads, proceeded to haul in some C.W. transmissions.

"HJO," he transcribed, "on 23 metres; see who it is. Ah, yes; Bogota, South America. Not bad for 6,000 miles, eh?"

Indeed, it was *not* bad; in fact, as Mr. Partridge himself admitted, "that's a fairly good test for a three-valve set." Down we went to 22 metres, where the American side of the Transatlantic telephone conversations were pulled in at great strength. Apparently the short waves are a more reliable medium for the Transatlantic phone at night.

"Do you get much hand-capacity trouble with this short-waver?" I asked. "Practically none," was the reply, "and as far as signal strength is concerned this receiver is as good as the super-het. over there, but not nearly as stable."

Certainly tuning appeared to be quite easy; but, then, Mr. Partridge knows a thing or two about *that* process!

Leaving the American to finish his verbal duel with his wife, we slid down to

(*Continued at foot of next page*)

For the Newcomer to Wireless: VALVE POINTS

NOT long ago you explained just what a power valve meant; I wonder if you would mind telling me just what the other classes of valves are and what they do?

Keeping to the three-electrode valves only and not concerning ourselves with those containing two or even three grids, we have five main classes.

What are they?

First of all there is the high-impedance valve especially designed for resistance coupling. Then comes the medium impedance valve, generally used as a high-frequency amplifier or rectifier. A third class consists of what are generally known as first-stage low-frequency valves. It is rather difficult to find an "impedance" name for them. I suppose we must call them low-impedance, though, strictly speaking, this title applies rather to the power and super-power valve, which form the last two classes.

That word impedance. . . .?

I am afraid that we shall have to leave that for another discussion for it is a big subject. Let us say now, that impedance is to alternating or oscillating current what resistance is to direct; in fact another term for impedance in valves is A.C. resistance.

What is the effect of impedance?

In three-electrode valves the impedance is bound up with the amount of amplification obtainable in the valve. The higher the one the greater the other and *vice versa*.

Then the greatest amplification is obtainable from the R.C. valve?

Yes, that's so.

Well, in that case couldn't we use them for high-frequency amplification?

We can, but in the ordinary way there is no great advantage in using them for that purpose.

How's that?

The amplification factor of a valve is a theoretical figure which is never fully realised in actual practice. In order to get the fullest possible amplification from a valve we must have in the plate circuit an impedance with a value many times greater than that of the valve itself. In the case of the R.C. valve we can do this by means of a very high resistance coupling.

Well?

Unfortunately the resistance coupling, being untuned, is inherently unselective. That is exactly what we want on the low-frequency side of the set where we wish the valve to give as equal a response as possible to all frequencies. On the high-frequency side matters are very different.

Why is that?

Here we require selectivity which means that the valve must respond fully only to a very narrow band of frequencies. A tuned circuit is therefore essential and unless it is very specially designed and constructed, a tuned circuit will not enable a high-impedance valve to show what it can really do in the way of magnification.

So we compromise?

Yes, by using a medium-impedance valve. Efficient tuned circuits enable us to bring out the greater part of the valve's possible magnification and the impedance of the valve is sufficient to ensure a reasonable amount of selectivity.

Then what about detector valves?

I will tell you more about them next time we meet. Meantime I will just say that the medium-impedance valve is suitable in the majority of cases for this particular purpose.

Then how can the high-impedance valve be used?

Its most frequent use is to follow the detector valve, but there is one very important point to be remembered.

What is that?

High magnification and high impedance invariably mean that a valve can deal faithfully only with signals of very moderate strength and we must, therefore, be careful to see that we do not overload the valve by using it in a set whose detector delivers impulses of big magnitude to its grid. Probably the best position for the high-impedance valve, taking it all round, is as detector working on the anode-bend system and followed by resistance-capacity amplification.

Then what will come next?

We can follow up this arrangement with a first-stage note-magnifying valve, which should be able to deal properly with the signals passed on to it.

"AN EVENING AT KESTON"

(*Continued from preceding page*)

fourteen metres—but only heard the ignition of a passing car!

9ECO, of Wisconsin, came in quite well; then we left the phones and looked at the super-het. already referred to. From the blueprint on the wall, we saw what can best be described as the AMATEUR WIRELESS "Short-wave Super-six" with a local oscillator; in other words, a seven-valve super-het. with three intermediate stages, two detectors, an oscillator, and an L.F. amplifier. The intermediate frequency is 1,100 metres, so chosen to avoid any long-wave C.W. interference.

At 10.45 p.m. the carrier wave of 2XAF was tuned in on the super-het. and soon after the American announcer's voice was filling the room. Having heard 2XAF just a few times before, we were not overwhelmed by this feat, but were rather humbled, nevertheless, by the immensity of the volume and the stability of the reception. What we heard was delivered by the seven-valver super, coupled to a two-stage R.C. amplifier.

"Normally, we work on seven valves only," explained Mr. Partridge, "and 2LO takes the seven-valve output over the line, after which it is amplified at the other end."

Having devoted rather much space to the short-wave side, I must hasten to make it clear that a great deal of the work done by the Keston post is in checking and charting the wavelengths of all the European broadcasting stations in the Unione International de Radiophonie. For this purpose a special screen-grid-valve receiver and a Sullivan wavemeter are used.

A new receiver had arrived the very day of our visit, a most imposing affair consisting of two screen-grid H.F. valves, a detector, and two R.C. coupled L.F. valves, with a wavetrap in the aerial circuit, which was loosely coupled to the first screen-grid valve.

This standard check receiver covers the two wavelength bands of 200 to 600 metres and 900 to 2,000 metres with interchangeable plug-in coils. The new receiver, made, by the way, at the Clapham branch of the B.B.C., is divided into four totally screened compartments, of a sufficient size to prevent damping by the screens.

Every day the frequencies of a batch of broadcasting stations—the whole lot are dealt with in rotation—are checked on the oscillating wavemeter and logged as shown by the following example: Station, Cardiff; time (B.S.T.), 16.50; frequency in k.c., 850; remarks, heterodyned by unknown station on 856.5 k.c.

From these reports a type sheet is made out, sent to the head office at Savoy Hill, and subsequently forwarded to Brussels. If, as sometimes happens, a sudden heterodyne interference between one of our stations and a foreigner develops, the Keston people find out who is the culprit and, having done so, send an urgent wire to Geneva without waiting for the routine formalities.

It may be some comfort to listeners when they hear a whistling accompaniment to their local stations' transmission to know that the Keston "watch-dogs" will soon track down the offender and with equal speed will tell him to get back on to his alloted frequency!

On Your Wavelength!

Here We Are Again

BY the time that you read these lines you will probably have visited the Exhibition; or it may be that you are just about to do so; or, again, that you are wishing you could, but can't. If you have been to it, you will agree with me that it is by far and away the greatest Exhibition in every way that we have yet had. Should your visit be still to come, I can assure you that, whatever your anticipations may be, you won't be disappointed. If you are one of the unlucky ones, unable to make your way to Olympia during the great week, you have all my sympathy, but there is the consolation that you will be able to read all about the wonderful things displayed there in AMATEUR WIRELESS.

The More We Are Together!

I don't know how many people have visited Olympia in the last five days, but a very large proportion of the wireless enthusiasts of Great Britain must have turned up, to judge by the size of the throng. It is interesting to notice, looking back on past years and comparing them with the present, the development which has taken place not only in the Exhibition itself, but also in its visitors. Numbers of people used to come not knowing particularly what they wanted to see or were likely to see, but because they were sure of a thrill in the contemplation of the then almost unknown wonders of wireless. The 1928 crowd is much more expert. It doesn't ask the worried salesman, "If I buy this set shall I be able to talk to my brother who is stationed in Irak?" or expect him to guarantee loud-speaker reception of a hundred stations or so with a single-valve set.

An Interesting Crowd

What struck one whilst mingling with the crowds round the stands was that most of them had come with a definite purpose in view. If they were constructors they were particularly interested in the various components displayed, and it was quite plain from their questions that they were all out for efficiency. They knew what they were talking about, too, as their queries showed. The component salesman of yesteryear might get away with it even if his knowledge of wireless was somewhat sketchy. To-day he has got to know his job pretty well if he does not want to be tied up in knots.

Getting On With It

We have gone ahead in wireless as rapidly during the last year as in any twelve months since broadcasting began, though possibly there are many listeners who hardly realise that this is so. They may argue that the most up-to-date sets bring in no more stations than the old ones, and that kind of thing. That is true enough. I have an old tuned-plate set built several years ago which will bag a big number of home and foreign stations on any decent evening. But, for all that, there is no comparison between it and the really up-to-date set. There is a delightful simplicity nowadays about the controls of a wireless receiver and, what is more, there is a complete absence of the tendency to instability that used to be so marked a feature of sensitive sets. We have been learning more and more about high-frequency amplification, and the time has come when we can say that we really do understand what we are doing when we use a particular component here and another there.

BAIRD TELEVISION

"A.W." ATTENDS A PRIVATE DEMONSTRATION

We have pleasure in announcing that we were last week—by the courtesy of Mr. J. L. Baird—given an opportunity of seeing for ourselves the remarkable progress made by the Baird system of television. We were afforded a private view at the offices of the Baird Television Development Company, the transmitter being in one room and the televisor or receiver in another room some 50 ft. away, the connection between the two being by line.

It is hoped that before this announcement appears a second and even more interesting demonstration will have been afforded us—that of seeing television "over the broadcast." Provided that this demonstration takes place within two or three days of this issue of "Amateur Wireless" going to press, we shall be able to publish a special article in next week's issue giving at first hand our impressions of Mr. Baird's achievements. In the meantime, we must bear testimony to the truly remarkable progress that Mr. Baird has made since those early days, when, on more than one occasion, we were given an opportunity of acquainting ourselves with the course of his experiments.

Improved Quality

But where the new set scores so enormously over the old is in the matter of quality. The ancient had to be pressed almost to its limit of endurance in order to give decent volume from a distant station. The result was that we worked the thing just on the verge of oscillation, which meant, naturally, that the quality suffered considerably. Nowadays we obtain selectivity and sensitiveness without undue use of reaction, and quality is immeasurably better. On the low-frequency side we now understand the importance of using just the right output impedance with a particular loud-speaker. This year's Exhibition shows what big strides we have made also in valves, transformers, and loud-speakers, to name only three of the many important parts which go to make up a wireless set.

Nearly Mutiny

I do think that it is a pity that the authorities cannot stage the Exhibition at a date just before the public school boys return for the three months' hard labour of the winter term. This year it has been a particularly tantalising business, since so many schools went back a day or two before the gates of Olympia were opened. My own boys assured me that they were in no fit state of health to go back, tried to urge me to write to their headmaster to that effect, and nearly threatened mutiny when I had to decline. One saw a great many schoolboys at the Exhibition, and there will be more still at the closing day, for there are many big day schools in London, and Saturday is a half-holiday. Still, it is nothing to the number that would have been there could the Exhibition have opened a week earlier. My own view has always been that manufacturers do not realise fully what a very large part schoolboys play in popularising wireless—and what good customers they are.

The Honey Pot

Like bees and wasps and other things of that ilk that would have a sweet tooth if they had teeth, the human race is pretty quick at picking out the spots at which the maximum amount of benefit is to be obtained for a minimum expenditure of trouble and energy. When they see a real good thing they go at it whole-heartedly. That, I imagine, is why there has been such a throng round the AMATEUR WIRELESS and *Wireless Magazine* stands. I always knew that the big listening public had a warm place in its heart for AMATEUR WIRELESS and the *Wireless Magazine*, but until I saw this year's swarm round the stands I had no idea just how big that place was.

The Royalty Position

The Radio Manufacturers' Association is to be warmly congratulated on the bold action that it has taken with regard to the royalties question. The Loewe and Brownie decisions left matters rather up in the air, if one may put it so. Strictly speaking, the tribunal's findings concerned only those two companies, and the Marconi people had announced their intention to

On Your Wavelength! (continued)

appeal. The R.M.A. held a big meeting and decided to reduce immediately their prices to the public for finished receiving sets. The reduction is such as is equivalent to charging royalty fees, not on the old scale, but the scale suggested in the tribunal's decision. This means that, whatever may be the result of any appeal, the public benefits at once, whilst the manufacturers take a really sporting risk.

Buy Now

The public can show its appreciation of their courageous action by supporting them fully now, and not waiting to see what may happen in the future. There is not the slightest advantage to the purchaser in waiting, for, whatever the result of the appeal may be, it is perfectly certain that royalties will not be reduced to anything less than the figures of the tribunal's decision, and, therefore, there can be no further diminution in prices. It is, of course, on the cards that the appeal may succeed, in which case the old royalties will come back. In that case, the present prices will have to be increased, and those who purchase now will be able to congratulate themselves on their foresight, Don't delay if you are buying a wireless set. Now is the time to take full advantage of the reduced terms.

Don't be Misled

Quite a number of people I know have been hesitating to purchase wireless sets because they hear that wonderful new developments in valves are to take place shortly which will render all present receiving sets out of date. Please take it from your THERMION that there could be no more complete and absolute tosh. The sets shown at the Exhibition and on sale afterwards incorporate the very latest things in valves, and the "wonderful new developments" are present—not future—facts. Don't hang back expecting miracles, because there are not likely to be any before the 1929 Exhibition.

There are some people who always put off buying things because they are sure that something a bit better is coming along. I know one wealthy man who has never yet bought a motor-car, though he first contemplated doing so about the beginning of the present century. Each year he says: "Cars are pretty good this year, but I think I will wait till next, when you will see some enormous improvements."

A Proms. Point

I was struck by an interesting point at a Promenade Concert recently concerning the relative absorption of different frequencies in the audible spectrum. The occasion was one of a very popular concert when the promenade was packed. There was, indeed, barely room to move and the crowd was bulging out of the doors—one of those nights, in fact, which all Prom.-lovers knew of old, when there is a feast of good things in the programme. Having been to another Prom. only a few nights before, I was immediately struck by the apparent weakness in the bass and the extraordinary lack of brilliance in the performance. By comparison, the orchestra seemed lifeless, although, as a matter of fact, it was well up to usual standard.

The only conclusion that one could come to was that the large audience was having a serious deadening effect upon the sound, rendering the acoustics of the building—at any rate, on the ground level—very bad. This was borne out by the experience a few nights later, when I attended an equally crowded concert, but on this occasion "did the heavy" and deposited myself in the dress circle. The brilliance had again returned, although conditions were practically identical with the previous occasion, showing that it was the ground or promenade floor which was principally affected by the crowd.

Where Wireless Scores

This is really, I suppose, only common sense, for the difference between playing to an empty hall and a full one is known to all music-lovers, but I had not realised before that it was particularly the bass which suffered in this respect, for there was quite a noticeable decrease in the lower registers. This brings us to the interesting thought that there are occasions when broadcasting reception can be better than the actual thing! I have no doubt that, from the point of view of the actual reproduction of the various frequencies, a good set with a Class A amplifier, coupled to a good moving-coil loud-speaker, would have given better results than were observed by the listeners on the spot on that particular evening. This is because the microphone is not on the ground level, but is suspended above the orchestra: a factor which was probably taken into account by the B.B.C. engineers when they first made their tests on the building.

NEXT WEEK:

"Thermion Looks Back at the Show"

A Special Article

There is, of course, always the lack of "bite" to which I referred in a previous issue, but this quality appeared to suffer also, due to the crowded hall; so that if we can find a satisfactory method of reproducing music in its correct light and shade, we may be able to claim that broadcast reproduction is actually better than the real thing under present adverse conditions. I shall now sit back and await my slaughter at the hands of the scoffers.

B.B.C. Methods

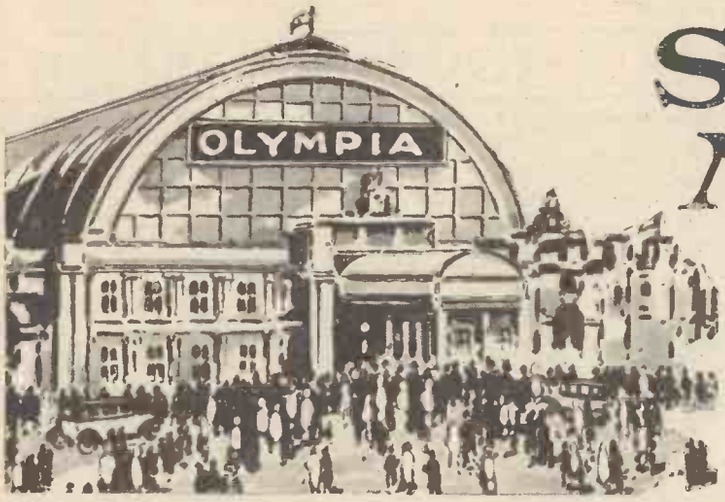
My remarks about the system of L.F. amplification used by the B.B.C. has brought forth comments from one or two of the engineers. They say that they have proved and checked by a large number of experiments that there is practically no frequency or amplitude distortion in the resistance-capacity circuits of their low-frequency amplifiers. The response of the amplifiers is absolutely even from fifty to ten thousand cycles, they say, and reaction effects are absolutely negligible. These characteristics are not maintained, however, if there is the slightest tendency to blasting in any amplifier stage, a possibility which is guarded against by allowing a very large margin of safety. If a resistance-coupled stage blasts and grid current flows, this current charges up the coupling condenser and takes quite an appreciable time to discharge. Thus, when a resistance-coupled amplifier is good, it is very, very good; but when it is bad, it is horrid!

Transformers

The fact that the B.B.C. uses as few transformers as possible does not indicate that the policy of the Corporation is to frown on L.F. transformers in receivers. As a matter of fact, it is realised that the modern L.F. transformer is a very efficient instrument and much less likely to cause distortion than, for instance, the coupling effect of a run-down H.T. battery used with a resistance-coupled amplifier. Very carefully designed and maintained resistance coupling is still unsurpassed, however, for multi-stage microphone amplifiers. Distortion of false relative strengths, known as amplitude distortion, is due partly to inaccurate microphone response and partly to the variation of the volume control at the broadcasting station. I have long been in favour of some sort of change in policy of the "controlling" of speech and music.

Stunts

It's a long, long time since we had any engineering stunts from the B.B.C. Stunts have now become part of the ordinary programme and pass unnoticed. Various O.B.'s and other transmissions which require the use of special portable transmitters and a thousand and one other gadgets and cables are now carried out as a matter of course, and we are no longer given details of the technical side of the transmissions. There once was a time when hardly a week passed without some kind of stunt. THERMION.



SOME NOTABLE EXHIBITS AT THE SHOW

Last week we gave a Guide to the National Radio Exhibition being held from September 22 to September 29. Below some of the outstanding exhibits are reviewed in greater detail

The Lissen Variable Condenser

GOOD value for money, a characteristic of all Lissen products, is a strong point in the new Lissen variable condenser, which was recently introduced by Lissen Ltd., of Friars Lane, Richmond, Surrey. Made in five capacities, from .0001 microfarad to .0005 microfarad, the condenser follows modern practice, in that the moving vanes are connected to the metal end-plates and the fixed vanes clamped to insulated supports fixed to the end-plates, which are of solid brass.

But Lissens have looked ahead in designing this condenser, as is evident from the provision of four fixing feet, giving the constructor the choice of panel or baseboard mounting, so that, with the extended spindle at each side, the condenser can be used with a drum control instead of a dial.

Other notable features of the construction include a braided copper pigtail connection, to ensure a positive moving-vanes contact, alternative fixed-vane terminals for easy wiring and a heavy spindle stop.

R.I. and Varley Universal Transformer

The logarithmic shape of the vanes gives a true logarithmic variation of capacity, as stated by the Technical Editor in his laboratory report given a few weeks ago.

Marconiphone Moving-coil Loud-speaker

Everyone knows that the ideal moving-coil loud-speaker, driven by a correctly designed receiver, would be the most perfect reproducing instrument possible. So far the basic principle has been limited in its practical interpretation, due to the difficulty of suspending the moving coil without introducing resonances.

In the new Marconiphone moving-coil loud-speaker the system of double suspension of the coil is claimed to eliminate resonances due to the suspensory material. The edge of the cone is unrestricted, but carries a light ring of felt, effectively preventing the circulation of the air waves from one side of the diaphragm to the other.

Due to the accurately parallel motion of the moving coil a very small air gap is possible, resulting in a great reduction in both size and weight of the electro-magnet, with, of course, a corresponding economy of field current consumption.

