MAKING A SIMPLE BATTERY CHARGER

Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XV. No. 378 Saturday, September 7, 1929

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

Pages 251 and 252 are missing

BROADCASTING the SCHNEIDER CUP RACE

1·50 p.m on Saturday September 7

Plans for a Great Relay

IT is six years since the Schneider Cup Race was last held in England, and no one can say how many years will elapse before this contest—the fastest in the world—will again take place off our shores. It may be taken for granted, then, that everyone who has a set will be sitting by it next Saturday afternoon (September 7), when, weather permitting, the race will take place.

The B.B.C. Commentators

The B.B.C. have been fortunate in securing as commentators two officers of the Royal Air Force, Squadron-Leader Helmore and Flight-Lieut. Ragg, who are experts in all the phases of high-speed flying. Hence they may be relied upon to give us a sound and practical impression of the race. They themselves will have every opportunity to see what happens, since they will be immediately behind the judges and working in conjunction with them.

The starting and finishing line is opposite Ryde Pier, and the commentators will be on the roof of the Pier Pavilion, where they will have the best possible view of the competing machines. The race is over two hundred nautical miles which, in the present instance, are spread over seven laps of approximately 50 kilometres each. Hence each machine will be heard crossing the microphone eight times, providing it has no sort of trouble. Past experience, however, suggests that in all probability listeners will be told from time to time that so and so, of such a country, has retired. The cause of the trouble may or may not be given; in any case, it is hardly likely that complete details will be furnished on that head—there are so many jealously guarded secrets in connection with these machines.

Lest this forecast seems unduly pessimistic, in view of the far greater reliability of present-day aircraft it is as well to remember that only two machines, both British, completed the course in 1927. The truth is that, for one reason or another, it always happens that the delivery of the competing seaplanes is delayed until the last moment; this year, it will be remembered, the first Britisher to be completed took the air exactly a month before the date of the race. This leaves but a very small margin for the elusive troubles which are almost bound to crop up before the machine has been perfected, and a model which may eventually prove a world-beater has been known to fail in the Schneider Cup. For example, the Italian Macchi seaplanes failed in 1927, yet shortly afterwards, when a certain fault had been corrected, Bernardi broke the world's speed record on one of them.

Interpreting the Broadcasts

For safety's sake, each competitor starts by himself, so those listeners who wish to follow the race for themselves will do well to provide themselves with pencil and paper. Each country is allowed a maximum of three machines, but at the moment of writing no one knows how many entrants there will be. The starting interval depends on the number and, as far as one can tell from various reports, there should be six or seven machines, starting at ten-minute intervals. So it by no means follows that the first man home is the winner.

Some extravagant predictions of speed have already been made; it is well to recollect that the four turns per lap will do a great deal towards keeping the speed down, and if the winner averages 330 m.p.h. he will have added 50 m.p.h. to Webster's winning time in 1927. He would then take about six minutes to cover each lap. I mention this point because the chief sound the microphone will pick up will be a screech and a roar as each 'plane passes it, and to follow the race it will be necessary to realise that the second "roar" will be that of the first machine commencing its second lap, if the ten-minute starting interval is adhered to.

Immediately a "noise" has died away the commentators will inform us of the pilot's name, nationality, and time; but the whole thing will be taking place so rapidly that it will help considerably if the listener has a list ready and knows which pilot to expect next. If every machine flies according to expectations there will not be a great deal of overtaking, but they will often be close together as regards the time of passing the microphone.

What will the pilot of each machine be doing? He does not, as is sometimes said, fit his cockpit like a hand in a kid glove. His seat is comfortable, though his quarters are not exactly roomy, and,

Supermarine-Napier S.5. Winner of the International Schneider Trophy in 1927

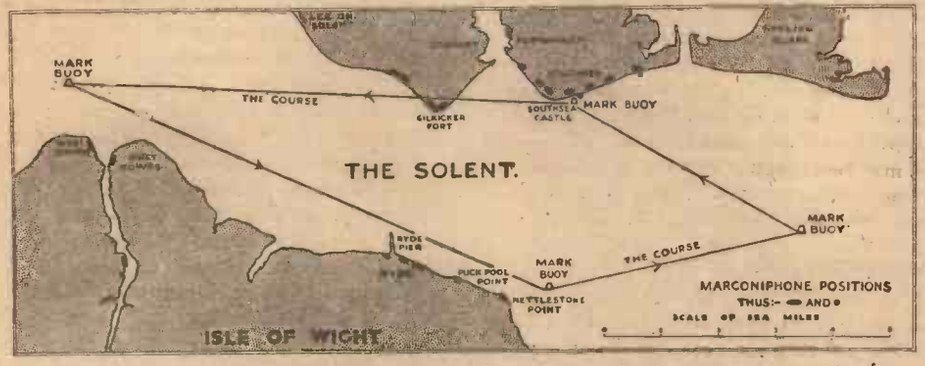
By courtesy of the Daily Mirror

BRITAIN'S SCHNEIDER TROPHY PILOTS

Left to right: Flying-Officer H. R. D. Waghorn, Flying-Officer T. H. Moon, Flight-Lieut. D. D'Arcy Greig, Squad.-Leader Orlebar, Flight-Lieut. G. H. Stainforth and Flying-Officer Atcherley, who will pilot Britain's Schneider Trophy 'planes

for all his incredible speed, he will probably find his machine fairly easy to handle.

The preliminary roar, as he gathers speed and "gets off," indicates one of his most anxious moments; the machine is not yet properly under control. There is always still a dangerous task before him in the landing. His landing speed is likely to be in the neighbourhood of 100 m.p.h., and should he make a mistake at such a speed he might not live to explain what happened. In the high-wing monoplanes which were popular (not among pilots!) a few years ago, this landing was made almost blind, but this year all the British machines have a low wing—that is to say, instead of stretching away on either side of the pilot at almost eye level, and so almost obscuring his view, the wing is much lower, and enables him to see objects which are comparatively close.



Map of the course showing the positions of the Marconiphone loud-speakers from which the running commentary will be heard

the chance of something going wrong during this period, but once he is in the air everything should be plain sailing. With throttle wide open he watches his course, keeps one eye open for any other machine which may be near, and at the same time automatically watches the dials on his dashboard. These show him the temperature of the water cooling his engine, the temperature and pressure of his oil, his air speed, and the rate at which his engine is turning over.

The Pilot's Task

Everything has been rehearsed many times beforehand. He knows exactly what type of turn he will execute on each corner, and the course will be clearly marked out for him. Nevertheless, the strain will be severe, though he does not realise it until afterwards. If anything went wrong with engine, cooling or oil systems, he would not wait to investigate, but come down while there was yet a chance of safety, for at speeds of over 300 m.p.h., with every part of the machine and its engine undergoing terrific stresses, trouble develops with lightning rapidity. Fortunately, the race taking place over sheltered water, there is always a good landing ground beneath the pilot; in the event of a mishap he does not have to pick his ground.

Having completed his seven laps, he has

The winner will be the country which puts up the best time, and listeners will know the result sooner than spectators, as they will be given the official timing within a second or two of the completion of each machine-lap. Spectators, on the other hand, will either have to carry stop watches and attempt their own timing (I do not recommend this course, for the amateur timekeeper is never accurate).

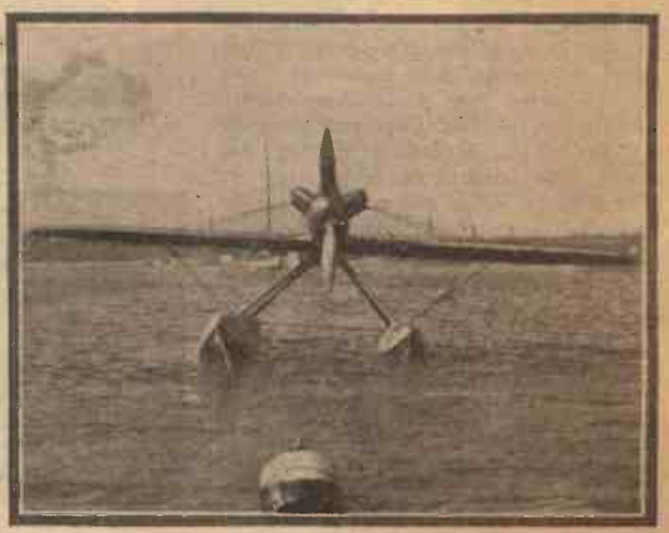
The Broadcast Route

The broadcast will proceed from the Pier Pavilion roof to the Ryde-Portsmouth submarine cable. At Portsmouth there will be an automatic correction of weak frequencies. This will be tested and set the day before, during the usual try-out. From Portsmouth it will take the Brighton land-line, and at Brighton, after a second automatic correction, it will proceed to London for radiation. It is probable that Continental broadcasting stations will be served with the results. Negotiations are said to be proceeding to this end, and perhaps this event will set up a record in the number of countries listening-in to it.

In this connection a peculiar fact strikes one. The speed of soundwaves is approximately 1,100 feet per second, whereas wireless waves travel with practically no loss of time. Consequently, listeners anywhere on earth will be able to hear the machines pass the microphone before the spectators standing a mile or so from the course!

The *Boston Traveler*, in co-operation with the Fox Film Corporation, has started making a movietone of Boston. This historic sound picture of the city will be stored in municipal vaults for future generations after it has been shown.

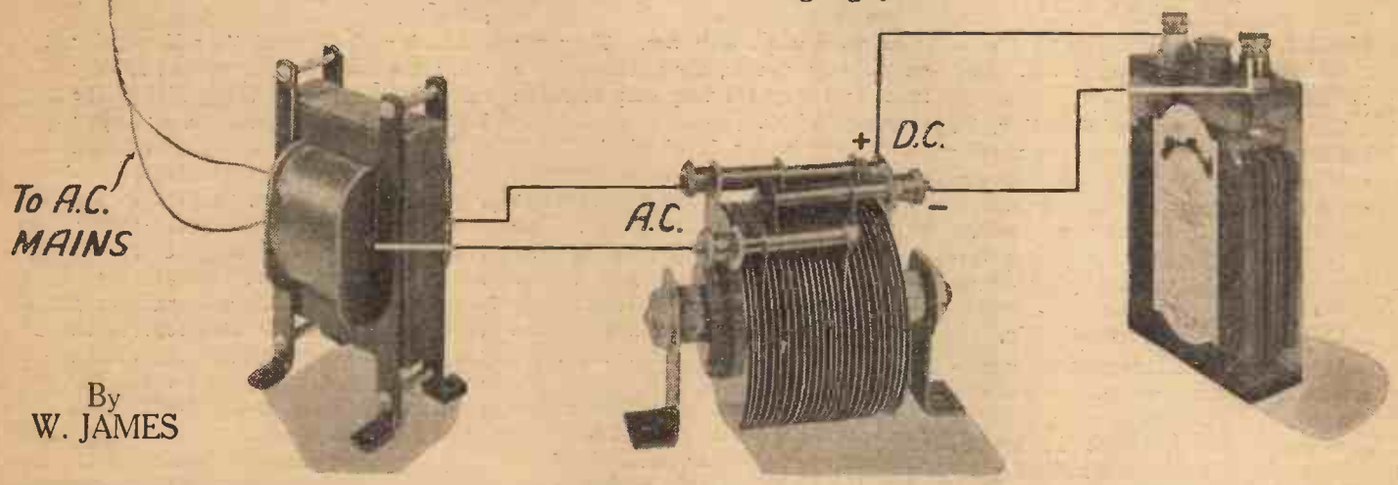
It is reported from Germany that the Italian broadcasting station at Trieste is testing on 248 metres. A London amateur also states that he picked up the call on two successive evenings between 10 and 11 p.m.



Another view of the Napier S.5.

A 1-AMP. CHARGER

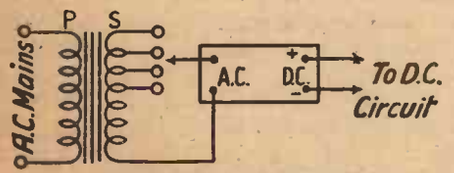
For Accumulator Charging from A.C. Mains



By W. JAMES

THOSE having a small receiver such as one with three valves of the two-volt class are usually satisfied with a trickle charger of the half-ampere type. But those amateurs who use six-volt valves or power valves taking a fairly heavy current, or who run a moving-coil loud-speaker, find that a half-ampere charging unit is not quite able to supply the whole of the current required for charging or other purposes.

Some time ago a relatively inexpensive type of one-ampere rectifying unit was issued by the Westinghouse Company. It may be used in battery-charging apparatus, as shown in the heading, for supplying the filaments of valves through a filter or for



Showing tapped transformer

any other purpose where the current does not exceed 1-ampere and the voltage is suitable.

The unit listed as type A3, is of the low-voltage pattern. It should be supplied with an input of from 12 to 14 volts A.C. when it will give the maximum output of 9 volts 1 ampere. A transformer must, therefore, be used to adapt the voltage of the mains. Thus, if the alternating current mains are of 200 volts, the primary winding of the transformer must be suited to this voltage and the current it will pass, whilst the secondary winding must supply from 12 to 14 volts according to the actual output required.

The Transformer

A metal rectifier, type A3 may be purchased and so may a suitable transformer, but as a number of amateurs would prefer to build their own transformer, I will describe one. An iron core is required. This may be of stalloy and No. 4 stampings will be suitable. Sufficient stampings to give a thickness of 1 inch will be needed, and the cost is about four shillings.

A bobbin or former to slip over the central limb of the core will be needed and a quantity of No. 30 guage enamelled wire for the primary and No. 22 for the secondary. A fairly large number of turns of wire is needed for the primary winding. Thus for 200-volt 50-cycle mains, 1,400 turns are needed; for 220 volts, 1,540 turns; and for 240 volts, 1,680 turns.

Winding

Winding must be carefully carried out and an attempt made to layer wind. Further, a piece of thin paper ought to be laid over every few layers, for insulating purposes and in order to assist in winding uniformly.

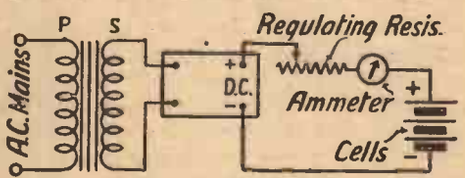
If the secondary winding is given 90 turns, the full output will be obtained, but as much depends upon the load, it is advisable to employ a tapped winding in order that the current may be regulated. Alternatively a 1-ampere adjustable resistance may be included in the load circuit, that is, between a D.C. terminal of the rectifier and the accumulator or other piece of apparatus being supplied with current.

The 90-turn winding should therefore be tapped at the sixtieth, seventieth, and eightieth turns. This secondary winding ought to be carefully insulated from the primary and for this purpose several layers of Empire cloth or tape should be wrapped over the primary winding. At the same time, the coils must be well insulated from the core itself.

It is a surprisingly easy matter to build a small transformer, but care must always be taken with the insulation. It is necessary to clamp the laminations in order to avoid movement which would result in damage to the windings, and also produce noise. A pair of clamps should therefore be fitted to each side of the transformer.

These clamps may have their bottom ends bent out to form feet for fixing, after they have been drilled.

I would suggest the use of an ammeter in the output circuit, when the unit is employed for battery charging, or when it is first being used with other apparatus. An inexpensive instrument is suitable as great accuracy is not needed. Its maximum reading should be over 1 ampere, as it is possible the output may exceed 1 ampere



The current in this case is regulated by a resistance

when the full secondary winding is used. This may be adjusted, however, to suit the load, by altering the tapping position or adjusting the regulating resistance.

Charging Values

A two-volt accumulator may be charged if the resistance has sufficient value to limit the current to 1-ampere. For this purpose, 7-ohms will be needed, but a 10-ohm resistance is recommended and its carrying capacity must be 1-ampere.

The rectifier is not enclosed in a metal case and should, therefore, be protected if it is likely to be damaged. Its terminals are marked. Two of them are marked A.C. and should be joined to the secondary winding of the transformer. The other two terminals are marked D.C.+ and D.C.−.

(*Continued at foot of next page*)

For the Newcomer to Wireless: COILS

THERE seem to be a great many different kinds of coils; basket, honeycomb, lattice, solenoid, binocular, toroidal and so on. Will you please tell me something about them and their virtues or drawbacks.

Their history is rather interesting. In the early days of wireless there was only one kind, the plain solenoid. It was quite common practice in those days to make a set which with one coil, either tapped or provided with a sliding contact, would tune from about 300 to about 3,000 metres.

Coils must have been pretty big.

They were. I still have my first somewhere. It is wound with enamelled wire on a millboard former about 4 inches in diameter and 12 inches in length. Hardly the thing for the modern portable, what?

Since you say that the solenoid was the original coil, I gather that the others were improvements upon it?

The solenoid seemed to be too bulky, so the basket, the lattice and the honeycomb coil were produced with a view to compactness.

What is the basket coil?

It was wound on a former consisting of a small cylindrical centre piece provided with an odd number of spokes. The turns were wound in and out of the spokes, producing a coil which reminded one very much of basket work.

Are these coils good?

In some ways they are. They are exceedingly narrow, they occupy little space and they are very easy to make or cheap to buy.

And now for the drawbacks!

Unless they were stuck together with a heavy dressing of shellac they were apt to come to pieces rather easily. The basket winding reduced the self-capacity of the coil; but the presence of the shellac tended to cancel out this advantage. Then the H.F. resistance of the basket coil was always rather high.

Why is that?

Well, you see, you have to use rather fine wire if the diameter is not to be too great and you want a good deal of wire since the turns near the centre are of small diameter and have therefore a comparatively low inductance value.

What about lattice and honeycomb coils?

These are still quite widely used. They are probably the compactest coils going and they are very fairly efficient. The self capacity is higher than that of the solenoid coil and the resistance is also rather on the high side.

We seem to have come back to-day to the original solenoid.

That is so, at any rate for short and medium-wave reception.

What are the advantages of the solenoid?

If it is well designed the self-capacity when the turns are air spaced is very small indeed and by using wire of the best gauge for the purpose, or better still the Litzendraht cable, we can reduce the high-frequency resistance to a remarkably low figure.

It must, I suppose, have certain drawbacks, for everything in wireless seems to possess these.

Curiously enough there is really only one serious "crab" to the solenoid coil.

It has a comparatively large field, which means that if we do not use screening, interaction is liable to take place between solenoids, however carefully they are placed. On the other hand if we do use screening a good deal of energy is frittered away by setting up eddy currents in the screens.

And what about the so-called fieldless coils?

These have been designed to overcome the drawbacks of the solenoid. Owing to their small field they minimize interaction troubles and do not fritter away energy by setting up eddy currents. Fieldless coils are of the binocular or toroidal types; or they may be made by winding in solenoid fashion, the turns in each half going in opposite directions.

"A 1-AMP. CHARGER"

(*Continued from page 255*)

When charging an accumulator the positive terminal of the battery must be joined either directly or through an adjustable resistance to the positive terminal of the unit. The two negative ends are, of course, joined together.

Protection

A fuse ought to be joined in the circuit. It may take the form of a special fuse joined between one of the terminals of the primary winding and the main, or a flash-lamp bulb of the small-current-capacity type may be used. Alternatively, a fuse could be included between one of the terminals of the secondary winding and the unit. This fuse will, of course, have to be of the heavy-current type, as it must carry at least one ampere.

In order to avoid the possibility of an electric shock, the terminals of the primary should be covered. It is an easy matter to make a small cover for them and to screw it down or better still, to employ safety connectors.

A 1-ampere unit may be used for supplying the current to a moving-coil loud-speaker. As a rule, there will be no need to regulate the output from the unit, provided, of course, the field winding of the speaker is of the six-volt type. A hum may, or may not, be introduced when the supply is from a charger. One must, therefore, try the charger by itself and then, if necessary, join an electrolytic condenser across the loud-speaker field terminals, or alternatively to this, a small six-volt accumulator.

A 1-ampere unit is very useful and I have used one for some time. The output from the type A3 is limited by the manufacturers to 9 volts 1 ampere direct current. but I generally overrun mine, at my own risk, or course, and have had no trouble. Little heat is developed, but it is unwise totally to enclose the unit when its full output is being taken.

FARADAY ELECTRO-MAGNETIC CENTENARY

ARRANGEMENTS have been initiated by the Royal Institution for the celebration of the centenary of Faraday's discovery of electromagnetic induction. Two committees are now at work. The first, consisting of representatives of the Royal Society, the British Association, and other scientific societies, as well as the Royal Institution, is concerned with the purely scientific aspects of Faraday's work in relation to the proposed celebrations; the second committee, which has been called together by the Institution of Electrical Engineers, consists of representatives of the principal organisations of those industries which have risen in the past hundred years upon the scientific foundation of Faraday's discoveries, and is dealing with the industrial aspects of the celebrations.

The significance of the centenary is very widely appreciated and the celebrations are likely to arouse world-wide interest and support. The dates have now been fixed, and the proceedings will commence in London on Monday, September 21, 1931. Further, an intimation has been received from the British Association that their centenary meeting will be held in London during the week commencing September 23, 1931. These two centenaries, with important electrical conferences and other events which are to take place about the same time, will thus conjoin to make the year 1931 a memorable one in this and every country where the genius of Faraday has borne fruit.

On Your Wavelength!

A Valve Comparison

IT struck me the other day what a very interesting example the wireless valve is of the way in which the scientific research worker gradually eliminates waste of energy and gets the greatest possible amount of useful work out of any piece of apparatus. When broadcasting began the valve in general use required four volts on the filament and passed .7 ampere. This gives a total of 2.8 watts for the filament. Now, remember that the power put into the filament is completely useless from a wireless point of view. It serves merely to activate the filament so that it will emit electrons and enable a stream of current to pass between it and the plate. Now, filament current does two things: it produces both heat and light. Heat is useful, since it enables the filament to do its work; light is entirely useless. Science, therefore, set about the business of getting rid of the useless light, and so the dull emitter was born.

A Wonderful Improvement

The 2.8 watts consumed by the filament allowed the bright valve to produce in useful work about 1 milliampere of plate current at 60 volts or .06 watt. That was the total amount of power available in those days for working the loud-speaker. Compare the most generally used type of output valve to-day. This has a 2-volt filament drawing .1 ampere; the power, therefore, is .2 watt, or one-fourteenth of that necessary in the bright valve. But with 150 volts on its plate such a valve may deliver 15 milliamperes of current. This comes to 2.25 watts, or 37½ times as much useful power as was obtainable from the bright valve. It is interesting to note how the total watts, L.T. and H.T., have balanced up in the two types of valve. In the old bright emmiter we have 2.8 plus .06 or 2.86. The 2-volt dull-emitter gives us .2 plus 2.25 or 2.45. There is thus no great difference between the two totals, but in the one the greater amount of the power was useless, whilst in the other by far the biggest part is definitely useful.

The Wireless Wastrel

Good though the results are which it produces, by far the most inefficient part of the wireless receiving set is the loud-speaker. We think it marvellous that from 10 to 20 milliamperes of current fed to it from the last valve can produce such enormous volume and such faithful reproduction of both speech and musical sounds. Actually not more than one-thousandth part of the energy passed to the loud-speaker does useful work in the way of providing sound waves. Ninety-nine thousandths at least of the energy applied to it is frittered away in heating up the wire of the windings in giving rise to eddy currents and in other small ways.

Improvement Wanted

By far the most efficient piece of electrical apparatus known is the transformer. The efficiency figure is arrived at by comparing the output with the input watts. This in a first-rate transformer may be as high as 97 per cent. If we could obtain even a distant approach to such efficiency in the loud-speaker, a tiny receiving set would be sufficient for reproduction at full volume of the broadcast programmes. I don't suppose that anything of the kind will ever be done; certainly it won't with magnetically-operated loud-speakers. In future years someone, of course, may devise an entirely new and far more efficient method for the electrical reproduction of audio-frequencies.

Fortune's Frowns

Our stations do not suffer very much from breakdowns in the ordinary way, but there have been a few lately at odd times. 5GB had a "technical hitch" (a beautiful phrase, isn't it?) the other day, whilst 5XX was even more unfortunate and was off the air for quite a time. And misfortune has not been confined to this country. Those who are accustomed to tune in the excellent transmissions of Barcelona (EAJ13) will have been searching in vain for him of late, for he has had to close down for a period owing to what must be a super-hitch. Luckily, Barcelona has another station, the well-known EAJ1, which has taken over the invalid's work. EAJ1 is coming in very well indeed at the present time. He and Madrid are amongst the most useful stations in summer, since they invariably put on good programmes late in the evening, when reception conditions are at their best. I wonder if it has occurred to readers that the main reason why we hear little of stations in Eastern Europe during the summer is that their time is from one to two hours ahead of ours, and often they have gone to bed before it gets dark enough in this country for good signal strength to be obtainable?

Last-minute Changes

If there is one thing that does annoy me more than any other it is finding, when I have tuned in to hear some special item, that something quite different is taking place. On the whole, the B.B.C. is pretty good in this way, and it does not very often happen that one is disappointed by a last-minute change that has not been announced in the printed programmes. I must say that I was rather put out the other night. Glancing at the evening paper, I saw that a very attractive concert was on. I therefore telephoned to some friends to come and hear it. When I switched on, the strains of jazz music came through, which was not in the least what we wanted to hear. Luckily, Nuremberg was coming in well at the time and providing a very welcome alternative with just the right kind of fare for the occasion. It is not the first time that Nuremberg has got me out of a similar difficulty. He is a marvellous station, being received in most parts of this country with a volume only slightly less than that of the local station, and sometimes he is so strong that one has to bring the volume control into play.

Funny, Isn't It?

Whenever a new thing comes along there immediately arise prophets who foretell that it will be the death of something else. The motor-car, for instance, was to kill the push-bike, but after thirty years of cars the pedal cycle trade is still in a very flourishing condition. Broadcasting was to slay the gramophone; just the opposite has happened, for it has made the gramophone more popular than ever. Wireless showed people just how good the mechanical reproduction of music could be; the gramophone people improved their instruments to keep pace with the loud-speaker, and the dissemination of music by broadcasting has led to the sale of more records than all the advertising would ever have done. Nowadays we hear that the theatre is to be slain by the talking film. The old silent film was to have done it, but didn't somehow, and I have an idea that it will continue to flourish.

About a year ago I heard a prophecy that the battery eliminator and mains drive for receiving sets would kill the dry battery. But the sale of dry batteries continues to show a big increase, and there are no signs yet that their existence is seriously threatened. But the queerest case I know is that of the ordinary candle. It was to have been killed first by the paraffin lamp, then by gas, and lastly by electricity. Do you know that more candles are made and sold to-day than ever before?

A New Accumulator

About two years ago now I told readers that a rather remarkable new accumulator was being developed. Startling results were produced as long ago as that, but it was found exceedingly difficult to duplicate

On Your Wavelength! (continued)

them, for, owing to some factor then unknown, one batch of batteries might give results entirely different from those produced by another, though, so far as was known, the two were identical in their make-up. This difficulty has now been overcome, and the new accumulator has been found very successful for a variety of purposes. It is to be tried out presently on the Irish railways, for it is hoped that it will enable trains to be driven electrically at very small cost. With the huge amount of power available from the Shannon Electric Works, accumulators can be charged very easily and cheaply. Those of the lead-plate type could not be used economically owing to their enormous weight. The new accumulator, however, has weight for weight an efficiency many times greater, and it is quite possible that its coming may revolutionise electric traction. So far as I know, small batteries suitable for wireless purposes have not yet been made—or, at any rate, are not yet on the market. They are sure to come along pretty soon.

A Novel H.T. Unit

One of the most interesting H.T. units that I have seen has just recently come on the market. It is an accumulator battery, but it makes use of cells with nickel and iron plates. These cells have an E.M.F. of only 1.5 volts, but their strong point is that you can charge them or discharge them at a very heavy rate without doing them the slightest harm. The battery in question is made up in 60-volt units, each consisting of forty cells arranged in ten groups of four. At the end of the containing box is a switch which can be moved to either of two positions. Turning it over to the first connects all the groups in series and provides a terminal voltage of 60. When the switch is moved to the other position the groups are in parallel and fully charged their voltage is six.

A Novel System

Charging the unit is done in a very novel way. When the switch is turned to the parallel position it connects up the groups to the six-volt filament accumulator. Thus, if they are below their proper voltage they receive a charge from it, which automatically ceases when the E.M.F. of both batteries rises to 6 volts. The advantage of the system is that only the filament battery ever need visit the charging station, and since very little current from it is required to keep the H.T. accumulator up to the mark, it is more economical to work in this way than to pay for the charging of both sets of batteries. The modern dull-emitter draws so little from the accumulator that the small amount necessary for charging up the H.T. battery is easily spared when the set is out of action.

Adopting Baird's 30-hole Disc

The recent television activities in Germany have brought to light one very interesting fact. This is the adoption by the German Post Office of the Baird 30-hole disc, giving a 30-strip image; it may in one sense be regarded as an initial gesture on the part of this section of the Continent, to introduce commercial television. If we turn to the United States of America we find that little effort towards standardisation has been made. For example, the G.E.C. favour 24 holes, Jenkins employs twice that number, the Radio Corporation has signified its intention of putting machines on the market with 60 holes, while there are several independent experimenters who use a 36-hole disc.

Frequency Separation

Looked at from one aspect, we can say that the more holes there are in a scanning disc employed for televisors, the greater the detail; but, on the other hand, a limitation is set on this detail by the side-bands now allowed for ordinary broadcasting. As readers know, this waveband is 9 kilocycles, and it appears to me to be most extraordinary that, since there must be an optimum value in the number of holes to give the best results, this should prove to be attainable with exactly the number of holes used by Baird in his early experiments conducted in 1926. The Germans are particularly keen on the tele-cinema, as they desire to start with the simplest possible transmitting apparatus and introduce television proper at some future date.

Television at the German Exhibition

I have just garnered some interesting details concerning the German Wireless Exhibition now being held. The German Post Office—or, at least, that section of it which is devoting its energy to the development of television under the very able leadership of Dr. F. Banneitz—is sending out tele-cinema signals by wired wireless on a wavelength of 2,000 metres. Two line wires are laid round the exhibition, and any exhibitor desirous of doing so can tap off from this supply by means of a loosely coupled amplifier.

The Post Office has a very ambitious display, and in opposite corners of the section devoted to television has erected two special telephone booths so that two people can carry on a conversation with one another. The two people in telephonic communication will not only be able to hear each other's voices, however, but will *see* one another in addition. Actually, it is arranged to have a dual transmitter and receiver in each booth, so that when one of the two persons is speaking he will be televised and his features seen by the person spoken to and *vice versa*. This experiment, while having already been demonstrated in America, redounds to the credit of the German Post Office, and is indicative of the enthusiasm with which a government department is taking up this wonderful science. Small wonder we are inclined to draw a contrasting picture of the official apathy at home.

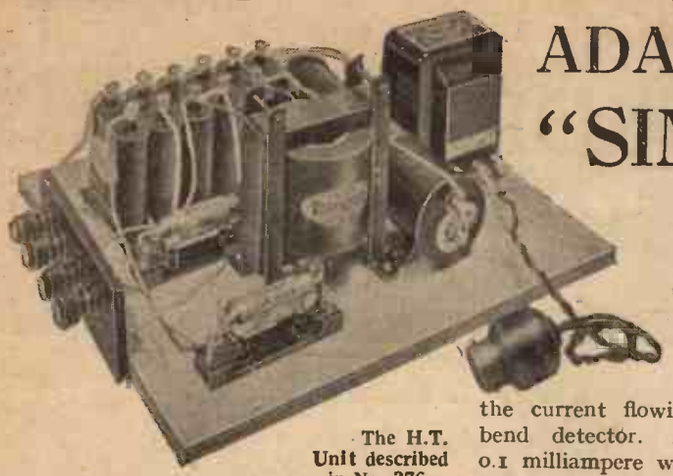
Automatic Synchronising

Reverting to the tele-cinema signals which are being transmitted, in addition a synchronising signal is being sent round the building, and exhibitors are permitted to tap this wire to obtain synchronising current for their machines. The Fernseher A.G., which, as no doubt readers will recall, consists of an amalgamation of interests between four powerful companies, namely, the Baird International Co., the Zeiss Optical Co., the Loewe Radio Co., and the Bosch Magneto Co., are exhibiting two different classes of receiver. One of these makes use of the synchronising signal provided, but the most interesting exhibit is the machine which has automatic synchronising.

Obviously, any machine which requires a separate synchronising signal is not a commercial proposition, and that is why this "star exhibit" of the Fernseher A.G. is sure to create enormous interest, for all the other companies exhibiting, including Telefunken, Mihaly, Karolus, etc., have to resort to the synchronising signal, since they have not so far produced anything which is automatic; that is, a machine which uses the actual television signals to hold the picture in synchronism with the transmitting station.

Output Problems

I wonder what proportion of loud-speakers are given a proper chance of doing their best? What so often happens is this. A loud-speaker is bought and wired slap into the plate circuit of an output valve of a pattern which we will call A. It may or may not match the impedance of this valve. A little later on the owner is persuaded to try a different output valve, this time of make B, whose impedance is quite different. He may also purchase and use at various times C and D valves, again with different impedances. Very often none of them quite suits the loud-speaker, which therefore cannot reproduce as faithfully as it should. Or, if there is a filter circuit or an output transformer, how many people bother to see that it is suitable for use with a particular power valve and loud-speaker? It is most interesting to experiment with output circuits, output valves, and loud-speakers. THERMION.



The H.T. Unit described in No. 376

ADAPTING THE "SIMPLEST" H.T. UNIT

FOR SHIELDED VALVES AND ANODE-BEND DETECTORS

By W. JAMES

IN the high-tension mains unit described the week before last provision is made for three outputs—120 volts for the power stage of a set, 90 volts for the leaky-grid detector, and 60 volts for the high-frequency stage.

The particular set I had in mind when fixing the values of the parts in the mains unit was the "Dual-wave 3" (described in No. 376), and the voltage outputs are suitable for this set. Those having a different receiver may need other output voltages, and it may also be necessary to fit potentiometer arrangements. Everything depends upon the circuit of the receiver.

Thus, for example, when an anode-bend detector is used, the ordinary anode circuit resistance and condenser are not always satisfactory. This is because the normal (no-signal) current passing through the anode circuit is very small and may rise considerably during reception. If, therefore, we used a resistance of, say, 100,000 ohms to reduce the voltage applied to the detector from 120 to 90 volts when no signal was being received, there would probably be distortion. There would also be a little difficulty in setting the anode voltage at its correct value unless an adjustable resistance were fitted.

Better results are to be obtained by using a potentiometer as indicated in Fig. 1. This has two parts, R1 and R2. Obviously, if they have equal resistances the voltage across one will equal that across the other.

If, now, the anode circuit of a valve is connected to H.T.+2 (Fig. 1) more current will flow through R1 than R2, with the result the voltage across R2 will fall. Allowance must be made for this, either by using an adjustable resistance at R1 or by choosing such low values of resistance for R1 and R2 that they pass a current which is much greater than that normally taken by the valve.

Let us suppose, for example, that the two resistances are of 20,000 ohms each and the total H.T. voltage is 120. Then the current flowing is 3 milliamperes, which is considerable in comparison with the current flowing through an anode-bend detector. An anode current of 0.1 milliampere will not, as a matter of fact, alter the voltage of the detector circuit by more than 2 volts.

For these reasons a potentiometer of the fixed or adjustable type is generally employed for an anode-bend detector stage. The potentiometer does, of course,

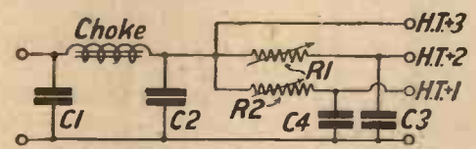


Fig. 2. Adjustable resistances at R1 and R2 for close regulation of voltages

load the rectifier and filter. In the above example the load was 3 milliamperes. This is not very much, however, and most units will stand it.

There is also some little difficulty in providing the correct voltage for the shield of an H.F. valve. It is found that the shield current varies from type to type and that valves of the same make may differ by material amounts. It is therefore not safe to specify a certain value of series resistance, as the actual shield voltage would probably only be correct in a few instances.

The effect of variations in the screen current may be reduced to negligible proportions, however, by employing a potentiometer as for an anode-bend detector. Here again one of the resistances may be of the adjustable pattern in order that the voltage may be accurately set.

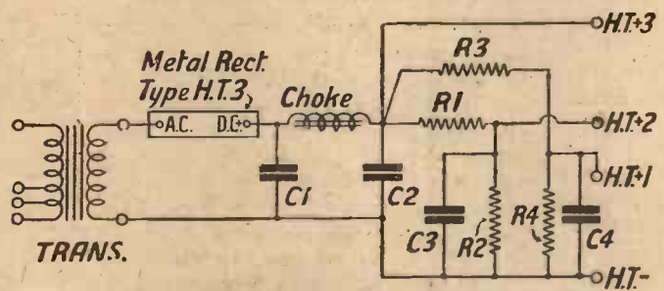


Fig. 1. Showing use of fixed potentiometers

The circuit Fig. 1 shows two fixed potentiometers, but they may be converted to the adjustable pattern by fitting variable resistances at R1 and R3. Good average values for R2 and R4 would then be 20,000 ohms.

Fixed condensers C3 and C4 may be of 2 microfarads each, but should the detector be supplied with a low voltage, when R3 (H.T.+2 is for the detector) is also low, it may be necessary to increase the capacity of condenser C3 from 2 to 4 microfarads. This is because the filtering action of the resistance R1 and condenser C3 is dependent upon their values and, when R1 is small, C3 must be correspondingly greater.

A value of 1 microfarad at C4 is usually satisfactory, but a 2-microfarad condenser is often employed in order to make certain of satisfactory results.

Any number of resistances and condensers may be added to the condenser C2 of the main filter provided, of course, that the rectifier be not overloaded. In every instance the resistance must have such a value that the circuit voltage is correct and a fixed condenser must be used. Its capacity should, as a rule, be of 2 microfarads, but there may be occasions when the capacity should be more—such as 4 microfarads.

The mains unit of Fig. 1 is suitable for a three-valve set having a shielded valve H.F. stage and an anode-bend detector. Terminal H.T.+1 may be taken to the shield of the valve, and H.T.+2 to the anode-bend detector and H.T.+3 to the power valve and also the anode of the shielded valve. When the detector is of the leaky-grid type, resistance R2 is not required.

Resistances R1 and R3 may be of the adjustable pattern, when R2 and R4 may be 20,000 ohms each. Assuming the voltage of H.T.+3 to be 120, as it is when the rectifier specified is employed, and that a screen voltage at H.T.+1 of 60 is required, it will be clear that resistance R3 should be a little smaller than R4, because the screen current passes through R3. Suitable values for R3 and R4 would be 20,000 and 25,000 ohms respectively; but, as a matter of fact, there would be no harm in assuming the voltage across R4 to be proportional to its resistance as compared with R3, since the shield current is relatively small in comparison with the total current passing.

The output voltages cannot be measured with an ordinary voltmeter, although an exception to this rule may be made in the

(*Continued in 3rd col. of next page*)

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

THE Sunday evening programmes, such as they are, become more and more irritating.

Take the recent service from Highbury. It was a good service. But by "special request," a church anthem was included, and the preacher with the American accent then began to talk and talk and talk. Up to one point I thought he was dramatic and appealing. But then he went on and on, encroaching upon other people's time. I thought he was never going to end. If he is one of those exchange speakers I have been recommending, then I will withdraw what I said, or exclaim: Send us people who can say what they have to say in the time allotted to them."

◆ ◆ ◆

Besides keeping millions of listeners waiting, there were people actually at Bournemouth in the Pavilion also held up. I think it was very good of the Bournemouth people to have exercised so much patience.

◆ ◆ ◆

And, speaking generally, why is the old-time error always made by speakers? The effect of a good speech is often reversed by its being five minutes too long. It is like a good joke being spoilt by reiteration and over-emphasis.

◆ ◆ ◆

This overlapping on Sundays by the service impinges on the charity talk, which must affect the appeal because the listener is no longer in a receptive frame of mind. He is, in fact, irritated and is least of all ready for another moral talk.

◆ ◆ ◆

By the way, newcomers to the microphone, like the Countess of Haig (although I am not certain whether she has appeared once before), should be told that it is not necessary to emphasise each word in order to get over the ether. It sounded as if she were dictating a message from a long-distance telephone. Her appeal, however, was simple and dignified, and moved one. I sincerely hope she got as much money as both she and the cause deserved.

◆ ◆ ◆

To return, however, to the matter of delay. Finally, we had to wait until the provinces gave their local news, which probably dealt with Mrs. Smith falling down a flight of stairs and having to use embrocation. (Why London should have to wait until this local gossip is sent over beats me.) So that when the main programme was reached the announcer hastily had to explain that he had no time to tell us what the programme was about. This surely is very bad management.

◆ ◆ ◆

I contend that, since important national speakers and music of world-wide interest is interrupted *on the minute* for dance music, such long-winded preachers *should be similarly switched off*, which is not only logical, but common sense.

◆ ◆ ◆

The talk by Mr. Harry Firman on "Peacocks, Pots, and Pants: Three London Fairs" revealed a good subject, lightly presented, but difficult to follow; the speaker did not possess the best microphone manner.

◆ ◆ ◆

I thought that the much-advertised organ at the Brixton Astoria was too overpowering. This kind of super-organ may be all very well in a huge auditorium, but not for broadcasting.

◆ ◆ ◆

With the "Proms." in full swing it is, oh, so difficult to turn to the ordinary programmes. The "Proms." are for the multitude, and I suppose that the B.B.C. gets fewer complaints regarding them than any other series. Therefore, with the Wagner concert from 2LO and a play, *One Day More*, by Conrad, from 5GB, what was a man to do? In order to make the best of both worlds, I managed to hear a part of Conrad's play during the interval. It sounded quite good.

◆ ◆ ◆

There will probably be two opinions about Wee Georgie Wood's week of broadcasting. I had seen him as well as heard him in one of his episodes, and there is no doubt that his appearance helps to get him over the footlights. Inasmuch as I did see him, it is difficult to give a detached verdict, but I should think that he was a success. His elocution was perfect, although I should imagine he does not deceive many listeners with regard to his actual age.

◆ ◆ ◆

It needs great moral courage to criticise Blackpool—what? All one can say is that the programme put over was quite Blackpoolian. I wondered, however, why Max Miller was described as "the quaint comedian" "in a special act." The only thing quaint about it was the announcement.

An Impression of Sutherland Felce

"ADAPTING THE SIMPLEST H.T. UNIT"

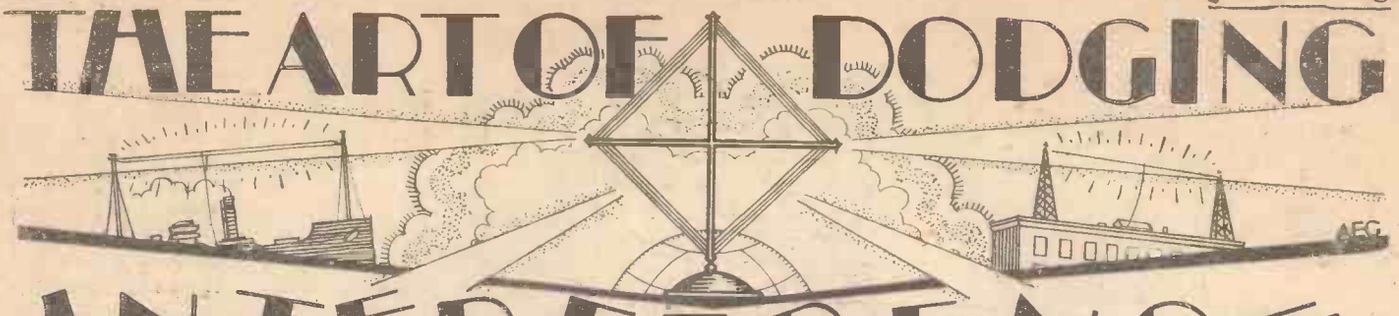
(*Continued from preceding page*)

case of the power tapping, H.T.+3, when great accuracy is not required. It is never safe to take voltmeter readings when a resistance is included in the circuit, however, as at R1 and R2 (Fig. 2). These resistances would drop the voltages by considerable amounts, depending upon the current passing.

An instrument having a resistance of as much as 1,000 ohms per volt would not be suitable for accurate measurements, because, even when the current flowing through the instrument is as little as 0.5 milliampere, the voltage lost in the resistance R3, assuming 20,000 ohms, would be 10 volts.

One could, of course, always measure the current flowing and make an allowance accordingly, but I expect the average reader will be content to measure the voltage of H.T.+3 when the unit is supplying its normal current to the set, using a good instrument for reasonable accuracy. The other voltages may then be estimated.

THE ART OF DODGING INTERFERENCE



Though no means has yet been discovered of entirely eliminating atmospheric interference, there are several ways in which its effect can be minimised as explained by R. W. Hallows in this article

THE first point to bear in mind is that, since the natural wavelength of the average atmospheric is a very long one, their effects upon reception become more and more marked as the wavelength to which the set is tuned is increased. Generally speaking, though, if atmospherics are about, they will be more troublesome on the long waves than on the ordinary broadcast band. Many a time, in fact, I have found that when Radio Paris and Königswusterhausen were badly interfered with, atmospherics were hardly noticeable on wavelengths below 300 metres. There seems, too, to be at times an exceptional form of atmospheric with a comparatively short natural wavelength. When these are occurring interference is usually at its worst near the bottom of the medium waveband. When, therefore, atmospherics are noticed as the set is switched on, do not jump to the conclusion, unless they are particularly violent, that they are going to be a bother on all wavelengths. By trying round you may discover a band upon which comparatively little is heard of them.

Damped Waves

The atmospheric is in one respect very like the spark signal in its nature, for both consist of trains of damped waves. Both tend to make the aerial oscillate at its natural frequency by shock excitation. The higher and the more efficient the aerial, the greater is the effect of such excitation upon it, and the more noticeable is the interference caused. For this reason it is often a good idea when conducting DX work during a period of mild atmospherics to change over from the outdoor wire to an indoor aerial made by slinging a length of No. 18 d.c.c. from small insulators round three sides of a room.

The change over from an outdoor to an indoor collector generally produces very interesting results. Little or nothing is heard of atmospherics, except those of the more violent kind. Signal strength suffers considerably, unless an additional stage of high-frequency amplification is employed; but, strange to say, there is usually very little reduction in the number of stations receivable. The year before last, at the height of summer, I was surprised in the early hours of one morning to find several of the American medium-wave stations coming over quite well. Atmospherics, however, were a nuisance, and I changed to the indoor aerial. This almost eliminated interference.

Another point about atmospherics is that they often come from definite areas of electrical disturbance, which means that distinct directional effects may be noticed. Here is a golden opportunity for the frame, which scores in two ways. Owing to its nature, it is less affected by atmospherics than most other forms of collector, and its directional properties often make it possible to dodge atmospheric interference successfully. Experimenting with a frame in such circumstances is exceedingly interesting. Try first of all for home or Continental stations lying as nearly as possible due north or south. Then work round towards the east and west position of the frame by selecting stations with reference to the map. It will often be found that atmospherics are either not heard at all or are definitely less violent through a certain arc of rotation. Once this quiet spot has been found, one can make full use of all the stations whose transmissions come from directions within it.

Atmospherics and Reaction

In "atmosphericky" weather never make more use of reaction than you can help. The tighter the coupling, the more are the tiny atmospherics amplified, which are nearly always present in warm weather. The use of a great deal of reaction inevitably makes for a noisy background. And make quite sure that any atmospherics that you do hear are the genuine article, and not noises due to defects in the set itself. Dame Nature supplies quite sufficient crackles and fizzes in summer time; we do not require in addition "battery-spherics," due to a run-down H.T. battery, or "dustospherics," caused by dirty vanes in the variable condensers.

Heterodyne and spark interference can also be dodged to a very great extent. Suppose, for example, that you particularly wish to hear a programme from some station which you find completely jammed on tuning it in. Often a main station has one or more relays which may be found quite free from interference.

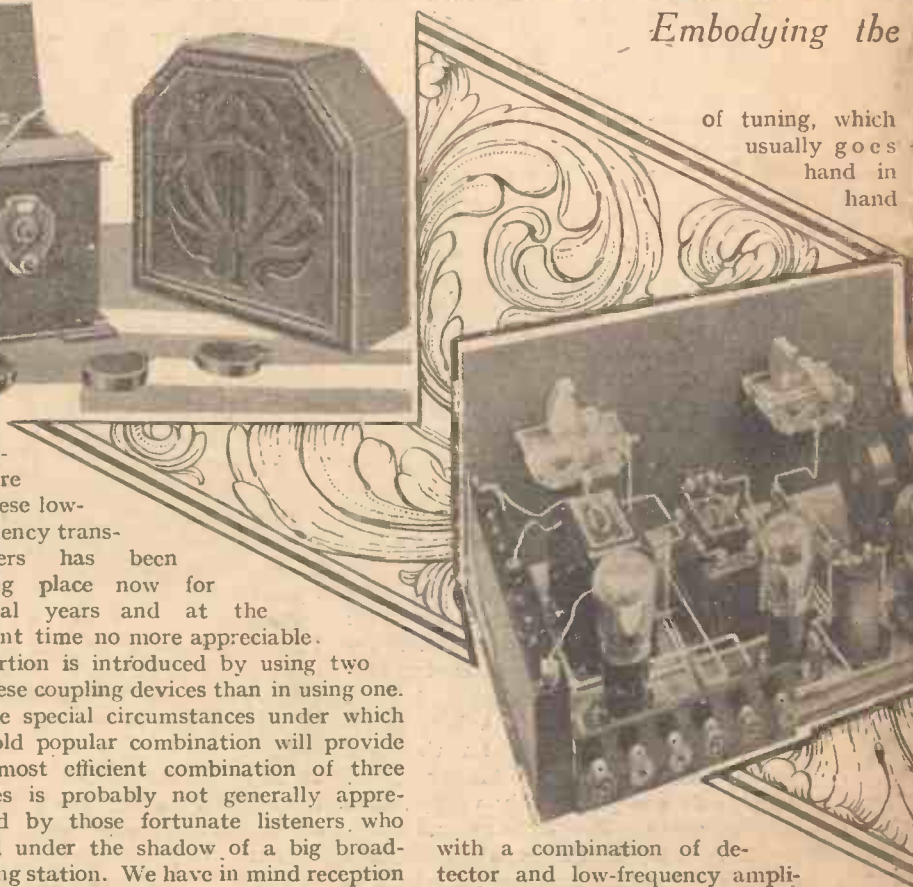
Heterodynes

It is not always realised that a slight heterodyne on a transmission which is coming through pretty strongly may often be dodged by a slight alteration in the tuning. Suppose, for example, that the interference is being caused by a transmission working on a wavelength below that of the desired station, then a very slight increase in the tuning of the receiving set will often get rid of whistle.

The first "sight and sound" studio. It is the television studio of the Baird Co., in their premises in Long Acre

The ALL-WAVE

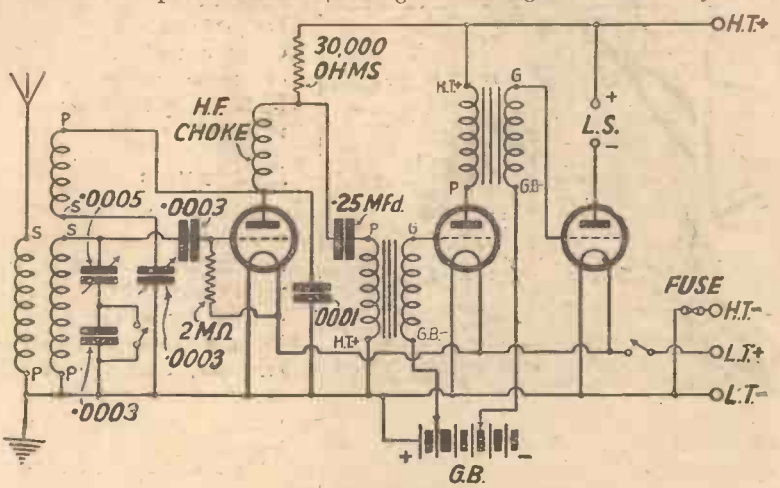
Embodying the



THREE or four years ago, no set was so popular as the combination consisting of a detector and two transformer-coupled low-frequency amplifiers; that its popularity has waned during the last year or so is a fact that can be attributed to a variety of causes. For one thing, high-frequency amplification, which was extremely inefficient at the time when the combination we are discussing was at the height of its popularity, has now reached a high degree of development. In a three-valve combination for general purposes it has become more logical to utilise the sequence of one high-frequency amplifier, a detector and one low-frequency amplifier. Among other reasons for the falling off in the popularity of the detector and two transformer-coupled low-frequency amplifier arrangement was the inherent distortion introduced by the presence of the transformers.

Gradual improvement in the design and manufacture of these low-frequency transformers has been taking place now for several years and at the present time no more appreciable distortion is introduced by using two of these coupling devices than in using one.

The special circumstances under which the old popular combination will provide the most efficient combination of three valves is probably not generally appreciated by those fortunate listeners who dwell under the shadow of a big broadcasting station. We have in mind reception situations where there is no local broadcasting station within a twenty-mile radius and where three or four alternative signals can be tuned in at approximately equal strength, without the necessity for a high degree of selectivity. For listeners in such situations who desire the maximum loud-speaker reproduction, with the minimum of tuning complications, the combination of detector and two transformer-coupled low-frequency amplifying stages fulfils their needs completely.



The Circuit Diagram

Arising out of this simplicity of tuning, which usually goes hand in hand with a combination of detector and low-frequency amplifier, is the possibility of arranging for a wavelength range covering all frequencies from the highest to the lowest in use. It is, in fact, practicable in such an arrangement to include facilities for the reception of the trans-Atlantic short-wave broadcasting as well as medium and long-wave Continental broadcasting.

The Circuit

Before discussing the ways and means of this three-valve set, an examination of the theoretical circuit diagram will enlighten most readers. The first low-frequency amplifier is not arranged in the simple way of three years ago, but is "resistance-fed." Let us explain what this means. As the actual low-frequency transformer used is the new Varley Ni-Core type, it cannot be directly connected in the anode circuit of the detector valve, because its primary, although having a high primary inductance, will only pass about 2 milliamperes. An excessive primary current would permanently destroy some

E HIGH-MAG. 3

new resistance-feed transformer-coupling system which provides great volume with purity

of the valuable properties of the special alloy used for the core; for this reason some means has to be adopted to prevent any such possibility.

Instead of connecting the primary winding in series between the anode and the high-tension supply, we connect a 30,000-ohm resistance there and feed the low-frequency component of the rectified detector anode current through a .25-microfarad coupling condenser.

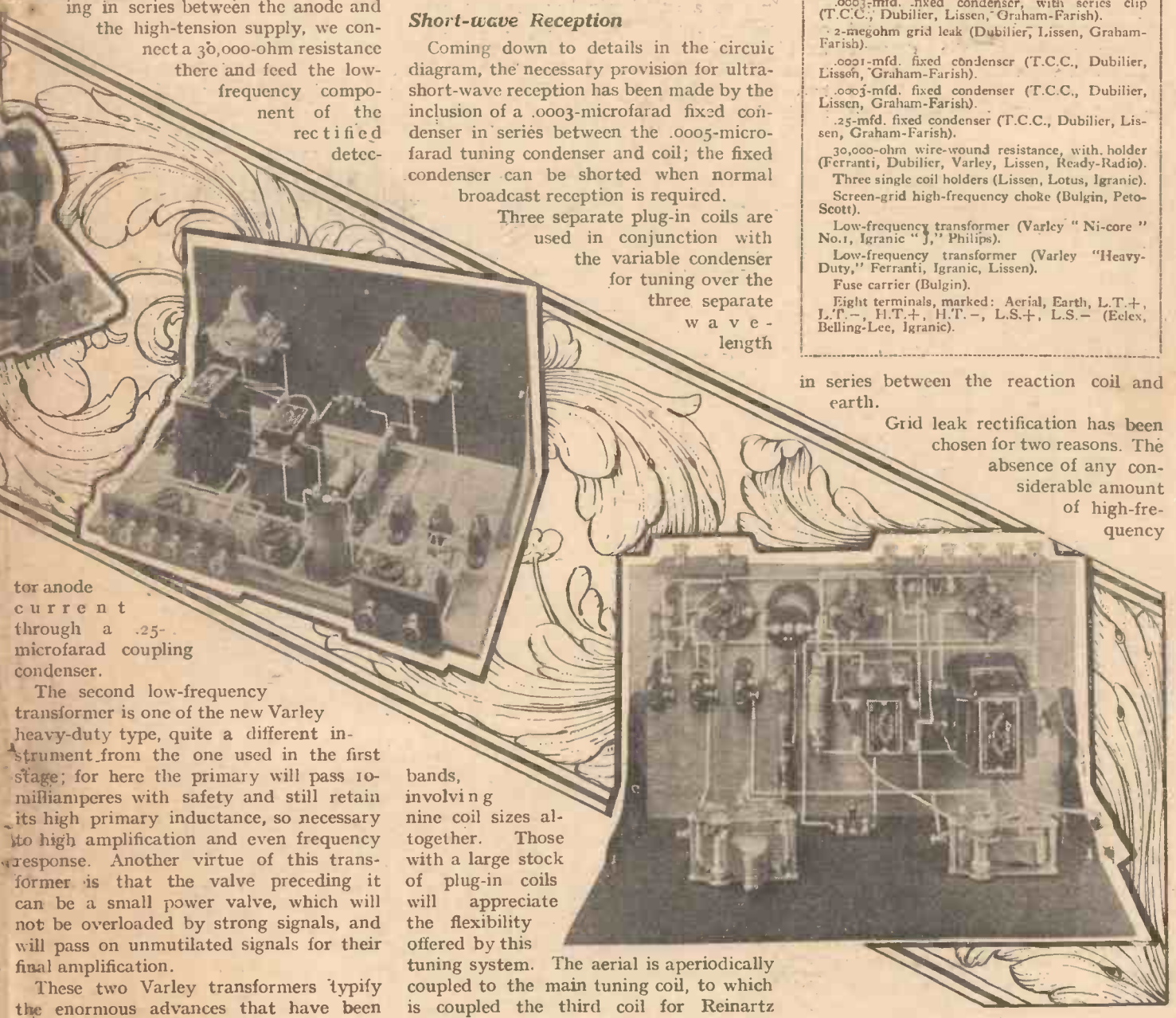
The second low-frequency transformer is one of the new Varley heavy-duty type, quite a different instrument from the one used in the first stage; for here the primary will pass 10-milliamperes with safety and still retain its high primary inductance, so necessary to high amplification and even frequency response. Another virtue of this transformer is that the valve preceding it can be a small power valve, which will not be overloaded by strong signals, and will pass on unmutilated signals for their final amplification.

These two Varley transformers typify the enormous advances that have been made through the untiring research of British manufacturers in the direction of the perfect low-frequency transformer, which, incidentally, some of our leading firms seem now to have very nearly achieved.

Short-wave Reception

Coming down to details in the circuit diagram, the necessary provision for ultra-short-wave reception has been made by the inclusion of a .0003-microfarad fixed condenser in series between the .0005-microfarad tuning condenser and coil; the fixed condenser can be shorted when normal broadcast reception is required.

Three separate plug-in coils are used in conjunction with the variable condenser for tuning over the three separate wave-length bands, involving nine coil sizes altogether. Those with a large stock of plug-in coils will appreciate the flexibility offered by this tuning system. The aerial is aperiodically coupled to the main tuning coil, to which is coupled the third coil for Reinartz reaction. All three coils are fixed coupled in relation to one another, the variation of reaction being accomplished by means of the .0003-microfarad variable condenser in series between the reaction coil and earth.



Grid leak rectification has been chosen for two reasons. The absence of any considerable amount of high-frequency

LIST OF COMPONENTS

Ebonite panel, 16 in. by 8 in. (Becol, Raymond, Ebonart, Paxolin).

Two strips, one 3 in. by 2 in. and one 6 in. by 2 in. (Becol, Raymond, Ebonart, Paxolin).

.0005-mfd. variable condenser (Lotus, Lissen J.B., Burton, Igranic, Polar).

.0003-mfd. variable condenser (Lotus, Lissen J.B., Burton, Igranic, Polar).

Push-pull filament switch (Bulgin, Lissen, Benjamin, Wearite, Lotus).

Panel brackets (Ready-Radio, Bulgin).

Two slow-motion dials (Brownie, Varley, Lotus, Lissen).

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

Three valve holders (Godwinex, Wearite, W.B., Lotus).

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

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

.0001-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

.0003-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

.25-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

30,000-ohm wire-wound resistance, with holder (Ferranti, Dubilier, Varley, Lissen, Ready-Radio).

Three single coil holders (Lissen, Lotus, Igranic).

Screen-grid high-frequency choke (Bulgin, Peto-Scott).

Low-frequency transformer (Varley "Ni-core" No.1, Igranic "J," Philips).

Low-frequency transformer (Varley "Heavy-Duty," Ferranti, Igranic, Lissen).

Fuse carrier (Bulgin).

Eight terminals, marked: Aerial, Earth, L.T.+, L.T.−, H.T.+, H.T.−, L.S.+, L.S.− (Eelex, Belling-Lee, Igranic).

"THE ALL-WAVE HIGH-MAG. 3" (Continued from preceding page)

amplification means that unless the set is operated very close to a broadcasting station (which is not the particular function of this set) the incoming signal will not have a very large amplitude, and consequently will be more efficiently rectified by the grid-leak method than by the alternative method of anode bend. Another reason for deciding on grid-leak rectification in this set is the presence of the transformer coupling between the detector valve and first low-frequency amplifying valve. To get the best results from the use of this transformer a medium-impedance valve is recommended and here again grid-leak rectification offers the better alternative.

It may be wondered why a .0001-microfarad fixed condenser has been connected between the anode of the detector valve and earth when there is already a by-pass capacity to earth provided by the reaction condenser. The point is that the reaction condenser in the nature of things is constantly varying in capacity and on minimum adjustments does not provide sufficient by-passing for the high-frequency current which flows in the anode circuit of the detector and which must not be allowed to pass into the low-frequency amplifying stages.

No special output circuit for the loud-speaker has been included as it was desired to keep down the cost within practical limits.

Common H.T. Supply

The common source of high-tension supply works out very well in practice, for the maximum is only applied to the last two valves, the 30,000-ohm anode resistance in the detector anode lead dropping the maximum to a sufficiently low working anode voltage for the detector valve. In the high-tension negative lead is arranged a fuse which will prevent damage to the battery and valves, should a wrong connection be made.

Those who see in this set something that meets their own particular requirements should consult the list of components necessary to assemble what has been very descriptively called the "All-wave High-mag. 3."

From the illustrations accompanying this article the general layout of the components should be sufficiently clear to render a detailed description unnecessary; there are one or two little pointers that will help. For example, the three single-coil holders mounted in line must be fitted in the exact pin-and-socket relationship to one another as is clearly shown by the reduced reproduction of the blueprint. If these coil holders are not so mounted and, of course, subsequently wired exactly as indicated, reaction may be found impossible, due to a reversal of current. The coil holders are mounted sufficiently distant from the front of the baseboard to allow for the largest size of tuning coil to be inserted without fouling the tuning condenser on the panel.

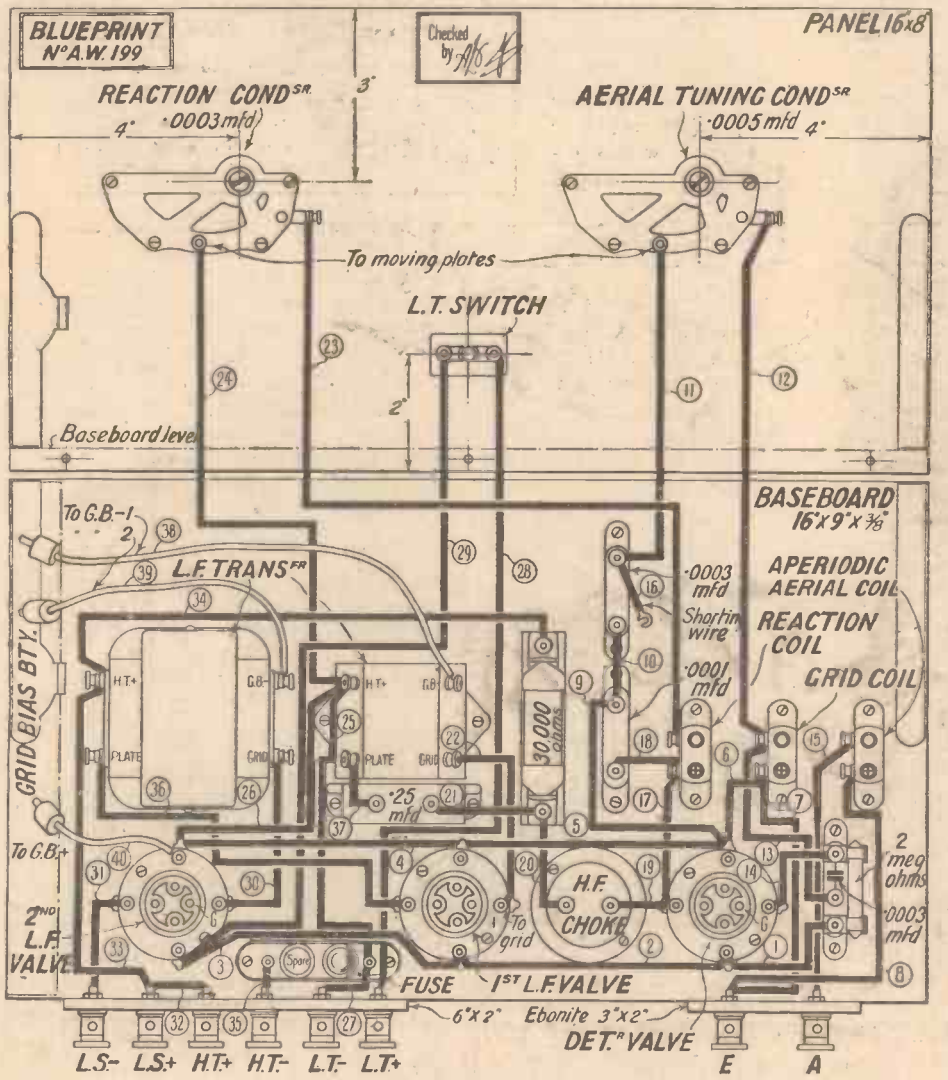
Assembly

The exact sequence of assembly is not of great importance, but probably the most convenient way is to start by drilling the panel for the accommodation of the variable tuning condenser and variable reaction condenser and filament switch, not forgetting the panel brackets. The positions of the holes for these one-hole-fixed components and for the holes involved in the panel to baseboard fixing can be accurately determined by placing the full-size blueprint (available from this office for 1s. post free), fair and square on the panel and pricking through with a needle. While the drilling tools are still handy, the terminal strips for the aerial-earth and battery and loud-speaker connections can also be drilled as shown. Work can now quickly proceed by the fitting of the panel components and the terminal strips and then both panel and strips can be mounted on the baseboard, leaving the careful dispositioning of the baseboard components to be done. Lastly comes the rather more arduous process—the wiring together of the components.

Here again work can be considerably facilitated by careful reference to the blueprint which is more explicit than words. Covered Glazite neatly bent at right angles so that all wires are either parallel with or vertical to the baseboard and panel looks neat in the original model and can be duplicated by an enthusiastic constructor.

The grid-bias battery leads, consisting of two negatives and one positive, are suitable lengths of rubber-covered flex, soldered to convenient wiring points in the receiver. This allows for the incorporation of the grid bias battery in the cabinet if desired.

Next week, we shall deal with the operation and maintenance of the "All-wave High-mag. 3" for the benefit of those who in the meantime have started on its construction.



The wiring diagram of the 'All-wave High-mag. 3." Blueprint available, price 1/-

MY WIRELESS DEN

By W. JAMES

Weekly Tips Constructional and Theoretical—

For the Wireless Amateur

The Finger Test

THE most difficult faults to trace are usually those which have the effect of lowering the quality of the reproduction or of producing instability. I have a particular fault in mind which I had to deal with not very long ago. It was not a difficult one, but at the same time it might have puzzled those without a few spare parts.

The set had one of its stages resistance-capacity coupled and the grid leak was disconnected. I discovered this almost immediately, because the output and the quality of the reproduction were not what they should have been; suspecting a break somewhere I had placed my fingers on different points. When I touched the end of the grid leak connected to the grid the signal strength improved immediately, and a new grid leak had the effect of restoring the set to normal.

I do not know what readers do first when a set is faulty, but I generally touch the grid terminal of the last valve holder first and, if there is a noise from the loudspeaker, assumes that this last valve is at all events working. Then I touch the grid of the preceding valve. If it happens to be the detector a buzz is usually heard when the grid terminal is touched. It is surprising how soon one becomes accustomed to spotting faults from the simplest of tests.

Are the Valves to Blame?

When the shielded-grid high-frequency amplifying valve was first introduced we were led to believe that all our high-frequency troubles would disappear. But, as a matter of fact, I believe there are as many sets in use to-day that have an unstable or oscillating high-frequency stage with a shielded valve as there were a year or two ago, when neutralised high-frequency circuits were used.

This accounts, no doubt, for the fact that the shielded valve is not as popular with amateurs as it might be. Much of the oscillation trouble is to be traced to unsatisfactory arrangements of the parts, and sometimes the coils are not quite right. Unfortunately, too, shielded valves vary rather widely in their electrical characteristics, with the result that whilst a receiver may function very well with a particular shielded valve, instability is experienced when another valve is fitted.

The second valve may have a lower value of impedance or it may be a better valve from the point of view of its mutual conductance. All one can do without modifying the coils is to find the best working voltages and, if necessary, stabilise the aerial circuit by fitting a grid leak across the aerial tuning condenser. This grid leak may have to be a low one, such as 100,000 ohms, but it would be better to try in the first instance a leak of, say, ¼ megohm.

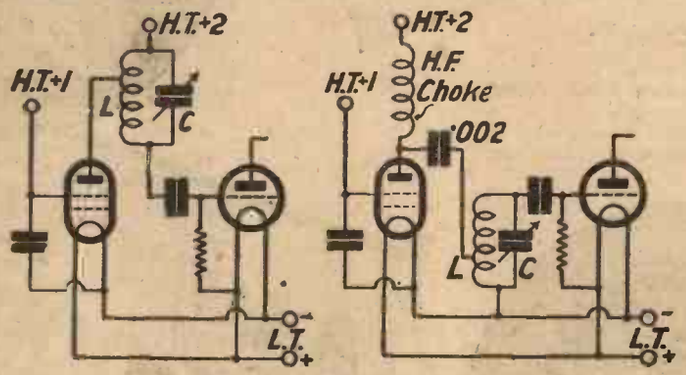


Fig. 1. A choke for stability

A Choke for Stability

The tuned-anode circuit—or, rather, its tapped variety—may prove rather troublesome in a four-valve receiver having two low-frequency stages unless suitable precautions are taken.

I have found a tendency for such a set to motor-boat, for instance, unless each anode circuit is fitted with a resistance condenser or anode-circuit filter. Complete filtering will naturally prevent motor-boating and the distortion which arises long before the oscillations which we often hear as a squeal or as a popping noise have commenced.

Quite apart from other circuit reasons, however, the high-frequency choke and condenser circuit with the tapped-anode coil actually joined in the grid circuit is a most effective motor-boat stopper, and rarely is it necessary to add further apparatus to the anode circuit. For this reason it should be more widely used, as a proportion of sets are not too satisfactory because of a tendency to instability.

The owners, not having experience of numbers of receivers, may not be aware that their set is below normal. In Fig. 1 a coupling condenser of .002 microfarad is indicated. The tapped anode coil is marked L and its tuning condenser C.

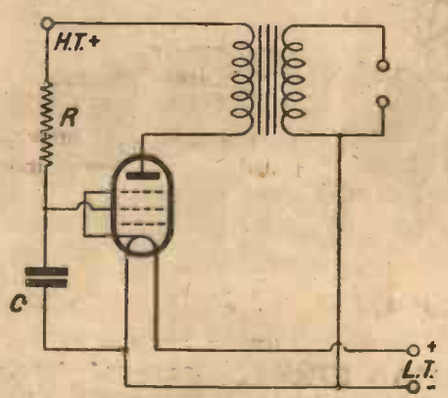


Fig. 2. Connections of pentode output stage

A Pentode Tip

When a pentode receiving valve is employed in a receiver, care must be taken that it is used with the correct grid bias and high tension. Do not overlook the fall in voltage over the choke or other part joined in its anode circuit, and when necessary connect a resistance condenser filter to the grid of the valve that is supplied with high-tension.