Three different units are made: (1) For 6-10 volt accumulator; (2) For D.C. mains 100-250 volts; (3) For A.C. mains 100-250 volts. The high-voltage units are specially recommended to those who have electric-light installations. For the A.C. model a valve rectifier and mains transformer are supplied.

The units can be obtained separately or in complete cabinets, these being provided with ornamental grilles so placed as to eliminate box resonance.

Home constructors will be more interested in the coil-driven cone and field-magnet assembly, mounted in a framework suitable for incorporation in a cabinet or behind a baffle.

Wearite Anode Filter

Motor-boating, that curious "popping" noise often set up in efficient low-frequency amplifiers, especially when a mains unit is in use, can be cured by an anode filter, comprising a split anode resistance with a 2-microfarad fixed condenser between the

A New Tudor Accumulator

junction of the two sections of the resistance and earth.

Existing amplifiers not provided with such a filter will almost certainly develop "motor-boating" if a mains unit is brought into service. To avoid the necessity of taking down the amplifier, Wright and Weaire have produced a compact unit for addition to amplifiers requiring such a filter.

This consists of an ebonite case with five terminals on the top, and inside a 2-microfarad fixed condenser and three resistances, one having a value of 10,000 ohms and two having values of 20,000 ohms, giving alternative values of resistance between 10,000 ohms and 50,000 ohms by suitable terminal connections.

The unit can be wired in circuit with any amplifier and from actual tests can be said to be highly effective.

New Dubilier Products

Drum control of the variable condenser is a noticeable tendency in receiver design.

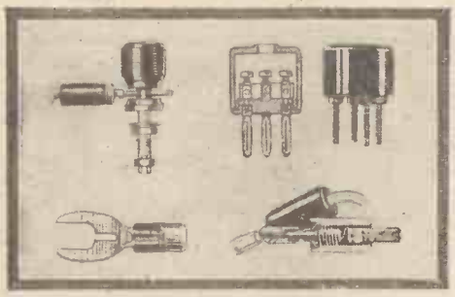
(*Continued on page* 435)

SOME NOTABLE EXHIBITION FEATURES ILLUSTRATED

1—Cosmos Elastic Aerial Unit. 2—Westinghouse Metal Rectifier 9 volt 1 amp. type. 3—Westinghouse G.B. 45 volt Rectifier. 4—Philips loud-speaker. 5—Wearite Anti-mobo. 6—Marconiphone Moving-coil Loud-speaker. 7—Ripault's Lateral-action Condenser. 7—Hunt's Milliammeter. 9—Igranic Type J Transformer. 10—Formo 2-stage L.F. Unit. 11—Lissen Variable Condenser. 12—R.I. and Varley Resistance-capacity Coupler. 13—Lewcos Short-wave Coil. 14—Oldham L.T. Power Unit.

SOME NOTABLE EXHIBITS AT THE SHOW (*Continued.*)

Two drum-control types are now available—the single one having two drums, for the coarse or fine adjustment of a single K.C. condenser and the triple one having three drums, operating three separate K.C. condensers. The drums are sufficiently



Clix Terminals, Plugs, Sockets, Connections, etc.

close together to provide either simultaneous or independent control of the condensers. Triple condensers can be supplied in capacities of .0003 or .0005 microfarad or, if desired, a combination of both.

A midget condenser added to the Dubilier range is made in two capacities, .0001-microfarad and .0002-microfarad and is particularly suitable for use as a variable reaction condenser.

Four models of the Dubilier H.F. choke for all purposes should find their way into new season's sets.

The Dubilier Anti-Interference Unit is *not* a wavetrap and cannot be connected to a receiver. Its purpose is as a shunt across the output terminals of electrical machines that cause interference by sparking commutators and so on.

Mullard Pure-music Loud-speaker

Formo L.F. Unit

Housed in one case are two complete low-frequency coupling stages, with terminals brought out to the base for valve holders and battery connections. It is claimed by the makers, the Formo Company, that there is no interaction between the circuits. Certainly the arrangement makes for convenience.

The circuit consists of a modification between resistance-capacity and dual impedance coupling in the first stage and simple transformer coupling in the second.

Instead of a resistance leak in the R.C. stage, a choke leak is embodied, which by careful design, produces a resonant effect tending to augment the amplification on the low frequencies. The anode resistance in the first stage is tapped, giving 100,000- or 150,000-ohm alternative values. This tapping can be utilised in the anode-filter system making use of a 2-microfarad condenser across the junction of the two sections and earth.

Philips Loud-speaker

Among the notable additions to the ever-growing range of good-quality cone loud-speakers, the new Philips loud-speaker attracts attention, because of its compactness and business-like appearance. Designed

Making Sets at the "A.W." Stands, 63 and 66, at the National Radio Exhibition

with a special electro-magnetic movement of the balanced-armature type and fitted with a seven-sided cone, providing ample surface area, this new loud-speaker retains its rigidity under all conditions and responds to a wide range of frequencies, resulting in pleasing and natural tone of reproduction.

At the back of the loud-speaker, which can be hung on the wall or stood on one of its sides, by opening a support, there is a switch device by means of which the user can adjust the volume and tone. The makers say the Philips loud-speaker is "fair to the finest transmission."

Six-sixty Two-volt Pentode

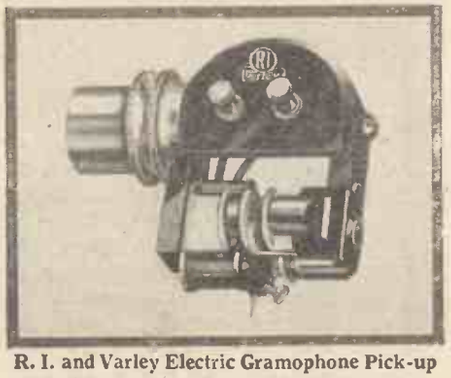
Mullard Permacore Transformer

Improved Osram Valves

Since the original "R" valve came into being the efficiency of receiving valves has been periodically improved upon, to such an extent that one might well ask whether any further improvements in this branch of the science could be expected during the coming season.

One noticeable improvement is incorporated in the new season's Osram valves marketed by the General Electric Co., Ltd. The filaments are given a most tenacious coating which, besides improving the emission, maintains it to a remarkable extent.

The coating applied to the filaments is a thin layer of barium, an extremely rare material. Due to the new method of coating, a layer of barium is so firmly deposited on the core of the filament that it actually becomes part of the filament itself. The result is that less energy is required to operate the valves, thus effecting economy in accumulator current. A very long filament can be used for a given filament voltage and the large electron emitting surface thus provided accounts for the greatly improved characteristics of the latest Osram valves.



R. I. and Varley Electric Gramophone Pick-up

Mullard Pure-music Loud-speakers

Two additions to the Mullard range that deserve special comment are the Mullard

SOME NOTABLE EXHIBITS AT THE SHOW

types C and H loud-speakers. The translation of electrical impulses into sound is effected by a perfectly balanced moving-armature, symmetrically arranged with respect to the magnetic field. A conical diaphragm translates the impulses into audible speech or music. A special feature

Baker Moving-coil Loud-speaker

is the incorporation of a tone filter which can be used to minimise the reproduction of distortion caused by too much reaction, incorrect grid bias and so on.

The design of the magnetic system in the model H loud-speaker is such that the polarity of the connections is immaterial. By means of plugs and sockets at the back of the instrument three alternative connections are available, hence the impedance of the loud-speaker can be matched with the output impedance of the receiver with which it is used. This model is specially robust, the cone being protected by means of a moulded bakelite frame designed to offer the least possible resistance to sound waves, thus obviating any risk of box resonance.

The Igranikit assembled by the new Igranic system

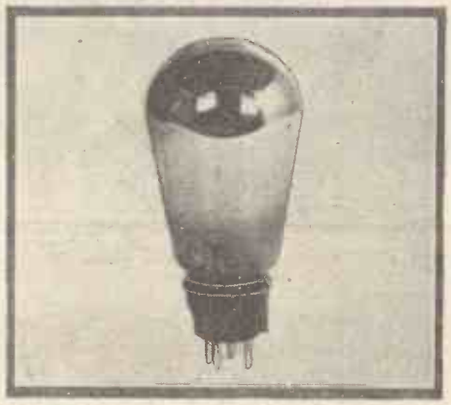
R.I. and Varley Gramophone Pick-up

By means of a special method of suspension of the moving parts, the R.I. and Varley gramophone pick-up overcomes many of the disadvantages associated with earlier types. The mass factor, as it is called, of the moving parts is divided into two, one dealing with the high frequencies, the other the lower audible frequencies. Each mass component is damped in a special way, each independent of the other, with the resonance of the one kept well below and the resonance of the other kept well above the audible frequency band. Rising characteristics are thus obtained at the high and low frequencies. As the gramophone record invariably has a flat peak characteristic in the middle frequencies it is claimed that the whole combination will give substantially a straight-line frequency response.

The compound mass suspension arrangement leaves the needle extremely flexible, thus obviating any risk of damage being done to the track of the needle on the gramophone record.

Goodman's New Junior Moving-coil Loud-speaker Kit

With a kit of New Junior moving-coil parts no constructor should have the slightest difficulty in assembling a complete



The New Osram Super Power Valve Type P625

moving-coil loud-speaker. The new design of spider, with an easy and permanent centring device, cone paper cut to shape and a well-designed moving-coil eliminate practically all possibility of error. The coil itself is sectionally wound to give equal inductance at all frequencies. Although quite powerful enough for average reception the pot magnet only consumes half an ampere at six volts.

Clix for Contact

Every constructor who wants to be sure of positive contacts in his receiver, and especially between the receiver terminals and the batteries, is catered for by Lectro Linx, Ltd., the makers of a wide range of Clix wander plugs, sockets and pins of every description. For wire extensions the Clix-Lox connector constitutes a permanent and completely insulated wire length connected and disconnected in a moment.

Lewcos H.F. Choke

Special emphasis is laid by the London Electric Wire Co. and Smith's Ltd. on the wide choking range of the new Lewcos H.F. choke. A special graph has been made out to show that the Lewcos choke maintains its full choking value to well above 2,000 metres and at 2,250 the choking value is still well above an arbitrary self-oscillation line.

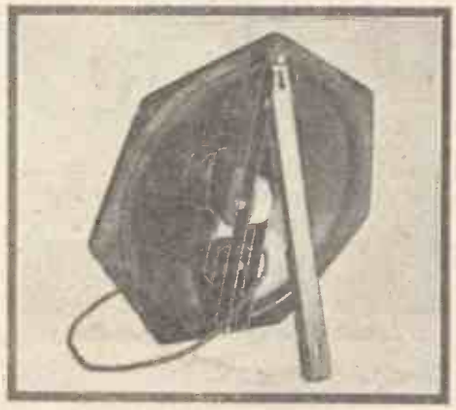
The new Cossor Melody Maker

It is claimed that by designing the winding so that there is a minimum amount of high-frequency leakage through self-capacity, a choke has been produced which is equally effective between the wide wavelength limits of 20 and 2,000 metres.

Another recent product of the same firm is the Lewcos range of short-wave coils. Two of these coils, the A.M.S.4 and A.M.S.9, will, with a .0005-microfarad variable condenser, tune between 20 and 130 metres. With their six-pin plug-connections these short-wave coils are readily interchangeable with the new Lewcos A.M.5 and A.M.20 coils for the broadcast and long waves respectively.

Ferranti H.T. Supply Units for A.C. Mains

Two of the latest products of Ferranti



Philips Cone Loud-speaker

Ltd. are the new H.T. supply units, one incorporating a Westinghouse metal rectifier and the other a valve rectifier. The first type has a D.C. output of 220 volts, 100 milliamps. It has been arranged that this output is obtained free from motor-

(*Continued on page* 464)

Build *yours* to-night

-you can't go wrong!

EDISWAN

R.C. THREESOME 1929 CIRCUITS.

Beautiful tone
More programmes
No Coil Changing
Easy and Cheap to build
Full size paper model
New type valves. *Specially designed for the 1929 Threesome circuits.*

Call in at your Wireless Shop on the way home and get a free full-size paper model. See how simple it is to construct. Then buy the components and have your own set working on to-night's programme.

You who want PURITY OF TONE first and foremost — of course with several Foreign Stations now and then — build the Ediswan Resistance Capacity Coupled Circuit No. R/3.

If DISTANT STATIONS and VOLUME are more important to you than Purity of Tone then build the Ediswan Circuit No. R/3T incorporating Transformer Coupling in the last stage.

Decide *now* for perfect radio. Ask your dealer for the paper model, or just post this coupon.

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To The EDISON SWAN ELECTRIC Co., Ltd., Publicity Dept., 123/5, Queen Victoria Street, London, E.C.4.

Please send FREE Paper model and Instruction Book as selected.

Name.....

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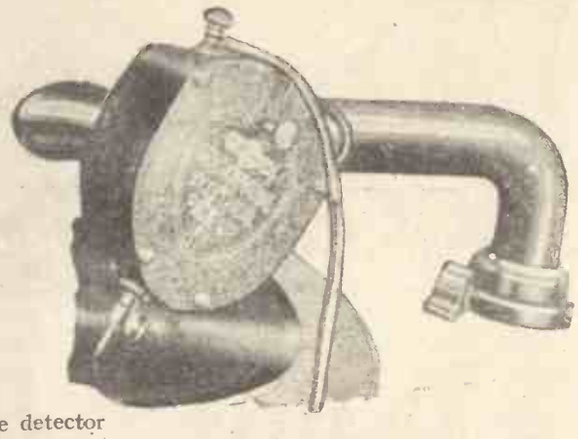
C.S./T4. *Please cross against Model required.*

Make a point of inspecting the R.C. Threesome and the range of new Ediswan Low Temperature Valves at Olympia, **STAND 43,** *Main Hall.*

The A,B,C of Gramo-Radio



A Simple Explanatory Article

By OUR TECHNICAL EDITOR

THE gramophone is now recognised as an important accessory to the ordinary radio set. With modern electrically-produced records, the quality which can be obtained by playing these records electrically is surprisingly good. Even a simple set without any particular claims to quality will give very pleasant reproduction, while if one is using a real quality amplifier, the reproduction is surprising in its brilliance and register. It is only the most expensive gramophone which can come anywhere near the perfection possible with electrical reproduction.

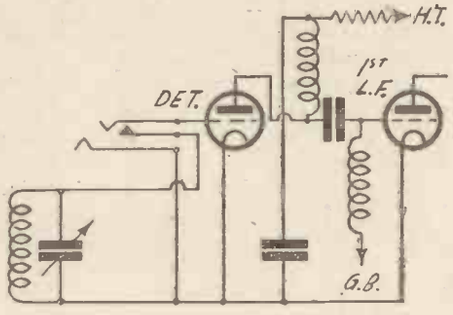
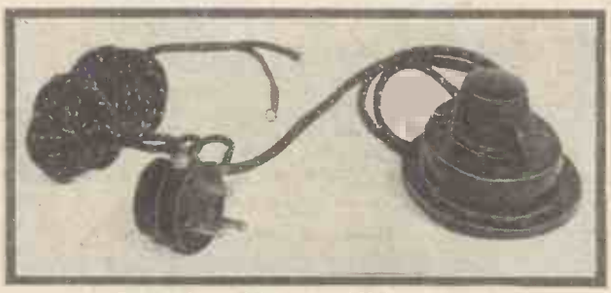


Fig. 1—Circuit with Jack Switching

Most readers are aware that the methods adopted in order to reproduce records electrically is to replace the existing tone arm on a gramophone with a device known as an electrical pick-up. In this arrangement, the movement of the needle, as it traverses the record, is not communicated to a mica diaphragm as in the ordinary sound box, but to a moving armature in a magnetic field. The small variations in the field which are thus produced set up electrical currents in the windings of the pick-up and these can be transferred to the input of an ordinary wireless amplifier and reproduced through the medium of the loud-speaker.

One of the simplest methods of achieving this is by the use of an adaptor. This consists of a plug which fits into the socket normally occupied by the detector valve. Terminals are provided on the side of the plug to which the gramophone pick-up is connected. In use, the detector is removed from the set, an adaptor is plugged into the valve socket, and the detector valve is replaced in the four sockets on the top of the adaptor. Such a device is shown in the photograph accompanying this article. The filament pins at the bottom of the adaptor and the filament sockets on the top are connected together so that the valve receives its filament current in the ordinary way. The anode pin and socket are likewise common so that the anode of the valve is connected directly to the normal transformer, resistance or dual-impedance unit, as the case may be. The grid socket, however, is not connected through, the grid of the valve being taken to one of the terminals to which the pick-up is wired, while the other pick-up connection goes to one of the filament leads.

The normal detector circuit is thus disconnected completely and the pick-up has been connected in its place. Thus the amplification of the detector valve is utilised and the insertion of this simple adaptor plug serves to make the necessary alterations in the connections.



Gramophone Adaptor and Volume Control

Alternatively the same arrangement may be achieved by the use of a jack which is arranged so that the pick-up may be plugged in. The action of inserting the plug disconnects the normal grid circuit from the valve and connects the pick-up. This latter method is particularly useful where it is not desired to interfere with the receiver itself for gramophone work. Such a method is illustrated in diagram Fig. 1. The method can be arranged, if desired, so that any high-frequency valves which are used when the set is being employed for radio reception, are switched out when gramophone reproduction is in progress. Needless to say, a simple switch may be used in place of the jack if desired.

A point which arises in this connection is which filament lead the pick-up should be connected to. One side of the pick-up is taken to the grid and the other must be taken either to the positive or the negative filament lead. For the simplest connection the pick-up should be taken to the negative lead, although in certain cases, particularly with two-volt valves, better results are obtained if the return is taken to L.T.+.

Securing Quality

Where real quality is desired, it is undoubtedly best to arrange to insert a small negative grid-bias on the detector valve when using the amplifier for gramophone work so that no grid current at all shall flow during the playing of the records. This involves the limitations of the voltage swing on the pick-up strictly within the limits of the grid swing of the particular valve and the average detector valve is not provided with a very large margin of safety in this direction. It is not possible to go into the subject in greater detail in the present article, but it will be clear that unless special quality is desired and particular precautions are taken, the simple connection of the pick-up to L.T.— gives the most satisfactory results.

A point of some interest is the relative sensitivity of different pick-ups. Owing to the popularity of electrical reproduction there are now quite a number of makes of pick-up on the

(*Continued on page* 468)

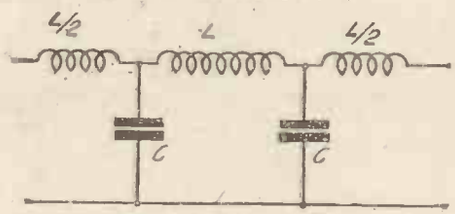


Fig. 2—Low-pass Filter

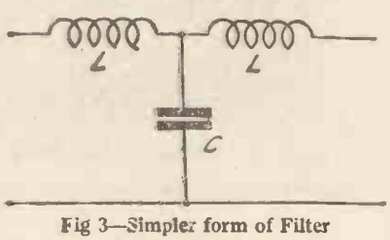


Fig 3—Simpler form of Filter

L.T. Supply Economy

A Novel Method of Obtaining Filament Current

By E. E. FOURNIER d'ALBE, D.Sc., F.Inst., P.

THERE are several systems already known by which low tension can be supplied to valves direct from the lighting mains. Where the supply is alternating, these have become popular on account of the difficulties encountered by amateurs in charging accumulators from A.C. mains. But it is difficult so to design them that accidents due to live wires are entirely excluded. The L.T. battery, charged at intervals at the nearest garage, still holds the field. In what follows I shall describe an arrangement which secures a permanent supply of L.T. current which is at once safe and extremely economical, both as regards first cost and upkeep.

A Simple System

The system consists of a number of blocks of H.T. accumulators charged in series and discharged in parallel, together with a specially designed switch for changing over two sets of blocks at the same time.

To take a concrete example, H.T. accumulators can be had in blocks of five, giving ten volts each. Those with a capacity of 2,500 milliampere-hours are quite capable of yielding ¼-ampere for ten hours without suffering injury. As this is quite a reasonable current for one valve, it is obvious that we can use H.T. accumulators for lighting valves for a short time.

Now take ten such blocks and charge them in series from 200 or 250-volt D.C. mains. In four or five hours they will consume one unit of current, costing anything from 2d. to 6d. Now separate them and discharge them in parallel, with a suitable resistance, through a valve which takes ¼-ampere. Instead of ten hours, the combined blocks will now light the valve for 100 hours, at a total cost of 6d. or less. As the ten blocks together cost about fifty shillings. it is evident that this method is economical both in first cost and in working.

It remains to devise a practical way of working it. The amateur is not usually able to construct a switch with twenty contacts to convey currents of the order of an ampere with a sufficient degree of certainty. I therefore propose to use mercury for the contacts. The resistance of mercury contacts is practically zero, so that there is no heating. Friction, which in ordinary metallic contacts would be considerable, is reduced to vanishing point. There remains the risk of spilling, but this is no greater than it is in the case of the accumulators themselves, and the mercury is easily renewed.

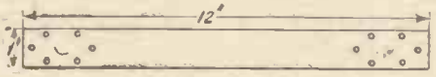


Fig. 1—Ebonite contact strip

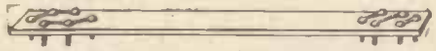


Fig. 2—Contact screws inserted and joined in parallel on left and series on right

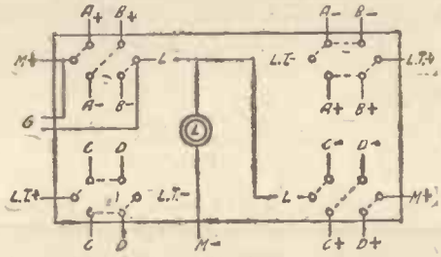


Fig. 3.—Plan of base showing mercury cups and connections. A, B, C, D, are the H.T. accumulator blocks (Oldham 10-volt, 2,500 mA—hrs.) M+, M—, are the lighting mains. The dotted lines indicate how the cups are connected on lowering the contact strips. G, is a connector which may be used for charging an H.T. accumulator

Fig. 4—Side view of switch in neutral position

I will first describe a series-parallel switch with sufficient contacts to work the system with one valve and considerable convenience and economy.

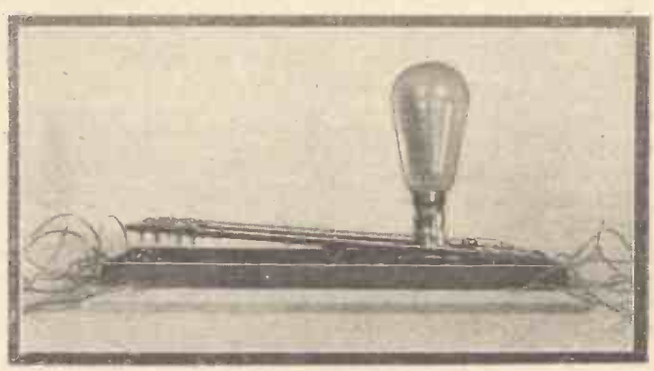
Cut two strips of ebonite 12 in. by 1 in. by ¼ in. At each end drill six holes in the form of a hexagon as shown in Fig. 1. Into these holes fit ½ in. round-headed wood-screws (brass) so that they project ¼ in. on the other side. Cut some strips of thin copper ⅛ in. wide, and bend them into staples for joining the holes as shown (Fig. 2). The thickness of the screws and strips should be chosen so that the screws fit tightly, with a little hammering. Alternatively, metal-screws may be tapped into the ebonite, and their heads joined by soldering.

Mercury Cups

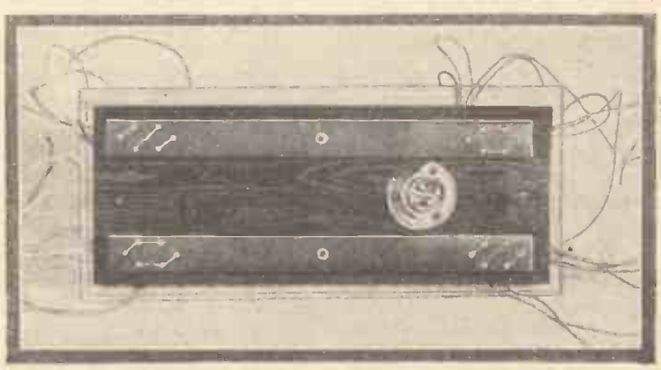
The two contact strips are now ready to be joined by means of a wooden cross-bar bevelled below and attached by means of hinges to an ebonite base plate 13 in. by 5 in. by ½ in. The cross-bar should be thick enough to raise the contact strip half an inch above the base plate, so that the latter just clears the ends of the screws.

Now smear some plasticine, putty, or other soft material on the base plate, screw the hinges temporarily into position, and press the ends of the screws into the putty. This will mark out the centres of the

(*Continued on page* 452)

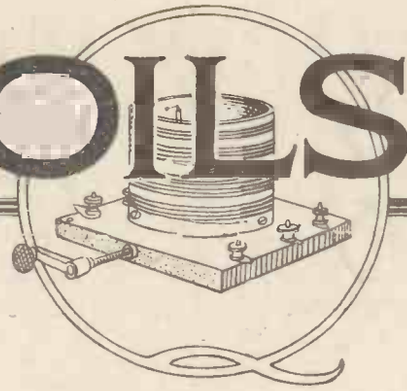


A Side View of the Unit



Plan View showing Layout of the Unit

"Q" COILS AND HOW TO USE THEM



In last week's issue Mr. Reyner detailed the uses of four types of these coils. Below are given some further applications

THE QSP type is used in amplifiers employing normal triodes. There is an increasing tendency, however, to employ screen-grid valves for H.F. work and the "Q" coil may be used with advantage in this respect. There are two methods of accomplishing this and for both of these the standard types may be employed. The first method is the simple tuned-anode arrangement as shown in Fig. 5. Here an ordinary QA coil has been used, terminal No. 2 being connected to H.T.+, the other connections being as illustrated in the diagram. A similar QA coil is used in the grid circuit, the reaction winding not being made use of.

If the coils are kept some distance apart, only a simple capacity screen will be required, due to the astatic properties of the coil, but in order to obtain the best results, it is desirable to use a really effective screen extending round three sides of the H.F. coil, so protecting it adequately from the grid circuit. A three-valve receiver employing "Q" coils, designed for use with the new types of screen-grid valve has been in use for some time at the Furze-hill Laboratories and will shortly be described in these columns.

There is a tendency with the more modern screen-grid valve to reduce the internal resistance of the valve while still maintaining a very high amplification factor. In such circumstances, the use of a transformer-coupled arrangement becomes practicable in preference to the simple tuned-anode arrangement just described. Good results are obtainable in this direction by using the QSP coil. The primary and neutralising windings are placed in series and used as one primary while a small amount of reaction may be applied from the detector if desired. A suitable circuit is given in Fig. 6.

Further details of applications of these "Q" coils to screen-grid work will be given from time to time and receivers will be described embodying them. I have also conducted a number of experiments on gang-control, whereby the tuning condensers in the circuit are all linked together on a common spindle. As a result of these tests, a new form of gang control has been devised which is giving exceptionally good results and is particularly applicable for use with the "Q" coil.

Brief reference may be made to the use of these "Q" coils in connection with short-wave coils. While the complete removal of the necessity for interchanging coils on the broadcast band is a great advantage,

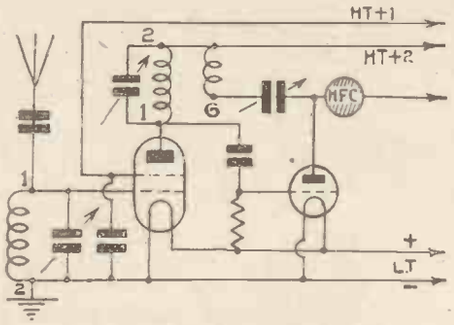


Fig. 5.—Tuned-anode Circuit with QSP-type coil

it is often desired to receive the short waves in addition. For serious work, it is desirable to have an entirely separate receiver using smaller values of tuning capacity and embodying various other modifications, but it is possible to make arrangements to receive short waves on a "Q"-coil receiver without much difficulty. This is done by simply plugging in the short-wave coils in parallel with the "Q"-coil windings.

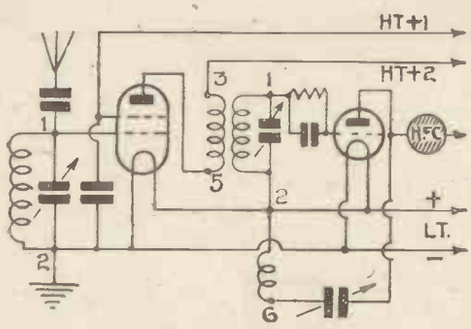


Fig. 6.—Another Circuit using the QSP Coil

Owing to the fact that the frequency of the short waves is 10 or 20 times higher than that employed for the broadcast band, the coils act purely as a small capacity. Their principal effect, therefore, is to increase the minimum of the tuning condensers, but if suitable allowance is made for this factor, excellent short-wave reception can be obtained.

In the case of the receiver described elsewhere in this issue, a simple switch is incorporated whereby the short-wave coils are wired in parallel with the "Q" coil, but for actual short-wave reception two leads are disconnected, this minimising the self-capacity effect. This was done, however, in order to make use of certain six-pin short-wave coils, but tests have been made in which ordinary short-wave two-pin plug-in coils have been used in parallel with the "Q"-coil windings with every satisfaction.

It will be obvious from these remarks that the "Q" coil possesses valuable properties of great use to the experimenter and when built into a receiver they give the maximum efficiency on both wavebands with the minimum of trouble.

"Q" coils are now available in four makes, namely, Lewcos, Wearite, Finston and Lotus.

NEXT WEEK:

FULL DETAILS OF A SIMPLE ALL-WAVE TWO OF EXCEPTIONAL MERIT

GRAVEL EARTHS

AN earth-plate buried in gravelly soil is often the unsuspected source of weak or inefficient reception. In the first place the contact between the plate and the earth will, in such circumstances, be made through a large number of "points." This means a relatively-high resistance, with corresponding damping and loss in selectivity.

In the second place, gravelly soil is naturally porous, so that rainwater percolates through, leaving the actual earthing-point dry, which is again unfavourable to a low-resistance aerial circuit. It is possible that many so-called "blind" spots, or areas of poor reception, owe their bad reputation to a gravel soil. Wherever practicable, it will pay to dig down until the earth-plate or tube makes contact with the clay sub-soil.

B. A. R.

Dr. Charles Sheard, of the Bio-Physical Research Laboratories of Rochester, U.S.A., has been experimenting with short waves to determine heat effects. Working with wavelengths of 6 to 10 metres, sausages have been fried simply by passing the waves through them.

THE EXHIBITION POSTER

The BERLIN RADIO EXHIBITION-1928

Dr. Alfred Gradenwitz Gives His Impressions of a Personal Visit

WHEN the first Berlin Wireless Show was opened in 1924, the industry was then in its infancy. A large number of persons having no special knowledge of wireless had started manufacturing sets and accessories so that the market was swamped with inferior goods. Before anything like healthy conditions could be brought about, these firms had to die out, giving place to competent makers. This era was short, as the German public five years ago had very little money to spare and there was only a market for the cheapest types of wireless sets.

The German wireless industry, during the intervening years, came to consist, therefore, of a smaller number of firms of greater efficiency, highly specialised in their own fields, who had to adopt methods of mass production and, by all possible means to keep prices low.

A Large Exhibition

The Fifth Annual Exhibition, which has just ended is a striking illustration of the tremendous growth of the German radio industry. While the number of listeners in the country now exceeds two and three-quarter millions, the number of manufacturers, in spite of demand growing by leaps and bounds, has been only increasing slowly. Special measures have been taken to control the market with a limited number of responsible firms, and to secure a continued reduction of selling prices. In fact, present prices of wireless sets are about one half of what they were in 1923.

The Fifth Exhibition, far larger than the last which was accommodated in the old Radio Hall, by the side of the well-known Radio Tower, required a second Radio Hall, of 3,500 square metres specially built for the occasion, and the New Automobile Hall covering an area of over 5,000 square metres. Part of the Automobile Hall was set apart for exhibits by public authorities, the Broadcasting Corporation, the Berlin Broadcasting Company and such special shows as television, synchronised cinemas, speaking films, etc.

Real Progress

What first struck the visitor on viewing the industrial section of the Exhibition, was the continued development of all wireless apparatus, particularly receiving sets, on lines which even last year were just perceivable. The tendency towards increased simplicity of control has been gaining ground. The fact that about 99 per cent. of listeners require a receiver always ready to work, is now realised fairly generally. Receiving sets, to be acceptable to the average listener must be designed to be switched on and off with the same ease as, say, the electric light. Apart from reducing the control of receivers to a maximum of simplicity, both the H.T. and L.T. batteries should, the manufacturers consider, be done away with.

Wireless constructors in Germany, as elsewhere, have, of course, for some time been designing eliminator units. Much difficulty had been experienced in designing cheap and durable rectifiers for the heating current and in doing away with disturbing noises. Two methods have mainly been adopted; first, specially heated valves, and, secondly, by the use of suitable rectifiers. Two kinds of alternating-current valves were on show. One is the short-filament valve directly heated by alternating current. This type of valve can be used on the high frequency side and in the last L.F. stage. The second type of A.C. valve has the filament heated by radiation.

Many rectifiers were shown, the newest being the dry metallic rectifiers yielding up to 1 ampere heating current.

The accumulator industry has, of course, been intent upon designing improved types of batteries. In fact, some of those shown at the exhibition were intermediate between electrolytic cells and accumulators and are said to be both cheaper and simpler in operation than the latter. There were many simple arrangements for the charging of batteries, some using dry metallic rectifiers.

Wireless in Aviation

Mihaly's Television Exhibit

Lorenz Sets for Aircraft

Telefunken 5-valve A.C. Mains Receiver

Components

As regards the more important parts of receiving sets, *viz.*, coils and condensers, there were many improved and efficient types, though no radical changes were apparent. Besides the usual types of variable condenser with straight-line frequency curves, there were many of the so-called logarithmic type. Many condensers are fitted with ball-bearings.

The valve industry has, of course, made enormous strides. Apart from the A.C.

THE BERLIN RADIO EXHIBITION—1928 (*Continued*)

valves above mentioned, there were shown some types of barium-oxide valves, requiring filament current of about a quarter of that of the present thorium valve.

The new types of screen-grid valve are particularly successful. Multiple valves,

An Advertisement of Stations installed by the Telefunken Co.

which have given excellent results in connection with cheap and efficient receivers (the well-known Loewe type) were shown by several makers.

ties, the Broadcasting Corporation, the Berlin Broadcasting Company, as well as a number of instructive exhibits of such novelties as television, speaking films, "remote cinemas," etc. In addition to the Postal Department, the Police Department and the Safety in Aviation Central Office were represented. The Police exhibit gave a survey of the extensive system of wireless posts and showed the usual types of police transmitters and receivers, and also a complete installation for the transmission of fingerprints and photographic portraits.

Television

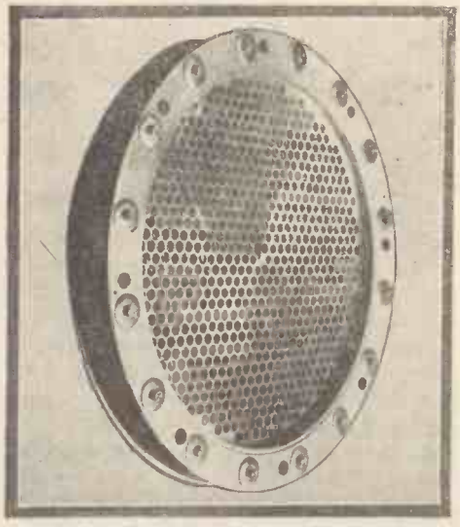
The Safety in Aviation Central Office showed its system of wireless stations, as well as several airplane transmitters and direction-finders. The German Postal Department exhibited a comprehensive series of wireless sets illustrating the development of wireless engineering. Also the various phases of wireless transmission were illustrated; the usual causes of wireless disturbances and the means of reducing these to a minimum were also shown.

The checking devices used by the German Postal Department in connection with broadcast transmitter were exhibited, thus showing what measures are taken in order to ensure reliable reception. Further apparatus exhibited by the Department

of the Hungarian engineer D. V. Mihály, which naturally excited a considerable amount of interest.

Hertzian Exhibits

A retrospective show was devoted to the



The Vogtt Electro-static Loud-speaker

memory of Heinrich Hertz and comprised his experimental outfit for ascertaining the presence of electric waves. Also the earliest studio was exhibited, side by side with a replica of the latest.

Outfits for Locating Interference

The Police Exhibit

Police Apparatus for transmission of Photographs

Combined radio receivers and gramophones were shown by many firms.

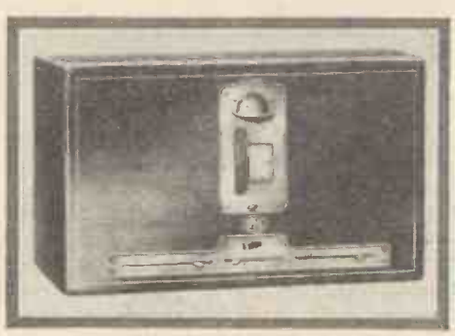
Wavetraps and other selective apparatus have assumed great importance as the power of transmitting stations has been increased and there was a large variety of this class of apparatus on show.

Loud-speakers of all three types, viz., electro-magnetic, electro-dynamic and electro-static were on show. Electro-dynamic loud-speakers are very popular and some very powerful instruments were to be seen. A number of power amplifiers enabling several loud-speakers to be fed from one set were likewise shown.

Special Exhibits

The new Automobile Hall contained the most interesting exhibits of public authori-

included devices for the measurement of wavelengths and the treatment of cables in order that these may be suited for the transmission of music. The German Postal Department also had on view the televisor



The Lorenz Gramo-Radio Receiver

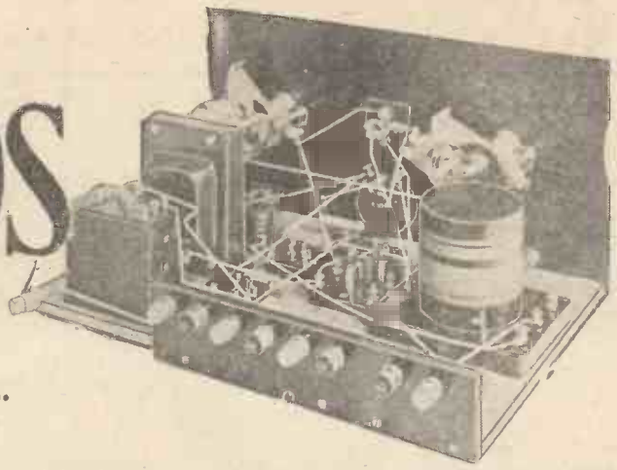
RADIOGRAMS

The Japanese Broadcasting Association proposes to begin broadcasting educational programmes, through station JOAK, for children of the "floating population" in and around Tokio who do not receive regular schooling.

A Marconi wireless transmitter is being sent to Pitcairn Island, in the Pacific, which is probably the world's loneliest island settlement.

Station KGO (Sanfrancisco) is co-operating with the 'Frisco bureau of the United Press of America, a world-wide news-gathering association, in broadcasting news events to wireless enthusiasts in Alaska. Charles A. Bennett will broadcast a weekly report.

THE ACE of TWOS



"The Two-valver with the Three-valve Punch"

Designed by J. H. REYNER, B.Sc., A.M.I.E.E.

Continued from Our Last Issue

NO other comment is necessary on the circuit save to note that a flash-lamp fuse has been connected between H.T.– and L.T.–. This saves the filaments of the valves from any accidental damage due to wrong connections, and also serves to protect the loud-speaker in the event of any fault on the pentode.

In the circuit given last week a slight error occurred which may have caused readers some misapprehension. The short-wave coil and "Q" coil were shown transposed; that is, the short-wave coil should be connected where the "Q" coil is shown and *vice versa*.

Simple Construction

The constructional work of this receiver is simple, and considerable thought was spent in devising the layout so that it could be constructed with the maximum of ease. It should be particularly noted that not only the layout, but in the wiring also, the diagram given must be copied exactly in order to obtain the best results, particularly on the short waves.