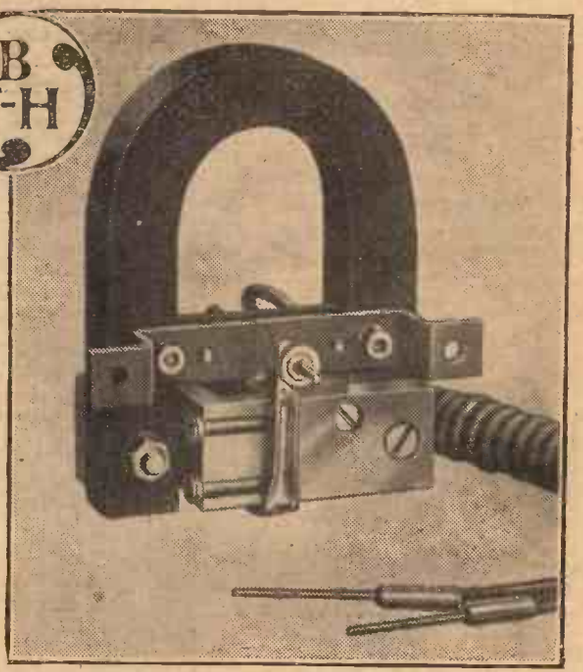
Owing to the fact that the voltage of this grid, which is sometimes termed the priming grid, must not be very much less than that of the anode, too a high a value of resistance in the filter cannot be used. The value of 10,000 ohms is, however, usually quite satisfactory and a 2-microfarad fixed condenser. The connections should be made as in Fig. 2, the resistance and condenser being marked R and C.

BUILD YOUR OWN SUPER LOUD SPEAKER . . FOR 27/6

CONE UNIT

B T-H

THIS wonderful unit gives excellent reproduction over the whole range of musical frequencies. It is constructed on the balanced armature principle and has a powerful permanent magnet system with a step-up mechanism for driving the cone.



PRICE 15/-

B T-H

ASSEMBLY

THIS chassis has been produced for use in conjunction with the B.T.H. cone unit. A corrugated cone is used and not only does it vastly improve the response, but also prevents unpleasant paper rattle. It is supplied finished in our standard radio brown, ready drilled for baffle board mounting.

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The EDISON SWAN ELECTRIC CO., LTD., *Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Business of the British Thomson Houston Co., Ltd.*

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W.15.

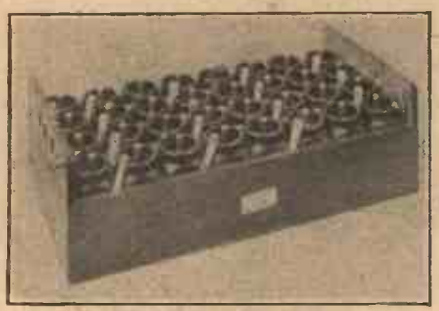
"A.W." TESTS OF APPARATUS

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

Standard Wet H.T. Batteries

THE popularity of wet H.T. cells appears to fluctuate from time to time, but there is little doubt that the large-capacity H.T. type is most suitable for the purpose of supplying a high value of H.T. current which may be increased on occasions to 60 or 70 milliamps.

We have on previous occasions tested wet H.T. batteries made by the Standard



Standard wet H.T. battery

Wet Battery Co., of 184-188 Shaftesbury Avenue, W.C.1, and the tests have invariably proved satisfactory.

The makers have recently sent us for report a battery made up of their large "Standard" type No. 4 cells, which owing to their high capacity, will supply large high-tension currents suitable for working powerful amplifiers operating moving-coil speakers. The mall refinements which from experience have been incorporated in the lower-capacity cells are included. Leakage of the electrolyte from the glass containers is prevented by waxing the tops of the glass containers.

The positive carbon element forms a part of the inner "sac" electrode which has proved so efficient in all types of wet cell. Surrounding it there is the outer zinc electrode to which reference has already been made.

A battery consisting of these cells has now been in use for some months in our laboratories and is still showing full voltage. Apart from filling and keeping the electrolyte up to the correct level, no other attention has been necessary.

Varley Pick-up Arm

THE design of tone arms for electrical pick-ups has engaged the attention of manufacturers for some time and as a result one sees many ingenious forms of this simple, but necessary accessory to the pick-up. The simple tone-arm, fitted to the normal gramophone may suffer from the disadvantage that it does not maintain the needle in its correct track throughout the playing of a record.

One of the most interesting and practical tone-arms available to the public is the Varley parallel-motion type, incorporating principles which make for low record wear. The main arm of this pick-up rotates between two ball-bearing joints and is in consequence particularly smooth in motion. The member to which the pick-up is attached is free to rotate in a vertical plane and can also move in a horizontal plane being actuated by a subsidiary arm in parallel with the main arm. This device automatically ensures that the tracking of the needle is correct throughout the playing of a record.

In addition to the features already outlined an automatically controlled stop is fitted which may be adjusted to suit various types of record: for example, in some records, the cutting only occupies a small portion of the surface and with some arms the automatic stop will not function at the

The Varley pick-up arm

correct position. With the Varley pick-up arm, however, by rotating a knob one can automatically set the stop to function at the correct position on the record.

This component which is finished in polished aluminium is a thoroughly sound engineering job. It is a Varley product of 103 Kingsway, W.C.2.

Telsen Transformers

NOW that the principles of low-frequency transformer amplification are well understood it is generally accepted that the transformers employed should be designed to suit the conditions under which they are to operate. Thus, the type employed in the first stage following the detector valve should have a high-primary impedance, whereas in the second stage, when following a valve of lower impedance the value of primary impedance may be appreciably less.

We have recently tested two Telsen transformers, one having appreciably larger physical dimensions than the other. The more expensive type, which has a step-up ratio of 3 to 1 sells at 11s. 6d. and on test in our laboratories gave a primary inductance of 15.3 henries with 1 milliampere D.C. flowing through the windings and 13.4 henries with 10-milliamperes, indicating

The Telsen Transformer

that the transformer does not readily saturate. It is understood that this type may also be obtained with a step-up ratio of 5 to 1.

The smaller type which we tested had a step-up ratio of 3 to 1 and a primary inductance of approximately 9 henries with 3-milliamperes flowing through the winding; it is therefore quite suitable for use after moderately low-impedance valves and should make a good portable set component.

Both instruments are encased in iron shrouds and are fitted with four terminals with the notations marked clearly at the side. They may be recommended to readers.

On September 7 the B.B.C. is broadcasting through Belfast a running commentary on the Ulster Grand Prix Motor Cycle Race from the Antrim course.

Another B.B.C. SOS call for a Scottish fisherman has been answered. The call, which was to the skipper of a Buckie steam drifter on account of his wife's dangerous illness, was picked up at the herring fishing off the West Coast of Scotland and all speed was made for the nearest port.

Nine American Boy Scouts talked with their parents in Jackson, Michigan, from Paris recently, the conversations lasting forty minutes. Captain Sparks, who commanded the Jackson American Legion, was the donor of the call, which cost £150. Loud-speakers and microphones were installed at both ends to permit all present to participate in the demonstration.

THE LOUD-SPEAKER MUST MATCH THE VALVES

What exactly is the effect of the loud-speaker impedance upon the performance of the set? Does it really make any appreciable difference, or is it simply an imaginary benefit? Our Technical Editor answers these questions below

IN the general run of things considerable attention is paid to the earlier portions of the receiver. We design our tuning circuit or circuits with a view to simplicity, ease of control, selectivity, or whatever the particular requirement is, we arrange our detector to perform its functions efficiently, and we probably go to a certain amount of trouble to obtain satisfactory performance from the L.F. stage or stages. Then, when it comes to handling the output from the set, we connect a loud-speaker in the anode circuit of the last valve and hope for the best.

There certainly has been a tendency recently to utilise a choke-output circuit, the function of which is to isolate the high-tension battery from the audio-frequency currents, thus avoiding battery coupling to a considerable extent, while, in addition, the steady anode current on the last valve, which is inclined to be heavy, does not flow through the delicate windings of the loud-speaker. Even this precaution, however, is adopted more with a view to avoiding distortion in the amplifier itself rather than any attempt to make the last valve operate under its most satisfactory conditions.

The output transformer is another solution to the problem of avoiding back-coupling. Here the anode current in the last valve flows through the primary winding, while the audio-frequency currents are transferred to the secondary from which they flow through the loud-speaker winding. This particular method, however, has the advantage that it is possible to adjust the ratio of transformation either to give a step-up or a step-down, so that the effective anode impedance of the output valve can be adjusted within certain limits. In most practical cases a step-down ratio is required, and Messrs. Ferranti make a range of output transformers covering ratios from 1-1 to 66-1.

Any reader who has experimented at all seriously with moving-coil loud-speakers will be able to answer this question without hesitation. The matching of the loud-speaker to the valve has a most important effect upon the power output obtainable from the particular circuit. Let us consider the conditions a little more closely.

We apply to the grid of the last valve a certain alternating voltage and we obtain in the anode circuit a change in current which, passing through the loud-speaker either directly or through the medium of a transformer, produces an aural response, which is what we are requiring. For a given value of grid swing our object is clearly to obtain the greatest possible variation in the anode current operating through the particular loud-speaker. The loud-speaker is doing work, i.e., absorbing energy, and it therefore behaves largely as a resistance. It is indeed the product of the current and the voltage developed across this effective resistance that determines the power output from the loud-speaker.

Proportionate Resistances

Now it must be obvious at once that the relative proportion of the loud-speaker and the valve resistance exercises considerable effect upon the power output. If the external anode impedance is very small, then the majority of the power developed in the anode circuit will be wasted inside the valve itself and only a small proportion will be developed externally. As we increase the external impedance, so the proportion of the power developed outside the valve increases; but, on the other hand, the total resistance of the circuit has increased so that our current is diminished.

The two effects work in opposite directions. At first, the increased proportion of power developed externally more than counteracts the reduced total current, and the power output in the loud-speaker increases. After a certain point, however, the falling off in the current begins to exercise its sway and our power commences to fall off again. Viewed from this angle, it is quite easy to work out the conditions for maximum power output with a given voltage swing on the grid. It is found that this is a maximum when the external anode impedance is equal to the resistance of the valve.

It is clear at once, therefore, that the effect of matching the loud-speaker to the valve is to increase the efficiency of the valve so that it gives a greater power output for a given input. In other words, on a given signal the set will give a greater volume of sound. There is, however, another factor to be considered, and in the fulfilment of this second condition we obtain a slightly different criterion for the optimum position, although the need for matching the impedance remains equally vital.

We do not require the greatest possible output from the valve irrespective of other conditions. What is wanted is the best *undistorted* power output. Now, here we have to consider the limitations imposed in order that distortion shall not be present. Our grid swing cannot exceed a certain amount, for if we make the grid positive we run into grid current, while if we make the grid too much negative we commence to operate on the curved portion of the valve characteristic which introduces distortion again.

At first sight it appears that the limits set by these two conditions are definite and easily determined from the static characteristics. This is not the case, however, for when a valve is operating, the anode voltage is continually changing, due to the varying anode current passing through the external impedance. As a result of this, the voltage on the valve increases as the grid becomes more negative, and this has the effect of lengthening the straight portion of the curve. Our effective maximum grid swing without causing distortion is thus somewhat larger than is apparent from an examination of the static characteristic, and the extent of this increase is dependent upon the anode circuit. Where the anode circuit impedance is small, the increase is little or none, whereas if the anode circuit impedance is increased, so the effective grid swing may increase by 50 or 60 per cent., so that the anode impedance has a very definite effect upon the maximum input which can be applied to the valve without causing distortion.

Added to this, we have the effects already discussed of the proportion of the total power developed external to the valve, and

(*Continued on page 274*)

WIRELESS WIT

HAROLD (*showing grandmother his new set*): "You know who invented wireless, don't you, Grannie? It was Marconi."

GRANNIE: "Harold, Harold! Don't be so disrespectful. You should say Mrs. Coni."

RECENTLY a man was discovered with his head jammed into the opening of a horn loud-speaker. At the hospital he explained that he was Scotch, that he was listening to a broadcast church service, and that he had heard somebody drop the collection plate.

"I BELIEVE in getting the best out of my radio," said the American as he produced a bottle of whisky from the battery compartment.

PAYING THE PIPER

JOTTINGS FROM MY LOG

By JAY COOTE

IN most European countries in which a broadcast tax is collected for the benefit of the transmitting studios, the listener is consulted in regard to the style of entertainment most likely to give him pleasure.

Since I have been staying on the Belgian coast, I have been given many opportunities of hearing the English broadcasts, and I can only endorse the opinions expressed by a number of foreign radio fans with whom I have come into contact, that although the actual transmissions are perfect, from the engineering point of view, the programmes are unsuited to the particular period of the year.

Light Programmes Wanted

During the bright sunny days and warm evenings the greater part of Europe has recently enjoyed, light entertainments only will hold the fan to his wireless receiver. Little interest, if any, can be taken in technical or other talks, and of these, only the weather forecasts and news bulletins will hold the listener's attention.

Most Continental studios possessing the experience of previous years, have realised this fact, and many of them, taking into consideration the knowledge that the general public will listen attentively to orchestral and other performances taking place in the open, have made arrangements to devote many hours of the day to outside broadcasts.

Germany, perhaps, is the country most favoured with spas and watering resorts, and consequently finds no difficulty in giving its unseen audience a large variety of light popular entertainments from well-known kursaals and casinos.

Continental Enterprise

Try for some of these stations even in the early morning, and you are sure to strike two or three at least, which can offer you performances by first-class orchestras. On Sundays, especially, you may pick up a number of these outside broadcasts. The early concert from Berlin is on the air at 6.30 a.m., admittedly it is an early one, but who wants to stay abed these fine days? Towards lunch time, the studio will take you over to one or other of the public squares for a military band performance and if light music is required for the evening hours you are safe in turning to Cologne (via Langenberg), to Hamburg, or even better still, to Frankfurt, which makes so much of its fashionable neighbour, Wiesbaden, during the summer season. Hilversum, as of yore, still connects us almost daily with the famous Scheveningen Kurhaus, and Brussels, which you may capture at times, on higher power, will switch you over, whenever the occasion is a worthy one, to the Ostend Kursaal. In its recent relays from that well-known Belgian seaside resort, the B.B.C. showed the British public the class of entertainment offered to visitors by these places of amusement.

Too little is made in Great Britain of the entertainments provided by our seaside resorts or inland hydros, and too much of the studios, for the period of the year. As regards light programmes we have much to learn from the Continent.

"THE LOUD-SPEAKER MUST MATCH THE VALVES"

(*Continued from page 272*)

if we combine these two effects we can again work out the conditions for *maximum undistorted power output* from the valve. The optimum condition here is again quite definite, although different from that obtained in the previous case. It is that the external impedance should be *twice the internal resistance* of the valve.

Actually, the difference is not great if the impedances are made equal, but with a moving-coil speaker it is possible to detect the distortion introduced by an incorrect relationship between external and internal impedances. The difference is not so marked with an ordinary loud-speaker, but nevertheless it is present. The fact remains, in order to obtain best results from one's set, it is desirable to make sure that the loud-speaker is satisfactorily matched, and this is a point to which greater attention should be paid.

ILLUSTRATING ONE VERY GOOD REASON—

—FOR KEEPING A LOUD-SPEAKER EXTENSION OFF THE GROUND.

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
		GREAT BRITAIN	
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds (2LS)	0.13
*242	1,238	Belfast (2BE)	1.0
*261	1,148	Newcastle (5NO)	1.0
288.5	1,040	Swansea (5SX)	0.13
288.5	1,040	Stoke-on-Trent (6ST)	0.13
288.5	1,040	Sheffield (6LF)	0.13
288.5	1,040	Plymouth (5PY)	0.13
288.5	1,040	Liverpool (6LV)	0.13
288.5	1,040	Hull (6KH)	0.2
288.5	1,040	Edinburgh (2EH)	0.35
288.5	1,040	Dundee (2DE)	0.13
288.5	1,040	Bournemouth (6BM)	1.0
288.5	1,040	Bradford (2LS)	0.13
*301	995	Aberdeen (2BD)	1.0
*310	968	Cardiff (5WA)	1.0
*356	842	London (2LO)	2.0
*377	797	Manchester (2ZY)	1.0
*399	753	Glasgow (5SC)	1.0
*479	626	Daventry (5GB)	17.0
*1,554	193	Daventry (5XX)	25.0
		AUSTRIA	
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	5.0
*453	666	Klagenfurt	0.5
*517	581	Vienna	15.0
		BELGIUM	
235	1,276	Charleroy (LL)	0.25
250	1,202	Schaerbeek-Brussels	0.5
250	1,200	Ghent	0.5
280	1,071	Liége	0.5
*509	590	Brussels	1.0
		CZECHO-SLOVAKIA	
*263	1,139	Morava-Ostrava	10.0
*279	1,076	Bratislava (Feriby)	12.5
*293	1,022	Kosice	2.0
*342	878	Brunn (Brno)	2.4
*487	617	Prague (Praha)	5.0
		DENMARK	
*281	1,067	Copenhagen (Kjobenhavn)	1.0
1,153	260	Kalundborg	7.5
		ESTHONIA	
*297	1,010	Reval (Tallinn)	2.0
		FINLAND	
*221	1,355	Helsingfors	0.8
1,796	167	Lahti	40.0
		FRANCE	
170	1,750	St. Quentin	0.25
212.8	1,410	Fécamp	0.5
220	1,364	Béziers	0.1
230	1,304	Ste. Etienne	0.3
237	1,265	Juan-les-Pins	0.4
238	1,260	Bordeaux (Radio Sud-Ouest)	2.0
240	1,250	Radio Nimes	1.0
*255	1,175	Toulouse (PTT)	1.0
*265	1,130	Lille (PTT)	0.8
268	1,121	Casablanca	2.5
*276	1,087	Rennes (PTT)	1.0
*.80		Montpelier (PTT)	1.5
292	1,028	Radio Lyons	1.5
*294	1,020	Limoges (PTT)	0.5
304	986	Bordeaux (PTT)	0.5
304	986	Agen	0.3
309	970	Radio Vitus	2.0
*316	950	Marseilles (PTT)	0.5
329	914	Grenoble (PTT)	1.5
336	892	Petit Parisien	0.5
346	869	Strasbourg	0.3
353	849.1	Algiers	2.0
368	815	Radio LL (Paris)	0.5
*381	788	Radio Toulouse	0.0
411	729	Radio Maroc Rabat)	2.0
436	687	Radio Flandre (Lille)	0.5
447	671	Paris (Ecole Sup. PTT)	0.7
468	640	Lyons (PTT)	5.0
1,350	222	Tunis (Kasbah)	0.6
1,444	207.5	Eiffel Tower	8.0
*1,725	174	Radio Paris	8.0
		GERMANY	
*218	1,373	Flensburg	1.5
*227	1,319	Cologne	4.0
*234	1,283	Muenster	4.0
*239	1,256	Nurnberg	4.0
*246	1,220	Kiel	0.7
*246	1,220	Cassel	0.7
*253	1,184	Breslau	4.0
*259	1,157	Leipzig	4.0
*270	1,112	Kaiserslautern	1.5
*276	1,085	Koenigsberg	4.0
*283	1,058	Magdeburg	0.7
*283	1,058	Berlin (E.)	0.7
*283	1,058	Stettin	0.7
*319	941	Dresden	0.75
*325	923	Gleiwitz	6.0
*339	887	Bremen	0.75
*360	833	Stuttgart	4.0
*372	806	Hamburg	4.0
*390	770	Frankfurt	4.0
*418	716	Berlin	4.0
*453	662	Danzig	0.75
*456	657	Aachen	0.75
*473	635	Langenberg	25.0
*533	563	Munich	4.0
*560	536	Augsburg	0.5
*560	536	Hanover	0.7
570	527	Freiburg	0.7
*1,635	183.5	Zeesen	20.0
2,100 / 2,290	142 / 131	Norddeich	10.0
		GRAND DUCHY	
1,220	246	Luxembourg	2
		HOLLAND	
31.4	9,554	Eindhoven (PCJ)	25.0
*300	1,000	Huizen via Hilversum aerial (until 5.40 p.m. B.S.T.)	5.0
*1,070	280	Huizen via Hilversum aerial (after 5.40 p.m. B.S.T.)	5.0
*1,070	280	Scheveningen-Haven (from 10.30 a.m. to 5.40 p.m. B.S.T.)	5.0
*1,875	160	Hilversum via Huizen aerial (AVRO)	5.0
		HUNGARY	
550	545	Budapest	15.0
		ICELAND	
*1,200	250	Reykjavik	1.0
		IRISH FREE STATE	
*225	1,337	Cork (1FS)	1.5
*413	725	Dublin (2RN)	1.5
		ITALY	
248	1,209	Trieste (testing)	
*274	1,094	Turin (Torino)	7.0
*332	905	Naples (Napoli)	1.5
*385	779	Genoa (IGE)	3.0
*441	680	Rome (Roma)	3.0
453	662	Bolzano (IBZ)	0.3
*501	599	Milan (Milano)	7.0
		YUGOSLAVIA	
*307	977	Zagreb (Agram)	1.25
*431	694	Belgrade	2.5
568	530	Sjubljana	2.5
		LATVIA	
*525	572	Riga	4.0
		LITHUANIA	
*1,935	155	Kovno	7.0
		NORWAY	
*283	1,058	Notodden	0.7
*365	820	Bergen	1.0
*394	761	Frederiksstad	1.0
447	671	Rjukan	1.0
453	662	Tromsoe	1.0
453	662	Aalesund	1.0
453	662	Porsgrund	1.0
*493	608	Oslo	1.5
		POLAND	
*313	959	Cracow	1.5
*335	896	Posen	1.5
385	779	Wilno	1.5
*408	734	Kattowitz	10.0
*1,411	212.5	Warsaw	10.0
		ROUMANIA	
*394	761	Bucharest	2.0
		RUSSIA	
*351	855.5	Leningrad	10.0
*427	702.5	Kharkov (NKO)	5.0
*483	621.5	Homel	2.0
*825	364	Moscow (PTT)	25.5
1 000	283	Tiflis	10.0
1,000	300	Leningrad	20.0
*1,304	230	Kharkov	5.0
		SPAIN	
251	1,193	Almeria (EAJ18)	1.0
314	950	Oviedo (EAJ19)	0.5
*349	860	Barcelona (EAJ1)	8.0
*368	815	Seville (EAJ5)	0.5
403	743	San Sebastian (EAJ8)	0.5
*424	707	Madrid (EAJ7)	3.0
453	662	Salamanca (EAJ22)	0.55
		SWEDEN	
231	1,301	Malmo	0.5
*257	1,160	Hoerby	10.0
270	1,112	Trollhattan	0.4
*322	932	Goeteborg	0.0
322	932	Falun	0.5
*436	689	Stockholm	1.5
*542	554	Sundsvall	1.0
*770	389	Ostersund	2.0
1,200	250	Boden	2.0
*1,348	222.5	Motala	30.0
		SWITZERLAND	
*403	743	Berne	1.0
*459	653	Zurich	0.6
680	442	Lausanne	0.6
760	395	Geneva	0.5
1,010	297	Basle	0.25
		TURKEY	
*1,200	250	Stamboul	5.0

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

LETTERS TO THE EDITOR

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

Kolster-Brandes Sunday Transmissions

SIR,—You may have observed that, in addition to the fortnightly Sunday concerts which are broadcast from the Hilversum station under the direction of Mr. Hugo de Groot, we are now having another series of programmes transmitted from Radio Toulouse every alternate Sunday evening between the hours of 6 and 8 p.m.

This now provides for a Kolster-Brandes entertainment every Sunday evening from one or other of the stations. The Kolster-Brandes Orchestra at Toulouse has been selected from the famous orchestra of the Capitol Theatre in Toulouse. It is from this theatre and with the aid of the same orchestra that Radio Toulouse transmits the excellent operatic programmes to which many of your readers have doubtless listened.

The September 8 transmission is from Hilversum.

KOLSTER-BRANDES, Ltd. (Sidcup).

The Oscillation Fiend

SIR,—Being a regular reader of your popular paper, and also of "Thermion's" versatile weekly remarks, I would like to correct the said gentleman's idea that oscillation is dead ; it has never even been indisposed.

In this district you are not worth considering if you cannot bring in on the loud-speaker about a dozen stations with a det. and one L.F. set, and H.F. valves are merely an encumberance to a set.

The local station (5NO) is, of course, only for paltry crystal sets, and anyone who trys to listen to 5GB between 6.30 and 8 p.m. is treated to the finest collection of Indian war-whoops one could wish to hear.

Appealing to the B.B.C. is hopeless, as it does not appear to have any means of locating oscillation. What this winter will bring I dread to think.

O. M. M. (Chester-le-Street).

"The James Special 3"

SIR,—A friend of mine has on my recommendation just written for a back number (156) of AMATEUR WIRELESS for blueprint containing "The James (very) Special 3." Between ourselves, I have constructed half a dozen of them and have not had one failure, and I know of another half-dozen friends that require same. Here are its good points in this swamped area, fifteen miles from 5GB and 5XX.

The special tapping on aerial coil makes use of wavetrap for cutting out 5GB needless. All other three-valvers need one. The volume is terrific on all long waves, English and Continental. Reaction is smooth.

I trust I have not wearied you with this letter, but I felt that I must let you know how pleased I am with this set. As a wireless fiend who has been twiddling for seven years, I may merely add that I have not altered my "James Special 3" since it came out.—F. (Wellingboro').

Transmission Hours

SIR,—Although an ardent admirer of "Thermion's" excellent articles, I do occasionally think he gets a bit off track on certain subjects. I have in mind his reference to the unnecessarily late start of the daily programmes.

Now I beg to submit that, although 2LO does not start up until midday or after, the B.B.C. finds difficulty in filling its twelve hours a day with tolerably decent material. Already we grumble at the eternal talks, and yet "Thermion" suggests starting up at 9 a.m. or 10 a.m. merely to give us more of them.

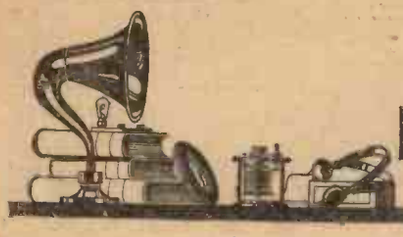
If radio is such a part of American domestic life as "Thermion" suggests, the cartoons which appear from time to time in the periodicals belie the facts, as in these Sadie is for ever asking Cyrus to "Switch off, for Heaven's sake; they're advertising something."

Furthermore, has "Thermion" no sympathy for the unfortunate DX fan residing in London?

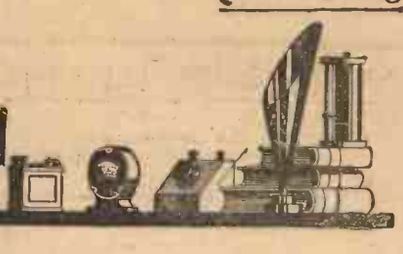
One more grouse. I cannot see where the eternal "song plugging" about television is going to get us.

Apart from the uselessness of such a small picture as that at present obtainable, how is the man without a televisor going to fare when these programmes are going full swing? His ordinary broadcast set is going to bring in a lot of unintelligible speech and music connected with the matter being televised. This combined transmission will probably usurp the principle wavelengths and entirely exclude the possibility of distant reception. No, sir, I think it would be better to wait until television is a commercial possibility.

F. A. I. (London, W.C.).



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, laycuts, 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

Astatic Coils and Screening

Q.—*In view of the fact that astatic coils are assumed to be fieldless and do not give rise to inductive coupling when two or more are arranged in a receiver can it be assumed from this that screening between the coils is unnecessary? I ask this because to omit the screening in my proposed new receiver will be a saving both in cost and space.—J.S.* (*Salisbury*).

A.—Even though astatic coils are practically fieldless and reduce the possibility of coupling between themselves and other components there is always the possibility of coupling between the wires forming the wiring of the receiver and inductances, etc., in the receiver. For this reason it is always advisable to use screening, at least between the grid and anode circuit components of a receiver, especially if a screen grid H.F. valve is used. Even the loop in the wire of the valve filament is liable to create inductive coupling into some components or some part of the wiring of another circuit in the receiver and the use of a screen will usually reduce if not entirely eliminate such coupling. When excessive oscillation is experienced in a receiver and it is proved that excessive reaction is not the cause, it can often be traced to inadequate screening in the receiver between the various circuits. The importance of screening in receivers cannot be over emphasised owing to the super efficiency of present day high-amplification valves.—C.L.

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

Converting Set for Gramophone Reproduction.

Q.—*Having rather an expensive receiver and wishing to make use of it for gramophone pick-up work I should be glad if you would inform me how I can adapt my set without interfering with the panel arrangements to work in conjunction with my gramophone. I am not a mechanic nor am I handy with tools, so have no wish to spoil the outward appearance of my receiver. Can you suggest how I am to adapt my set for the work in question?—S.F.* (*Kensington*).

A.—There are a number of special adaptors now on the market which can be plugged into the detector valve-holder of the receiver. These adaptors are permanently connected to the gramophone pick-up so that when the normal detector valve is pulled out of its socket the pick-up is connected up in place of the detector valve. The detector valve is usually inserted in a suitable valve holder attached to the top of the gramo-radio adaptor so that the normal detector valve becomes the first L.F. amplifying valve when the gramophone pick-up is being used. We advise you to inspect some of these components during the forthcoming radio exhibition, or, failing this, inspect catalogues of the various manufacturers. Firms marketing such components are Burndept, Lissen, Igranic, S. G. Brown, Magnum, Grawor, Magnum, Edison Bell and possibly some others that do not occur to us at the moment.—C.A.

RADIOGRAMS

PROMENADE concerts from the Queen's Hall will be relayed by 2LO, 5XX, and other stations on the following dates : September 5, 7, 9, 11, 13, 17, 20, 23 and 26; from 5GB on September 6, 10, 12, 14, 16, 18, 21, 24, 25, and 27.

Listeners to 5GB on September 11 will hear a satire on suburban life entitled *Squirrel's Cage*, by Tyrone Guthrie; it is also to be given from 2LO and 5XX on the following day. *Squirrel's Cage* was broadcast last March and met with great success.

2LO on September 10 will broadcast an "all-black" vaudeville programme, probably including the following artistes : Williams and Taylor, Jackson and Blake, Zaidee Jackson, and a coloured chorus.

The following colonies will be represented in a "Colonial" vaudeville programme from 2LO and 5XX on September 14 : Australia (Albert Whelan), New Zealand (Keith Wilbur), South Africa (Kerslova and Noel Eadie), and also Canada.

On September 13 the 5GB studio will broadcast a "match-making medley" entitled *Romance Unlimited*, by Dorothy Eaves. Well-known broadcasting artistes taking part in this programme are Alfred Butler, Phyliss Lones, John Rorke, Colleen Clifford, George Buck, Edith James, and Jack Venables.

Newcastle on September 12 is to broadcast a special Irish programme, sponsored by Alderman Sir John Fitzgerald, D.L., J.P., who has been both Sheriff and Lord Mayor of Newcastle, and is one of the most prominent Irishmen in the north of England. Irish artistes taking part are Joan Vincent (soprano), D'Arcy Woolven (baritone), and Denis O'Neil (entertainer).

Winners at the Royal National Eisteddfod of Wales, Liverpool, 1929, are to broadcast a concert from Cardiff on September 14. They are Ethel Gomer Lewis (mezzo-soprano), Ben Jones (baritone), Edmund Hopkins (violin), the Penybont Quartet, and the Cory Silver Band (conducted by J. G. Dobbing).

To celebrate the anniversary of the birth of Antonin Dvorak on September 8, the North Regional Stations will broadcast a programme of this great composer's works, played by the Northern Wireless Orchestra under the direction of T. H. Morrison. Percy Bilsbury (tenor) will sing some gipsy and biblical songs by Dvorak.

Cardiff is to relay a concert given by the National Orchestra of Wales from the Pavilion, Llandaff Fields, on September 15. The soloists will be Gwladys Naish (soprano) and Melsa (violin).

Café au Lait, a condensed musical comedy by Charles Brewer, is down for broadcast from 5GB on September 16. The scene is a coffee stall "up West" and the artistes taking part are Cyril Lidington, Wynne Ajello, Alfred Butler, and Harold Clemence.

Southport and Blackpool are to be represented in the "Famous Northern Resorts" programmes from the North Regional Stations on September 11. The former will supply a Municipal Band concert under the direction of Fred Royle and an entertainment by the famous Besses o' th' Barn.

Inverness is to provide a big broadcast for all Scotland on September 19; on this date the first of the famous balls in connection with the Northern Meeting takes place. The first part of the programme will be a relay of some of the reel music from the ball and some Scottish dance music at its very best. The event is unique of its kind, and listeners will be given a very true impression of the atmosphere of this gathering.

The German authorities have decided to equip some 3,000 railway station waiting-rooms and restaurants with wireless receivers in order to give passengers a broadcast service of news bulletins and musical entertainments. The installation will also be used for announcing the departure and arrival of trains.

The new broadcasting plant destined to the Ecole Supérieure station may be heard carrying out tests during the luncheon hour. Between 12.30 and 1.30 p.m. listeners may notice that the transmissions are frequently heard on higher power.

For the first time, on Saturday afternoon, August 24, an exclusive broadcast from England to Germany took place, when, by arrangement with the B.B.C., Frankfurt, Hamburg, and Stuttgart relayed a description of the England *v.* Germany athletic meeting from Stamford Bridge. The commentary was given by Dr. Laven, Sports Communicator of the Sudwestdeutsche Broadcasting Company, and relayed to Germany by telephone lines and submarine cable. This transmission was not broadcast to British listeners.

RADIOGRAMS

(Continued)

Notwithstanding the fact that the cost of a licence in Germany is more than double that paid by the English listener, statistics show that the total number of registered licence-holders in Germany exceeds Great Britain by some 400,000. In ratio to population, however, whereas England shows 20 per cent., only 14 per cent. of the Germans are interested in broadcast programmes.

With the opening of its new television station on the outskirts of Washington, D.C., the Jenkins Television Company has announced that it will provide daily television transmission for wireless experimenters.

3LO, at Melbourne, Australia, during 1928 sent out 18,416 songs, which took up 55,248 minutes of its time. Classical, orchestral, and instrumental numbers occupied 36,000 minutes, and dance music took up 31,515 minutes.

Of the Continental stations, the only studios which have adopted the SOS broadcast in the event of accidents or sudden illness are Hilversum, Huizen, and Vienna.

The Spanish Government has called for proposals for the reorganisation of the broadcasting system in that country. The scheme calls for eighteen transmitters, including one high-power station (about 20 kilowatts) at Madrid. The provincial stations (with the exception of Barcelona) will vary in power from 500 watts to 3 kilowatts. It is also suggested that a 40-kilowatt short-wave station should be erected in the Spanish capital. To provide an income for the broadcasting company, the listener's licence will be fixed at 4 pesetas per annum for a crystal set and 20 pesetas for valve receivers, with an additional tax of 5 per cent. on all wireless components.

According to statistics published by the International Telegraph Union, there are 958 official broadcasting stations in the world. This number does not take into account certain countries such as Russia, from which full details were not available, and does not include many short- and long-wave transmitters from which wireless telephony is broadcast.

Ekco Mains Units—Referring to our notes on page 218 of the August 24 issue it should be noted that the A.C. Model L.T.1 only supplies low-tension current from the mains, and not high-tension as well. The model C2A supplies both high- and low-tension current from the mains. In our illustrations, the uppermost is Model C1A, also for high- and low-tension from the mains, while the lower picture shows the Model LT1, supplying low-tension only.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Sept. 9 Queen's Hall promenade concert—Wagner.
" 10 A vaudeville programme.
" 11 Running commentary of the St. Leger.
" 12 *Squirrel's Cage*, a play.
" 13 Queen's Hall promenade concert—Beethoven

DAVENTRY EXPERIMENTAL (5GB)

Sept. 9 A vaudeville programme.
" 10 Queen's Hall promenade concert—Haydn and Mozart.
" 11 *Squirrel's Cage*, a play.
" 12 A symphony concert.
" 13 "Romance Unlimited," a match-making medley by Dorothy Eaves.

MANCHESTER

Sept. 11 A concert from Blackpool.

ABERDEEN

Sept. 10 *The Grenadier*, a play by George Reston Malloch.

BELFAST

Sept. 13 *Samson and Delilah*, an opera by Ferdinand Lemaire.

As a result of observations taken in the north of Scotland during the holiday season, the B.B.C. is led to the conclusion that the vogue of the portable set appears to be steadily increasing on the beach or with picnic parties.

BROADCASTING IN GERMANY

Double Programmes at Last

A NUMBER of welcome changes and improvements have been made in the Berlin broadcasting programmes since the new manager, Dr. Flesch, has taken charge.

The most outstanding novelty is the adoption of a new plan according to which double programmes are transmitted regularly from Berlin. In fact, whereas the Königswusterhausen transmitter formerly was content with duplicating the Witzleben evening programmes, it now sends out an entirely independent programme, so that wireless listeners in Berlin even with simple crystal sets have two programmes to choose from. Moreover, even those thousands of listeners in other parts of Germany and abroad who have been in the habit of receiving the "Deutschland" transmitter with relatively simple sets side by side with their local transmitters will be benefited by henceforth receiving another programme arranged on quite independent lines.

A novel feature that was notable from the very first days of August is that Königswusterhausen now repeats some particularly important broadcasts on the day following their transmission from Witzleben, thus enabling them to be even better appreciated with a keener understanding of their musical or literary value. In fact, this is a case of overcoming one difficulty experienced in wireless, viz., the question as to how to get over the exclusive broadcasting of "first nights" and nothing beyond.

Other new developments of Berlin programmes comprise the transmission of artistic gramophone records, now a regular feature of afternoon programmes; also the orchestra of the Berlin broadcasting house is being resorted to more often than previously in its full strength to entertain listeners. Talks will no longer follow on one another without any break throughout the late afternoon, but will be made more attractive by half an hour's musical interlude. The Press Review has been resumed. Still-picture broadcasting has likewise been extended by the addition of one or two transmissions daily.

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

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

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Printed in England. Published by Bernard Jones Publications, Ltd., 58/61 Fetter Lane, London, E.C.
Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH, LIMITED. Saturday, September 7, 1929

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Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XV. No. 379 Saturday, September 14, 1929

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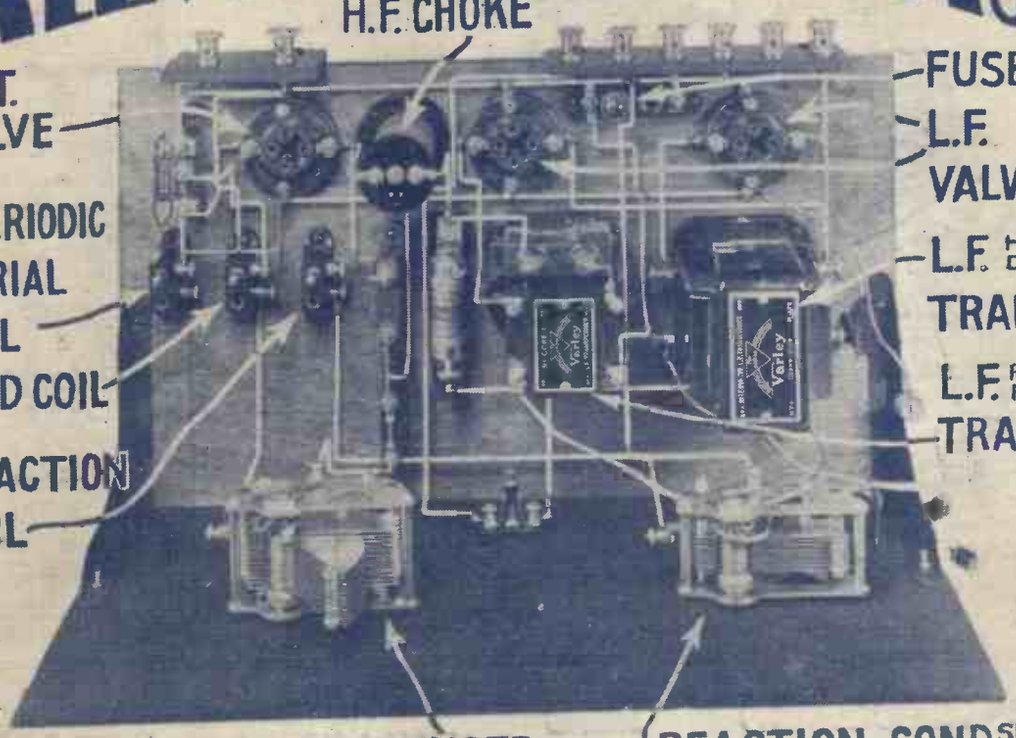

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SEPTEMBER 14, 1929 No. 379 Vol. XV

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

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

That Show Feeling—Thunder and Lightning!—Multi-lingual Mark!—King's English Again—Alive After 6,000 Volts—The Coming Regional

That Show Feeling—Are you getting the "urge" to visit the Radio Show? If so, don't resist it, because the Exhibition this year promises to be better than ever. If you go, take the Show Issues of AMATEUR WIRELESS as a guide to show you the positions of the stands and the good things to see. If you live too far from Olympia, then make sure of your Show Issues and in the comfort of your own armchair tour Olympia in spirit, if not in flesh.

Thunder and Lightning!—Some serious storms have occurred in various parts of England during the last fortnight, and houses have been struck and damaged by lightning. In no cases, however, was the damage attributed to the presence of a wireless set and, for once, the daily Press refrained from splashing big headings about the "radio risk." As a matter of fact, the question was gone into very thoroughly in a recent issue of AMATEUR WIRELESS (No. 377), and there need be no misunderstanding on the subject of lightning and radio risks.

Multi-lingual Mark!—Mark Hambourg is taking the star part in a new talkie dealing with the life of Beethoven and four separate versions are made in English, French, German, and Russian. Mark Hambourg has therefore had to do a lot of language learning. But is this achievement as great as that of the announcer of PCJ, whereat the broadcasts to the chief countries of Europe are made by one man in the separate languages?

King's English Again—The B.B.C. pronunciation cranks have been at it again and a new guide for announcers has been issued, including a number of commonly-used words. They had a bit of trouble over "ass" which they were not sure whether to pronounce long as "pass" and "grass," or short as "lass." And, an ass being a stupid thing, and "ass" being a stupid word they had half a mind to let it follow its own course and still be pronounced differently by people in the north and south of England! But the standard pronunciation has been fixed to rhyme with "lass," which will please the poets if no one else.

NEXT WEEK'S ISSUE

Will be a

COMPLETE GUIDE TO THE SHOW

with plans and a stand-to-stand review.

If you intend making a visit the issue will be indispensable for reference. If you cannot attend, "A.W." will tell you about all that is new in radio.

In addition this Greatly Enlarged Special Show Issue will be full of interesting constructional and general articles. Constructional details of two new sets, which are sure to be very popular, will be included:

The Knife-edge Three, by J. H. Reyner, a receiver specially designed for giving a high degree of selectivity, and

The Clarion All-electric Three, a receiver designed by the "A.W." Technical Staff. It is the ever-popular "Clarion Three" modified to operate from A.C. mains.

Broadcast Hoots—As the "Proms." are being broadcast, the following has a radio interest: "I thought the Promenade Concerts at the Queen's Hall were safe . . . but erosion has begun. Even that stronghold of sanity is toppling. There is a motor-horn in the orchestra."—"Beachcomber" in the *Daily Express*.

Alive After 6,000 Volts—Most amateurs jump a few feet if they accidentally get a short from the mains when tinkering with eliminators! This voltage is seldom in excess of 250 and quite an unpleasant kick can be obtained. And yet a Norwich boy is still alive after coming in contact with 6,000-volt cables. He was badly burned, but the current did not prove fatal. It will be interesting to know just what is the highest voltage which can safely be withstood.

The Coming Regional—As the date draws near when Brookmans Park will be putting up a dual programme, anxiety is increasing on the part of some owners of old sets as to the degree of selectivity which will be required in order to bring in the alternatives free of mutual interference. A number of selectivity tips have already been given in AMATEUR WIRELESS, and some special receivers have been designed, such as Mr. Reyner's "Knife-edge Three" for next week's issue. It is more than probable that many amateurs will have to make some alterations in order to cope with the new situation.

Deafening Millions—Mr. S. C. H. Davis, that well-known personality in the motoring world, who flew in a "Moth" to broadcast T.T. car race results from Glasgow, has met the microphone more than once. He says "on that earlier occasion, the particular example I used had near it a notice something like this: 'If you sneeze you will deafen millions.' Ever since I have had a great desire to get in one good sneeze the moment I see the instrument."

PRINCIPAL CONTENTS

NEXT WEEK—A Specially Enlarged Issue :: A Complete Guide to the Show

The Show Secrets Revealed

—A Forecast

THE question which is on the lips of every radio "fan" is this: When Olympia opens its doors for the Radio Exhibition on Monday week, what progress will be revealed and what will the manufacturers offer for the coming season?

It is not at first sight obvious in what directions developments have taken place, because last year we had pentodes and indirectly-heated A.C. valves as newcomers and these brought in their train greater popularity for three-valvers employing the new five-electrode valve in the last stage, and for all mains-operated receivers.

Now, without going into detail, it may safely be predicted that a review of the stands will show how manufacturers have directed their efforts towards producing *really* portable portables, and to the perfection of super radio-gramophones, operating in many cases entirely from A.C. mains.

In many cases you will find that it is possible to buy a set which can, with but slight alteration, be made mains or battery operated. Largely this is due to our newcomers for this year, the directly-heated A.C. mains valves. Directly-heated valves are so simple to work and install that they bring all-mains-operation well within the scope of manufacturers of quite cheap receivers.

Everyone seems to be turning towards the mains for "juice," and rightly, too. Manufacturers of mains units, both for H.T. and L.T., will reap the benefit of their perseverance; most of the units offered employ dry metal rectifiers, and are, therefore, entirely trouble-free.

Moving-coil loud-speakers are enjoying increasing popularity and on one or two stands it will be noticeable that attention has been turned towards bettering the permanent magnet type of moving-coil instrument.

Of course, it needs careful design in order to get a satisfactory flux density at the poles as great as that with an accumulator-supplied or mains-supplied pot. But many makers seem to be tackling the problem from the right direction and hence the reason for more than ever a number of moving-coils.

As you will gather at the Exhibition, however, other types of loud-speaker are by no means "dead as the dodo." At least two prominent makers have done great things with cone units of the balanced-armature types and you can quite take it for granted that if you have a good diaphragm assembly, then there will be no lack of a good unit to fit to it.

Reverting once again to valves and battery problems, it is common knowledge that changes are taking place behind the scenes with the valve manufacturers. Large sums of money are being spent and new plant being put down for the manufacture of new valves. The laboratories have been at work during the past year and while there is no possibility of the cost of valves coming down (despite rumours heard in some quarters), the quality is better than ever. British valves certainly lead the world, a fact of which we ought to be very proud. The laboratory work has been connected chiefly with that crucial element in the valve—the filament.

(*Continued on page* 312)

SOME REPRESENTATIVE SHOW FEATURES

(1) Philips all-electric receiver; (2) Westinghouse multi-volt power transformer for H.T. and L.T.; (3) Mullard filament transformer; (4) Varley heavy-duty push-pull input transformer; (5) G.E.C. cabinet speaker; (6) Exide unspillable battery; (7) Ferranti moving-coil speaker; (8) R.I. three-valve all-electric set; (9) G.E.C. three-valve A.C. set

EXPERIMENTS WITH LOUD-SPEAKERS

Thermion on What Can be Done with Old Horn and Cone Instruments

EVERY loud-speaker that comes into my hands is liable in the course of its career to suffer more changes in its shape and general make-up than is the most devoted feminine patron of the beauty parlour; for I am one of those who can never handle any wireless component without experiencing a desire to effect improvements in it. Sometimes the experiments are successful; sometimes matters are neither better nor worse as a result of them; sometimes they do not produce the desired effects. But the experimenter enjoys his pudding, if I may so put it, quite as much in the cooking as in the eating.

Improvement Possible

Loud-speakers of all kinds form the subject of a very great number of experiments of mine, and in many cases I can claim to have produced very marked and definite improvements in their performances. This is particularly true in the case of some of the older models, whose driving units were infinitely better from an acoustic point of view than the parts which they drove.

Let me expound this saying. The driving part in the ordinary horn loud-speaker is an enlarged telephone receiver with its magnets, wire-wound bobbins, and diaphragm. The driven part here is the air which fills the pressure chamber (the cavity between the upper side of the diaphragm and the top of the case enclosing the movement) and the horn. The horn itself does not, or should not, vibrate; it is the air in the two places mentioned which is acted upon by the diaphragm and caused to set up sound waves that travel to the ears of listeners.

What actually happens is this. The diameter of the pressure chamber is comparatively large, being as big as, or slightly bigger than, that of the diaphragm. The only outlet is the small neck at the top over which the horn fits. The effect produced is not unlike that observable with a garden syringe fitted with a single-jet nozzle. Quite a moderate pressure upon the handle causes water to squirt out for many yards; since the diameter of the piston (which corresponds to the loud-speaker's diaphragm) is much greater than that of the orifice, the syringe acts as a kind of hydraulic transformer with a step-up ratio. In the same way there is a pneumatic step-up between the pressure chamber and the horn of the kind of loud-speaker under discussion.

Horns and Tone

Everyone knows that unless the horn is at least 16 ft. in length it is a matter of impossibility for it to produce real bass notes; but not everyone realises that the quality obtainable from a horn loud-speaker depends enormously upon the shape and size of the pressure chamber and the shape of the horn. I have had in operation now for several years an instrument which my friends agree is the very best horn speaker of moderate size that they have ever heard.

Though the makers would not recognise it in its present form, it is, in fact, one of the original Amplion Junior speakers, very much altered as the result of numerous experiments. Perhaps you remember that particular model? It reclined in a semi-horizontal position, the reproducing unit being attached to a small conical horn some 10 in. in length. In its present form it is so mounted that the diaphragm is horizontal instead of being almost vertical, and the shape of the pressure chamber has been considerably altered. The horn, which is 34 in. in length, is made of very thick papier mâché and its shape is truly exponential. The driving mechanism must be at least eight years old. Its magnets have been gingered up at intervals, but it has been otherwise untouched. You will appreciate now what I meant when I said that many of the old driving units were better acoustically than their driven parts.

Cone-speaker Modifications

But the average reader will probably be more interested in experimenting with speakers of the cone type, and for a very good reason: pressure chambers and horns are difficult to make, whilst anyone can turn out reasonably good cones of different sizes, shapes, and weights. And experiments with some of the older cone-type instruments are very well worth while. The driving units of many of these are beautiful pieces of work, electrically and mechanically. They are, in fact, capable of far better reproduction than is often possible with their existing free or fixed-edged cones of large size. Even if the cone after long service retains its original shape, improvements can be made; and there must be thousands of such speakers in the country the quality of whose reproduction has fallen off since the diaphragms have become dented, cracked, warped, or even torn in course of time.

(*Continued at foot of next page*)

HAVE YOU NOTICED

—how much better, from the point of view of quality, the gramophone transmissions are than the ordinary studio music from Radio-Paris? This is no doubt due to the pick-up and amplifier going straight to the transmitter, instead of via an intermediary, the microphone, which, although being of a well-known make, is not up to British standard.

—how the German studio dance bands differ from those we are used to in England? It would seem that they are ordinary orchestras adapted for the time being for syncopated music.

—that the B.B.C. has decided that Marseilles should be pronounced "Marsales," and yet Calais "Cal-eh"?

Gramophone Amplifiers and Surface Noise

Some Hints on Eliminating Unwanted Sounds

A NUMBER of amateurs appear to regard a considerable amount of extraneous noise as inseparable from the electrical amplification of gramophone records. It is true that needle scratch cannot entirely be avoided with the present method of reproduction, but careful elimination of those factors that are within the control of the operator will demonstrate to the listener that the irreducible minimum is practically inaudible. It should never be necessary to rely upon increased volume to drown surface noise, for although the latter may be less easily detected in the more powerful output, and may indeed become inaudible as scratch, it must inevitably affect the quality of the reproduction.

Capacity Effects

In a long experience of gramophone amplification and pick-ups, it has been found that a large proportion of the sound associated with needle scratch may often be traced to the amplifying circuit. Modern practice prescribes the intervention of a transformer between the pick-up and the grid-circuit of the first valve, and it is absolutely essential in the first place that the transformer should be efficiently earthed.

But there is a further source of trouble in the lead between the grid terminal and the corresponding side of the transformer output. This lead, owing to the exigencies of spacing, switching devices, and a desire for symmetry of lay-out, is often of inordinate length. A long wire carrying currents destined for subsequent amplification is always prone to give distressing evidence of capacity effects, and a curious feature of this particular instance is that the resultant hiss appears to impose itself upon the least suspicion of needle scratch.

A Simple Remedy

To such a wandering lead may frequently be traced a sound that only manifests itself when the needle is placed in contact with the moving record. An infallible cure for this trouble is to substitute for the more orthodox lead between grid and transformer a length of lead-covered wire of about 16-gauge, such as that used for house wiring. The outer sheath, when earthed, will be found an effective preventative of capacity effects. A warning must here be issued against the indiscriminate use of fixed condensers at various points in the amplifying circuit. Practically any extraneous noise, which is immediately curable by by-passing a proportion of the high frequencies, will probably be found to proceed from stray capacity owing to incorrect spacing of leads or components. Any attempt to damp out these frequencies will necessarily affect the reproduction of the higher harmonics.

The Pick-up Circuit

But there is one position in which the use of a condenser may be found to be definitely beneficial. The volume in many amplifiers is controlled by a resistance placed in parallel or series, either with the input or the output of the transformer. A condenser of any value up to .5 microfarad may, with advantage, be shunted across the terminals of this resistance, which is apt to develop a field affecting components in its vicinity.

The large number of pick-ups now available will be found to vary considerably, not only in their tonal characteristics, but also in the amount of surface scratch which they transmit. It is possible that this depends largely on the proportionate damping fore and aft as compared with that applied to the side of the needle holder. This is a matter in which the average amateur is scarcely qualified to experiment, and in the case of a reputable pick-up, it is advisable to let well alone. It will often be found, however, that considerable improvement as regards surface noise may be effected by earthing one terminal of the pick-up. This may be easily achieved by connecting one input terminal to the earthed case of the transformer. J. D. WOOD.

"Experiments with Loud-speakers"

(Continued from preceding page)

Deformations of the diaphragm have inevitably an evil effect upon reproduction. If you possess an old loud-speaker of this kind whose results are nowadays disappointing do not regard it as a hopeless case. Make sure first of all that the magnets are up to the mark, and if they are not send them for re-magnetisation, which can be done at absurdly small cost. It is as well at the same time to ask the makers to make any adjustments in the driving unit that may be necessary.

The main reasons why old-fashioned cone speakers fall short in the quality of reproduction are these. The large diaphragm is necessarily rather heavy, and it therefore possesses considerable inertia. Its large surface means that any movement meets with a great deal of resistance from the air which it must displace. Now, if two notes are played at a broadcasting station, one very high up in the scale and the other low down, the diaphragm must make a far bigger movement in the case of the second to reproduce with equal intensity.

We can see at once how it is that the big diaphragm, comparatively good though its performance may be, is handicapped in its task of bringing out the deep notes. And there is a further evil influence. Sound waves set up in the air by the movements of the diaphragm travel round from the front of it to the back. If they arrive there at the right moment they may succeed in increasing the amplitude of vibration; on the other hand, if they are just a little out of step they may help to reduce it.

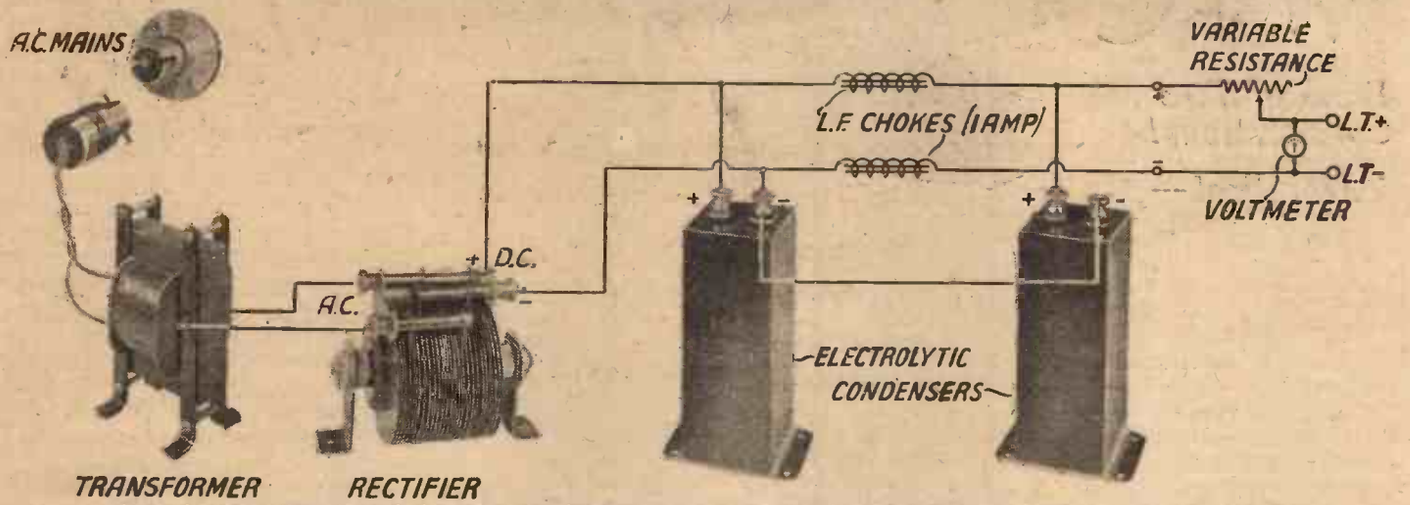
It follows that so long as these circulating waves, as they are called, are allowed to have their way, a free-edged or fixed-edged diaphragm must always unduly accent certain musical frequencies and suppress others or reproduce them imperfectly.

The key to the problem is to make the cone as small and as light as is reasonably possible on the lines of the moving-coil speaker.

With a good balanced-armature driving unit we can approach very nearly the quality of the moving-coil instrument. We cannot perhaps quite equal it, but at the same time reproduction of a quality which was previously undreamt of with this kind of drive can be obtained. In the second part of this article the possibilities of the balanced-armature drive and methods of converting old loud-speakers incorporating it to the free-edged cone and baffle board type will be described in detail.

RECEIVING WITHOUT L.T. BATTERIES

W. James explains how to run ORDINARY Valves from A.C. Mains



Above is shown the schematic layout of the simple apparatus necessary for running ordinary valves from A.C. Mains

ORDINARY receiving valves must be supplied with a current that is nearly perfectly steady and without fluctuations. An accumulator is, therefore, quite an ideal source of filament current from the point of view of the operation of valves; but, unfortunately, an accumulator will supply a current for only a limited period, depending, of course, upon its capacity and the number and types of valves connected to it.

When a trickle charger is available this unit may be employed for charging during those periods when the receiver is not being used.

Rectification

A suitable trickle charger is easily constructed, is reliable, and should last for years. The battery will, however, need a little attention from time to time. Distilled water will have to be added and the terminals kept clean. Some experimenters, therefore, prefer to dispense entirely with the filament accumulator and to employ a unit which, by itself, will not only convert the alternating current obtained from the mains supply into direct current, but will also smooth the output current so that it is entirely suitable for the filaments of ordinary receiving valves, and, of course, for other purposes.

The "1-amp. Charger" described in last week's issue will form an excellent alternating-to-direct-current converter for such a filament power unit. Its output is, however, not a steady direct current, but a number of pulses of current. Thus, if the frequency of the supply is 50 periods per second there will be 100 pulses of current per second, as the rectifier is of the full-wave pattern.

A current which is varying in this manner is quite suitable for accumulator charging, but it would not do for filament heating, because the temperature of the filaments of the valves would vary in unison with the current. This would cause the anode current to fluctuate and a hum would be heard from the loud-speaker.

Apparatus Required

We have, therefore, to connect to the converter a smoothing system which will level the current, as it were, and allow only a steady and unvarying current to pass to the filaments of the valves.

Now let us see what apparatus is needed for smoothing. Obviously, ordinary choking coils are perfectly useless for this purpose. For one thing, their resistance is much too high, considering the amount of the current which is needed. This, by the way, is usually .1 ampere for an ordinary valve and .2 or .3 for a shielded or a power valve in the 2-volt series. Sometimes a valve having a greater filament consumption is employed. An ordinary three-valve receiver may therefore pass a current of about ½ ampere or a little more. This is well within the full-load capacity of the 1-ampere unit recommended.

The second reason why an ordinary choking coil is not suitable is that it would not carry the current without seriously overheating. A rather special choking coil must therefore be used. It must have a low resistance and be able to carry a current of about 1 ampere continuously. Several types are manufactured having a resistance of approximately ½ ohm and an inductance of .03 or .04 henry.

These choking coils are not very expensive. They have to be carefully designed, however, in order that the inductance shall be sufficient when a relatively heavy current is passing. One feature of a suitable design is an air gap in the iron core, which is adjusted by the manufacturers.

The smoothing apparatus must also include condensers. Once again, ordinary condensers of a few microfarads capacity would be useless. The condensers of a low-voltage filter must have a large capacity, or the smoothing will not be sufficient for our purpose. A special pattern is therefore used. They are not of the ordinary paper type, but of the electrolytic pattern and are characterised by their enormous capacity for their small size.

An electrolytic condenser for low-voltage circuits having a capacity of 1,500 or 2,000 microfarads is, for example, no larger than a standard 4-microfarad condenser of the usual paper type as used in high-tension mains units.

There are two points to be noted in connection with electrolytic condensers, the first being its terminal indications. One of its terminals must be connected to the positive side of a circuit and its other goes, of course, to the negative.

Connections

The second point is its maximum working voltage, which must not be exceeded or the condenser may break down. Having a pair of suitable chokes and condensers, we may connect them as indicated in the figure. Notice that a choking coil is joined in each lead, whilst one of the condensers is connected across the output from the rectifier. The second condenser is joined from one side of the rectifier to a choke.

This completes the smoothing system, but our unit is not yet finished, for we should find, were we to experiment with different valves, that the voltage across the terminals of the receiver varies according to the number of valves. Thus, with only one valve the voltage might be 7,

(*Continued in 3rd col. of next page*)

MY WIRELESS DEN

By W. JAMES

Weekly Tips Constructional and Theoretical—

For the Wireless Amateur

Screening and Stability

I REMEMBER, some time during the war, seeing and trying a captured German amplifier having transformers of huge dimensions and wired with lead-covered cables.

The amplifier was a powerful one, having three transformer-coupled stages, with various switches for controlling the circuit and one for adapting the primary coil of the first transformer to suit the input circuit. It was quite stable. All metal parts and the lead coverings were connected together and to earth. This had a deal to do with the amplifier's stability. Were ordinary wires used and arranged to look pretty there would have been howls and squeals, I am sure, for I have lately experimented with a powerful amplifier.

It is surprising how carefully the parts and wiring must be arranged when wrong couplings have to be avoided. To earth the cases of transformers and other parts is by no means always the correct thing to do; on the contrary, this sometimes introduces difficulties. One must, therefore, be prepared to look elsewhere for the cause of instability and, when necessary, thoroughly shield the various parts and stages of the amplifier.

Screen-grid Valves as Detectors

Shielded or screen-grid valves were designed for high-frequency amplification, the shield being for the purpose of lowering the capacity of the normal grid to the anode to such a small amount that stability could be obtained.

Did you know that a valve of this type works quite well as a leaky-grid detector? I have lately tried one or two and, provided a large choking coil was used for the anode circuit impedance, the results were good.

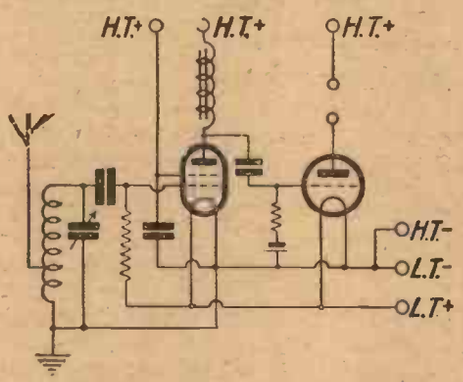
Choke coupling is suggested for the reason that the anode impedance of shielded valves is high and not much voltage is lost over a good choke. An ordinary transformer is not very suitable, whilst a resistance coupling is unsatisfactory with normal voltages.

There seems not much point in using a shielded valve for detection, but those who experiment will possibly obtain curious results by altering the voltages of shield and anode.

Cheap Components

The lowering of the prices asked for valve holders appears, I regret to say, to have resulted in certain instances in a reduction in the quality of the product to the point where it ceases to represent reasonable value.

Time after time I find loose or unsatisfactory contacts. Sometimes it is the screw which holds one of the contacts that becomes loose, or maybe the contact itself



Using a screen-grid valve as a detector

is a poor fit. Whatever the reason for faults, however, one thing is certain: amateurs who discover defective parts after a set has been built are apt to remember, and do not make the same mistake twice.

It is foolish of manufacturers so to reduce the quality of an article that it is unsatisfactory. The reduced price is no compensation.

Microphonic Valves

A howling valve in a receiver is a nuisance, and sometimes only the addition of rubber bands round the bulb, a metal cap, a covering of cotton wool, or the use of another expedient will prevent, more or less, the setting up of ringing or howling during reception.

I have found, however, on more than one occasion that attention to the pins of the valve has definitely cured the trouble. Sometimes all that is necessary is that one of the pins be bent out a little. But it may be necessary to make certain that all contacts are firm.

RECEIVING WITHOUT L.T. BATTERIES

(*Continued from preceding page*)

and 6 volts with four valves.

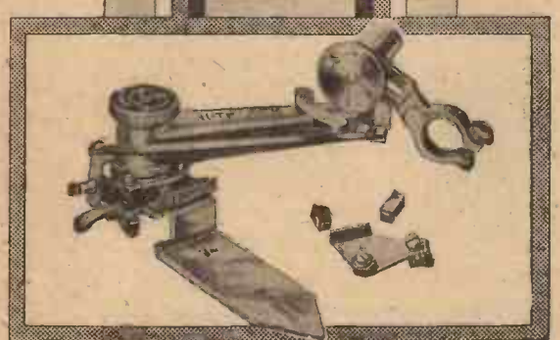
A regulator must, therefore, be joined in the circuit, and also a voltmeter. The regulator may be an adjustable resistance capable of carrying a current of 1 ampere continuously, and its value should be 5 to 10 ohms. A second resistance, but having a much lower value, may be included in circuit with it for the purpose of fine adjustment. The voltmeter should be a reasonably accurate one, but need not be expensive.

I suggest that a fixed resistance be joined across the output terminals, in order that the voltage may be regulated by adjustment of the variable resistance included in the unit. This fixed resistance may represent approximately the valves in the receiver to be tested. If they are of a 6-volt type and the current is, say, ½ ampere, the resistance may be 12 ohms. The voltage should be set for safety to, say, 4 volts, and then, when the valves are joined, the voltage may be increased to its correct value.

One could, of course, make a point of always putting the whole of the adjustable resistance in circuit before switching on and then regulating the voltage, but the important point to remember is that the voltage will always tend to increase as the current is reduced. More resistance must, therefore, be included when the load is small than when it is large.

When once the unit has been adjusted for a particular receiver there is no need to alter it, as a rule, although one may find that as the various parts warm up a little after use the output voltage falls off by a small amount. It is usually unnecessary to compensate for this, excepting when 2-volt valves are used, and even then it will not be necessary unless the current is fairly heavy.

NOW— 37'6



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On Your Wavelength!

An Interesting Visitor

ONE of the most interesting Americans that I have ever met is Dr. C. F. Burgess, head of the big U.S.A. company of that name, who is at present taking a holiday in this country. Dr. Burgess is one of the most modest men that I have ever come across and any information about his own doings has almost to be dragged out of him. He tells me that radio is still making enormous strides in the United States and, despite the huge number of receiving sets in use, there are no signs that the saturation point has been reached.

Broadcasting plays perhaps an even more important part in the life of the American man and woman than it does with ourselves. One reason for this is that the big stations, which give practically continuous programmes from early morning to late at night, have ample time to devote to special business and home features without in any way trespassing upon normal entertainment hours. We shall, I think, in time see the same kind of development over here; but we cannot do so so long as the B.B.C. tries to crowd education, women's talks, children's talks, topical talks, musical training, and all that kind of thing into the comparatively few hours that are now available for broadcasting.

The Wireless Man's Home

We wireless folk undoubtedly take up a good deal of space in the home with all the gear that we accumulate as time goes on. Lately I have found myself faced with a new problem. I have been, and still am, conducting a long series of comparative tests with loud-speakers. Now, naturally, you cannot make your tests without having the loud-speakers, and tests are not very valuable unless you make them cover a big variety of instruments. At the moment of writing I have only nine working, and it is astonishing how much room nine loud-speakers seem to want. The little fellows with horns or fixed cones, or those contained in small cabinets, will fit in almost anywhere; but when you come to the ones that want baffle boards, then you have to do a bit of manœuvring. Since my own den became rather congested I have had to overflow into the dining-room, and Mrs. Thermion has begun to register protests against the presence there of three baffle-board loud-speakers.

Points of View

I think they look very jolly, but she says they get in the way of carpet sweepers and things. *I* say "Why bother about carpet sweepers?" and she says "Why bother about loud-speakers?" The worst of it is that I have just heard that two more have arrived, and they will have to go into the dining-room, too! I have not yet dared to break the news. My own solution would be to put most of the dining-room furniture temporarily into the bathroom, but I have some misgivings in putting this forward. I am consoled by the thought that many other experimenters have been found a nuisance by their families.

Interesting Work

To be serious, though, comparing loud-speakers is one of the most interesting jobs that I have done for a long time. Frankly, I have come up against some real surprises, not the least of which is that there are several balanced-armature driven loud-speakers to-day which are very nearly, if not quite, in the same class as the moving-coil instrument. Much as I like the moving-coil speaker if it has plenty of space in which to let itself go, I do not greatly care about it, as a rule, in living-rooms of average size. If you tone it down it seems to lose quite a bit of its rich quality. It occurred to me some time ago that the balanced-armature drive was capable of very fine things, and nowadays some wonderful units of this kind are being turned out.

Another very absorbing point brought out is the importance of matching the output of the receiving set to whatever kind of speaker is employed with it. With the best valve and the best speaker going, you may get horrible results if the filter circuit or the output transformer are not of the right values. Alternatively, even a mediocre loud-speaker can be made to do much better than it ordinarily would by paying very careful attention to the output arrangements.

A Big Improvement

Not a few of the older balanced-armature units were disappointing in their performances because they would not stand up to anything like a respectable volume of sound. The reason was that the spaces between the pole pieces of the permanent magnet and the armature were very small, so that any comparatively large movement was apt to cause chattering due to the armature coming into contact with them. One old unit that I took to pieces the other day for examination has a heavy armature (which seemed certain to mean a loss of bass owing to its inertia) and such a small clearance that it took a very long while to adjust it properly after it had been put together again. Worst of all, the adjusting arrangements were very primitive.

Now, in the best modern units a much lighter armature is generally employed with an air gap of respectable size. Adjustment is an easy matter, since a knob is provided, by turning which the armature can be exactly balanced up with the greatest ease. There will be many of these units on view at the coming exhibition, and I strongly recommend readers who think that they want something better than they now have in the way of loud-speakers to spend a bit of time examining them.

Wireless Geography

In my young days there used to be a book which we either read ourselves or had read to us, which was written to show how much of the world was laid under tribute by our dinner tables. Somebody really ought to write a book nowadays on the same lines to show how many countries contribute to the wireless receiving set. When you come to think of it, there are an immense number of them. Could the reader say off-hand just where the following ingredients of his receiving apparatus come from: Rubber, sulphur (these two go to make ebonite), zinc, aluminium, copper, tin, lead (in accumulator plates), tungsten, thoria (in the dull-emitter filament), manganese, sal-ammoniac (both in the dry battery), nickel, molybdenum (both used in valve plates), magnesium (used for gettering valves), and iron? Best soft iron used either by itself or as a component of stalloy for armatures, diaphragms, and transformer cores comes from a foreign country.

The Transportable

When the portable set first swam into our ken its designers had, I think, in mind the idea that it would be mainly used for reception out of doors. They therefore turned out sets of the smallest possible weight and so shaped that they were not difficult to carry. I may be wrong, but my own impression is that the great majority of portable sets are not nowadays purchased for any such purpose. People buy them for two main reasons. The first is that they have no visible wires and batteries and need no outside aerial. The second is that they can be used in any room of the house. This being so, would not makers be justified in ceasing to bother so much as they do about weight or size? An extra pound or two on the weight very often means a tremendous increase in the quality and in the service life of the batteries.

Does Weight Matter?

Personally, if I were a manufacturer I should be inclined to go one better and to turn out a transportable set intended

On Your Wavelength! (continued)

for mains working. Instead of batteries I should have an eliminator built into it. There would be one visible wire—or, rather, one pair of wires. These would be connected to a standard plug which could be pushed into a wall socket in a room. I have an idea that a transportable set built on these lines would meet with very great success. It would be easy and cheap to run, and there is really no reason whatever why first-rate quality should not be obtainable from it.

What Has Happened?

I used to recommend any of my non-wireless friends who maintained that the loud-speaker could never reproduce real music to pay a visit to the Science Museum at South Kensington, where the B.B.C. demonstration set is installed. And a very wonderful receiver it was in conjunction with its Rice-Kellogg loud-speaker. You will notice that I write "I used to recommend . . ." At the moment I am rather wondering just what has happened. When I went round to South Kensington the other day I received quite a shock. Two loud-speakers were in use; not together, but first one and then the other. These were a Rice-Kellogg—the original one, I believe—and an instrument with an immense horn. The moving-coil was used first of all, and I could hardly believe my ears. It seemed reedy on the upper registers and boomy down below. Certainly, it wasn't in the least natural.