The first operation is the marking out of the panel and the mounting of the necessary components thereon. There are two condensers, the .0005 tuning condenser on the left and the .00015 reaction condenser on the right. In the centre of the panel we have the two-pole push-pull switch. (This is actually marketed as an H.T. and L.T. switch. It makes and breaks two entirely separate circuits.) Underneath this switch is the potentiometer for the detector valve. In the left-hand bottom corner of the panel is the "Q" coil switch, and in the right-hand bottom corner, the on-off switch controlling the whole set.

Having marked out the panel and mounted the components in the positions shown on the diagram, attention can then be turned to the baseboard, where the components may be laid out in strict accordance with the diagram given. On the left-hand side of the baseboard we have the "Q" coil, and next to it the six-pin base. To the right again and towards the rear of the baseboard are the two valve holders, while the H.F. choke, L.F. transformer, and anode filter occupy the right-hand side of the baseboard. On the extreme right there is the grid-bias battery, which has been incorporated in the set itself.

These components should be laid out and screwed down in the positions shown. Before finally fixing them in the panel should be placed temporarily in position to ascertain that the condensers do not foul any of the components. The wiring up of the baseboard components may then be completed and practically the whole of the circuit can be wired up without reference to the panel. When this portion of the wiring has been carried out the panel may be inserted in its correct position and the remaining wiring completed. This consists of the following wires:

The "Ace of Twos," which has been on show at the Exhibition, has met with a remarkable reception. Limitations of space prevent us from giving more than a brief outline of the method of operation in this issue but next week we shall give particulars of its performance and full operating instructions.

Two wires are taken to the on-off switch on the right of the panel. Two further wires are then taken from the fixed and moving plates of the tuning condenser to terminals 1 and 2 on the six-pin base. A wire is then taken from the fixed plates of the reaction condenser to terminal No. 6 on the six-pin base, and, finally, the moving plates of the two condensers are joined together.

Wiring the Switch

We have now to complete the receiver by wiring up the switch, and this is quite simply done as follows: Take a wire from the fixed plates of the tuning condenser to one side of the first contact. From the opposite terminal to this take a wire to terminal No. 1 on the "Q" coil. Now take a wire from the fixed plates on the reaction condenser to the third contact on the push-pull switch and from the opposite terminal to this, take a wire to terminal No. 6 on the "Q" coil. This completes the wiring and the receiver is then ready for use.

Operation

The operation of the receiver is simple. Test out first of all on the broadcast band, and for this purpose the short-wave coil must be removed from the six-pin base and the push-pull switch on the panel must be pulled out. Insert the correct valves in the valve holders. The detector valve should be an H.F. or an R.C. valve. In the last stage, insert a pentode valve such as the Mullard Pentone, the Marconi Pentode, or the Cossor Quintode. This is inserted in the socket in the ordinary way and the flex connection from the H.T.+ terminal at the back of the set is taken to the terminal on the side of the base of the valve.

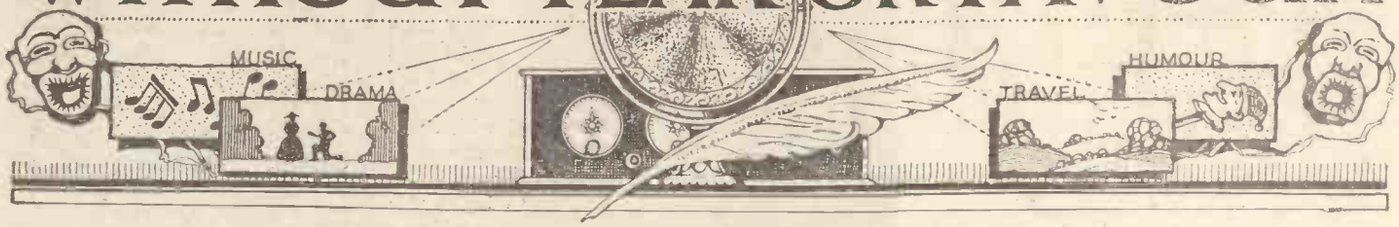
On switching on the receiver and placing the "Q" coil switch in the required position, reception will then be accomplished easily and simply on whichever waveband is desired. Placing the "Q" coil switch to the left-hand side sets the coil for reception on the long waves, and to the right hand changes the connection to the 250-500-metre band.

For the reception of short waves, merely push in the push-pull switch and insert the appropriate short-wave coil in the six-pin base. No other alteration is necessary. Further notes on the set, with operating details, will be given next week.

Pillow-phones, which enable broadcast music to be heard only by those laying their heads on the pillows, have been installed at the Liverpool Open Air Hospital for Children at Leasowe.

A young San Francisco inventor, Phil. T. Farnsworth, claims to have perfected a new system of radio television which eliminates the revolving disc feature, and reproduces objects in great detail and can be manufactured to sell at about £20. He declares it would reproduce pictures at the rate of twenty a second, thus perfectly recording motion, and that the machine has no moving parts and can easily be attached to the average home radio set.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

A FRIEND of mine, switching on (and soon switching off!), when the first of the Great Play series—*King Lear*—opened, remarked to the company present: "Well, at any rate, there will be one listener sticking it—and that will be Sydney Moseley!" They laughed, and I can imagine somebody present adding: "The poor mutt!" Well, the laugh is certainly not on me, for I was in the mood to settle down and enjoy this ambitious Shakespearean production in the way that it can best be appreciated—that is, by following the "score"! This, and the interesting booklet issued by the B.B.C., did the trick. Separate pocket volumes of Will's play may be obtained for the price of a packet of cigarettes. . . . Yes, you heard!

◆ ◆ ◆

But, of course, it is the mood. In any case, I can't possibly see how you could enjoy—or expect to enjoy—a broadcast of this character in a room full of people, each of different temperament and inclination. My friend did well in switching off. If other listeners who were inclined to be very irritated at what was coming over did the same, there would be less "frayed nerves," fewer letters to the Editor, fewer stamps wasted.

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And, please: Am I too kind to the B.B.C.? A Fleet Street colleague, who tells me that he is "a constant reader" of these notes, insists that, on the whole, I *am* too kind to Savoy Hill. Surely I ought to have noticed it! Seriously, my friend is evidently one whose sole desire is to be entertained. He wishes to be amused, day in and day out. All I can say is, that if he went the round of the theatres or music-halls, or the pictures, night after night he would soon jolly well get fed up with it. *Change*, my dear Watson—that's the thing. After a feast of variety, jazz and jangle, a highbrow piece, whether it be music, talk, or literature, is in the nature of a relaxing contrast. . . . Next, please.

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The Swiss National Programme sought to "give some idea of the delightful manners and music of Switzerland as seen through the eyes of two imaginative tourists." And a good idea, too. The folk-songs were haunting; so were the tourists, but not in the way they imagined they would be. It is extraordinary how seemingly difficult it is to be unconventional by wireless. The dialogue that is put into the mouths of the "unconventional people" sounds like Ethel M. Dell. Well, this may be unconventional, but it certainly is not natural.

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Vernon Bartlett's talk from Geneva didn't come over well, so far as my set was concerned. I hope other readers were more successful.

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The reception given to Fanny Davies, the pianist at the Proms., was so prolonged that it seemed almost as if Sir Henry Wood might have to break his rule of "no encore" during the first half. . . . I waited when the applause stopped. But it was the next turn! That is how it should be. Rules is rules.

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Back to variety! What is the ideal programme? My criticism of the past is now backed by managers themselves who say that artistes won't advance with the times. The older artistes believe that vulgarity and hoary "jokes" still go over. They don't! I can't see why a programme of the sort we had recently, when the Parkington Quintet played a finely balanced programme and we had some artistes who could really sing, should not be given preference.

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And the type of variety items represented by T. C. Sterndale Bennett with his irresponsible chatter-songs is far preferable.

Take one of his latest: "Sophie." . . .

Won't bear analysis, of course; but quite English, you know—quite English.

◆ ◆ ◆

When Anona Winn announced that she was going to sing a light ballad by Montague Phillips, I thought: "Fine!" It was a light English song, too. Then as her second song she promised (it was a threat, as it turned out) to sing, "Why am I Blue?"—the old whining balderdash—an insult to the multitude of listeners who don't live in the New Cut.

Cut out that type of trash, Miss Winn.

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However, we went back to the more appealing music played by the quintet—for which relief many thanks.

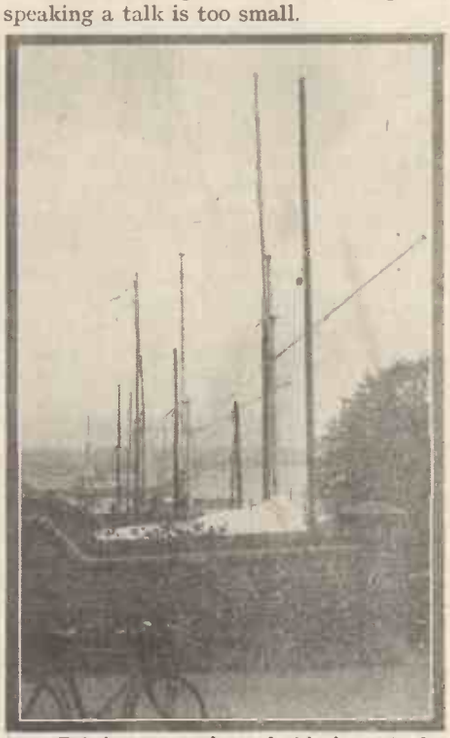
The half-an-hour selections from Sullivan operas are also most welcome, and I venture to think agreeable to eight out of ten listeners. We all have our pet songs as well as our favourite composers. Sullivan once upon a time was regarded as cheap. But, like Dickens, he is a British immortal. In any case, one is always grateful for light orchestral compositions in preference to the drivelling laments from the U.S.A.

◆ ◆ ◆

The quartets, quintets, and octets are multiplying. The latest is the Ernest Leggett London Octet. I wonder if new players are engaged daily. Of course, it all strengthens the B.B.C.'s hands. As I said years ago, those who quarrelled with the B.B.C. were foolish. That is why I always advised Savoy Hill to stick out against extortionate demands by those whose reputations were made through the microphone.

◆ ◆ ◆

I am not suggesting that these disagreements were all due to artistes. I myself have not broadcast again because—the novelty having worn off—I think the fee of five or six guineas for writing *and* speaking a talk is too small.



No!—This is not a view of ships' masts, but merely aerials in back gardens at Gravesend.

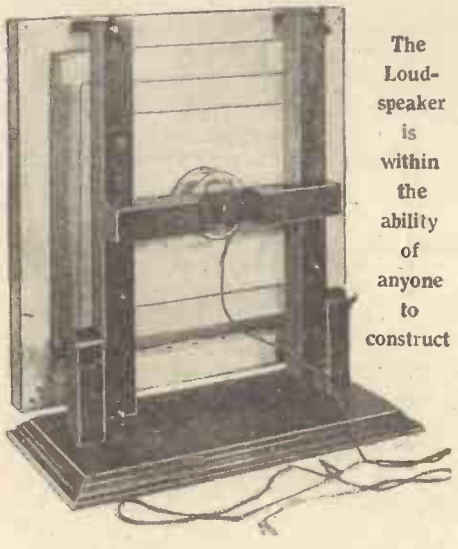
THE DUPLEX

THE linen diaphragm loud-speaker is the latest development to be exploited by the AMATEUR WIRELESS Technical Staff in the interests of their readers. Exclusive constructional details are now given of a loud-speaker of great merit embodying the new principle. Enormous interest has already been aroused by the publication, in our contemporary, the *Wireless Magazine*, of similar details and we anticipate an even greater response from our own readers.

First suggested in America, the linen diaphragm loud-speaker is now brought across the Atlantic, so to speak, for the benefit of English listeners. The idea appealed to us from the first, but only when we had tried out a working model did we realise how great were its possibilities.

Excellent Reproduction

The linen-diaphragm loud-speaker is capable of providing excellent reproduction in conjunction with the average receiver



The Loud-speaker is within the ability of anyone to construct

and furthermore, it is far more sensitive to weak signals than almost any other type of instrument. Some who have heard one or other of the several models of linen-diaphragm loud-speakers in our laboratory have expressed a preference for this new type even compared with a moving-coil instrument.

As the illustrations indicate, there are two stretched square diaphragms of linen drawn together at their centres, through which passes the driving reed of a balanced-armature movement. Imagine a small bass drum, square instead of round, with its opposite sides separated by only an inch or two and drawn together at the centres. There you have a fairly good idea of the basic construction of the linen diaphragm loud-speaker.

Simple Construction

In practice, two square frames, one larger than the other, have stretched across them pieces of embroidery linen suitably doped with collodion and drawn together at their centres until the two flat surfaces assume conical shapes, the apexes of which are held in contact by the fixing nuts and washer of an ordinary cone loud-speaker unit.

Those who are intending to build this loud-speaker are very strongly advised before starting, to obtain the full-size blueprint which has been specially prepared by the AMATEUR WIRELESS draughtsmen to assist the constructor. At best, the following description can only be a complement to this blueprint, because without a clear idea of the general construction the reader will be at a loss to follow the references made in the following instructions.

The Frames

The complete frame stand assembly is obtainable from the Carrington Manufacturing Co., Ltd. Assuming that the constructor is not going to worry about assembling the wooden part of the structure for himself the first part of the task will be to tack the linen to the two square frames. The best type of linen for loud-speaker use is that known as embroidery linen which, in a good quality, is neither too coarse nor too fine for the purpose.

Take the large frame and place it square on a piece of this linen of such a size as to allow an overlap of 4 in. all round. The overlapping side of linen nearest the constructor is then folded over and round the four edges of the front of the frame and tacked to the fourth side, that is to say, the inside edge of this particular side of the frame. One tack at the centre and one in each corner, about one inch from the ends will do for the present.

Swing round the frame until the opposite side faces the constructor. The same procedure is then adopted and three more tacks used to secure the second side. The third and fourth sides of the frame are overlapped with linen and tacked in the same way.

It is most important not to draw the linen too taut in this tacking process. General stretching and evening up of the linen surface can be accomplished by adding more tacks until the four inside edges of the frame have tacks placed all round, about 1½ in. apart.

A Loud-speaker of this type was des
" Wireless Magazine " and it met w
felt it desirable to submit this
of "Amateur W

As the last two sides of the frame are tacked, the corners must be trimmed by cutting away the waste linen as will be clear when the constructor comes to this point in the process. Three tacks in each corner serve to secure these overlaps of linen.

Detail showing attachm

The above sequence is repeated in every detail in the case of the smaller frame. The constructor then has two evenly stretched linen diaphragms.

The next business is to find the two centres of the frames by means of diagonals

LOUD-SPEAKER

scribed in the September issue of the ith such unanimous approval that we modified instrument for the benefit ireless" readers

drawn with a pencil along a straight edge placed from corner to corner. Having found the centre, prick a small hole, by carefully "working" the linen with a sharp point, such as a pin or gramophone needle. Great care must be taken not to break a thread otherwise the diaphragm will be ruined. Enlarge this hole at the centre of each diaphragm to about $\frac{1}{16}$ in.

ent of unit to diaphragms

Assembling

The two diaphragms are now ready to be mounted on the pivoted stand. To do this, four thumb-screw plates have to be screwed to the large frame on the opposite side of the diaphragm surface about 3 in. from each corner. Refer to the blueprint for this detail.

Next bolt the small frame to the two main vertical supports of the stand. Four ¼-in. tapped bolts serve this purpose. The diaphragm surface of the small frame should face the support.

Then the big frame can be fitted to the supports by means of four lengths of ¼-in. tapped rod screwed into the four plates already referred to and passing through the four corners of the supports. The sequence of assembly here, that is to say, at each corner of the vertical supports, is: Back of big frame—thumb-screw plate—rod—nut—washer—support—washer—wing nut.

The four nuts between the vertical supports and the big frame are then run along until they touch the thumb-screw plate so as to bring both diaphragms as close as possible.

The rod of the balanced armature unit is then unscrewed and passed through the two holes already made in the centre of the two diaphragms. The two cone washers supplied for the unit are fixed one on each diaphragm and then two cone washer nuts fitted over these and screwed down until each diaphragm is just a little taut.

Doping

The next process is the doping of the two diaphragms with collodion. Apply the collodion freely, but not thickly, with a wide camel-hair brush. At the same time tighten up the two cone washer nuts until the two diaphragms just touch at the apexes of the cones thus formed. When these are touching more dope is applied and the diaphragms left to dry, a process which will take about a quarter of an hour.

In the meantime the balanced armature unit can be mounted to the cross support which has, of course, been removed from the vertical supports of the frame. Here again the constructor can see just where he is by referring to the blueprint. When this has been done the diaphragm will have dried. The loud-speaker unit rod is then removed and put back on the unit. The diaphragms will thus be released but will, owing to the doping, retain their conical shapes.

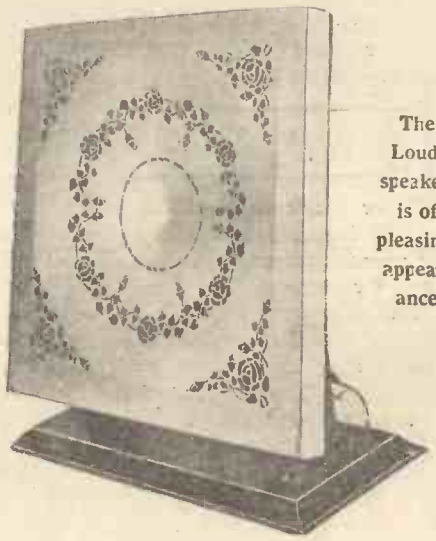
Put one nut on the unit rod, then a washer and push the rod through the big diaphragm again so that the nut and washer come close up to the apex of the smaller diaphragm. The cross piece is then adjusted until absolutely central with respect to the holes in the diaphragms, after which this support can be screwed in position.

Then the other cone washer and nut are screwed on the end of the rod against the big diaphragm, so that the two diaphragms are tightened up until their apexes are touching as before.

Adjusting the Diaphragms

It is hoped that the constructor will now be able to appreciate the fact that the two diaphragms can be pulled apart by adjusting the four nuts in turn between the vertical supports and base plates. This should be done until about ½ in. of rod appears at each corner.

It is necessary to keep both diaphragms at approximately the same tension, otherwise the balanced armature will be strained. Once the diaphragms have been adjusted it is best to leave them set. It might be found advisable to leave the screwed rod in the diaphragms while stretching, attaching the unit afterwards.



The Loud-speaker is of pleasing appearance

Directional Effects

All that remains now is to mount the two diaphragms by means of bolts and wing nuts to the wooden base. The direction of sound propagation can be varied by swivelling the main vertical supports on the rods passing through the two short verticals of the base.

Various ways of decorating and finishing the front diaphragm will no doubt occur to the constructor. Our plan was to spray gold paint on to the big diaphragm by means of a flower-spray, after which stencils were super-imposed on the gold paint surface to impart an artistic effect.

"THE DUPLEX LINEN-DIAPHRAGM LOUD-SPEAKER" (*Continued*)

On no account paint on the gold paint, as such procedure will spoil the flexibility of the linen surface. Any point not clear from the description can be cleared up by a careful comparison between the instructions given and the extremely clear drawings shown in the blueprint and the various photographs.

Components

For the construction of the loud-speaker the following materials and components will be required.

Oak framework, dimensions as in blueprint (Carrington Mfg. Co.).