A Difference

I much looked forward to hearing the huge horn, for one has always understood that the size and shape of the trumpet plays such an immense part in the performances of this kind of loud-speaker. They turned on the horn. There was a distinctly metallic sound about it. On speech it turned single "s's" into quadruples and double "s's" into the kind of noise that an empty soda syphon makes when you press its lever. Why does reproduction here not sound so good to-day as it did a year or two ago? Is it that our ears have been educated up to expect much more than they did from the loud-speaker? Is it that the loud-speakers want an overhaul? Is it that the receiving set is not now up to date? Frankly, I don't know, but I would like to hear what any reader who has been lately to South Kensington thinks of these two speakers. There was a third there, but it was not in use, and I could not find out to what particular type it belonged.

Some Amplification!

During the past few weeks I have been trying out some of the newest types of screen-grid valves, and I must say that I am delighted with their performances. The great point about them is that, owing to their astonishingly low plate-grid capacity, one does not need to use the parallel feed circuit; they can, in fact, be employed with efficient transformer coupling. The difference this makes to the amount of mag. on the H.F. side has to be experienced to be believed. I know that now I have to use only a touch of reaction on most foreign stations instead of bringing the reaction condenser to perhaps 50 or 60 degrees, as was the case with the older S.G. valves and the parallel-feed circuit. Quite a number of foreign stations come through without any reaction at all, though I have only one H.F. stage, and powerful fellows like Nuremberg and Toulouse actually require a little volume control on good nights.

Did You Know?

By the way, you all know how very much better reception is in the winter time and how it falls off during the summer months. Various theories have been propounded to account for this fact, and wonderful pictures are drawn of Heaviside layers and other curious effects of this nature. In view of the high calibre of wireless technicians in general it is rather surprising that no one has stumbled on the real reason. With all modesty I lay claim to having discovered this, and I feel sure our readers will agree that it must be the correct solution in view of its astounding simplicity. It is simply that large numbers of electrons are having their annual holiday during the summer-time, so that it stands to reason that the electrical processes in the upper atmosphere cannot be carried out with the same activity as usual. I give this idea quite freely to the world, and I have no doubt that it will start the pundits off in all sorts of directions.

The Gramophone

The radio-gramophone is rapidly becoming a standard article, judging by advance information of the radio manufacturers' plans for the coming season. The number of queries we are receiving concerning "all-electric" gramophones is increasing weekly, and I intend to devote more attention to this "department" than heretofore. Several people have asked me if the electric turntable is really worth while, considering how reliable a really good spring gramophone motor is. The answer to this question is that a really good electric turntable *is* worth while, with the "rider" that A.C.-driven gramophone motors are more steady than those driven by D.C.

Steadiness

The chief requirement of a gramophone motor is that it shall drive steadily, with ample reserve power so that heavy modulation on the record will not slow up the turntable momentarily. Looking at the matter more from an idealist's point of view than from that of the practical man, I would say that the weight-drive used by many gramophone companies in recording give the most constant drive, followed closely by three-phase synchronous A.C. motors, used in many talking film and gramophone recording systems. Next in order of merit I would place A.C. motors, preferably of the synchronous type, driven from single-phase A.C. mains, such as are available in many of our homes. After these would come the best double-spring clockwork motors, D.C.-driven motors, and, finally, the single-spring cheap gramophone motor. Steadiness of drive insures that a constant note will not have that annoying tremolo effect and that there will be no tendency for the music to flatten in pitch towards the end of a record.

Luxury

I think people are inclined to turn down the spring-driven motor solely because of the winding up. After all, there is not much effort required to wind a good gramophone spring, and one winding should play two or three records. But if this small "labour-saving" luxury can be acquired at the same time as additional steadiness of speed, then it is all to the good. I have heard expensive electric gramophones giving most horrible vibrato effects, due to badly adjusted D.C. motors; in such cases as these the good old clockwork motor must be substituted and handle winding regarded as an act of self-sacrifice in the cause of better quality!

Three Speeds

The electric gramophone turntable of the future should, in my opinion, be capable of turning at three speeds, namely, 80, 78, and 33⅓ revolutions per minute. The first two speeds will deal with the principle makes of records, while the 33⅓ speed will make the motor capable of driving Vitaphone and other talking-picture records. There is no doubt that many of these eleven-minute-playing records will shortly be available to the public. These long-playing records are amusing for their novelty, with the speech and effects that synchronise with a reel of film, but many of the all-music records have a greater value than that of mere novelty. I have in my possession several Vitaphone records and have succeeded in making my gramophone run fairly well at 33⅓ r.p.m. The result on the loud-speaker is quite good, orchestral, singing, and dancing "numbers" coming through especially well. Apart from second-hand cinema records, it is highly probably that the gramophone companies will issue standard 33⅓ records.

THERMION

THE BERLIN RADIO EXHIBITION

A Critical Survey by an "A.W." Correspondent

THE exhibits at this year's annual exhibition of the German Radio Industry were arranged in three halls of the permanent Exhibition Ground. Two halls were devoted to apparatus and the remaining one to the work of the German Post Office in technical matters.

Taking the latter exhibit first, it included, as well as a complete record of German broadcasting, a display of "The Enemies of the Listener." This comprised a selection of all kinds of apparatus which can interfere with a receiving set, such as vacuum cleaners, electric bells, and violet-ray apparatus, together with a chart showing the suggested cure for any interference experienced from that source. Demonstrations were given of the efficacy of the cure.

A general view of the Berlin Exhibition taken from the Broadcasting Tower

Television

Another part of this exhibit was devoted to television, in which research has been financed by the Post Office. Several types of apparatus, including the systems of Baird, Karolus, and Mihaly, were on view and frequent demonstrations were given, the results being extraordinarily good. Two telephone booths were fitted with the apparatus developed by the Post Office itself, and visitors were allowed to converse and watch one another's faces on the televisor screen.

Throughout the exhibition the large conference hall was used as a studio by the Witzleben station, and as the whole of the transmitter was on view, including the 420-ft. Broadcasting Tower in the exhibition grounds, visitors were able to see the whole process of broadcasting, from microphone to aerial.

The outstanding feature of the new receiving apparatus was the very great popularity of all-mains sets and of moving-coil loud-speakers. Mains sets were exhibited by the dozen, having anything from two to six valves. All these receivers were of all-metal construction, although some were ornamented on the outside with Trolite mouldings, and in the case of large radio-gramophones the metal chassis might be fitted in a wooden cabinet. Prices ranged from £10 to £15 for three-valve sets and from £12 to £20 for four-valvers.

A typical example was the Kaston model, exhibited by Koch & Sterzel, of Dresden. This had an H.F. stage, an anode-bend detector, and two resistance-capacity-coupled L.F. stages, the last valve being a screened-grid output valve—a valve not used in England. Complete with valves, this set cost £16. Some sets of similar type were even cheaper. German designers have been clearly influenced by modern American practice in the construction of these sets and wiring in most cases was carried out with copper strip rivetted to the components. The resulting sets were surprisingly compact, and one all-mains three, the Telefunken, was in a metal case less than 8 in. each way.

Self-contained Sets

Another type of receiver much in evidence was the self-contained set, either battery or mains driven. This must not be confused with the transportable or portable as we know it. Rather, it is a cabinet loud-speaker with a set built in at the back of the case.

Portable sets are still a novelty in Germany, although two of those exhibited were excellent examples of this type of set, one being a screen-grid four and the other a six-valve superhet.

The cheapest type of set exhibited was that represented in England by the Loewe receiver. These sets consist of a one-piece hollow moulding of Trolite with the valves and coils mounted on top and the other components fitted inside. In the case of the Loewe and two others, multiple valves are used, but in all other makes three ordinary valves are supplied. Some of these sets measure less than 6 in. square, and they all cost about £2 or less, complete with valves and a set of coils.

Loud-speakers fall into two classes: cabinet cone types, fitted with 4-pole movements, and moving-coil instruments. The condenser type of speaker, at one time very common in Germany, has fallen into disfavour and was represented by only two types. The exponential horn, so popular in America and for "talkie" work, was exhibited at one stand only.

The number of 4-pole loud-speaker movements available, two or three of which are well known in this country, was seemingly endless, and it was very difficult to detect much difference between them. Some of the speakers using this type of unit were 3 ft. or 4 ft. square and amazingly sensitive, giving great volume when working from a pick-up followed by a two-stage amplifier. The most expensive of these speakers, almost capable of public-address work, cost about £9 and the small home

(*Continued at foot of next page*)

A television demonstration at the Exhibition

The Funkturm (broadcasting tower) which has a cafe at the top

For the Newcomer to Wireless: THE IDEAL AND THE ACTUAL

I AM rather puzzled over the screen-grid valve, which as you know I have been using for some weeks now.

What is the problem?

The amplification factor is stated to be about two hundred, but I am sure that I don't get ten times the magnification that a three-electrode valve with an amplification factor of twenty used to provide.

You certainly will not be able to do so.

Then will you please tell me why?

You know that in the three-electrode valve there must always be a small amount of capacity between grid and plate.

Yes. And in modern circuits this is neutralized by various means, isn't it?

That is so; and just because you are able to neutralize this capacity you can make the fullest use of the valve's amplification factor.

How exactly?

If you connect the plate and grid of the three-electrode valve to unneutralized circuits of very high efficiency, the valve will oscillate before resonance is reached owing to the feed-back through the tiny condenser which exists between grid and plate.

Neutralising cancels out the capacity—doesn't it?—and enables the circuits to be sharply tuned without their oscillating.

That's it, and when you tune both the grid and plate of a valve sharply with "low-loss" circuits the magnification obtained will very nearly reach the figure of the amplification factor. And you can go a step further.

How do you mean?

By means of a well-designed step-up transformer in the plate circuit it is possible to obtain an amplification of as much as forty per stage from a neutralized three-electrode valve.

And what about the screen-grid?

The purpose of the screen is to wipe out the capacity between control grid and plate; but it does not quite succeed and there is always a tiny amount of capacity left.

Can't we neutralize this?

It *could* be done but it would demand the use of rather complicated and tricky circuits. Most people are content to put up with the little capacity that there is and to use straightforward circuits.

What is the result of this?

We can't employ genuinely "low-loss" circuits in connection with both plate and grid of the S.G. valve. If we tried them we should find that the valve would oscillate.

Then I suppose we must compromise, as we so often seem to do in wireless?

The nail on the head! The great advantage of the screen-grid valve is that with quite simple circuits it gives far more amplification than the average triode, and that with complete stability.

What is the average amplification actually obtained from the screen-grid valve in broadcast reception?

Between thirty and forty on the medium band and rather more on the long waves, but it is very interesting to experiment with the S.G. valve to see how far you can go in the way of low-loss whilst still retaining stability.

How do you mean exactly?

Well, with effective screening you can use *one* fairly "low-loss" circuit with the valve and then you can go on to see just how far you can cut down losses in the second without upsetting stability. And don't forget that if you use the parallel-feed method in the plate circuit the high-frequency choke is all-important. It must be of first-rate make and in every way suitable for the purpose.

"THE BERLIN RADIO EXHIBITION"

(*Continued from preceding page*)

models about £2. The smaller speakers were mostly cased in Trolite mouldings, and special white porcelain finished models were available in the Telefunken range for use in hospitals and sick rooms.

Loud-speakers

Almost unknown a year ago, the moving-coil loud-speaker is now the fashion in Germany and there were well over a hundred types on view, most of which could be heard in the demonstration rooms attached to each stand. Probably because resistance-capacity amplifiers with high value anode resistances were used almost exclusively, the reproduction appeared to be lacking in the upper part of the scale, and with most of the instruments there was considerable resonance in the bass. Examination of many of the speakers showed that all of them, except the A.E.G., which is the standard Rice-Kellogg design, were fitted with the same centering device, a very heavy type. This may have accounted for all the speakers showing signs of resonance at about the same place in the musical scale.

Electrical gramophone reproduction has acquired a similar popularity to that of the moving-coil speaker, and every valve set in the exhibition was adapted for working with a pick-up. Almost all the manufacturers exhibited a new pick-up, costing about £1, and many showed electric motors and other components for building radio gramophones. Complete combination instruments, many with dual turntables and pick-ups for restaurant or hotel work, were available at prices between £20 and £50.

German Valves

Valves formed a very interesting comparison with the many types we have on the home market. With the exception of three 2-volt valves and one or two special types, all battery valves had 4-volt filaments. In addition to the usual ranges there were eight screen-grid valves, two double-stage H.F. valves, three pentodes, and several double-grid valves designed to function on anode voltages of 20 volts or less. These types had their counterparts in a very full range of mains valves, both directly- and indirectly-heated patterns being available, fitted with the standard 5-pin base. There were also two special H.F. triode valves with the anode connected to a terminal on top of the bulb, as in a screen-grid valve.

Rectifier valves were exhibited for all values of anode voltage and rectified current, and in nearly every case these valves were of the glow-discharge type. Metal rectifiers are not yet in general use, except for exciting pot windings of moving-coil speakers.

Among components there was an almost complete absence of intervalve transformers; resistance coupling, with grid-leak type anode resistances, and high-impedance valves, was used in the great majority of amplifiers.

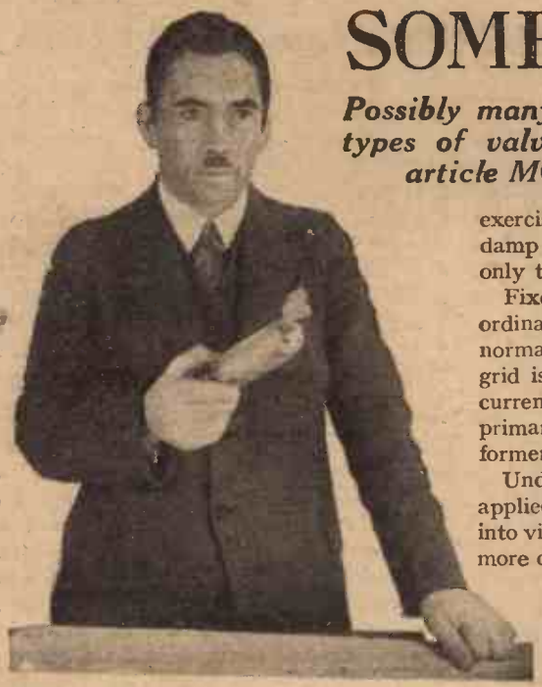
High-tension batteries, which have always been a speciality of German manufacturers, were much in evidence, and there was an interesting demonstration of the construction of each component cell of a battery by means of automatic machinery.

Mass Production

Considering the exhibits as a whole, the apparatus, especially the complete sets, showed a very high standard of workmanship, and the finish of most of the sets and speakers could not be improved. German designers have been handicapped by the need for producing cheap sets, and so in the past they have devoted more attention to ingenious methods of construction and simplicity of operation than they have to purity of reproduction. With the advent of the moving-coil speaker, no doubt, improvements in the design of amplifiers will raise the standard of purity of reproduction, and manufacturers in other countries will then have to follow Germany's lead in mass-production methods.

SOME UNUSUAL VALVES

Possibly many listeners will be surprised to know that there are many types of valve other than those used for wireless purposes. In this article MORTON BARR describes some outstanding examples.



IT is difficult in these days of intensive valve development to discover any really new principle, but the tribute of ingenuity can at least be paid to an ingenious type of valve microphone recently protected by two Scotsmen, Messrs. A. F. and D. A. Pollock, of Jedburgh.

In the ordinary way, a "microphonic" valve is a source of downright annoyance to the listener, because it is prone to produce sustained "noises" when subjected to any mechanical vibration from outside. The slightest jar—sometimes the mere act of walking across the room—is often sufficient to cause such a valve to give trouble.

"Microphonic" Valves

The usual cause is some imperfection in the mounting of the electrodes, especially the grid. If this is loosely held, or is too springy, it tends to swing slightly to and fro under any small shock. The resulting displacement is sufficient to set up a rhythmic variation in the electron stream between plate and filament.

Taking advantage, apparently, of the old adage, that "it's an ill-wind that blows nobody good," Messrs. Pollock have deliberately emphasised the "shaky grid" action, and have thereby produced a new type of microphone.

A Valve Microphone

Instead of being firmly held in position between the filament and plate, the grid is loosely pivoted inside the bulb so that it can swing to and fro. As shown in the diagram it consists of an L-shaped plate, pivoted at the point P. The lower foot of the plate extends into the path of the electron stream between the filament (which is shown in section) and the plate.

In order to prevent the grid from swinging too freely and so producing undesired "noise," a permanent bar magnet is mounted just outside the bulb. This exercises a restraining force which serves to damp the movements, so that they respond only to the applied sound waves.

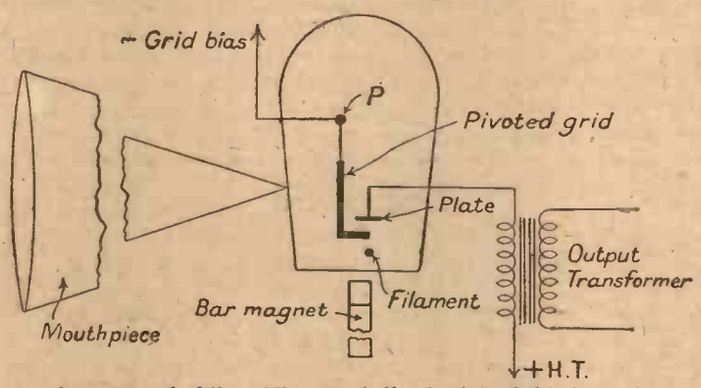
Fixed to the outside of the bulb is an ordinary mouthpiece as shown. Under normal conditions the foot of the pivoted grid is held steady by the magnet, and a current of definite value flows through the primary winding of the output transformer.

Under the influence of speech or music applied to the mouthpiece, the grid is set into vibration so that it intercepts or cuts off more or less of the electron stream according to the strength of the applied air waves.

Owing to the amplifying property of the valve, the volume of sound obtained from a loud-speaker connected to the secondary of the output transformer is much greater than that applied to the input, though further stages of valve amplification can be used if necessary.

A Self-steering Valve

A somewhat similar idea has previously been suggested elsewhere for a different, but equally ingenious, purpose. As before, the action depends upon the use of a moving grid, but in this instance the grid is actually a magnetised compass needle, pivoted inside an elongated glass bulb. In use, the



Arrangement of the "Microphonic" valve intended to be used as a microphone

compass grid, which naturally sets north and south, is arranged to lie accurately along the central axis of the bulb. In this position, it is aligned over a single-wire heated filament.

Two plates or anodes are situated above the moving grid, one being displaced slightly to the right or east, and the other to the left or west. So long as the compass grid remains centred above the filament, the effective current passing through the valve will be shared equally between the two plate circuits.

The whole arrangement is then fitted to a submarine, aeroplane, or other vessel which is to be steered automatically along a definite course. So long as this course is maintained, nothing happens; but if the vessel yaws to one side or other, the compass grid will swing to left or right, and so divert a greater proportion of the electron stream to one particular plate. A relay in the external circuit of this plate thereupon comes into action and operates the steering gear so as to restore the vessel to its original course.

Modern Valve Tendencies

Turning for a moment to the ordinary type of valve as used for broadcasting, it is an interesting matter to speculate in what direction the next outstanding development will take place.

Within the last year or so the most important improvements have related to the introduction of the screening-grid for radio-frequency application, and the development of the two-grid or pentode type for low-frequency amplification. Side by side with this tendency is the appearance of double-filament or indirectly-heated valves and filaments of low heat-inertia for using unrectified A.C. current taken directly from the electric mains.

The Battery Problem

The outstanding problem that still remains to be solved—upon which many inventors are still racking their brains—is how to lessen still further the supply of electric power necessary to energise the valve in operation.

The use of low-consumption and indirectly-heated filaments, together with continued improvements in the construction and design of mains-eliminator units, have undoubtedly gone far to minimize the battery problem. Whether the ideal "cold" valve, taking no filament current, and a comparatively small H.T. voltage, will ever be achieved remains to be seen. All that can be said is that it is not impossible.

The Grid-glow Tube

Some very extraordinary results have already been secured, for instance, with the so-called grid-glow tube. This is an electron discharge tube, in which no heated filament is used, but requires a high-tension

(*Continued in third column of next page*)

TANTALUM AS AN A.C. RECTIFIER

By W. W. WHIFFEN

CONSIDERING the important advantages tantalum has as a rectifier, it is surprising that it is not more generally used. For eliminators it is extremely useful as it has a very rapid cut-off, which reduces the amount of smoothing necessary. Its life is practically everlasting and when renewals are required the cost is only a fraction of that of the valve. Running costs are also lower as no energy is wasted in filament heating.

Against these advantages is the natural disinclination to have anything to do with acids or chemicals. The Noden valve is a chemical rectifier with electrodes of lead and aluminium in a solution of ammonium phosphate, and although generally satisfactory in results continued time and attention are required to keep it in good order. It is certain that those who have been satisfied with the Noden valve will be more than pleased with the tantalum rectifier. It has every advantage over the former except one. The exception is that tantalum possesses a much lower breakdown voltage.

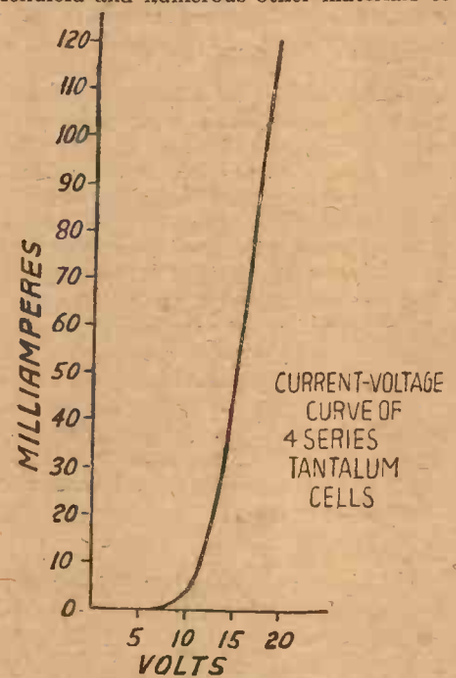
Breakdown Voltages

An aluminium cell of good design and construction will withstand a back-pressure of 100 to 120 volts. One authority on tantalum places its breakdown voltage at 27, but the writer considers this very much under-estimated. On a D.C. test, actual breakdown was not obtainable until 60 volts was reached. On an A.C. voltage the breakdown would be lower. An ample factor of safety is provided in fixing the breakdown voltage at 40. As the internal resistance at any current value required is very much lower than the aluminium cell, the volume of the electrolyte can be decreased very considerably. Instead of the usual 1- or 2-lb. jam jar, small pots of 1- or 2-oz. capacity can be used.

Current Density

Apart from the question of cooling, tantalum has a current density 100 times greater than aluminium, and can, therefore, have 1/100th part of its area. A safe basis for calculating current-carrying capacity to area is to allow 1 ampere per square centimetre of metal, which includes both sides. In English measurement this is equivalent to approximately 6.5 amperes per square inch. Thus, although tantalum is expensive to buy, only a very small quantity is wanted for amateur requirements. As an illustration of its long life, the writer constructed a trickle charger designed to supply ½ ampere to a low-tension accumulator. This has been in constant use for over two years and at present shows no signs of deterioration, although frequently it has been forced up to an output of 1½ amperes for normal charging.

Before such satisfactory results could be obtained, however, considerable experiment was necessary to obtain a reliable means of mounting the rare metal. Despite every care, the sulphuric acid in time found its way through bitumen sealing compound, celluloid and numerous other materials to attack the metal to which the tantalum was fixed and to stop the rectifying action. This trouble was particularly noticed in high-tension chargers. There is a certain amount of local heat generated during rectification, and one theory for the unexpected difficulty of making an acid-tight sealing round the tantalum and its connecting wire, is that during slight expansion of the metal when warmed up, the surrounding medium is forced out slightly. Upon contraction when the charger is not in use, a tiny aperture is obtained up which the acid creeps by capillary attraction.



Celluloid has been found repeatedly to be unsatisfactory in connection with tantalum chargers.

Internal Resistance

With a view to ascertaining their internal resistance, four rectifying cells for a high-tension charger were wired in series with a moving-coil milliammeter and a large-capacity high-tension accumulator. As the conductivity of the cells was required and not the breakdown voltage, positive of accumulator was connected to the outside lead electrode and the outside tantalum *via* the milliammeter to the negative of the H.T. battery. Until a pressure of 8 volts was applied no meter deflection was observed. At this figure one milliampere was registered, and 3 m.a. at 10 volts. At 12 volts the output rose rapidly to 12 m.a. The internal resistance of the cells continued to decrease rapidly until at 20 volts the meter was showing .8 ampere. These results are shown graphically. It will be seen from the graph that the tantalum cell when passing current in any quantity becomes an efficient rectifier. In addition it is entirely silent in operation, free from smell and perfectly clean. A tantalum charger or eliminator, designed with the avoidance of the pitfalls outlined and within its voltage and current limitations will give lasting satisfaction and amply repay the constructor for the time and labour spent upon it.

Baby tunes in! The radio nursemaid has come into being, and a set installed in a pram keeps the occupant quiet!

"SOME UNUSUAL VALVES"

(*Continued from preceding page*)

supply of considerable voltage.

This H.T. voltage is applied across two cold electrodes, one being in the form of a metal cylinder, and the other a vertical wire. Between the two is interposed a fine grid wire which ends in a point very close to the anode.

The action of the grid-glow tube depends upon the so-called "short-path" principle. If the distance between the grid "point" and the anode is made less than the free path of travel of the molecules of rarefied gas inside the bulb, the response of the device is extraordinarily sensitive.

It has been calculated that a discharge tube of this type is capable of magnifying a voltage stimulus applied to the grid more than one hundred million times. At present, such tubes are mainly used as ultra-sensitive relays for detecting and testing minute voltage variations.

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

A CLEVER surprise idea was somewhat spoilt in the handling when "a mystery play" was announced the other evening.

We were told that "the artistes were not called upon until that afternoon, nor was the play written by then." It was a surprise, in fact, to author, artistes, and producer.

◆ ◆ ◆

When the show was under way it turned out to be the most trivial of mystery plays

An impression of Miss Florence Marks

and might well have passed muster as a parody on thousands of this sort of penny dreadful. I wager that a good many listeners switched off, as I nearly did; in which case they lost the whole point of the surprise. It turned out to be a one-man show by the ever-brilliant Bransby Williams. He it was who wrote the "masterpiece" and took *all* the parts; thus providing a real surprise.

◆ ◆ ◆

As I say, it was a pity that we were not told beforehand that all the parts were being taken by one man, so that one might have enjoyed trying to detect a similarity in tone, etc.

◆ ◆ ◆

I am sorry to see that an ex-announcer is criticising slight errors of pronunciation by a new announcer. This is hardly worthy of him. The new announcer isn't doing at all badly, although one was sorry for the departing announcer.

◆ ◆ ◆

I was greeted in the house on my return home with: "There was some horrible 'Foundation of Music' playing to-day!" It turned out to be the modern pianoforte sonatas! And perhaps it was just as well that I was detained in the City.

◆ ◆ ◆

I heard part of the Zepp. transmission in the drawing-room at Savoy Hill. No doubt they have a super-super-super receiver there, for it sounded excellent. Miles better than anything I have heard from across the "herring pond."

◆ ◆ ◆

I don't know that I cared very much for the play by Pirandello; which shows, of course, that I do *not* belong to the coterie of highbrows who make a fuss of this kind of play.

◆ ◆ ◆

Vernon Bartlett steered very carefully through the difficult channels of the Palestine dispute. I was interested to see what would happen in his survey of a question of such an inflammable nature. But beyond a legal reference to the dispute, which is open to question, it was done perfectly.

◆ ◆ ◆

Dr. Thomas Gann's talk on "In Search of a Treasure Temple in Central America" was interestingly simple—and simply interesting. The more pioneers the B.B.C. gets to the microphone, the better.

◆ ◆ ◆

Florrie Ford was a vocal ghost of the past, although, if my recollection of her is right, you could scarcely call her a ghost *physically*. It was an interesting experiment, and must have been a revelation to the younger generation as to the manner in which some of us elders enjoyed ourselves in the long ago.

Sandy Rowan was bright and fresh, as usual, during the vaudeville hour. A song I have not heard before, "We're all Scotch, every one of us," went with a lilt, while his jokes appear to be as fresh as his personality. But why does he say "trew blew" for "true blue"? Isn't this a mixture of Scotch and American. Oh, Sandy!

◆ ◆ ◆

As a rule, the *compere* (which I believe is French for something or other) is a bore. But Claude Hulbert and Enid Trevor were not so bad. Many of the vaudeville hours are spoilt by the stupidities of introducers.

◆ ◆ ◆

My young adviser on dance-music matters, "Harold," pops up again after a long silence with a kind word for Philip Brown's hard-working Dominoes Dance Band. "Although I have said none too complimentary things about this little band before," he writes, "I must say that they seem better each time I hear them. They have improved beyond expectation."

"Harold" suggests that the band is far too small for broadcasting purposes and would make the nucleus of a very good band if only the B.B.C. would encourage it to increase the personnel.

Charles Keys—seen through Lissenden's eyes

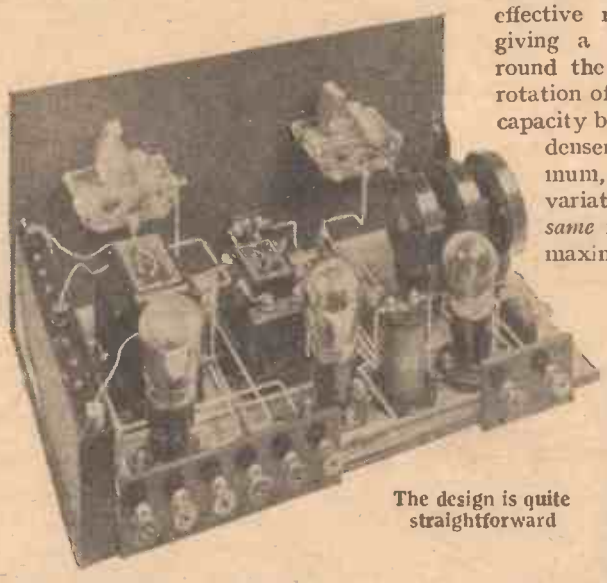
Operating The ALL-W

Constructional details of this set, which has been expres
Below are instructions on its

IN addition to those who have built, or intend to build, the set described and illustrated last week, its operation and maintenance should be of general interest and value. As explained previously, the tuning wavelength range extends from the ultra-short waves to the long waves; this flexibility of tuning is made possible by the use of plug-in coils, which are changed from ultra-short to medium-wave sizes and from medium-wave to long-wave sizes.

Coil Sizes

In all, nine plug-in coils are required; the best sizes for average aerials have been found in the AMATEUR WIRELESS Test Laboratory to be as follows : For the ultra-short waves the aperiodic coil should be a No. 2, the secondary or middle coil a No. 6, and the reaction coil a No. 6 or No. 9. Suitable short-wave coils to be recommended are Atlas, Igranic, and DX makes.



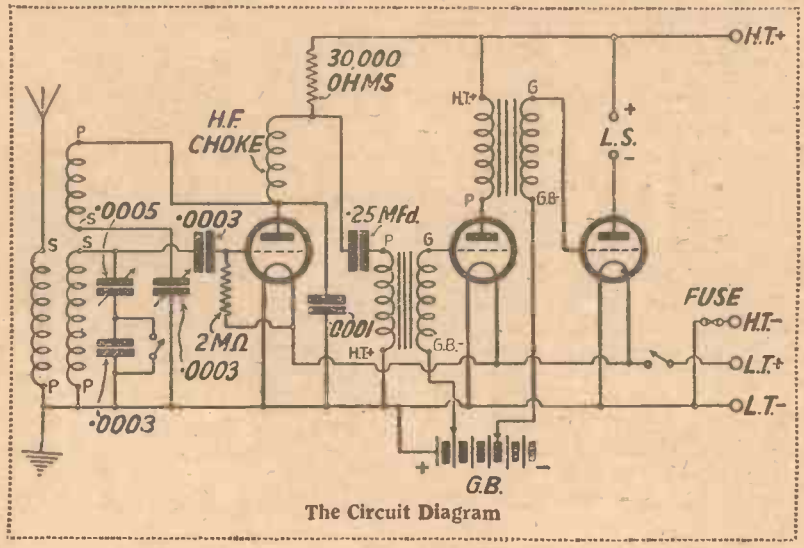
The design is quite straightforward

A No. 6 size, with the variable condenser specified, will give a wavelength range of approximately 30 to 80 metres. For the lower waves in this band the shorting strap across the .0003-microfarad series fixed condenser should be opened, so that the effective maximum is reduced, thereby giving a greater separation of stations round the dial. Instead of the complete rotation of the dial covering a variation of capacity between the minimum of the condenser and a .0005-microfarad maximum, this rotation will only cover a variation of capacity between the *same* minimum and a greatly reduced maximum.

For medium waves—on what is generally termed the broadcast band—the aperiodic coil is not critical, sizes of No. 30 and No. 40 giving a fair compromise between maximum selectivity and maximum signal strength. The secondary coil should be a No. 60 size, as this will cover all wavelengths between 250 and 550 metres. Reaction is not critical, a No. 40 being quite suitable.

Long-wave Coils

On the long waves, where Daventry 5XX and other high-power long-wave stations can be heard, the aperiodic coil should be a No. 150, the secondary a No. 250, and the reaction a No. 60 or No. 75.



The Circuit Diagram

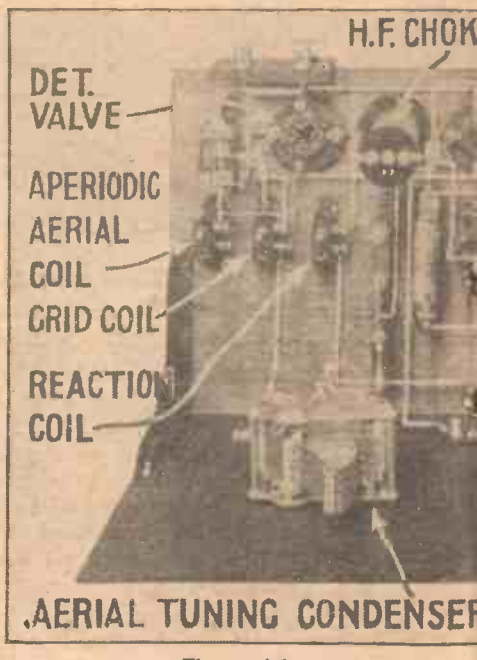
Suitable Valves

The choice of valves for this set is rather important, as actual tests have very strikingly proved. For those who desire to get really good quality reproduction (and who does not?) we recommend the following: The detector to be a valve of about 20,000 ohms impedance, the first low-frequency valve not more than 5,000 ohms impedance, and the second low-frequency valve not more than 3,000 ohms impedance. Excellent quality was obtained with a PM1HF as detector (22,550 ohms), a PM2 as first low-frequency valve (4,400 ohms), and an Osram P240 as second low-frequency valve (2,500 ohms).

The impedances of the first two valves have been chosen with reference to the impedances of the transformers that follow them; the last valve is chosen to suit the loud-speaker, which in one test, to take an average condition, was one of the linen-diaphragm types driven by a Bluespot unit. If the impedances of the first two valves differ greatly from those recommended, such troubles as motor-boating and distortion will inevitably develop.

H.T. Consumption

With these valves the measured H.T. anode-current consumption was 16 milliamps., the maximum voltage from a nominally rated 120-volt battery being 106 volts at this load. For economy of



The special features of the set

AVE HIGH-MAG. 3

sly designed for volume, were given in last week's issue.
maintenance and operation

working the super-capacity type of dry battery is strongly advised, because with a power valve in the first amplifying stage and a super-power valve in the second amplifying stage, the current drain is far too heavy for the standard-capacity battery.

The grid-bias values with the above valves and high-tension battery are as follows: 9 volts for G.B.—1 and 15 volts for G.B.—2. A reduction of either of these values will send up the anode-current consumption in a particularly wasteful way; hence the importance of following the values given.

Operation of the "All-wave High-mag. 3" is simple enough for even a novice, though the technique of simultaneously tuning and adjusting the reaction can only be learned by experience. With coils, valves, and batteries fixed up, the operation of the set consists in setting the reaction-condenser dial on the right at zero, pulling out the filament switch knob, and then slowly turning the tuning condenser on the left until the nearest transmitting station is tuned in. This steady signal will prove useful in the preliminary adjustments of grid bias, etc., after which the real business of "finding the wavelengths" can be undertaken. Although not primarily designed for long-distance reception, the set will always have a number of stations at its command, because of its wide wavelength range. The ultra-short waves will provide the most interesting long-distance reception; American short-wave stations and Continental amateurs provide plenty of telephony.

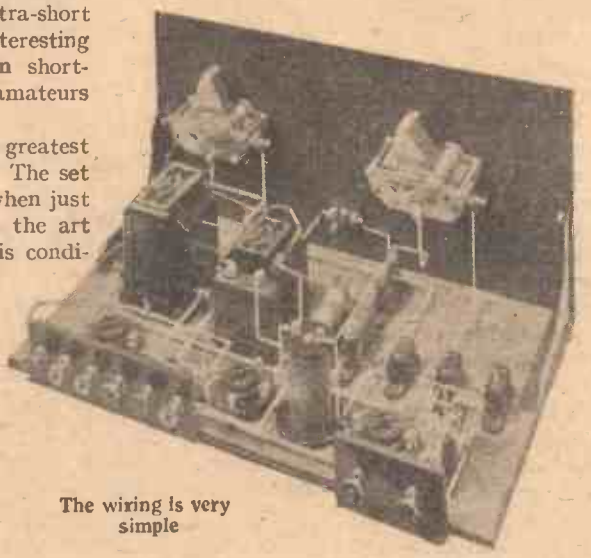
It is on the short waves that the greatest adeptness in tuning is necessary. The set is in its most sensitive condition when just short of the point of oscillation; the art lies in tuning the set when in this condition, and the difficulty lies in the fact that this condition changes for every point of tuning.

The simplest process is to vary tuning and reaction in sympathy; start by allowing the set to oscillate, then adjust the reaction dial to a point just below that at which oscillation sets in. Turn the tuning-condenser dial a few degrees to the right and left of the setting at which oscillation was obtained; then see how much more or less reaction-dial setting is required to start oscillation. It will be found that less reaction is required on the lower settings of the tuning dial than on the higher settings.

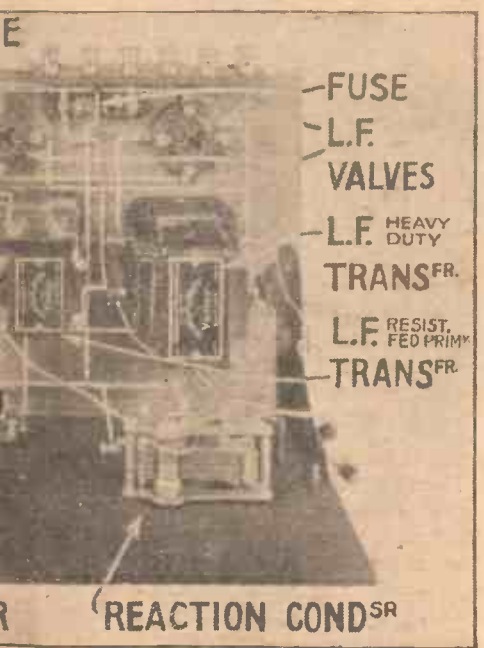
The point to bear in mind is that on short waves the sensitivity is definitely reduced if the set is allowed to oscillate. Of course, oscillation will sometimes have to be resorted to when a weak distant station is being picked up, but as soon as the dial setting is located reduce oscillation to the predetermined point. A great number of quite strong signals on the short-wave band can be entirely missed by over-oscillation. When receiving C.W. morse signals allow the set to oscillate gently; too much oscillation will reduce the strength of this type of signal.

Medium-wave Coils

On the medium-wavelength band the chief concern will be selectivity; here the use of the aperiodic aerial-tuning coil will be appreciated. If a rather large aerial is involved and selectivity is perhaps inadequate with the coil specified, try a smaller size—No. 25, for example. If selectivity is not the main object, but instead of this maximum signal strength from a certain station is desired, a greater volume of sound can be obtained by taking the aerial lead to the centre terminal of the grid condenser, thereby connecting the aerial direct to the secondary coil; a smaller size may then be required for the secondary.



The wiring is very simple



are indicated in this photograph

LIST OF COMPONENTS

Ebonite panel, 16 in. by 8 in. (Becol, Raymond, Ebonart).

Two strips, one 3 in. by 2 in. and one 6 in. by 2 in. (Becol, Raymond, Ebonart, Paxolin).

.0005-mfd. variable condenser (Lotus, Lissen, J.B., Burton, Igranic, Polar).

.0003-mfd. variable condenser (Lotus, Lissen, J.B., Burton, Igranic, Polar).

Push-pull filament switch (Bulgin, Lissen, Benjamin, Wearite, Lotus).

Panel brackets (Ready-Radio, Bulgin).

Two slow-motion dials (Brownie, Varley, Lotus, Lissen).

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

Three valve holders (Godwinex, Wearite, W.B., Lotus).

.0003-mfd. fixed condenser, with series clip (T.C.C., Dubilier).

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

.0001-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

.0003-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

.25-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Graham-Farish).

30,000-ohm wire-wound resistance, with holder (Ferranti, Dubilier, Varley, Lissen, Ready-Radio).

Three single coil holders (Lissen, Lotus, Igranic).

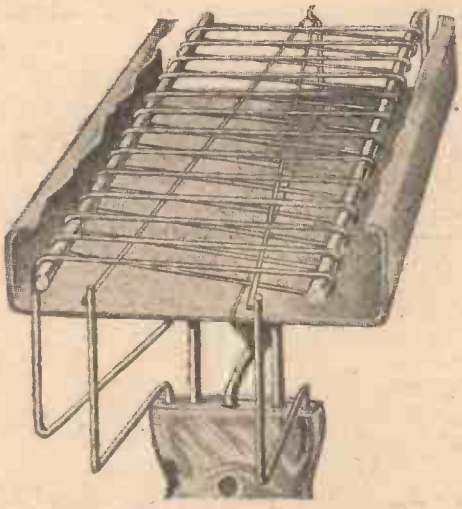
Screen-grid high-frequency choke (Bulgin, Peto-Scott).

Low-frequency transformer (Varley "Nicore" No. 1, Igranic "J," Philips).

Low-frequency transformer (Varley "Heavy-Duty," Ferranti, Igranic, Lissen).

Fuse carrier (Bulgin).

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



The internal elements of the new valve

NEW LONG-LIFE VALVES

A Recent Filament Development

WHEN a valve manufacturer who has had a great amount of success with his valves over a period of years (with both ordinary private users and receiver manufacturers) decides to introduce an entirely new series, we may be certain they really represent an advance over existing types.

Cossor valves, as issued during the past year or two, are much too well known to need description here. Everyone knows of their remarkable characteristics as expressed in terms of electrical efficiency and long life.

But now the Cossor people are issuing even better ones. The valves have been entirely redesigned. They have a new type filament, providing an emission that is even greater than that from the older valves. The construction is new and, in fact, the whole process of manufacture has been revised.

Microphonics

One of the troubles in the past with all makes of valves has been that high-impedance types, as often used for detection, have tended to be microphonic. It has been difficult sometimes to receive without valve noises being troublesome. The whole subject of valve noises was, therefore, investigated by the research and development sections of the Cossor company, who succeeded not only in discovering the reason for microphonic noises, but, and this is more important, in finding how to manufacture valves that would remain perfectly silent throughout their life, even when used under the most unfavourable conditions.

Microphonic noises are due, to an extent, to the construction of the filament and its supports. Attention to these factors has resulted in the production of a different filament and a new style of mounting it in association with the other electrodes, with the happy result that the new valves are not only silent, but their filaments provide a greater emission and have even longer lives.

Seven Types

We have received samples of seven types having 2-volt filaments for test. They are rated as follows:

Type.	*Filament Current.*	*Impedance.*	*Amplification Factor.*	*Remarks.*
210 H.F.	.1 ampere	20,000 ohms	20	H.F., det., L.F.
210 L.F.	.1 „	12,000 „	10	First L.F.
210 R.C.	.1 „	50,000 „	36	Res. cap.
220 P.	.2 „	4,000 „	8	Normal power
230 X.P.	.3 „	2,000 „	4	Extra power
220 S.G.	.2 „	200,000 „	200	Screen-grid
230 P.T.	.3 „	20,000 „	40	Pentode

These valves have been tried in various receivers in order to obtain an idea of their sensitivity, quietness, and freedom from howling, and their ability to magnify with the minimum of distortion.

They have proved without exception to be excellent. The 210 R.C. makes a splendid detector valve when the coupling is of the resistance type, or a transformer when there is only one L.F. stage; the magnification would be too great were a transformer coupling used with two low-frequency stages.

We were also particularly struck with the 230 X.P., which handles powerful signals without the least trace of valve distortion.

In a receiver having an ordinary high-frequency stage we tried one of the new 210 H.F. type, and here again there was a distinct improvement in the sensitivity and selectivity, whilst the receiver was much more easily stabilised. This may be attributed to the improved characteristics of the valve and to its relatively low electrode capacity. Cossor valves have a skeleton type base which results in the capacity being less than when a solid base is used.

Type 220 S.G., which is a shielded valve having very good characteristics, was tested in a portable receiver, in which it provided greater magnification than other types tried, with freedom from howling and instability. All the electrodes of this type are firmly locked together, a form of construction which ensures that the valve will not suffer should it accidentally be knocked.

Small H.T. Consumption

A point of great importance to those who use dry batteries for high tension is the amount of the anode current which passes when the valves have their correct grid bias. Tests of the new valves show a saving in anode current as compared with the old types, which were not extravagant valves by any means.

A full test report of the new valves will be given in an early issue, when it will be seen from the actual figures obtained in the laboratory that the manufacturers are working to close limits. They are to be congratulated upon having produced a fine range of new valves. We understand that 4- and 6-volt types are about to be issued in the new improved form.

Cossor new process valve—note the new label on the bulb

Meteorological reports and weather forecasts are broadcast daily from the observatory situated on the summit of the Pic du Midi de Bigorre, in France. A correspondent reports having picked up these transmissions at about 5.15 p.m. B.S.T. on a wavelength of 253 to 258 metres. The power of the transmitter is only 150 watts, but the announcement in French, "*Ici Poste de l'Observatoire du Pic du Midi de Bigorre*," was clearly heard.

"A.W." TESTS OF APPARATUS

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

Trix Valve Holder

THE new Bob Brown anti-microphonic valve holder marketed by Messrs. E. J. Lever (Trix), Ltd., of 8-9 Clerkenwell Green, E.C., is an interesting example of modern production. Here we have a small and compact valve holder of the vibratory type produced at a price nearly a third of what we used to pay only a year or two ago.

The valve holder is in two portions, a centre moulding holding the valve sockets and an outer shell to which the centre portion is anchored by four springs which serve to make the connections between the valve sockets and the terminals. The centre moulding is provided with a groove so that the valve may be rotated until the pins automatically find their correct slots while the contacts are recessed to a depth of nearly one-eighth of an inch so that accidental contact is practically impossible.

The construction of the springs themselves showed evidence of thought, for there is a great tendency for phosphor-bronze springs to break off at the point where the spring turns into the valve socket. To avoid this, the stamping has been specially shaped so that there is no

Trix Valve Holder

sharp bend at this point and we imagine that this should overcome the difficulty to a large extent.

Throughout the job gives evidence of careful thought and it should prove an attractive and satisfactory line in use.

New Mazda Valves

AFTER inspecting the characteristics of the new Mazda valves, one cannot help wondering if there is any limit to the efficiency that can be obtained from the modern valve. The super-Mazda 240 power-valve for example, has a mutual conductance approaching a figure of 4, whereas only two years ago a figure of 1 was considered quite satisfactory.

The two-volt valves in the new range include an H210 which has an A.C. resistance, as measured in our laboratory, of 66,500 and an amplification factor of 40. This valve is the latest type of resistance-coupled amplifier, but owing to the much lower value of impedance it can also be utilized in choke-coupled and even transformer-coupled amplifiers.

The next in the series, the H.L.210, is a general-purpose valve with an A.C resistance of 22,000 ohms and an amplification factor of 23. As a high-frequency or detector valve or even a first stage low-frequency valve in portables, it should prove most satisfactory.

Then we come to the L210 with an A.C. resistance of 10,500 ohms and an amplification factor of 16, this being an excellent valve for anode-bend rectification as well as first stage L.F. amplification.

The power-valves have exceptionally fine characteristics: firstly the P220 has an A.C. resistance of 4,500 and an amplification factor of 10.8 and secondly the P.240 has a resistance of 2,000 and the astounding figure of 9 for an amplification factor. There is little need to comment on these figures as they speak for themselves.

A valve of some importance is the new Mazda 2-volt screen-grid. The figures here depend of course on the conditions under which measurements are made. We obtained an A.C. resistance of 134,000 with an amplification factor of 200, giving a mutual conductance of 1.49 which is a good figure. In addition the internal capacity of the valve is extremely low, being .005mmF only. This means that the maximum amplification obtainable before instability occurs is greatly increased.

Finally we have a Mazda Pentode 220. Here the makers have been satisfied with a fairly efficient valve. The resistance is 53,000 and the amplification 54. The makers have attempted to strengthen up the electrodes and design them in such a manner as to overcome to some extent the vulnerable qualities of this particular class of valve.

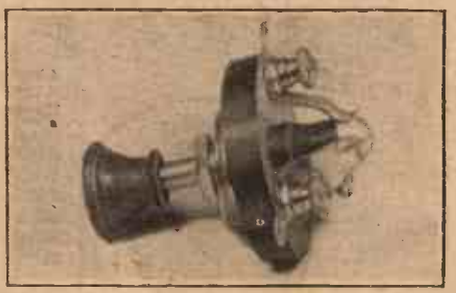
The agreement between our figures and the rated values is fairly close, while there is no doubt that the efficiency of the new Mazda range is beyond question.

Pioneer Switch

THE number of push-pull switches on the market is not by any means small and it would seem as if there could be little new in this direction. Our first impression of the Pioneer battery switch was that it was just "another push-pull switch," but closer inspection revealed that this was not a fair statement, various points being revealed which made the component of undoubted merit.

The springs are of nickel silver and are shaped at the top to conform with the plunger. The other end of the spring is finished off in the form of a soldering tag giving a one-piece contact. At the same time terminals are provided for convenience.

When this switch is in the off position the springs rest in a grooved portion on the plunger, the diameter being less than the diameter of the contact portion. Thus, the springs are not perpetually strained, but are at rest when the switch is not in use and under tension when the switch is making contact. This is a useful property and should do much to avoid the noises



Pioneer Switch

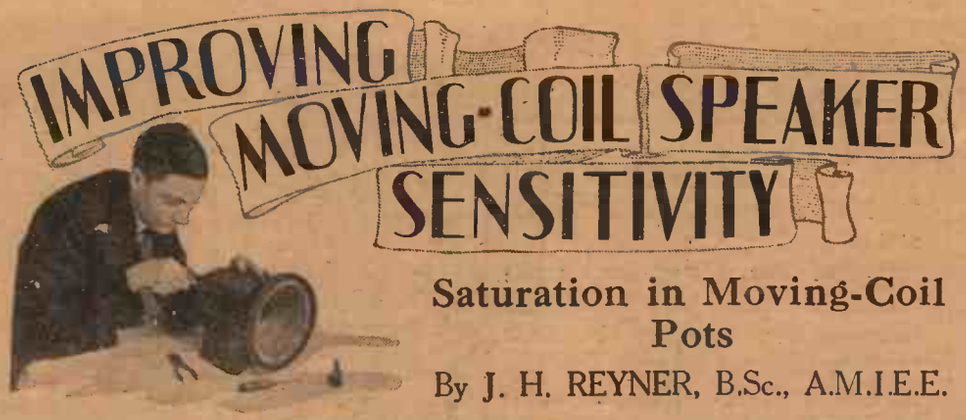
which occur in push-pull battery switches after they have been in use some time.

The action is definite without being harsh and the whole switch is of a workmanlike construction. The particular sample we tested was a three-point switch of the type often used in modern circuits, but a similar battery switch is made having two contacts only.

The prices are very reasonable in view of the quality of the articles. The makers are The Pioneer Manufacturing Co., of Cromwell House, Fulwood Place, W.C.1.

FUSSY LANDLORD: "You say you have no piano, no gramophone, and only a crystal set? You seem to be the quiet tenant I have been looking for."

FLAT-HUNTER (*sarcastically*): "I think I ought to tell you my catswhisker sometimes squeaks a bit!"



Saturation in Moving-Coil Pots

By J. H. REYNER, B.Sc., A.M.I.E.E.

IN the article which appeared the week before last the general principles of the magnetic system used in a moving-coil loud-speaker were discussed, and it was shown that the magnetic circuit was made up of two portions. The first of these was the iron or magnetic material of the magnet system, while the second was the air gap in which the coil vibrated. The object of the designer is to obtain the greatest possible field in the air gap as the sensitivity of the loud-speaker depends essentially upon the strength of the field, other things being equal.

It was shown that one of the methods of improving the sensitivity is to reduce the gap, since the reluctance or magnetic resistance of air is much greater than that of iron, but that we are limited by practical considerations, and a gap of about $\frac{1}{16}$ in. is the smallest permissible. In order to improve the sensitivity still more it is necessary, therefore, to investigate the iron circuit to see if any increase in the field strength can be obtained from this direction.

Increasing Field Strength

At first sight it would appear as if this would not be possible, for even under the best conditions the reluctance of the air gap is between two and three times that of the iron, and the only method of obtaining increased field strength seems to be to increase the number of turns or the current flowing round the magnetising winding, or both. There are, unfortunately, two factors which come into operation as soon as this simple solution is applied to the problem. It is the appreciation and satisfactory disposal of these problems which results in a good design.

The first factor is that iron does not behave in a uniform manner and its magnetic reluctance increases rapidly after a certain point is reached. This effect is known as "saturation" and has a certain physical meaning. The atoms of the iron are made up of tiny belts of electrons rotating in orbits of their own, and the application of an external magnetising force tends to turn all the atoms in one particular direction, so that the tiny magnetic fields produced by the electrons all add up together and produce a resultant appreciable magnetic effect. As we increase the magnetising force the magnetic effect increases until we reach a point where the majority of the atoms have already taken up their appropriate positions. Beyond this point it is clear that the increase in the magnetic field with increased magnetising force will not be anything like as rapid because the iron is becoming saturated.

It is this effect which gives rise to the well-known magnetisation curves such as are shown in Fig. 1. Here the saturation effect is quite marked, there being a distinct bend over in the curve. The point

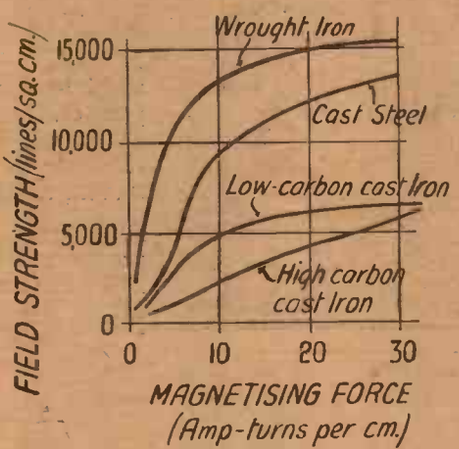


Fig. 1. Typical magnetisation curves

which is of interest, however, is the difference between the various forms of magnetic material. Cast iron, for example, is poor, whereas cast steel is distinctly better, and wrought iron is even better still. Thus, with the materials shown, a given magnetising force applied to the iron circuit produces the greatest magnetising effect with wrought iron.

The first essential in a good design, therefore, is to use good quality iron or steel, so that for a given magnetising force we get the greatest possible magnetic effect. The design then simplifies itself into one of mechanical considerations. We are able to apply a certain voltage across the speaker winding. This may be 6 volts, 100 volts, or 200 volts, according to the circumstances, and we have in our minds some current which the loud-speaker shall take. This determines the resistance of the winding, and consequently the size of wire which can be used.

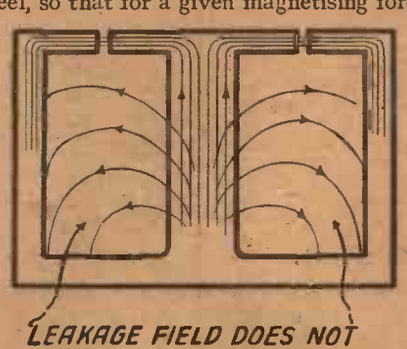


Fig. 2. Leakage Paths of moving-coil speakers

Limitation of Turns

Consequently, with a given size of pot, the number of turns which can be put on is determined at the outset, and the best design is the one in which the greatest possible use is made of the iron circuit. Increasing the size of the pot enables more turns to be put on, but it also increases the total length of the iron circuit which counteracts to some extent the effect of the increased current. A further important point is that of the leakage, for a great percentage of the magnetic field does not flow across the gap at all, but leaks across from the sides of the pot to the centre, as indicated in Fig. 2.

Because of this the design is largely empirical. It depends upon practical experience to a great extent, theory being used to assist the design, and data collected from experience to determine the percentage of leakage and such like. It is no uncommon thing for half the original field strength to be lost in leakage in this manner.

Measuring Field Strength

The measurement of the field strength obtained with the various experimental models is, of course, a matter of distinct interest, as it is necessary to see how far the actual results tally with the theoretical. There are various ways in which this may be done, one of the simplest being known as the "search coil" method. For this purpose a small coil having a suitable number of turns is made up on a former which just fits inside the gap, and leads are taken from this coil to an instrument known as a "ballistic galvanometer." This is an instrument which has what may be termed a sluggish movement. If it is set swinging it will take a long time over each swing. It is, as it were, slow off the mark, and that is the feature which is utilised.

If the search coil is suddenly withdrawn from the gap a voltage is induced in the coil, depending upon the number of turns and the field strength in the gap, and this sends a sudden pulse of current through

(*Continued on page* 308)

"IMPROVING MOVING-COIL SENSITIVITY"

(*Continued from page* 306)

the galvanometer. If the galvanometer is ballistic this current will have come and gone before the galvanometer has had time to move. The moving system, therefore, has received a sudden shock which will cause it to give a certain deflection, and it is possible, by noting this deflection, to work out the actual quantity currents which passed in the sudden pulse. Since this current was produced as a direct result of the magnetic field in the gap, we can work backwards and find what that field is.

In practice, therefore, the method is very simple. The search coil is inserted in position and connected to the galvanometer. It is suddenly removed, and the pointer on the galvanometer swings over to a certain figure and then slowly comes back to rest. From the calibration of the galvanometer and the indication obtained it is possible to determine exactly the field strength of the gap, and by this means a very quick and easy method of comparison is obtained for various forms of magnetic system.

The order of magnetic field obtained in the air gap of a moving-coil speaker is between 5,000 and 10,000 lines of force per square centimetre. To reach the latter figure necessitates a very good design and a very small air gap, but if this strength of field can be attained, then the sensitivity of the speaker is comparable with a good cone speaker. If, on the other hand, the gap is made larger and, as is very often the case, the iron circuit is not too well designed, the field strength is more likely to be of the order of 5,000 lines per square centimetre, or even less, and in such cases the sensitivity is poor.

Obviously, although one may be prepared to sacrifice a certain sensitivity for quality, there is a limit to this when the power output necessary from the amplifier to obtain satisfactory volume begins to exceed the safe distortionless output, and for this reason it is best to give due attention to the sensitivity question.

NEXT WEEK:

A Complete Guide to the Show and Two Fine Receivers

SECRET WIRELESS

ONE system for rendering wireless telephone messages unintelligible to an unauthorised listener consists in splitting up the applied speech-currents into two separate bands by means of filter circuits inserted in the microphone leads. One band covers frequencies between 500 and 900 cycles, whilst the other extends from 900 to about 1,500. The two speech bands are then applied to separate modulators, and are radiated on carrier-waves at different frequencies.

At the receiving end, before the transmitted speech can be understood, it is necessary to rectify each carrier-wave separately along suitable filter channels, and afterwards to re-combine the speech components in a common receiver. M. A. L.

PLATE RESISTANCE

THE term "internal impedance" is very often used loosely when "plate resistance" is meant. The former expression is open to two objections. In the first place every valve has two internal circuits, viz (*a*) from plate to filament and (*b*) from grid to filament, and these have very different values. In the second place the nature of the path traversed by the electron stream is a pure resistance, not an impedance, since it has a practically constant value at all frequencies. B. A. R.

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

What Value Grid-leak ?

Q.—*I have been informed that I shall get greater sensitivity from my receiver by replacing the present 2-megohm grid-leak with one having a value of, say, 3 megohms or even 5 megohms. Can you advise me in this respect?—F. S. (Ipswich).*

A.—The value of the grid leak is governed by the type of valve used and the value of the grid condenser. A value of 2 megohms, for the grid leak, is usually employed with a grid condenser having a capacity of .0003-microfarads. These values have been found to be satisfactory for most present-day valves used as cumulative grid rectifiers. Increasing the resistance of the grid leak does not, as is popularly supposed, increase the sensitivity of the detector valve, but, in most cases, such an increase in grid leak resistance will improve the stability of reception. The best method of improving the sensitivity of a grid-leak detector valve is to introduce a potentiometer across the filament terminals of the valve and to take the end of the leak, which normally connects to positive L.T. to the sliding contact of the potentiometer. Where the introduction of a potentiometer on the panel would upset the balance of the panel layout, a fixed-tapped potentiometer such as the Lewcos or Polar could be used. These can be screwed to the baseboard inside the receiver and perform similar duties to the usual variable type potentiometers.—C. A.

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

Testing Battery-eliminator Voltages

Q.—*I have recently installed a battery eliminator for H.T. only and although this works extremely well I thought I would make sure of things by testing across the different points with a voltmeter. You may imagine my surprise when I found that the maximum voltage being delivered to my set at the power terminals was only 50 volts and that to the detector valve was only 25 volts ! In view of this and the fact that my set works quite well I should think that if the eliminator were giving the proper voltages I should get even better results. Can you assist me to trace the lost volts, so to speak, so that I can still further improve my reception.—D. A. (London).*

A.—Your "lost volts" are only mythical. Actually you are getting the necessary voltages applied to your receiver but it appears that you are testing your eliminator voltages with a low-resistance voltmeter which gives a totally inaccurate reading. To be sure of reasonable accuracy in your voltage tests you should use a high-resistance voltmeter. One having a resistance of 1,000 ohms per volt is suggested. Such an instrument, although practically a laboratory instrument can now be obtained for a very reasonable figure from Messrs. Ferranti, Ltd., and you are advised to use one of these voltmeters for any further tests you may conduct. Your present instrument may consume quite a large amount of current.—L. C.

"The SHOW SECRETS REVEALED"

(*Continued from page 284*)

So far as portables are concerned, two former snags, namely excessive weight, and lack of economy, are being rapidly killed and you will find important steps in this direction from a brief tour of the Exhibition.

It is being realised that home constructors want to make their own H.T. and L.T. eliminators and many prominent manufacturers are marketing power resistances, chokes, transformers, and so on, which are just what is wanted for the home construction of mains units.

Wide Range of Components

Generally the whole range of component parts available to the amateur is being rapidly increased and it is a safe prediction that the lot of the home constructor will be a very happy one in the coming season.

For those, too, who wish to purchase ready-made receivers, everything has been done to make operation and maintenance as simple as possible. It is an open secret that in many cases "one-control" is rendered possible by the use of a number of aperiodic H.F. stages (a scheme which can be very efficient if properly designed), and with most radio gramophones mains operation is a *sine qua non*. Even with ordinary sets, provision is made in ninety-nine cases out of a hundred for the use of an electric pick-up. Gramo-radio has certainly come to stay.

Short-wave gadgets are not so much in evidence, perhaps as in former years and probably at the Show, they will be swamped out by the increased number of clever devices for ordinary broadcast reception.

MORE RADIOGRAMS

Half the cost of operating station WAPI (Birmingham, U.S.A.) is shared by the city each month.

The police department of San Francisco has issued special police badges to five local broadcasting stations to be divided among their staff members. The passes will be used to admit them beyond police lines at fires, wrecks, road accidents, etc., to obtain information for broadcasting.

The most beautiful feminine radio staff artiste in the United States will be picked when the sixth annual Radio World's Fair takes place in New York, September 23 to 28.

NEXT WEEK

A GREATLY ENLARGED ISSUE

COMPLETE GUIDE TO THE SHOW

USUAL PRICE, 3d.

RADIO IN FRANCE

IN his annual report to the Department of Overseas Trade, Mr. J. R. Cahill, our Commercial Councillor in Paris, gives an interesting account of the progress of the radio industry in France. Upwards of 30,000 people are now constantly engaged in the manufacture of wireless sets and components. Although French exports of radio appliances exceed their net imports, it is satisfactory to note that a great number of British products are sold over there, among which loud-speakers are especially in evidence. M. B.

STARCHED LINEN FOR CONES

A FIELD of useful experiment is provided in employing starched linen for the cone material. The ideal cone material would have practically no weight, no resonance, and yet be capable of moving a good deal of air almost instantaneously.

Paper of any kind has its advantages and disadvantages, as also have the special fabric cones now obtainable. Starched linen offers itself as a possible substitute; various grades of cloth down to thin silk may be tried either thinly or thickly starched, and an inch or two of the material, left unstiffened round the circumference of the cone, may be employed as a very efficient and supple suspension for the actual cone from the baffle board.

LETTERS TO THE EDITOR

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

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

The Capehart Automatic Gramophone

SIR,—In a recent issue of your journal you described the Capehart automatic gramophone, which in America is sold under the trade name Orchestrope.

We regret to say that we have been advised that the trade name Orchestrope has been registered by M. P. A. Wireless, Ltd., 62 Conduit Street, London, W.1, who called our attention to the fact that they are the proprietors of this registered trade name and have asked us to see that equal prominence is given to a notice to the effect that they are the registered proprietors of the name and that the name was used by us in ignorance of their rights in the matter.

In future the machine will be described as the Capehart automatic gramophone.

THE ROTHERMEL CORPORATION, LTD.
(London, W.).

Coil Comparison

SIR,—I have seen it stated recently that, under the regional scheme interchangeable plug-in coils might come into favour again. It would be interesting to learn the opinion of those who are able to speak of the merits of the two types of coil mostly used to-day, i.e., the ordinary plug-in kind and the solenoid or single-layer wound. I have tried both, and must confess that, in spite of being dubbed "old-fashioned," I have a decided preference for the interchangeable plug-in variety. There is a certain flexibility in the use of these for meeting wavelength requirements that seems to be lacking in the solenoid. For example, a single-layer wound coil may be rated to cover, say, 250 to 550 metres with a certain condenser. The probability is that, when you come to try it out, your minimum is higher and your maximum lower than you anticipated, owing perhaps to the idiosyncrasies of your aerial-earth system, or other factors, so that certain stations are out of your reach.

On the other hand, if ordinary plug-in coils are used it is a very simple matter to change your inductance if a station is backward at coming forward, or not quite good enough with the coil in circuit. This is what I mean by the greater flexibility of the latter type. In other words, with a solenoid coil you are tied to a definite range of wavelengths which may or may not include the broadcast band, whilst with the plug-in type your range is limited only by the number of coils in your possession.

I have made up two sets with solenoid coils (six-pin type), one employing a screen-grid valve, but with neither was I able to tune in 5GB (which is a rather difficult station to get up here) and comparatively few stations on the lower range of wavelengths compared with what I could get with the plug-in coils. I have now reverted to the latter, and can not only receive 5GB on the loud-speaker, but more than twice the number of foreign stations I used to get with the solenoids. I may have been unfortunate in my experience with them, but I am certainly not surprised that so many old-stagers still prefer to remain "old-fashioned" by using the good old plug-ins.

A. W. (Manchester).

A Curious Trouble

SIR,—I wonder if any of your readers have ever had a similar experience to one I had recently? I have just finished building a three-valver utilising swinging-coil reaction and using an old ebonite panel, all the components being mounted on this (underneath), except the coils, which are mounted on the top of the cabinet on the outside.

I was desirous, when finished, of covering the holes left in the panel; so I cut a piece of three-ply to size and left holes for the terminals, tuning dial, and switch.

I stained and polished it and fixed it to my ebonite panel. A test when my set was first assembled revealed excellent results, but with the three-ply panel covering was decidedly a failure, there being what I should describe as a low-frequency howl, and although there was no mechanical contact with the wooden panel, when

"LETTERS TO THE EDITOR"

(Continued from preceding page)

touched it seemed to be alive and increased considerably the howl.

However, on removing it results were normal, and to ascertain whether or not it was the wooden cover I again affixed it, with the same mystifying results, and, of course, had to remove it.

M. (Warrington).

Manchester listeners on September 20 will hear a one-act comedy, *The Rest Cure*, by Gertrude Jennings, produced by D. E. Ormerod.

The North Regional programme on September 15, which will also be broadcast by 2LO and 5XX, comprises a concert by the Eccles Borough Band, conducted by James Dow, and the Tudor Singers, under the direction of Dr. J. E. Wallace.

On September 22 Aberdeen and all Scottish stations will broadcast a Roman Catholic service. The address will be given by the Rev. Bernard Grimley, D.D., and the choral part of the service will be rendered by the Boys' Choir of Nazareth House, Aberdeen.

The Hawk's Feather, a new Scots play by Neil M. Gunn, is to be presented by the Aberdeen Radio Players and broadcast by that station on September 24.

Listeners to Glasgow on September 24 will hear a community drama entitled *The Kirn*, by Gilbert Pitt. This play has been produced in Scotland and met with great success. It is the first radio presentation, and will be produced by the author, with the original cast—The Garrick Players.

The Instalment Age

TEACHER: "Tommy, if your father could save a pound a week for four weeks, what would he have then?"

TOMMY: "Please, miss, a radio set, a gramophone, and a Rolls-Royce."

Leyton Batteries. The address of the Leyton Battery Co., which was omitted from a test report in a recent issue, is 305, Church Road, Leyton, E.10.

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

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

2LO, 5XX, and other stations will broadcast an eye-witness account of the Amateur Motor Cycle Road Race from the grand stand, Douglas, Isle of Man, on September 16.

2LO will relay a popular concert from the Kingsway Hall on September 22. This will include a performance by the Band of the Welsh Guards, and vocal solos by Harry Brindle (bass) and Thelma Tuson (soprano), also Leonard Henry (entertainer).

The 5GB vaudeville programme on September 17 includes a short play entitled *Dining Out*, by Austin Melford, given by Vera Ashe and Partner. Other artistes taking part in the programme are Tommy Handley, James Donovan, and Philip Brown's Dominoes Dance Band.

A concert entirely dedicated to Spain will be given by the London studio on September 18.

Two short plays, entitled *The Pot of Broth*, by W. B. Yeats, the well-known Irish playwright, and *Between the Soup and the Savoury*, by Gertrude Jennings, whose comedy, *These Pretty Things*, is now showing in London, are to be broadcast from 5GB on September 20.

Dorothy Ord-Bell, a native of Newcastle, will give a song recital from that station on September 16. This talented artiste has frequently broadcast from London and provincial stations.

Popular artistes taking part in a programme from Newcastle on September 19 are Constance Astington (soprano), Hughes Macklin (tenor), Herbert Cameron (baritone), and Catcheside Warrington (Tyneside entertainer).

On September 21 a concert by the Eastbourne Municipal Orchestra, conducted by Captain H. G. Amers, will be relayed from the Festival Hall at the North-East Coast Exhibition. The soloist will be Frederick Stevenson (baritone).

Winners at the Royal National Eisteddfod of Wales at Liverpool, 1929, are to give another concert from the Cardiff station on September 22. The Rhondda Ladies' Choir, conducted by Mr. James Davies, will take part in the programme.

Cardiff listeners on September 23 will hear a "Round the World" programme to be given by John Stean's Carlton Celebrity Orchestra. Thirty-eight instruments can be played by the members of this orchestra, which can present, as required, a tango band, a dance band, an entire Hawaiian combination, or a concert orchestra.

The National Orchestra of Wales will give its first performance at Swansea in the Patti Pavilion on September 24. This will be relayed by Cardiff and Swansea. Megan Thomas (soprano) and Parry Jones (tenor) are the soloists.

Cardiff on September 26 relays an All-Welsh Concert from the Pavilion, Carnarvon. The Carnarvon Choral Society will be heard.

Belfast listeners on September 27 will be given a concert of the works of Brahms, which will include two of this composer's best known choral works, the "Contralto Rhapsody" and "Song of Destiny."

RADIOGRAMS

(Continued)

Radio Belgique may be heard testing on Saturdays and Sundays during the morning and late evening hours on 339 metres, a wavelength which may eventually be adopted by the Brussels high-power transmitter.

A small private transmitter at Antwerp has started to broadcast concerts on Sundays, Wednesdays, and Thursdays on 246 metres. The call is: *"Ici Station Belge á Anvers 4ED."*

Arlon, capital of the Belgian province of Luxembourg, now possesses a small broadcasting station working three times weekly on 312 metres.

F8BP, the experimental station of the French wireless association Le Journal des Huit, has increased its wavelength from 47 to 55 metres.

Eiffel Tower, Paris, has resumed its experiments in short-wave telephony; the wavelength has been reduced to 31.5 metres.

From September 1 a radio telephony service was opened between the s.s. *Leviathan* and Berlin on short waves.

The Bavarian stations have abandoned their old interval signal and between items now broadcast a short carillon of bells G, E, F, A, B, C.

The full plans regarding the new Centenary Algiers (North Africa) high-power broadcasting transmitter show that the station, which is now nearing completion, at Eucalyptus will have an energy of 12 kilowatts minimum in the aerial. It is of an ultra-modern type and will be brought into operation on October 1 next. Although the wavelength has not yet been definitely fixed, it is expected that tests will shortly be made on 364 metres.

The transatlantic telephone service is now available to and from (1) all places in the Isle of Man, (2) Northern Ireland (Belfast only), and (3) the Irish Free State (Dublin only). Extensions in Northern Ireland beyond Belfast and in the Irish Free State beyond Dublin will be made as soon as circumstances permit.

Plans of the Universal Wireless Communication Co., U.S.A., call for the erection of two new radio stations just outside Memphis, Tenn., one a transmitting station and the other a receiving station. These will give Memphis direct connection with points in Europe and South America.

Eighty per cent. of the radio sets in the Canadian west are in the rural districts.

After fulfilling a Glasgow engagement, Rona Valdez, the popular soprano, left immediately for the Continent, where she is to figure in broadcast concerts in Italy and Germany.

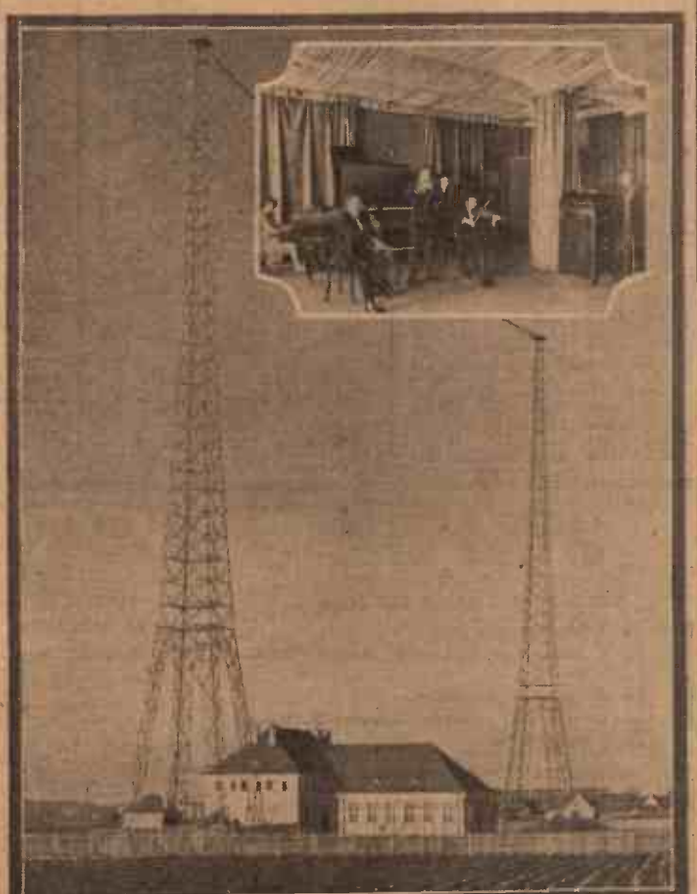
Next Week

"THE KNIFE-EDGE THREE"

—A Reyner Set

AND

"THE CLARION ALL-ELECTRIC THREE"



Outside and inside a prominent German broadcaster—Nurnberg. The giant aerial probably largely accounts for the good reception of this station in this country

BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
		GREAT BRITAIN	
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds (2LS)	0.13
*242	1,238	Belfast (2BE)	1.0
*261	1,148	Newcastle (5NO)	1.0
288.5	1,040	Swansea (5SX)	0.13
288.5	1,040	Stoke-on-Trent (6ST)	0.13
288.5	1,040	Sheffield (6LF)	0.13
288.5	1,040	Plymouth (5PY)	0.13
288.5	1,040	Liverpool (6LV)	0.13
288.5	1,040	Hull (6KH)	0.2
288.5	1,040	Edinburgh (2EH)	0.35
288.5	1,040	Dundee (2DE)	0.13
288.5	1,040	Bournemouth (6BM)	1.0
288.5	1,040	Bradford (2LS)	0.13
*301	995	Aberdeen (2BD)	1.0
*310	968	Cardiff (5WA)	1.0
*356	842	London (2LO)	2.0
*377	797	Manchester (2ZY)	1.0
*390	753	Glasgow (5SC)	1.0
*479	626	Daventry (5GB)	17.0
*1,554	193	Daventry (5XX)	25.0
		AUSTRIA	
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	5.0
*453	666	Klagenturt	0.5
*517	581	Vienna	15.0
		BELGIUM	
216	1,391	Charleroy (LL)	0.25
246	1,219	Antwerp (Anvers) 4ED	0.4
250	1,202	Schaerbeek-Brussels	0.5
250	1,200	Ghent	0.5
280	1,071	Liége	0.5
312	961.4	Arlon	0.25
*509	590	Brussels	1.0
		CZECHO-SLOVAKIA	
*263	1,139	Morava-Ostrava	10.0
*279	1,076	Bratislava (Feriby)	12.5
*293	1,022	Kosice	2.0
*342	878	Brunn (Brno)	2.4
*487	617	Prague (Praha)	5.0
		DENMARK	
*281	1,067	Copenhagen (Kjobenhavn)	1.0
1,153	260	Kalundborg	7.5
		ESTHONIA	
*297	1,010	Reval (Tallinn)	2.0
		FINLAND	
*221	1,355	Helsingfors	0.3
*1,796	167	Lahti	40.0
		FRANCE	
170	1,750	St. Quentin	0.25
211.3	1,420	Béziers	0.1
220	1,364	Fécamp	0.5
230	1,304	Ste. Etienne	0.3
237	1,265	Juan-les-Pins	0.4
238	1,260	Bordeaux (Radio Sud-Ouest)	2.0
240	1,250	Radio Nimes	1.0
*255	1,175	Toulouse (PTT)	1.0
*265	1,130	Lille (PTT)	0.8
268	1,121	Casablanca	2.5
*277.5	1,081.4	Rennes (PTT)	1.0
*280		Montpelier (PTT)	1.5
292	1,028	Radio Lyons	1.5
*294	1,020	Limoges (PTT)	0.5
304	986	Bordeaux (PTT)	0.5
304	986	Agen	0.3
309	970	Radio Vitus	2.0
*310	950	Marseilles (PTT)	0.5
326.5	918.9	Grenoble (PTT)	1.5
345	868	Petit Parisien	0.5
346	869	Strasbourg	0.3
353	849.1	Algiers	2.0
368	815	Radio LL (Paris)	0.5
*381	788	Radio Toulouse	0.0
411	729	Radio Maroc Rabat)	2.0
436	687	Radio Flandre (Lille)	0.5
447	671	Paris (Ecole Sup. PTT)	0.7
468	640	Lyons (PTT)	5.0
1,350	222	Tunis (Kasbah)	0.6
1,461	205.3	Eiffel Tower	8.0
*1,725	174	Radio Paris	8.0
		GERMANY	
*218	1,373	Flensburg	1.5
*227	1,319	Cologne	4.0
*234	1,283	Muenster	4.0
*239	1,256	Nurnberg	4.0
*246	1,220	Kiel	0.7
*246	1,220	Cassel	0.7
*253	1,184	Breslau	4.0
*259	1,157	Leipzig	4.0
*270	1,112	Kaiserslautern	1.5
*276	1,085	Koenigsberg	4.0
*283	1,058	Magdeburg	0.7
*283	1,058	Berlin (E.)	0.7
*283	1,058	Stettin	0.7
*319	941	Dresden	0.75
*325	923	Gleiwitz	6.0
*339	887	Bremen	0.75
*360	833	Stuttgart	4.0
*372	806	Hamburg	4.0
*390	770	Frankfurt	4.0
*418	716	Berlin	4.0
*453	662	Danzig	0.75
*456	657	Aachen	0.75
*473	635	Langenberg	25.0
*533	563	Munich	4.0
*560	536	Augsburg	0.5
*560	536	Hanover	0.7
570	527	Freiburg	0.7
*1,635	183.5	Zeesen	20.0
2,100 / 2,290	142 / 131	Norddeich	10.0
		GRAND DUCHY	
1,220	246	Luxembourg	2
		HOLLAND	
31.4	9,554	Eindhoven (PCJ)	25.0
*298	1,007	Huizen via Hilversum aerial (until 5.40 p.m. B.S.T.)	5.0
*1,071	280	Huizen via Hilversum aerial (after 5.40 p.m. B.S.T.)	5.0
*1,070	280	Scheveningen-Haven (from 10.30 a.m. to 5.40 p.m. B.S.T.)	5.0
*1,875	160	Hilversum via Huizen aerial (AVRO)	5.0
		HUNGARY	
550	545	Budapest	15.0
		ICELAND	
*1,200	250	Reykjavik	1.0
		IRISH FREE STATE	
*225	1,337	Cork (1FS)	1.5
*413	725	Dublin (2RN)	1.5
		ITALY	
248	1,209	Trieste (testing)	
*274	1,094	Turin (Torino)	7.0
*332	905	Naples (Napoli)	1.5
*385	779	Genoa (IGE)	3.0
*441	680	Rome (Roma)	3.0
453	662	Bolzano(IBZ)	0.3
*501	599	Milan (Milano)	7.0
		YUGOSLAVIA	
*368	973	Zagreb (Agram)	1.25
*431.7	694.8	Belgrade	2.5
566	530	Sjubljana	2.5
		LATVIA	
*525	572	Riga	4.0
		LITHUANIA	
*1,935	155	Kovno	7.0
		NORWAY	
*283	1,058	Notodden	0.7
*365	820	Bergen	1.0
*394	761	Frederiksstad	1.0
447	671	Rjukan	1.0
453	662	Tromsoe	1.0
453	662	Aalesund	1.0
453	662	Porsgrund	1.0
*493	608	Oslo	1.5
		POLAND	
*313	959	Cracow	1.5
*335	896	Posen	1.5
385	779	Wilno	1.5
*408	734	Kattowitz	10.0
*1,411	212.5	Warsaw	10.0
		ROUMANIA	
*394	761	Bucharest	2.0
		RUSSIA	
*351	855.5	Leningrad	10.0
*427	702.5	Kharkov (NKO)	5.0
*483	621.5	Homel	2.0
*825	364	Moscow (PTT)	25.5
1 060	283	Tiflis	1.0
1,000	300	Leningrad	20.0
*1,304	230	Kharkov	5.0
		SPAIN	
251	1,193	Almeria (EAJ18)	1.0
314	950	Oviedo (EAJ19)	0.5
*349	860	Barcelona (EAJ1)	8.0
*368	815	Seville (EAJ5)	0.5
403	743	San Sebastian (EAJ8)	0.5
*424	707	Madrid (EAJ7)	3.0
453	662	Salamanca (EAJ22)	0.55
		SWEDEN	
231	1,301	Malmo	0.5
*257	1,160	Hoerby	10.0
270	1,112	Trollhattan	0.4
*322	932	Goeteborg	6.0
322	932	Falun	0.5
*436	689	Stockholm	1.5
*542	554	Sundsvall	1.0
*770	389	Ostersund	2.0
1,200	250	Boden	2.0
*1,348	222.5	Motala	30.0
		SWITZERLAND	
*403	743	Berne	1.0
*459	653	Zurich	0.6
680	442	Lausanne	0.6
760	395	Geneva	0.5
1,010	297	Basle	0.25
		TURKEY	
*1,200	250	Stamboul	5.0

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

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Sept. 16 A Ketelbey programme.
" 17 Queen's Hall promenade concert—Tchaikovsky.
" 19 A vaudeville programme.
" 20 Queen's Hall promenade concert—Beethoven and Mozart.

DAVENTRY EXPERIMENTAL (5GB)

Sept. 16 *Cafe au Lait*, a condensed musical comedy, by Charles Brewer.
" 18 Queen's Hall promenade concert.
" 21 Queen's Hall promenade concert.

CARDIFF

Sept. 15 A concert by victors at the Royal National Eisteddfod of Wales, Liverpool 1929.

Authority has been granted by the Polish Posts and Telegraphs to the Polskie Raadjo Company to reorganise the broadcasting system in that country. It is proposed to reconstruct the Warsaw transmitter in order to obtain a power of some 70 kilowatts in the aerial and to erect further stations at Thorn, Lemberg, and Lodz.

A broadcast as a "send-off" to the holidays is the somewhat novel policy adopted by the Glasgow station in connection with "the Crawford Chaotics." The latter are a band of merry amateur mirth-makers who go to the little upland holiday resort of Crawford for a September holiday yearly.

Advance Notes on the Radio Exhibition

REALISM FROM RECORDS

AT the invitation of Gambrell Radio, Ltd., of Buckingham House, Buckingham Street, W.C.2, members of the staff of AMATEUR WIRELESS were able to attend an interesting Press demonstration of the McLachlan tone compensator, to be marketed by this firm under the name Novotone. This instrument, it is claimed, imparts to the electrical reproduction of gramophone records a realism making it comparable to the original music.

It was to substantiate these claims, explained Dr. McLachlan himself, that the Press had been invited to the demonstration. He explained that notes under a frequency of 250 cycles are not recorded on the gramophone record at anything like their true proportion as originally played. Apart from this root cause of unrealistic reproduction, caused by lack of bass notes, the average electrical pick-up is more efficient, it was stated, on the middle register, with a falling off in efficiency at the top and bottom registers.

Added to this was the imperfection of the amplifier; the cumulative effect of these faults was to be heard in the vast difference in the original music and that reproduced on the record. All these faults, it was claimed, could be compensated by the use of the Novotone, designed to supply the electrical equivalent of the deficiencies.

In making up for the loss of high and low notes, Dr. McLachlan explained, the Novotone raised the whole sound output to a much higher level, making the general volume of sound some four times greater than that obtained without the Novotone.

Volume and Quality

Nine different gramophone records were then played through a high-quality amplifier and moving-coil loud-speaker, the Novotone being switched in and out of circuit during the playing of each record. The increase in volume was very appreciable when the Novotone was switched in, so much so that the difference in actual quality was not an easy matter to determine. Bass notes came up considerably when the overall volume was increased by the insertion of the Novotone; top notes were appreciably enriched.

Without question the overall volume and quality of the reproduction with the Novotone is exceptionally pleasing to the ear, much more so than without it. Probably the most impressive part of the demonstration was the exceptionally realistic reproduction of the drums and cymbals at the end of the *Parsifal* record.

We congratulate Dr. McLachlan on his latest contribution to the much desired perfection of electrical reproduction, and we look forward to making a laboratory test of the Novotone in the near future. Its price has been fixed at £5, and readers should make a point of inquiring about it at the forthcoming Radio Exhibition.

"SCRATCH" AND STATIC

THERE is an interesting parallel between the "scratch" produced by a gramophone record, especially when used with a pick-up, and atmospheric "static" as heard on a wireless set. Both are extraneous noises, and both are due to irregularities or a lack of uniformity in the medium concerned.

Static arises from a state of discontinuity in the electric content of the ether, and to the resulting movements of the electric charges as they seek to find a common potential level. Scratch, on the other hand, is due to a lack of homogeneity in the material on which the gramophone record is engraved. In reproduction the needle finds out these minute irregularities and emphasises them. B. A. R.

HE: "I've got a 'orrible 'eadache listening to 'er and 'er 'ouse'old 'ints."

SHE: "What you want is a couple of aspirates."

FADING

FADING is a recognised bugbear in all long-distance signalling, but it is particularly troublesome in the case of transatlantic picture transmission, where uniform signal strength is essential in order to maintain correct light-and-shade values. In practice radio engineers regard fading as a variable "attenuation factor" which cannot be prevented in itself. They therefore seek to counteract it by systematically varying the sensitivity of the receiving valves in exact step with the ether fluctuations.

In practice a special "control" wave is sent out with the picture signals, but at a different frequency, and this is utilised to continually adjust the grid bias of the first receiving valve. In this way the valve amplification factor is automatically varied to offset the effect of fading experienced by the wave *en route*. B. A. R.

ELECTRONS AND WAVES

THE new "wave theory" of the electron is mainly due to the ingenious speculation of Louis de Broglie, the famous French physicist. La Planck, in his quantum theory, had shown that, under certain circumstances, light and X-rays behave as if they were particles, i.e., they deliver their energy in definite "packets" or pulses, and not in a perfectly continuous manner.

In these circumstances de Broglie asked himself, why should not particles under certain circumstances behave as waves? Although the reasoning may not appear convincing, subsequent experiments made by Davisson in America, Thomson in Scotland, Rupp in Germany, and Rose in England, have shown it to be fully justified—so far as this is possible in the realm of molecular physics. M. A. L.

Screen grid receivers

can be improved this simple way

Equip your set with these new CROSS-MESH screen grid valves

TODAY all experienced wireless owners know the much greater range given by a screen grid H.F. stage. But it is only by fitting the new Marconi screen grid valves that you can obtain the best possible results from your set.

The unique cross-mesh construction of the screen in these Marconi valves — specially designed for the very highest efficiency — gives greatly improved screening and lowers the inter-electrode capacity. No other screen grid valve produces so high a gain per stage, such stable, easy control.

Made by skilled engineers — designers of the great transmitting valves used in the leading stations of the world — each Marconi valve you buy is fully tested, thoroughly reliable, with a long life of first-class service before it.

Enjoy the power and range that Marconi screen grid valves can give your set. Types S.215 for 2 volts, S.410 for 4 volts and S.610 for 6 volts cost 22/6 each. Type S Point 8 for A.C. mains operation costs 25/- Ask any dealer for them. If you do not know of a dealer near you, write to the Marconiphone Co. Ltd., 210-212 Tottenham Court Road, London, W. 1.

The special cross-mesh construction of the new Marconi screen grid valves gives you greatly improved screening and easier control

SPECIFICATIONS

	S.215	S.410	S.610	S Point 8
Filament volts	2.0 max.	4.0 max.	6.0 max.	0.8 max.
Filament current	0.15 amp.	0.1 amp.	0.1 amp.	0.8 amp.
Anode volts	100-150 max.	100-150 max.	150 max.	100-150 max.
Screen grid volts	60.90 max.	60.90 max.	60.90 max.	60.90 max.
*Amplification factor	170	180	210	160
*Impedance	200,000 ohms.	200,000 ohms.	200,000 ohms.	200,000 ohms.
*Normal slope	.85 Ma/v.	.9 Ma/v.	1.05 Ma/v.	0.8 Ma/v.

*At Anode Volts 120, Screen Grid Volts 80, Grid Volts 0 to -1

MARCONI *Screen Grid* VALVES

See the Marconiphone stands at Olympia, Nos. 79 to 84

Printed in England. Published by Bernard Jones Publications, Ltd., 58/61 Fetter Lane, London, E.C.4
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ALL THE LATEST & BEST IN RADIO

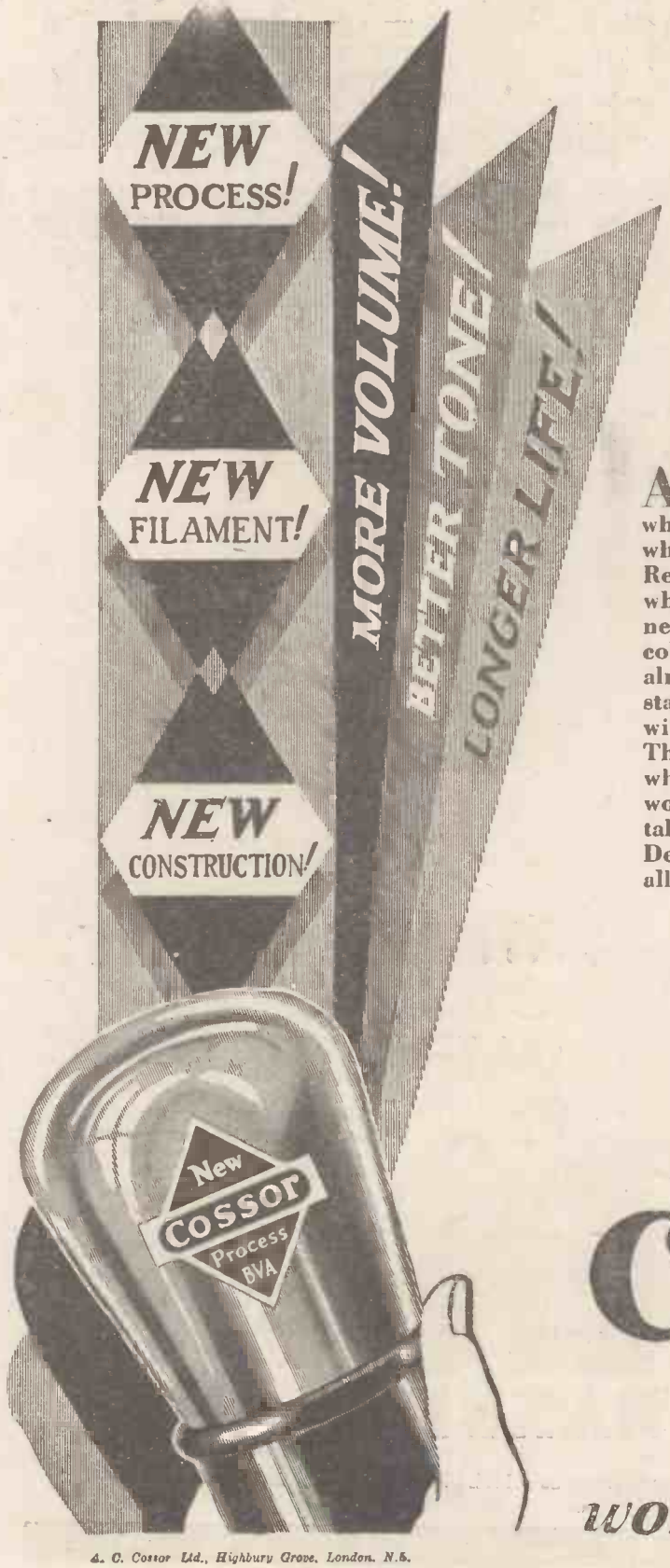
Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XV. No. 380 Saturday, September 21, 1929

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



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These are the results that anyone can expect when his Set is fitted throughout with these wonderful New Cossor Valves. But don't take our word for it. Ask your Wireless Dealer. He is demonstrating them daily in all the Sets he is selling.

FREE *An interesting 32-page booklet telling you all about the new Cossor filament—the new construction and the new high vacuum process. Ask your dealer for a copy.*

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—it's a wonderful valve!

A. C. Cossor Ltd., Highbury Grove, London, N.5.

CA 369

SEPTEMBER 21, 1929 No. 389 Vol. XV

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

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

America Follows Us—Scotland Yard and "A.W."—PCJ's Nightingale—Regional Sets for the Blind—A Great Achievement—The Show!—Television at Last!

America Follows Us—From what little the general public knows of the radio side of Scotland Yard's Flying Squad, it is generally deduced that the whole organisation is run on rather "American" lines. Well, this is wrong, because the Chicago Police Department has studied our radio section and intends to follow our lead. Chicago is having a 5-kilowatt central station and 150 radio-equipped cars. Some of the cars will carry machine guns and tear bombs, but then Chicago wouldn't be complete without that, would it!

Scotland Yard and "Amateur Wireless"—Apropos of Scotland Yard's radio we are now able to disclose a piece of very interesting secret history. A trusted member of the AMATEUR WIRELESS Staff was recently allowed to see the whole of the inner workings of Scotland Yard Radio Section, with its powerful transmitter and radio-equipped Flying Squad cars. It was hoped to present our readers with a glimpse into these interesting things. But for the time being the Commissioner has said "No," so the Yard's inner history must remain unpublished until a change of mind occurs!

PCJ's Nightingale!—One of the PCJ studio staff had a curious experience in the early hours recently. A regular transmission having just finished, he opened the studio window to admit fresh air, and heard the full-throated song of a nightingale singing not far away. Taking in the situation immediately, he ran to the microphone and announced in six different languages that PCJ was about to broadcast the bird's song. The microphone was silently wheeled to the window, and for some time five continents heard the bird's song.

Regional Sets for the Blind—The National Institute for the Blind, following a questionnaire addressed to nearly 2,000 blind listeners in the London area, has devised a scheme by which the special needs of the blind will be met when the regional scheme comes into operation. The Institute, in co-operation with the B.B.C., has designed a crystal set capable of receiving either of the alternative programmes without disturbance by the other. The Institute intends, if funds permit, to exchange each existing crystal set for one of the new and more selective kind.

OUR SECOND SPECIAL SHOW NUMBER NEXT WEEK

will be another bumper issue, full of interest for those who are going to the Radio Exhibition, and for those who will just have to be content to read all about it in "A.W." Of special interest will be

A Critical Survey of the Exhibits

explaining most items of particular merit. The receiver to be described will be

The Music-lover's Gramo-radio

which is a "super" receiver and gramophone, cheaper to make up than any commercial instrument.

Make sure of your copy of this

BUMPER SHOW ISSUE

Television at Last!—Arrangements have at long last been concluded, and the experimental broadcasting of Baird television will begin on September 30, through 2LO, from 11 to 11.30 daily, except Saturdays and Sundays. This is just what amateurs have asked for, and a few weeks should see some startling practical developments in amateur-constructed television outfits.

A Great Achievement—A late note on the Schneider Trophy race broadcast can be excused, owing to the entire success of the event. It is unnecessary to say anything about reception in this country, because nearly every listener must have taken advantage of the broadcast, and it is good to know that some thirty American broadcasting stations linked up for a relay of the event, and reception was quite good for most of the programme. A relay was also conducted at Sydney, Australia, and, of course, in Rome great interest centred on the doings of the Italian team. Loud-speakers were installed in all the prominent public squares and parks.

Radio Honoured—The Prime Minister is honouring radio by giving a short talk on the National Radio Exhibition on Saturday next, September 21. Mr. Ramsay MacDonald is always a good broadcaster, and no listener should miss this special event.

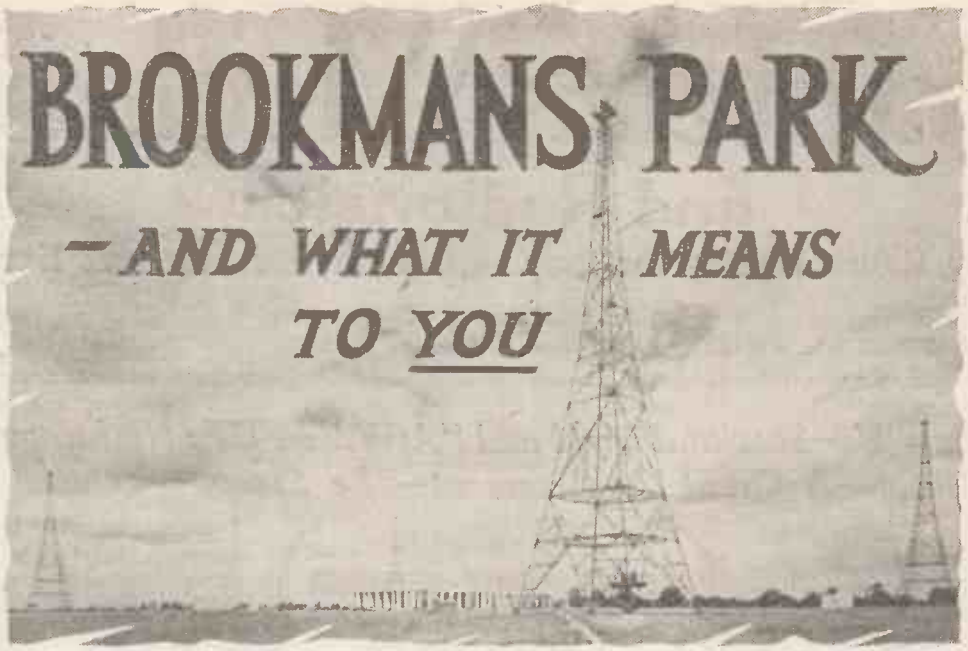
The Show!—The eighth Radio Exhibition opens next Monday morning. If you are within convenient reach of Olympia, do make a point of seeing the Exhibition. And, if you go, don't miss our stands, Nos. 19 and 20. Come to us for free technical advice. And you can't fail to be interested in the AMATEUR WIRELESS and *Wireless Magazine* receivers which will be on show. You can make them up yourself.

PRINCIPAL CONTENTS

NEXT WEEK—The Music-lover's Gramo-radio and a New Moving-coil Speaker

BROOKMANS PARK

—AND WHAT IT MEANS TO YOU



WHAT is this new Regional Scheme? Will it still be possible to have a choice of programmes? Will old sets still work, or won't they be selective enough? And where is Brookmans Park, anyway?

These are questions which everyone is asking. Brookmans Park is going to make such a difference to reception in the South of England; and, in addition, this new twin-wavelength station is an experiment upon the success or otherwise of which depends the extension of the regional scheme.

And now let me make the details clear. Brookmans Park station is on the north side of London at the side of the Great North Road and is about thirteen miles from Charing Cross. When the station is complete it will consist of two transmitters in one, putting out alternative programmes.

But for the time being we are concerned not with the alternatives, but with the changes that may happen when the present Oxford Street 2LO transmitter closes down entirely. The B.B.C.'s conservative estimate for the present transmitter is thirty miles, whereas the service range for really reliable reception from Brookmans Park is up to eighty to a hundred miles.

Ninety-nine listeners out of a hundred will find that they will get better reception from the new station than from the present one. But it is inevitable that a few should suffer, and tests have shown that in the following districts the received signal strength will be appreciably weaker: *Paddington, Bayswater, Mayfair, Marylebone, Kingston, Chelsea, Balham, Battersea, Southwark, Holborn, Westminster, Lambeth, the City, and Clapham.*

Signal strength should, however, be amply great enough to give good crystal reception, and valve users will certainly not have much about which to grumble.

The Question of Selectivity

Certainly when the twin-wavelength transmitter is in full swing you will need very good selectivity in order to get the alternatives, but the degree of selectivity required will not be greater than that already possessed by most good receivers. Circuits employing a detector followed by one or more stages of L.F. amplification may need a loose-coupled circuit, or a wavetrap, in order to get that "knife-edge" feeling. Sets with one H.F. stage, however, should not be much of a bother, and the insertion of a small condenser in the aerial lead, or an alteration to the tuning coil in order to give an aperiodic-coupling effect, will in most cases be found to make a complete cure.

Not for some time, though, will you have to trouble about this. Brookmans Park is at present testing on 356.3 metres after the close of the ordinary London programme, and on and after Monday, September 30, the last section of the London programme (usually dance music) will be transmitted from the new station every night for two or three weeks, excluding Sundays. Probably not until December, or even early in the New Year, will the two transmissions be put out.

The foot of one of the masts of the new transmitter

What is the station itself like? It is, of course, the best thing the B.B.C. has ever owned. Brookmans Park estate consists of thirty acres of field, practically dead flat. The building is squarish, modern in style, and faces the Great North Road. There are two giant masts supporting the aerial.

A large part of the building is taken up by the generators, there are three giants, one for each transmitter and one to spare, each capable of an output of 160 kilowatts at 10,000 volts direct current. Then there are fifteen other generators for auxiliary jobs. One, for instance, supplies the 3,000 volts negative applied to the grid of the main amplifiers. The L.T. current consumed is 2,600 amps. Huge 300-h.p. crude-oil Diesel engines supply the drive for the main generators.

The main transmitting-room does not differ in appearance from other B.B.C. transmitters, except on the score of hugeness. AMATEUR WIRELESS made a detailed tour of the station a few days ago, and further technical details will be given next week.

The B.B.C. is well aware that it is going to receive a number of complaints about the drop in signal strength noticed in the areas I have mentioned. This will certainly be a problem. It is therefore interesting to note that Mr. Reyner has for some time been making a number of tests with receivers, and for this he has made his own "Brookmans Park."

He has rigged up a complete screened oscillator on the same system as is employed in the broadcasting transmitters. The apparatus was adjusted to be capable of variations in strength from the weakest signals to the strongest. It has thus been possible to estimate to a fair degree of approximation the order of signal strength likely to be experienced from a regional transmitter at various distances.

It will be clear that it has been of considerable value to AMATEUR WIRELESS designers to have had advance information as to the exact effect of the regional scheme.

KENNETH ULLYETT.

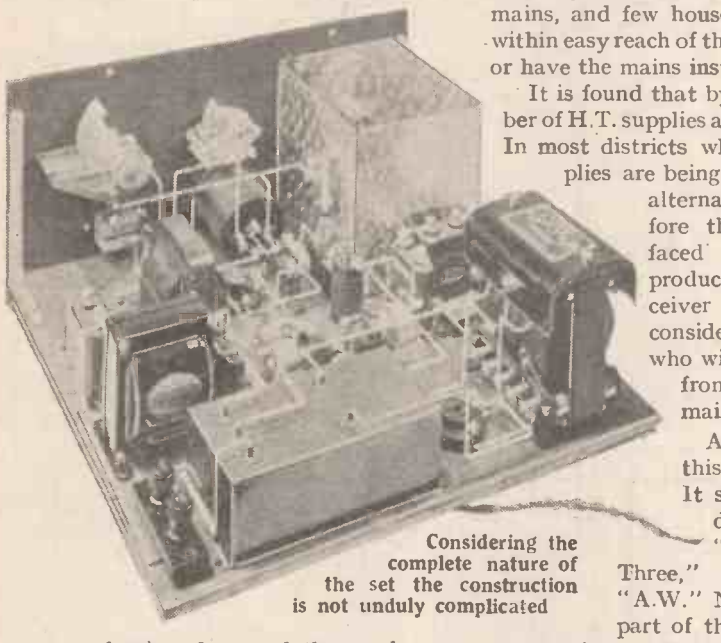
NEXT WEEK:

CONSTRUCTIONAL DETAILS OF A COMPLETE GRAMO-RADIO OUTFIT

The CLARION ALL ELECTRIC THREE

Designed by J. SIEGER

ONE of the early wireless snags was the battery problem. Valves took as much as .75-amp. each (there were no power valves) and a good three-valve set consumed perhaps 2½ amp. of filament juice. H.T., true, was not so bad, for the valves of those days did not necessitate more than 60 to 80 volts anode potential and this was easily supplied by a small row of flash lamp batteries.



Considering the complete nature of the set the construction is not unduly complicated

But this is past history. Valves developed. The dull emitter came into being and the demand on the L.T accumulator fell to a negligible quantity. Conversely, the H.T. problem increased and became increasingly difficult of solution. Nowadays valves take only about .1-amp. on the filaments, but require an anode potential of at least 120-volts to give good results, and the number of milliamps. consumed is considerable.

This is where the problem lies to-day. The use of very big H.T. batteries is the only economical way satisfactorily to cope with big anode current demands, and big H.T. batteries are expensive. An H.T. accumulator can be used, but it is obvious that the bulk and weight of this type of H.T. supply precludes its use in cases where charging stations are all too remote.

Lastly, one can obtain current from the mains, and few houses nowadays are not within easy reach of the electric-light mains, or have the mains installed.

It is found that by far the greater number of H.T. supplies are of the A.C. variety. In most districts where new mains supplies are being put in the current is alternating. It follows therefore that a designer when faced with the need to produce an all-mains receiver must logically first consider the needs of those who wish to operate the set from alternating-current mains.

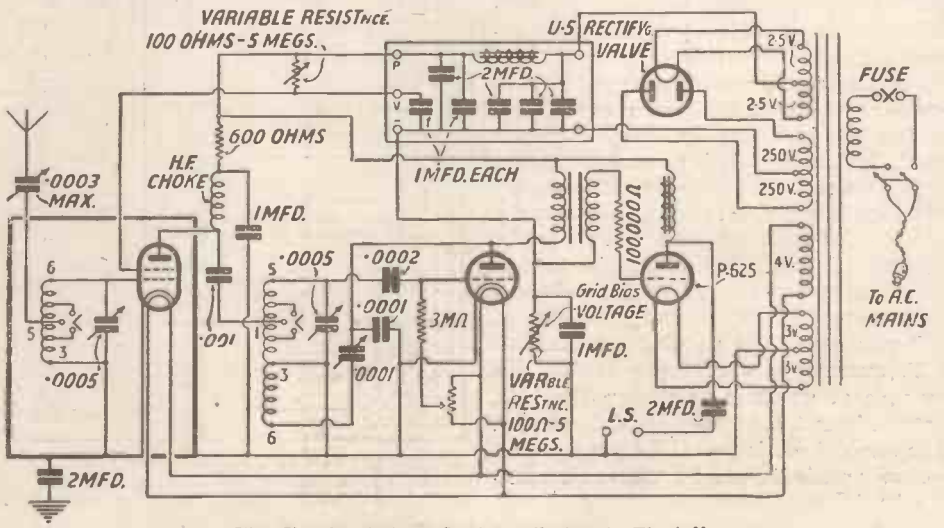
And now to come to this particular receiver. It should need no introduction, for the "Clarion Screen-grid Three," first published in "A.W." No. 352, in the early part of this year, is one of the best receivers which "A.W." has ever done and it attained almost immediate popularity. It will be remembered, too, that so highly did Messrs Selfridge & Co. think of this set that they made arrangements for blueprints to be sent gratis and post free to every reader making application to the Radio Department of that well-known London stores.

The popularity achieved by this receiver convinced its designers that when it was required to bring forward a very attractive three valver, designed to work from alternating-current mains, they could do no better than use the basic circuit of the well-tried "Clarion" and fit to it the necessary apparatus for converting the electric-light mains current. This is just what has been done.

In this present receiver, then, you have the "Clarion Three," with its circuit modified only as necessitated by the addition of mains drive, and with the addition, of course, of the necessary rectifiers and smoothing apparatus.

Doubtless there are a number of points upon which you will be curious on examining the photograph and meeting the receiver for the first time.

Most probably you will ask: just how does this new "Clarion" work from the mains, and what batteries does it save? The set looks larger and much more complicated than the original "Clarion"; is this really so? Obviously there are more



The Circuit of the "Clarion All-electric Three"

"THE CLARION ALL-ELECTRIC THREE" (Continued from preceding page)

components; and is the expense entailed by them justified by the economy in running? Finally, the original receiver was one of the easiest sets to construct that "A.W." has ever published. Could the same be truthfully said of this new "Clarion"?

No Batteries Whatever

At the outset let it be said that this new "Clarion" works entirely from the mains and no H.T. battery, L.T. accumulator or grid bias batteries are necessary. The advantages of this are obvious. Attached to the receiver is a long length of flex with a plug. It is necessary only just to place this into a convenient electric light point in order to produce immediately an ample and live flow of H.T., L.T., and G.B. The mains supply is as safe as the Bank of England and never again will you be troubled with batteries which run down at awkward moments and make big demands upon the purse, so far as H.T. renewals are concerned.

The set is certainly larger, owing to the addition of the mains components, but it would not be fair to say that it is more complicated. There are more components and there are more connections to make, but that is all. All the problems have been solved by the "A.W." Technical Staff and this finished design represents almost the apex of reliability.

To this end and with the object of enabling the most satisfactory results to be obtained, the attempt has not particularly been made to cut down the cost or to reduce the number of components below the sensible level. In next week's issue, when the construction will be most fully dealt with, it will be made obvious that in building up this receiver no more than the usual skill, patience and knowledge are required.

Most wise constructors probably examine the circuit diagram of a receiver before laying out the components. It is a wise plan and in this instance, although the theoretical circuit diagram may look complicated, it is actually quite straightforward.

At this stage it would be a good plan to examine the circuit diagram of this set and to see just how the mains drive for H.T., L.T., and G.B. is obtained. To the right is a mains transformer, the primary of which is connected through a fuse and a double-pole switch to the mains supply. There are a number of secondaries to cope with the various current needs, and these are arranged in the following manner. A five-volt centre-tap winding supplies the L.T. current to a rectifying valve, the purpose of which is to change the H.T. current from A.C. to pulsating D.C. current. The anode juice is supplied by a 250-volt centre-tap winding, and double-wave rectification is employed.

There is a 4-volt winding which supplies raw A.C. to the heater elements of the indirectly-heated A.C. valves. Valves of this type are used in the screen-grid and detector stages. It is particularly interesting to note that the power valve is an ordinary battery type valve, of the P625 variety, which is fed with raw A.C. from a separate 6-volt secondary. It is found that with a valve of this type taking a fairly heavy current at 6 volts, there is no noticeable hum on supplying unrectified A.C. to the filament. The reason, of course, is simply that the physical characteristics of the heavy filament incorporated in a valve of this type, result in the temperature being reasonably constant, despite the A.C. fluctuations. Moreover, as this valve is in the last stage such slight ripple as might arise is amplified only by that stage and not by any subsequent valves.

Having dealt thus fairly fully with the L.T. supply it remains only to be noted that the output from the H.T. rectifying valve passes through a unit-type smoother in the one box of which is included the necessary

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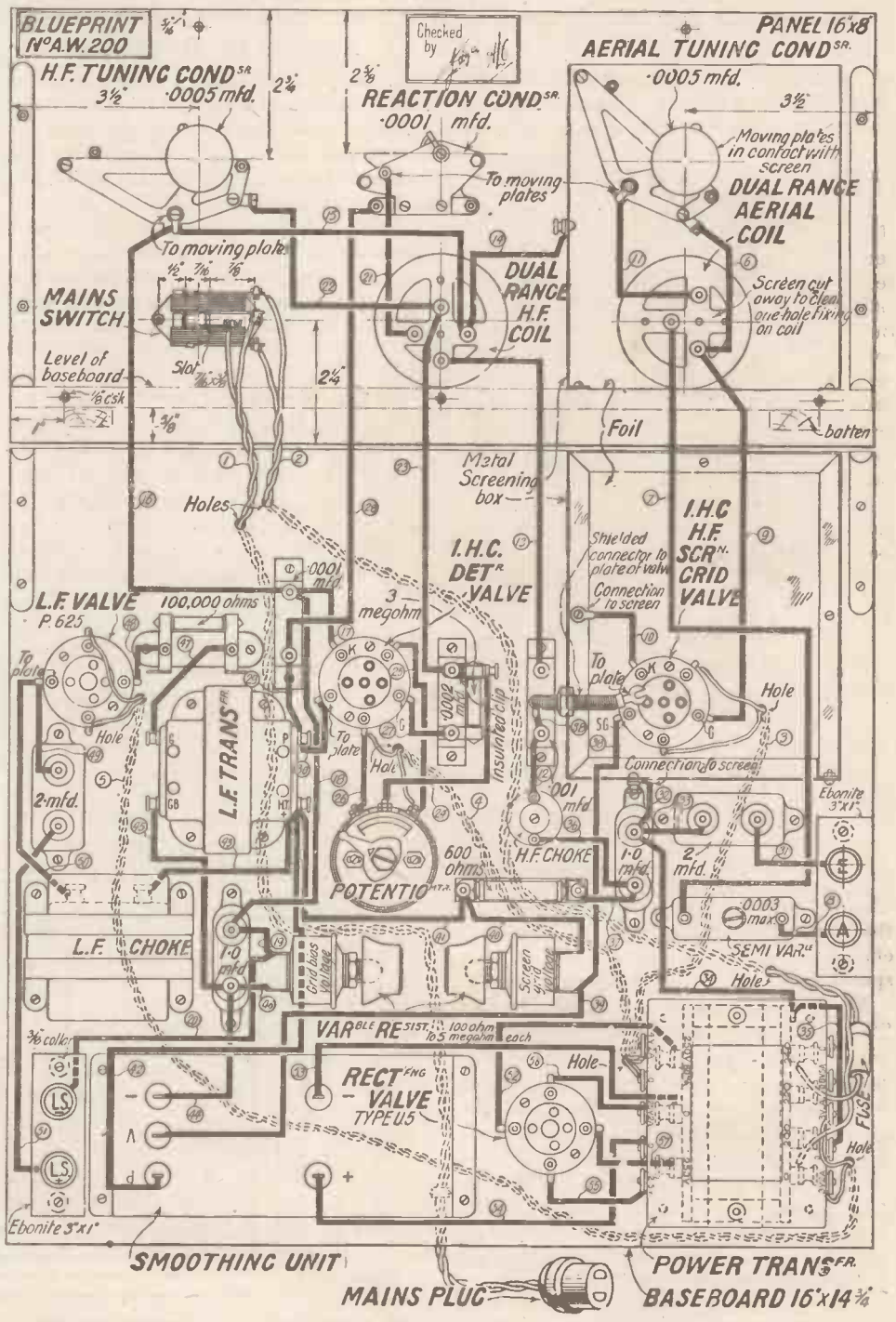


The Wiring Diagram of the "Clarion All-electric Three." Blueprint available, price 1/6

Safety First with BATTERY ELIMINATORS

By H. REES

THERE are many listeners who shun mains units as they would fire. "The mains are very dangerous." This and similar remarks is what one frequently hears when suggesting an eliminator.

Perhaps this attitude is all to the good, for *the mains are certainly dangerous to play with*. But there is no reason whatever why an eliminator cannot be made as safe and sound as, say, a vacuum cleaner, an electric iron, or kettle.

It all reduces to a question of the designs of the set and eliminator. If the set has been designed for the mains, and the designer's instructions are carefully followed, there will be little to worry about. But to purchase, say, a D.C. eliminator and simply plug it on to *any* set is to ask for trouble. The result of such procedure would probably be a blowing of fuses or a few severe shocks, with the consequent conclusion that eliminators are exceedingly dangerous.

Before connecting any type of mains unit to your set you should ask: Has the set been built so as to make mains operation safe? Are there any bare "live" parts liable to be touched? Is there a possibility of shorts or leakages which might lead to fire or other damage? This article is an attempt to help you in answering these questions.

The first point, of course, you will have to settle before buying any eliminator is whether the supply is A.C. or D.C. An important advantage of A.C. units is that they incorporate double-wound transformers which effectively separate the set from the mains. It is true that where these step up the supply voltage the consequences of a shock would be far more serious than with D.C. But, since the output side is insulated from earth, the actual liability to serious shocks is decidedly less.

Possibility of Shock

It is not possible to effect a true step-down of D.C. in any simple and economical manner. What is usually done is to dissipate energy in resistances, thus producing an absorption rather than a true voltage step down. The low-voltage side is thus not really insulated from the mains, and so it is possible to receive a shock to earth at full voltage.

From the standpoint of safety, then, A.C. units are superior to D.C., but there is no reason why the latter cannot be made equally safe with a little attention to details. I will confine the rest of this article to a consideration of D.C. units, as there are a few snags here which are not applicable to A.C.

These snags centre around the fact that one of the mains is usually earthed. This is true of A.C. mains also, but as the transformer separates the set from the mains it is not of much consequence with an eliminator of this type.

Now the majority of large D.C. systems are what is termed 3-wire, and small installations are connected between two "outer" cables, and a middle wire called "the neutral." *It is this middle wire that is earthed at the supply station.* What is more important, the polarity of the neutral, in a given installation, depends to which "side" of the system the installation is connected. If it is between the

(*Continued at foot of next page*)

"THE CLARION ALL-ELECTRIC THREE"

(*Continued from page 328*)

choke and condensers. It will be understood, of course, that the reason for the provision of a rectifying valve of the thermionic variety in place of a metal rectifier, is simply that the overall cost is slightly lower. For instance, the same type of transformer is necessitated in both cases, a metal rectifier is slightly more expensive than a valve rectifier, and finally more efficient smoothing is needed, generally speaking, with metal rectifiers.

The circuit is still, of course, of the "S.G. H.F., det., and one L.F." species.

List of Components

Cabinet (Clarion).

Ebonite panel, 16 in. by 8 in. (Becol, Raymond, Resiston, Paxolin).

Two strips, 3 in. by 1 in. (Becol, Raymond, Resiston, Paxolin).

Baseboard, 16 in. by 15 in. (Clarion, Pickett).

Panel brackets (Bulgin, Ready Radio).

Two .0005-mfd. variable condensers with slow-motion movement (J.B., Igranic, Burton, Lissen, Formo).

.0001-mfd. reaction condenser (Cyldon, J.B., Lissen, Peto-Scott).

"Clarion" aerial and anode coil (Tunewell).

Double-pole mains switch (Bulgin).

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

5-pin A.C. valve holder (Wearite, W.B., Lissen).

Aluminium screening-box, 5 in. wide by 6 in. high by 6 in. deep (Parex).

.0002-mfd. fixed condenser with series clip (Dubilier, Lissen, T.C.C., Graham-Farish).

.001-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Graham-Farish).

.0001-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Graham-Farish).

Two 2-mfd. fixed condensers (Dubilier, Lissen, T.C.C., Graham-Farish).

Two 1-mfd. fixed condensers (Dubilier, Lissen, T.C.C, Graham-Farish).

3-Megohm grid leak (Ediswan, Dubilier, Lissen, Graham-Farish).

600-ohm resistance with holder (Ready Radio, Varley, Dubilier, Lissen).

Pre-set condenser (Formodenser, type J, Igranic).

400-ohm baseboard-mounting potentiometer (Igranic-Pacent, Lissen).

S.G. high-frequency choke (Peto-Scott, Lissen, Burndept, Wearite, Varley, Parex).

Low-frequency transformer (Lissen "Super," Varley, Igranic, R.I.).

100,000-ohm resistance with holder (Lissen, Varley, Dubilier, Graham-Farish).

Output choke (Ferranti B.2).

Two universal-range Clarostats (Claude Lyons, Rothermel).

Special multi-volt power transformer (Varley).

Filter unit (Regentone No. 1).

Three yards of lighting flex (Lewcos), Adaptor or mains plug (G.E.C.), Glazite.

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

Two dial indicators (Bulgin No. 3), Screen-grid valve connector (Bulgin), Flexible-lead fuse holder (Belling-Lee).

In next week's issue a very full description will be given of the construction of this set. In the meantime it must be emphasised again that the construction is well within the capabilities of any amateur. The wiring is really very simple and to prevent any possibility of error a blueprint has been prepared which can be obtained, price 1/6, from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4.

You Will be Interested In

The "All-mains S.G.P. Three" receiver on Messrs. E. K. Cole's stand; also the new Ekco H.T. and L.T. eliminators.

The new metal rectifiers marketed by the Westinghouse Brake and Saxby Signal Co., Ltd.

Benjamin anti-microphonic valve holders, over 3,000,000 of which have been sold.

A range of wet H.T. batteries for H.T. on the Standard Wet Battery Co.'s stand; also the handy Wates pocket test meters.

An interesting mains-drive four-valve receiver which Gambrell Radio, Ltd., are showing.

A new Lotus development—complete receivers. Note particularly an all-mains transportable set.

Lewcos coils for practically every set, displayed by the London Electric Wire Co. and Smiths, Ltd.

Handy Electron indoor aerial pins and Electron wire.

Ferranti's new moving-coil loud-speakers; also their all-mains receivers and gadgets for the home constructor.

The new Marconi five-valve portable on the Marconi stand, this is designated the Model 55. See also the new range of Marconi ordinary and transportable receivers.

A special two-valver on the G.E.C. stand, which is fitted with single dial tuning; also the Gecophone mains-operated receivers. And Osram valves, *of* course!

Tunewell coils, as have featured in many prominent AMATEUR WIRELESS receivers, on the stand of Turner & Co.

Inexpensive H.T. and L.T. supply units, mains chokes, and Parmeco transformers on Partridge & Mee's stand.

Colvern's dual-range, interchangeable and six-pin coils for all sets.

The "super" range of portable receivers made by L. McMichael, Ltd. The home-assembled "Screened Dimic Three" will interest home constructors.

An interesting new balanced-armature speaker unit manufactured by the Watmel Wireless Co.

Orphean loud-speakers of all types and to suit all pockets.

Handy drum-dial condensers and micro-dials and other Utility gadgets, made by Wilkins & Wright, Ltd.

In addition to the range of Ormond condensers and portable sets, a new four-pole adjustable loud-speaker unit.

C.A.V. H.T. accumulators and jelly-filled L.T. accumulators, the latter just the thing for your portable set.

The new R.I. receivers and components on the stand of Radio Instruments, Ltd.

Ever Ready batteries and accumulators, particularly the super-power Ever Ready H.T. batteries.

Graham-Farish all-wave H.F. chokes, new components specially designed to work equally well on both the long and the short waves.

The new Mazda radio valves on the stand of Edison Swan Electric Co., Ltd.

The much discussed Elkon metallic rectifiers marketed by the Igranic Electric Co., Ltd.

Exide batteries, particularly the new W.Y.10 for multi-valve sets.

The new "Z" type Celestion loud-speaker units; also the familiar Celestion models, which a price reduction has made even more attractive.

Dubilier condensers, fixed and variable, which have featured so much in AMATEUR WIRELESS sets; also some very satisfactory A.C. and D.C. eliminators.

The whole range of Lissen gadgets for the home constructor; and don't miss the new Lissen valves and complete portable receivers.

American-type cabinets made by W. & T. Locke, Ltd.

The Trix all-electric radio-gramophone, shown for the first time; also the Trix Portette one-valve portable.

The new range of Brown loud-speakers, including the new units for the home constructor.

Wearite coils and switches and A.C. mains components.

Mainten H.T. units, all-metal cabinets, and loud-speakers.

The giant T.C.C. condenser, as used by the B.B.C. at the new Brookman's Park station.

"Radiolegs," an ingenious form of metal stand made by Belling & Lee, Ltd., for converting a table receiver into a pedestal set at a trifling cost.

Interesting Bulgin and Competa parts for the convenience of those who make their own sets.

The well-known R.D. 40 permanent detector on the Jewel Pen Co.'s stand.

Jackson Bros. well-known J.B. condensers of all types.

The new A.C. mains-operated Philips multi-valve set.

Formodensers, made by Arthur Preen & Co., which find many uses in a set.

The Regentone complete A.C. mains receiver.

The new range of Cyldon Junilog condensers on the stand of Sydney S. Bird & Sons.

The whole range of Six-Sixty valves.

Siemen's dry batteries for every purpose; also the new Crystacel glass-cell L.T. accumulators.

Novel copper and aluminium screens on the stand of E. Paroussi.

The new range of Cossor valves, having an entirely new form of construction.

At the Exhibition

"SAFETY FIRST WITH BATTERY ELIMINATORS"

(*Continued from preceding page*)

+ outer main and neutral, the neutral is clearly negative, and the opposite holds true if the installation is across the — outer and neutral. This is an important point to bear in mind, for some have the idea that the live main is always positive. In a long street half the houses would be on the + side (— neutral), the other half on the — side (+ neutral).

Consider now the bearing of all this on a D.C. mains unit. Taking first the output side of the unit, it is well known that —H.T. must be joined to the filament side of the set, and since —L.T. is generally in direct connection with earth, it is clear that the negative side of the eliminator will be earthed. As long as the negative main of the supply happens to be the neutral, all well and good. But if it is the "live side," the result of switching on the eliminator would be a dead short to earth via the set, and possibly a blowing of valves if —H.T. is joined to +L.T. To be sure whether or not it will be a *dead* short depends, of course, on the eliminator connections, i.e., whether there are chokes or resistances in the negative main.

The first point to attend to, then, is the prevention of this state of affairs. What is required is to insulate the filament circuits of the set from earth. This is easily accomplished by putting a 2-microfarad fixed condenser in the earth lead. As the neutral is sometimes a few volts above (or below) earth, this condenser should always be included irrespective of the polarity of the mains.

But what is the result of insulating the filament circuits from earth in this way? Assuming still the negative line main connected to the filament side, it is clear that everything connected to the filament leads will be at a high voltage to earth. L.T. batteries, grid batteries, coils, and variable condensers will be therefore "alive."

Hence the need for the utmost care in the design of the set. Bare filament switches, bare terminals on the panel, etc., are things to avoid like wild fire.

If the mains are of opposite polarity to that just considered the danger zone will be removed to the anode side.

Safety First Do's and Don'ts

I will conclude with a few "Do's and Dont's," for which you should now be in a position to see the reason :—

1. Treat the set as if both the anode and filament circuits are to be at a high voltage to earth, and insulate all bare parts accordingly.

2. Remember to put a fixed condenser in the earth lead or use a loose-coupled tuning arrangement.

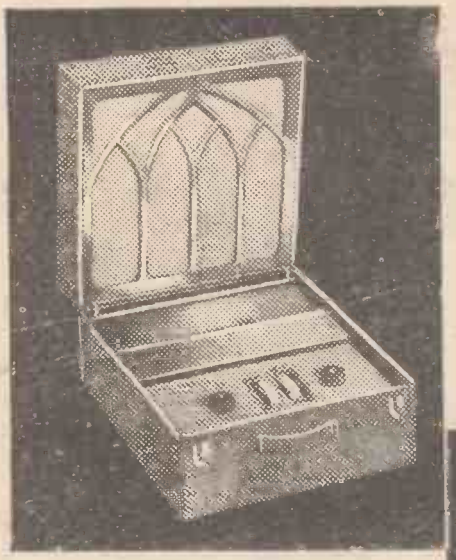
3. Don't be tempted to use headphones without a telephone transformer.

4. Avoid earthing switches.

5. Think well before you put in new gadgets.

6. Don't touch the wiring, the loud-speaker, the accumulator, or change the coils until the eliminator is switched "off."

THE NEW BURNDEPT TRIO



THE NEW BURNDEPT SCREENED PORTABLE

The Wandering Minstrel widens his range and offers a better instrument at a lower price—the result of true economy and ripe experience. Four valves including screened grid—drum control calibrated direct into wave lengths—single switch for 225 - 530 and 900 - 2100 metres. Complete in suit case of imitation crocodile finished blue.

Priced at **19 gns.** including royalty.

THE NEW BURNDEPT A.C. SCREENED SEVEN

The very summit of radio perfection —in reception, reproduction and operation. Seven valves including 2 screened grid and 2 super power valves. Rotational frame aerial and a superb loud speaker in the one cabinet. **All current from the mains.** 100-240 volts, 40-100 cycles. Single switch covers 200 to 530 and 1050 to 1900 metres.

Price complete in bak **36 gns.,** in mahogany **37 gns.** including royalty.

Burndept

PORTABLE AND ALL MAINS TRIUMPHS

See the new Burndept models at the RADIO **EXHIBITION STANDS NO. 144-147.**

Write for specifications and hire - purchase terms to:—

BURNDEPT WIRELESS (1928) LTD.,
17 Eastnor House, Blackheath, S.E.3

THE NEW BURNDEPT A.C. ETHOGRAM

Combined self - contained Radio Gramophone, with all power from the mains for both radio and the electrically driven gramophone. The radio set is identical with the A.C. Screened Seven. The gramophone uses the new patent Burndept "Needle Armature" pick-up.

Prices complete, including royalty, **50 gns.** oak. **51 gns.** mahogany.

B.26

The National RADIO EXHIBITION

On Monday next Olympia opens its doors to the eighth Radio Exhibition since the inception of broadcasting, and the third to be held under the auspices of the Radio Manufacturers' Association. It will be better and larger than ever, for developments have gone ahead quickly during the past year and at the Exhibition you will see what the manufacturers have to offer for the forthcoming season.

This issue contains a *Complete Guide to the Show*, and with its aid, you will have no trouble in making a most interesting stand-to-stand tour.

Don't miss the AMATEUR WIRELESS Stands (Nos. 19 and 20), where a hearty invitation is extended to all readers to obtain free technical advice and to see some of the most popular AMATEUR WIRELESS and *Wireless Magazine* receivers.

Stand 1. J. Dyson & Co. (Works), Ltd., 5 Godwin Street, Bradford.

A full range of Godwinex receivers and components is displayed on this stand.

Stand 2. The Radielle Co., Ltd., 18a Haverstock Hill, Chalk Farm, London, N.W.3.

The Radielle Co. make battery chargers and power units for A.C. and D.C. mains. If you are interested in changing over from battery to mains operation, you should inspect the Radielle range, wherein you are bound to find a unit to suit your requirements. Power transformers are also displayed and will be found useful by those making up their own mains units.

Stands 3 and 4. Catesbys, Ltd., Tottenham Court Road, W.1.

Stand 5. Odhams Press, Ltd., Long Acre, W.C.2.

Epoch permanent-magnet loud-speaker

Stand 6. Yagerphone Ltd., 28 Charlotte Street, E.C.2.

Stand 7. Will Day, Ltd., 19 Lisle Street, Wardour Street, W.C.

All gramo-radio enthusiasts will visit this stand, because the principal exhibit is the Musikon triple-turntable electric gramophone, with complete equipment for supplying a small hall or the largest cinema. There will be, too, the usual range of accessories, such as transformers, accumulators and so on.

ALL THE LATEST AND BEST IN RADIO

Stands 8, 9, 10 and 11. E. K. Cole, Ltd., London Road, Leigh-on-Sea.

This company's new season's receivers are fitted with improved cabinets and an additional S.G. tapping is provided on the Ekco power-supply units, excepting in the 10 milliamp range. Westinghouse metal rectification is employed in most A.C. models and numerous other refinements have been made. The Ekco-Electric S.G.P.3 set, using the latest type of screened-grid valve, in conjunction with a steep-slope detector valve and a pentode power valve will be well worthy of inspection. It combines high amplification with pure reproduction and is suitable for use with D.C. and A.C. mains, provision being made for the attachment of a gramophone pick-up. Several other good sets and a number of units, including rectifiers, trickle chargers, etc., are also to be on view.

Stand 12. Royal Radio Co., 4 Dorset Mews North, Upper Gloucester Place, London, N.W.1.

The Royal Radio Co. are specialising in a screened-grid four portable and a pedestal model radio-gramophone for mains operation. The portable set has a very convincing specification and merits inspection of every amateur who intends to buy a portable for the next outdoor radio season.

Stands 13 and 14. The Westinghouse Brake and Saxby Signal Co., Ltd., 82, York Road, King's Cross, London, N.1.

Owing to the successful advance of metal rectification during last season, two new Westinghouse ranges are being introduced in this category. The new units are the H.T.3 and H.T.4. The former is intended for use in an H.T. battery eliminator, and should be employed with a transformer giving a secondary voltage of 135. The latter is for use either with an H.T. eliminator or with an H.T. charger. A four-circuit universal charging set is also to be shown, together with the company's wide range of units of various types.

Stands 15 and 65. William Dibben and Sons, Ltd., St. Mary's Road Southampton.

Monarch and Cromwell receivers have several important improvements this season, so these well-known "straight-threes" should be even more popular than usual. Loud-speakers, a new radio gramophone, a screen-grid portable four, a Monarch set similar to the type T, but arranged S.G. detector and power, and an all-mains receiver in the same class will also be shown.

Stands 16, 17, and 18. Regent Radio Supply Co., 21 Bartlett's Buildings, Holborn Circus, London, E.C.4.

H.T. units of all types are prominently displayed here and they should not be missed by listeners who intend scrapping H.T. batteries or accumulators in favour of mains units. In addition, too, are handy components for those who want to make their own mains units, such as mains transformers, chokes, and variable resistances. The Regentone A.C. mains receiver is on view and merits inspection by those who want to purchase a receiver capable of operating entirely from the mains.

Stands 19 and 20. Bernard Jones Publications, Ltd., 58-61 Fetter Lane, London, E.C.4.

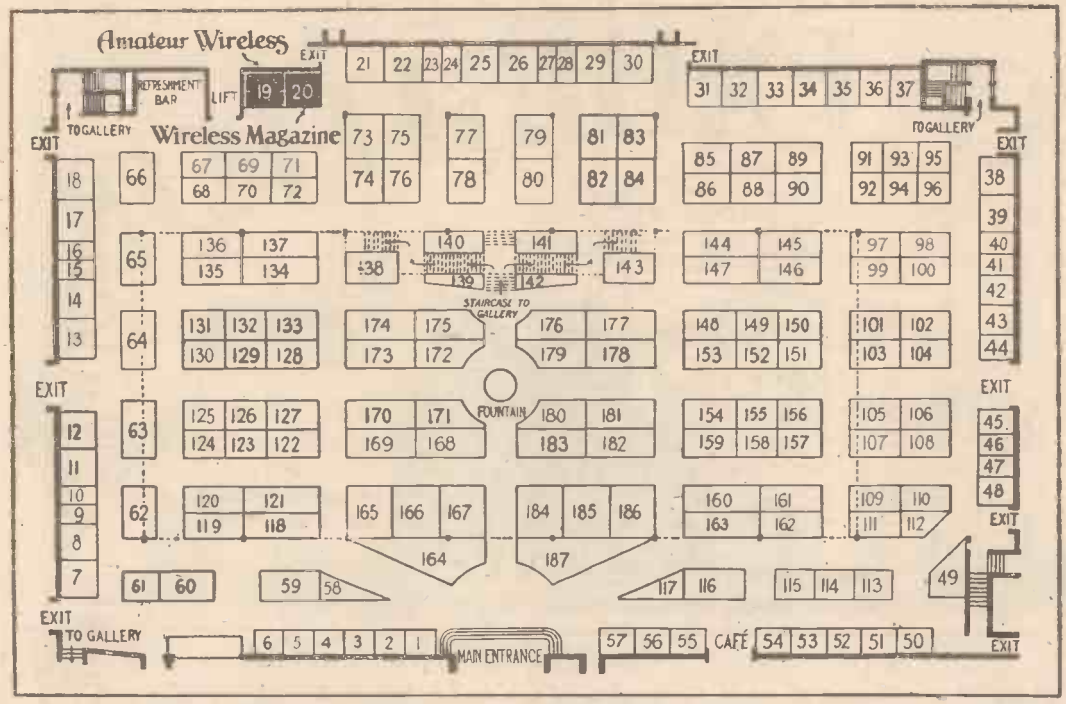
Here is the home of AMATEUR WIRELESS and the WIRELESS

(*Continued in fourth column of next page*)

G.E.C. screened-grid A.C. mains portable

COMPLETE GUIDE TO SHOW

LIST OF EXHIBITORS



PLAN OF GROUND FLOOR OF NATIONAL RADIO EXHIBITION, NEW HALL, OLYMPIA, LONDON, W.

MAGAZINE. Don't on any account miss our stand, which will be of the greatest interest to you because here are to be found some of the actual receivers described.

Stand 21. The British Ebonite Co., Ltd., Nightingale Road, Hanwell, London, W.7.

Eleven different types of Becol low-loss formers, ranging in size from 1 in. to 4 ins. outside diameter, will be on view. Ebonite sheet in mat, polished and mahogany grained, panels, rods, tubes and mouldings of various sizes and description will complete the exhibit.

Stand 22. Cleartron (1927), Ltd., 21 Cumberland Street, Birmingham.

The new types of coated filament valves recently produced by this concern will be on view and amateurs will note that it has been possible to increase the efficiency and lower the filament consumption of these new valves. The whole range is very comprehensive and embraces H.F., L.F., R.C., power, super-power and screened-grid valves, all in two, four, and six-volt types.

Stand 23. A. Baker, 89 Selhurst Road, London, S.E.25.

A number of loud-speakers of various types are on show here, including the popular amateur type moving-coil loud-speakers, in connection with which the name Selhurst is very well known.

(*Continued in 1st col: at foot of page*)

The List below and the Plans will enable you to find any Exhibitor

Stands 24 and 25. S. Kalisky (Aldgate), Ltd., 75 Aldgate High Street, London, E.C.3.

Here will be found a large number of component parts of interest to all constructors. A certain amount of clearing lines at reduced prices will also be of interest.

Stands 26, 27, and 28. A. J. Dew and Co., Ltd., 33 and 34, Rathbone Place, Oxford Street, London, W.1.

Although Messrs. Dew cater only for wholesalers, amateurs should find much to interest them in the complete range of receivers and accessories to be seen on these stands. Practically everything of interest to the radio trader is shown.

Stands 29 and 30. Messrs. Ellison and Hillman, 123 and 125, Albion Street, Leeds.

Particular attention will be given to portable and all-electric mains operated receivers, in addition to a good show of loud-speakers and components, by certain prominent makers.

Stand 31. The Benjamin Electric Ltd., Tariff Road, Tottenham, London, N.17.

The well-known Benjamin anti-microphonic valve holder with one piece springs, over three million of which have been sold, will be on view here. Earth-plates, battery switches and other types of efficient valve-holder will also be featured. A special component will be the ball-bearing turntable for use with portable sets, the hinged and folding legs enabling the set to remain at the level on uneven ground. The legs can be folded up when not required.

Stands 32 and 33. The Fellows Manufacturing Co., Ltd., Park Royal, London, N.W.10.

The Fellows exhibit will make a feature of a range of new Little Giant receivers. There will be two 5-valve portables, cabinet and horn loud-speakers, H.T. and L.T. eliminators, L.T. home-chargers, all-mains receivers and several new screened-grid sets.

Stands 34 and 35. Brown Bros., Ltd., Great Eastern Street, London, E.C.2.

Accumulator charging apparatus, receivers, mains units, and loud-speakers form the main exhibits on Brown Bros. stands, which, it should be noted, are primarily for traders.

Stands 36 and 37. C. F., & H. Burton, Progress Works, Bernard Street, Walsall.

Stands 38 and 39. Iliffe & Sons, Ltd., Dorset House, Tudor Street, London, E.C.4.

Stands 40, 41, and 100, Universal Gramophone & Radio Co., Ltd., Ryland Road, Kentish Town, N.W.5.

The Truvox range of radio gramo-

COMPLETE GUIDE TO SHOW STAND Nos. 42—63

phones and loud-speakers will be on show on these stands. In addition, there is a demonstration room in the main gallery and special demonstrations at the Truvox West End showrooms.

Stands 42, 43 and 44. Peto Scott Co., Ltd., 77 City Road, London, E.C.1.

On these stands will be found an excellent display of components and receivers marketed by this well-known concern. Messrs. Peto Scott specialise in the construction of receivers for all purposes, and the interest of all visitors should be centred on this display.

Stand 45. Bedford Electrical and Radio Co., Ltd., 22 Campbell Road, Bedford.

Stand 46. Redfern's Rubber Works Ltd., Hyde, Cheshire.

Redfern's make ebonite for practically every radio need, and on this stand are to be found panels, coil formers of all kinds, ebonite battery boxes and handy gadgets such as rubber accumulator trays and loud-speaker mats. If you are a DX enthusiast you will be interested in the new Ebonart low-loss coil formers.

Stands 47 and 48. Messrs. C. S. Dunham, Elm Works, Elm Park, London, S.W.2.

Up-to-date receivers will form the bulk of this exhibit. Last year's Simplicity Two, with many improvements, and an all-mains model of the same type will doubtless cause favourable comment. These can be supplied, fitted up in oak pedestal cabinets with a special cone-type speaker and will be shown arranged in this manner. There will also be the Homing Three, with single-dial control as with the above sets, a pair of excellent portables, a main's unit and a charger, incorporating the Westinghouse dry metal rectifier.

Stand 49. Hart Collins, Ltd., 38a, Bessborough Street, S.W.1.

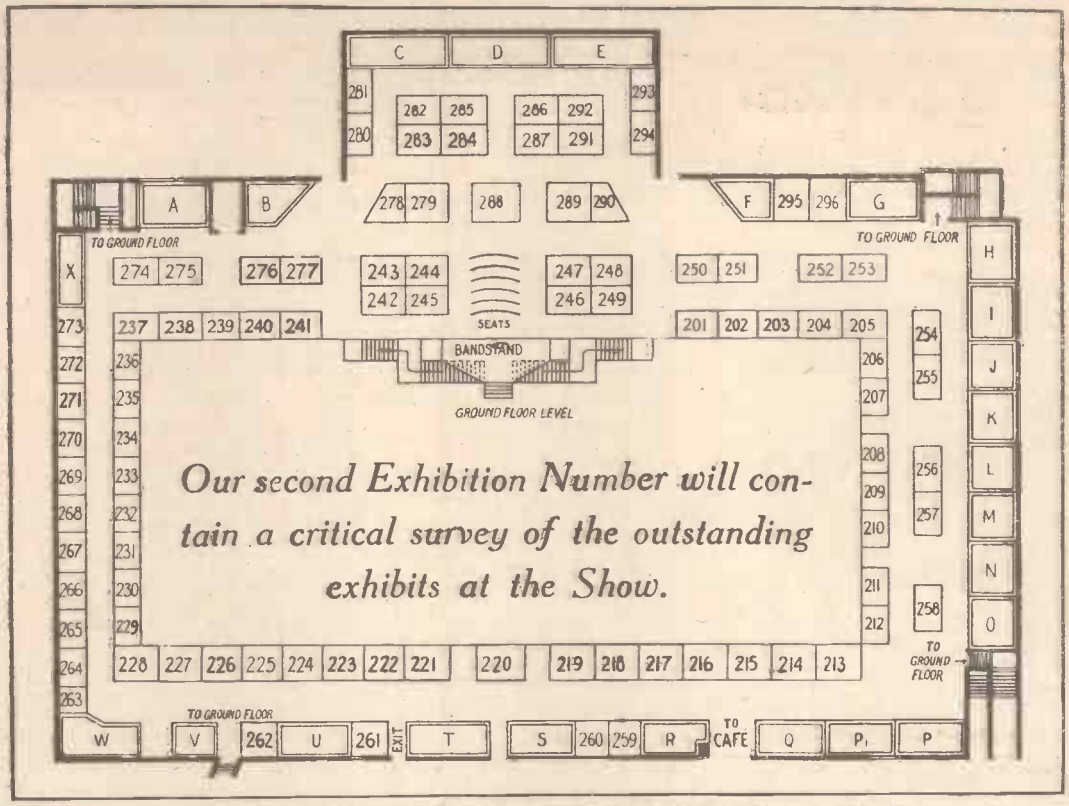
A Philips H.T. Supply Unit

Stands 50 and 51. Burgoyne Wireless, Ltd., 34a, York Road, King's Cross, London, N.1.