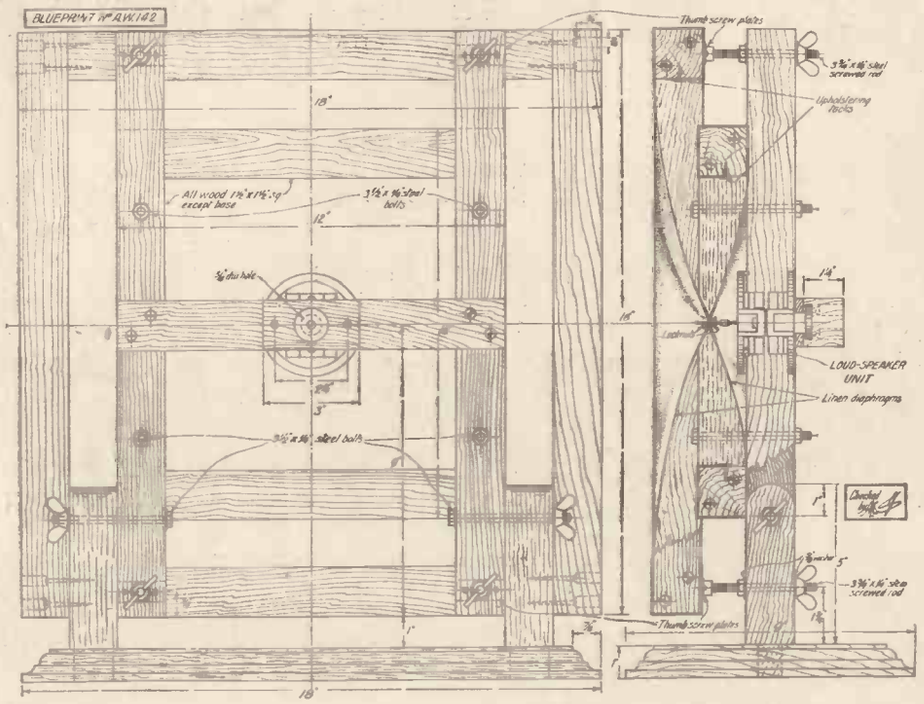
1½ yds. embroidery linen, 36 in. wide (Best quality).

Four thumb-screw plates to take four 3¾ in. lengths of ¼ in. diameter screwed steel rod. Six 3½ in. by ¼ in. diameter bolts; twelve washers for bolts; eight ¼ in. nuts; six ¼ in. wing nuts (any high-class ironmonger).

10 ozs. Collodion Flexile (chemist).

¼ lb. upholsterer's flat-headed ½ in. nails (ironmonger).

Loud-speaker unit (Goodman, Blue Spot, Bullphone, Beam).



An Elevation and Vertical Section of the Linen-diaphragm Loud-speaker. Blueprint available, price 1/-.

"THE ALL-WAVE MAINS 3" (*Continued from page 426*)

fixed condenser is connected in the aerial lead to improve selectivity and extend the wavelength range of the coil. A 2-microfarad condenser is connected in the earth lead as a precaution against an accidental short-circuit of the mains—an unlikely eventuality, it is true.

H.F. transformer. The "Q" transformer follows the usual rule of numbering: No. 3, one end of primary to grid of valve through neutralising condenser. No. 4, centre tap of primary to H.T.+. No. 5, other end of primary to anode of H.F. valve. No. 1, one end of tuned-secondary to grid of detector. No. 2, other end of secondary to G.B.— for the anode bend bias. No. 6, free end of reaction winding, through .0001-microfarad reaction condenser to anode of detector valve.

The whole transformer is tuned by means of the .0005-microfarad condenser across the secondary.

Low-frequency amplifier: The H.F. choke in series with the anode of the detector valve and one end of the primary ensures smooth reaction. Between the other end of the primary and H.T.+ is a 50,000-ohm resistance, which, in conjunction with the 2-microfarad fixed condenser connected between the junction of the primary and the resistance and earth forms an anode filter, which effectively prevents any tendency on the part of the L.F. stage to "motor-boat."

Output circuit: The loud-speaker winding is not connected directly in the anode circuit of the third valve. A low-frequency choke is substituted and the loud-speaker connected in series with a 2-microfarad condenser between the anode and H.T.—. The low-frequency impulses are thus diverted through the loud-speaker, the winding of which is completely isolated from the direct current flowing in the L.F. choke.

Filament supply: The 4-volt secondary on the power transformer is connected across the heater elements of the A.C. valves and the operating filaments are therefore free. All three are joined together and taken to the slider of a potentiometer, the winding of which is connected across the heater secondary. The anode circuits are thus completed through this potentiometer.

Grid bias: All three valves are negatively biased. The grid of the H.F. valve gets its bias *via* the aerial coil in the same way the grid of the detector is biased through the secondary winding of the H.F. transformer from the G.B. battery. The L.F. valve bias is obtained in the usual way.

The complete circuit therefore provides (1) H.T. and L.T. from A.C. mains, completely free from all hum. (2) All-wave tuning from 250-2,000 metres due to the "Q" coils. (3) Sensitivity and selectivity due to the valves and tuning systems respectively.

Components Required

Ebonite or bakelite panel, 16 in. by 8 in. (Radion, Becol, Pertinax, Paxolin).

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

.0001-microfarad reaction condenser (Peto-Scott "Midget," J.B., Bowyer-Lowe, Igranic).

Two dial indicators (Bulgin).

Three A.C. valve sockets (Cosmos).

Anti-microphonic valve holder (Lotus, W.B., Benjamin, Wearite, Trix).

"Q" aerial coil (Wearite, Lewcos).

"Q" split-primary coil (Wearite, Lewcos).

Neutralising condenser (Burne-Jones, Bowyer-Lowe, Gambrell).

High-frequency choke (Lissen, R.I. and Varley, Wearite, Lewcos, Trix).

Three 2-microfarad Mansbridge type fixed condensers (Dubilier, Hydra, Lissen, T.C.C.).

8-microfarad and 4-microfarad, Mansbridge type, fixed condensers (Dubilier type B.D., Hydra, T.C.C.).

.0001-mfd. fixed condenser (Graham-Farish, Trix, Lissen, Dubilier, C.D.M., Watmel).

50,000-ohm resistance, with holder (Graham-Farish, R.I. and Varley, Lissen, Dubilier).

Low-frequency transformer (Ferranti, type A.F.5, R.I. and Varley, Igranic, Lissen, Mullard).

(*Continued on page 480*)

RADIOGRAMS

IN the series of twelve plays, to be broadcast one a month, the B.B.C. has in rehearsal for October Maeterlinck's *The Betrothal*. On the operatic side during that month we are to be given from the 2LO studio *Pelleas and Melisande*, by Debussy. A performance of *Samson and Delilah* (Saint Saens) is in preparation and will be given in November.

The season of B.B.C. symphony concerts to be given at the Queen's Hall, London, will open on October 12, when Sir Thomas Beecham will direct the orchestra. Many British and foreign conductors have been engaged for the season, including such well-known personalities as Sir Henry Wood, Sir Hamilton Harty, Granville Bantock, Franz von Hoesslin, Ernst Ansermet, Albert Coates, Sir Landon Ronald, Albert Wolff, and Gino Marinuzzi. All these concerts will be broadcast.

On the occasion of the visit of the Carl Rosa Opera Company to Cardiff, on October 17, Act 3 (the garden scene) of Gounod's opera, *Faust*, will be relayed to Daventry 5GB.

October 9 is the date fixed for the first of the weekly hours of vaudeville, revue, and variety arranged for broadcast by Albert de Courville; arrangements have been made for a series of six programmes.

"Seamark," an author who must have thrilled many readers with his clever novels, has written a sketch entitled, *The 'Ole in the Road*, in which he himself will take the part of a navvy.

On September 29, the 2LO studio will be visited by the British Legion Military Band, conducted by Robert Eastleigh, which will provide the main feature of the evening programme.

The Man from Toronto, a comedy by Douglas Murray, which enjoyed considerable success at the Royalty Theatre, London, some years ago, will be broadcast for the first time from 2LO and 5XX on October 3.

Listeners to 5GB on October 2 and 4 will hear Culley and Gofton, two variety artistes who describe themselves as broadcasters of broad grins in broad Yorkshire.

When the Rt. Hon. J. Ramsay MacDonald opens an exhibition of paintings by old Dutch masters at the Cartwright Memorial Hall, Bradford, on September 28, his speech will be broadcast through all the North of England stations.

Les Cloches de Corneville, Planquette's evergreen comic opera, is down for performance at the Newcastle studio on October 3. The principal parts have been entrusted to Marjory Dixon, Vivienne Chatterton, Gregory Stroud, and Henry Wendon.

The new Laibach (Jugo-Slavia) 2.5-kilowatt broadcast transmitter now tests daily towards 8 p.m., B.S.T., on a wavelength of 570 metres. Announcements are given out in the Serbian, English, French, German, and Italian languages, the call being *Radio Ljubliana* (pronounced Liubliana). As an interval signal between items, the call of the cuckoo has been adopted.

Although attempts have been made by Béziers (France) to relay open-air operatic performances from its historic Roman arena, permission to use telephone cables has always been refused by the French PTT. The station now intends to effect a relay by wireless link.

A new wireless telephony and telegraphy transmitter for the cross-Channel airplane services has been erected at Middlekerke, near Ostend. Tests are being carried out daily on 900, 1,400, and 1,680 metres.

At Ghent (Belgium) loud-speakers have been installed on the railway station platforms in order to advise passengers of the departure and arrival of trains. They are operated from the main signal box.

As a special attraction for the forthcoming International Exhibition at Barcelona (Spain), plans have been approved for the erection outside the city of a 400-metre tower—100 metres higher than the Eiffel Tower. It is proposed to construct it in seven stories, the three first to be reserved to hotels, the fourth to a theatre, the fifth to a museum, the sixth to a library, and the top platform to a powerful wireless telephony and telegraphy transmitter. The circumference of this gigantic tower at its base will reach some six hundred feet.

"L.T. SUPPLY ECONOMY"

(*Continued from page* 442)

mercury cups on the base plate. Drill each with a fine drill right through the base-plate. Now take a ¼ in. twist drill and drill out the twenty-four cups in the places marked out, making each cup ⅜ in. deep. Into each cup pass the end of a piece of flex from below and seal it in with sealing wax, Chatterton compound, or a small screw. The free end of the flex should be teased out and spread in the cup, but must not emerge from it. Connect the pieces of flex to the mains, the receiving set, and the blocks as shown in Fig. 3, and screw the ebonite base plate on to a wooden board.

The cups must now be filled with mercury. This is best done by means of a fountain-pen filler. The mercury should reach within about ⅛ in. of the top of each cup (see Fig. 4).

The switch is now ready for use. By lowering the contact strip into the mercury cups on one side, two of the blocks are automatically connected in parallel to the receiving set, while the two other blocks are charged in series from the mains through the lamp L. This lamp should pass a current half as strong as the current supplied to the set. Thus, if the valve current is ¼ ampere a thirty-watt lamp will suffice in the charging circuit if the supply voltage is 240. If the supply voltage is in the neighbourhood of 120, a 15-watt lamp will suffice, as it gives the same current.

The voltage supplied to the set is 10. This suffices for all wireless purposes, and can be adapted to any valve by introducing an appropriate rheostat. Allowance should be made for the fact that the internal resistance of small accumulators is greater than that of the ordinary size.

The greater the number of blocks used, the greater the economy of charging current. The four-block arrangement just described costs 21s. in first cost and will furnish ½ ampere for sixteen hours (or for 32 hours if the supply voltage is 120) for the price of one unit.

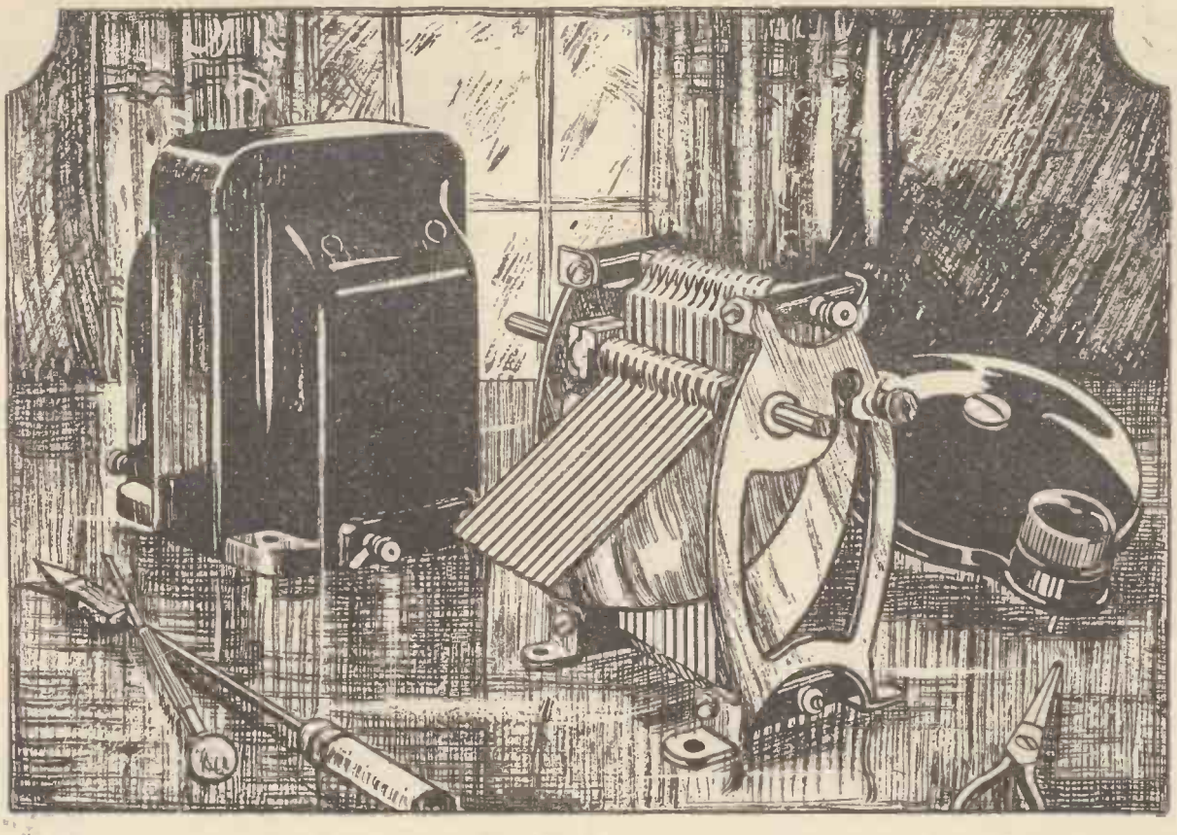
The rule to be observed in the choice of the charging current is the following: Divide the valve current required by the number of blocks simultaneously charged in parallel. The result is the charging current required. The charging current, multiplied by the supply voltage, gives the wattage of the lamp to be inserted in the charging socket.

The satisfactory and economical working of the arrangement depends largely upon the correct choice of the charging current according to the rule given above. The working is then very simple. All that is necessary is to use the batteries equally turn and turn about. This can be secured in two ways. Either the set is turned on for the same period each day, using the right-hand cups one day, and the left-hand cups the next; or the set is kept functioning on one side till it shows the first signs of running down, when it is promptly switched over to the other side for charging, while by the same movement a freshly charged battery is brought into action to work the valves.

The switch and set of batteries may be enclosed in a box, with two ebonite rods, connected to the ends of the contact strip, emerging through the top of the lid. A tap on one or other of these rods will switch over instantly, and the whole arrangement is absolutely "foolproof."

The connector G shown in Fig. 3 is for the use of the fortunate owners of a set of H.T. accumulators. These may be recharged while the set is not in use.

The arrangement described in this article is designed primarily for those who have a D.C. house current. Where there is an A.C. supply economical recharging is a matter of transformers and rectifiers, but I have used the above arrangement successfully with an aluminium rectifier in the charging circuit and everything else unchanged.



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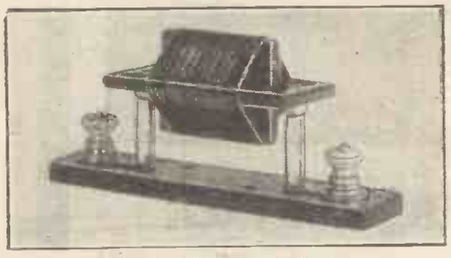
"A.W." TESTS OF APPARATUS

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

Airmax Short-wave H.F. Choke

SHORT-WAVE receivers are becoming increasingly popular with wireless enthusiasts who enjoy handling delicate sets of this nature. Apart from the actual tuning coils and condensers, an efficient high-frequency choke is an essential feature of a short-wave set and must be designed specifically for its work.

An ingenious high-frequency choke for the ultra-short wavelengths, known as the Airmax choke, is marketed by J. Dyson and Co., Ltd., of 5-7 Godwin Street, Bradford. With the object of reducing the capacity of this choke to a minimum, the winding is placed in a single layer on a former consisting of two narrow insulating strips fixed at right angles to one another. In this manner the turns are air-spaced to a great extent,



Airmax Short-wave Choke

and therefore the overall capacity is much reduced. Furthermore, the insulated strips are freely drilled with holes with the object of further improving the component's performance. The ends of the winding are brought to two pins on either side of the former, and these fit into a special two-socket base.

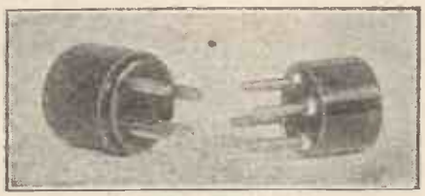
Tested in a short-wave set, the component functioned satisfactorily from a wavelength below 15 metres up to a value exceeding 100 metres. The choke will, therefore, cover the full range required for short-wave work. There was no evidence of faulty choking at any intermediate wavelength.

Trix Plug and Socket

E. J. LEVER, LTD., of 33 Clerkenwell Green, E.C.1, have submitted a neat pattern plug and socket for test and report.

The socket consists of a cylindrical piece of insulated material in which four metal sockets are mounted, the spacing of the sockets being the same as that of a normal valve holder: the component can, in fact, be utilised as a rigid valve holder in amplifying stages or battery eliminators. Each socket terminates in a length of screwed rod, which, with the aid of four nuts, will fix the component to a panel. The price is 1s.

The plug comprises four pins mounted in an insulated holder and terminating in neat screw connectors. These connectors are



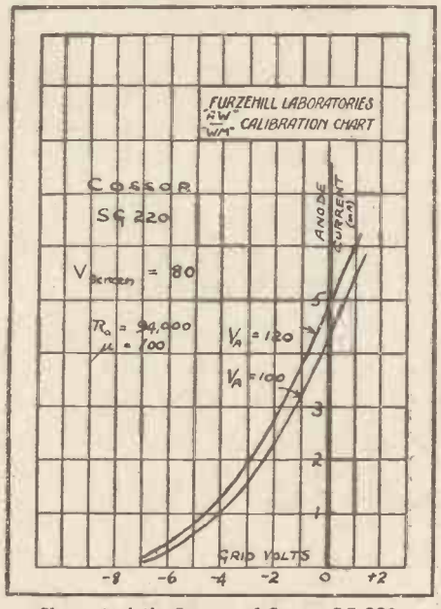
Trix Plug and Socket

finally enclosed in a cylindrical insulated cover, which screws into place with a hole in the back to allow for the connecting cord. The plug pins are split in a similar manner to valve pins, and are, therefore, a good fit in the socket.

Cossor Screen-grid Valve

SINCE its inception the screen-grid four-electrode valve has caused much interest amongst wireless enthusiasts; but owing to the extra complications in receiver design they involve, only a limited number of experimenters have tried them out. Recently, however, the characteristics of the valve have been improved to such an extent that there is little question as to whether its use is worth while.

We recently tested one of the new Cossor 2-volt screen-grid valves which is designed



Characteristic Curves of Cossor SG 220

to fit in an ordinary valve holder. The anode of the valve is taken out to an insulated terminal mounted on the top of the glass bulb. In order to obtain the best results with this valve, it should be mounted in such a position that it passes through a screen, which, in conjunction with the internally fitted screen, completely isolates the grid and filament leads from the anode terminal.

The figures obtained on test in our laboratories give a good idea of the efficiency of this valve: the filament consumption is .2 ampere at 2 volts. With 100 volts on the anode and 80 volts on the screen, the valve was found to have an impedance of 94,000 ohms and an amplification factor of 100: this gives a mutual conductance exceeding 1 milliampere per volt, which is certainly a high figure. The valve is made by A. C. Cossor, Ltd., of Highbury Grove, N.5

Ripault H.T. Battery

IT is only lately that the public are beginning to realise that a small-capacity high-tension battery, when used in a multi-valve set, is a poor investment, since more economical running can be obtained with a

Ripault Double-capacity H.T. Battery

larger capacity battery, even though the first cost is greater. High-tension battery manufacturers are, therefore, starting to grade their batteries into certain standard sizes.

A Ripault 60-volt double-capacity battery (made by Ripaults, Ltd., of 1 King's Road, N.W.1) has recently been sent in for test and report. The cells of this battery have a similar action to the well-known Léclanché cell and, in consequence, after heavy usage, the battery will revive to some extent, and this gives a long life.