Will be showing a four-valve portable screen-grid model, using a pentode in the last stage, fitted with independent reaction and volume controls, a four-valve A.C. all-mains transportable, employing indirectly-heated valves, a straight five-valver, utilising a pentode in the last stage, and a Burgoyne speaker, already on the market.

Stands 52, 53 and 54. Montague Radio Inventions and Development Co., Ltd., 117-119, Regent Street, London, W.1.

Incorporating the Montague quassi-constant reaction circuit, the Beethoven Standard Q.C.R. portable, of the attache-case type, using five valves will attract considerable attention.



THE GALLERY PLAN OF THE NATIONAL RADIO EXHIBITION

Stand 55. Reproduction, Ltd., 5, 6 and 7, Dysart Street Wilson Street, London, E.C.2.

The Rhapsody-Twin portable radio gramophone of new design will be prominently staged on this stand. A comprehensive range of normal-type Rhapsody-Twin radio gramophones, comprising battery and all-mains operated models, will be displayed in addition to the above.

Stands 58, 117, 134, 135, 136 and 137. Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

Mullard, formerly only famous for

VISIT "A.W.'S" STANDS (Nos. 19 and 20)

Stand 56. Messrs. The Mic Wireless Co., White Horse Place, Market Street, Wellingborough.

Zampa new and improved moving-coil speakers, cone chassis, linen-diaphragm speakers, aerial tuners and radio-gramophone amplifiers for A.C. mains operation will form the bulk of this exhibit.

Stand 57. The Standard Wet Battery Co., 184-188 Shaftesbury Avenue, London, W.C.2.

It is sometimes considered that the normal type of wet battery is troublesome to handle, owing to the possibility of spilling its fluid and the messiness of the acid when the battery has to be taken to pieces for reconditioning. With a view to overcoming these difficulties, the Standard cartridge cell has been introduced and will be featured on this stand. Simpler assembly is allowed by the new method and the cartridge, which

Lithanode Unspillable Accumulator

valves, now manufacture many other useful accessories. A visit to these stands shows, in addition to the whole range of Mullard valves, components such as the Mullard loud-speakers, L.F. transformers, H.T. supply units, R.C.C. units, grid leaks, condensers, and so on. The Mullard demonstration room is an asset to those who want to hear good reproduction.

Stand 59. Langham Radio, Ltd., Exhibition Works, Wembley, Middlesex.

Langham sets will include the dual-wave Popular Five, with single tuning control, the Langham Blue, with terminals for gramophone pick-up, and a long-range screened-grid four portable and transportable. A number of high-class radio gramophones will also be exhibited.

Stand 60. Bullphone, Ltd., 38 Holywell Lane, E.C.2.

Here are to be found Bullphone

Westinghouse Rectifying Unit

loud-speakers of all types and to suit all requirements. Bullphone units earned a good name for themselves many years ago and this reputation is reflected in the high quality of the present exhibits.

Stand 61. Trader Publishing Co., Ltd., St. Bride's House, Salisbury Square, London, E.C.

Stand 62. Gambrell Radio Ltd., Buckingham House, Buckingham Street, Strand, W.C.2.

The remarkable Gambrell All-

C.A.V. H.T. Accumulator

electric Four is to be shown here. This set, which combines good selectivity and volume, is contained in an artistic mahogany cabinet. It is fitted with volume control and is easily adaptable for reproducing gramophone records. It can be equipped for use with both A.C. and D.C. mains.

Stand 63. Garnett Whiteley & Co., Ltd., Mill Lane, Old Swan, Liverpool.

Lotus sets and components are so well known that this stand is sure to be popular. A number of high-performance 3-valvers, including an all-mains transportable set which can be obtained in oak, walnut or mahogany, will attract special attention in the display of receivers. So far as components are concerned the list is so varied and comprehensive that it is difficult to do it justice in the

COMPLETE GUIDE TO SHOW STAND NOS. 64—97

space available. Particular mention, however, may be made of the various types of condenser—logarithmic, differential and reaction—and of the excellent range of plugs, switches, antimicrophonic valve holders, dual-wave coils, control dials, etc.

Stand 64. The London Electric Wire Company and Smiths, Ltd., 7, Playhouse Yard, Golden Lane, London, E.C.1.

Reductions in the company's prices for certain components are

An example of a Carrington Cabinet

announced. There will be featured the whole range of coils and components as marketed during last season, except that the number of Q coils will be limited to three types, namely QAT, QSP and QSG. The first is a recent pattern of dual-wave coil and is suitable for various types of circuit. It may be used as a plain aerial coil omitting reaction, as a magnetic reaction on a Reinartz aerial coil, or as a tuned anode coil for S.G. circuits. There are also to be two interesting absorption wavetraps and a varied display of accessories of other kinds.

Stand 66. Whiteley, Boneham and Co., Ltd., Nottingham Road, Mansfield, Notts.

The initials W and B are connected chiefly, in amateurs' minds, with valve holders and loud-speakers. In the first-mentioned component, developments have produced the W.B five-pin valve holder for A.C. valves. The W.B. cone loud-speaker unit is incorporated in the cabinet loud-speakers, also displayed, but the unit may be purchased separately by those who want to make their own instruments. The range of cabinet loud-speakers is very complete and mention must be given to the Lodestone loud-speaker design by our Research Consultant, Mr. W. James, and made to his specification.

Stand 67. The New London Electron Works, Ltd., East Ham, London, E.6.

Introducing a new line, namely Electron indoor-aerial insulator pins, this display is also featuring a 50-ft. aerial for experimental purposes, as recommended by the B.B.C. for use in conjunction with Brookmans Park.

Stands 68 and 70. Oldham & Son, Ltd, Denton.

A very full range of H T. and L.T. accumulators is on show here and no amateur should have any trouble in choosing a battery to suit his requirements. Oldham accumulators incorporate several novel features which make for longevity and easy maintenance. Recently, too, Oldham have introduced mains chargers for accumulators, so that amateurs can keep their accumulators always in tip-top condition.

Stands 69 and 71. Siemens Bros., and Co., Ltd., Woolwich, S.E.18.

As might be expected, batteries to suit every need can be found on these two stands. There are H.T. batteries, of every type, L.T. dry batteries for those who cannot conveniently use accumulators, handy little grid bias batteries which can be fixed in the receiver itself, super-power batteries and Leclanche cells for every phase of radio power supply. Crystacel L.T. accumulators of the glass cell type will be included, which can be obtained in the dry-charged state. Two high-class testing instruments will be shown and these should not be missed by those who are fitting out their radio laboratory. All set users will be interested in a booklet which is being given entitled "Inside Knowledge." This deals with the technicalities of dry batteries in which field Messrs. Siemens are, of course, acknowledged experts.

Stand 72. Arthur Preen & Co., (Formo), Ltd., Crown Works, Cricklewood Lane, London, N.W.2.

Formo components are, of course, familiar to all amateurs, and here are to be seen some of the best known, including the handy Formodenser (which figures largely in "A.W." receivers), the Formo transformer, log condenser and anti-microphonic valve holder. There is no doubt but that something in the Formo range will interest every constructor.

Stand 73. Aeonic Radio, Ltd., 90 Regent Street, W.1.

Aeonic is a name which one always associates with portable receivers and a large number of portables are on show at this stand.

Stand 75. Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex.

Accumulators for all purposes and in connection with the power supply, for every part of a receiving set are to be found on this stand.

Stand 77. The Eagle Engineering Co., Ltd., Eagle Works, Warwick.

Warwick Junior portable receivers are to be shown in two models, one being a 4-valve model using a pentode valve in the output stage and the other a five-valver employing 2 L.F. valves. The Warwick radio gramophone, incorporating the above type of set, and the new dual-wave Warwick,

Stands 78, 138, 173, and 174. A. C. Cossor, Ltd., Cossor House, Highbury Grove, N.5.

Cossors having recently introduced a new series of valves there is, as might be expected, a gigantic display of the whole range on these four stands. The Cossor range includes a valve for every purpose and for every type of set, and the keenest attention should be paid to the latest products of this immense concern.

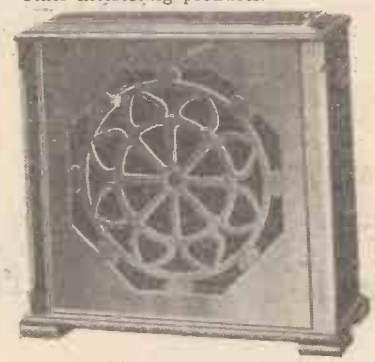
Stands 79, 80, 81, 82, 83, 84. The Marconiphone Co., Ltd., 210-212, Tottenham Court Road, London, W.1.

Apparatus shown in this imposing display will comprise receivers, loud-speakers, mains units, valves, batteries, accumulators, transformers and public-address apparatus. The receivers will include Model 82, an eight-valve frame-aerial super-het, with dual wavelength range, single tuning dial and remote control of volume. Model 35 is an excellent

THE A.W. SETS DESCRIBED IN THIS ISSUE ARE ON VIEW ON STAND Nos. 19 and 20

Stands 74 and 76. Ferranti, Ltd., Hollinwood, Lancashire.

Numerous new lines characterise the display on these stands. Prominent among these may be mentioned two new moving-coil speakers, Types SA1 and SD1. The first is for use on A.C. supplies of 200-250 volts and incorporates a valve rectifier, the second, being for use on D.C. mains, does not include the rectifier. Improvements and additions have been made to the range of Ferranti transformers, eliminators, condensers, chokes, etc., and these will be displayed together with the new Ferranti anode feed units. The last-mentioned have been designed to simplify the well-known Ferranti anode-feed system and have been designed in two types. The first consists of a resistance and clip on a moulded base embodying the requisite 2 mfd. condenser; the second is provided with three resistances and condensers. The new Ferranti all-mains receiver, Model 31, using a similar circuit to that of the Ferranti S.G.3, and the S.G.3 in kit form will also be on view together with other interesting products.



A Reed Type Celestion Speaker

instrument with a screened-grid valve detector and a transformer-coupled L.F. stage. It is fitted in a mahogany cabinet with a sloping front and its controls are mounted on an antique copper escutcheon, which prevents any possibility of hand capacity effects. The set is of the dual-wave type and can be operated either from batteries or A.C. mains. Among other sets shown will be a six-valve frame-aerial receiver, Model 61, a moderately priced portable five-valver, Model 55, and a high-performance three-valver, Model 39, using one S.G. stage, detector and pentode or power valve.

Stands 85, 86, 87, 88, 89, and 90. The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

One of the fullest displays in the exhibition will make a feature of several new receivers, both battery and all-electric types having received their mead of attention. The Gecophone two-valver, for use with batteries, is fitted with single-dial tuning and can be adapted for gramophone amplification. In this class are to be included a screened-grid three-

The Varley Resistance capacity Coupler

valver, with a switch for dual range, a six-valve long range and an eight-valve Supersonic heterodyne model. The Gecophone all-electric display shows a two-valver and a three-valver, both being suitable for 200-260 volt A.C. mains. Several excellent screened sets and portables will likewise be featured. Loud-speakers, transformers, Osram valves, condensers, and a complete range of standard components will make the company's stands a centre of attraction.

Ferranti Claema Amplifier

Stands 91 and 92. Climax Radio Electric, Ltd., Haverstock Works, Parkhill Road, N.W.3.

Many Climax components are to be found here, including the popular Climax H.F., L.F., and power chokes, wire-wound resistances and other components for making mains eliminators. Complete mains eliminators are also to be found, together with earth tubes, loud-speakers, lightning arrestors and other well-known Climax accessories.

Stand 93. Ready Radio, Ltd., 159 Borough High Street, London, S.E.1.

Ready Radio make a number of components which appeal to all listeners and the display on this stand will therefore be of great interest.

Stands 94 and 96. Columbia Gramophone Co., Ltd., 92 Clerkenwell Road, London, E.C.1.

Interest at this stand centres on the Columbia five-valve portable and the radio table model 304. This latter is a luxurious all-mains receiver, incorporating three screened-grid valves. As might therefore be supposed, it is capable of putting up a most satisfactory performance. If desired, it can work from either A.C. or D.C. mains, though batteries can be provided if no mains supply is available.

Stand 95. Turner & Co., 54, Station Road, New Southgate, London, N.11.

Tunewell dual coils for use with the Clarion S.G.3 circuit will be of special interest to Amateur Wireless readers. There will also be coils of this type for the Broadcast Picture 4 and the DX2, among other circuits. Tunewell two-pin plug-in coils are well-known for their sturdy construction and for the good results they give—a full range of these will be shown. Coil formers and bases, chokes, etc., will complete an attractive stand.

Stand 97. Jackson Bros., 72 St. Thomas Street, S.E.1.

J. B. condensers need no introduction and on the J B. stand it is possible to find a condenser to suit every need. There are condensers for broadcast sets with slow-motion and

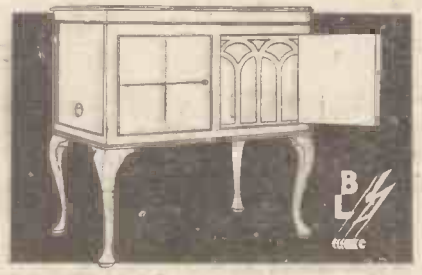
SHOW GUIDE CONTINUED ON PAGE 352

Now See the Complete BOWYER-LOWE Range for 1929-1930

New models! Improved sets! Greater values! Receivers and components for every purpose, widely comprehensive in price, all backed by the Bowyer-Lowe reputation for highest technical efficiency.

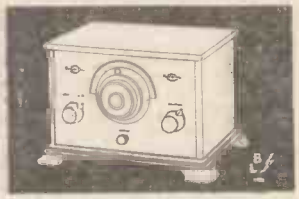
Ask your Wireless Dealer about the Bowyer-Lowe range of Sets and Components, or write to Headquarters for illustrated literature.

STAND NO. 130 & 131.



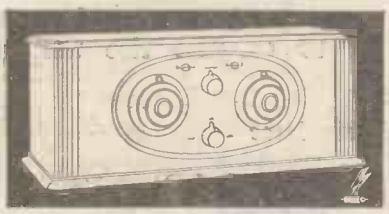
RADIO-GRAMOPHONE

A combination of the famous Bowyer-Lowe Screened Vox Populi 3 and an Electrical Reproducing Gramophone. Gives perfect reproduction of radio and gramophone music. Prolongs life of records. List No. 374, Battery Model, £39
Mains Model D.C. £56
Mains Model A.C. £65
Including valves and royalties.



PENTOVOX 2

A two-valve receiver using the Pentode valve. Wavelength ranges are 250/500 metres and 1,000/2,000 metres. No change of coils. List No. 329, £6. 8s. Including valves and royalty.



£10 *including valves & royalties.*

THE PENTOVOX 3.

The finest set of its kind on the market, yet lowest in price. Using a screened grid H.F. valve and a Pentode amplifying valve, it is notable for purity, selectivity and volume. Wavelength ranges are 250/500 metres and 1,000/2,000 metres. Now improved in detail and appearance but reduced in price. List No. 362 ... £10 including valves and royalties.

JUNIOR CONE REPRODUCER

A thoroughly efficient speaker, giving clear and faithful reproduction, and selling at a very attractive price.
List No. 375 ... 35/-

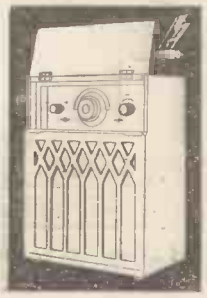
GRAMOPHONE PICKUP

A scientific instrument giving an entirely new beauty to records. Absolute fidelity of reproduction obtained, the design being tested to give bass and treble their true values. List No. 364, 19/6. List No. 365, Special Track-arm for Pick-up, 10/-.

UNIVERSAL LOG CONDENSER.

For panel mounting with dial or drum control. Very easily ganged. Single hole fixing.
.0003 ... 5s. 9d.
.0005 ... 6s. 0d.

All Bowyer-Lowe Sets and Loud Speakers can now be obtained on generous hire purchase terms.



PORTABLE 5.

The latest addition to the Bowyer-Lowe range, this set establishes a new standard among portables. A wonderfully efficient production at a moderate price. List No. 363, £16. 16s. including valves & royalties.

Bowyer-Lowe

In association with Recordaphones Ltd.

London Showrooms:
ASTOR HOUSE, ALDWYCH, W.C. 2
Head Office & Works:
Radio Works, Letchworth, Herts.

BUILD IT YOURSELF—

Build it yourself in an evening!

Gets Concerts from all Europe!

A real Musical Instrument!

Works from your Electric Light!

—A SET YOU'LL BE PROUD TO OWN!

AT last the standard of home-built Receivers nas been raised to that of factory-built Sets—by the makers of the World's finest loud speaker.

Look at this wonderful new Brown Receiver. A handsome Set—in rich mahogany or oak cabinet—it gives you concerts from all Europe! Amazingly selective—cuts out local station at will—the ideal Set for the new B.B.C. Regional Scheme which will put old Sets out-of-date. It is self-contained too—batteries, accumulator and loud speaker contained in the cabinet. Or—if you prefer it—you can build it without the loud speaker—and either model can be made to work from your electric light. Finally, its tone is purer and its volume is greater than any previous home-built Set. *And you can build it yourself*—even if you have never made a Set before! *Now*—read on below, decide which model you will build and hear it at your Dealer's.

2 Models—Battery or Electric Mains Use.

Types "A." and "A.M." — As illustrated—with Brown Loud Speaker tested and assembled in cabinet. Type "A" has space for batteries and accumulator. complete kit of parts, less valves, batteries and accumulator, but including coils for 200-550 metres, price £12. Type "A.M.," as type "A." but for A.C. or D.C. Mains operation, price £20.

Types "B" and "B.M."—Similar to types "A" and "A.M." but without loud speaker. Kit of parts for type "B," less valves, batteries and accumulator, but including coils for 200-550 metres, price £9. Type "B.M.," as type "B" but for A.C. or D.C. Mains operation, price £17.

Extra coils for 900-2,000 metres, 17/- extra.

FREE!

The four models of the wonderful Brown Receiver are more fully described in an illustrated Folder which you can obtain free from your Dealer or direct from—

S. G. Brown, Ltd.,
Western Avenue,
N. Acton, London, W.3

THE WONDERFUL NEW

Brown RECEIVER

You can pay as you listen!

Any of the four types of the Brown Receiver can be obtained on easy monthly payments. Ask your Wireless Dealer for Folder giving full details of our "pay as you listen" system.

522 (A)

On Your Wavelength!

Winter Joys

FOR obvious reasons, the approach of the long winter evenings does not have the same depressing effect on the wireless man as it does on the ordinary man in the street. For the same reasons, the wireless manufacturer permits himself to smile at this time of the year. And the smile grows broader than ever at the commencement of the period of the Radio Exhibition, particularly if he has something new and startling to show in receiving sets and components. Well, what *is* going to be the "rage" of this year's Exhibition?

One Dial

The one-dial, one-switch set is going to be "the thing." Hitherto, the complication of the high- and low-wave tuning range has retarded the progress of one-dial receivers in this country, but I hear of several sets of this type which will be "featured" (horrible word !) at the Exhibition. In America, one-dial sets are the rule rather than the exception, largely owing to the fact that the broadcasting wavelengths are limited to between 200 and 600 metres. Secondly, I anticipate the more general use of the moving-coil loud-speaker, which will be cheaper and more reliable than ever. Elaborate cabinets for moving-coil loud-speakers will be seen, too, but these I do not regard in the light of a step forward. The square "fire screen" type of baffle board may be a little inconvenient, but it is certainly free from that unpleasant "boxy" effect frequently heard when a moving-coil loud-speaker is mounted inside a cabinet.

Portable Sets

It is extraordinary the way portable sets have "caught on." There are many excellent portable sets now available, and from time to time AMATEUR WIRELESS has published details of tried and tested portables for the amateur to construct. But never has it been guaranteed that the portable will "reach out" and give as good quality as the orthodox type. It stands to reason that the limited amount of space available is insufficient for large batteries or moving-coil loud-speaker. Moving-coil loud-speakers are out of the question for portable work, anyway. Just imagine attempting some portable set reception on the top of Snowdon, carrying with one a moving-coil loud-speaker, portable set with heavy-current filament valves, high-capacity L.T. accumulators, and 400 volts of accumulator H.T. !

Television—Cause for Congratulation

The recent announcement that at long last the B.B.C. and the Baird Television Development Co., Ltd., have come to terms concerning the broadcasting of television is a matter for mutual congratulation on both sides. It may be remembered that the Baird Company some time ago declined an offer of three one-quarter-hour periods a week without guarantee of continuity of broadcast, but as a result of the mediation brought to bear by the Post Office this offer was substantially increased to five half-hour periods per week. Obviously, this is really all too short a time to satisfy the desires of the large proportion of listeners who now wish to become acquainted with the art of "seeing-in."

However, we must be thankful for small mercies, and in any case this step marks a turning point in the history of television as far as this country is concerned. Germany is already turning her hand to production, so it will be interesting to see which country ultimately takes the lead in the commercialisation of television. Not only ready-made receivers will be in demand, but home constructors, alive to the fresh opportunities now afforded for their display of skill in making up the machines, will seek fordetails.

Progress in America

In America there are a large number of television experimenters, but up to the present most of the results are desultory. Parts for the home constructor have been on sale in the U.S.A. as in other countries, but a "pukka" commercial machine has not been available to the public, and undoubtedly this fact hinges on the all-important question of automatic synchronising.

Talking Films—What Next?

The agreement between the B.B.C. and the Baird Company has followed quickly in the wake of the tele-talkies demonstrations which have been going on for the past three or four weeks at the Baird Company's laboratories in Long Acre. In many quarters it has been held that the entertainment value of a silent film is not very high, and in consequence Baird rapidly developed a transmission of picture and speech combined on one film. Both voice and picture depend for their "transformation" upon the photo-electric cell, but whereas the former was worked direct through the medium of the narrow speech strip running down the edge of the film, the latter called into play the familiar scanning disc to break it up into light spots to be handled adequately by the cell.

NEXT WEEK:

A

CRITICAL SURVEY OF THE EXHIBITS

Real Television

George Robey as the blushng bride is the film featured at the demonstrations. It may be recalled that Mr. Baird in his earlier experiments tried the silent film alone, but after achieving success in that direction he turned his energies and inventive genius into real television channels, being convinced that although film work was easier, the televising of a living subject had greater potential value, and undoubtedly he was correct in his diagnosis. However, the mere idea of a choice between television proper, tele-talkies, silent films, colour television, stereoscopic television, daylight television, noctovision, and phonovision opens up an avenue of delight to those who have felt they were heading for a *cul-de-sac* as far as ordinary listening was concerned.

Does the Pentode Pay?

In a recent issue of AMATEUR WIRELESS I was taken to task by a correspondent who maintains that there is no very great saving in having one pentode L.F. stage against two fitted with three-electrode valves of the more generally seen type. "According to my reckoning," he says, "a two-valve pentode set cost only sixpence less than a three-valve set giving the same volume." I take it that he means in the one case a set incorporating a valve rectifier and a pentode and in the other a detector valve followed by two L.F. stages.

Comparisons

Here is my reckoning for the two. In both, the aerial, grid, and reaction coils, with their condensers, will cost the same and there will be no difference in the price of the detector valve, including the coupling of the first L.F. valve. In the pentode set we require, therefore, one valve holder at, say, 2s., one resistor at 1s. 6d., and one valve at 22s. 6d.; total, £1 6s. Now for the two L.F. stages. A pair of valve holders of the same class comes to 4s., a pair of resistors to 3s., a first-stage L.F. valve at 10s. 6d., a super-power valve in the last holder 15s.; total, so far, £1 12s. 6d. We must have a super-power valve, since this is the only triode type which will handle the same volume as the pentode.

But we have not yet finished with the expense. In a two-stage L.F. set there must be a coupling of some kind between the first and second L.F. valves. If we allow as little as 13s. 6d. for this, the saving on the pentode works out at a whole Fisher, which is certainly not to be despised in these days. Either set will require a filter circuit or an output transformer, and this will cost no more for the pentode than for the triode outfit. There will be a small economy in running costs, since the two filaments of the pentode set will

On Your Wavelength! (continued)

take rather less current than the three of the other and slightly less H.T. current will be consumed by the former than by the latter.

The Next Point

Our correspondent, too, is clearly not a believer in putting all one's eggs into one basket. "If the pentode burns out," says he, "the cost of replacement is 25s. against 15s." True, but placing your hand upon your heart, dear reader, just how often have you known a valve come to an end by burning out? I don't want to exaggerate, but I must have had many hundreds of valves through my hands in the course of a long and exciting wireless career. I can remember an old bright-emitter or two burning out, but such a thing has never happened to me or to anybody else I know with dull-emitters. By burning out I mean, of course, the giving way of the filament in the ordinary course of operation, and not a firework display due to a short-circuit or a wrong connection made in a moment of madness. That sort of burning out has been known to occur, but it becomes absolutely impossible if one connects the batteries negative to negative and fits safety fuses in the H.T. leads.

—and Another

And there is one little point that this correspondent has, I think, overlooked. If he is referring to a burn-out of that kind it would affect the pentode and one other valve in the one case (costing 10s. 6d. plus 22s. 6d. equals 33s.), and in the second case three triode valves (costing 15s. plus 10s. 6d. plus 10s. 6d. equals 36s.). On the whole, I think the odds are quite distinctly in favour of the pentode combination.

Safety First

Talking of fuses reminds me that I have used safeguards of this kind for some time now and that (here I touch wood firmly) I have never had an accident with my valves since they were installed. In these days of screening the provision of suitable fuses is, I think, an absolute necessity. In the set we have large areas of metal all connected to L.T.—, and there are a thousand and one opportunities of causing a short that may damage the batteries even if it does not injure the valves. Here is my own simple system, which works admirably. First of all the L.T. battery. I remove one of the lead connecting strips between cells and put in its place a piece of fuse wire guaranteed to blow at 2 amps. This allows a good margin for ordinary working, and even a direct short will do no damage to the accumulator. Every now and then the fuse wire should be renewed, but if it is kept well vaselined it does not seem to suffer much from corrosion.

H.T. Fuses

High-tension-battery fusing is done with flashlamps, one being used in the H.T. negative lead and one in each positive lead. The best kind of bulb to use is one designed for low voltage—say, 2.5 or 3, and intended for a current of about .2 ampere. The resistance of the filaments of these bulbs is not excessive and its presence certainly makes no difference to the working of the set if decoupling resistances are used. A filament designed for .2 ampere generally blows instantly when current reaches about double that amount and valves suffer no damage.

A Convincing Test

Once or twice, to convince doubting friends, I have put a brand new valve into a holder and have deliberately blown a fuse by making a short. Curves of the valve taken before and after this treatment showed no difference whatever. An ammeter placed in circuit with the valve filament shows that the overload when a short-circuit is made never reaches any serious figure and that the fuse blows so quickly that insufficient time elapses for any real harm to be done. It costs only a shilling or two to provide both L.T. and H.T. batteries with fusing arrangements, and the cost is well worth while, in view of the excellent insurance that it offers.

Shorter and Shorter Hours?

Recently I commented on the poor showing that our home stations make with regard to the number of hours' service given during the day when compared with those in the United States. Matters are even worse at the moment of writing. On most afternoons during the week 2LO and 5XX are silent from two o'clock until four, whilst 5GB does not open up until 3.30 p.m. And this, too, during the holiday month, when people like to use portable sets out of doors on fine days and indoors on wet ones. Why there should be these gaps during the afternoons I do not understand, and I am quite sure that it is not to the general advantage that they should exist. A good deal of shopping must be done between 2 and 4 p.m., and it is pretty hard lines on the retailer who cannot give a demonstration of his wares. We ought, I think, to press for a better service and to see that we get it.

The Advertising Question

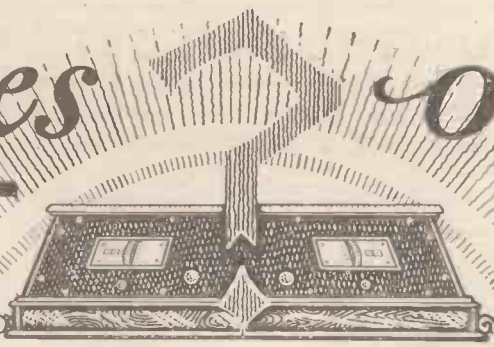
Foreigners hold that we Britishers are about the most inconsistent people on the face of the earth Though, of course, we stoutly deny the allegation, there is, between you and me, quite a lot in it. I mean to say that we are proud of boasting that no advertising is ever allowed to form any part of our programmes. It would never do—would it?—to have anyone providing free programmes so that his products might be advertised. You agree with me that it is simply not done? Now we come to the delightful inconsistency. On a good many occasions during the week we are treated to canned programmes of gramophone records and always the announcer is most careful to give, in addition to the title of the record, its number and the name of the company that manufactures it.

Am I wrong in supposing that the records are sent in free for "review," just as books are to newspapers? Would it be wrong again to suggest that the gramophone company could receive no better publicity than that obtained from the broadcasting of their records? Myself, I have not the slightest objection to a reasonable amount of advertising if it leads to better programmes.

A Suggestion

Now, obviously, every company using the microphone in this way will want to put on the best possible programme, and the result is that some of the very finest items over there are provided in this way. I think myself that if the same kind of system were introduced over here it would go very well. A first-rate programme with stars of the first magnitude for one hour a week could be provided at far less cost than a whole page advertisement in a big daily paper THERMION.

W. James on the BEST SET



Is there a Best Set? This a question that every listener asks and below W. JAMES indicates what is the best type of receiver for your requirements.

I SHOULD not like to say how many types of sets there are in use to-day. There must be several hundreds, and I suppose that when their owners first

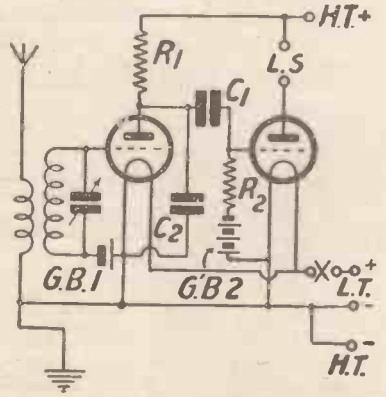
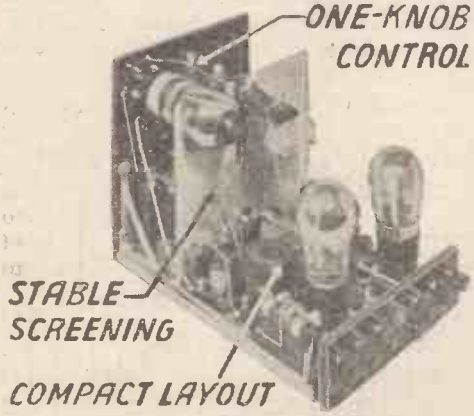


Fig. 1a. A good circuit for the local station

obtained them they considered them the best for their own particular purposes.

It is therefore quite impossible in a few words to describe more than a few receivers that might be reckoned the best in their own class. What I shall do, however, is to describe a few sets for certain purposes.

There is, to commence with, the listener who lives within a few miles of a broadcasting station who wishes to hear that station very well with a simple receiver, and not to bother with distant stations. The best set for this listener would have an anode-bend detector and a power valve with a resistance coupling, the circuit arrangements being shown in Fig. 1a.



The "Listener's Three," a particularly compact set (described in A.W. No. 347)

As the listener is not far from a broadcasting station there would be ample strength for the anode-bend detector which would, therefore, rectify almost without distortion. One may also claim that with a good resistance coupling there is very little distortion, with the result that the quality of the reproduction from this little two-valve receiver would be very fine. Ample high-tension and a good loud-speaker should be used. There is only one knob for tuning and a switch in the filament circuit.

A Local-station Set

The circuit of Fig. 1a shows a detector grid battery, GB1, which must be adjusted to suit the high-tension, as well as the usual grid battery for the power valve, marked GB2. There is also an anode circuit condenser C2 of .0003 microfarad, a resistance R1 of 100,000 ohms, a grid condenser C1 of .005 microfarad and a grid leak of 1 megohm.

A LIST OF BLUEPRINTS
OF A.W. AND W.M. SETS
APPEARS ON PAGE 379

A modification which will give greater strength is indicated in Fig. 1b. I should call this a local-station receiver, and it will give excellent quality with the minimum of tuning. Resistance R1 may be of 30,000 ohms, condenser C1 of .01 microfarad, condenser C2 of .0003 microfarad and transformer T may have a ratio of about 4 to 1.

These two receivers may be run from high-tension dry batteries as their current consumption is small. I would naturally like to see them used with 160 or more volts, but this may not always be possible. They could, of course, be supplied with high-tension from a mains unit and there is no reason why, with special valves, the whole set should not be run from the mains.

If I had to run a moving-coil or other good loud-speaker at ample volume and lived say 10 miles or so from a main station I would use a three-valve receiver of the type indicated in Fig. 2. This set has two resistance coupled stages with anode filters and an anode-bend detector. It is an excellent local-station set when the best quality of reproduction is desired with the minimum of trouble.

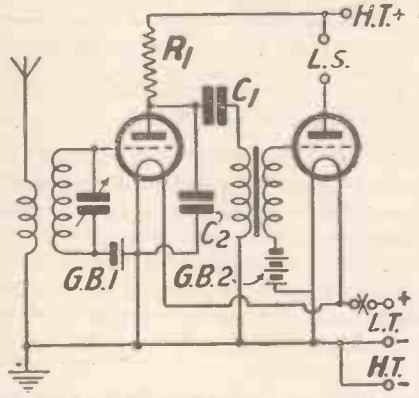
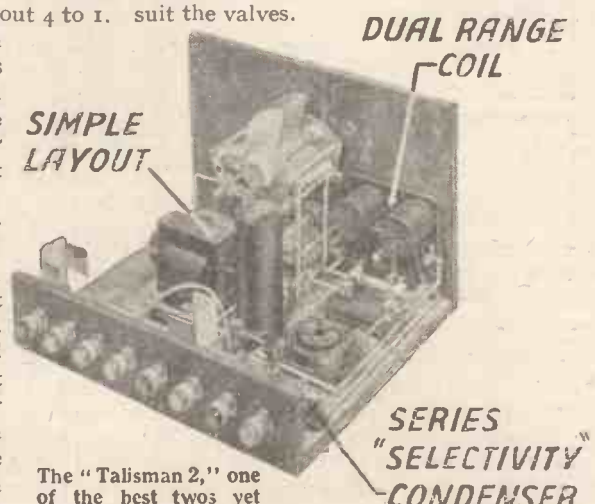


Fig. 1b. Another local-station circuit giving excellent quality

Three extra large capacity dry batteries should be used for high-tension or better still, a well-made mains unit giving the desired voltage. Reaction could be added to bring up the strength of a second station and a dual-range coil could be used. Notice that a potentiometer is employed as a volume control. The parts may have the following values: C .001, C1 .1, C2 .1, C3 .0003 microfarad, R 1 megohm, R1 100,000 ohms, R2 50,000 ohms, R3 500,000 ohms, R4 20,000 ohms, R5 10,000 ohms. The various grid batteries should be chosen to suit the valves.



The "Talisman 2," one of the best twos yet (described in A.W. No. 373)

"W. JAMES ON THE BEST SET" (*Continued from preceding page*)

If very powerful signals were required, a push-pull stage would have to be fitted instead of the last stage indicated in the figure.

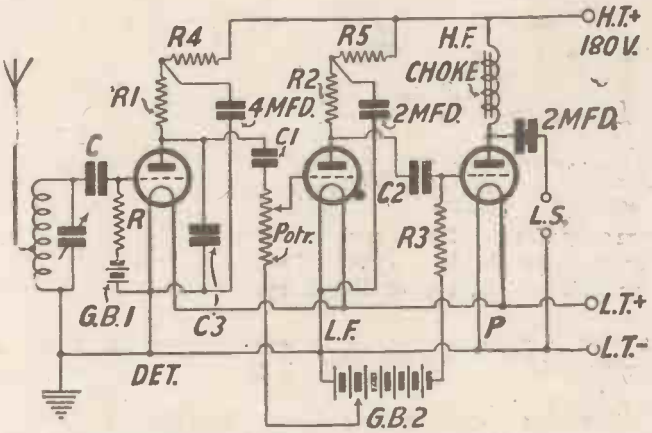
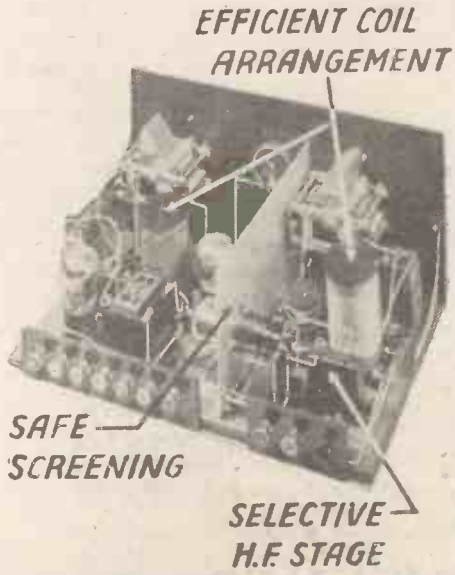


Fig. 2.—A suitable 3-valve circuit for working a moving-coil speaker

The tuning coils indicated in Figs. 1 and 2 should be well made in order to obtain reasonable selectivity. I should prefer Litz-wire coils and small primary windings.

All three receivers could be converted into sets capable of bringing in with good volume and quality of reproduction, two or three other stations by the addition of a single high-frequency stage. This stage would have to be tuned in order to provide adequate selectivity for the magnification.



The "Brookman's Three" an Ultra-Selective H.F. set described in the October issue of the "Wireless Magazine"

None of the three receivers is intended for long-distance work, but simply to provide good quality of reproduction.

If I wanted to listen to the distant stations as well as the local one and still put quality of reproduction first, I should use a set wired as indicated in Fig. 3. This shows two high-frequency stages, an anode-bend detector and a single power stage. There is no reaction. Every valve is biased negatively, and the high-tension should be at least 160 volts.

This set will tune very well, and the three condensers should be fitted with geared dials. One could gang the second and third, but it would hardly be safe to gang the three, when good coils are used. Resistance R is employed as a volume control. It is joined to the filaments of both shielded valves. Their shields are shown fitted with the usual stopping resistances R1 and condensers C.

Complete shielding maybe needed in order to ensure perfect stability. A set of this description must not oscillate, and it will not do so when the parts are carefully arranged. Here again, special coils fitted with switches may be employed in order to cover both wavelength ranges.

The best set for distant stations and quite good quality of reproduction for ordinary purposes would have only one high-frequency stage, a leaky-grid detector and a single power stage. Such a set, built with good parts, would bring in a number of stations, have adequate selectivity and be easily tuned. This type of set is very popular just now, but different designs result in widely different results.

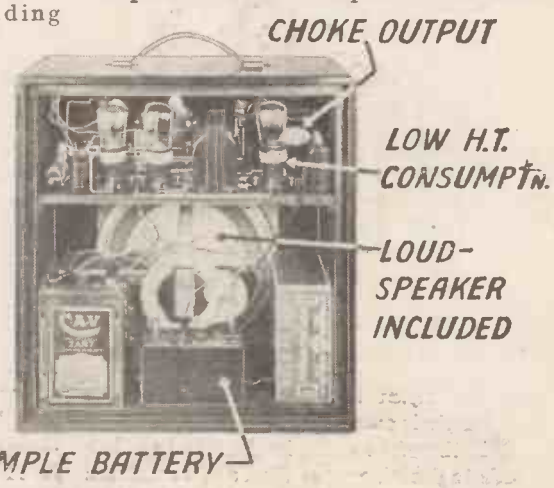
Good high-frequency transformers must be used, and an aerial of moderate dimensions. I would naturally prefer to supply the filament current, grid bias and high-tension from the household supply of electricity, for then a good power valve with, say, 180 volts high-tension could be used. Sufficient dry batteries to provide such a high voltage as this might be too expensive, but the best results cannot be obtained unless there is plenty of high-tension.

None of the diagrams show how an electric sound-box for playing gramophone records may be fitted and, indeed, a set having only one low-frequency stage is not very suitable for this purpose. But when there are two stages, as in Fig. 2, very good results may be obtained, although one must remember that in order to improve upon a good gramophone it is necessary to employ as a minimum 180 volts of high-tension and a push-pull output stage.

I would prefer for my own use a more powerful amplifier for wireless and the gramophone, but this is only possible when a mains supply is available and the equipment is, of course, rather expensive

Blueprint Service

For every published description of an AMATEUR WIRELESS receiver, there is available a full-size blueprint, giving panel and baseboard dimensions and layouts. These blueprints are most helpful to the home constructor, and as a complement to the detailed descriptions. They can be obtained from the AMATEUR WIRELESS Stands, 19 and 20, at the Radio Exhibition, or from the AMATEUR WIRELESS Blueprint Department, 58-61 Fetter Lane, London, E.C.4.



The "Holiday Portable"—an inexpensive and efficient portable. Described in "A.W." No. 365

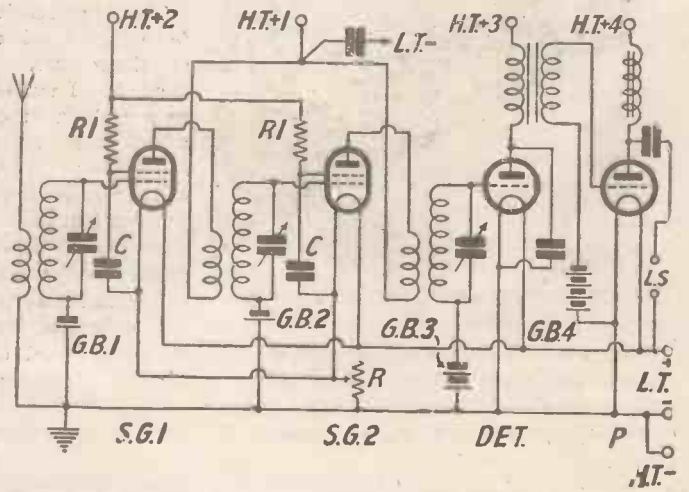


Fig. 3—A set incorporating this circuit would give good quality and bring in distant stations

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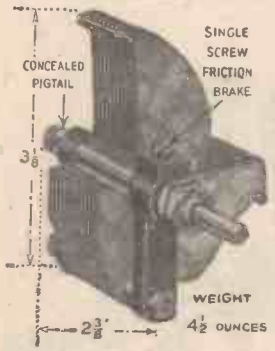

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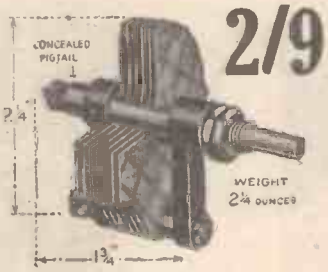
NOTE.
.00015 Double spacing for Ultra Short Wave

"MIDGET" REACTION CONDENSER



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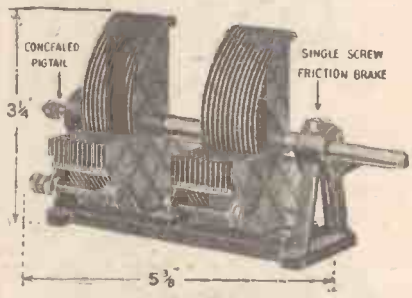
"1930" DUAL GANG CONDENSER



.0005 **15/6**

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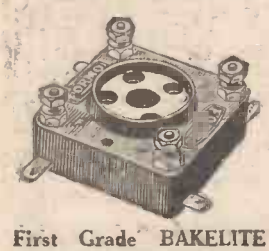

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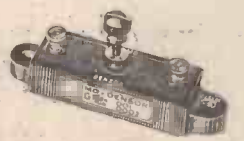

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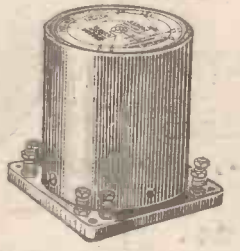

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Pages 351 and 352 are missing

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

OF course, cheers for the Schneider Cup relay, which was done perfectly and thrilled the whole multitude of listeners. It is on such occasions as these that many who forget to pay their licence fees remember to fork up.

◆ ◆ ◆

The Gershom Parkington Quintet continues to discourse music which, besides being refined and popular, is rendered in a truly classic manner.

Lissenden's idea of Miss Babs Valerie

A recent programme of theirs included Ponchinelli's "Dance of the Hours," Liszt's "Liebestraume," Debussy's "Prodigal Son," and Rachmaninoff's "Vocalise." If anyone asked me who, in my opinion, had the power to pacify our millions of varied listeners, I should refer them to the "Parkington Boys."

◆ ◆ ◆

What a welcome they gave Solomon at the Promenade Concert. Few listeners will forget his brilliance in the "Concerto No. 1 in B-flat Minor," by Tchaikowsky.

◆ ◆ ◆

It seems easy for Tommy Handley to get out of his element. This happened in *Lost Pearls*, "the farcical comedy," which was silly and inconsequential. The music was so-so, and, as I have said, Handley was not the Thomas we know.

◆ ◆ ◆

It's a funny thing. I mean, this A. J. Alan business. People who heard him for the very first time when he talked about the "19" Club say he is marvellous. On the other hand, those who heard him before, say he was dry. Personally, I could find little to write home about in this latest effusion of his. No doubt, it was because I'd heard him before. One soon gets used to his careful "care-free' manner, and then the paucity of real laughs becomes boring. I think Alan *reads* better than he sounds.

◆ ◆ ◆

Why take the trouble to S.B. a talk on "Bird Migration" from Aberdeen at ten o'clock at night? There was a certain interest in Professor J. Arthur Thomson's talk, but why—oh, why—give us this sort of thing when we want an hour's good entertainment before turning in? I hate the idea of giving Professor Thomson the bird, for their habits (I mean the birds) are always interesting. But not at ten o'clock at night.

◆ ◆ ◆

Gloria Swanson's surprise item was a surprise, inasmuch as we don't often have film stars singing to us across the ether!

But now we know that she can sing—and a film in which she sings is now on show. What a boost the film was given!

◆ ◆ ◆

What is Greenhorn's idea in niding his identity? He has nothing to lose in revealing himself. Indeed, much to gain. This occurred to me some time ago, but I am not certain whether I said it before. I hope not. If I have, so much the better.

◆ ◆ ◆

A first performance in England of "Flivver Ten Million" was described as a "joyous epic." Don't you believe it.

◆ ◆ ◆

I liked Derek McCulloch's plantation programme, "Down in the Canebrake." The melodies were well chosen and the whole affair was put together in a most palatable form.

I can see no reason for the artistes' names being kept dark. Each singer was good and every instrumentalist—particularly the banjoist—was tip-top. I rather fancy I could trace the identities of most of those concerned. But, anyhow, why this undeserved obscurity?

◆ ◆ ◆

There is always something to enjoy in a programme which gives us extracts from the good old musical comedies—if only the memories which some of the tunes call up again!

Birmingham went one better in giving us a programme of the new and old together. To find such selections as *The Arcadians* and *The Desert Song* coupled together was quite pleasing.

An impression of Ernest Jones

◆ ◆ ◆

Listened in one lunch hour to the Piccadilly Hotel Orchestra, and could hardly hear what seemed an excellent repertoire because of the noisy diners. At the conclusion of a good selection I heard one solitary clap.

The KNIFE THE SELECTIVE

By J. H. REYNER,

ONE of the greatest calls this coming season is undoubtedly going to be for selectivity. When the new London transmitter starts operations many people who have hitherto been untroubled with the problem of selectivity will find themselves in the happy position of receiving too much signal strength. It has been suggested that residents within five miles or so of Brookman's Park will be able to light their houses from the signals from 2LO, but I do not think we need fear this just yet! The fact remains, however, that greater selectivity will be required than has been necessary in the past, and although the problem will affect London listeners only at the outset, the whole country will ultimately be subject to similar conditions.

Specially Selective

The present set is an attempt to provide a good all-round receiver suitable for use in various parts of the country. It has been designed to give good and efficient results under average conditions, while special provision is made for London listeners in the arrangement for obtaining special selectivity.

Sharp tuning can be obtained in a variety of ways, all of which depend upon the use of additional tuned circuits in some form or another. One method is to use an H.F. stage with efficient tuning arrangements. The second method is to use a coupled-circuit system similar to that employed in the "Hyper-selective Two," which was described in these columns a short time back. In the present receiver the extra "tune" takes the form of a wave-trap which can be cut in or out as required.

This enables us to build a very simple and straightforward receiver—a reference to the photograph and diagrams will illustrate this point—while the flexibility of the arrangement is good. For the receiver portion the straightforward detector, R.C. and transformer arrangement has been employed, the only point of difference being that a relatively low value of anode resistance is used in order to obtain a high value of H.T. on the anode of the detector valve. This is necessary in order to prevent overloading of the detector on a fairly strong signal. Otherwise, the arrangement is conventional.

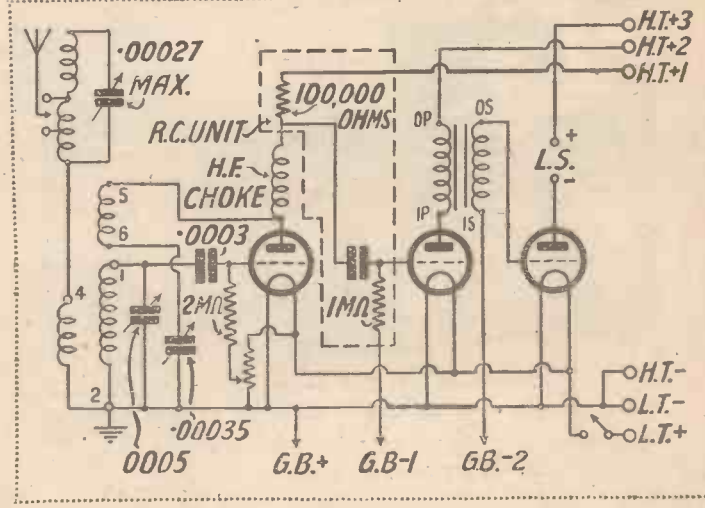
For the tuning coil, one of the new "Q" coils has been employed. These coils retain the properties of the older form of "Q" coil in that they tune to both wave bands in the most efficient manner and are astatic on the short-wave band, but they have been reduced in diameter and size of base, while the efficiency has been materially improved. In addition, the switching arrangement has been made distinctly simpler, so that the coil is in every way a vast improvement.

WHAT THIS REC

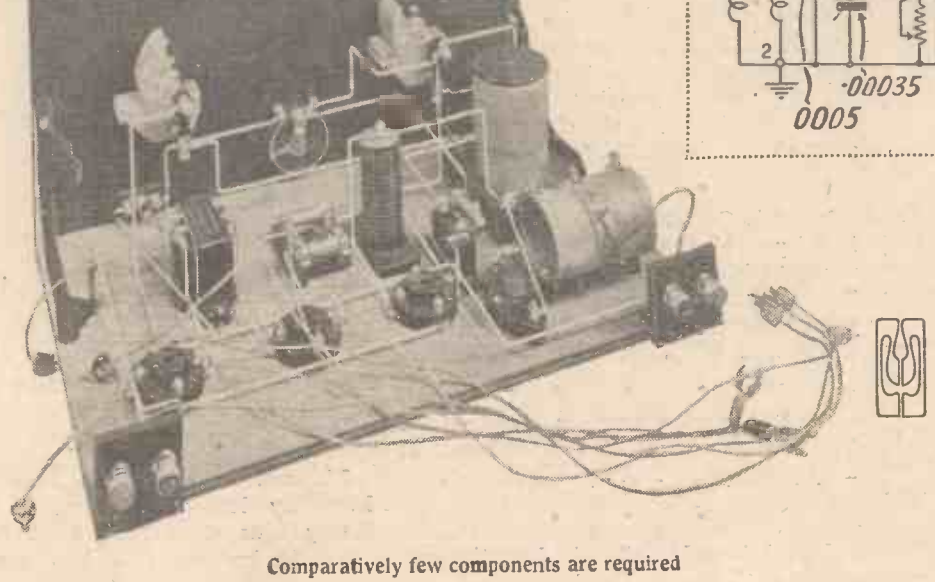
Selectivity is not just a matter of cutting out other stations as well. On the standard Lond it was possible to receive Stuttgart (360 met from London which was working at the same artificial signal equivalent to the London Reg miles showed that this could be tuned out a of 50 metres only.

Coils

The H.F. transformer coils, both for ordinary and screen-grid valves remain as before, but a further simplification has been effected in the matter of the aerial coil. In place of the various forms of aerial coil which were necessary with the old type of coil it has been found possible to replace all of them by one simple coil, which is known as the "QAT" coil. This coil has a coupled aerial winding which has been very carefully proportioned to give good results on both wavebands without any trace of short-wave interference; and it has the advantage of being distinctly more selective than the average types of coil.



Cabinet
Ebonite strips, 2 in
Resiston,
.0005-m (Formo,
.00035-m (Formo, J.B.).
400-ohm meter (Lis "Q"
Three (Lotus, W
.0003-m series clip Graham-F
2-megoh Graham-F
Resistar with 100 (Lissen,
High-fr Ready-Ra



Comparatively few components are required

E-EDGE REE

SIMPLE

, B.Sc., A.M.I.E.E.

EIVER WILL DO

a station. It must be possible to receive don transmission, at a distance of 12 miles, res) at good strength without interference e time on 356 metres. A test made on the gional transmitter at a distance of 15 to 20 and a weak station tuned in at a separation

Thus, in itself, the tuning coil used for the circuit constitutes an aid to selectivity and in many cases this will be found to be sufficient without the use of any wave-trap. It is, indeed, the most selective, simple receiver that I have handled, particularly having regard to the fact that a dual-range coil is employed.

The reaction winding, by the way, is entirely separate on this new aerial coil, so that the reaction condenser may be arranged with its moving plates at earth potential, thereby avoiding any hand effects. Reaction will be found to be fairly uniform and quite smooth if the circuit is arranged as shown in the diagram given.

An Optional Wave-trap

For the benefit of readers who require the greater order of selectivity, more particularly London readers who wish to be prepared for the regional scheme, the wave-trap may be added. This is mounted at the back of the baseboard in the rear of the tuning coil itself. The wave-trap itself is simple of construction and is arranged to be brought into use by connecting flex leads to the various terminals. It is then a simple matter to find which particular setting suits the local conditions—when the receiver may be left with this adjustment for all normal working. The wave-trap itself is simple in construction, its principal feature being that it is astatic. The properties of the wavetrap may often be marred to a large extent, if the set is being used close to a local station, by direct pick-up on the coils themselves. Moreover, interaction may take place between the wavetrap coil and the tuning circuit, which again militates against the satisfactory operation of the device.

In the present instance, pick-up is reduced to a considerable extent by the fact that, first of all, the "Q" coil itself is astatic on the short-wave bands, with which we are dealing, while in the second case the wave-trap has been made astatic. This, coupled with the correct positioning of the coil as shown in the diagrams, results in a negligible interaction between the two and an equally negligible pick-up on the local station either on the wavetrap or on the tuning coil. This will apply, as far as can be ascertained from preliminary tests, even when Brookman's Park commences operation.

Selectivity Tests

Some details of the nature of these tests may be of interest. The idea of Brookman's Park has created a certain scare in some quarters and varying opinions were expressed as to what the signal strength really would be like. I felt that some definite information on the subject was highly desirable, and for this reason I arranged an artificial transmitter capable of supplying to another aerial a signal strength equivalent to that from Brookman's Park at varying distances, ranging from ten miles upwards. Elstree, by the way, is a little under ten miles; so that we, ourselves, were rather anxious to discover the relative seriousness of the new transmissions.

This oscillator had to be completely screened, all batteries and accessories being inside the case, so that the only outlet for high-frequency energy was via the coupling coil, which could be calibrated. In this way it is possible to control the signal strength at will and duplicate the conditions existing at any distance from ten to one hundred miles or more away from the regional transmitter. A dummy aerial was used, because the strength was so large that had it been coupled to an ordinary

LIST OF COMPONENTS

(Camco, Pickett, Clarion).

panel, 16 in. by 8 in. and two n. by 2 in. (Becol, Raymond, Paxolin).

fd. variable condenser Burton, Cyldon, J.B., Lotus), mfd. variable condenser issen, Cyldon, Lotus, Burton,

ns panel-mounting potentio- ssen, Igranic).

erial coil (Wearite, Lewcos).

nti-microphonic valve holders V. & B., Lissen, Benjamin).

fd. fixed condenser with o (Dubilier, T.C.C., Lissen, Farish).

hm grid leak (Dubilier, Lissen, Farish).

nce-capacity coupling unit ,000 ohm anode resistance Dubilier, Graham-Farish).

equency choke (Lewcos. dio, Lissen, Peto-Scott).

Low-frequency transformer (Igranic, type J, ratio 6-1, Philips).

Push-pull filament switch (Bulgin, Lissen, Benjamin, Trix).

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

Panel brackets (Ready-Radio, Bulgin).

Paxolin tube, 3 in. long and 2 in. diameter (Wearite, Atlas).

1 oz. No. 30 D.S.C. wire (Lewcos).

Baseboard, 16 in. by 10 in. (Pickett, Clarion).

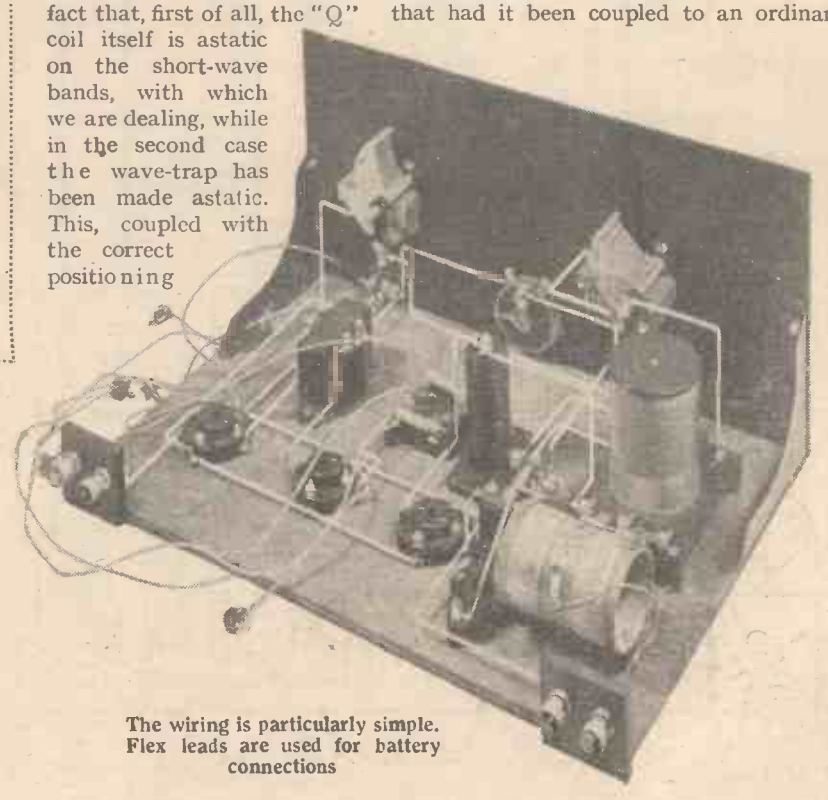
Pre-set condenser, .00027-microfarad maximum (Igranic, Formo).

Connecting wire (Glazite).

3 yards thin flex (Lewcoflex).

7 wander plugs marked H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.+, G.B.—1, G.B.—2 (Belling-Lee).

2 spade terminals, one red and one black (Clix, Belling-Lee).



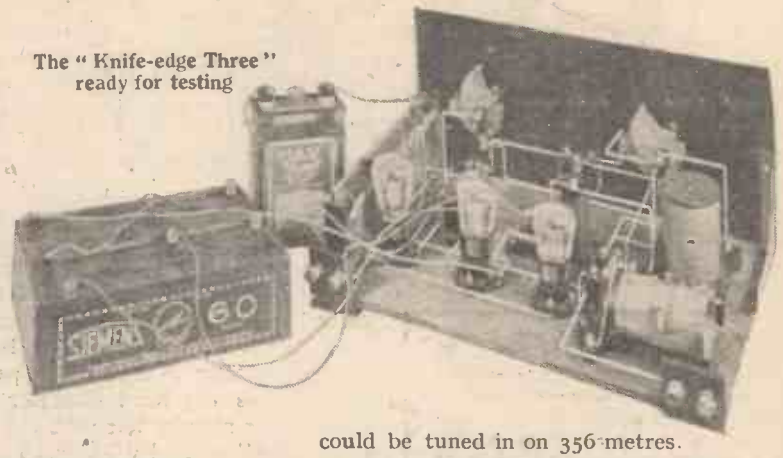
The wiring is particularly simple. Flex leads are used for battery connections

"THE KNIFE-EDGE THREE" (*Continued from preceding page*)

aerial it would have caused serious interference with neighbouring receivers.

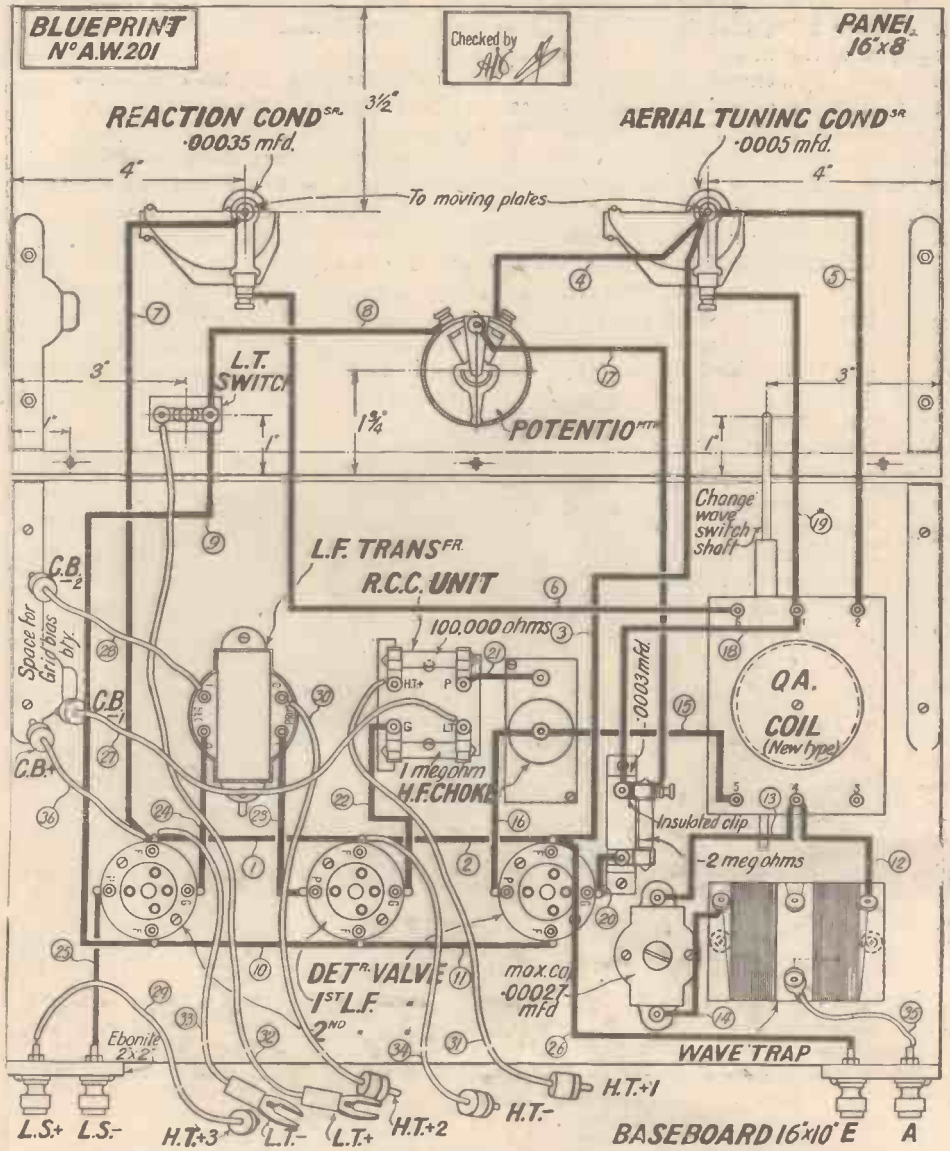
Actually the signal was applied to the dummy aerial consisting of a condenser and resistance, a 20-ohm effective resistance being assumed as representing average conditions, and the earth side of this aerial system was connected to earth. Under these conditions London could be tuned in on the set at a strength comparable with that obtained from a good foreign station on an outside aerial, the pick-up, of course, being on the earth lead. The artificial regional transmitter was connected up and set in operation on a wavelength of 395 metres. A 30 per cent. modulation was arranged by means of a gramophone amplifier and the strength obtained with the plain aerial system was shattering. This was under conditions corresponding to ten miles away. The detector overloaded so badly that two tuning points were obtained, this being the well-known effect of a strong signal on the grid detector. The signal also extended all over the dial.

The wavetrap was then brought into operation and tuned to the regional transmission. It was not possible to eliminate the signal completely, but it was possible to reduce it to a value which did not cause serious overloading, even when the receiver was fully tuned in. On altering the setting of the tuning condenser the regional station could now be tuned out with a fair amount of ease, and the test consisted in seeing how easily London could be tuned in on 356 metres.



The "Knife-edge Three" ready for testing

It was found that with the strength of the regional transmitter adjusted to correspond to a distance of fifteen to twenty miles London could be tuned in on the earth lead, as already described, without any interference. There was a faint background of the regional transmission when London stopped modulating, but that was all. It therefore appeared that the receiver would be capable of tuning out the regional transmission in something under 15 metres and receiving a distant station without difficulty. By the time these notes appear in print, of course, London will be carrying out experimental transmission after its usual programme, so that it will be possible to test under actual conditions, but the information obtained from these preliminary tests has enabled me to feel confident that the receiver will meet the needs of the majority of listeners.



The wiring diagram of the "Knife-edge Three." Blueprint available, price 1/-

Construction

The construction of the receiver is straightforward and, if desired, no soldered joints need be used at all. From the photographs and diagrams given the layout will be seen with complete clearness. A full-size blueprint showing the exact position of the parts and the wiring may be obtained, if desired, price 1s., post free. There is no need to make any comments on the construction. Care must be taken to see that the "Q" coil is placed the correct way round, i.e., with the terminals 1, 2, and 6 towards the front of the baseboard, while it will be necessary to cut the extension rod on the switch to a suitable length so that it just projects through the panel. The operating knob can be screwed on to complete the assembly of this component.

Details of the construction of the wavetrap, together with operating notes on the receiver, will be given in next week's issue.

COMPLETE GUIDE TO SHOW STAND Nos. 122—164

(*Continued from page* 352)
sells at very reasonable prices. Jelly-acid filled accumulators for portables and a full display of the various kinds of battery marketed by the company will be staged.

Stands 122, 123, and 124. Radio Instruments, Ltd., 12 Hyde Street, New Oxford Street, London, W.C.1.

Transportable all-electric 3-valve screened-grid receivers will be a prominent feature on this stand. In the A.C. model, indirectly heated Cosmos valves (screened-grid, detector and power valve) are used, whilst, in the D.C. model, ordinary valves

G.E.C. 2-valve A.C. Set

(screened-grid, detector and pentode) are employed. This type of set has given very good results under test. An all-electric or battery-operated 2-valver, with single-dial tuning, is also to be shown. Transformers, battery eliminators, chokes, tuners, testing sets, reactive anode units, P.M. detectors, slow-motion dials, astatic fieldless coils and many other accessories to interest radio constructors and experimenters will be featured.

Stand 125. Burne-Jones & Co., Ltd., 296 Borough High Street, London, S.E.1.

Prominence will be given to Magnagram all-electric reproducers, the Universal Three receiver, portable and mains sets, a short-wave convertor and a full range of components.

C.A.V. Mass-plate Cell

Stands 126 and 127 S. A. Lamplugh, Ltd., King's Road, Tyseley, Birmingham.

Silver Ghost receivers and radio gramophones are to be the basis of this display. The Chassirad range of sets will attract those who are interested in purchasing either a straight detector and L F. or normal screen-grid 3-valver, to be mounted in cabinets to suit their particular tastes.

Stand 128 and 133. Wingrove and Rogers, Ltd., 188-9 Strand, W.C.2.

Polar components are shown to advantage on these stands, and there will be found something to interest the home constructor and set user alike.

Stand 129 and 132. The Symphony Gramophone & Radio Co., Ltd., Axtell House, Warwick Street, Regent Street, W.1.

Stands 130 and 131. The Bowyer-Lowe Co., Ltd., Radio Works, Letchworth, Herts.

This concern has made a number of interesting additions to their well-known range of sets and components for the coming season. Don't miss seeing the Pentovox Two and the Pentovox Three, two very popular receivers.

Epoch 1-2 amp. Trickle Charger

Stands 139 and 142. The Ever Ready Company (Great Britain) Ltd., Hercules Place, Holloway, London, N.7.

There is sure to be much of interest on these two stands. The exhibits will comprise a very full range of batteries and accumulators for radio use, covering almost every size and type suitable for the purpose.

Stands 140 and 141. Graham Farish, Ltd., 17 Masons Hill, Bromley, Kent.

A feature here will be a new H.F. choke arranged to give a nearly equal impedance on both short and long waves. This component, which can be fitted into the standard grid leak and anode resistance holder, incorporates an uneven form of winding divided into sections of a graduated number of turns. A good gramophone pick-up, a vernier dial for use with the new Graham-Farish Microficient Bakelite dielectric condenser, and several other interesting types of condenser are also to be shown.

Stand 143. Brownie Wireless Co. (Gt. Britain), Ltd., Nelson Street Works, London, N.W.1.

All the Brownie gadgets are to be found here, including the Dominion vernier dial which is fitted to so many receivers nowadays. There is bound to be something in the Brownie range which will be of use to you.

Stands 144, 145, 146 and 147. Burndept Wireless (1928) Ltd., Blackheath, London, S.E.3.

Designed to give more than adequate selectivity for the requirements of the regional scheme, the imposing Burndept sets should make an attractive array. New lines will include the new Burndept portable, fitted with a recently developed type of speaker, and the Burndept A. C. Screened Seven, with single main control and containing frame aerial and loud-speaker.

Stands 148 and 152. Metro-Vick Supplies, Ltd., 155 Charing Cross Road, London, W.C.

On this stand will be found an excellent range of the well-known Metro-Vick components which will be of great interest to constructors and to those in need of complete receivers.

Stands 149 and 153. Edison Swan Electric Co., Ltd., 123-5 Queen Victoria Street, London, E.C.4.

As at last year's exhibition, many new products distinguish the Ediswan display. There will be a new range of Mazda Radio Valves and an exhibit of accumulators and dry batteries which should prove of special interest. In the section dealing with sound reproducers will be a new cone unit and a pick-up equipped with an adaptor for use with standard-type gramophones. For the field excitation of moving-coil loud-speakers the latest Ediswan rectifier unit is to be introduced. Four receivers are to be shown, three of these being entirely new designs and the other the B.T.H. 4-valve set, which is a modification of the 1928 5-stage receiver. Of the new sets, the first is an A.C. mains model transportable type, the second a 3-valve A.C. all-mains pattern and the third a 3-valve all-mains model for use with D.C. Many accessories will also be shown.

Stands 150 and 151. British Thompson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.

Don't miss this display of the full range of B.T.H. receivers and components. If you are seeking complete receivers then stop here and weigh up the advantages of the B.T.H. jobs and don't overlook the very well-known moving-coil loud-speakers and gramo-radio accessories.

Stands 154 and 159. Varley (Oliver Pell Control, Ltd.), Kingsway House, 103 Kingsway, London, W.C.

Varley have recently introduced a number of new components of outstanding interest and undoubtedly all visitors will find something to attract them in the Varley range of components. The name Varley is very well known in connection with high-grade wire-wound components of all descriptions and such handy accessories as wire-wound resistances and transformers and chokes, of all types figure largely in the display.

Stand 155. Sydney S. Bird & Sons, Ltd., Cyldon Works, Sarnesfield Road, Enfield Town, Middlesex.

Cyldon condensers have featured very largely in "A.W." receivers and therefore need no introduction. There are condensers for every purpose in a set from the ordinary square-law type, up to the very convincing looking Synchratune triple condensers with thumb control. Transmitting and short-wave condensers are bound to be of interest to the more technical enthusiast.

Stands 156 and 157. The British Radio Gramophone Co., Ltd., 77 City Road, London, E.C.1.

As its name implies, this company will be showing a range of up-to-date radio gramophones. Electric gramophones and radio receivers will also be exhibited. The Craigwell range is composed of high-quality sets and is well worthy of inspection, the Model 120 Radiogram de Luxe being a notable combination of gramophone and receiver.

Stand 158. Hardyson Radio, Ltd., 13 Market Street, Huddersfield.

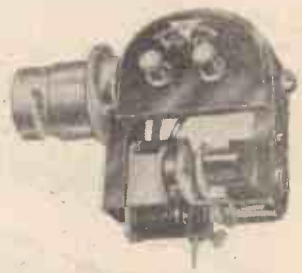
A 3-valve all-mains receiver, specially adapted to radio gramophone reproduction, is incorporated in the Standard radio gramophone, which will be shown here.