Each battery is housed in a stiff cardboard case, measuring 7⅜ in. by 6⅜ in. by 3¼ in. The first nine volts on the negative side are tapped at every 1½ volts for grid bias: this is an excellent feature. The tappings then occur at every 9 volts up to 60.

We subjected this battery to a continuous test lasting 262 hours. Since the rated discharge is 12 milliamperes, a resistance was placed across the battery to take a discharge of this value. At the completion of the test the current had fallen to 6 milliamperes, giving a mean discharge of 9 milliamperes for 262 hours, which is equivalent to a total discharge of over 2,300 milliampere hours.

On leaving the battery idle for twenty-four hours, the discharge on the same resistance rose to 8 milliamperes.

VALVES OF CHARACTER
FOR OPERATION OFF THE ELECTRIC LIGHT MAINS

Don't engage a Valve without a good character

"Cosmos-Met-Vick" A.C. Valves are each supplied with a written character, the details of which are in close accord with the actual inherent character of the valve.

The new reduced prices are comparable with those of ordinary battery valves and will greatly assist all who are converting their sets from battery working to operation from the electric light mains.

The A.C./G (Green Spot) Valve can be used for any stage except the last. It has a very high amplification factor of 35 with an impedance of only 17,500 ohms. It is suitable as a Detector and for all forms of coupling.

Used by Mr. N. P. Vincer-Minter in his A.C. 2 & A.C.3 *(Wireless World, Aug. 22 and Sept. 5.)*

The A.C./R (Red Spot) valve has been designed specially for the Loud Speaker Stage. It has a very high mutual conductance, and amplification factor of 10 with an impedance of 2,500 ohms at 180 volts H.T.

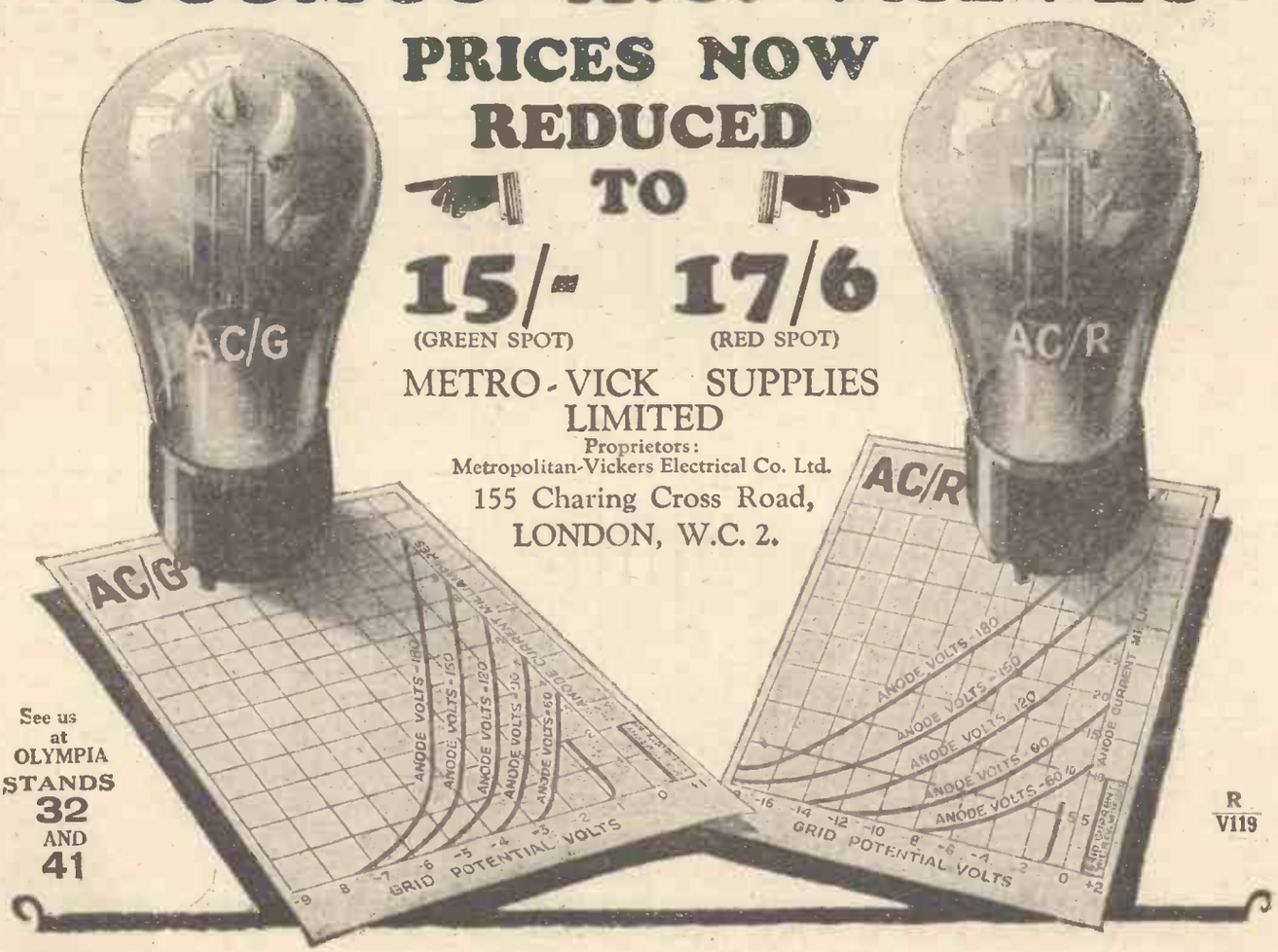
It will give twice the output for the same input of any battery operated valve on the market.

EVERY USER IS ENTHUSIASTIC ABOUT

"COSMOS" A.C. VALVES

PRICES NOW REDUCED TO

15/- (GREEN SPOT) **17/6** (RED SPOT)



METRO-VICK SUPPLIES LIMITED
Proprietors:
Metropolitan-Vickers Electrical Co. Ltd.
155 Charing Cross Road,
LONDON, W.C. 2.

See us at OLYMPIA STANDS 32 AND 41

R V119

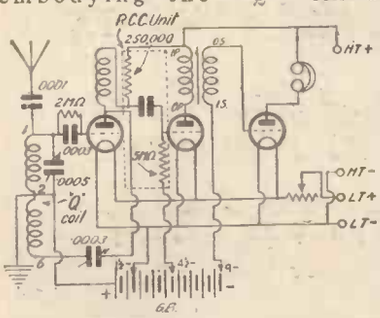
You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

SETS FOR EVERYONE

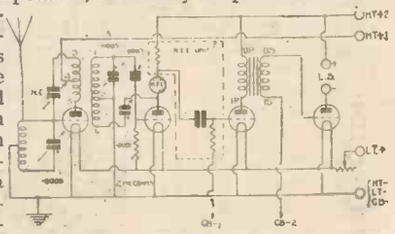
In the comprehensive range of AMATEUR WIRELESS and WIRELESS MAGAZINE receivers every listener is catered for—from the crystal user to the "de-luxe" man. The list below of our best receivers is given with the object of helping the intending constructor to choose just the right set for his purpose.

TWO OUTSTANDING RECEIVERS

THE Q-COIL 3: This is an excellent general-purpose receiver, embodying the "Q" coil and the popular R.C. and transformer L.F. coupling arrangement. With the "Q" coil, coil changing for medium and long wavelengths is no longer necessary—it is simply done by the flick of a switch—while, owing to its astatic properties, local-station pick-up is eliminated. The receiver is sensitive and can receive, besides home stations, a number of Continental and three or four long-wave stations on the speaker. **Blueprint A.W. 84, price 1/-.**

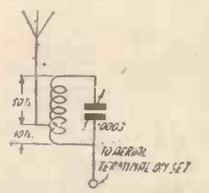


THE FIVE-POUNDER FOUR: The object of the designers of this receiver was to produce an inexpensive, extremely simple to construct, long-range loud-speaker receiver. And they have certainly succeeded. It costs less than five pounds to buy the parts, there are no soldered connections, and during an independent test carried out in one evening twenty odd stations were logged. It has a neutralised H.F. valve, detector valve, and R.C. and transformer-coupled L.F. valves. Plug-in centre-tapped coils are used for medium and long wavelengths. There are only two tuning controls. **Blueprint W.M. 91, price 1/6.**



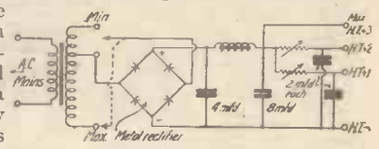
A WAVETRAP TO CUT OUT LOCAL STATION

KNIFE-EDGE WAVETRAP: Lack of selectivity is undoubtedly the greatest drawback of the average two or three-valve receiver in use at the present time. A simple external addition in the form of a wavetrap will greatly assist in separating distant transmissions from those emanating from the local station. Long experience proves that the type of wavetrap shown here is the most effective in cutting out the local station, without cutting out everything else as well. A tapped coil and a tuning condenser are all the additional components required. **Blueprint 131, price 1/-.**



A NO-TROUBLE H.T. BATTERY ELIMINATOR

ELIMINATOR FOR HIGH-TENSION: In the all-metal eliminator the listener has the fruits of a remarkable new development, the solid metal rectifier. The Westinghouse rectifier, in conjunction with a suitably designed mains transformer smoothing circuit and series resistances, provides a constant and noiseless supply from A.C. mains of 200 volts D.C., up to a load of 50-milliamperes. The three alternative high-tension positive terminals on the unit are particularly useful for running a screen-grid valve receiver where varying H.T. supplies are essential. **Blueprint 135, price 1/-.**



COMPLETE BLUEPRINT LIST OF "A.W." & WIRELESS MAGAZINE SETS

Copies of the "Amateur Wireless" and of "Wireless Magazine" containing descriptions of all these sets can be obtained at 4d. and 1s. 3d. respectively, post free.

CRYSTAL SETS. 6d. each, post free.

"Best-yet" Set	AW114
Centre-tap Set	WM150

ONE-VALVE SETS. 1s. each, post free.

Ultra sensitive Hartley One	AW103
Fan's Short-wave One	AW119
Super Reinartz One	AW127
Beginners' One-valver	AW140
Long-range Hartley	WM154
Reflexed One for the Loud-speaker	WM166

TWO-VALVE SETS. 1s. each, post free.

Britain's Favourite (D, Trans) (*Price 4d., with copy of "A.W."*)	AW 74
Home-and-Abroad 2 (D, Trans)	AW 77
Ultra-selective Hartley (D, Trans)	AW 90
Oceanic Short-wave (D, Trans)	AW 91
Trapped Reinartz (D, Trans)	AW 92
"Q" 2 (D, Trans)	AW 99
Long Distance Two (HF, D)	AW110
DX Headphone Two (HF, Det.)	AW134
Ace of Twos (D, Pentode)	AW143
Girdle Two (*Price 1s. 3d., with copy of "W.M."*)	WM130
Mains-fed 2 (D, LF)	WM137
British Broadcast 2 (D, Trans)	WM144
Two-programme 2 (D, Trans)	WM156
Q-coil 2 (D, Trans)	WM162
Crusader (D, Trans)	WM169
Flat-dweller's 2 (HF, D)	WM176
Two Daventry Two (D, Trans)	WM97
Tetrode Short-wave Two (SG, D)	WM199

THREE-VALVE SETS. 1s. each, post free.

Modern Tuned-anode (HF, D, Trans)	AW 35
All-from-the-Mains (D, 2LF)	AW 41
Short-wave (D, RC, Trans)	AW 50
Ether-searcher (D, RC, Trans)	AW 52
Britain's Favourite (D, RC, Trans) (*Price 4d., with copy of "A.W."*)	AW 72
Broadcast 3 (D, RC, Trans)	AW 76
Q-coil 3 (D, RC, Trans)	AW 84
Clarion 3 (D, 2 Trans)	AW 88
Summer-time DX Three (HF, D, Trans.)	AW106
Three-valve Mains receiver (HF, D, Trans)	AW109
British Station (Three HF, D, Trans)	AW122
Optional Two-three (D, 2LF.)	AW124
"Simpler Wireless" Mains Three (D, 2 LF)	AW126
Simplicity Screen-grid Three (HF, D, Trans)	AW132
"Proms" Three (D, 2RC)	AW137
Adaptable Three (D, 2 Trans.)	AW139
New-style Baffle Three (D, RC, Push-pull) (Price 1s. 6d.)	AW143
All-wave Mains Three (HF, D, Trans, Rectifier—Price 1s. 6d.)	AW144
Continental (HF, D, RC)	WM 7
Screened-grid (HF, D, RC)	WM21
Five-guinea 3 (HF, D, Trans)	WM29
Dominions Short-waver (D, 2 Trans)	WM39
Metropolitan (D, 2LF)	WM48
Everyday (D, 2 Trans)	WM52
Music Charmer (D, RC, Trans)	WM60
Britannia (D, RC, Trans)	WM67
Home and Garden 3 (D, 2RC)	WM78
Pole-to-Pole Shortwaver (D, RC, Trans)	WM89
Glee-singer Three (D, 2RC)	WM92
Aladdin Three (HF, D, LF)	WM95
Inceptor Three (SG, D, Pentode—1s. 3d., with copy of "Wireless Magazine")	WM105

FOUR-VALVE SETS. 1s. 6d. each, post free.

Tuned-anode 3-4 (HF, D, 2 Trans)	AW 49
Near and Far Three-four (HF, D, RC, Trans)	AW113
"Pick-up" Three-four (D, 2 Dual Imp.)	AW118
Explorer Four (HF, D, RC, Trans)	AW120
Summertime Searcher (2HF, D, Trans)	AW128
Overseas Shortwaver (HF, D, 2 Trans)	AW133
Simplicity (HF, D, 2 Trans)	WM49
Station-finder (HF, D, 2RC)	WM68
Gramo-Radio 4 (D, RC, 2 Trans Push-pulled)	WM70
Q-coil 4 (HF, D, Trans, RC)	WM71
Screened-grid 4 (HF, D, 2RC)	WM77
Frame Aerial 4 (HF, D, 2RC)	WM85
All-from-the-Mains Four (HF, D, 2LF)	WM86
Five-pounder Four (HF, D, RC, Trans.)	WM91
Symphonic Four (HF, D, 2LF)	WM98

FIVE-VALVE SETS. 1s. 6d. each, post free.

Exhibition 5 (2HF, D, RC Trans)	WM33
1928 Five (2HF, D, 2 Trans)	WM46
All-the-world 5 (2HF, D, 2RC)	WM63
Cataract 5 (HF, D, RC, Push-pull)	WM79
Empire Five (2SG, D, RC, Trans)	WM96

SIX-VALVE SETS. 1s. 6d. each, post free.

Short-wave Super-6 (Super-het, Trans)	AW 67
Adaptor for Short-wave Super-6 (6d.)	AW67A
Nomad (2HF, D, RC, Push-Pull Trans)	WM31
Connoisseur's Six (2HF, D, RC, Push-pull)	WM88

PORTABLE SETS.

Easter 7 (Super-het, RC, Trans)	AW 89	1/6
Companion 5 (2HF, D, RC, Trans)	AW100	1/6
Daventry Loud-speaker Portable (2 HF, D, RC, Trans)	AW107	1/6
Town and Country (HF, D, RC, Trans)	AW111	1/6
House and Garden (screened-grid HF, D, RC, Trans)	AW116	1/6
Hand Portable (D)	AW125	1/-
"Best-yet" Portable (SG, D, 2 Trans)	AW136	1/6
Sunshine 5 (2HF, D, 2 Trans)	WM74	1/6
Crummy 4 (with modification for L.S. & H.T.)	WM80A	1/6
Pilgrim Portable (D. Trans)	WM94	1/-
Super Crummy Four (2HF, D, Pentode)	WM104	1/6

AMPLIFIERS. 1s. each, post free.

Screened-grid HF Unit	AW 73
One-valve LF Unit	AW 79
Add-on HF Unit	AW 82
Super-power Push-pull (2LF)	AW 86
Hook-on Short-waver (Amplifier)	AW104
Add-on Distance-getter (HF)	AW117
Add-on Three (D, RC, Trans)	AW121
Screened HF One	AW129
Screen-grid HF Amplifier	AW138
Range Extender (HF Unit)	WM38
True-tone Amplifier (3 valves) (Trans, RC, Parallel Power)	WM47
Gramo-radio Amplifier (2 v.) (Trans, Parallel Power)	WM72

MISCELLANEOUS. 1s. each, post free.

Rectifier for "Simpler Wireless" Sets	AW 62
H.T. from A.C. Mains	AW 73
"AW" Moving-coil Loud-speaker	AW 97
H.T. Eliminator for A.C. (200 v. output)	AW102
Moving-coil Output Unit	AW115
L.T. and H.T. Mains Unit (DC)	AW123
Anti-motorboating Unit	AW130
Knife-edge Wavetrap (6d.)	AW131
All-metal Eliminator for H.T.	AW135
Duplex Diaphragm Loud-speaker	AW142
A.C. Battery Eliminator	WM41
Cone Loud-speaker	WM55
Moving-coil Loud-speaker	WM58
D.C. Battery Eliminator	WM59
Wavetrap	WM64
Universal Short-wave Adaptor	WM82
Linen-diaphragm Loud-speaker	WM90
Valveless A.C. Power Unit (L.T.)	WM100
Valveless A.C. Power Unit (H.T.)	WM101

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Send a Postal Order (stamps over sixpence in value unacceptable) to Blueprint Service, Amateur Wireless, 58-61 Fetter Lane, London, E.C.4.

SOME NOTABLE EXHIBITS AT THE SHOW (*Continued from page* 436)

boating even when feeding a receiver incorporating the very best coupling arrangements.

Four H.T. tappings are provided so that receivers using screen-grid valves in the H.F. stages can be satisfactorily operated. A novel feature of the H.T. tappings is the provision of clip-in resistances enabling anyone to vary the H.T. supplies to the various H.T. terminals. The units are made with a special interlocking device so that if the cover is removed the inside becomes dead.

The second H.T. supply unit is built on similar principles, and with its valve rectifier provides a D.C. output of 220 volts 60 milliamps. This type will be cheaper than the other.

Epoch Self centred Moving-coil Loud-speaker

The Six-Sixty Pentodes

At Stand 42a, which is full of surprises, the well-known range of Six-Sixty valves on show includes the new Six-Sixty pentodes.

These five-electrode super-power valves are made in two types, SS230PP and SS415PP, for 2- and 4-volt accumulators respectively. Here are the characteristics of each :

	SS230PP	*SS415PP*
Filament voltage	2 volts	4 volts
Filament current	.3 amp.	.15 amp.
Anode voltage ...	150 volts	150 volts
Mutual conductance ...	1.25 Ma/volt	2.2 Ma/volt
Anode Impedance	64,000 ohms	27,000 ohms
Amplification Factor ...	80	60

These valves resemble the ordinary three-electrode type in outward appearance, with the addition of a grid terminal on the side of the cap, as shown by the illustration. One of the pentodes, with a suitable coupling device, will replace a two-valve amplifier, owing to the enormous amplification factor resulting from the special three-grid construction.

Moving-coil Loud-speakers

A new moving-coil loud-speaker shown by the Epoch Electrical Co. is of interest. The moving coil itself is self-centred, a device which is claimed to give improved results. See Stand 211.

The M.P.A. Wireless, Ltd., at Stands 21 and 22, are showing a dual-inductance-self energising moving-coil loud-speaker. Fitted with an entirely new type of movement, this new moving-coil loud-speaker requires no energising either from the accumulator or mains. A new patent diaphragm is a special feature.

Westinghouse G.B. Unit

Added to the solid metal rectifiers for trickle charging and H.T. elimination is the Westinghouse rectifier for grid bias. This is a small half-wave unit requiring a 45-volt A.C. input, which it will convert into a 40-volt D.C. output. This voltage is sufficient for biasing a super-power valve and can be obtained up to a maximum load of 50 milliamps—a load which will never be imposed under ordinary circumstances. The 45-volt unit can be worked off a 45-volt secondary on the mains transformer and will, with a simple smoothing circuit, comprising two 2-microfarad condensers and a small choke or resistance, provide a lasting substitute for the dry grid-bias battery.

Tudor Accumulators

Tudor accumulators in glass containers, having capacities from 10 to 60 ampere hours, are now provided with a useful "state of charge" indicator which shows the specific gravity of the acid by the different positions of small red and white balls. During discharge the red ball remains floating and the white ball sinks. When fully charged both balls float and when discharged both balls sink.