Stands 160 and 163. Pye Radio, Ltd., Paris House, Oxford Circus, London, W.1.

Apart from the excellent range of Pye components the name is fast becoming famous in connection with a number of receivers, portable and otherwise. The whole Pye range is on show here.

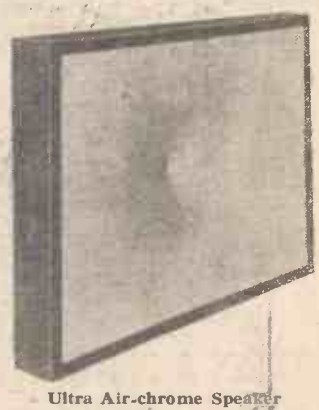
Stands 161 and 162. Igranic Electric Co., Ltd., 147 Queen Victoria Street, London, E.C.4.

New products shown will include



Varley Improved Pick-up

the Igranic Pentoformer, Igranic-Elkon metallic rectifiers, dual-wave inductance coils, special H.T. supply units and the latest type of battery charges. These will doubtless create a large amount of interest among constructors. The display of new receivers will contain the Igranic A.C.3 in both table and console form; a radio gramophone incorporating the same model and two forms of the Igranic Neutrosonic Seven all-mains receiver, one being complete with an electrical-reproducing gramophone. There will also be the Igranic Neutrosonic short-wave set in a table cabinet and the company's well-known standard range.



Ultra Air-chrome Speaker

Stands 164 and 187. Graham Amplion, Ltd., 26 Savile Row, Regent Street, London, W.1.

Apart from the well-known Amplion range of loud-speakers, including the recently-introduced Lion instrument, Amplions are showing a number of complete receivers, which, bearing in mind the good standing of the name attached to them merit careful inspection.

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COMPLETE GUIDE TO SHOW STAND Nos. 165—222

(*Continued from page* 358)

Stand 165. M.P.A. Wireless, Ltd., 62 Conduit Street, London, W.1.

Apart from complete receivers, mains operated and otherwise, the M.P.A. exhibits include loud-speakers of several types, including a permanent magnet moving-coil instrument. The complete receivers range from an all-electric two up to an all-A.C. home-radio gramophone.

Stand 166. Rolls-Caydon Sales, Rolls-Caydon House, 77 Rochester Row, Victoria Street, S.W.

Portable sets are, of course, the prominent feature of the Rolls-Caydon stand. Suitcase type sets, such as the Regional and Phantom Regional, will interest those who like to take their radio with them while there are other sets more of the trans-portable type, such as the Super Ranger Screened Four. It is interesting to note that loud-speakers specially manufactured by Celestion, Ltd., to match Rolls-Caydon receivers will be displayed.

Stand 167. Truphonic Radio, Ltd., Truphonic House, Hanover Park, Peckham, London, S.E.

Stands 168 and 171. The Halcyon Wireless Co., Ltd., 313-319 Regent Street, W.1.

Halcyon portable sets are very well known and form the major exhibit on these stands. There will also be a number of other receivers, including a screen-grid four and a de luxe cabinet five.

Stands 169 and 170. Philips Lamps Ltd., 145, Charing Cross Road, W.C.2.

Philips make a very wide range of receivers and they have some good things in hand for the coming season which are to be seen on their stands. Apart from the smaller components, such as H.T. chargers and loud-speakers, there are some very interesting mains operated sets which deserve the attention of all visitors to the Show. Philips sets are very novel and attractive in appearance and the fact that it is possible to buy a receiver which, for instance, operates entirely from A.C. mains (H.T., L.T. and G.B.) makes the Philips range particularly attractive.

Stands 172 and 175. The Chloride Electrical Storage Co., Ltd., 217-229, Shaftesbury Avenue, London, W.C.2.

Exide were to the fore, as it were, when unspillable accumulators came into public favour, and an even wider range of products of this type is to be displayed than last year. The new Exide battery, type W.Y.10, is especially adapted for multi-valve sets and is likewise suitable for public-address and sound-projector systems. Talking-picture installations can also be operated from this type of battery. Low-tension batteries have naturally also received due attention from this maker.

Stands 176, 177, 178, and 179. Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

The Kolster-Brandes range is comprehensive enough to meet the requirements of most amateurs and on the large number of stands the full range is exhibited. There are complete sets, radio-gramophones, loud-speakers, and all necessary components, the technical points of which deserve merit by all amateurs.

Stands 180 and 183. Celestion, Ltd., London Road, Kingston-on-Thames, Surrey.

For the third year in succession the popular Celestion C.10, C.12, C.14 and C.24 speakers are still to be offered to the public, moreover, a price reduction renders this range specially attractive. The Z-type instruments are fitted with a most sensitive electro-magnetic unit, which whilst not departing from recognised principles, embodies a number of improvements enabling very good results to be obtained when employed in connection with the established Celestion reinforced diaphragm.

Stands 181 and 182. The Dubilier Condenser Co. (1925) Ltd., Victoria Road, North Acton, London, W.3

The Dubilier exhibit will mainly comprise a range of receivers, mica and paper dielectric fixed condensers and high-tension batteries. The sets shown will include portables, a radio-gramophone, and several all-mains receivers, the Dubilier all-mains 3T A.C. or D.C., with self-contained loud-speaker and frame aerial in a transportable cabinet being of special merit. The last-mentioned can also be used with an external aerial. The condenser range will show a number of excellent variable instruments and the miscellaneous components will include H.F. chokes, H.T. eliminators for A.C. or D.C. mains and anti-interference units.

M.P.A. Loud-speaker

G.E.C. L.F. Transformer

Stands 184, 185 and 186. Lissen, Ltd., Worple Road, Isleworth, Middlesex.

Since the last exhibition, the Lissen Popular portable 5-valver has been introduced. As in the case of the company's higher-priced portable, this receiver has a very low high-tension consumption, and it will be prominently featured in the display. There will be a complete range of 2-volt valves; battery eliminators, both A.C. and D.C.; accumulators, with both glass and celluloid containers, and among the new components will be the Lissen anti-microphonic valve holder, heavy-duty output choke, gramophone pick-up, 0-70,000 ohm wire-wound resistance, a ½ megohm volume control, a portable set turntable, together with grid leaks and push-pull switches, now fitted with terminals. Lissen synthetic mouldings and a range of standard sets, gramophones and components will complete this comprehensive exhibit.

Stand 201. W. J. Henderson and Co., Ltd., 351, Fulham Road, London, S.W.10.

A portable 2-valver, Type U, weighing 19½ lbs. and incorporating a Mullard speaker. Another portable, Type W, using a screened-grid valve, and radio gramophone operated from the mains. The range of eliminators will include one supplying H.T., grid bias and L.T. up to 0.6 amps. from D.C. mains.

Stands 202 and 203. W. & T. Lock, Ltd., St. Peter's Works, Bath.

Showing a full range of Kabilok cabinets in oak and mahogany.

Stand 204. Radio Service (London) Ltd., 105, Torriano Avenue, Camden Road, London, N.W.5.

No goods will be actually exhibited for sale here, inasmuch as the company's business is mainly concerned with an efficient hire service connected with high and low-tension accumulators.

Stand 205. Sel-Ezi Wireless Supply Co., Ltd., 6 Greek Street, London, W.

Stand 206. E. Paroussi, 10 Featherstone Buildings, High Holborn, London, W.C.1.

The excellent copper and aluminium screens and coils made by Paroussi are well displayed on this stand. A novel design of wave selector is also of great interest, particularly in view of the increasing need for selectivity. Parex coils are available for practically every receiver and a full range is shown.

Stand 207. Junit Manufacturing Co., Ltd., 2 Ravenscourt Square, W.6.

Junit, once known only for very ingenious self-soldering wire, are now responsible for some handy gadgets such as universal valve holders, terminal strips and multi-contact switches. These are all to be seen on this stand together, of course, with Junit wire and soldering outfits. The wire carries its own supply of solder in a groove along its length.

Stands 208, 209, and 210. Selfridge and Co., Ltd., Oxford Street, London, W.1.

On these stands is to be found an excellent range of receivers, including Gecophone and British Brunswick products, which will interest every enthusiast. The aim of the company will be to enable visitors to make the choice of a receiver suited to their requirements.

Stands 211 and 212. Eric J. Lever (Trix) Ltd., 8-9 Clerkenwell Green, London, E.C.1.

For the first time, the Trix model A all-electric radio gramophone is to be shown. This is an entirely new product and works from A.C. mains with three indirectly-heated valves, two of these being used for gramophone amplification. The loud-speaker is of a special exponential horn type. Several portables and a good 3-valve A.C. mains set will also assist in attracting the passer-by. The Trix Portette one-valve portable for use with headphones is likewise interesting. The exhibits include eliminators, chokes, valve-holders, condensers, grid leaks, lightning arresters, lead-in tubes, coils, switches and a variegated range of other high-class accessories.

Stands 213, 214, and 215. S. G. Brown, Ltd., Western Avenue, North Acton, London, W.3.

One of the most comprehensive series of receivers, speakers, phones, etc., in the Show will be staged on this stand. First, Type A and A.M., are supplied in kit form. They are screened-grid 3-valvers, the former being for battery and the latter for A.C. mains operation. Types B and BM are to the same design, but do not incorporate loud-speakers. Moving-coil speakers will be featured. The new Duplex series is claimed to give remarkable results and sells at very reasonable prices considering the quality of the workmanship employed. The well-known Mascot type and the popular HQ horn speaker will also be on view. The Duckling, introduced last season, is the lowest-priced speaker in the Brown range and gives very good results.

Stand 216. Sells, Ltd., 168 Fleet Street, London, E.C.4.

Stand 217. Voltron Co., Ltd., 3 Queensway, Ponders End, Middlesex.

Voltron components include L.F. transformers, variable condensers, wire-wound R.C. units, wire-wound resistances, reaction condensers and thumb control dials. Make a point of seeing the Voltron range.

Stand 218. Epoch Radio Manufacturing Co., Ltd., 25 Laurence Pountney Lane, London, E.C.4.

Moving-coil loud-speakers, trickle-chargers, mains transformers and chokes and scratch filter units can be seen here. Probably the most interesting among the loud-speaker range is a permanent-magnet moving-coil speaker at a remarkably low price.

Stand 219. Danipad Rubber Co., Ltd., 5 and 7 Market Street, London, E.C.2.

Stand 220. The Automatic Coil Winder & Electric Equipment Co., Ltd., Winder House, Rochester Row, London, S.W.1.

Interest on this stand is centred on automatic coil winding machines, which wind at speeds up to 3,000 r.p.m. Slektun coils will be shown, which are wound in a special manner, and which incorporate several novel features.

Stand 221. Wright & Weaire, Ltd., 740 High Road, Tottenham, London, N.17.

Anti-capacity switches will be an important part of this range. These include a recent type, namely the rotary, which lends itself to many combinations, including gramo-radio work. The established heavy and light types are also to be shown. Others are the push-pull wave-change switch, the series parallel pattern and one embodying a condenser for aerial tuning. Coils of many kinds, A.C. mains components, including five-pin valve holders, H.F. and L.F. chokes, transformers, etc., Paxolin parts and other up-to-date accessories will command attention.

Stand 222. London Metal Warehouses, Ltd., Hill Street, Blackfriars Road, London, S.E.1.

Plain and enamelled copper aerial

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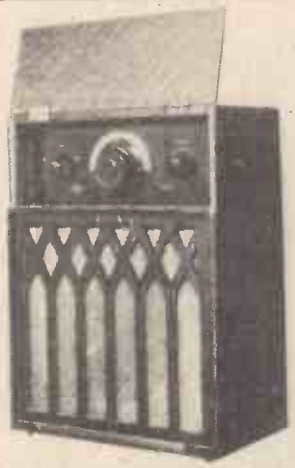
COMPLETE GUIDE TO SHOW STAND Nos. 223—260

(*Continued from page* 360)

wire, insulated terminals, the Lunmet indoor expanding aerial, screws, nuts, stamped parts, etc., will be the main items on this stand.

Stand 223. Cook's Wireless Co., Ltd., C.W.C. Works, Ipswich, Suffolk.

This concern is adopting the conventional course of marketing table-model receivers suitable for operation on A.C. or D.C. mains. One of the receivers upon which great attention will centre is a radio-gramophone.



Bowyer-Lowe Five-valve Portable

Stand 224. Parr's Advertising, Ltd., Craven House, Kingsway, W.C.2.

Stand 225. Pandona, Ltd., 87-89 Edmund Street, Birmingham.

Pandona receivers are of interest, particularly the Pandona portable, which will make an appeal to a large number of listeners. The portable receiver is shown to advantage on this stand.

Stand 226. Mainten Manufacturing Co., Ltd., 126 Portland Road, Hove, Sussex.

Six A.C. and six D.C. battery

M.P.A. Electric Two

eliminators form one of the main features here. One particular model, the DCM6.SG is suitable for screened-grid receivers and delivers 17 milliamperes, the screen-grid tapping being variable and the remaining two tappings being at 60 and 120 volts at 1 milliampere and 9 milliamperes respectively. The prices of these eliminators are very attractive in view of the high Mainten standard of production. An excellent loud-speaker, a range of metal cabinets, a Mainten all-mains three-valver, and other special exhibits are also to be included.

Stand 228. Keith Prowse & Co., Ltd., 159 New Bond Street, London, W.1.

Stand 229. Williams & Moffat, Ltd., Ladypool Road, Sparkbrook, Birmingham.

The Simplicon range of accessories includes many handy parts, such as geared condensers, Duplex condensers, reaction condensers, and drum and vernier controls of all kinds. "Simplicon" stands for simplified control, and this idea is well carried out by the condensers shown on the stand.

Stand 230. Messrs. R. F. Graham and Co., 45 and 47 Cambridge Road, Kingston-on-Thames.

Numerous types of Norbex valve holders, including the new L.O.E.T. pattern, which is anti-microphonic and avoids the need for soldering, will be displayed among other useful components, such as Norbex plugs, valve pins, safety caps, bushes, nuts, and screws.

Stand 231. Sylvex, Ltd., 144 Theobalds Road, London, W.C.1.

Sylverex radio crystals and permanent detectors, together with cone materials, of artistic design, and tinsel fabric for cabinet speakers, will constitute this exhibit.

Stand 232. The Lithanode Co., Ltd., 190 Queens Road, Battersea, London, S.W.8.

Some fifteen or twenty unspillable portable accumulators displayed on this stand should interest all set users. For the first time, too, Lithanode batteries will be shown with glass containers. Prominently displayed will be a high-capacity battery for power work.

Stand 233. B. & J. Wireless Co., 2-4 Athelstane Mews, Stroud Green Road, London, N.4.

Stand 234. Atalanta, 1-3 Brixton Road, London, S.W.9.

Atalanta manufacture some very handy tools for wireless constructional work. The Atalanta screwdriver is particularly useful for the manipulation of nuts in places difficult of access. There are chucks for holding small taps and reamers, drilling jigs, and a complete Atalanta handy tool set, comprising screwdrivers, box spanners, soldering iron, pliers, and so on.

Stand 235. Norman Huntly, 35 Clerkenwell Green, London, E.C.1.

The most prominent Norma exhibit is the Norma five portable set, which sells at a competitive price, despite a very comprehensive equipment. The Norma screened-grid three is a somewhat different type of receiver, which is also capable of very satisfactory operation. Norma components include condensers, H.F. chokes, switches, and terminals.

Stand 236. Manufacturers Accessories Co. (1928), Ltd., 85 Great Eastern Street, London, E.C.2.

A five-valve portable set is the chief exhibit on this stand, while the component shown will include Reliomac H.T. and grid-bias batteries, and Maco cabinets and mains transformers and chokes.

Stand 237. The Grosvenor Battery Co., Ltd., 2 and 3 White Street, Moorgate, London, E.C.2.

This company is showing a standard range of high-tension batteries and has given consideration to constructors of portable sets, batteries specially designed for this class of receiver being prominently displayed.

Stand 238. The Econasign Co., Ltd., 137 Victoria Street, London, S.W.1.

Economical advertising outfits of much use to wireless traders. There will be improvements on last year's products.

Stand 239. Hart Bros. Electrical Manufacturing Co., Ltd., Queensway, Ponders End, Middlesex.

As specialists in the manufacture of electrical wires and cables, the company are showing a full range of Harbros flex, battery cords, winding wires, etc., for radio use. The Easy-fix flex will be a good line here.

Stand 240. Swift Levick & Sons Ltd., Clarence Street Works, Sheffield.

Permanent magnets, cast, bent and stamped in cobalt and Tungsten steels will be displayed here. There will also be balanced-armature speaker magnets and fittings of this type for moving-coil units.

Stand 241. Television Press, Ltd., 26 Charing Cross Road, W.C.2.

Stands 242, 243, 244, and 245. Houghton-Butcher, Ltd., Ensign House, 88-89 High Holborn, London, W.C.1.

Houghtons are wholesalers and these stands are, therefore, primarily of interest to the trade. It is Houghtons endeavour to make their stands a rendezvous for radio dealers and amateurs will be interested in the display of a limited number of new lines which will be most popular in the coming season.

Stands 246 and 249. Amalgamated Press, Ltd., Fleetway House, Farringdon Street, E.C.4.

Stand 247. Gramo-Radio Amplifiers, Ltd., 1a New London Street, E.C.3.

Stand 248. The Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, London, W.3.

Fixed condensers are specially detailed on this stand. These will comprise paper and mica types for radio reception and transmission purposes, besides high-frequency models as supplied to certain government departments. High-voltage smoothing condensers will be tested here as high as 80,000 volts D.C. together with a condenser of the type used by the B.B.C. for Brookmans Park. Two patterns of electrolytic condenser, one being intended for working up to 40 volts D.C., subdivided block condensers of various types and sizes in all voltages will also be displayed.

Stands 250 and 251. The Sun Electrical Co., Ltd., 118 and 120 Charing Cross Road, London, W.C.2

As wholesalers, the company will be displaying receivers and components by prominent British manufacturers. We understand that this exhibit, although naturally of interest, is mainly intended for the trade, and that only new lines will be shown.

Stands 252 and 253. Hobday Bros., Ltd., 21-27 Great Eastern Street, London, E.C.2.

These stands are of primary interest to retailers, but doubtless in the range of components exhibited many amateurs will find great interest.

Stand 254. K.N. Electrical Products, Ltd., 5 Singer Street, Finsbury, London, E.C.2.

The three items of major interest on the "K.N." stand are the receivers for all-mains operation, portable sets and "K.N." loud-speakers. Of interest to constructors is the "K.N." electric soldering iron which is a very handy gadget when constructing a new receiver.

Stand 255. Bakelite, Ltd., 68 Victoria Street, London, S.W.1.

On this stand will be found a selection of components made by many of the well-known radio manufacturers on which bakelite materials have been used. Bakelite laminated sheet for radio panels, and Bakelite moulded parts, together with a general display show in a convincing manner the increasing number of uses to which Bakelite can be put.

Stand 256. City & General Radio Co., Ltd., 46 Watling Street, E.C.4.

Kolster-Brandes Cabinet Speaker

Stand 257. Lock-Atkinson Wireless, 95 Gt. Titchfield Street, W.1.

Stand 258. A. W. Gamage, Ltd., Holborn, London, E.C.1.

There will also be a complete range of sets, and a display of portables.

Stand 259. A. H. Hunt, Ltd., Tunstall Road, Croydon.

In place of an actual display, a

Falkstadelmann Ascot Portable Four

trade office is to be established for the duration of the Show, where business will be conducted in connection with Hellesen dry batteries, Polymet components, and other accessories.

Stand 260. Thos. De la Rue & Co., Ltd., 90 Shernhall Street, Walthamstow, E.17.

SHOW GUIDE CONTINUED ON PAGE 364

"EKCO-LECTRIFY" YOUR RADIO!

VISIT US AT THE NATIONAL RADIO EXHIBITION, OLYMPIA. STANDS 8:9:10:11

The "EKCO-LECTRIC" Sets listed below work direct from the mains. No batteries. No accumulators. No mess. As convenient and simple to use as a table lamp. Switch on—that's all! You can also electrify your present set with an "EKCO" All-Power Unit—eliminating accumulators, batteries, and grid-bias. Or eliminate H.T. batteries with an "EKCO" H.T. Unit, and L.T. accumulators with an "EKCO" L.T. Unit. No alteration whatsoever to set, wiring, or valves. Ask your dealer for the new "EKCO" booklet and particulars of Easy Payments.

"EKCO-LECTRIC" RECEIVERS					REMARKS	PRICE COMPLETE D.C.	PRICE COMPLETE A.C.
Model P2		Detector and Pentode Valves			Cabinets of finest grade Polished Walnut	£12-17-6	£12-17-6
Model SGP3		Screen Grid, Detector and Pentode Valves				£21- 0-0	£21- 0-0
Model	Current Output	VOLTAGE TAPPINGS					
ALL-POWER UNITS							
	Milli-amps.	H.T.	G.B.	L.T.			
C 1. A	60	S.G.: 0-120: 120/150: POWER	Up to 21	D.C. Up to .6 amp. A.C. 2-6 volts from .3 amp. min. to 1 amp. max.	Completely Electrify your Radio Set with no alteration whatsoever to Set, Wiring or Valves. Westinghouse Rectifier in all A.C. Models.	£9-15-0	£17-15-0
C 2. A	20	S.G.: 60: 120/150	Up to 12	D.C. 2-6 volts from .2 amp. min. to .35 amp. max. A.C. 2-6 volts from .2 amp. min. to .5 amp. max.		£5-17-6	£10-17-6
H.T. UNITS							
1 F. 10	10	120.			For 1 to 3 Valve Sets, or those not requiring more than 10 m/a., Westinghouse Rectifier in A.C. Models	17-6	——
2 F. 10		60 and 120.				£1- 9-6	——
2 A. 10		60 and 120.				——	£3-10-0
3 F. 20	20	S.G.: 60: 120/150.			For 1 to 5 ValveSets, or those not requiring more than 20 m/a., Westinghouse Rectifier in A.C. Models	£1-17-6	£3-19-6
1 V. 20		S.G: 0-120: 120/150.				£2-10-0	£4-12-6
4 T. 60	60	S.G: 0-120: 120/150: POWER.			For Multi-Valve Sets or those not requiring more than 60 m/a. — Valve Rectifier in A.C. Model: Philips 505	£3-15-0	£7- 5-0
5 T. 60		S.G: 0-120: 0-120: 120/150: POWER.			For Multi-Valve Sets or those not requiring more than 60 m/a. — Westinghouse Rectifier in A.C. Model	£4-15-0	£10-10-0
RECTIFIER UNITS					REMARKS		
R. 20	20	For attaching to D.C. Units for use on A.C. Mains.			Valve Rectifier: Philips 373 or 505	——	£3- 7-6
R. 60	60				Valve Rectifier: Philips 505	——	£5- 0-0
L.T. UNIT							
L.T. 1		2-6 Volts from .3 amp. min. to 1 amp. max.			Westinghouse Rectifier	——	£8-15-0
TRICKLE CHARGER							
T. 500		Charges 2, 4 or 6 volt ac. from A.C. mains at ½-amp.			Westinghouse Rectifier	——	£2-12-6
ISOLATING TRANSFORMER							
I. Tr		For isolating Loud-speaker or 'Phones from set where a Power Supply Unit is in use.				15s. 0d.	

"EKCO-LECTRIC" RECEIVER. Model P2.
A.C. or D.C. £12 17 6
complete

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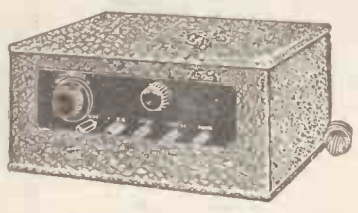
PLUG IN—THAT'S ALL

"EKCO - LECTRIC" RADIO RECEIVERS AND POWER SUPPLY UNITS



"EKCO" H.T. UNIT.
A.C. Model 4T60.
£7 5 0
complete

Announcement of E. K. COLE, LTD., DEPT. K, "EKCO" WORKS, LEIGH-ON-SEA

COMPLETE GUIDE TO SHOW STAND Nos. 261—296

(*Continued from page 362*)

Stand 261. Lectro Linx, Ltd., 254 Vauxhall Bridge Road, London, S.W.1.

The Linx All-in plug and socket is the main new feature here. All its metal parts are completely insulated and the fitting is ideal for metal mounting. The well-known Clix valve pin and wiring device are incorporated, and a point is that no spade or other contact end is required. There is also a new Clix show-case for the benefit of traders and the full range of Clix specialities will be shown, including pin and spade terminals, the Clix multi-plug, bushes, connectors, and accumulator knobs.

Kolster Brandes Electric Gramophone

Stand 262. D. X. Coils, Ltd., 542 Kingsland Road, London, E.8.

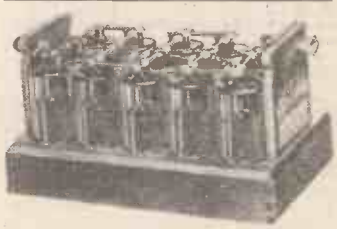
Messrs. D. X. Coils are showing, as their name implies, a number of very efficient coils of various types.

Stands 263 and 264. Belling & Lee, Ltd., Queensway Works, Ponders End.

Here are to be found a full range of Belling & Lee terminals and connectors of all types. Belling & Lee terminals are used extensively in the construction of receivers described in "A.W." and undoubtedly interested constructors will all the time gather at the Belling-Lee stand to inspect the various types of non-rotatable head terminals and to learn of the practical advantages of other Belling and Lee constructional gadgets.

Stand 265. The Tonex Co., Tonex Works, Walker Street, Blackpool, Lancs.

Many of the components in the Tonex range are on show here, including the Tonex Tonatuna, an auto-coupled dual-range tuner.



Hart H.T. Accumulator bank

Stand 266. The J. R. Wireless Co., 6 and 8 Rosebery Avenue, Clerkenwell, London, E.C.1.

Here are to be found a number of components in the Sovereign range. Dual-range coils, wavetraps, six-pin bases, rheostats and H.F. chokes are the most prominent Sovereign components,

Stand 267. Jewel Pen Co., Ltd., 21 and 22 Great Sutton Street, London, E.C.1.

A number of very handy Jewel Pen gadgets can be seen on this stand including the well-known R.D. 40 Permanent Detector. Other useful components include lead-in tubes, switches, H.F. chokes, coils and coil bases.

Stands 268 and 269. Donotone (Regd.) Loud-speakers, 40 Furnival Street, London, E.C.4.

Donotone loud-speakers of all types are to be seen here and the attendants will be pleased to explain the technical features of this unique type of loud-speaker.

Stands 270 and 271. Carrington Manufacturing Co., Ltd., Camco Works, Sanderstead Road, Croydon.

Camco cabinets are used in conjunction with so many receivers that they need no introduction. If you are in need of a very well-made cabinet for your set then stop to inspect the Camco products.

Stands 272 and 273. Messrs. J. J. Eastick & Sons, Eelex House, 118 Bunhill Row, London, E.C.1.

Ingenious in design, the new Eelex insulated plug and socket will be one of the best things in its class. Our drawing shows the construction of this useful and low-priced little fitting. A full range of the popular Eelex products will be shown, in addition to accessories of many types.

Stands 274 and 275. East London Rubber Co., 29 Holywell Lane, London, E.C.2.

This concern is exhibiting a full range of up-to-date complete receivers and components.

Stand 276. The Tulsemere Manufacturing Co., 1-7 Dalton Street, West Norwood, S.E.27.

The Tannoy H.T. mains unit does not follow the practice of the normal thermionic rectifier and therefore requires no filament-heating current, no valve replacement and no critical control. This eliminator will be on view together with an L.T. supply unit and a comprehensive array of components, containing chokes, condensers, potential divider panels, etc. An interesting combined H.T. and L.T. mains unit will also be shown.

Stand 277. Messrs. Harlie Bros., Balham Road, Lower Edmonton, London, N.9.

Featuring the new Volustat variable resistance of the graphite-mica type, the display will include a complete range of the firm's well-known standard components and a number of improved fittings. The Volustat is made in three ranges, namely universal, 50 to 500,000 ohms, medium resistance, 2,000 ohms to 2 megohms.

Stand 278. Dulcetto Polyphon, Ltd., 2 and 3 Newman Street, Oxford Street, London, W.1.

This display will be mainly devoted to showing up-to-date lines by various makers, the company being factors as well as manufacturers. There will likewise be a number of Dulcetto lines.

Stand 279. Falk, Stadleman & Co., Ltd., 83-93 Farringdon Road, London, E.C.1.

Efescaphone sets have received reinforcements in the shape of several new models for both battery and mains operation, whilst the established existing models have been improved in constructional details and appearance. Two portables will be shown, one being a screened-grid four and the other a five-valver, which can also be obtained in transportable form. H.T. battery eliminators, A.C. all-mains units and the new Paravox cone speakers will also be prominent.

Stand 280. J. L. Goldsman, 4 Gt. Queen Street, London, W.C.

Stand 281. Trelleborg Ebonite Works, Ltd., Union Place, Wells Street, London, W.1.

Many of Britain's radio manufacturers use Trelleborg ebonite specialities and a full display of these products will be made. A good range of components, such as tubes and formers, will be on view and will include examples of machined work.

Stand 282. Flinders (Wholesale), Ltd., East Stockwell Street, Colchester, Essex.

This stand has been taken mainly so as to give retailers in the Eastern Counties a meeting place.

Stand 283. Partridge, Wilson and Co., Loughborough Road, Leicester.

The latest lines here will be the Davenset starter charger and the Davenset all-mains transformer choke conversion kit for altering receivers from battery to all-mains operation. The Davenset transportable five-valver incorporates a Celestion speaker, Mullard valves, and two Mullard Permacore transformers. It has smooth reaction control, provided by a differential reaction condenser. The well-known Grippleshell eaves brackets will again be on view.

Stand 284. Webb Condenser Co., 42 Hatton Garden, E.C.1.

Stand 285. The Incorporated Radio Society of Great Britain, 53 Victoria Street, London, S.W.1.

Stand 286. Itonia Gramophones, Ltd., 58 City Road, London, E.C.4.

The Autocrat Portable Five, which embodies the Air Chrome speaker, will be shown here. It is fitted with a local station rejector. A number of interesting developments will be noticeable in the range of radio gramophones and a section of the stand will be devoted to the Air Chrome speaker and various accessories.

Stand 287. Beaver Electrical Supply Co., 5 Gt. Chapel Street, W.1.

Stand 288. Six-Sixty Radio Co., Ltd., 122 Charing Cross Road, W.C.2.

There are Six-Sixty valves for every purpose in a receiver, and the full range is to be found on this stand, together with other Six-Sixty accessories, such as cone type loud-speakers and turntables for portable sets. Those who make up their own loud-speakers will be interested in the special paper marketed by Six-Sixty, which is specially made for cone diaphragms.

Stand 289. The Hart Accumulator Co., Ltd., Marshgate Lane, Stratford, London, E.15.

Glass-container type L.T. accumulators continue in public favour and these will be well demonstrated here. The company's RME products of this type are assembled in moulded pressed glass boxes with sealed glass lids. Vaseline cups are provided to prevent corrosion of the terminals. Unspillable accumulators for use with portable sets are also to be shown, together with the MEZ models assembled in ebonite containers for tropical work.

Stand 290. Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester.

It is not possible in a short note to catalogue the complete numbers of lines exhibited on this stand. Ward and Goldstone make radio gadgets of practically every description. Fixed condensers, coils, wire, quick-grip condensers, Volex H.T. batteries and H.T. chargers are to be counted in the range.

Stand 291. The Loewe Radio Co., Ltd., 4 Fountayne Road, Tottenham, London, N.15.

Here will be shown the Loewe local receiver, type O.E.333, the company's Multiple valves, types 3NF and 2HF, and the efficient

New Amplion Receiver

loud-speaker, type E.B.71. The Loewe Multiple valves contain, as it were, three complete valve systems together with the necessary coupling elements. They operate without reaction.

Stand 292. Radio Gramophone Development Co., 322 Broad Street, Birmingham.

A range of R.G.D. radio-gramophones, operating from the mains are prominent on this stand. These receivers cover all needs and are designed to work with almost any mains supply.

Stands 293 and 294. London Electric Stores, Ltd., 9 St. Martin's Street, Leicester Square, London, W.C.2.

This company, being mainly concerned with the wholesale side, each year makes its stand as representative as possible of the products of established makers with a view chiefly to attracting retailers.

Stands 295 and 296. A. F. Bulgin and Co., 9-11 Cursitor Street, Chancery Lane, London, E.C.4.

Prominent among the displays of components and accessories will be the Bulgin range. An interesting product is the Bulgin automatic indicating control, this being a relay

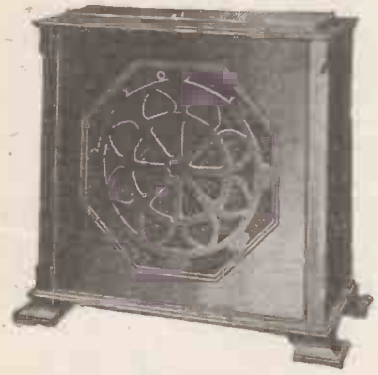
G.E.C. Short-wave Set

which combines the duties of a remote control and signalling device. It can be operated from any distance by means of Bulgin wall jacks, opening and closing the L.T. circuit of the set by a telephone plug fitted to the loud-speaker. There are to be many new lines, including the Bulgin Multi-coil which covers all wavelengths from 250 to 2,250 metres, the centre-tapped connection being maintained on both high and low wavelengths. This is specially designed for use with S.G. valve circuits.

MODEL Z.20

Oak	... ...	£7	15 0
Mahogany	... ...	£8	5 0
Walnut	... ...	£9	0 0

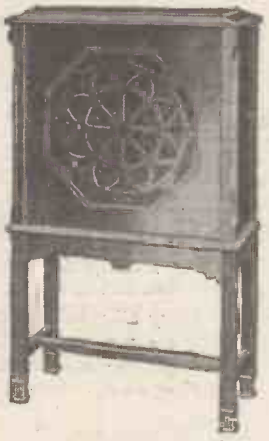
(to special order only).
Size, 19½ in. by 18 in. by 8⅝ in.
Resistance, 750 ohms (other resistances to order, at 5/- extra).



MODEL Z.25

Oak	... ...	£15	0 0
Mahogany	... ...	£15	15 0
Walnut	... ...	£16	16 0

(to special order only).
Size, 24 in. by 24 in. by 14 in.
Resistance, 750 ohms (other resistances to order, at 5/- extra).



"CELESTROLA" MOVING-COIL SPEAKER

6 volt D.C. complete.
Oak, £24 0 0. Mahogany, £25 0 0

110 and 220 volt A.C., complete.
Oak, £25 10 0. Mahogany, £26 10 0

110 and 220 volt D.C., complete.
Oak, £24 12 6. Mahogany, £25 12 6
Size, 24 in. by 40 in. by 11½ in.
(Without Cabinet Stand, £1 5 0 off the above prices).

incomparably superior

We claim of the new Celestion that every detail of tone is re-created flawlessly. The proof of our claim is in your hearing. So confident are we of the outstanding merit of all Celestion models, that we ask you, unhesitatingly, to call at any radio dealer's and hear for yourself a COMPARATIVE DEMONSTRATION of Celestion and other makes. Every reputable radio dealer stocks and demonstrates Celestion—a sure indication of its acceptance in all radio circles. An interesting and beautifully illustrated booklet on Loud-speaker Reproduction awaits your postcard.

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MAKING SURE OF GOOD RESULTS

How simple additions and alterations to a set can increase the pleasure to be obtained from it

THERE is no doubt but that many listeners do not realise how much of the pleasure of radio they are missing : and in a number of cases just a little time or a few shillings spent in improvement would result in greatly increased pleasure in listening.

Take, for the sake of example, the case of a friend of mine who invited me to listen to his two-valver recently : most folk are justly proud of their own receivers, and it does not behove anyone to criticise, or to suggest improvements. But in this particular instance I was invited to do what I could to improve reception—for the set-owner felt that he was not getting the best.

Well, I turned on the "juice" and prepared to criticise. Nothing happened. Examination showed that the L.T. accumulator was run down, and there was no spare. My own reserve 2-volt cell was soon fitted, but the first moral was obvious. The accumulator fitted to the two-valver on which I was called to adjudicate lasted only for about a week and a half at each charge.

A Silent Set

So, for the remaining days of the fortnight, while the cell was on charge, the set was "as dead as a door nail." Often these "silent periods" coincided with some item which it was particularly desired to receive, and the resulting disappointment on the part of the whole family more than outweighed the advantages of the times when the set was working, and there were no items deemed worth receiving !

And to think that for a few shillings spent on a spare cell, of a capacity sufficient to last only over a couple of days, all this disappointment could be avoided. A large or expensive cell would not be necessary : indeed, a large cell would be a disadvantage for an accumulator is never at its best if not given a reasonable amount of work, and a big L.T., if used as a spare, would be doing hardly any work at all for most of its time.

To cut a long story short, the set itself was examined when a new accumulator had been wired up, and the somewhat startling discovery was made that—in these days of regional schemes and alternative programmes—only one B.B.C. station was receivable, together with a few faint squeaks from foreigners. This was because plug-in coils of an obsolete type were used, and the variable condenser used did not enable the wavelength range of one coil to overlap that of another.

The set was being worked in the London district, with the result that 2LO and 5GB should have been receivable on the medium-waveband without the need for coil-changing. But in this instance 5GB came in the gap between two of the medium-wave coils, and the only indication of its presence was a faint whisper—almost inaudible—at the "all-in" setting of the tuning condenser. There was no long-wave coil, and so 5XX and Radio Paris were not available.

In addition to these troubles, the

"MAKING SURE OF GOOD RESULTS"

(*Continued from page* 366)

coil holder was of the type which would strike horror into the heart of an engineer! It wobbled, altered its setting and did not allow of anything like fine adjustment. So there was no possibility of the foreign stations, faintly received, being resolved into pleasing sound.

Fitting a Dual Coil

To effect a cure it would be necessary to scrap the moving coil-holder, and to put in its place a dual-range coil (which would tune-in 2LO, 5GB, and other medium-wave stations, and the long-wavers, such as 5XX), and an accompanying reaction condenser and H.F. choke. This, with a slight modification to the circuit, would enable semi-Reinartz reaction to be provided, which would overcome all the bugbears of "floppy" reaction, and enable faint distant stations to be tuned in with precision.

The cost of such a conversion need be only in the nature of a few shillings. Dual-range coils of very good efficiency are now available at ridiculously low prices, and the total cost of this component, together with a reaction condenser and H.F. choke need not be great.

Attention was next turned to the valves. These were, more or less, O.K., and had been fitted according to the specification given with the constructional article with the aid of which the receiver had been built. But the power valve was of the "super" type taking (by measurement) 9 milliamps. This would have been excusable, and, indeed, an excellent figure had everything else been in keeping.

But the presence of a dubious-looking inter-valve transformer of cheap Continental make, coupled with the fact that the H.T. was provided by a 99-volt small-capacity dry battery, made the use of this large-consumption power valve simply a wasteful extravagance.

So much distortion was always present owing to the faulty characteristics of the transformer, and owing to the insufficient H.T. supply, that a small-grid-swing power valve, or even an ordinary low-impedance L.F. valve could have been used, with a consequent cheapening of running costs.

In the interests of good results, it would have been worth while investing in a really good inter-valve coupler, when a large H.T. battery would be needed adequately to supply the H.T. for the second valve. True, this would have meant a fair expense, probably 25s. for the transformer and 3d. a volt for H.T.; but the increased pleasure to be had from the set, and the greater economy over a long period of working would have made it well worth while.

Owing to the Complete Show Guide occupying a large amount of space in this issue it has been necessary to curtail some of the "A.W." regular features and "A.W." Tests of Apparatus and Information Bureau have been omitted.

Bad "A" and "E"

In this particular instance, too, the aerial and earth arrangements were defective. The former was badly insulated and consisted of a length of insulated steel wire—not at all ideal for the job. A similar length of enamelled "seven-twenty-two's" hung up on porcelain bobbin-insulators proved to be more than twice as efficient; and the cost—4s. 9d. all told!

The earth connection was made to a gas pipe, because this was near; but the total run of the gas-pipe to earth was far longer than to a more distant water-pipe: and as the gas-pipe was found to have composition joints it is doubtful if it made a proper connection with earth, anyway. Ten minutes spent in unwinding the earth wire from the gas-pipe and in making a proper clip connection to the water-pipe, resulted in greatly improved selectivity.

It is, indeed, strange, that owing to simple faults such as these, people miss the best that is to be had from radio!

K. U.

For the Newcomer to Wireless: RECTIFICATION

WHAT exactly is meant by rectification?

You are referring, I suppose, to ordinary wireless reception?

Yes, that's what I want to know about.

You know that wireless waves as received by the aerial move up and down an enormous number of times in each second.

Yes, I have heard that their vibrations are pretty rapid.

When you are listening to London, waves flash through the ether and cause your aerial to vibrate no less than 842,000 times every second; but that is a comparatively low frequency for wireless.

Low!

Yes. If you happen to tune in Radio Malabar on the short waves the wavelength is 17 metres and the frequency of vibrations is 17,647,000 every second.

Phew!

To enable the wireless set, whether crystal or valve, to produce sounds, the diaphragm of the telephones or loudspeaker must vibrate in order to set up sound waves.

Yes, I follow that.

You will appreciate that no diaphragm could possibly vibrate 842,000 times a second—still less something over seventeen million times.

I suppose it would become red hot if it did?

Quite possibly it would. In any case one wouldn't hear anything.

Why is that?

The shrillest note that the human ear can detect is one with a frequency less than 30,000 a second. In the wireless set it is necessary to convert these enormously rapid radio-frequency vibrations into audio-frequency vibrations.

That is done by rectification?

Yes. In both the crystal and the valve set we have appliances—the crystal and the valve—which will pass current only in one direction.

Please explain.

In the valve, current can pass only from the filament to the plate. In the crystal detector it can pass either from catwhisker to crystal cup or from cup to catwhisker, according to the crystal used. No reversal of current is ordinarily possible.

What is the effect of that?

Each wave consists of a crest or push, followed by a trough or pull.

I follow that.

Whatever detecting device is used only the crests or the troughs can be effective. In other words, one-half of each complete wave is strained out.

What happens then?

In the crystal set the uni-directional impulses are marshalled either by the fixed condenser wired across the telephones or by the invisible but still present condenser provided by the phone leads.

And in the valve set?

Hundreds, or possibly thousands, of impulses arriving upon the grid serve to build up a small rise or fall in the plate current. The net effect is that, though the grid potential varies at radio frequency, the plate current changes at audio frequency.

Am I right in taking it, then, that rectification results in the conversion of impulses far too rapid for the ear to detect into something that it can hear?

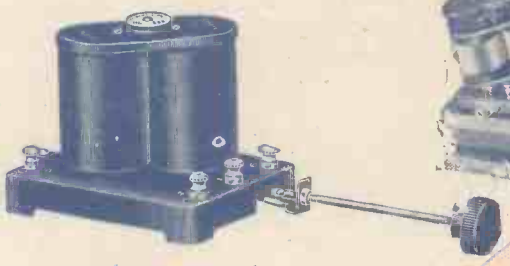
You have put it in a nutshell; that's exactly what takes place in any wireless set.

LEWCOS Regd.

NEW DEVELOPMENTS AT OLYMPIA

The Radio Exhibition at Olympia will reveal nothing more astonishing than the Lewcos new developments. A combination of the finest materials and skilled workmanship, backed by scientific research, guarantees *every* Lewcos component to give superior reception.

LEWCOS RECEPTION IS PERFECT RECEPTION.



The New Lewcos Dual Binocular Coil for the 1930 "Monodial"

Price 17/6

The Lewcos 3-valve Kit Assembly.

Price £7

The New Lewcos L.F. Transformer.

Price 30/-

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Trade Counter and Cable Sales—
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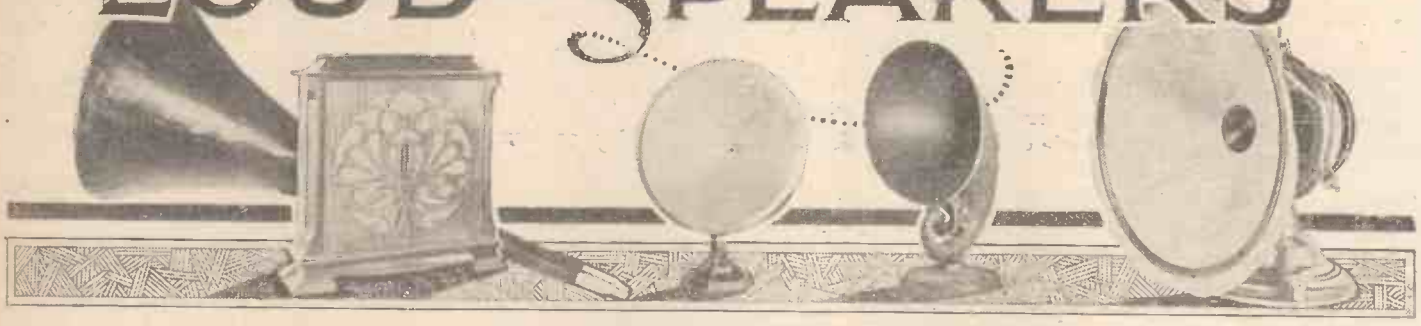
Actual models of LEWCOS New Developments will be on view at Stand 64.

The LEWCOS Kit Assembly, illustrated above, will also be on view at Olympia.

EXPERIMENTS WITH LOUD-SPEAKERS



Thermion on Converting Old Cone-type Instruments

IN the preceding article a general statement was made that a balanced-armature drive employed with a light floating cone and a baffle board might give results almost as good as those obtainable from a moving-coil loud-speaker. This statement requires a certain amount of qualification. Unless a moving-coil instrument is of first-rate make and design, its results may be distinctly disappointing. Reproduction from a really good moving-coil speaker is so excellent that it is difficult to tell with one's eyes shut whether one's own piano is being played or the music is coming from a studio many miles away. But many moving-coil loud-speakers have one distinct drawback: unless the volume from them is rather great they lose their natural tone.

Volume Required

Now, in the average house with its rooms of moderate size what has been called "realistic volume" is, to say the least of it, somewhat trying. What the wireless loud-speaker ought to do in ordinary circumstances is to give, as it were, a miniature of the actual performance in the studio: everything must be reduced in proportion. The *right* moving-coil loud-speaker used with the *right* receiving set can do this, and, though it may sound heresy to say so, I maintain that the balanced-armature unit can do very nearly, if not quite, as well.

One of the great points about the moving-coil speaker is that it brings out the bass; but one can have too much bass—far more than there should be for proper musical balance. It is no good sacrificing, as often happens with mediocre moving-coil units, the brilliance of the treble and middle registers to the undue booming of the bass. And it must be borne in mind that the B.B.C. in its wisdom is apt to accentuate the bass when transmitting so as to help out the *average* loud-speaker.

The balanced-armature unit is handicapped in its reproduction of the bass by the weight of the armature and the rod which connects it to the driven cone. Still, if given a fair chance, it can do wonders with notes near the bottom of the scale.

And now for the practical part of the problem of converting an old-fashioned large-diaphragm cone speaker to the more modern floating cone and baffle-board type. Provide the drive with a small and very light cone, and obviously inertia will play a much less important part in making reproduction fall short of perfection. The lighter the driven parts and the less their resistance to air, the more we are likely to hear of the bass. Remove, therefore, the old large and rather heavy diaphragm of the fixed-edge or free-edge type and discard it altogether.

We are left with the driving unit, mounted upon the frame of the loud-speaker, and its connecting pin. A suitable free-edged cone is one with an angle of about 45 degrees and a greatest diameter of some 6½ in. It is suspended freely in an aperture cut in a piece of thin wood by a ring of fabric or thin leather. The apex of the cone is provided with a small nipple with a setscrew to enable it to be fixed to the connecting rod.

How are we to mount the small piece of wood containing the aperture in which the cone floats? There are several simple and satisfactory ways of accomplishing this. In the majority of cases it is best to retain the metal frame of the loud-speaker, leaving the driving unit in position. The frame supporting the floating cone may be mounted by means of wooden battens acting as distance pieces. In the case of many types of speaker it will be a very easy business to accomplish this.

The second method, which I have found very good, is to make use of Meccano perforated strips for the purpose. The ring on the frame which supported originally the large diaphragm will contain, in most cases, screw holes diametrically opposite one another. Fix Meccano strips to these and bend them downwards until they are at a suitable angle. Then with a pair of pliers bend down the free ends of the strips, cut off any unneeded portions, and fix the wooden frame by means of a couple of 4B.A. countersunk screws and nuts.

Great care must be taken, whether wooden battens or Meccano strips are used, to see that the floating cone is properly centred. Before the setscrew in the nipple is tightened up it must be absolutely

(*Continued on next page*)

A Schneider Trophy Scene: mechanics on the pontoon with a portable listen to the report of the lap times

free to move on the connecting rod of the driving unit. A good way of seeing that the cone is free is to leave the setscrew quite loose and to blow gently into the cone. Quite a light blow should produce a considerable movement.

Alternatively, converters of old loud-speakers may employ one of the many floating cone chassis now on the market, fixing it to the original frame of the speaker either directly or by means of distance pieces. Again, there is little difficulty about the job if one tackles it with a certain amount of care.

There remains lastly the provision of a suitable baffle board. This should normally not be less than 24 in. square, and if space permits 36 in. square is better. The aperture, which, of course, should be in the middle of the board, should be slightly larger than the greatest diameter of the floating cone. A cheap and very effective baffle board may be made from 3/8-in. five-ply wood with mahogany veneer, which can be obtained at a cost of about ninepence per square foot. Fix this vertically to a baseboard of whitewood by means of small angle brackets. The loud-speaker frame is fixed to the baseboard by means of a couple of screws, pieces of wood being used, if necessary, as props to bring it to the height required to centre the floating cone in the aperture cut in the baffle.

LETTERS TO THE EDITOR

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

Oscillation

SIR,—With reference to O.M.M.'s letter *re* the "Oscillation Fiend," I should like to confirm his remarks.

On Sunday nights in particular, as soon as 5NO closes down, one is treated to the finest selection of bird impersonations it is possible to find, making distant reception possible only through a background of who-o-o-ps that would certainly convince "Thermion" that Ham-handed Henry and Oscillating Oswald are still very much alive.

Mr. Moseley objects, quite rightly, to delay in the programme, but when he remarks, "Why London should have to wait until this local gossip is sent over beats me," I am afraid he is getting off the rails somewhat.

Why shouldn't London wait any more than should the provinces? And perhaps the "local gossip," which annoys Mr. Moseley, is of more consequence to the local listener than the rest of the news bulletin put together. Mr. Moseley should remember that London listeners are not the only pebbles on the beach.

J. J. C. (Gateshead).

Accumulator H.T. Batteries

SIR,—Referring to "Thermion's" advice as to not being "flabby" and failing to report to makers when their goods do not afford that service they claim, I have done as he advised and the makers took some interest in my letters. I even had a visit from their London agents, who also took some pains to remedy matters.

My everlasting cause for complaint is my accumulator H.T. battery, which is supposed to give 5,000 m/a hours' service.

My milliammeter (dead beat) in circuit shows my consumption is 8 milliamps—say, 10 for convenience. I use the set less than 3 hours daily—anyway, say 3. Now, allowing 20 per cent. loss, I should get 4,000 m/a hours; on this last figure I should get 4,000 ÷ 30, or 133 days' theoretical service, using 10 milliamps. for 3 hours a day.

I have not had 42 days' service from the battery at any time!

This brings me to that wretched thing called a hydrometer. With this wonderful instrument it takes me an hour and a quarter to get a rough reading of my 80 cells. (Think of that in 1929!) I once asked a service agent what was the reading of my cells on gassing. The agent was so shocked that he said: "Good Lord, we haven't time for that. E. E. H. (Gorleston).

[*We regret that it has been necessary to hold over a large amount of correspondence.*]

My Wireless Den

Weekly Tips—Constructional and Theoretical by W. JAMES

Choosing a Transformer

MANY intervalve transformers have a ratio of 3 to 1. In other words, there are three times as many turns of wire in the secondary winding as in the primary.

Under favourable conditions the voltage generated in the secondary is three times that in the primary, which accounts for the saying that a transformer steps up the voltage. One might, therefore, ask why not a ratio of say six to one or even more, in order that still greater voltage may be developed.

Unfortunately, there is a limit to the ratio which may usefully be employed with a given valve. Much depends upon the type of valve and more especially upon its anode impedance. As a general rule, the lower the anode impedance of a valve, the greater the step-up ratio that may be employed for identical quality of reproduction. Thus, a transformer having a ratio of six or eight to one might be employed with every satisfaction, after a valve of 4,000 or 5,000 ohms impedance, but the ratio would have to be restricted to about 3 to 1 for a valve of from 10,000 to 20,000 ohms.

The size of the core and its magnetic properties are of vital importance. Ratio by itself is valueless, but ratio and the impedance of the primary winding at various frequencies, are factors which enable one to form a fair opinion of the worth of a transformer. A further important factor is the actual value of the inductance of the primary under various working conditions.

It is therefore apparent that a transformer is really a complicated piece of apparatus as regards its electrical properties, and that ratio by itself does not mean a great deal. Most manufacturers who issue a transformer having a ratio of 3 to 1 have designed their product to suit valves of moderate impedance, however, and usually a curve is given with the object of showing the results to be expected from a combination of a transformer and a particular valve.

Those Long Aerials!

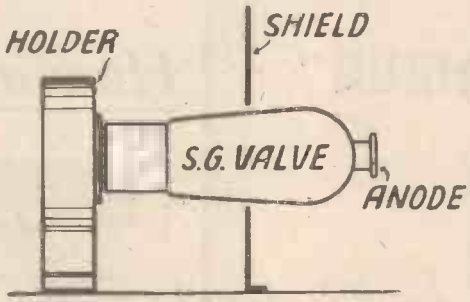
I have recently had an opportunity of testing a number of receivers with particular reference to their selectivity and magnification. I have been particularly struck by one point, and it is this.

Much depends upon the size of the aerial and its construction and also upon the earth. It is well-known that the apparent selectivity of a set increases as the aerial is reduced in length, and I have found that several sets which magnified very well have put up excellent performances when used with a small aerial, but were not sufficiently selective when connected to what is known as a standard aerial. Such an aerial would be 100 ft. in overall length.

For the new conditions, a total length of 60 ft. is generally ample, and indeed those who are troubled by a powerful station may find an aerial of 40 ft. the best.

S.G. Valve Mounting

The shielded valve was designed with the object of allowing stable high-frequency amplification to be obtained, but not very long after this type was issued it was found the anode-grid capacity was still sufficient to set a limit to the magnification. As a result, if precautions



Method of mounting screen-grid valve in order to obtain the most efficient shielding

are not taken, high-frequency amplifiers will oscillate and, therefore, be difficult to tune, and provide unsatisfactory results.

It would appear that the latest valves are rather better than earlier samples. Better results are therefore to be expected. Practical tests indicate that more magnification may be obtained with greater stability. With improved valves, however, circuit couplings must be still further minimised, and the question arises as to whether it has become essential to shield the high-frequency valve itself.

This question is easily answered by tests which have shown that the method of mounting the valve in a screen is worth while. The simple upright screen having a hole in it which is a fairly good fit round the bulb of the valve, seems satisfactory. Suitable valve holders are now available, and there are no difficulties in fitting or removing the valve. See the accompanying sketch. A simple screen of this type effectually separates the anode and grid circuits, provided care is taken, and allows one to obtain the maximum results.

Test Your G.B.

Most amateurs know why a grid battery is employed in a receiver. One important reason for its inclusion is that the anode current is reduced to a value which allows the maximum volume, or magnification as the case may be, to be obtained.

Thus, as an example, a well-known make of power valve passes a current of 20 milliamperes when no grid bias is used and of about one half of this amount when the bias is 9 volts negative. This difference is a considerable one because the usual high tension battery will not last very long when it is supplying 20 milliamperes, whilst it will have a normal life when the current is about 10 milliamperes.

Having this point in mind you may well imagine how surprised I was when testing a new set to find the current was something like 35 milliamperes. A test soon showed the reason for the excessive current. The grid bias battery was wrongly marked. The end which was marked positive should have been negative.

A mistake of this description is serious. Had I not noticed there was something wrong, the high-tension battery would have discharged itself in a week or two and the power valve would probably have suffered. It is therefore, a good plan to test a grid battery before it is used in a set, and those who are without a voltmeter ought to make a point of having a new battery tested at the time it is purchased.

NEXT WEEK:

HOW TO MAKE AN UP-TO-DATE MOVING-COIL SPEAKER

BLUEPRINTS

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of all these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

All Post Free

CRYSTAL SET (6d. each)

A Daventry-Local Crystal Set	AW185

ONE-VALVE SETS (1s. each)

Reinartz One	WM127
The A.1	WM153

TWO-VALVE SETS (1s. each)

East to West Short-wave Two (D, Trans)	AW159
1929 Favourite Two (D, Trans)	AW186
Loud-speaker America Two	AW190
Talisman Two (D, Trans)	AW194
Hyper-selective Two (D, Pentode)	AW198
Meteor Two (D, Trans)	WM114
Clipper Two (D, Trans)	WM135
Continental Two (D, Trans)	WM143
Stay-put Two (All-AC, D, Trans)	WM153
Ether Ranger (D, Trans)	WM156
ABC Two (D, Trans)	WM160

THREE-VALVE SETS (1s. each)

All-Britain Three (H.F., D, Trans)	AW158
Bantam Three (D, RC, Trans)	AW162
Listener's Three (HF, D, Trans), price 4d., free with copy of "AW"	AW169
The Binowave Three (D, RC, Trans)	AW172
Clarion Three (SG, D, Trans)	AW175
1929 Favourite Three (D, RC, Trans)	AW179
Local and Continental Three (HF, D, Trans or D, RC, Trans)	AW189
Broadcast Three (SG, D, Trans)	AW192
James dual-range Three (HF, D, Trans)	AW196
All-wave High-mag. Three (HF, D, Trans)	AW199
Clarion All-electric Three (SG, D, Trans)	AW200
Knife-edge Three (D, RC, Trans)	AW201
All-wave Screen-grid Three (HF, D, Trans)	WM110
Standard Coil Three (HF, D, Trans)	WM117
Wide-world Short-waver (SG, D, Trans)	WM120
New Year Three (SG, D, Pentode)	WM123
The Q3 (D, RC, Trans)	WM124
Lodestone Three (HF, D, Trans)	WM129
Simple Screen Three (HF, D, Trans)	WM131
Dynamic Three (AC—SG, D, Trans)	WM136
At Home Three (D, 2RC)	WM141
Short-Wave Link (D, RC, Trans)	WM142
Binowave S.G. Three (SG, D, Trans)	WM152
Fanfare (D, 2 Trans)	WM157
Brookman's Three (SG, D, Trans)	WM161

FOUR-VALVE SETS (1s. 6d. each)

Overseas Short-waver (HF, D, 2 Trans)	AW133
Touchstone (HF, D, RC, Trans)	WM109
Binowave Four (SG, D, RC, Trans)	WM119
Standard-coil Four (HF, D, 2RC)	WM122
Dominions Four (2SG, D, Trans)	WM134
Short-wave Adaptor for Dominions Four	WM140
The Drum Major (HF, D, RC, Trans)	WM137
Music Player (HF, D, RC, Trans)	WM144
Arrow (SG, HF, D, Trans)	WM154
1930 Monodial (2SG, D, Trans)	WM158
All-electric Four (All AC—SG, D, RC, Trans)	WM162

FIVE-VALVE SETS (1s. 6d. each)

Fidelity Five (HF, D, 2RC)	WM130
All-wave Lodestone Five (HF, D, RC, Push-pull)	WM146

SIX-VALVE SETS (1s. 6d. each)

Short-wave Super-6 (Super-het, Trans)	AW671
Eagle Six (3 HF, D, RC, Trans)	WM105

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier (3RC)	AW162
Searcher Unit (HF)	AW176
Gramophone Amplifier (3 v.)	AW187
Signal Booster (HF Unit)	WM128
Auditrol Amplifier	WM132

MISCELLANEOUS (1s. each)

H.T. Eliminator for A.C. (200 v. output)	AW102
L.T. and H.T. Mains Unit (D.C.)	AW123
Arcadian Linen-diaphragm Loud-speaker (Full-size)	AW177A
D.C. Unit (HT)	AW178
Short-wave Adaptor (1 v.)	AW183
High-tension Battery Charger	AW191
Mains Unit for S 8 Valves	AW193
Scratch filter (6d.)	AW195
Simplest H.T. Unit (1/-)	AW197
H.T. Unit for A.C. Mains	WM125
Lodestone Loud-speaker	WM126
James H.T. Unit for D.C. Mains	WM133
Two Ampere Low-tension Unit	WM147
A.C. Mains Amplifier	WM149
A.C Mains Unit for All-wave Lodestone Five	WM151
H.T. Unit for A.C. Mains	WM159

PORTABLE SETS

Arcadian Portable (SG, D, 2 Trans) with linen-diaphragm loud-speaker (half scale)	AW177	1/6
£5.5.0 Portable (D. Trans)	AW181	1/6
Talisman Portable (SG, D, 2 Trans)	AW184	1/6
Holiday Portable Three (D, RC, Trans)	AW188	1/-
Wayfarer Portable (Super-het)	WM139	1/6
1929 Chummy (SG, D, Trans, RC)	WM145	1/6
Picnic Portable (D, RC, Trans)	WM148	1/-
Enchanter Portable (2HF, D, RC, Trans)	WM150	1/6

When ordering Blueprints please send Postal Order NOT STAMPS

AMATEUR WIRELESS 58-61 FETTER LANE LONDON E.C.4

AT HOME WITH "EXIDE"

"THERE is no finality about accumulators. There may be an epoch-making invention some day. Exide are on the look-out for it all the time and through their organisation in all countries. There is no sign of it yet."

In these words Mr. D. P. Dunne, director of the Chloride Electrical Storage Co., Ltd., summed up the policy of Britain's largest accumulator makers on the occasion of a special Press visit to the Exide works at Clifton Junction on September 10, at which AMATEUR WIRELESS was represented by the Editor and a member of his staff.

This factory, which covers an area of 37 acres and gives employment to 2,000 people, is one of the three largest in the world devoted exclusively to the manufacture of accumulators. It is safe to say that nobody who has been over it will ever misuse an accumulator again!

No praise can be too high for the splendid Exide organisation, which is probably the best of any works in the country. Extraordinary care is taken to prevent any chance of lead poisoning; in fact there has not been a single case of this dread disease since the end of 1927.

A Man's Job!

Every man handling lead oxides (women are not employed on this work at all) has to take a compulsory bath before changing into his own clothes; special working clothes are provided by the company, and twenty minutes of works time are allowed for bathing and changing. Compulsory mouth-washing and teeth-cleaning are also the order of the day in this department.

The most spectacular process is the testing of ebonite accumulator cases for pin-hole faults that would cause trouble were they put into use.

Each case is placed upside down on a metal block and is wiped all over with a kind of metal "brush." A high voltage is applied between the brush and the turntable; consequently a spark takes place at any pin-hole and is clearly visible to the operator. Quite a large spark is obtained from a hole so small as to be invisible in the ordinary way.

Wireless batteries are made at Clifton Junction in all sizes and types. All work involving the use of celluloid is isolated from the rest of the works and automatically-closing fireproof doors are provided.

At every stage in the manufacture stringent tests are applied. No faulty battery can possibly get out of the Exide works. During the war the output averaged 100 tons of submarine accumulators per week, and the company is proud of a letter of thanks from the Admiralty stating that not a single instance of failure regarding the batteries was recorded.

There is just one other point that deserves particular mention: if you work for the Exide people for twenty-five years, you will receive a long-service gift of £100!

Follow the lead of the Experts

WHETHER FOR SWINGING COIL, REINARTZ, HARTLEY, S.G. OR MAINS CIRCUITS, FIT

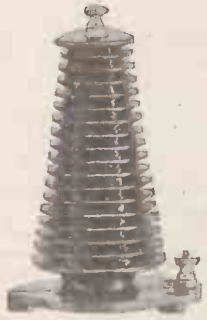
TUNEWELLS

Again selected in this week's issue by the "Amateur Wireless" Technical Staff, for inclusion in their special EXHIBITION CIRCUIT

THE CLARION ALL-MAINS 3

ANODE

PRICE 10/6 EACH



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Price 5/9

DUAL RANGE

Clarion 3, Dominion 4, Mullard S.G.P.3, Cossor 3, Lissen 3, etc. Coils, Dual Range, 10/6 each.

Bantam 3, Favourite 2 and 3, Mullard's 3, and 3 Star, DUAL COILS for baseboard fitting as illustrated.

PRICE 8/3 EACH

NO 6-PIN BASE REQUIRED.

Above coils for 6-pin base mounting—from 7/9 each. Panel mounting, 10/6

2-pin coils from 1/6 each. Complete Wavetraps, 10/6 each.

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Wide research and experience are behind these new components Every Eliminator is tested to over 1,000 volts A.C. for breakdown and complies in every way with I.E.E. regulations.

UNIVERSAL MODEL A.C.—For input voltages from 200-250 volts. Supplies H.T., in 6 tappings from 200/60 volts, output at 200 volts 50 m.a., L.T. (A.C. 4 v.—4 amps.). Grid Bias in 20 one-volt steps. (*Exclusive of Marconi Royalties*). **Price £12 . 10 . 0**

GENERAL PURPOSE MODEL A.C.—For input voltages from 200-250 volts. Supplies H.T. in 6 tappings from 200/60 volts—output at 200 volts, 50 m.a. L.T. for ordinary (D.C.) valves variable 2/6 volts, and Grid Bias, 20 one-volt steps. **Price £16 . 16 . 0** (*Exclusive of Marconi Royalties*).

POWER MODEL A.C.—For Public Address Systems and Power Amplifiers. For input voltages from 200-250 volts. Supplies H.T. 400 volts and six for 200/60 volts. Output at 400 volts, 100 m.a. Output at 200 volts, 45 m.a. L.T., A.C. valves, 4 volt, 6 volt; and Grid Bias, 20 one-volt steps and one variable supply to 150 volts. (*Exclusive of Marconi Royalties*). **Price £23 . 0 . 0**

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Power Smoothing Choke (Type SM/500).
EXCEPTIONAL EFFICIENCY! FIRST-CLASS WORKMANSHIP! Carrying capacity 500 milliamps, suitable for smoothing in power amplifiers. Tested to over 1,000 volts for breakdown. Complies in all respects with I.E.E. regulations. **Price 60/-**

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M.P.A. CHOKES, L.F.—Maximum inductance at full load No increase in temperature. Comply with I.E. regulations. Tested to over 1,000 volts A.C. for breakdown.

"A" Series:	Carrying Capacity	"B" Series:	Carrying Capacity
30 Henries ..	170 m.a.	30 Henries ..	55 m.a.
50 Henries ..	90 m.a.	50 Henries ..	28 m.a.
150 Henries ..	55 m.a.	150 Henries ..	12 m.a.
	Price 37/6		Price 25/-

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High efficiency with first-class workmanship. Tested to over 1,000 volts A.C. for breakdown. Comply with I.E.E. Regulations in every respect. Blueprint of suggested circuit supplied with each transformer. AMT/50.—Primary tapped for all A.C. voltages. Secondary 200+200 volts full wave. 45 milliamps output. Filament-heating, 2 volts+2 volts—3 amps. output. 2.5 volts+2.5 volts, 2 amps output. **Price 65/-**

AMT/100.—Primary tapped for all A.C. voltages. Secondary 400+400 volts full wave, 100 milliamps output. 200+200, 45 m.a. For G.B. or intermediate or both. Filament 4 volts, 2 volts, 2.5 volts, 2.5 volts—3 amps. at 4. 3 amps. at 2. 2 amps at 2.5. **Price 105/-**

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TYPE "A"—3-pole 2-way switch with additional adjustable pair of contacts. Ideal for radio gramophone combinations . **Price 9/-**
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For H.T. and G.B. supply. Another product of the M.P.A. Research Laboratory. 20,000 ohms resistance for Grid Bias and 2,000 ohms (heavy duty) for H.T. supply. 8 values H.T., 20 tappings G.B. in one-volt steps. Carrying 50 m.a. on H.T. tappings. **Price 7/6**

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BROADCAST TELEPHONY

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

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds (2LS)	0.13
*242	1,238	Belfast (2BE)	1.0
*261	1,148	Newcastle (5NO)	1.0
288.5	1,040	Swansea (5SX)	0.13
288.5	1,040	Stoke-on-Trent (6ST)	0.13
288.5	1,040	Sheffield (6LF)	0.13
288.5	1,040	Plymouth (5PY)	0.13
288.5	1,040	Liverpool (6LV)	0.13
288.5	1,040	Hull (6KH)	0.2
288.5	1,040	Edinburgh (2EH)	0.35
288.5	1,040	Dundee (2DE)	0.13
288.5	1,040	Bournemouth (6BM)	1.0
288.5	1,040	Bradford (2LS)	0.13
*301	995	Aberdeen (2BD)	1.0
*310	968	Cardiff (5WA)	1.0
*356	842	London (2LO)	2.0
*377	797	Manchester (2ZY)	1.0
*393	753	Glasgow (5SC)	1.0
*479	626	Daventry (5GB)	17.0
*1,554	193	Daventry (5XX)	25.0
AUSTRIA			
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	5.0
*453	666	Klagenfurt	0.5
*517	581	Vienna	15.0
BELGIUM			
216	1,391	Charleroy (LL)	0.25
246	1,219	Antwerp (Anvers) 4ED	0.4
246.1	1,218.8	Schaerbeek-Brussels	0.5
250	1,200	Ghent	0.5
280	1,071	Liége	0.5
312	961.4	Arlon	0.25
*509	590	Brussels	1.0
DENMARK			
*281	1,067	Copenhagen (Kjobenhavn)	1.0
1,153	260	Kalundborg	7.5

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
FRANCE			
170	1,750	St. Quentin	0.25
211.3	1,420	Béziers	0.1
220	1,304	Fécamp	0.5
230	1,304	Ste. Etienne	0.3
231	1,301	Nimes	1.0
237	1,265	Juan-les-Pins	0.4
238	1,260	Bordeaux (Radio Sud-Ouest)	2.0
240	1,250	Radio Nimes	1.0
*255	1,175	Toulouse (PTT)	1.0
*265	1,130	Lille (PTT)	0.8
268	1,121	Casablanca	2.5
*272	1,103	Rennes (PTT)	1.0
*286		Montpelier (PTT)	1.5
292	1,028	Radio Lyons	1.5
*294	1,020	Limoges (PTT)	0.5
304	986	Bordeaux (PTT)	0.5
304	986	Agen	0.3
309	970	Radio Vitus	2.0
*316	950	Marseilles (PTT)	0.5
326.5	918.9	Grenoble (PTT)	1.5
345	869.6	Petit Parisien	0.5
346	869	Strasbourg	0.3
364	824	Algiers	2.0
368	815	Radio LL (Paris)	0.5
*381	788	Radio Toulouse	0.0
411	729	Radio Maroc (Rabat)	2.0
436	687	Radio Flandre (Lille)	0.5
447	671	Paris (Ecole Sup. PTT)	0.7
468	640	Lyons (PTT)	5.0
1,350	222	Tunis (Kasbah)	0.6
1,461	205.3	Eiffel Tower	8.0
*1,725	174	Radio Paris	8.0
GERMANY			
*218	1,373	Flensburg	1.5
*227	1,319	Cologne	4.0
*234	1,283	Muenster	4.0
*239	1,256	Nurnberg	4.0
*246	1,220	Kiel	0.7
*246	1,220	Cassel	0.7
*253	1,184	Gleiwitz	6.0

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
*259	1,157	Leipzig	4.0
*270	1,112	Kaiserslautern	1.5
*276	1,085	Koenigsberg	4.0
*283	1,058	Magdeburg	0.7
*283	1,058	Berlin (E.)	0.7
*283	1,058	Stettin	0.7
*319	941	Dresden	0.75
*325	923	Breslau	4.0
*339	887	Bremen	0.75
*360	833	Stuttgart	4.0
*372	806	Hamburg	4.0
*390	770	Frankfurt	4.0
*418	716	Berlin	4.0
*453	662	Danzig	0.75
*456	657	Aachen	0.75
*473	635	Langenberg	25.0
*533	563	Munich	4.0
*560	536	Augsburg	0.5
*560	536	Hanover	0.7
570	527	Freiburg	0.7
*1,635	183.5	Zeesen	20.0
2,100 / 2,290	142 / 131	Norddeich	10.0
HOLLAND			
31.4	9,554	Eindhoven (PCJ)	25.0
*298	1,004	Huizen via Hilversum aerial (until 5.40 p.m. B.S.T.)	5.0
*1,071	280	Huizen via Hilversum aerial (after 5.40 p.m. B.S.T.)	5.0
*1,070	280	Scheveningen-Haven (from 10.30 a.m. to 5.40 p.m. B.S.T.)	5.0
*1,875	100	Hilversum via Huizen aerial (AVRO)	5.0
IRISH FREE STATE			
*225	1,337	Cork (1FS)	1.5
*413	725	Dublin (2RN)	1.5
ITALY			
248	1,209	Trieste (testing)	
*274	1,094	Turin (Torino)	7.0

Metres	Kilocycles	Station and Call Sign	Power (Kw.)
*332	905	Naples (Napoli)	1.5
*385	779	Genoa (1GE)	3.0
*441	680	Rome (Roma)	3.0
453	662	Bolzano (IBZ)	0.3
*501	599	Milan (Milano)	7.0
NORWAY			
240	1,250	Rjukan	1.0
*283	1,058	Notodden	0.7
*365	820	Bergen	1.0
*394	761	Frederiksstad	1.0
453	662	Tromsoe	1.0
453	662	Aalesund	1.0
453	662	Porsgrund	1.0
*493	608	Oslo	1.5
SPAIN			
251	1,197	Almeria (EAJ18)	1.0
314	956	Oviedo (EAJ19)	0.5
*349	860	Barcelona (EAJ1)	8.0
*368	815	Seville (EAJ5)	0.5
368	815	San Sebastian (EAJ8)	0.5
*424	707	Madrid (EAJ7)	3.0
453	662	Salamanca (EAJ22)	0.55
SWEDEN			
231	1,301	Malmo	0.5
*257	1,160	Hoerby	10.0
270	1,112	Trollhattan	0.4
*322	932	Goeteborg	6.0
322	932	Falun	0.5
*436	689	Stockholm	1.5
*542	554	Sundsvall	1.0
*770	389	Ostersund	2.0
1,200	250	Boden	2.0
*1,348	222.5	Motala	30.0
SWITZERLAND			
*403	743	Berne	1.0
*459	653	Zurich	0.6
680	442	Lausanne	0.6
760	395	Geneva	0.5
1,010	297	Basle	0.25

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

RADIOGRAMS

ALL the concerts of the 1929-30 season of symphony concerts to be given by the B.B.C. at Queen's Hall are to be broadcast; the opening night is fixed for October 12. In all, twenty-three concerts will be given, and the conductors will include Sir Henry Wood, Sir Landon Ronald, Hermann Scherchen, Franz von Hoesslin, and Ernest Ansermet. Well-known soloists will perform during the season and many novelties will be heard.