These accumulators possess such excellent features as wood board separators, non-corrosive terminals and moulded ebonite lids with non-splash vents.

The Igranikit Receiver

A new idea in home construction is introduced by the Igranic Electric Company, who have reduced the process to a matter of fixing nuts to bolts ! There is no wiring to be done; all the connections are mounted on an insulated sub-base, which, when clamped in position underneath the main baseboard carrying the components, automatically connects them together.

The circuit, a "straight" three-valver, consists of one high-frequency valve, a detector and one low-frequency valve. Provision is made for the use of the new pentode power valve. The power supply can be either batteries or A.C. mains.

There are two main tuning controls of the "drum" type for aerial and H.F. tuning. Subsidiary controls for sensitivity and volume are provided.

The outfit of parts contains everything necessary to build the receiver, including the all-metal case, which may be built up from separate sections.

The outfit is supplied complete with a pedestal base and batteries, or a suitable supply unit can be supplied according to requirements. Alternatively, the outfit can be supplied with ordinary flat base, but without pedestal base, to meet the needs of those users who wish to run the set off batteries or supply units already in their possession.

M.P.A. Self-energising Loud-speaker

New Ediswan Valves

Recent additions make the Ediswan range of valves marketed by the Edison Swan Electric Co., Ltd., one of considerable value and interest. 2-, 4-, and 6-volt screen-grid valves are now made, and in the 2-volt range a notable addition is the R.C.210, which, with an impedance of 67,000 ohms, has an amplification factor of 40, as compared with the Ediswan R.C.2 having an impedance of 150,000 ohms and an amplification factor of only 30.

The type HU235 Ediswan rectifying valve has been designed to meet the demands for a rectifier capable of supplying high-tension current to valves of the super-power class. An output of 300 milliamps at 400 volts is obtainable from the valve, which must not be used without some form of barreter or limiting resistance. The types U235 for charging accumulators from A.C. mains, at the rate of 2 amperes, and the U222 for supplying 30 milliamps at 120 volts from A.C. mains are also notable.

Belgium, according to reports received from Brussels, is to possess a high-power transmitter in 1929

The advertisement of Burndept Wireless (1928), Ltd., on page 329 of our September 15 issue inaccurately described the Ethopower H.T. eliminator as an instrument which supplied both H.T. and L.T. current from A.C. mains. Actually, this unit gives H.T. current and grid bias only.

BUILD YOUR ELIMINATORS

THE ALL-METAL WAY

WITH

WESTINGHOUSE

METAL RECTIFIERS

WHICH GIVE FULL WAVE RECTIFICATION WITHOUT VALVES OR ELECTROLYTE

NO EXPENSIVE OR MESSY RENEWALS

FOR H.T. ELIMINATORS

The type **H.T.1** Rectifier Unit gives a D.C. supply of 0·1 amp. at 200-v. with an input of 230-v. A.C.

This unit can also be incorporated in a high-tension battery charger.

Price **84/-**

The H.T.2 type, designed for users of L.S. 5a valves, has an output of 350 volts 0·1 amp, with an input of 400 volts A.C. **Price £8. 8. 0.**

Price **23/6**

FOR L.T. ELIMINATORS

The type **A.3** Rectifier Unit has been designed for use in a 6-volt low-tension battery eliminator, using transformer, chokes, and electrolytic condensers.

Its output is 9 volts 1 amp., and it is sold at a price which enables the low-tension eliminator to become a practical and economical proposition.

ALSO UNITS FOR L.T. BATTERY CHARGERS AND TRICKLE CHARGERS

The Westinghouse Brake & Saxby Signal Co. Ltd., 82 York Road, King's Cross, London, N.1.

ALL BRITISH.

- - ON VIEW AT - -
THE NATIONAL RADIO EXHIBITION, OLYMPIA
1928. Sept. 22nd—29th
STAND 78
CALL AT THE STAND AND GET A COPY OF OUR 24-PAGE BOOKLET "THE ALL-METAL WAY" HOW TO BUILD H.T. & L.T. BATTERY ELIMINATORS.
Or send 1d. stamp with your name and address.

valve creation

MARCONI achievement!

MARCONI DIRECTLY HEATED A.C. MAINS VALVES

THE new series of Marconi Point 8 valves is designed for direct heating off A.C. mains through a suitable transformer, thus dispensing altogether with High and Low tension batteries.

The series embraces, Type H Point 8, for resistance capacity coupling or high frequency.

Type HL Point 8, general purpose.

Type P Point 8, low frequency Power Valve.

All these valves use a moderately high current at a very low voltage, thus avoiding A.C. hum. For greater output than that given by Type P Point 8 a 4-volt Marconi Super Power Valve can be used in the last stage.

Write for full particulars of New Marconi Valves mentioning "Amateur Wireless."

The Newest Refinements in Valve Manufacture are to be found in Marconi Valves.

H POINT 8		HL POINT 8		P POINT 8	
Fil. Volts	0.8	Fil. Volts	0.8	Fil. Volts	0.8
Fil. Amps	0.8	Fil. Amps	0.8	Fil. Amps	0.8
Anode Volts	150	Anode Volts	150	Anode Volts	150
Imp.	55,000	Imp.	17,000	Imp.	6,000
Mag. Factor	40	Mag. Factor	17	Mag. Factor	6
PRICE	**15/-**	PRICE	**15/-**	PRICE	**17/6**

THE MARCONIPHONE COMPANY Ltd.
210-212 TOTTENHAM COURT ROAD, LONDON, W.1

MARCONI VALVES

"THE A.B.C. OF GRAMO-RADIO"

(*Continued from page 441*)

market, and several manufacturers have brought out improved models which replace their former models. There can be no doubt, therefore, that the pick-up is now a scientific instrument and not a mere novelty, and it will be necessary to devise definite methods of testing pick-ups submitted by various manufacturers in order to obtain some idea of their merits. The principal factors concerned are frequency response and sensitivity.

One of the principal features of the electrical gramophone is the relative absence of scratch. When properly arranged an electrically reproduced record is noticeably more free from scratch than is the case with ordinary mechanical reproduction. Scratch is due principally to the needle rubbing on the bottom of the groove in the record. The actual movement which has to be imparted to the needle in order to produce the sound waves is a transverse movement from side to side. It is clearly necessary, however, for the point of the needle to rest somewhere, which it does in the bottom of the groove. The bottom of the track is not dead level, but contains minor variations, and these are communicated to the needle and result in the heterogeneous mixture of noises which constitute scratch. Wear on the record or on the needle both accentuate this defect.

The use of balanced tone arms to carry the electrical pick-up is coming to the fore as a method of reducing the scratch still further. Strictly speaking, an electrical pick-up should not be sensitive at all to vertical movement, but should respond only to horizontal or lateral movement, which is the direction in which the cut is impressed on the record by the recording mechanism. There is always a certain amount of response, however, to vertical movement, but the less this can be made, the less are scratch noises. If the whole tone arm is carried on a pivot and is so counter-weighted that the weight actually on the record is equivalent to a few ounces only (just sufficient, indeed, to prevent the needle from chattering on the record), then the scratch can be considerably minimised, and a number of firms are marketing pick-ups of this type as complete units.

Obviating Scratch

Scratch may be minimised electrically, and in this direction the connection of the customary volume control across the pick-up will be found to have a great effect. If a pick-up is used directly across the grid and filament of the first valve of the amplifier without a shunt resistance of any sort, the scratch will often be found to be very large and will spoil the reproduction altogether. The connection of a resistance across the pick-up often reduces the scratch materially, and if this resistance is made variable, a very pleasant volume control can be obtained (the less the resistance, the smaller being the actual volume of sound obtained), so that two purposes are served by the one control.

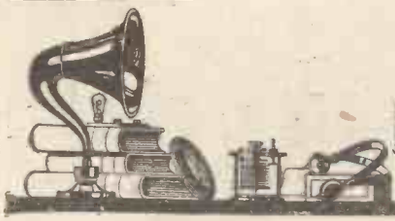
For those who wish to tackle the matter a little more scientifically a scratch filter can be made up. Scratch is usually found to occur in the upper frequencies, above 4,000 to 5,000 cycles per second. There are few loud-speakers which will reproduce very efficiently at these high-frequencies, so that the normal harmonics, which are only quite small in strength, are usually lost, and one can sacrifice frequencies of this order without much loss of quality.

The insertion of a low-pass filter will do much to assist matters therefore. A low-pass filter is illustrated in Fig. 2. It consists essentially of a chain of inductances in series, with by-pass condensers connected at suitable intervals. A simpler form of filter is shown in Fig. 3, and this may be tried by those readers who wish to experiment. A filter such as this will pass all frequencies below a certain critical frequency given by the expression

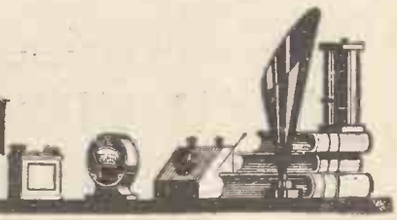
$$f = \frac{225{,}000}{\sqrt{LC}} \text{ cycles/sec}$$

where L = inductance in henries
C = capacity in microfarads

This is known as the cut-off frequency, and above this frequency the filter begins to present a very high impedance, the cut-off being relatively sharp.



OUR INFORMATION BUREAU



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

Crystal Set and Flat Tuning.

Q.—*I have an old manufactured crystal set and get quite good results from both of the Daventry stations and from the London station. My complaint, however, is that the set is rather unselective, in that when London is working I experience difficulty in receiving 5GB clearly. There is always a background of the London transmission, and I would like to remedy this, if possible. Can you advise me in the matter?—S. A. (London).*

A.—The fact that a crystal is used for "detecting" is sufficient to prevent the receiver from being selective. The crystal itself, being connected with the phones across the tuning circuit, causes damping and flat tuning, and the only way in which greater selectivity can be obtained is to use loose-coupled aerial tuning, so that the circuit in which the crystal is connected is isolated from the aerial and earth system. A high degree of selectivity cannot be expected from any crystal set.—C. L.

Screened Wavetraps.

Q.—*I have been in the habit of using a wavetrap to cut out interfering signals, but having read of a screened wavetrap, I am wondering whether such an instrument would be an improvement upon my existing arrangement. What is the real use in screening a wavetrap?—L. R. (Devonport).*

A.—There is little point in using a screened wavetrap unless it is needed to obviate interference due to "shock-effect" reception from some powerful nearby station. When shock-effect reception is experienced, it is usually necessary to screen the whole receiver, so that a screened wavetrap holds no advantages over the ordinary unscreened type unless the receiver itself is also screened. If you reside within a mile or so of your local station and you wish to get other stations farther afield, then, provided your receiving set is screened, a screened wavetrap will be useful.—A. D.

When Asking Technical Queries

PLEASE write briefly and to the point

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

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

Super-power Valves.

Q.—*Ordinarily I use a power valve in the last stage of my set with about 120 volts H.T. applied to its plate. Recently I was advised to use a super-power valve to get more volume, but I find that on introducing a super-power valve into my set the volume is less and distortion is experienced. Can you explain why this should be?—D. T. (Hereford).*

A.—If you are using a super-power valve, you must apply the required amount of H.T. voltage. You do not say whether you have done this, nor do you say whether you are using ordinary capacity H.T. batteries or those of the super-power type. The latter are necessary in any case. The H.T. voltage should at least be 180 volts, and preferably more. If you will attend to these points and also apply suitable grid bias, we feel sure you will overcome your difficulties.—L. A.

LETTERS TO THE EDITOR

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

Crystal Reception

SIR,—I have read with no little interest THERMION's remarks, in the September 8 issue, relative to 5XX and 5GB, headed "A Better Course?" and note he says that 5GB is not receivable on a crystal set 100 miles east. It may interest you to know that only a fortnight ago, when in Skegness, I received 5GB at considerable strength on a crystal set, without any amplification whatever; in fact, it was a thing that surprised me that it came in stronger even than 5XX. I find exactly as you say, that 5XX in Bradford and district is 50 per cent. stronger than 5GB. My aerial was a Mar's aerial, only 7 ft. or 8 ft. high, and for earth I used a wire fencing as a counterpoise.

I regularly receive Langenberg on this same crystal set, on the outskirts of Bradford, almost every night.

E. T. (Bradford).

The Critic's Critic

SIR,—I had been for some time contemplating writing you re Mr. Sydney A. Moseley's criticisms, and some of your critic's remarks have further prompted me.

The criticisms are, I must say, usually fair and fully justified, and I am in complete agreement with Mr. Moseley regarding "Charlot's Hour." If there is any more utter drivel about I have yet to hear it.

Mr. Moseley apparently thinks that "Cherry Ripe" is over-ripe. Personally, I found it rotten years ago. Another song which should be barred from all programmes is "Drink to Me Only." We have had too long a draught of this.

There is one item I cannot understand Mr. S. A. M. being so desirous of hearing; and that is the "Roosters" turn. Admitted they used to go down well "over there"; but we were not critical then.

—X. D. R. (Barnet).

Loud-speaker Reproduction

SIR,—With reference to W. J. F.'s letter in "A.W" dated September 1 regarding loud-speaker reproduction, I think that he cannot have heard a good cone speaker properly operated; that is, with a "super" valve in the last stage, with a 150-volt H.T. and a 22-volt grid swing.

Horn speakers will not reproduce notes below middle C in their true value; cone speakers reproduce notes much lower than this, besides giving a better tone.

Perhaps W. J. F. does not realise that the lower tones are more important than the high tones in music. In the first twenty-four bars of the overture to *Tannhäuser* only fifteen notes are above middle C. How about the horn speaker here?

(*Continued on page* 476)

Letters to the Editor

(*Continued from page* 474)

Music played without the majority of its bass score sounds very ordinary. The B.B.C. transmit frequencies of 80 upwards, and so, if all listeners were the same as W. J. F., the double bass and 'cello players, kettle drummer, etc., might as well cease their playing, as their efforts would not be heard.

I am not praising the cone, but stating facts. Personally, I use a moving-coil speaker, but my advice to the person who desires good, almost natural, results is: "Use a good cone speaker with a good receiver." If he requires practically perfect results he should use a moving-coil speaker with a properly designed amplifier, using not less than 200 volts H.T. with push-pull valves.

Wishing "A.W." every success.

—W. E. S. (Birmingham).

The "Favourite Three"

SIR,—Having made the "Britain's Favourite Three" from "A.W." Blueprint No. 72, which answered to every requirement, I have since tried a one-drum coil in place of the two plug-in coils, which, in my opinion, seems much better and cheaper. Continental stations can be received whilst London is operating.

—H. (South Croydon).

KNX (Hollywood, California) claims it has been on the air with regular scheduled programmes more hours per day than any other station in America.

Letts Amateur Wireless Notebook Diary.—The 1929 edition of this handy pocket reference book and diary is an entirely new compilation which no wireless enthusiast can afford to be without. All those little facts which the amateur must have available are presented, together with a fund of general information, including a glossary of terms. Two editions are on sale, one in plain cloth at 1s. 6d. and the other with a loop back at 2s. 6d. Either may be obtained from these offices or from any bookseller.

"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.

BROADCAST TELEPHONY

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

Metres	Kilo-cycles	Station and Call Sign	Power Kw.
GREAT BRITAIN			
24	12,500	Chelmsford (5SW)	20.0
252.1	1,190	*Bradford (2LS)	0.2
273	1,099	*Sheffield (6FL)	0.2
275.4	1,089	*Nottingham (5NG)	0.2
277.8	1,080	*Leeds (2LS)	0.2
288.2	1,041	*Edinburgh (2EH)	0.2
294.1	1,020	*Stoke-on-Trent (5ST)	0.2
294.1	1,020	*Swansea (5SX)	0.2
291.4	1,020	*Dundee (2DE)	0.2
294.1	1,020	*Hull (6KH)	0.2
297	1,010	*Liverpool (6LV)	0.2
306.1	980	Belfast (2BE)	1.5
312.5	960	Newcastle (5NO)	1.5
326.1	920	*Bournemouth (6BM)	1.5
353	850	Cardiff (5WA)	1.5
361.4	830	London (2LO)	3.0
384.6	780	Manchester (2ZY)	1.0
400	750	*Plymouth (5PY)	0.2
405.4	740	Glasgow (5SC)	1.2
491.8	610	Daventry EX (5GB)	24.0
500	600	Aberdeen (2BD)	1.5
1,604.8	187	**Daventry (5XX)	25.0
*Relay stations.		**Relays 2LO.	
AUSTRIA			
253.8	1,182	Linz	0.5
272.7	1,100	Klagenfurt	1.5
277.8	1,080	Salzburg (under const.)	0.5
294	1,020	Innsbruck	0.5
356.7	841	Graz	0.5
517.2	580	Vienna	15.0
576.9	520	Vienna	0.75
BELGIUM			
220	1,360	Chatelineau	0.25
230	1,304	Schaerbeek	0.5
265	1,130	Louvain (under construction)	7.0
275	1,090	Ghent	0.5
508.5	590	Brussels	1.5
CZECHO-SLOVAKIA			
263.2	1,140	Kosice	2.4
300	1,000	Bratislava	0.5
349.2	859	Prague (Praha)	5.0
441.1	680	Brunn (Brno)	2.4
DENMARK			
337.4	889	Copenhagen (Kjobenhavn)	1.5
972	308	Soro	2.5
1,153.8	260	Kalundborg	7.0
ESTHONIA			
408.5	735	Reval (Talljnn)	2.2
FINLAND			
375.4	789	Helsingfors (Helsinki)	1.2
1,522.8	197	Lahti	2.5
FRANCE			
40.2	7,463	Lyon (PTT)	10.0
45	6,666	Agen	0.25
61.5	4,878	Radio LL (Paris)	1.0
158	1,899	Beziers	1.0
176	1,700	Tourcoing	0.3
210	1,428	Chambery	0.5
228.4	1,313	Biarritz	0.25
230	1,304	Ste Etienne	0.25
238.1	1,260	Bordeaux (Radio Sud-Ouest)	2.5
239.5	1,253	Nimes	1.0
244	1,229	Juan-les-Pins	0.7
245.7	1,221	Toulouse (PTT)	2.0
253	1,185	Montpellier	0.5
254.2	1,180	Rennes	0.5
267.3	1,122	Lille (PTT)	0.7
268	1,118	Strasbourg	0.5
273	1,098	Limoges (PTT)	0.5
286	1,048	Bordeaux	0.5
291	1,030	Radio Lyon	1.5
299.4	1,002	Vitus (Paris)	2.0
299.7	1,001	Agen	0.5
317.4	945	Marseilles	0.5
310.9	880	Le Petit Parisien, Paris	0.5
353	850	Algiers (PTT)	2.0
370	811	Radio LL, Paris	1.0
389.6	770	Toulouse (Radio)	5.0
416	721	Grenoble (PTT)	1.5
416	721	Rabat (Radio Maroc)	2.0
430	698	Lille (Radio Flandres)	0.25
445.7	673	Paris (Ecole Sup., PTT)	0.7
476.9	629	Lyons (PTT)	1.0
1,765	170	Radio Paris	8.0
1,850	162	Radio Carthage (Tunis)	2
2,650	113	Eiffel Tower (FL)	8.0
GERMANY			
1,484	20.210	Nauen (AGA1)	20.0
37.65	7,968		
41.45	—	Doeberitz (AFK)	5.0
67.65	4,434		
51	5,882	Bergedorf (AFL)	3.0
236.2	1,270	Stettin	0.75
242	1,239	Nurnberg	3.0
250	1,200	Muenster	1.5
251.8	1,191	Cassel	0.7
254.2	1,180	Kiel	0.7
271.7	1,104	Danzig	0.75
272.7	1,100	Bremen	0.75
274.9	1,091	Dresden	0.75
283	1,060	Cologne	4.0
279.4	1,073	Kaiserslautern	1.5
297	1,010	Hanover	0.7
303.6	988	Koenigsberg	4.0
322.2	931	Breslau	4.0
329.7	910	Gleiwitz	10.0
366.3	819	Leipzig	4.0
379.7	790	Stuttgart	4.0
396	757	Hamburg	4.0
400	750	Aachen	0.75
429	699	Frankfurt-Main	4.0
471.6	636	Langenberg	25.0
483.9	620	Berlin	4.0
536.6	559	Munich	4.0
566	530	Augsburg	0.5
574	522	Freiburg	0.75
1,250	240	Zeesen	25.0
1,829	164	Norddeich	10.0
2,525	119	Berlin (News)	8.0
2,900	103	,, ,,	8.0
4,000	70	,, ,,	8.0
HOLLAND			
18.4	—	Kootwijk (PCLL) (Wed. 13.40 B.S.T.)	30.0
31.4	—	Hilversum (PCJJ)	25.0
340.9	880	Huizen (until 5.40 p.m.)	5.0
1,071	280	Hilversum (ANRO)	5.0
1,875	160	Scheveningen (5.45 to 6.0 p.m.)	7.0
1,875	160	Hulzen (after 6.40 p.m. and on Sundays	5.0
1,950	154	Scheveningen-haven	5.0
HUNGARY			
555.5	540	Budapest	15.0
ICELAND			
333.3	900	Reykjavik	1.0
IRISH FREE STATE			
319.1	940	Dublin (2RN)	1.5
401	748	Cork (5CK)	1.5
ITALY			
104	2,885	Milan	0.4
315.8	946	Turin (testing)	0.5
333.4	900	Naples (Napoli)	1.5
400	750	Bolzano	0.2
449	668	Rome (Roma)	3.0
547.4	548	Milan	7.0
JUGO-SLAVIA			
309.5	965	Zagreb (Agram)	1.25
460	652	Belgrade	.25
570	525	Laibach (testing)	5.0
LATVIA			
526.3	570	Riga	2.0
LITHUANIA			
2,000	150	Kovno	15.0
LUXEMBURG			
217.4	1,380	Luxemburg	0.25
NORWAY			
370.4	810	Bergen	1.0
400	750	Aalesund	1.0
412	728	Notodden	0.7
435.4	689	Fredriksstad	1.0
448	670	Rjukan	1.0
461.5	650	Oslo	1.5
500	600	Porsgrund	1.0
566	350	Hamar	0.7
2.041	142	Bergen	5.0
POLAND			
270.3	1,110	Lemberg (under construction)	10.0
343	874	Posen (Poznan)	1.5
422	711	Kattowitz	10.0
426.7	703	Wilno	1.5
567	529	Cracow	1.5
1,111	270	Warsaw	10.0
PORTUGAL			
259	1,200	Oporto	0.5
RUSSIA			
1,000	300	Leningrad	20.0
1,150	209	Moscow (Moskva)	30.0
1,700	176	Kharkov	15.0
SPAIN			
272.7	1,090	Oviedo (EAJ19)	0.5
277	1,083	Barcelona (EAJ13)	2.0
277.8	1,080	Cartagena	1.0
324.3	925	Almeria (EAJ18)	1.0
345	870	Barcelona(EAJ1)	3.5
375	800	Madrid (EAJ7)	2.0
400	750	Cadiz (EAJ3)	0.5
400	750	San Sebastian (EAJ8)	0.5
402.6	745	Salamanca (EAJ22)	0.55
422	711	Bilbao (EAJ9)	1.0
434.8	690	Seville (EAJ5)	1.0
SWEDEN			
260.9	1,150	Malmo	1.0
278.8	1,076	Trollhattan	0.4
316.7	947	Falun	0.5
416.7	720	Goteborg	1.0
453.1	662	Stockholm	1.5
545.6	550	Sundsvall	1.0
720	416	Ostersund	2.0
1,190	252	Boden	2.0
1,380	217	Motala	30.0
SWITZERLAND			
410.5	731	Berne	1.5
500	600	Zurich (testing)	0.4
588	510	Zurich	0.6
680	441	Lausanne	0.6
760	395	Geneva	0.5
1,034	290	Basle	0.25
TURKEY			
1,180	254	Stamboul	5.0
1,818	165	Angora	7.0