Massenet's opera *Thais* will be the first of the new series to be broadcast, on September 23, through 5GB. It is based on a novel by Anatole France. The cast includes Kate Winter, Evelyn Arden, Leonard Gowings, Dennis Noble, and other well-known radio stars. Filson Young will be the narrator. A second performance will be given for the benefit of 2LO and 5XX listeners on September 25. During October, November, and December, *Aida* (Verdi), *Louise* (Charpentier), and *Koenigskinder* (Humperdinck) will be presented over the microphone for the first time.

A running commentary on the England *v.* Germany Water Polo International will be relayed from the Pitfield Street Baths, Shoreditch, on September 28. In view of its interest to their nationals, it is possible that arrangements may be made to broadcast a description through the German stations.

A particularly strong vaudeville programme has been arranged for broadcast from the 2LO studio on September 19. The numbers include Julian Rose, Ann Penn (impersonations), Peter Bernard (comedy songs), and Lou Abelardo (guitar). Tommy Handley will also be heard on the same evening.

Radio entertainers in the United States engaged for chain broadcasts are paid from £7 to £150 for one performance, with the average being at about £16. Stage and opera stars receive as high as £2,000.

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

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

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 SECOND SHOW ISSUE

SPECIAL NUMBER : 68 PAGES, USUAL PRICE 3D.

Amateur Wireless

and Radiovision

Every Thursday 3d.

Vol. XV. No. 381 **Saturday, September 28, 1929**

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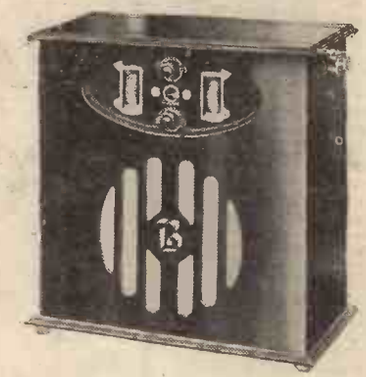

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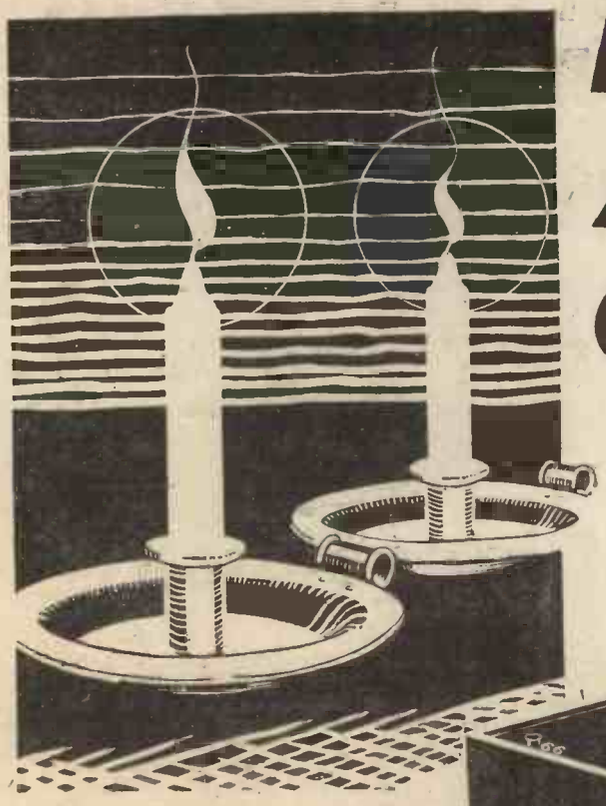
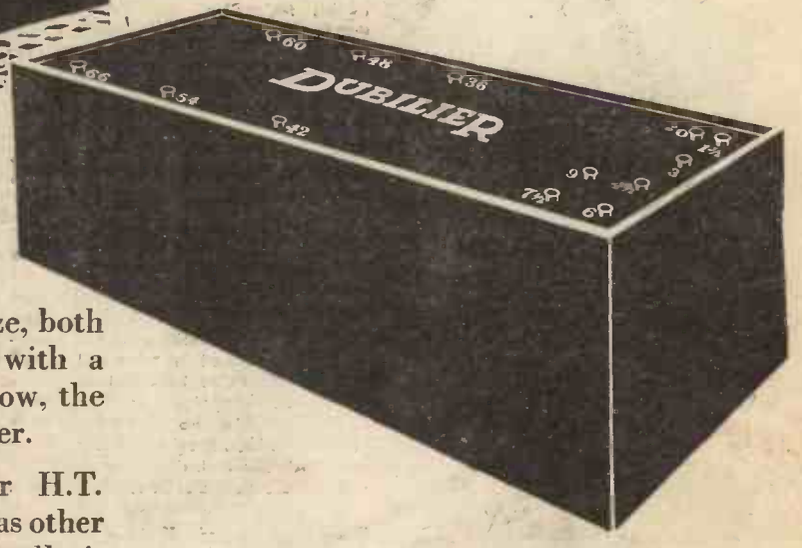


BOTH LOOK ALIKE BUT ONE GIVES LONGER SERVICE



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SEPTEMBER 28, 1929 No. 381 Vol. XV

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Editor: BERNARD E. JONES

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

"P.P.E."—The Announcer Says—A Shaw Play—The Manchester Show—The B.B.C. and £ s. d.—Another Radio University—Flying Tenors!—More B.B.C.'s

"P. P. E." Joins H.M.V.—Capt. P. P. Eckersley has followed the path of several of his subordinates in joining the Gramophone Company (H.M.V.). He has taken up a very important post on the electrical side, and within a little while he will be going abroad and intends to travel extensively in order to study problems in connection with radio reception under varying conditions in different countries. We wish him the very best of luck!

Exit the Proms.—The Proms. series of concerts is shortly coming to an end and the B.B.C.'s Queen's Hall season opens on October 12. Twenty-three concerts will be given and tendencies towards "highbrowism" will be checked by the addition of many musical novelties.

The Announcer Says—It is interesting to know what an ex-announcer thinks of an active member of this fraternity. An ex-announcer who has taken to criticism writing, says of Mr. Grisewood: "His announcing is very natural and easy and I believe he could even cough without saying, 'I beg your pardon.'"

A Shaw Play—Bernard Shaw, who was once mildly indifferent towards the radio public (a strange attitude for such a man), is now allowing a number of his plays to be broadcast. The latest is *Captain Brassbound's Conversion*, on October 16. This should certainly be well worth listening to.

The Manchester Show—*The Evening Chronicle* is running a set-building competition in connection with the Manchester Radio Exhibition, which will be held from October 16 to October 26. Full details and entry forms can be obtained from the Radio Sales Bureau at Withy Grove, Manchester.

The B.B.C. and £ s. d.—There seems to be a temporary lull in the exodus from the engineering department of the B.B.C. It does not need very great perception to know that largely the previous discontents were partly due to inadequate salaries and to lack of a possibility of advancement. While one does not wish to give undue prominence to such personal affairs, it is significant that no less a person than Mrs. Philip Snowdon has been responsible for a general upward revision of engineers' salaries. Luckily the B.B.C. directorate is not blind to the real cause of a deal of dissatisfaction.

ANOTHER SPECIAL ISSUE NEXT WEEK

USUAL PRICE 3D.

Among the many interesting new features will be:

The Talisman Two-Three,

a receiver developed from that popular little set the "Talisman Two."

Thermion Looks Back at the Show

a personal impression, and

W. JAMES *on*

Push-pull Simply Explained

Another Radio University—Broadcasts have been made, through the American station, WSU, from a classroom of the University of Iowa. Strange as British listeners might think, highbrow items not being so well received on this side of the Atlantic, there has been a big demand for this kind of broadcast lecture. Iowa intends to put a further radio course "on the air," and the lectures will be run on somewhat similar lines to the present B.B.C.'s transmissions to schools.

Flying Tenors!—"Should singers become aviators?" With this somewhat thrilling questionary title the B.B.C. Publicity Staff issues a paragraph on breathing exercises for singers. Mr. Frank Titterton, the well-known tenor, has made it a habit to do a fair amount of hill climbing for breathing exercises, and he has recently undertaken some experiments in an aeroplane. His advice to budding singers is that the best breathing exercises are to be obtained by inhaling the rarified air which one gets on aeroplane flights. True, Mr. Titterton! But rather expensive, we think.

More B.B.C.'s—Is there more than one B.B.C.? It seems that there are at least three, in addition to *the* B.B.C.! There are the Betting, Billiards, and Boxing Boards of Control—all separate bodies and all having the initials B.B.C. And which is *the* B.B.C., anyway? Presumably the British Broadcasting Corporation is not the oldest title, and amateur Tunneys, Donaghues, and Newmans might be offended if we said that the Broadcasting Corporation was *the* B.B.C. But it is at least the largest!

U.S.A. SB's to Germany—According to an American report, confirmed in Germany, arrangements have been made for a regular exchange of radio programmes next winter between the United States and Germany. Experiments will be carried out by the Riverhead (Long Island) transmitter in conjunction with the new Konigswusterhausen short-wave station.

PRINCIPAL CONTENTS

BROADCAST ARTISTES IN PICTURE

LEONARD GOWINGS.—One of the finest English tenors, at home equally in oratorio, opera, or concert work. Mr. Gowings has been heard from all stations and in every type of programme.

RITA SHARPE.—One of the earliest of star violoncellists to broadcast, she could play almost before she could talk. She comes of a musical family; her cousin is Cedric Sharpe, the 'cellist.

BEN WILLIAMS.—A frequent broadcaster, Mr. Williams is best known for his operatic work with the Carl Rosa Company. He played the title role in "Faust," which has been broadcast.

ELIZABETH COOPER.—Miss Cooper's own Irish songs and sketches have gained her much approval. She has sympathy with her subjects and portrays them admirably in song and story.

FRANK MULLINGS.—Famed for his operatic roles, notably with the late B.N.O.C., in which, as "Tristan," he was best known, Mr. Mullings has taken part in every form of vocal programme throughout the country.

IRENE SCHARRER.—A noted exponent of the Matthay method of pianoforte playing, she made her debut in 1901; since she has played with nearly every great orchestra.

MAURICE COLE.—A brilliant pianist and one of the first broadcasters. His performances of the Greig Concerto and Liszt Fantasias are triumphs of interpretation.

MIRIAM LICETTE.—Like many other members of the B.N.O.C., Miss Licette hails from across the seas. She has been heard in nearly every role of their repertoire.

ERNEST WHITFIELD.—Known as the blind violinist, Mr. Whitfield has not let his art suffer by reason of his infirmity. He is a capable musician and has given many recitals as well as broadcasts on several occasions.

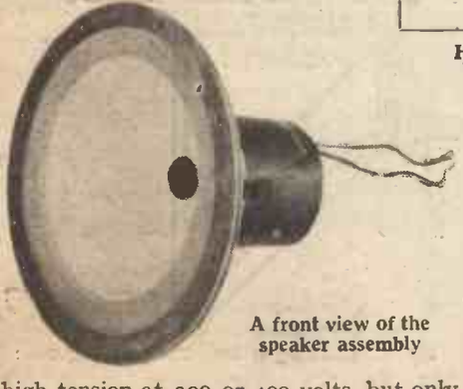
THE LODESTONE MOVING-COIL SPEAKER

The original Lodestone moving-coil speaker, designed by W. James, and described in the pages of the WIRELESS MAGAZINE, was one of the most successful of its type. We present the following article in response to many requests by A.W. readers. In its leading essentials the speaker is as was originally described, but the greater attention given to detail will, it is hoped, lead to the production of an even more efficient and reliable instrument.

MOVING-COIL loud-speakers of good construction are still generally recognised as providing better results than other types.

The receiver that is used must naturally be a reasonably good one if the quality of the reproduction is to be acceptable. If you have a set that distorts it would be better not to use a moving-coil loud-speaker, as it would show up the faults. It would be far better to employ an ordinary loud-speaker that is not quite so truthful, as the reproduction might then not sound too bad.

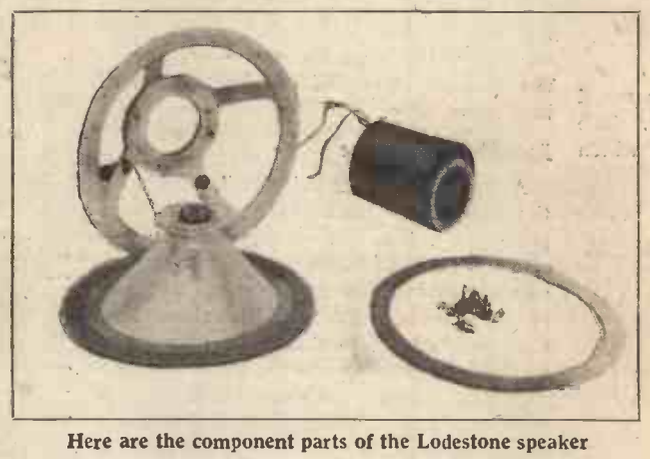
Nothing is worse than a good moving-coil loud-speaker and a poor set. The set does not have to be a powerful one supplied with high tension at 300 or 400 volts, but only one that is well designed and constructed. There are many suitable types, so that it is not difficult to obtain really fine quality of reproduction.



A front view of the speaker assembly

The volume naturally depends upon the amount of undistorted power to be obtained from the last valve. One must, therefore, rest content with moderate volume when the output valve is an ordinary one supplied with high tension of from 120 to 160 volts.

Some amateurs have the idea that enormous volume is to be obtained from a moving-coil loud-speaker. If you have a powerful set with big output valves and 400 volts high tension the volume will undoubtedly be much too great for ordinary domestic purposes. But when the set is an ordinary one the volume will be no more than when a cone or other loud-speaker is used.



Here are the component parts of the Lodestone speaker

Moving-coil loud-speakers are not, on the whole, noted for their sensitivity. They are usually less sensitive than the best cone types. This is a matter of small importance, however, as the better frequency response characteristics of this type of speaker results in more pleasing reproduction, and often in more volume, merely because bass notes are reproduced.

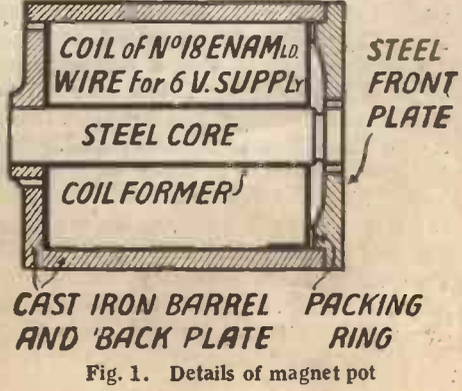


Fig. 1. Details of magnet pot

One of the disadvantages of most moving-coil speakers is that they must be supplied with current for magnetising the poles. The amount of the magnetising or field current, as it is often termed, is dependent upon the materials used and their shape. Early types had a magnet of cast iron and a large winding which had to be supplied with a heavy current.

Cast iron is not a suitable material for all parts of the magnet, as it is so difficult to avoid saturation at certain points. A much better material is steel, and in the loud-speaker illustrated here, which is most economical and sensitive, a steel centre pole is used with a steel front plate. These points are shown in the illustration.

This photograph shows how the cone is supported

By using the materials indicated I have found it possible to create an intense magnetic field with a current of only half an ampere at 6 volts.

The magnet winding may, of course, be arranged for any voltage, such as 100 or 200 D.C. When the mains provide alternating current a rectifier must be used to convert the current for exciting the fields and in some designs the magnet is actually employed as a smoothing choke in a mains unit.

Given a magnetic field of suitable strength, the next part to receive attention is the speech coil itself. This is composed of

a number of turns of fairly fine wire, and may be connected directly to the output from a set or through a transformer having the correct ratio. The winding sometimes has more than 1,000 turns of fine wire, but I prefer to employ a small number of turns of a little thicker wire, for the following reasons.

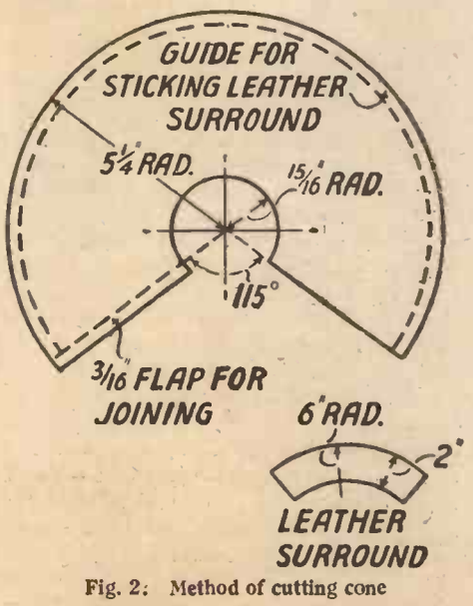
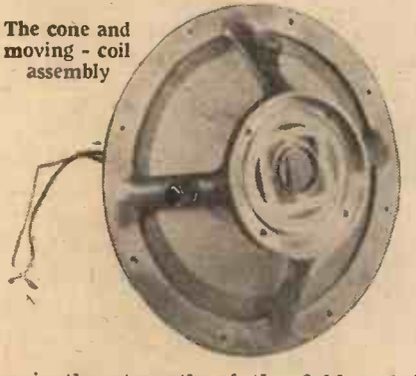


Fig. 2: Method of cutting cone

In the first place, there is only a small space in which the coil may move. The space is limited by many factors, of which



The cone and moving-coil assembly

one is the strength of the field and its relationship to the amount of the current needed to create it. In this space we

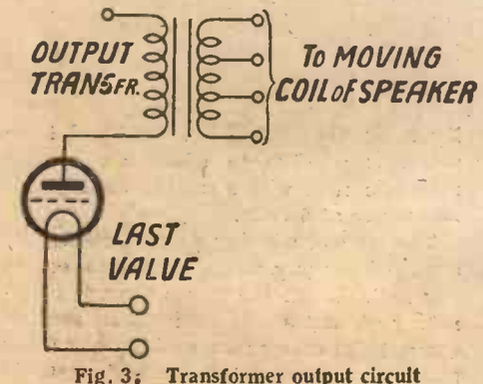


Fig. 3: Transformer output circuit

have to fit the moving coil and, whilst taking the greatest advantage of it, allow sufficient room for free movement.

The coil moves backwards and forwards according to the low-frequency currents passing through it, and must not rub against the poles. On the other hand, the clearances must not be so great that space is wasted, or the output will be too small. A designer has therefore so to arrange matters that, whilst providing ample clearance, the sensitivity is good.

A further reason in favour of the low-resistance winding is that it is stronger, and yet another is that more of the space is filled with copper and less with insulation.

Output Transformers

The adoption of a low-resistance winding naturally involves the employment of a transformer. This component must have such a ratio and be so constructed that the maximum of power is supplied to the coil. The best ratio for a given form of construction depends upon the impedance of the output valve of the receiver, and also that of the loud-speaker. Tests indicate that a suitable ratio is from 9 to 1, to 22.5 to 1, according to the output valve of the receiver, and I therefore recommend a Ferranti output transformer, type O.P.M.3.

The reader should try different ratios in order to find the most suitable. An interesting point is that the quality of the reproduction varies with the ratio—or, rather, the relative strengths of the treble and bass notes vary.

Making the Cone

Attached to the moving coil, which, by the way, is supplied ready wound, is a paper cone. This is also supplied with the other parts, but those who enjoy experimenting with different materials will find the diagram of assistance. This shows how the paper must be cut and the allowances for sticking the edges to the outer support.

A good paper to use is that known as two-sheet Bristol board, but another paper that I have employed with good results is called "lampshade" paper. The quality of the paper affects the results enormously. If it is too thin or too thick the output suffers, and with certain types paper-rattle may be heard. Oscillations may be set up along the cone itself, but they are the minimum when a "dead" paper is used.

Kid leather is used to support the cone at its outside edge. There are four pieces cut to shape, and they are stuck together and to the outer edge of the cone with seccotine. Very little seccotine should be used, and the parts be allowed to dry before they are finally assembled.

It will be noticed that a centring ring of paper is employed. This is fastened to the coil support itself and has been made a little stiffer than in my first model.

The construction is really very simple and straightforward, but must, of course, be accurately carried out, or the coil may rub against the poles. Having assembled the cone in its framework, the magnet pot may be bolted into position, taking great care not to distort the centring piece. Do not forget to join the ends of the coil to the terminals provided and to make certain that the coil is free to move backwards and forwards.

The whole of the parts may be obtained from Whiteley, Boneham & Co., Nottingham Road, Mansfield, Notts, who guarantee that the parts are built exactly in accordance with my specification.

Those who have a lathe might be able to build their own magnet pots from castings,

The Lodestone magnet pot

but I believe most readers interested in a loud-speaker of this type would prefer to purchase a completed set of parts.

One must not forget that a baffle ought to be used. The bass notes will not be heard at their proper strength if the loud-speaker is employed without a baffle. It may take the form of a flat sheet of wood

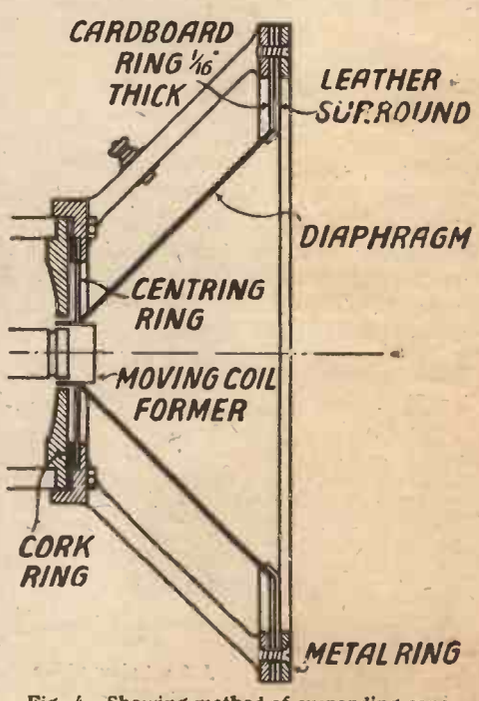


Fig. 4. Showing method of suspending cone

or other material, or a cabinet may be used. Care must be taken that the baffle itself is not noticeably resonant, or the output will be coloured.

Finally, do not overlook the output transformer. When a transformer is employed there is no need for the usual filter circuit.

I have used a loud-speaker as illustrated for over a year, and I believe it to be a really fine reproducer. It is not expensive and is easily made up. It may be used with any reasonably good receiver. Speech is natural and there is plenty of bass.

Brookmans Park FROM WITHIN

Impressions obtained by members of the "A.W." Staff during a visit

HAVING heard so much about the new Regional Station at Brookmans Park, it was with special interest that members of the AMATEUR WIRELESS Technical Staff journeyed north to the "Hertfordshire heights" to see it for themselves. To say that the visit exceeded expectations is not to do adequate justice to a notable B.B.C. achievement; Brookmans Park is an "inside job," in that only B.B.C. engineers have been concerned with its design and erection.

Standing in a field of some 34 acres, the building housing the apparatus is actually 400 ft. above sea level. The height of the site is a most important factor in the determination of the service area covered by the transmissions, more especially as the Air Ministry made it necessary for the B.B.C. to restrict the height of the aerial masts to a maximum of 200 ft.

As soon as the main transmitting hall of the spacious building is entered the visitor is immediately made aware of a unique feature—the station is a double one. Nowhere else in the world can one see two such powerful broadcasting plants side by side, controlled by engineers whose desks are separated by only a few yards.

Brookmans Park transmitter hall is, in the writer's opinion, one of the most impressive radio rooms he has ever seen. Not that there is much in it; just two transmitters facing each other, a main switchboard controlling the output from these machines, and the two control desks just mentioned. But the feeling is that, here in this hall, the energy from the giant Diesel engines in the power house outside is linked with the microphone sounds and flashed out as two of the most powerful broadcasting signals in the world.

Two Complete Stations

The entire completion of the twin broadcasting stations at Brookmans Park rather took the visitors by surprise, as they imagined that only one station was actually ready to transmit. As a fact, both stations are equally ready, and can be brought into use just as soon as the B.B.C.'s natural caution permits.

The transmitters will normally deliver 30 kilowatts to each of the two aerial systems and will employ modulation at low power, used with such success at Daventry 5GB. If necessary, the power of each station can readily be increased to 50 kilowatts; for the service the B.B.C. contemplates there is, therefore, an ample reserve of power.

The power house (large enough to supply electricity to a small town !) contains four 300-h.p. Diesel engines, mounted on a great bed of concrete to prevent vibration being transmitted to other parts of the station. Should one of these engines fail suddenly there is a storage battery with a capacity of 2,000 amperes that could temporarily take the load.

The main motor-generator room, containing six large generators and a number of small ones, presents an intriguing sight, especially when the three huge 160-kilowatt machines in the middle of the room are started up. The smaller motors are mounted so that, should anything go wrong with them, their height above the ground makes inspection very convenient.

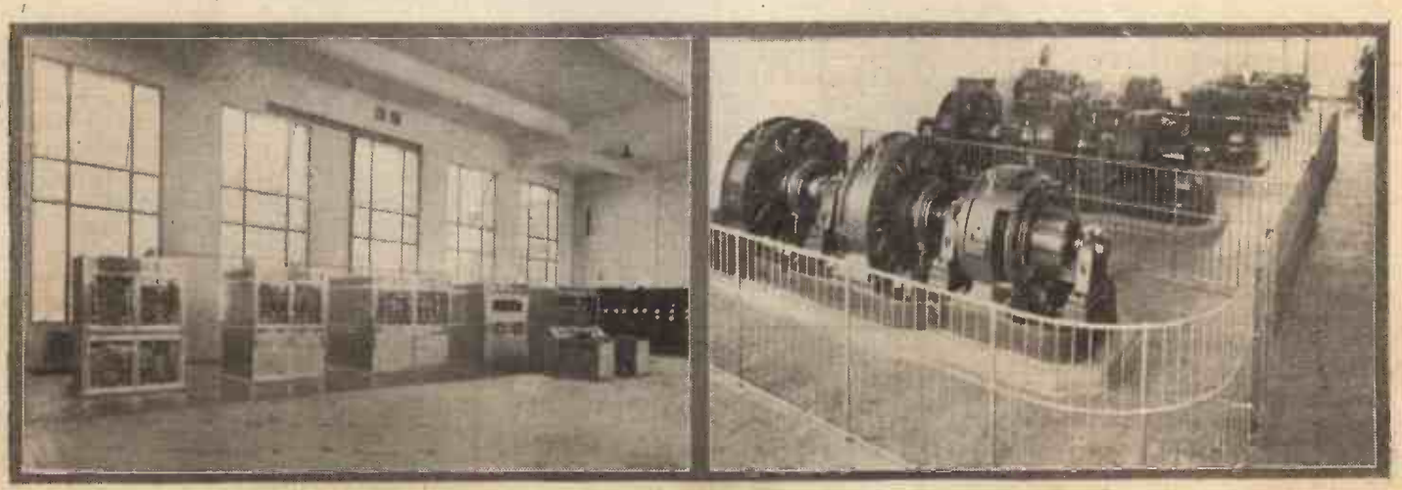
Nothing is *expected* to go wrong, but, as Captain Eckersley remarked, the engineers in charge of the station are not merely machine minders, they know each machine intimately. There is no suggestion of making the apparatus foolproof, because, as was pointed out, when anything goes wrong with foolproof apparatus it is usually very difficult to trace the fault.

Aerial Arrangements

Immediately below the down lead of each aerial are huts containing the aerial-transformer apparatus, including the aerial-tuning circuit; one of the engineers responsible for the design of Brookmans Park made the interesting remark that the loose-coupling system of the aerial-tuning circuits entirely overcame mutual interference between the two adjacent transmissions. It is rather amazing to think of two 30-kilowatt radiations so close together and yet so entirely indifferent each to the other's presence.

The four masts—two for each transmitter aerial—are entirely self-supporting and insulated from earth at their bases. Although low in height, the span between each mast is 600 ft. Only 900 ft. separates the centre lines of each aerial.

(*Continued at foot of next page*)



Left: One transmitter with part of main switchboard. Right: The 12,000-volt D.C. generators

For the Newcomer to Wireless: The Pentode Valve: Practical Uses

YOU told me recently how the pentode worked. Now will you please show me just what it does?

Owing to its peculiar construction the pentode is able to combine enormous magnifying powers with a high impedance, a long, straight portion of the characteristic curve and a comparatively low direct-current resistance.

That is very different from the triode.

Yes. In the triode valve we don't find the long, straight portion of the characteristic going hand in hand with high impedance; nor do we find a big current output combined with high magnification.

In what position should the pentode be used?

It must always be an output valve and generally speaking it must be something more than the *last* L.F. valve; it must be the only one.

Why is that?

So big is the magnification taking place within it that even with the maximum plate voltage permissible it cannot deal with grid swings greater than about 15 or 16 volts. These are quite sufficient to enable it to give enormous volume in the output.

What would happen if there were a preceding L.F. stage?

In ordinary circumstances, the pentode would be overloaded. With one really efficient high-frequency stage, preferably of the screen-grid type, an anode-bend rectifier and a pentode L.F. stage one can really obtain all the range and volume that one requires, for such a set is much more effective than the five valvers of a few years ago.

Since the impedance of the pentode is so high, is there not some difficulty about getting it to work a loud-speaker properly? I have always heard that the loud-speaker impedance should match that of the output valve.

There certainly is a difficulty here; in fact, until recently the pentode was rather under a cloud on this account.

What developments have taken place?

In the first place research has shown just how the moving-coil of a loud-speaker must be wound if the instrument is to be wired direct into the plate circuit, and secondly output transformers have now been designed which enable the pentode to be at its best with a loud-speaker of standard design.

Does the pentode give good quality?

Remarkably good with the right loud-speaker or output transformer. And there is one special reason why the quality should be very good.

What is that?

So much attention has been devoted to the design of high-frequency stages that we have perhaps rather lost sight of what is to my mind one of the biggest difficulties in the designing and making of wireless receiving sets.

What is that?

It is one of the hardest things in the world to get two low-frequency stages to operate perfectly without introducing noisiness, distortion, or any tendency to instability. Since the pentode does the work of two stages and has not these tendencies, it provides an automatic solution of a very pressing problem.

Is the pentode a robust valve?

It will certainly not stand as much rough handling as the triode, or the screen-grid valve on account of the number of its electrodes. The danger is an internal short circuit owing to the displacement of one of the grids. With careful handling, though, the pentode of to-day is a reliable and long-lived valve.

"BROOKMANS PARK FROM WITHIN"

(*Continued from preceding page*)

Red lanterns at the top of each mast serve to warn aircraft attempting to land near the station.

Probable Range

From talks with the engineers at Brookmans Park, AMATEUR WIRELESS was led to conclude that, while the B.B.C. is fully prepared for some dislocation, the increased overall service given by the new station when it replaces the present London transmitter will more than justify the dislocation. B.B.C. engineers are confident that the present range of the London transmitter will be trebled by the new one; crystal reception will be very good up to 50 miles, whereas now it cannot be guaranteed even at 20 miles. Those listeners who live in a line between Oxford Street and points as far south as Croydon, in Surrey, must expect a slight diminution of signal strength, but beyond this point an improved service is assured, as it is, indeed, for the majority of listeners.

For the next few months interest will naturally be centred around Brookmans Park; but it must be remembered that negotiations are already practically complete for the site of the northern regional station, and that there are to be five twin transmitters in the regional scheme, which when completed will fulfill the B.B.C.'s ideal of alternative programmes for everybody with simple sets.

NOTE: *Our Technical Editor, who was present at the official press visit to Brookmans Park, will give his impressions of the new station in next week's issue.*

THE LEAGUE OF NATIONS TRANSMITTER

SPEECHES recently broadcast from Geneva may lead to a reconsideration of the scheme by which the League of Nations would be endowed with a special transmitter for the purpose of keeping the world informed of its discussions and decisions, and by this means placing at its disposal a powerful instrument capable of affording considerable assistance in the event of any political or national crisis.

As far back as 1926 such a proposal was put forward by a French delegate, and the plan was fully discussed at a meeting which took place one year later. The cost of such an installation, however, was considered disproportionate to the service it was thought it might render. The scheme in detail was set down for discussion at the tenth assembly of the League of Nations in September, 1929.

In the meantime the Telefunken Company, in co-operation with a leading French radio concern, has worked out an estimate of the cost of such a transmitter. Competition also exists in other quarters, both in Great Britain and Switzerland.

Taking the bull by the horns, Radio Schweiz, in connection with the Swiss Posts and Telegraphs, has erected at Geneva a new high-power wireless telegraphy transmitter for inter-European traffic which was opened on September 1 last. It was placed at the disposal of the League of Nations.

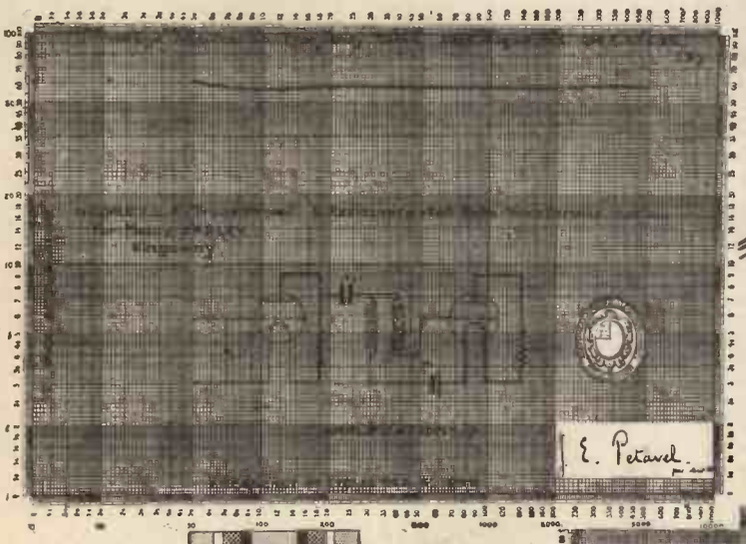
In view of the closer co-operation which is taking place amongst the foreign broadcasting stations for the transmission of programmes of international interest, it would appear feasible to conceive a workable scheme by which a central high-power station erected in a favourable spot in Switzerland could render valuable services to both the League of Nations and the Société Internationale de Radiodiffusion. The former organisation could at all times call upon the transmitter to carry out its broadcasts, and when not so needed, it could disseminate programmes of interest to the majority of European listeners.

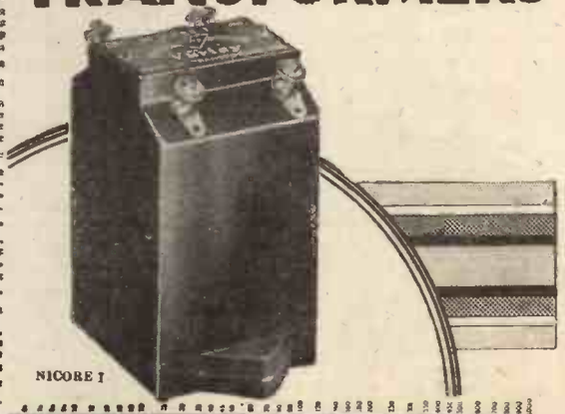
Next Week

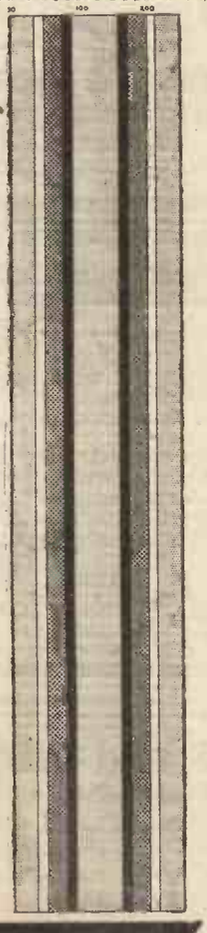
A TWO-THREE WITH UNIQUE FEATURES

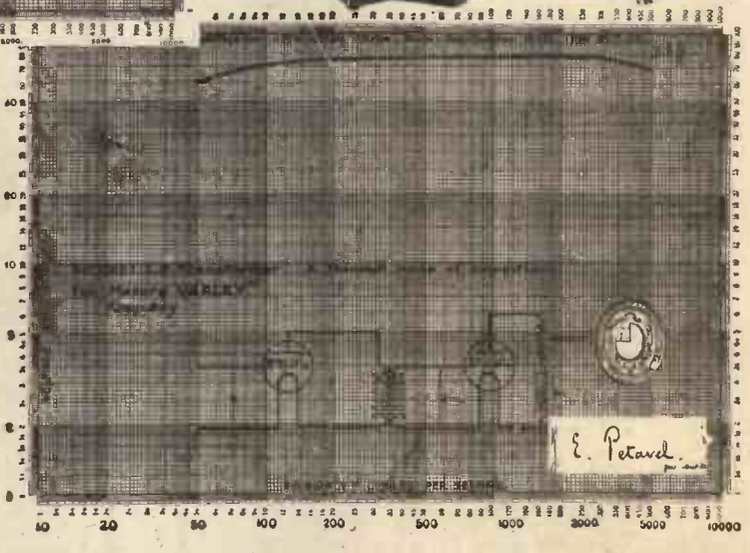
VARLEY

—NOW TAKE THE LEAD IN L·F INTERVALVE TRANSFORMERS









STANDS
154
&
159
OLYMPIA

You have only to look at these curves to see that for yourself. They show what the curves of no other transformer can show—perfect amplification of the deep bass notes, together with constant response at all frequencies from 50 to 5,000 cycles. After all it was only to be expected, for in the early days of broadcasting the coils for most of the well-known transformers were wound by Varley. Then after months of research came our success with the nickel iron alloy core, and to-day we are able to market at an amazingly low price two L.F. Intervalve Transformers whose performance is second to none.

Curve "A" is that of Nicore 1, used in the ordinary transformer arrangement, showing an amplification of the order of 80 between 100 and 5,000 cycles and over 60 at 50 cycles.

Curve "B" is that of Nicore 1 used in the resistance feed auto-transformer arrangement, showing an amplification of 60 and a perfectly straight line between 50 and 5,000 cycles.

No attempt has been made to retain inaudible side-band frequencies; the discerning public will not be slow to realise that our efforts have produced curves which are—like everything else connected with Varley—perfectly straight.

Nicore 1 is housed in an attractive bakelite case, with convenient terminals and soldering tags.

Write for Section D of the Varley Catalogue.

NICORE 1 (List No. D.P.1) Ratio 4-1 **PRICE £1 0s. 0d.**

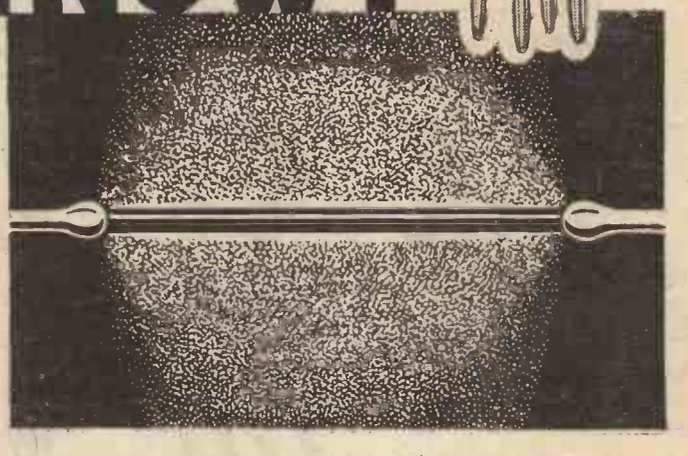
For RADIO OLIVER PELL MANUFACTURE

Varley

Advertisement of Oliver Pell Control, Ltd., Kingsway House, 103 Kingsway, London, W.C.2. Telephone: Holborn 5303.

The diagram shows the small emission available with the early valves.

With the coming of the first Cossor Dull Emitter emission increased considerably.



Cossor leads again with a wonderful new filament having a colossal emission.

28% GREATER EMISSION

—28% GREATER POWER
—INCREASED VOLUME
—LONGER RANGE

WITH EVEN LOWER FILAMENT CURRENT CONSUMPTION

Filament emission determines the performance of any valve. Volume, tone, range, length of life, all depend upon emission. The NEW Cossor Valves are fitted with a tungsten cored filament which gives 28% *greater emission.* This amazing new Cossor filament is tremendously strong—stronger than steel—and yet is as pliable as whipcord. Because of its pliability it cannot become brittle. And because it cannot become brittle it will not break even after hundreds of hours of use. So, due to their 28% greater emission, the new Cossor Valves will give you greater volume, longer range and sweeter tone. And because of the tremendous strength and pliability of the new Cossor filament, they will give enormously long life. Use the NEW Cossor in your Receiver. They make old Sets like new.

The NEW Cossor

The NEW Cossor is available in a complete range of types including Screened Grid, H.F. Detector, L.F., R.C., Power, Super Power and Pentodes. Your Wireless dealer stocks them.

They're wonderful Valves!

A. C. Cossor Ltd., Highbury Grove, London, N. 5.

CA 487

On Your Wavelength!

That Passing Craze!

AND so wireless is a passing craze, is it? The croakers who have gone on saying and writing that kind of thing ever since broadcasting began should have been in the neighbourhood of Olympia on the opening day of the show. It seemed to me, as I made my way Olympia-wards, that half London was doing the same thing, and when I got inside I added on half Britain as well. Ye gods, what a throng there was, and still is at the moment of writing! Perhaps, though, the croakers wrote more truly than they knew, for wireless *was* in one way a passing craze in its early days: it passed rapidly from a craze into the greatest and most widespread of all hobbies, and has become in a few short years one of the biggest and most important features of our home life. And every year will see its importance largely increased.

"Exhibishing"

Whenever I visit an exhibition I like to do things thoroughly. My custom is to spend the first day in a general survey of the show in an endeavour to get an impression of the trend of progress. Succeeding days I devote wholly or in part to valves, to loud-speakers, to batteries, and the eliminators thereof, to components, and to finished receiving sets. If you have only one day to spend at the exhibition I can recommend this method, but, of course, in rather more condensed form. Take a general look round for the first hour or two and then settle down to examining various departments in detail. Unless one "does" exhibitions on some kind of system, one is apt to come away with a rather hazy impression, since a kind of mental indigestion supervenes. Let there be method in your madness rather than madness in your method.

The Big New Step

To my mind, by far the most important development in wireless reception methods indicated by this year's exhibition is that shown by the transportable set. I am talking, mark you, not of the portable, but of the *trans*portable. When the portable first came along it leapt into instant popularity because it supplied a very big want, but, curiously enough, this want was not what the designers of portables had in mind. Everybody told everybody else what a splendid thing the portable was because you could take it with you out of doors. And everybody agreed with everybody else that this was so. Everybody bought or made a portable—but didn't use it out of doors! No, the want that they met was just this. The general public was getting tired of what you may call the bit-and-piece receiving set. It didn't like having batteries on the floor, and the receiving set on one table and the loud-speaker on another table. And it rather objected to rigging up poles and things in its garden and to running downstairs in its pyjamas to turn over the earthing switch when distant thunder began to rumble at midnight.

Portable and Transportable

More than once in these columns I have voiced the opinion that what the man in the street really wanted was not so much a picnic receiving set as something completely self-contained for home use; something, in fact, that looked as harmless as the average gramophone. It would be a great advantage, of course, to be able to use it in any room at will; but, since it would never need to be carried more than a few yards, there would be no need to make it "vest pocket" or "featherweight," or anything of that kind. You could do either of two things. You might fit hefty batteries capable of long and faithful service, or you might provide an eliminator within the cabinet. And that is exactly what has been done in this year's transportable receiving sets. There are battery-operated and all-from-the-mains models. There is no cramping of components; real efficiency and first-rate quality are both obtainable. The portable set will always remain popular with those who do want wireless out of doors, but the transportable will, I think, be the home set of the future.

Valve Developments

Like most other wireless enthusiasts, I am particularly interested in valve developments. I had rather expected a reduction in prices this summer, but makers have, I think, acted wisely in maintaining prices and spending large sums of money upon research and development. Externally there is not a great deal of difference between the "toobs" of 1929 and those of 1928. But inside the bulbs many small, though vastly important, changes have been made. Our old friend the S.G. valve has been improved almost out of recognition. The early models were good enough in their way, but it was rather exasperating to find that, though the amplification factor was 150 or so, one could not actually get a mag. of more than about 30 out of them. The reason was that, though the screening grid had greatly reduced inter-electrode capacity, enough of this undesirable quality remained to provide feed-back effects if efficient components were used in both plate and grid circuits.

The Problem

Actually, you cannot completely eliminate plate-grid capacity by means of a screen unless you make your screen of solid metal with no holes in it. You would then have a no-capacity valve; but you would also have a no-current valve, since electrons could not pass from filament to plate. The problem of reducing plate-grid capacity to something so small that efficient tuned circuits could be used has been an exceedingly difficult one, but it has been successfully tackled. With the latest S.G. valves you can use good tuned transformers for your couplings and you can obtain a magnification quite double as great as was possible last year.

New Pentodes

This year's pentodes, too, are exceedingly interesting. I have always had a great affection for the pentode valve, but I must admit that I found the first models rather expensive to use. It is a bit of a job, you know, to fit a filament and three grids inside one plate and to get all of these things into a bulb of reasonably small size. The electrodes have to be pretty close together, and unless they are firmly mounted horrid things may happen. In the triode valve the only internal short that one ever came across was contact between grid and filament. (I say "came" because this kind of thing never seems to happen nowadays.) Just think of the pentode. The filament may touch the control grid, the control grid may touch the screen, the screen may touch the third grid, and the third grid may touch the plate. Shorts of this kind did happen with the early pentodes, and not a few batteries were blown up in the sacred cause of experiment. This year's pentodes are a sturdier family. Various methods of construction are used by different firms, all of which aim at supporting the various electrodes, so that any movement on their part is almost impossible—unless, of course, one attacks the valve with a hammer or drops it on to the floor to see whether it will bounce.

Safety First

When I was at Mr. Reyner's laboratory the other day I gathered that a little *contretemps* had occurred a few days previously. Apparently one of the assistants had been working on the electric lighting system in a corner of the charging shed which at the time was somewhat damp. Thinking that he would be able to manage the job without much trouble he did not switch off the mains. This would have been all right had his screwdriver not slipped into contact with a live lead!

On Your Wavelength! (continued)

As his other hand was firmly grasping the lead covering he got the whole 240 volts A.C. through his body and as often happens in such cases was unable to let go. He just managed to let out a yell which Mr. Reyner heard and promptly acted upon by switching off the juice. I commented on this fact because at the time, the Technical Editor was in his office busily engaged on an article and it seemed to me rather good staff work to have sized up the position so promptly. "Oh, but I didn't," he said. "I heard the yell without knowing in the least what it was, but I thought it best to switch off first and enquire afterwards." It certainly seems a sound enough rule to me. He told me afterwards that he was half afraid somebody had got across 1,000 volts, in which case the affair might not have had such a happy ending. Even the 240 volts produced a very unpleasant burn and shook the unfortunate lad up considerably.

It Won't Do!

Though I am not one of those who habitually grouse about the broadcast programmes, I like to have my little grumble every now and then. Recently I referred to the unjustifiable gap in the programme between 2 and 4 p.m. each afternoon, which still continues. Now I want to mention the arid waste that we so often find before us between 6 and 8 p.m. Those two hours seem to me to consist of nothing but scraps; and not very satisfactory scraps at that. It seems to me that the first news bulletin could be appreciably shortened without much harm, for a great deal of the stuff that comes through can be of little real interest to anyone.

Those Talks!

And too often we find topical talks of the kind which appeal to a very limited number of listeners. The idea of giving a scrap of music, then a news bulletin, then another scrap of music, then a topical talk, then another scrap of music, then another topical talk, and so on, is, I suppose, similar to that of imbedding the unpleasant powders of our nursery days in jam. Not one topical talk in twenty is generally worth listening to, because the supply of really good talkers is exceedingly small. To me, it seems wrong to arrange for a definite and rather large number of talks every day and then to look round for people who can give them. If I were doing the organising I would work in just the opposite way. I would have talks only when I had found people who had something worth talking about and thoroughly capable of saying what they had to say in an interesting manner. Nor would I make my talkers read from manuscripts. Ninety per cent. of present-day talks lose all their liveliness simply because they are being so obviously read from typescript.

Effects

Once upon a time, the man in charge of "effects" at Savoy Hill was a big noise himself—metorphorically, I mean. He frequently had his picture in the papers, wrote articles, directed rehearsals, and made his mark generally in the many programme committees and sub-committees which rise and fall in the B.B.C. building. I suppose he still makes his presence felt behind the microphone, for the good work continues and makes a considerable noise in the ether on almost every broadcast play night. Effects were to the fore in *Squirrel's Cage*, an interesting modern play heard for the second time from London recently. In this case, the noises of the trains and incidental music and voices of the impressionistic interludes were far better than the dialogue of the play proper. There was much unnatural chatter spoken in elocution-like tones which made the play unconvincing and unreal. I wonder when Savoy Hill and the talkie companies will realise that the "declamatory" type of speaking in plays is futile.

A Talkie Echo

But to return to the question of the Effects Man. He is blossoming out in fine form in the talkie studios. Capt. A. H. Whitman has evolved a splendid effects room in the Islington talking-film studios of the Gainsborough Company. This is, I believe, the only special talking film effects room in existence. Here, Capt. Whitman has elaborate rain and wind machines, train effects, lightning and thunder, the noises of which are picked up by the effects room microphone and mixed up with the voices of the actors which come from other microphones on the studio floors. This is B.B.C. practice with a vengeance! The noises are "on tap" for sending by line to any recorder in the studio, in the same way as the effects are mixed up with various studio sounds at Savoy Hill.

At Elstree

Major Wright, who followed Capt. Whitman as Director of Effects at the B.B.C., presides over the Special Sounds Section of the British International studio at Elstree. The thousands who crowded to the Capitol Theatre, London, recently to see the first British all-talking film, *Blackmail*, will agree that the sound effects were very well carried out. I suppose the new talkie companies will snap up each B.B.C. effects man as soon as he masters his job.

The Condenser "Mike"

The condenser microphone, used in several of the Savoy Hill studios does not seem to have made much progress after a promising start some months ago. The B.B.C. seems loath to give up the Marconi-Reisz carbon microphones that have served them so well for the last three or four years; the Reisz gave occasional "blasting" and background noise, but it was a fine maintenance job. Condenser microphones, however, are troublesome in giving crackles and hiss, and the first stage of amplification has to be attached to the microphone itself. The "bag of tricks" is so sensitive to bad contacts that soldered connections have to be used everywhere and even the valve legs have to be soldered into the holders. The actual microphone is sensitive to damp atmosphere and provides its quota of crackles, too.

Broadcasting House

I suppose that the condenser microphone will not really come into its own until the B.B.C. remove from Savoy Hill to Broadcasting House. Here, we shall expect to see the condenser microphone used exclusively, aided and abetted with wonderful echo rooms, dramatic control boards, mixers and other gadgets. There is no doubt that Broadcasting House will put the B.B.C. service in front of every other broadcasting service in the world by many lengths. In spite of what many critics say, I am convinced that the B.B.C. is already leading—except in the matter of short-wave broadcasting. This side of the B.B.C. service seems to have been developed just so far, and then been left standing.

A Correspondent on Television

As I have been away for a few days it has only just come to my notice that a correspondent has taken me to task for what he calls "song plugging" in reference to television. He asks "what is the man without a televisor going to do when television programmes are being broadcast?" Also, he pleads that an ordinary broadcast set is going to bring in a lot of unintelligible speech and music connected with the matter being televised. Now without in any way wishing to be provocative, I beg to differ with his views and am sure that if he examines the case fairly he will be one of the first to give way. Until television has been given a fair trial from one of the B.B.C. stations, the public are unable to judge if the suggested commercial practicability of the arrangement is true or not. Even if the resultant image received is small, does it not give added interest to what is being aurally broadcast? Furthermore, during the periods when the B.B.C. station is transmitting television anyone not desiring to see and hear has a choice of alternative programmes.

THERMION.

A REALLY SELECTIVE SET

The KNIFE-EDGE THREE

By J. H. REYNER B.Sc. A.M.I.E.E.

WITH THIS RECEIVER.—At a distance of 12 miles from 2LO it was possible to receive Stuttgart (360 metres) at good strength without interference from London which was working at the same time on 356 metres. A test made on the Regional transmitter at a distance of 15 miles showed that this could be tuned out and a weak station tuned in at a separation of 5 metres only.

SINCE the notes which accompanied the first description of this set (given last week) were written, several people have had an opportunity of trying the receiver and all have expressed themselves surprised at the selectivity, even without the wavetrap. This is due entirely to the new "Q" aerial coil, which is not only particularly selective, but is capable of giving good signal strength. The customary methods of obtaining dual-range tuning properties by short-circuiting the long-wave coil do not appear to give anything like as good results as far as can be ascertained from tests which have been made.

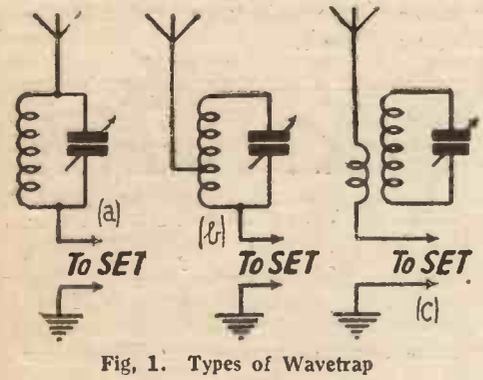


Fig. 1. Types of Wavetrap

No single coil, however, is likely to prove satisfactory for dealing with the regional scheme at anything less than twenty to thirty miles. Numerous experiments were carried out with exceedingly low-loss coils, but the effect is immediately nullified by the aerial resistance and the detector damping. Moreover, even if it were possible to overcome this defect, the sharpness of tuning is such as to cut off the top notes. More than one tuned circuit must be used, therefore, in order to obtain satisfactory selectivity, and at any very close distance these circuits must both be of a very high order of efficiency. Captain Eckersley in a paper on the Regional Scheme read before the Institution of Electrical Engineers, rather more than a year ago, pointed out that the ideal method of tuning was to use a band-pass filter, the simplest form of which is the wavetrap, as we know it to-day.

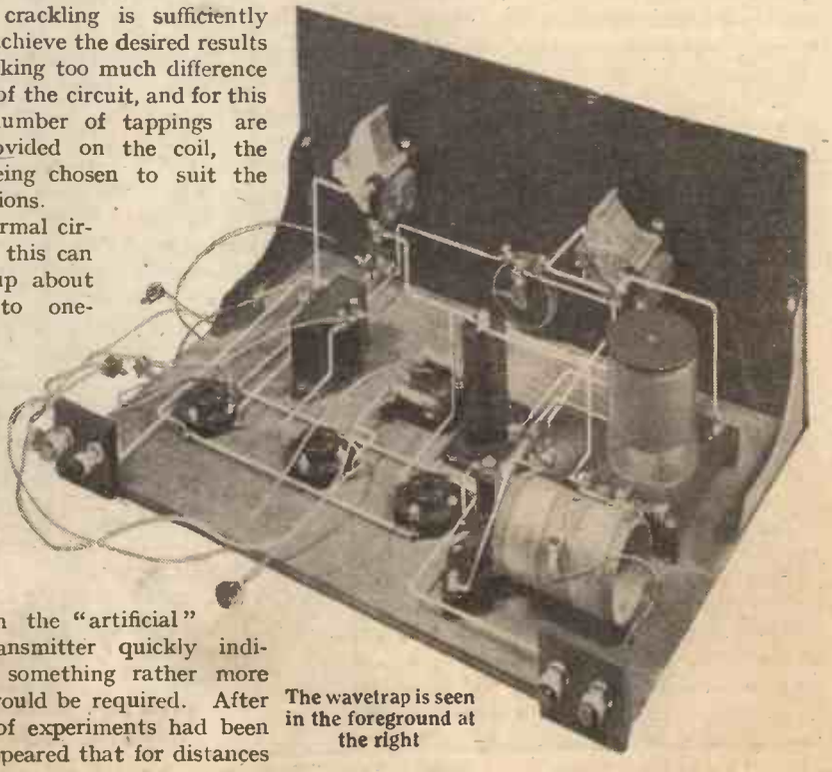
There are various forms of wavetrap which may be used, but the one which has given the most satisfactory results under all conditions is the series-rejector type. This term is to some extent a misnomer, for the device actually operates by absorbing energy at the signal frequency to which it is tuned. In its crudest form it consists of a tuned circuit directly in the aerial lead, and this has the effect of absorbing the energy and preventing it from being passed on to the tuning circuit proper.

Types of Wavetrap

The disadvantage of such an arrangement is that it also absorbs energy on either side of the actual tuning point, so making the receiver dead over a large band of wavelengths. To avoid this it is customary to connect the aerial across a portion of the wavetrap coil only as shown in Fig. 1*b* or to couple it to the coil as in Fig. 1*c*. Either of these two methods reduces the effect of the wavetrap at frequencies on either side of the actual tuning point, and, of course, to some extent reduces the effectiveness at the resonant point itself. It is a matter of compromise, therefore, to discover where the crackling is sufficiently marked to achieve the desired results without making too much difference to the rest of the circuit, and for this reason a number of tappings are usually provided on the coil, the best one being chosen to suit the local conditions.

Under normal circumstances this can be taken up about one-sixth to one-quarter of the full coil, this being found to give the maximum trapping necessary; but experiments which were conducted with the "artificial" regional transmitter quickly indicated that something rather more than this would be required. After a number of experiments had been made, it appeared that for distances of five to ten miles at least half the coil should be included in the aerial circuit. This, of necessity, means that the circuit is somewhat dead on each side of the actual tuning point; but the effect of the transmission is such that drastic measures are necessary. As was pointed out in last week's article, it is possible to get within about fifty metres of the actual transmission even when going on full power, and this should be sufficient for most purposes.

Another feature which is of particular importance, however, is the detector. If the regional station is tuned in at full strength on the detector, overloading is bound to occur. The signal applied to the grid of the valve may quite easily be of the order of 1 volt, and a grid detector will not handle more than about one-quarter of this value before serious distortion commences. Distortion will be noticed by the fact that the circuit tunes in two places, this being the property of the grid detector when it is being overloaded. The tuning points come quite close together, but they can quite definitely be noted



The wavetrap is seen in the foreground at the right

Signal Strength

The wavetrap reduces the strength of signal applied to the detector, so that for those living near to a regional transmitter the wavetrap not only enables them to receive other stations, but also to cut down the strength of the local signal to something which can be received with satisfactory quality on an ordinary type of set. The wavetrap, therefore, should be left in circuit the whole time.

The constructional details of the wavetrap are given in the diagram Fig. 2. As was pointed out last week, the wavetrap is astatic, the two halves being wound in opposite directions. The centre tap is brought out to one terminal, while a one-quarter tap taken in the centre of one of the sections is brought out to another terminal. In operation the receiver should be tuned in approximately to London, the aerial being connected to one of the two terminals in the centre of the wavetrap. Whether the quarter tap or the half tap is required depends entirely on the circumstances, and may be found best by trial. Having set the receiver approximately to London's wavelength, adjust the pre-set condenser controlling the wavetrap until the signal strength is reduced. It may not be found possible to cut the signal right out, but a position will readily be found at which the strength is considerably reduced and such that when the main tuning dial is rotated the transmission disappears reasonably rapidly on each side. A certain amount of adjustment must be made by trial in order to find the best setting, after which the circuit may be left adjusted, all the tuning operations being carried out on the main dial.

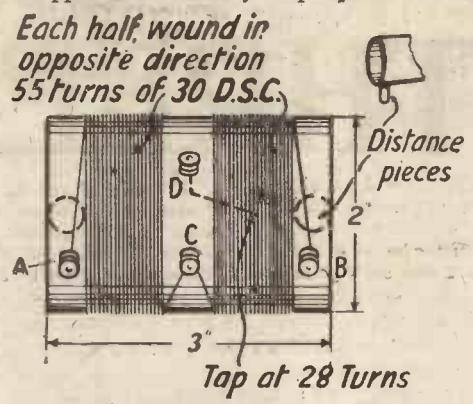


Fig. 2. Details of wavetrap for the "Knife-edge Three"

Readers not situated in the London area will, of course, have much greater selectivity, and the wavetrap may be used to give them very sharp tuning indeed. The method of operation is exactly the same, the wavetrap being used to cut out the particular local station causing the interference. It should be pointed out, however, that this wavetrap will not tune to more than about 450 metres, having been primarily designed for London.

Operation

Some brief notes on the operation of the detector were given last week, but it will be advisable to recapitulate these. The potentiometer situated in the centre of the panel controls the potential of the grid of the detector valve. As this is made more negative, so the reaction becomes smoother and the detector damping becomes less, making the receiver distinctly more selective. If the detector is made too negative, however, the quality begins to fall off and nasty distortion occurs, while the signal strength is impaired. It is a fairly simple matter to find the best position by trial and error, the correct setting varying with different valves and different voltages. In general, the setting lies between one-quarter and one-half the way round from the negative end.

MRS. FLEX OBJECTS TO THE WEATHER—

—BEING JUDGED FROM A WIRELESS POINT OF VIEW.

A CRITICAL SURVEY OF The EXHIBITS ~ AT THE SHOW ~

By "A. NODE BEND"

EACH year at Olympia I experience a very comfy feeling! Having passed the clicking turnstiles, the bebuttoned officials at the doorways, the small boys shouting "Katterlog-guide . . . katterlog-guide!" and the people crowding round the entrance, and not being quite sure at which stand to start first, I set off on my mission with a set purpose in mind.

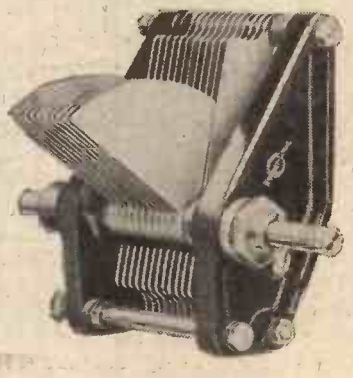
The purpose? Simply to see in tabloid form the whole of a year's progress in radio design. I think anybody should be able to "do" the exhibition in a day; that is, provided they have no "trade" axe to grind, or trade friends to meet at various stands or at various places for refreshment!

A Sy ematic Round

Ordinary folk, such as myself, should have no difficulty in seeing practically everything of interest in one comfortable tour of Olympia's hall and galleries. Personally, I find the best plan is to go through the first Show Number of AMATEUR WIRELESS, make a tick against every item of interest which I wish to see, and then to do a systematic stand-to-stand trip.

Once upon a time I was content just to push my way through the crowd and to look only at those stands bearing well-known names. But nowadays that method does not pay. There are something like 296 stands at Olympia this year, and without a pre-arranged scheme you'll find, when you return home and read through AMATEUR WIRELESS again, that you have missed quite half of the things you want to see.

There is no doubt but that radio is a fashionable trade. If you remember, last year saw the portable set coming into its own, and the rapid development of one-knob sets—rather American in style and obviously having more care expended in the exterior than in the interior in the endeavour to produce a handsome piece of furniture. The presence of one or two very "super" electric gramophones was, I thought, a straw showing which way the wind was blowing. Conversation with one or two manufacturers of complete sets might have led the despondent to think that the day of the home constructor was dead and that complete receivers and "kit" sets would for ever obviate the necessity for home assembly according to published designs.



Left to right: Celestion loud-speaker, Bowyer-Lowe condenser and Westinghouse rectifier

More Portables

Well, some of these straws blew rightly and some wrongly. This year you will find more than ever the number of portables, with most of the old problems run to earth, as I will explain later; one-knob receivers of the "handsome-piece-of-furniture" type are growing in number, but they are not by any means all the products of manufacturers.

This will be a bumper year for home construction, and ordinary folk who take sufficient interest in the technical side of radio not to wish to purchase complete receivers will find that they have at their command more than ever the number of components for assembly.

As you will find for yourself, the two salient points that must strike every visitor to the Radio Exhibition this year are, first, the home constructor is by no means as dead as the dodo, manufacturers realising that there is a far bigger market among people who take a pride in making their own sets than among those who are satisfied to buy a receiver "made to measure." Second, among the commercial receivers, the all-electric receiver, either combined with a gramophone turntable or at least with provision for the addition of an electric pick-up, is most popular.

Practically every stand this year is showing an electric gramophone. This is no craze. Mostly these *de luxe* receivers are expensive, and crazes are not set by instruments costing, in some cases, twice as much as a battery-operated receiver of former years.

But I mislead you if I say that all these electric gramophones are expensive—they are not. Speaking with only a few rough notes at hand, I can say that among the modest priced good-performance electric gramo-radio outfits figure Lissen, Bowyer-Lowe, Varley, Ormond, and B.T.H. Then,

A group of Tannoy mains units (Tulsemere Mfg. Co.)

again, there are several unique combinations of ordinary simple receivers and gramophone turntable. I am particularly impressed by Peto-Scott's simple and low-priced gramophone which incorporates a Philips two-valve A.C. receiver. Another outfit of the same description is that manufactured by W. & T. Lock, in which can be fitted any of the popular three-valve receivers, including, of course, some of those which have figured in AMATEUR WIRELESS.

Gramo-radio Construction

Neither in respect of gramo-radio is the home constructor forgotten. Olympia shows plenty of turntable assemblies and electric pick-ups, the latter, of course, being suitable for adding to practically any existing gramophone and the output being carried through the L.F. side of the wireless set to the loud-speaker.

Bowyer-Lowe's have an interesting pick-up and link-arm, which is not at all expensive, Lissen have just produced a most inexpensive new model pick-up, Burndept's have what is known as the needle armature pick-up (this reproducer having no actual moving armature), while yet other old friends are the G.E.C., B.T.H., and Celestion. And, while I think of it, among the electric turntables available the Igranic A.C. model turntable chassis and the universal type Osram (G.E.C.) turntable drive are particularly convincing.

Mains-driven Sets

Having finished with electric gramophones, the next most obvious development is the mains-driven receiver. I have said that practically every prominent manufacturer is exhibiting an electric gramophone of some kind or other, and the same seems to apply to ordinary mains-driven receivers.

Of course, it is a development which was bound to come. Batteries will undoubtedly always be needed; but those who are fortunate enough to have the public mains supply available are taking a very satisfactory and most economical course if they buy a mains-driven receiver or, alternatively, fit themselves out with a mains eliminator or trickle charger.

Lotus, I notice, are newcomers to the sphere of set manufacture, and they have some very convincing receivers, such as a three-valve S.G.P. all-mains transportable, a three-valve standard set of the same type, mains driven, and also a kit of parts for making up the all-mains S.G.P. Three. The G.E.C. have also made some big strides in the direction of mains-driven receivers, and the Osram range is now extended to include a number of very interesting all-electric sets. Particularly noticeable are the two- and three-valve models, both of which are designed to operate on A.C. mains of voltages from 200 to 260. Single-dial tuning is an up-to-date feature, and an intriguing little point is the fact that the tuning dials are illuminated; this addition certainly makes for convenience when tuning-in.

Above: Attractive M.P.A. loud-speaker. Left: New Celestion cabinet loud-speaker

Right: Osram Music Magnet in a W. & T. Lock cabinet. Below: T.C.C. fixed condenser

Many Varieties

Ekco, who in previous years have devoted their attention to mains units and trickle chargers, are now producing complete all-electric receivers, and the Ekco-Lectric range includes the P.2 and the S.G.P.3. These will merit the attention of all amateurs who do not wish to be bothered with having a separate unit for the mains supply.

Considering the technical snags which were experienced when pentodes first became popular, it is really rather remarkable that in such a short space of time it should have been possible to produce an all-electric set, A.C.-operated, with a pentode in the last stage. Yet many manufacturers are doing this. M.P.A. Wireless, Ltd., are showing an all-electric two, the pentode output of which is sufficient to operate a moving-coil loud-speaker from local and main B.B.C. stations, so I am told.

Burndept have a reputation for doing things thoroughly, and the Ethogram A.C. mains model should be very popular during the coming season. The Universal Screened Four, a new product of this company, should be most popular, while an A.C. screened seven, working on any wavelength from 200 to 2,000 metres and on an A.C. mains supply of 100-240 volts, 40-100 cycles, is an ambitious receiver which should fill the needs of those who want the very best out of radio.

So far as price is concerned, it is inevitable that the initial cost of a mains-driven receiver should appear high, but if you consider the cost of a battery-operated set or of an otherwise similar type, together with the cost of the necessary batteries and the replacements for, say, a period of five years, you will find that the all-electric set is an undoubted economy.

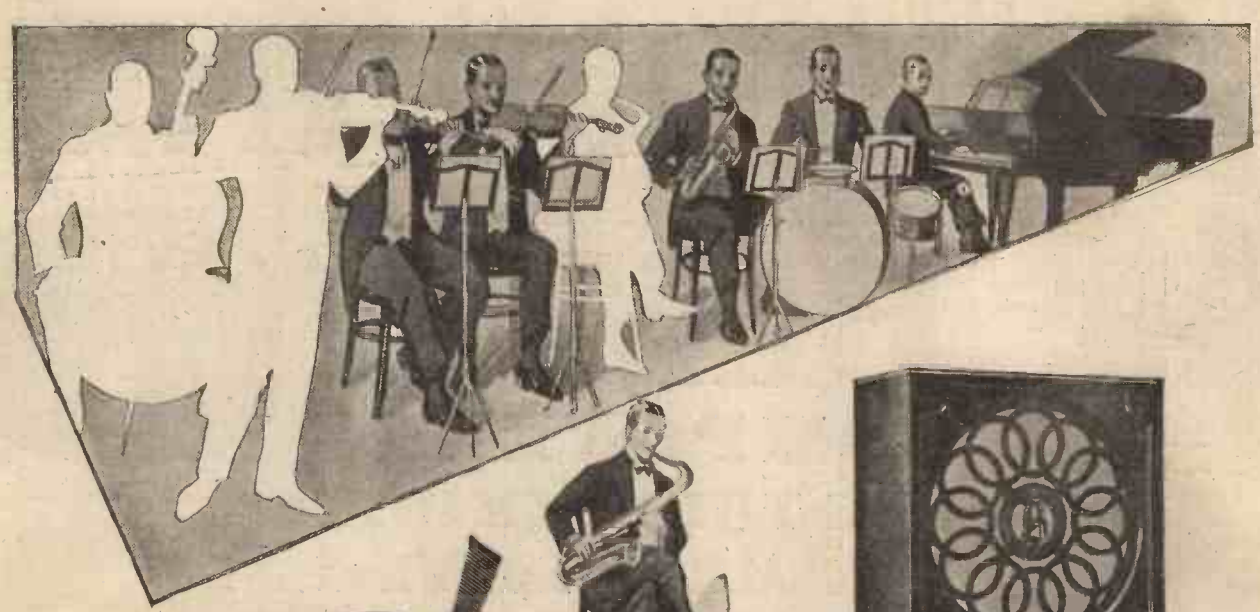
A.C. or D.C.?

One point which does strike a casual visitor at the exhibition is that manufacturers seem to have specialised far more in the production of A.C. sets rather than those operating from direct-current mains. This is all to the good, for undoubtedly in the course of time the mains supplies in this country will gradually change over to A.C., which is proving to be the more suitable system. But people want to buy mains-operated sets *now*. It is no good looking so far into the future that immediate markets are missed, and it is a pity that some makers are giving the advantage of mains drive only to those listeners who have an A.C. supply. I was particularly interested to note that the Bowyer-Lowe popular receivers, such as the Screened Four and Vox-Populi Three, are available for either A.C. or D.C. supply.