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Oct. 2 Nonsense programme.
,, 3 Vaudeville programme.
,, 4 Leeds Festival Concert, S.B. from Leeds.
,, 5 *Chloe*, a musical comedy by Rodney Bennett and Gerrard Williams.
,, 6 Military band concert.

DAVENTRY (5GB)

Oct. 2 French composers' hour.
,, 3 Prom. Concert.
,, 6 *Way Down South*, a selection of negro spirituals and songs.

CARDIFF

Sept. 30 Silver band programme.
Oct. 1 "Women and the Arts."

MANCHESTER

Oct. 1 *Leaves from Ossian*. Music by Liza Lehmann.
,, 6 Gilbert and Sullivan programme.

NEWCASTLE

Oct. 3 *Les Cloches de Corneville*, a comic opera.
,, 5 "My Programme," by Arthur Lambert.

GLASGOW

Oct. 5 *Gala*, a programme by Tyrone Guthrie.

In Turner and Co.'s advertisements for Sept. 15 and 22, the address should read 54 Station Road, N.11; and not N.W.11.

2XAD (Schenectady) is now broadcasting a special programme every Monday and Thursday from 18.00 to 20.00 G.M.T., for the benefit of short-wave listeners in this country. The wavelength used is 21.96 metres.

RAYMOND

L.L. Variable, .0003 and .0005, with 4 in. dial, 6/11 each.

Used in Music Charmer, Five-Pounder-Four and many other well-known sets.

British Made S.M. Dials, 3 apertures, made under Igranic Patent, 2/6.

Panel Brackets, pair 1/-. Copper Screens, all sizes cut. Aluminium ditto.

BLUE SPOT UNITS

66K . . 25/-

66A . . 21/-

Many other makes at moderate prices.

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for Quotations over 20/-,

Please write plainly, state actual requirements, make out list of parts. By doing this you will help us to give you an

IMMEDIATE KEEN QUOTATION

LISSEN'S LATEST SUPER L.F. 19/-

Wire Wound Resistances from 20,000 ohms, 4/6; up to 250,000 ohms, 7/6, including holder. Variable Condensers, .0005, 6/6; .0003, 6/-.

AUTHORISED DEALER for BRANDES

L.F. Transformers, 12/-; 5-1, 12/6.

.0005 Friction, 12/6; .0003, 12/-.

MATCHED HEADPHONES 4000 ohms, 8/- pr.

Table Talker	30/-
Brandola	50/-
Ellipticon	77/6

BRANDES PRODUCTS OVER £5, OBTAINABLE HIRE PURCHASE

FORMO NEWEST LINES

De Luxe Log Condenser, .0005, .00035, .00025, .00015 at 6/- each.

A.M. Valve Holder, 1/3.

2-Stage L.F. Unit, 30/-.

Short-wave Outfit, 10/6

2-Range Tuner, 10/6; Base, 2/-.

DARIO VALVES

(RADIO MICRO)

Super-Power, 2 or 4 v. 7/6

GP.05, 2 or 4 v. ... 5/6

R.C.C., 2 or 4 v. ... 5/6

Post 3d. each.

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Issued September, 1928

KIT OF PARTS and CABINET with 3 SPECIFIED VALVES

£7 : 15 : 0

Long Wave Coils extra

We stock Igranic, Climax, Ever-Ready, Hellesen, Siemens, Formo, Ferranti, Wearite, Ormond, J.B., Benjamin, Lotus, Mullard, Dubilier, Lissen, Lewcos, Utility, Magnum, Peto-Scott, Peerless, Burndept, Pye, Marconi, McMichael, Cosmos, Carborundum. R.I. & Varley, Gambrell, Brown's, Sterling, Amplions—in fact, everything it is possible to stock.

ORMOND

No. 3 CONDENSERS. .00025, 5/6. .00035, 5/9. .0005, 6/-. (With 4-in. Dial). Friction Geared, .0005, 15/-. .0003, 14/6. .00025, 13/6. Straight Line Frequency Friction Geared, .0005, 20/-. .00035, 19/6. S.L.F. .0005, 12/-. .00035, 11/-. Log .0005, 13/-. .00035, 12/6. .00025, 12/-. S.M. Dial, 5/-.

All Components Stocked.

J.B. CONDENSERS

T.T. Friction Ver.

.0005, 16/6; .00035, 16/-; .00015, 15/9.

S.L.F. OR LOG.

.0005, 11/6; .00035, 10/6; .00025, 10/-; .00015, 10/-.

Neutralising, ... 3/6.

J.B. New Lines as soon as ready.

LISSEN

Valve Holders, 1/-. Fixed Con., 1/-, 1.6. Leaks, 1/-. Switches, 1/6, 2/6. Latest 2-way Cam Vernier, 4/6. Rheostats, 2/6. B.B., 1/6. Lissenola, 13/6. L.F. Transformers, 8/6. Coils 60X, 6/4; 250X, 9/9. 60-v. H.T., 7/11; 100-v., 12/11; Super 60-v., 13/6. grid Bias, 1/6; 4-5, 5d.

ALWAYS IN STOCK

LEWCOS H.F. CHOKE 9/-

We offer the many new lines subject to makers' delivery, which we feel sure will be almost immediately, but will advise you at once if unobtainable.

EBONITE PANELS GRADE A. MATT OR POLISHED

3/16, ½d. sq. in.; ¼ in., at ¾d.

This is absolutely best quality

LOUD SPEAKERS

Ediswan One-Der...	50/-
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Phillips Seven-Corner	50/-
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Do., Mahogany ...	63/-
Ferranti	63/-
Orphean Gem ...	30/-
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Sterling Mellovox ...	50/-
Marconi Moving Coil Assembly, £6 6s.; in Cabinet, 210/- for A.C. Mains, etc.	
B.T.H.	50/-

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STAR

SET

THE LAST WORD IN WIRELESS

This new and wonderful set must appeal to young and old, amateur or experimenter, in fact EVERYBODY!

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ANY ITEM SEPARATELY (OR A KIT OF PARTS).

Every component is available at short notice.

This list is strictly to Mullard specification.

3 Valve Holders. Lotus, at 1/3. 1 Colvern Combined Wave Coil, 17/6. 1 Permacore Transformer, 25/-. 1 Climax "L.F.A." Transformer, 25/-. 1 Climax H.F. Choke, 7/6. 1 Benjamin Battery Switch, 1/3. J.B. .0005 Log, 11/6; .00035, 10/6. Mullard .0003, Leak and Holder, 5/-. Burne-Jones Panel Brackets, 2/6. Mullard .0001 Fixed Condenser. 2/6. 4 Belling-Lee Terminals for 2/-. 1 packet Junit-Links, 1/-. 8 Lissenen Plugs and 2 Spades for 1/8.

Total £5 . 19 . 0

IF YOU SEND US £6 4s. 6d. WE WILL INCLUDE THE FOLLOWING WITH THE KIT OF PARTS.

2 Handsome Slow Motion Dials, 2 Ebonite Strips, 9-volt Grid Bias, Splendid Aluminium Panel, 18 × 7, Baseboard, Twin Flex,

AND we will pay the carriage to any address U.K.

Oak Cabinet for 12/6, American type, hinged lid, carr. 2/-.

ACCESSORIES ON MULLARD LIST:

3 Receiving Valves to specification (Mullard). Exide L.T. (according to voltage). 9-volt Siemens Grid Bias. 108-volt Siemens H.T. Battery. 2 Sovereign S.M. Dials at 3/6. Collinson Aluminium Panel.

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LARGE STOCKS of really nice CABINETS, American type, hinged lid, baseboard, Mahogany Polished.

12x8	10/6	14x8	12/6
18x7	21/-	21x7	22/6

Oak (3 qualities).

12x8 ...	9/11	11/9	13/6
14x7 ...	12/11	13/11	16/6
16x8 ...	12/11	15/6	17/11
18x7 ...	15/-	18/6	21/-
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Carriage and Packing 1/- extra. Extra, Irish Free State & Abroad

CABINETS STOCKED for "Britain's Favourite 3," 16/11; "Everyman 4," 35/-; "Radiano 3," 12/11, and all well-known circuits.

SPECIAL CABINETS FOR COSSOR AND MULLARD. Handsome design, compartment underneath for batteries (fall front), elegant mahogany polished. Many testimonials.

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HELLESEN'S. Prices reduced. Quality unbeatable. 60-v. now 10/6. 99-v. now 18/-. Also 1.5, 4-v., 9-v., 16-v. stocked.

SIEMENS still top of the tree. 60-v., 8/-; 100-v., 14/-; Power, 60-v., 15/6; 16-v., 3/-; 9-v., 2/-.

OLDHAM L.T., 2-v., 45, 9/-; 2-v. 80, 14/-.

EXIDE AND ALL MAKES STOCKED.

EVER READY, 60-v., 7/-; 66-v., 7/6; 90-v., 11/6; Popular, 60-v., 9/6; 108-v., 15/6; Flash Lamp, 6/- doz. Flag 1.5 stocked. Grid Bias, 9-v., 1/3.

We must still include old favourites

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COSSOR MELODY MAKER

Good for years yet!

SPECIAL PRICE £4 : 4 : 0

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2 Ormond .0005, 2 Do. S.M. Dials, 6 T.C.C. Condensers, 2 B.B. Clips, 1 B.B. Rheostat, 3 Dubilier Leaks, 3 Lotus V.H., Ferranti A.F.3, 2 Switches, Cossor Wound Coil, Terminals, Glazite, Grid Bias.

Handsome Oak Cabinet, 12/6 with parts, Baseboard Free. Also Cabinets at 15/11, 18/11, and Mahogany Polished, at 20/-. Carriage 2/-.

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Drilled High-grade 21 x 7 Polished Panel and Strip. Wood Screws. Carriage 1/-

COSSOR VALVES 2, 4, or 6-Volt for above.

L.F., D., R.C., or H.F., 10/6 each. Power, 12/6 each.

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Amplion Vivavox Gramophone Pick-up, with volume control plug, adaptor, and leads, 50/-.

Amplion A.C. 13, cone unit assembly, 50/-.

AMPLION SPEAKERS, ALL MODELS

Bulgin Short-wave Chokes, 8-80 metres, 3/-, post 6d. Bulgin reaction .0001, 5/6; neutralizing, 5/-; grid bias Clips, 6d.; 2-volt Bulbs, 6d. (with holder, 1/-). Wall Jacks, 2/6 and 3/9. H.T. and L.T. Switch, 2/6. Key do, 2/9. Station Logs, 2/-. Safety Mains Plug 3/9. All parts stocked.

Bowyer-Lowe "Elfin" .00015, 8/-. Supplied with pointer, knob, and template.

Climax H.T. Unit. 100 to 240 volts, 10 tappings, 34/-.

Climax Autobat Transformer, 35/-; Heavy Mains Choke, 21/-; Pot Divider, 5/-; Special Choke, H.T., 10/6; H.F. Choke, 8/6.

Colvern Set of four S.W. Coils, 10/130 metres, with base, 35/-.

Colvern Formers, 2/6, 3/-. Bases, 1/6, 2/-. Featherweight Formers, 4/-.

SPIFFT Long, 7/6; Short-wave, 6/6. Mullard Master 3 coils, 4/6 and 5/6.

CONE SPEAKER CABINETS, take 12 in. cone (will take Blue Spot unit), handsome design, all enclosed, 12/11, post 1/6.

Double Reading (0-6, 0-120) Voltmeters, for H.T. and L.T. A very special offer. Post 6d. 5/11

DUBILIER K.C. Geared Condensers, .0005 and .0003 ... ... 12/-

Dubilier Resistances, .25, .5, 1, 2, 3, 4, 5-meg., 2/6 each. Fixed Condensers, 610 type, .0001 up to .0005, each 2/6; .001 up to .006, 3/- each; 620 type, same price. Wire-wound Resistances, at list prices.

Ebonite cut while you wait at ½d. square inch, also ¼ in. at ¾d. Only the best supplied. No cheap rubbish.

Ekko H.T. Units, all voltages.

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Ferranti AF5, 30/-; AF3, 25/-; AF4, 17/6. Output push-pull meters and chokes stocked.

Gambrell Neutrovernia, 5/6. .0001 Midget Bulgin, 5/6; .0001 Ormond Reaction (for P. or B.B.), 4/-.

Geared 2-way Ebonite Coil Stand, long handle, with 4 terminals, B.B. Wonderful value 3/11

HEADPHONES, etc.

Browns, 20/-. B.T.H., 15/-. British Ericsson, 12/6. Sterling, 15/-. All 4,000 ohms. N. & K. Pattern Lightweight. Grand value ... 6/6

Dr. Nesper De-Luxe Headphones, 4,000 ohms 7/11

HYDRA CONDENSERS

Tested on 500 volts D.C. (working voltage 240 d.c.). 1 mfd., 2/6; 2 mfd., 3/6; 4 mfd., 5/3.

Igranic L.F. Choke, Type G, 27/6; Smoothing Choke, 25/-; Indigraph Dial, 7/6; Universal High Resistance 5/6; Pacent Jacks, from 2/-. Ask for List No. J.546.

KEYSTONE (PETO-SCOTT

Midget .0001 Condenser, 5/6; Neutralising, 5/-; Six-pin Base, 2/9; Standard Wave Trap, 15/-.

Lissen Electrical Pick-up. The finest at the price. Without adaptor, 15/-. With adaptor, 16/6.

Lissen New Model Headphones, at an incredible price for the quality, 8/6. Post 3d.

Lotus 2-way Coil Stand, panel mounting, 7/-. For B.B. (Long handle), 8/-.

Lotus Jack Switches, stocked from 2/6. Plugs, 1/6.

Milliammeters, Moving-coil Type, 0-25, 0-50, 17/6 each.

Mullard Permacore L.F. Transformers. Special Winding, 25/-.

Panel Brackets, Aluminium, 1/-, 1/6; Magnum, small, 1/6; Master-S, 2/6.

Pye L.F. Chokes, 20 henries, 20/-; 32 and 110 henries, 12/6.

Peerless Rheostats, 2/6 each.

"Q" Coils (Lewcos), Aerial 15/-; H.F. Transformers, 21/-.

R.C.C. Units, various, Lissen, 4/-; Cosmos, 8/6 (with V.H.), 10/6; Magnum, 6/7; Carborundum, 8/6; Marconi "A," 7/3, and "B," 8/6; Dubilier, 7/-.

Sifam Moving Coil, milliammeter, 0-50, 25/-.

Sifam New Model Pocket Voltmeter, H.R., 4,000 ohms, heavy nickel case, 7/6.

Standard Wave Traps, made to specification of G. Kendall, Esq., 11/9; Magnum, 15/-; Lewcos, 13/6.

Short-wave Coils, set of four ... 6/6

Telsen L.F. Transformers, Radiogrand, 12/6. Telsen Ace, 8/6. Ratios 3 or 5 to 1.

Triotron Valves, 2-volt, power, 6/9; 2, 4/6; .06, 4/9; 4-volt power, 6/3; G.P., 4/3; .06, 4/6. Post 6d. each (20/- worth free).

Valve Holders. All with Terminals. Anti-microphonic. Harlie, 1/-. W.B., 1/6. Lotus, 1/9. Bowyer-Lowe, 2/-. Whiteline, 2/3. Benjamin Standard, 2/6. Lissen, 1/-. Ashley, 1/3. All makes stocked.

"The All-wave Mains 3"

(*Continued from page* 450)

Low-frequency choke (Igranic, type G, Ferranti, R.I. and Varley).

Power transformer, 200-240 volts, 50-100 cycles (Marconiphone, Model C).

Smoothing choke (Regentone, type W1A, Ferranti, R.I. and Varley).

Baseboard - mounting potentiometer, 400 ohms (Lissen, Igranic, Peerless).

Baseboard-mounting variable resistor, 2 ohms (Igranic-Pacent).

Four insulated terminals marked Aerial, Earth, L.S.+, L.S.— (Belling-Lee, Eelex, Igranic).

Two ebonite or bakelite strips, 2½-in. by 1-in. (Radion, Becol, Pertinax, Paxolin).

Two ebonite washers, ½ in. diameter and ½ in. long for terminal strips.

Grid-bias battery clips (Bulgin).

Baseboard, 26 in. by 10 in. (Camco).

Connecting wire (Glazite).

Mains safety-plug fitting (Bulgin).

Yard of single flex (Lewcos).

Four wander plugs, three black, one red (Eelex, Clix).

From the theoretical considerations already given it must not be thought that the practical work is at all difficult. In fact, the construction, as will be detailed in our next issue, merely involves the assembly of a straightforward three-valve receiver and H.T. eliminator on the same baseboard.

(*To be continued next week*)

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