Mains Units

Mains units are becoming more than ever in demand, and there are complete eliminators and trickle chargers marketed by such firms as Marconi, Ekco, Regent Radio, the Tulsemere Manufacturing Co., and so on, while numerous components are available for those who want to make up their own mains units. The Climax range of Auto-Bats. mains components is

(*Continued on page* 415)



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BY THE WONDERFUL

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

"A CRITICAL SURVEY OF THE EXHIBITS AT THE SHOW"

(Continued from page 410)

A Show selection. Left to right: Varley Ni-core transformer, C.A.V. H.T. accumulator, G.E.C. amplifier, and C.A.V. H.T.3 accumulator

particularly interesting, and Westinghouse, of course, produce a wide range of all-metal rectifier units, which can be incorporated in complete sets or eliminator units. Varley are manufacturers of mains chokes and transformers with a most excellent reputation.

A Portable Year

Next summer should see more portable sets in the open than ever. In previous years portable sets have been rather scrappy in performance, and in the attempt to cut down weight, batteries were reduced below the sensible limit. Some early portables could never give the same performance as that delivered by even the cheapest portable gramophone. None of this is true to-day, for portable-set problems have been tackled from a new angle, and while H.T. consumption has been reduced, performance is better.

A prominent portable at the exhibition is that interesting little newcomer the Marconi "55" model, 18-gn. set. This has two aperiodic H.F. stages and two transformer-coupled L.F. stages; the result is that only one tuning control and a reaction knob have to be operated. Portable sets on show fall into two classes: first, the aperiodic H.F. type, such as the Marconi "55", second, the four-valver, having one screen-grid stage—sometimes with gang control, so that there is only one knob—and with transformer-coupled L.F. amplification in most cases.

Ormond's are producing a portable five-valver incorporating a four-pole unit loud-speaker. And, talking of loud-speakers, the fact is obvious that portable-set makers are realising how much purity is needed even in the reproduction from small portable receivers. In early sets the loud-speakers were sometimes fitted as a kind of afterthought, but the fact that, as I have said, Ormond's are fitting four-pole units, while other makers are fitting Celestion loud-speakers, shows that the question of the loud-speaker is being adequately dealt with. Marconi loud-speakers are, of course, fitted to all the sets of this *marque*.

The Rover Five is a Peto-Scott portable which has enjoyed considerable popularity and which promises well for the next season. A good point about the Rover is that it has provision for operating an additional loud-speaker and for adding a gramophone pick-up.

Kit Receivers

Now let us descend from the heights of electric gramophones, all-electric sets, and portables; the home constructor will find the exhibition to be a kind of radio paradise, for the components available will enable him easily to rival the best commercial complete receivers.

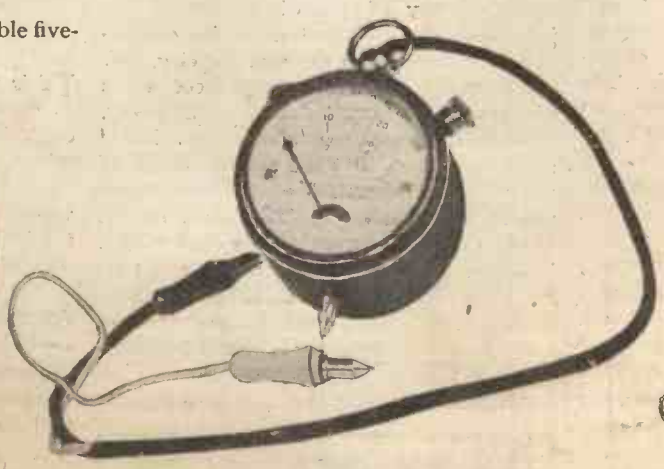
But first I must say that the kit sets available for those who do not want to go too deeply into the technicalities of construction seem to be much better jobs this year than formerly. The Osram Music Magnet and the new Cossor Melody Maker are two which come to my mind.

And mention of the name Cossor reminds me that this go-ahead concern has put down plans for production on a very large scale of a new range of valves. I should think the Cossor stand deserves to be crowded out with inquiries, for, owing to intensive laboratory developments during the past twelve months, Cossor's are able to claim for these new valves 28 per cent. greater emission and freedom from microphonic noises. A new range of Mazda valves is bound to be the centre of attraction among the exhibits of B.T.H., Ediswan, and Metro-Vick.

Loud-speaker Progress

With the exception of the humble crystal, every receiver nowadays necessitates a loud-speaker, and it is therefore not surprising to see that very many prominent manufacturers have something quite new to offer. More and more moving coils are to be seen, and it is probably true that what was once a fact is now only a rumour—the dictum that moving coils do not give good reproduction unless worked "all out" and at far too great a volume for the average room. Ferranti and Celestion are among the folk who are exhibiting new model moving-coil speakers, while the permanent-magnet type of speaker is one which is being specialised in by M.P.A.'s.

M.P.A. popular plaque loud-speaker



Wate's pocket combined volt and ammeter

Philips table-model loud-speaker

Reed movements are being improved, too, and in general the standard of reproduction should be considerably raised. For my part, I was interested in the new Osram plaque and cabinet loud-speakers, in the Climax Bijou models and, of course, in the new Brown Vee units and chassis.

I do not notice very much change in batteries; nor is any needed. People are

C.A.V. 2-volt Accumulator

beginning to realise at long last that if most economical use is to be made of dry H.T. batteries the triple-capacity type is the best to buy. Such prominent manufacturers as Siemens and Ever Ready are specialising in the really big batteries; also they have their eyes well focused on the needs of portable-set users, and some excellent long-life batteries are available which do not take up much space or turn the scale at too many pounds.

Then there are components which everybody needs—condensers, coils, valve holders, and so forth. It is very gratifying to note that firms such as Lotus, Formo, Burton, J.B., T.C.C., Tunewell, to mention only a few, are not content to remain stationary, even in these stock lines. For instance, variable condensers are better than ever—Lotus, Formo, J.B., and Cyldon in particular having good things to offer. Prices are coming down, too, which is not at all a fact to be disregarded. Firms are finding it possible, moreover, to produce really satisfactory components at lower prices even than last year, owing to new methods of production. Telsen transformers and numerous fixed condensers, grid leaks, and so on are all selling at most attractive prices.

Probably the average reader of AMATEUR WIRELESS is a home constructor—in a small way so far as gadgets are concerned, even if not in connection with complete sets. I have said that the National Radio Exhibition is a paradise for home constructors. If you don't believe me—well, go and see for yourself!

And all honour to the R.M.A., under whose auspices this most successful exhibition is being held.

HAVE YOU NOTICED

—the enormous number of plays broadcast by the German transmitters? It is to be surmised that there are as many grumblers in Germany as England.

—that the programmes from the stations in Soviet Russia are announced with "Comrades, you are now going to hear . . ."?

—that Copenhagen regularly gives a whole evening devoted solely to the broadcasting of dance music, from 7 p.m. to 1 a.m.? What about this occasionally from 5GB?

—how Radio-Toulouse has recently considerably enlarged its daily radio programmes, and now broadcasts without interruption for five hours daily?

THE CASE FOR THE PORTABLE

MANY readers will agree that a small attache-case may quite readily be converted to house a simple portable set with enclosed frame aerial.

In selecting a case for this purpose, however, care should be taken to see that no metal frames used in the fabric form a complete circuit round the case.

A single short-circuited loop of wire brought in proximity to a frame aerial, or any coil, for that matter, will be found to absorb energy from the circuit to a surprising degree, and, in fact, if coupled fairly closely to trap signals almost altogether.

M.B.

THE HALF-WAY HOUSE

Jottings From My Log

By JAY COOTE

TRAIN and steamer have combined to bring me to Wiesbaden (Germany), one of the smartest of European watering places. Last year at the same period my radio experiences were unfortunate, inasmuch as both electric trams and the thermal waters combined to make reception of distant and even nearer stations difficult. The news that the town had dismantled its tramway system and sold it lock stock and barrel to Kovno (Lithuania) led me to believe that conditions would be improved, but such is not the case. Wiesbaden lies in a hollow surrounded by high hills, and is badly masked to the north and north-east, thus making the reception of many stations, easily capturable in England, almost impossible. But the city is a half-way house to the Continent, and a short hour with a very modest four-valver showed me that Milan, Turin, Genoa, Rome, Vienna, Zagreb, Ljubljana, and most of the programmes broadcast by the Central European and South-eastern transmitters were brought appreciably closer.

What is the Cause?

The theory of the disturbance is an interesting one. The waters for which Wiesbaden is noted, flow through the city, and it is stated that several streams meet in this district. They bubble and gush out freely, and the temperature is a high one. Local scientists affirm that the actual mixing of these different chemicals are the cause of the rise in temperature and that at the same time electric currents are generated. Whether the theory is correct or not, I do not know, but it is an established fact that reception without an earth is clearer and less subject to interference. It would be interesting to learn from readers whether similar conditions obtain in the United Kingdom Matlock, Bath, Cheltenham and so on, or whether the English radio fan is luckier in such districts as Harrogate, Buxton, in his choice of residence than his Wiesbaden confrère.

PIEZO CRYSTALS

IT is well known that the operating frequency of a quartz crystal, as used for controlling the carrier-wave of a transmitter, depends upon the size to which the crystal is cut. Very approximately the wavelength in metres is equal to 100 times the length of the crystal measured in millimetres, or 2,500 times its length in inches.

For the longer wavelengths a somewhat different plan is adopted. For instance, two crystals of about 10 millimetres in length are cemented to opposite sides of a steel bar about 4 in. long. The system as a whole will then oscillate at a frequency corresponding to a wavelength of 10,000 metres.

M. B.

My Wireless Den

Weekly Tips—Constructional and Theoretical by W. JAMES

Straying Wires

I HAVE often met instances where instability has been produced by allowing the aerial wire to lie over the top of a receiver or underneath it. Many sets have only a plain sheet of metal for a shield, with the result that when the aerial wire lies near the anode coil, the coupling is sufficient to produce instability and poor results. The aerial wire should always pass from the aerial terminal away from the set, excepting when a metal container is used, when the same care is not necessary.

Hunting for Hum

Hum in a wireless receiver that is supplied with all its current from the mains may be due to many things, but I have found that not sufficient attention is given to the placing of the components in many instances. The position of an intervalve transformer, for example, is of great importance, because it is seldom that this component is provided with an effective shield.

It is true that transformers generally have a metal cover, but this is seldom to be regarded as an adequate shield against low-frequency interferences.

Then again, an earthing terminal is sometimes provided. Tests indicate that a hum may be increased in strength by earthing the case. It would seem desirable always to try the effect of connecting an earth wire to the case and then of disconnecting it, in order that the least hum may be obtained.

A Push-pull Advantage

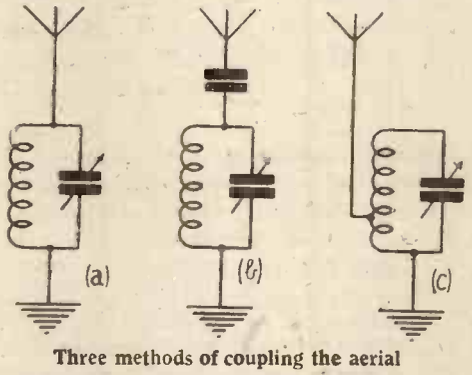
Do you know one of the principle advantages of the push-pull amplifier? It is that the minimum of smoothing may be used in the high-tension supply to the push-pull stage.

This may seem a matter of small importance when the high-tension is from dry batteries, but it is really not so. Thus, less anode-circuit filtering may be used when the output stage is arranged in push-pull. The greatest benefit is naturally derived when a mains unit is fitted, as the supply to the last stage need not be taken from the output side of the filter of the unit.

That Aerial Connection

It is, I find, not generally realised that the wavelength range of an aerial circuit is dependent upon not only the type of aerial, but also upon how it is connected. Thus sometimes the aerial is joined to the top of the aerial coil (see diagrams).

This is the worst possible connection from the point of view of wavelength range, for the reason that, whilst the maximum wavelength is only raised a little, the minimum is increased by a large amount.



Three methods of coupling the aerial

For example, a coil tuned with a .0005-microfarad condenser may cover a wavelength range of from 180 to nearly 600 metres when it is not connected to an aerial, and from only 280 to 600 metres when an aerial is joined to the circuit.

The effect of an aerial in restricting the wavelength range of a circuit is reduced by joining the aerial to a point nearer the earth end of the coil. A coil having, say, 50 turns may be tapped at the tenth, twentieth, and thirtieth turns. The wavelength range will then be the maximum when the aerial is joined to the tenth turn and the minimum when it is connected to the thirtieth.

It would, of course, be still less were the aerial taken directly to the fiftieth turn. Sometimes a small condenser is included in the aerial circuit for the purpose of allowing a circuit to be tuned to a shorter wavelength. This is not good practice, however, as the signal strength suffers. These points are illustrated in the accompanying figure, where arrangement (*b*) is better than (*a*), whilst (*c*) is the best.

Dust and Noise

Crackling noises from a loud-speaker may be due to many things, amongst which I may mention atmospherics, poor connections, faulty dry batteries, and faulty loud-speaker wires.

Dust is, however, the cause of much noise, particularly when it collects on the vanes of tuning condensers. It is not easily removed. Some use a feather or pipe cleaner and others blow air between the vanes.

Whichever method be adopted a certain amount of care is necessary, especially when the vanes are thin and close together. The inexperienced amateur is warned not to take down a condenser, as he may be quite unable to reassemble it in a satisfactory manner.

Rectifier Output Measurements

I use metal rectifiers of the dry type almost every day, and have therefore become quite used to them. If they are not grossly overloaded they work without trouble, but there is just one point that should be noted.

If measurements are to be made, time must be allowed for the rectifier to reach its normal working temperature, or it may appear that the full output is not being obtained.

"A.W." TESTS OF APPARATUS

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

Voltron R.C. Unit

A NEW Voltron component of interest is the R.C. unit, which has just been marketed. This is attractively housed in a small cylindrical case measuring 1½ in. diameter by 1¾ in. high. A wire-wound anode resistance is provided having a value, as measured in our laboratories, of 90,000 ohms. A mica coupling condenser of .01 capacity transfers the energy to the grid, and a grid leak of the moulded type completes the assembly. The value of this grid leak was 600,000 ohms, which is satisfactory in relation to the anode resistance and coupling condenser.

The whole of the components, of course, are housed inside the moulded case and are brought out to four terminals on the top. The assembly is neat and compact and can be recommended to readers. The makers are Voltron Valve Works, Queensway, Ponders End.

Voltron R.C. Unit

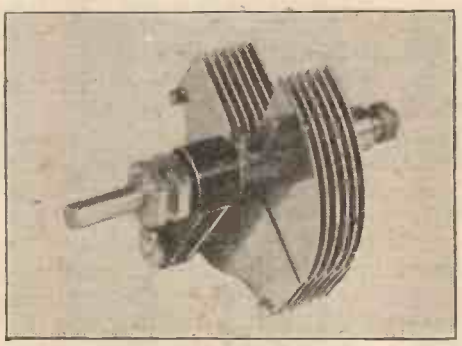
Formo Midget Condenser

SMALL-SIZE condensers are very popular to-day, particularly for such purposes as reaction control, reduction of aerial capacity, and the like. The Formo Company are well known for their condensers, and in providing their latest model, the midget condenser, they have obviously expended no little time and thought.

In the first place, the condenser is a double-bearing one. This is unusual in small condensers and is, in our opinion, a most desirable feature. The particular sample which we examined was very rigid and pleasant to handle.

The general construction will be clear from the photograph herewith. There are two ebonite pillars, the bearings being housed at one end, while at the other end is the fixing for the fixed plates, the whole construction being very neat and simple. In addition, a positive stop is provided, so that one has a definite indication as to the position of the condenser. Single-hole fixing is provided, while the new Formo internal pigtail is incorporated

The component is rated at .0002, and on our test was found to have a maximum capacity of .000185 microfarad, with a minimum capacity of 7.5 micro-microfarad. This is satisfactory, and the whole component indeed, positively bristles with good



Formo Midget Condenser

points. We think this should make a distinct appeal to readers. The makers are the Formo Co., Crown Works, 22 Cricklewood Lane, N.W.2.

Obeta H.T. Battery

THE Obeta H.T. battery, made by Messrs. Hook & Willis, 29 Ely Place, E.C.1, is of conventional appearance, although somewhat large, the actual dimensions being 9¼ in. by 5¼ in. by 3¾ in. high. The battery is provided with a cardboard cover in which holes appear, the necessary wander plugs being inserted through the appropriate holes. This is a form of safety device which is becoming popular, the object being to prevent accidental short-circuiting of the batteries if a metallic object, such as a pair of pliers, is placed on top.

The battery was placed on test in accordance with our standard method. It was discharged through a constant resistance, the rate of discharge being adjusted to be 7 milliamps initially. The discharge was continued until the voltage of the battery had fallen to one-half of the initial value, which was 100 volts, the battery being rated at 99 volts. On this discharge, the voltage fell away somewhat rapidly at first, and after fifty hours' discharge was only 70 volts. It continued, however, to give a very long discharge from this point down to the half voltage point, which did not occur until after 310 hours. This corresponds to an average discharge of just over 1,600 milliampere hours, which is quite a good performance. The size of the battery is little more than a customary standard-capacity type, while the milliampere-hour capacity is 60 per cent. above standard. The somewhat rapid initial fall of voltage is a point to be remembered when using these batteries, but otherwise they can be considered as eminently satisfactory.

Lissen D.C. H.T. Unit

THE Lissen H.T. unit which we have received for test is a worthy addition to the ranks of Lissen products. It is intended for use on D.C. supply mains, and consists of a cylindrical moulding having five sockets mounted on the top. One of these is connected to earth, and the other points are taken to tappings for different voltage values. The mains supply is led into the instrument by the use of a heavy rubber-insulated cable terminating in an adaptor for an electric light socket. The whole is attractively finished in a brown moulding and makes a very neat unit.

There are three H.T. positive tappings,

Lissen D.C. H.T. Unit

the full voltage and two subsidiary voltages. One of the subsidiary tappings is obtained through a series-resistance feed and is presumably intended for the detector, while the other tap (H.T.1) is provided with a potentiometer adjustment presumably for supplying the voltage to the screen-grid on modern H.F. sets. Both tappings are fixed and are, of course, suitably condensered.

The whole instrument is very nicely finished and should prove an attractive line. Lissen, Ltd.'s address, of course, is Worple Road, Isleworth, Middlesex.

Varley Power Transformers.—In AMATEUR WIRELESS, No. 379, page 284, a Varley power transformer is illustrated, but is named as a Westinghouse component. Actually this transformer is made for the Westinghouse rectifying units by Varley (Oliver Pell Control, Ltd.), 103 Kingsway, London, W.C.2.

Epoch's New Address.—Readers should note that the new City address of the Epoch Radio Manufacturing Co., Ltd., is 3 Farringdon Avenue, London, E.C.4.

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

LO and behold, the Sunday Service started at seven o'clock. True, it lasted an hour and a quarter, and was followed by sacred music and the usual routine. But if starting the service an hour earlier is the thin edge of the wedge—well, we'll put up with the sacred music for a while.

◆ ◆ ◆

Since I first wrote about these Sunday Services I have received many letters.

Here is one of the letters which more or less echoes the general complaint :—

"What jolly Sundays we are still getting! One hates to keep on the same subject, but I think the only way to get any notice taken by the powers that be is to rub things well in. Just look at the following programme broadcast on a recent Sunday :

5.30. Bible Reading.
5.45. Church Cantatas.
8.0. Service.
8.45. Charity Appeal.
8.50. News.
9.5. Most Mournful Chamber Music.
10.30. Epilogue.
10.40. Silent Fellowship.

"And so to bed.

"If the B.B.C. think these programmes will make us religious they are totally wrong. You will never make a man devout by *inflicting* religion upon him. Neither will you make him appreciate 'good' music by selecting the dreariest you can find and ladling it out for over an hour at a time."

◆ ◆ ◆

As I say, this is merely supporting the campaign I long ago instituted. Yet I cannot agree that all the music put over is the "dreariest" on Sunday. Much of it is first-rate stuff. Nor is "good" music necessarily dreary, except for those with no musical taste at all!

◆ ◆ ◆

Is it in the best of taste to include in the same programme—and next to each other—jazz songs and negro spirituals?

◆ ◆ ◆

There seems to be two views about the *Squirrel's Cage*, which was recently revived. Personally, it appeals. It is sheer entertainment all the way through, and in writing it for the microphone Tyrone Guthrie managed to make up in effects for the lack of stage advantages. The production was excellent.

◆ ◆ ◆

I beg your pardon, but I had never heard of Lawrence Kellie until I heard his songs being rendered by Muriel Lawrence Kellie. But she sang so well, with purity and ease, that I am sorry not to have heard her before, while the song "Now Will I Sing to God" at once puts Lawrence as a composer on a par with Muriel as a vocalist.

◆ ◆ ◆

The Birmingham Studio Orchestra, conducted by Frank Cantell, put over an acceptable contrast to the programme from 2LO by giving us songs and selections from the musical comedies. *A Country Girl*, *The Dollar Princess*, and others compare more than favourably with some of the stuff that is imported from Heaven knows where these days.

◆ ◆ ◆

There was a fellow who had the temerity to complain about the Promenade Concerts. So on the night when the "All Black Vaudeville" was being given from 2LO and a Promenade Concert from 5GB I switched on to London. There was a lady singing slop and slush—and went on singing it. So what did we do? We went over to the Proms. Many thanks, Sir Henry!

Albert Whelan and the gang who gave us an Empire vaudeville certainly put it over some of the English vaudeville hours. Albert has always been a London favourite, and his song about the Bear and the Tree is inimitable. As Jack Payne, he was extremely amusing.

◆ ◆ ◆

As a boy—ten, twenty, thirty, forty, fifty years ago—I always imagined that Wagner was beyond criticism. And I hardly ever missed a Monday at Queen's Hall. In Berlin recently the chief engineer of the Broadcasting Company, Dr. Reisser, who is an accomplished musician, told me that *Tannhauser* was not regarded by Wagner's compatriots as good Wagnerian music. But the other evening when it came over the ether it sounded just as alluring to me as it was in the long ago. I bet it did to you, too.

◆ ◆ ◆

Some of the gramophone records come over very well. There was somebody singing the other evening—and singing well—folk songs; and when I turned up the programme to see who it was—it was a gramophone record. I suppose that is why they have so many gramophone transmissions abroad.

An Impression of Billy Carlton and Renee Rudarni

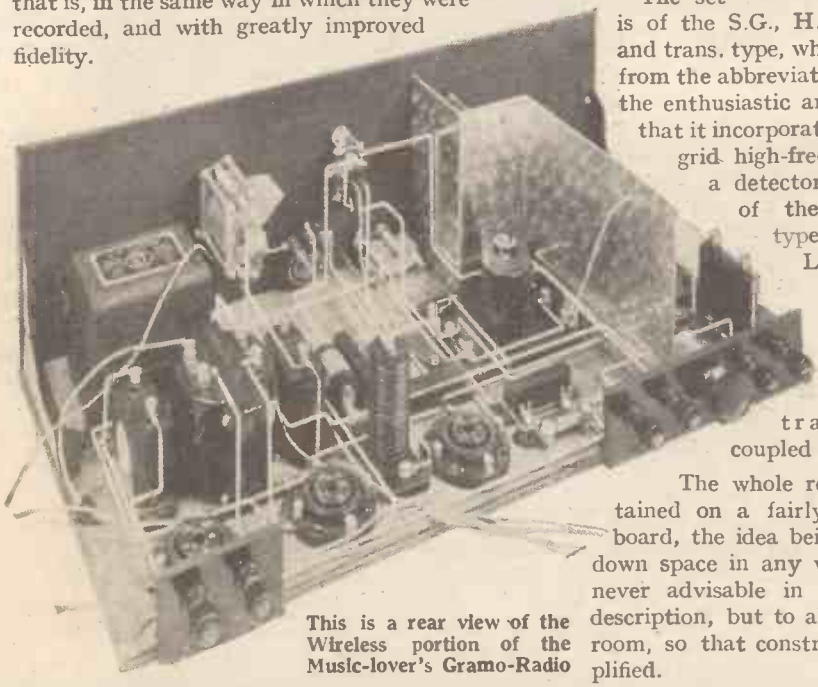
Lissenden's idea of Ewart Scott

The MUSIC-GRAMO

This receiver combines the advantages of an electric gramophone with the pleasure to be obtained from the ordinary radio set. A good-quality

GRAMO-RADIO has come to stay. No home is really complete nowadays without an ambitious type of combined receiver and electric gramophone. Even the normal gramophone is being superseded because it is realised that for quite a modest outlay, greatly increased fidelity of reproduction can be obtained from records, with consequent greater increase in enjoyment.

A simple switching arrangement in the receiver described below allows the set to be used either for radio reproduction in the ordinary way, or the electric pick-up may be brought into use, whereupon gramophone records are reproduced electrically—that is, in the same way in which they were recorded, and with greatly improved fidelity.



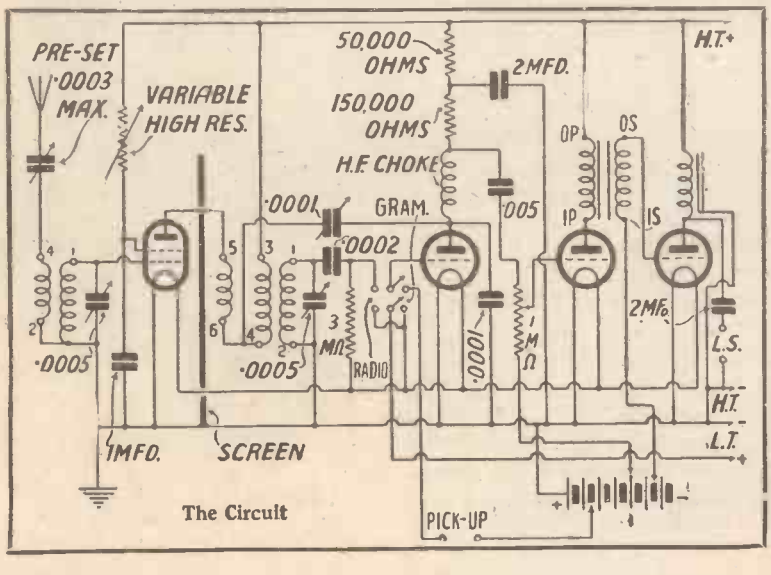
This is a rear view of the Wireless portion of the Music-lover's Gramo-Radio

This receiver has been designed to be included in the one cabinet with a gramophone turntable and loud-speaker as described, but it is on its own a very good four-valver and there may be some listeners who would prefer to make the set up as a separate unit, perhaps at a later date adding the gramophone section. So, for general convenience, it is intended to describe the receiver section first, and in the following issues to give details of the gramophone and loudspeaker sections.

The set is of the S.G., H.F., det., R.C. and trans. type, which translated from the abbreviated language of the enthusiastic amateur means that it incorporates a screened-grid high-frequency stage, a detector (in this case of the leaky grid type) an R.C., L.F. stage, with an anode filter system to prevent motor-boating, and final transformer-coupled stage.

The whole receiver is contained on a fairly large baseboard, the idea being not to cut down space in any way, which is never advisable in a set of this description, but to allow plenty of room, so that construction is simplified.

Indeed, those who have the opportunity of seeing this receiver, complete with the gramophone section, at the "A.W." stands Nos. 19 and 20, at the National Radio Exhibition will envy the possessor of such a satisfactory set and of such a handsome piece of furniture. Yet the whole gramo-radio outfit is strikingly simple to construct and, as will be gathered from the constructional description to be given of the receiver section, first, anybody capable of manipulating a few ordinary wood-working tools, and of bending wire and soldering it in place, can make either the receiver section, the gramophone section or both, without any difficulty whatsoever.



The Circuit

For the benefit of those who intend making up the receiver section alone, or who at least intend deriving the normal amount of pleasure from the radio side, as well as working the gramophone electrically, a critical analysis of the circuit will be given, so that the constructor will not have to work in the dark.

Regarding the performance of the set first, it must be quite clearly understood at first, of course, that the receiver is certainly of the "super" variety and having four valves and a most efficient screened-grid high-frequency stage, it is capable of "pulling in" foreign and very distant stations with a remarkable degree of satisfaction.

As the low-frequency stage is designed to handle a large output without overloading, immense amplification of weak

The completed instr makes a handsome pi furniture. It will be o at the "A.W." Stands 19 and 20, at the Exhibition.

LOVER'S RADIO

four-valve receiver is combined in a cabinet together with a gramophone turntable, electric pick-up and loud-speaker. Batteries, of course, also are self-contained

signals and ample volume from the more neighbouring stations are possible.

Although the receiver has not been made "down" to a price, it is a welcome fact that the overall cost is nevertheless reasonable. The total cost of the receiver and gramophone is only about half that of the best commercial instruments on the market with which this "Music Lover's Gramo-Radio Four" is in direct comparison and about two-thirds of the cost of cheaper and far inferior instruments.

ument
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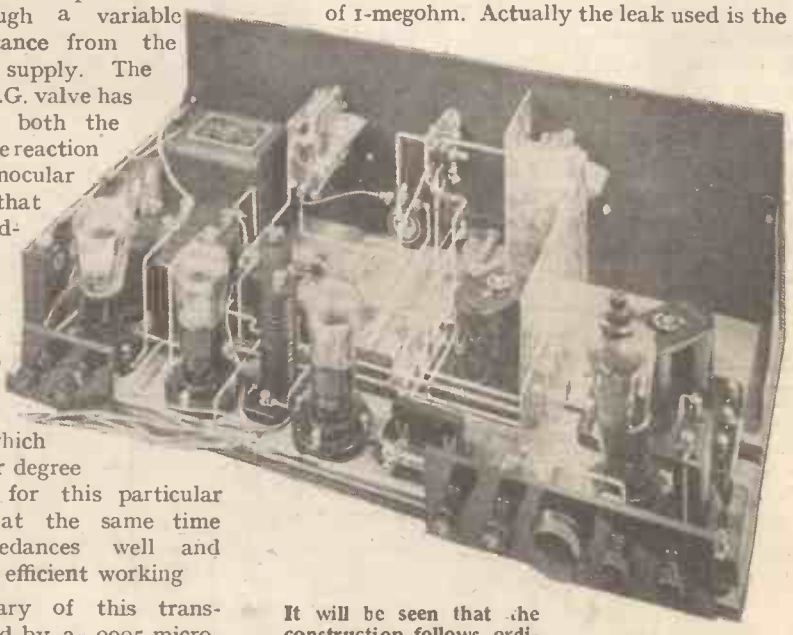
, Nos.
Radio

Examination of the circuit diagram shows that the tuning arrangements are a little on the complicated side, although the fact that this is really not so is proved by examination of the photographs and the components layout diagram. Most of the "complications" are in the coils themselves and the terminal connections are really very simple.

Dual-range binocular coils are used for both the aerial and H.F. circuits. There is no point which deserves special mention in the aerial circuit, except perhaps that the use of an aperiodic aerial coil, coupled to the tuned grid coil results in very good selectivity. Indeed the overall selectivity of this receiver is far greater than that normally to be obtained from a receiver having only one S.G. stage.

The S.G. valve has its screened-grid potential derived through a variable "drop" resistance from the common H.T. supply. The anode of the S.G. valve has in its circuit both the primary *and* the reaction coils of the binocular transformers (that is the two windings having the terminal ends, 3 and 4 — primary — and 5 and 6 reaction). This is a novel arrangement which results in a fair degree of selectivity for this particular coupling and at the same time matches impedances well and results in very efficient working



It will be seen that the construction follows ordinary practice

The secondary of this transformer is tuned by a .0005-microfarad variable condenser and the coupling condenser to the grid of the detector valve has a value of .0002-microfarad.

Placed between this coupling condenser and the grid is the switching arrangement for "radio" or "gramophone" —that is, a switch which puts the pick-up in or out of circuit.

If the receiver is being made up by an amateur who has not in mind the possibility of using the gramophone section, then he might be tempted to omit this switch. This cannot easily be done because the switch not only changes from "radio" to "gramophone" but also cuts off the L.T. Considerable alteration would have to be made in the wiring in order to substitute a simple on-off filament switch. Also, even for test purposes it is always an advantage to be able to place a pick-up in the detector grid circuit when required.

The first L.F. stage is, of course, a resistance-coupled one and in series with the anode resistance is a stabilising resistance of an anti-motor-boating unit. A .005-microfarad coupling condenser is used in the R.C. unit and the grid leak has a value of 1-megohm. Actually the leak used is the winding of a 1-megohm volume control. It will be noted that the potentiometer

COMPONENTS FOR THE RECEIVER

Ebonite panel, 21 in. by 7 in., and two strips, one 7 in. by 2 in. and one 3 in. by 2 in. (Becol, Raymond)

Two .0005-mfd. variable condensers (Cyldon, "Juni-log," Lotus, Lissen, Ormond).

.0001-mfd. reaction condenser (Peto-Scott, Bulgin, Polar, Dubilier, Lissen).

1-megohm volume control (Igranic, "Megostat," Gambrell).

Two slow-motion dials (Bowyer-Lowe, Lissen, Brownie, Lotus, Burndept).

Panel brackets (Ready-Radio, Bulgin, Raymond).

Double-pole double-throw switch (Utility, Lotus, Lissen).

Four valve holders (W.B., Lotus, Wearite, Benjamin, Igranic).

Dual-wave aerial coil (Lewcos, D.B.A.).

Dual-wave screened-grid transformer (Lewcos, D.B.G.).

Ganging switch for coils (Lewcos).

Screen (Parex, Ready Radio).

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

.0001-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish).

.005-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish).

1-mfd. fixed condenser (Lissen, Dubilier, T.C.C.).

Two 2-mfd. fixed condensers (Lissen, Dubilier, T.C.C.).

Pre-set aerial condenser (Formodenser type J, Igranic).

Grid leak holder (Lissen, Ediswan, Dubilier).

3-megohm grid leak (Dubilier, Lissen, Ediswan, Graham-Farish).

H.F. choke (Lewcos, Lissen, Tunewell, Ready-Radio).

150,000-ohm anode resistance with holder (Ready-Radio, Ferranti, Lissen).

50,000-ohm anode resistance with holder (Ready-Radio, Lissen, Ferranti).

L.F. transformer, ratio 4 to 1 (Marconiphone "Ideal," Ferranti, Lissen, Varley, Igranic).

L.F. choke (R.I., Ferranti, Igranic, Varley).

Variable resistance 250-ohms to 4-megohms (Regenstat, Clarostat, Volustat)

Six terminals marked, Aerial, Earth, Pick-up (2), L.S. (2), (Belling-Lee, Eastick).

Baseboard, 21 in. by 10 in. (Clarion, Raymond).

Seven yards of thin flex (Lewcoflex).

Six wander plugs, marked, H.T.—, H.T.+, G.B.+, G.B.—1, G.B.—2, G.B.—3 (Belling-Lee, Eastick).

Spade terminals (Clix).

Connecting wire (Glazite).

"THE MUSIC-LOVER'S GRAMO-RADIO" (Continued from preceding page)

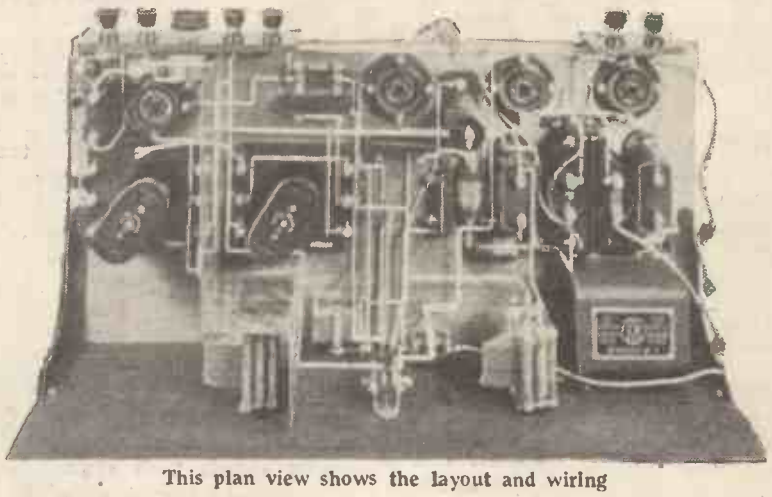
winding is always placed between the grid end of the coupling condenser and the bias battery tapping. The grid is connected to the slider of the volume control and in this way the output strength is controlled without any tonal change. As you probably know, if a volume control is wrongly connected, it is possible still to obtain a satisfactory control of strength, but the tone varies as the knob is moved. This is not the case in this receiver.

A choke output circuit is included in the last stage, and the form of output circuit employed is that which enables one lead of the loud-speaker to be at earth potential. Particular merit attaches to this arrangement if the loud-speaker is used at any distance from the receiver.

That completes a brief review of the circuit and attention may now be turned towards the constructional side. The list on page 421 shows the components which will be needed in order to make up this "Music Lover's Gramo-Radio Four."

The photographs clearly show that construction is quite straight-forward. Although the complete gramo-radio outfit is a massive piece of furniture, the receiver itself is made up on conventional lines and slips out of the cabinet when required. Alternatively, the receiver section may be housed in an ordinary cabinet, capable of accommodating a panel with dimensions 21 in. by 7 in.

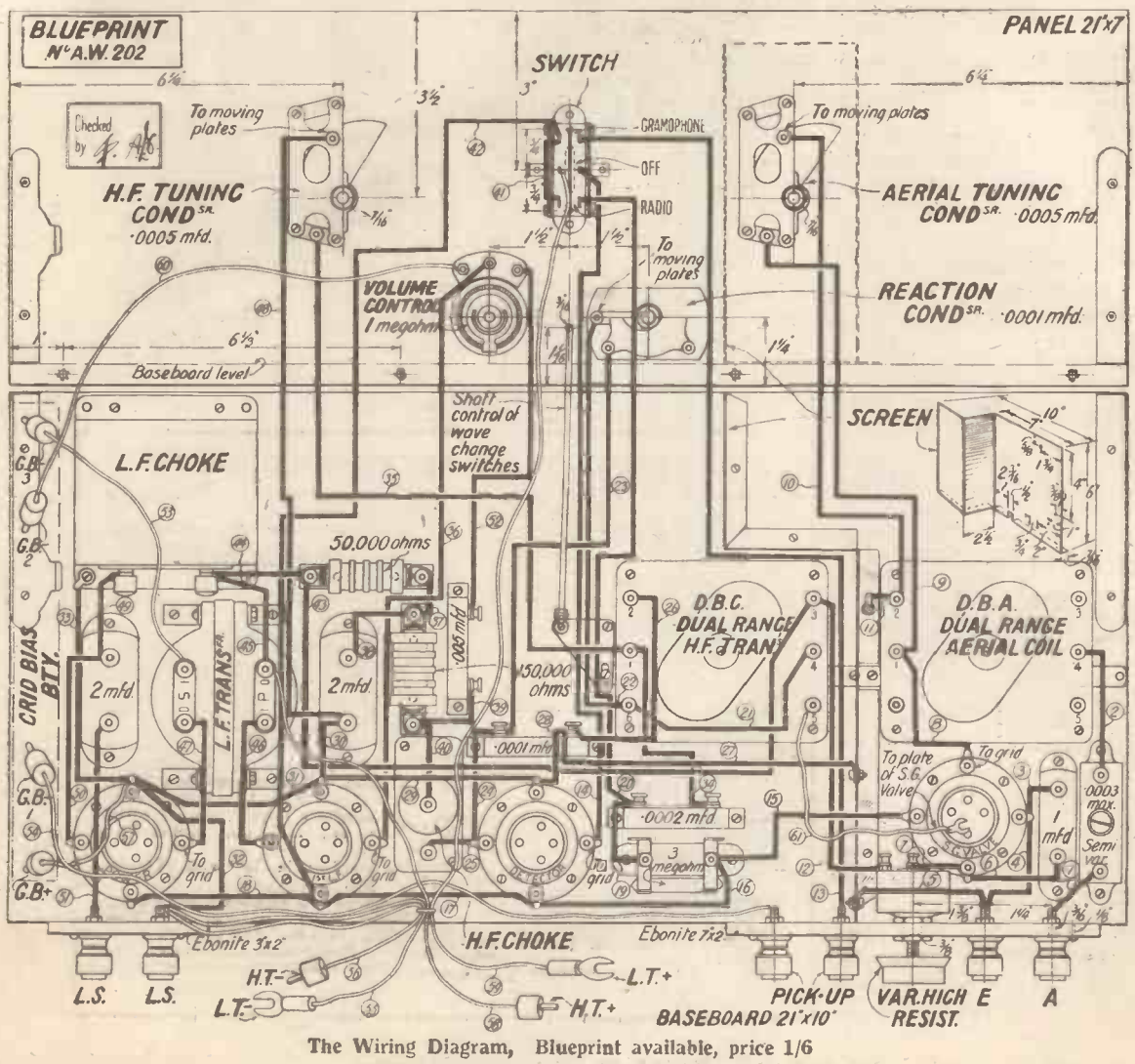
A blueprint has been prepared for this receiver, and can be obtained price 1s. 6d., post free, from Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. Its first use will be found as a drilling guide to the panel and as a template for the positioning of the components on the baseboard. The panel can most conveniently be drilled by placing the blueprint over the reverse side of it, attaching it at the corners with four spots of adhesive, punching the centres in order to give the drill a good start and then drilling the necessary holes quite cleanly. All the components may be mounted on the panel, and the panel mounted when this has been done. It is not necessary to leave the mounting of any panel components to a later stage.



This plan view shows the layout and wiring

It should be noted by those who intend making up the complete electric gramophone that the handsome specially-designed cabinet is made by Messrs. Clarion Radio Furniture 21 Mansfield Street, E.2.

In next week's issue, the layout will be described in detail and final constructional hints will be given in connection with the receiver section.



The Wiring Diagram, Blueprint available, price 1/6

Blueprints

For the complete Gramo-Radio instrument three blueprints are being prepared:—Blueprint for four-valve set (A.W. 202a) 1/6. Blueprint for linen-diaphragm loud-speaker (A.W. 202b) 1/-. Blueprint for motor board (A.W. 202c) 9d. Total 3/3.

Provided all three are ordered at one time they will be supplied at an inclusive price of 2/6.

LOOKING BACK AT THE

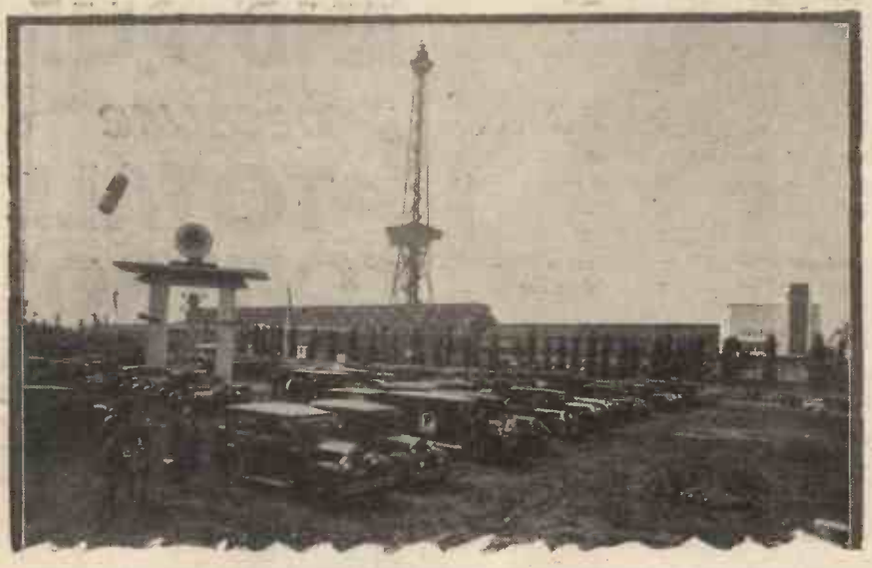
GERMAN WIRELESS EXHIBITION

BY DR. ALFRED GRADENWITZ

A preliminary survey of the sixth All-German Wireless Exhibition was given in AMATEUR WIRELESS two weeks ago, and now that it is concluded some further comments—this time by our German Correspondent—will be of interest

THE Berlin Radio Exhibition was a marked advance over its predecessor, both in size and the variety and high standard of its exhibits.

The first thing that struck the visitor was the tasteful and gorgeous make-up of the exhibition. Undoubtedly the great sensation of the show was television. The German Post Office had charge of this section and showed the systems at present in use in Germany. Television in Germany may be said to have been definitely adopted as a valuable adjunct to ordinary acoustic broadcasting.



A view of the Berlin exhibition buildings with the broadcasting tower in the background

Receiving Sets

In Germany now there is a much larger demand for long-distance reception than there used to be in former years. Though there is thus a large section of the public prepared to go to the expense of more powerful sets, economic conditions necessarily limit the financial possibilities of the majority. This state of affairs has resulted in an endeavour to improve the efficiency of sets comprising a moderate number of valves.

Among the means adopted in this connection should primarily be mentioned the fairly general use of screen-grid valves, resulting in particularly large amplification even in the high-frequency stage. Neutrodyne arrangements are still prevalent in connection with high-class receivers, though some firms are marketing superhets instead.

Among the numerous sets of this kind there are some deserving special mention, such as the "Telefunken 40," of which an enormous number are being constructed. One of its four valves is a somewhat novel shielded-grid high-frequency valve, the glass bulb of which has an outer coating of metal, the metal coating being connected to the cathode. This arrangement results in a very low internal capacity.

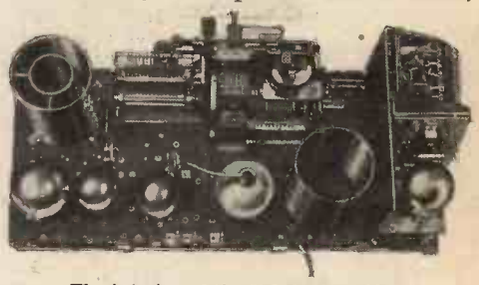
Other special sets are the Siemens and Halske A.G.'s shielded-grid-valve neutrodyne and the Geador of Messrs. A.E.G., which has two shielded-grid valves and one-knob control. C. Lorenz A.G. have brought out a four-valve receiver with two shielded-grid valves, one in one of the high-frequency stages and one in the low-frequency stage. The two high-frequency circuits of this set are accurately balanced so as to secure a common tuning. A feature of this receiver, likewise designed for single-knob control, is that the graduation of the tuning scale is entirely independent of the kind and length of aerial.

A general view of one of the Exhibition Halls

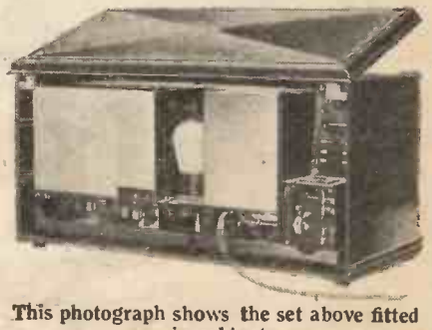
Loud-speakers

The quality of loud-speaker reproduction has improved since last year's exhibition, the majority being now quite good in tone, as well as in construction. Moving-coil speakers dominate in the case of larger outputs. While some electro-magnetic speakers could be had for £1 10s., prices of electro-dynamic speakers were in most cases between £5 and £7 10s.; and the larger cabinet instruments, of course, involved an outlay of about £25.

In the way of components and batteries, there was much of interest to be seen. Measuring instruments were exhibited by a number of firms, and one known as Tavo, which was brought out by the Guggenheimer firm, of Nuremberg, is a universal pocket instrument combining



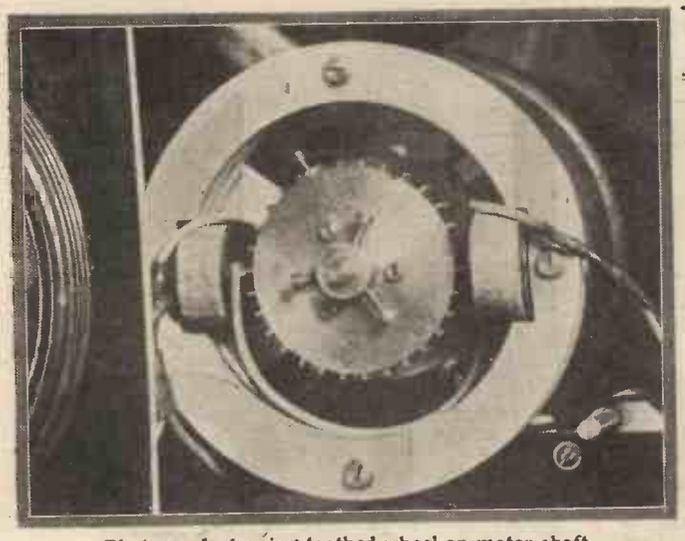
The interior of the Telefunken 40 set



This photograph shows the set above fitted in cabinet

(*Continued at the foot of page* 426)

How Baird Obtains Synchronism



Photograph showing toothed wheel on motor shaft

FOR a considerable time there has been speculation regarding the means of obtaining synchronism between the transmitting and receiving discs used in the Baird system of television. Secrecy on this point has been maintained for commercial reasons, but it is now possible to state how it is accomplished.

If the problem of synchronism is considered, it will be realised that it is no mean one. At the transmitting end we have a disc driven by an electric motor, and on the receiver, which may be in the home of a private individual, there is another disc, also driven by an electric motor. The rotational speed is 12½ revolutions per second, and it is essential that both shall keep in exact step even to a minute fraction of a revolution!

In America, use has been made of alternating-current mains, and where the transmitter and receiver are on the same network, synchronism may be achieved by this means, but it is only within very restricted areas that the same source of alternating current is available.

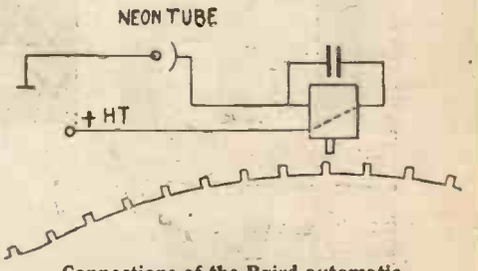
Efforts have also been made to obtain synchronism by means of independent oscillating systems, such as oscillating crystals, tuning forks or oscillating valves, the alternating current generated by these devices being amplified and used to supply synchronous motors. Such devices are extremely complex and expensive, and are only suitable for operation usually under laboratory conditions.

Before television, therefore, could become commercially practicable for broadcasting to the home, some method of synchronism had to be devised which would not necessitate the use of separate channels of communication, and would be sufficiently simple and inexpensive to come within the scope of the domestic user.

Synchronism in the Baird system is accomplished by taking from the picture part of the current, and using this to keep the mechanism in step. Where a large receiving disc is used, a commutator directs this current through a relay circuit for a brief interval during each line of the picture. For example, if there were 30 lines in the picture, the commutator sends 30 brief impulses through a relay during each reproduction of the image. In operation, the action is as follows:

Between one image and another there is a blank division, this being the demarcation between one picture and another, as will be realised if the spiral formation of the series of holes is considered. Now when the machines are in synchronism the commutator connects the relay just at this blank space; therefore, no current flows through the relay. If, however, the receiver goes slightly faster than the transmitter, the commutator comes into action at a lighted portion of the image and current passes through the relay, giving an accelerating impulse. The receiving machine is arranged to run very slightly slower than the transmitting machine, so that by means of the relay a balance is achieved.

In the smaller commercial machines supplied to the general public, the synchronising mechanism is simplified. In place of a commutator and relay, the correcting signal is applied directly to the coils of an electro magnet which acts upon an iron wheel, mounted on the shaft of the electric motor, and having little teeth corresponding to the interruptions in the commutator. This arrangement is shown in the photograph. Thus, when the machine runs too slowly, the correcting impulse pulls directly upon the iron teeth and accelerates the motor. If it runs too fast it pulls back the teeth and retards the motor. The cogged wheel, of course, is not a driving mechanism, but only functions as a speed corrector.



Connections of the Baird automatic synchronising system

"LOOKING BACK AT THE GERMAN WIRELESS EXHIBITION"

(*Continued from page 424*)

the ammeter, voltmeter, and ohmmeter for several ranges.

Exhibits by the German P.O.

The German Post Office was, apart from the television department referred to earlier, showing a short-wave transmitter such as has been in operation ever since the beginning of this year between Berlin, Magdeburg, and Stettin.

German Broadcasting Corporation

The Reichs-Rundfunk-Gesellschaft (German Broadcasting Corporation) showed a number of very instructive exhibits, viz., statistical returns about the development of the numbers of subscribers in connection with the distribution of radio dealers, showing strikingly those districts where the radio trade is so far only thinly represented, thus affording means of further development. The international programme exchange between Germany and other countries, which has been developed particularly during the last year, was likewise illustrated by an instructive picture. Another series of pictures extending throughout the exhibition hall given up to the Broadcasting Corporation showed the various activities of the Corporation: its central management, economic superintendence, the way it is represented in the World's Wireless League, etc. The long-distance reception laboratory of the Corporation at Zehlendorf, conducted by Dr. W. Reisser, was illustrated by actual duplication. Instructive films were shown and lectures held at frequent intervals; in fact, everything was done to make the best of the propaganda facilities afforded by the exhibition.

Lorenz 3-valver and self-contained loud-speaker

A POPULAR MAINS-DRIVEN THREE

The CLARION ALL ELECTRIC THREE

DESIGNED BY J. SIEGER OF THE 'A.W.' STAFF

Part II—The Assembly and Operation

FOR the benefit of those who missed last week's issue, it should be explained that the "Clarion All-Electric Three" is a new edition of that very popular receiver the "Clarion Screen-Grid Three," first published in A.W. No. 352, in the early part of this year.

This is one of the most popular "three's" which has ever been produced by the AMATEUR WIRELESS Technical Staff and it was felt that now that there is such a demand for mains-operated receivers, an A.C. edition of the "Clarion" would meet with a ready demand. Last week, the various points of this new receiver were discussed and no reader who intends making up this set should progress without getting last week's issue.

For convenience the list of components required is given again this week. It will be obvious that the total cost of all parts necessary is quite low and compares most favourably with the cost of the parts needed for the original "Clarion" receiver, plus, of course, the proper batteries and valves needed to operate it.

Once this all-electric edition of the "Clarion" has been made up it will work practically indefinitely and there are, of course, no batteries to charge, to run down at inopportune moments, or frequent expensive replacements needed.

LIST OF COMPONENTS

Cabinet (Clarion).
Ebonite panel, 16 in. by 8 in. (Becol, Raymond; Resiston, Paxolin).
Two strips, 3 in. by 1 in. (Becol, Raymond, Resiston, Paxolin).
Baseboard, 16 in. by 15 in. (Clarion, Pickett).
Panel brackets (Bulgin, Ready Radio).
Two .0005-mfd. variable condensers with slow-motion movement (J.B., Igranic, Burton, Lissen, Formo).
.0001-mfd. reaction condenser (Clydon, J.B., Lissen, Peto-Scott).
"Clarion" aerial and anode coil (Tunewell).
Double-pole mains switch (Bulgin).
Three anti-microphonic valve holders (Lotus, Benjamin, Lissen, Igranic, Burton).
5-pin A.C. valve holder (Wearite, W.B., Lissen).
Aluminium screening box, 5 in. wide by 6 in. high by 6 in. deep (Parex).
.0002-mfd. fixed condenser with series clip (Dubilier, Lissen, T.C.C., Graham-Farish).
.001-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Graham-Farish).
.0001-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Graham-Farish.).
Two 2-mfd. fixed condensers (Dubilier, Lissen, T.C.C., Graham-Farish).
Two 1-mfd. fixed condensers (Dubilier, Lissen, T.C.C., Graham-Farish).
3-megohm grid leak (Ediswan, Dubilier, Lissen, Graham-Farish).
600-ohm resistance with holder (Ready-Radio, Varley, Dubilier, Lissen).
Pre-set condenser (Formodenser, type J, Igranic).
400-ohm baseboard-mounting potentiometer (Igranic-Pacent, Lissen).
S.G. high-frequency choke (Peto-Scott, Lissen Burndept, Wearite, Varley, Parex).
Low-frequency transformer (Lissen "Super," Varley, Igranic, R.I.).
100,000-ohm resistance with holder (Lissen, Varley, Dubilier, Graham-Farish).
Output choke (Ferranti B.2).
Two universal-range Clarostats (Claude Lyons, Rothermel).
Special multi-volt power transformer (Varley).
Filter unit (Regentone No. 1).
Three yards of lighting flex (Lewcos), Adaptor or mains plug (G.E.C.), Glazite.
Four terminals marked Aerial, Earth, L.S+., L.S.— (Belling-Lee, Eelex, Igranic).
Two dial indicators (Bulgin No. 3), Screen-grid valve connector (Bulgin), Flexible-lead fuse holder (Belling-Lee).

Assembly

Those who intend making up the set should most certainly obtain the blueprint, which can be obtained, price 1s. 6d. post free, from the Blueprint Department, 58-61 Fetter Lane, London, E.C.4.

The print is particularly valuable in the case of this set, because, although construction is quite easy, the layout of the components is not easy to see at a glance from the photographs only. And, in addition, the blueprint gives a full-size wiring plan, which eliminates the possibility of making any errors; and errors in a mains-operated receiver may be more dangerous things than in one operating from batteries.

All parts may be attached to the panel, after the latter has been drilled with the aid of a blueprint, and it may then be screwed to the baseboard, preferably before any of the baseboard parts are mounted. There is no particular order to observe in mounting the baseboard parts. Quite a good plan is to place all the parts in position, as shown by the blueprint, and to mark with a pencil on the baseboard the exact position of each part.

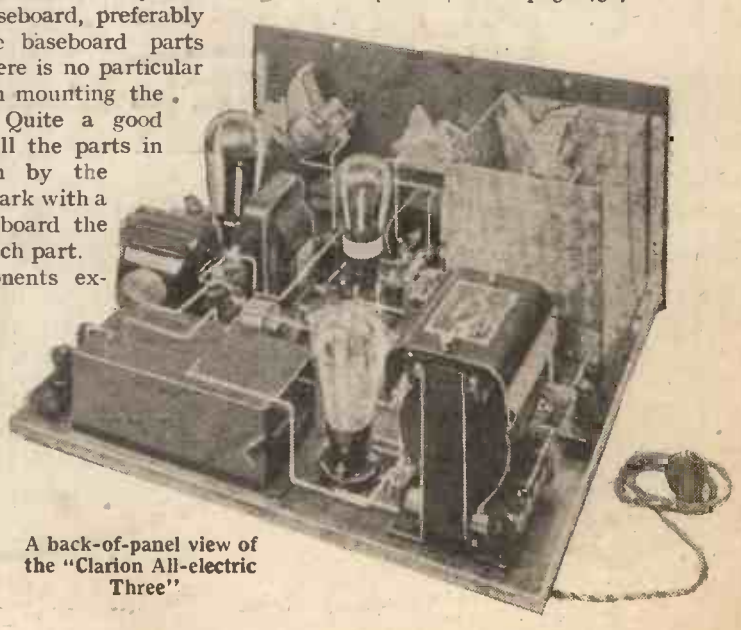
Then all components except, say, the valve holders, resistance holders, fixed condensers and so on, may be screwed in their proper places and wired up. As each wiring stage is finished, one or two further components may be screwed to the baseboard, as indicated by the pencil marks, and the further wires then added.

Rigid insulated wire is used for most connections, although flex is used between the mains plug and the mains switch on the panel, and from several of the power transformer terminals.

Incidentally, it is opportune to note here that one difference between the original "Clarion" and this new all-electric edition, is that the H.F. stage is screened. There are two reasons for this. First, the screening removes any possibility of interaction between the mains supply side and the H.F. side; second, the indirectly-heated screen-grid valve has a high factor of efficiency and it may be difficult to obtain stable working unless proper screening is incorporated, as in this receiver.

There are just one or two constructional details which should be observed. There are two terminal strips, each carrying two terminals. The terminals are of the insulated type and each strip is slightly raised from the baseboard with two very short lengths of ebonite tubing, or, alternatively, two thick ebonite washers. It is particularly important in the case of the aerial and earth terminal strip to see that the metal shanks do not touch the baseboard.

(*Continued on page* 430)



A back-of-panel view of the "Clarion All-electric Three"

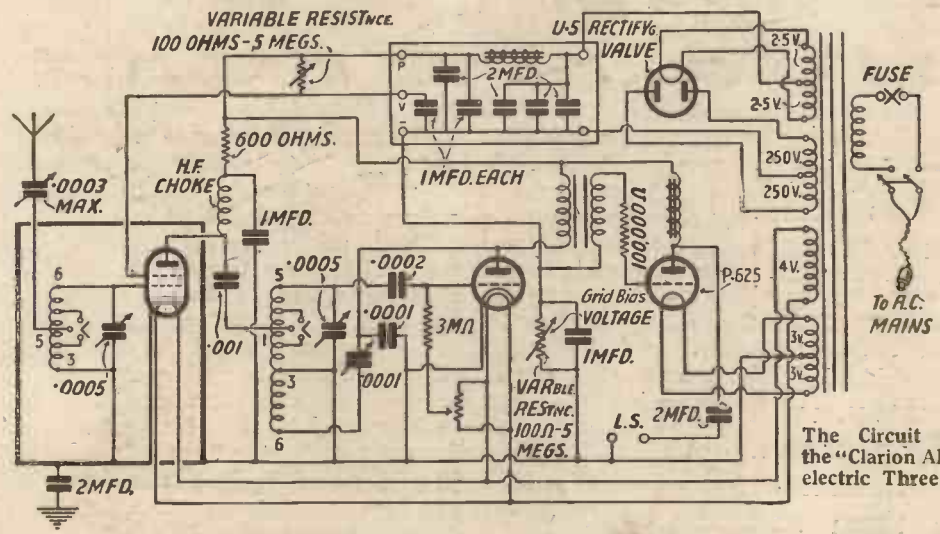
"THE CLARION ALL-ELECTRIC THREE"

(*Continued from page 428*)

It will be noticed that two infinitely variable resistances are used, in this case Clarostats, and these are mounted on little L-shaped brackets, approximately in the centre of the baseboard. Clarostats have very conveniently-placed soldering tags and no difficulty should be experienced in making connection. Soldering tags are also provided with the mains switch on the panel. As a high-voltage is present at these switch points it is imperative to see that the soldering here is neatly done. Any loose flux or solder might cause a short-circuit.

The connection to the anode of the screen-grid valve is made by means of a special armoured connector, which passes by means of a bush through the side of the screening box. If the standard connector obtained is not long enough a length of rigid wire can easily be added to make connection to one side of the fixed condenser. It is necessary only that the armoured part should pass through the screening box.

Other wires pass from the screening box to components on the baseboard and care should be taken that the holes drilled for these wires have not rough edges, which might fray the insulation and cause a further short-circuit. Note the way in which two fixed condensers near the screening box have two terminals connected together and to a terminal on the side of the box, which earths it.



The Circuit of the "Clarion All-electric Three"

So far as operation is concerned, it will be remembered from last week's description that indirectly heated valves are recommended for the H.F. and detector stages, but an ordinary battery-operated P625 valve is used in the last stage.

The control of the complete receiver is very similar, in general, to that of the original "Clarion." Reaction control and tuning are effected in the ordinary manner and it will be found that most selective tuning is obtained with the right-hand condenser, that is, the one tuning the H.F. stage. The two Clarostats on the baseboard control the screen-grid anode voltage and the grid-bias voltage to the power valve. A certain amount of experimenting should be done with the adjustment of these voltages in order to get the best results.

The original "Clarion" was a particularly selective receiver and this new edition will be found equally satisfactory. A .0003-mfd. maximum Formodenser, quite close to the aerial terminal, enables the degree of aerial coupling to be adjusted to a nicety. The only other additional control, which can be preset on first adjustment of the receiver, is the baseboard-mounting potentiometer.

LETTERS TO THE EDITOR

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

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

Loud-speakers in the Science Museum

SIR,—With reference to the B.B.C. set in the Science Museum, I think the following facts may interest you.

I understand that the large horn speaker is of Western Electric manufacture, and is the exact type as used in the cinemas for talkies, except that the horn is curved in order to take up less space behind the screen.

As regards quality of reproduction, the B.B.C. set is about three years old and was designed for the moving-coil speaker. Consequently, the impedance of the output does not match that of the Western Electric horn speaker. A fortnight ago, when I was at the Museum, the reproduction from the moving-coil was perfect, but from the horn speaker it was distinctly unpleasant. I understood from the attendant that they were going to alter the set to work with the horn speaker. The reason why both speakers were bad whilst "Thermion" was there was probably because they were then changing the set over. Personally, I don't think that set should ever be demonstrated when anything is wrong with it or experiments are being made. That set is supposed to represent the ideal for pure reproduction. Why, then, put it on when alterations are being made or when for some reason it is not quite up to standard?

Did "Thermion" notice terrible throw-back from the end wall facing the mouth of the horn speaker? Personally, I think heavy curtains should be hung down to the tops of the showcases in order to absorb this echo. It is bound to have an adverse effect on the reproduction.

I learned one interesting fact whilst I was at the Science Museum. Perhaps you noticed near the door a mechanical model made of wood laths, which when working demonstrates the movement of a sound wave or oscillating current. When broadcasting is on this model has to be switched off, because the air waves set up by it upset the music issuing from the horn speaker and cause it to come out in a series of waves! That is to say, it causes a kind of "fading" effect. And yet it is only wood laths with a good air space in between them, and also it is entirely closed in by glass! C. H. G. (London, W.).

SIR,—I was much interested in "Thermion's" paragraph regarding the quality of reproduction in the Science Museum at South Kensington. I, too, was horrified when I re-visited the place some months ago, after a long interval. The Rice-Kellogg loud-speaker was exactly as "Thermion" described it, and the third instrument mentioned (which, by the way, is an Amplion Lion) was streets ahead. I don't know whether you examined the set itself, but if you did you would have noticed that the output stage has been reduced to one L.S.5a, instead of the original three in parallel, presumably to suit the Lion; and this, I take it, accounts for the very indifferent quality from the R.K. The horn speaker was not installed at the time of my visit, but I shall take an early opportunity of hearing it.

G. B. (London, N.W.).

A Curious Trouble

SIR,—My set is suffering from the same complaint as was mentioned by a correspondent recently. It is a short-wave o-V-2 modified Reinartz, and the

(*Continued on page* 434)

"LETTERS TO THE EDITOR"

(Continued from page 432)

table on which the set is standing appears to be alive, and there is a plop in the headphones when it is touched. When a book is placed on the table, exactly the same thing occurs when the book is touched.

I can give no explanation, and I should be very pleased if any of your readers can tell me the reason for this plop.

B.R.5260 (Broadstairs).

Coil Comparisons

SIR,—The letter in a recent issue entitled "Coil Comparisons," and signed A.W. (Manchester), was of special interest to us as manufacturers of Tunewell plug-in coils.

It will, no doubt, interest the writer to know he is not nearly so old-fashioned as he thinks he is. The sale of our two-pin coils is again on the increase and, despite the fact that during the past three years most published circuits have specified mainly solenoid and dual coils of every type, there has been but a very slight falling off in demand.

Lately the tendency again to specify plug-in coils is quite noticeable, and for this reason such circuits as your "All-wave High-mag. 3," with its wavelength of 20 to 3,000 or more metres, are bound to prove popular. No real enthusiast will object to the slight trouble of coil changing in order to get such a range.

TURNER & Co. (London, N.).

SIR,—Like A.W. (Manchester), I prefer simple plug-in coils. The solenoids appear to me to be an older idea dug up, being very much like those old cardboard formers of various sizes seen in shop windows years ago. In my straight "three" I use two plug-in coils, and have an almost unlimited choice of wavelengths and reaction variations. My set contains also one variable tuning condenser, Mullard valves, two Ferranti AF3 transformers, etc. I consider the results I get as pure as anything I have heard. I cut out 2LO (twelve miles away) completely in 3 degrees and 5GB (about a hundred miles) in one degree on the slow-motion dial. My aerial is about 60 ft. in length.

"NOVICE" (Kingston).

Experiments with Loud-speakers

SIR,—I wonder if any of your readers have tried making a cone loud-speaker, using the mechanism of a horn-type instrument. I converted my "Dinkie" about two months ago, experimenting with various sized cones. It has now a 60-degree 9½-in. diameter cone made from photographic mounting paper attached to a 16-in. by ⅛-in. mahogany baffle by means of a handkerchief glued to the cone and the baffle; this latter has a 10-in. hole cut in it and is boxed in on the four sides with 6-in. wide mahogany.

I have not had the opportunity of trying a balanced armature, but my present contraption is 100 per cent. better than in its original form.

Of course, a piece of thin rod must be soldered to the diaphragm to take the diaphragm attachment.

S. M. (London, W.C.).

English and German Dance Bands

SIR,—Regarding some recent comments in AMATEUR WIRELESS on the difference between the English and German dance bands, in which it was suggested that the German bands are ordinary orchestras playing syncopated music for the time being, I am able to state at Berlin, at any rate, this is the case. The Gerhard Hoffman Orchestra occasionally plays in an orchestral concert starting at 8 p.m. and after the news bulletin plays dance music from 10.30 p.m. to 12.30 a.m., with a ten-minute pause at about 11.30 or 11.50. The Emil Roosz Band sometimes takes part in an orchestral concert from the studio and plays dance music at the Hotel Adlon. A few months ago Barnabas von Geezy played classical and dance music from the Hotel Esplanade. Two other well-known orchestras who play both types of music at the Berlin studio are the Marek Weber and the Dajos Bela orchestras.

G. A. K. W. (London, N.W.).

COILS FOR THE "LISTENER'S THREE"

IN response to numerous requests, we reprint below the instructions for making the coils for the "Listener's Three," a popular AMATEUR WIRELESS set which was described in No. 347.

Four coils are necessary for this receiver, in order to cover both the long and short wavebands, for reception on each band necessitates separate H.F. and aerial coils. Details of the simple formers are given by accompanying sketches.

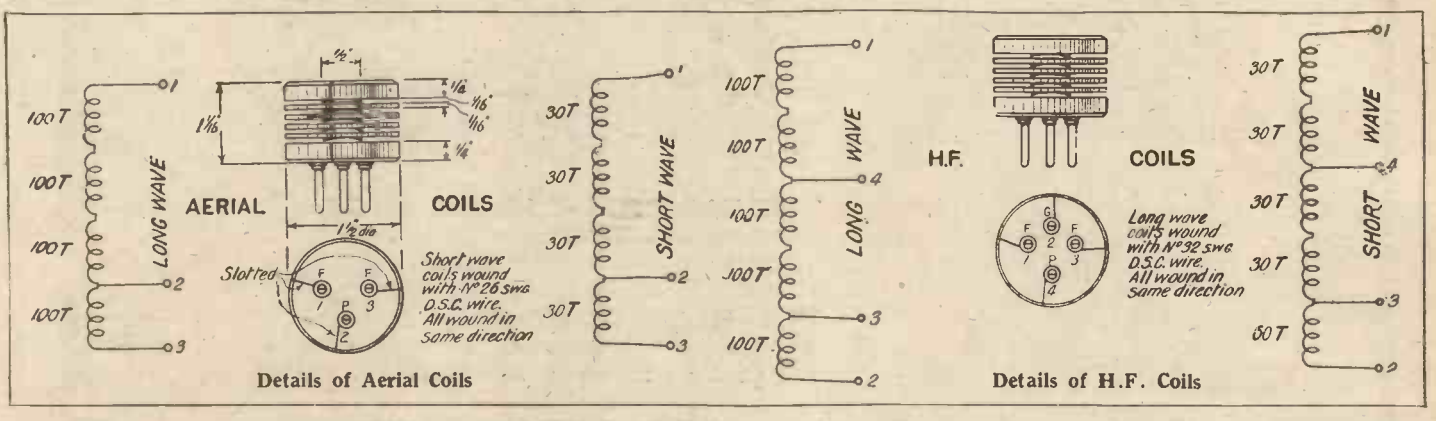
It will be seen that the centre of the bobbin is ½ in. in diameter, and the maximum diameter of the flanges is 1½ in. There are five slots, each $\frac{1}{16}$ in. wide and ½ in. deep, but only four of these are used in the case of the aerial coils.

Connections are taken to valve legs at the base of each coil former; all these legs are spaced in the conventional manner to fit in the valve holders on the baseboard.

Winding the coils is quite a simple job, and is done by hand. For the short-wave coils, H.F., and aerial, No. 26 d.s.c. wire is used, while No. 32 d.s.c. wire is used for both long-wave coils.

The short-wave coils carry 30 turns in each slot, while the short-wave H.F. coil has 60 turns in the extra fifth slot. This is the reaction winding.

Both aerial and H.F. coils for the long waves have 100 turns in each slot, and the reaction winding on the H.F. former is also of this size. It is most important to see that all sections are wound in the same direction. It is necessary that the windings should start from the pin end of the former so that the wire will not cross over the connections to the pins.



Details of Aerial Coils

Details of H.F. Coils

RADIOGRAMS

JOURNEY'S END, a play which has taken London by storm, and which has since been performed in the United States, France, Germany and Sweden with equal success, is to be broadcast, by arrangement with the author, Mr. R. C. Sherriff, from 2LO, 5XX, 5SW, and other stations on Armistice Day.

The last concert of the season will be relayed from Queen's Hall to 2LO, 5XX, and other stations on October 6, it will be a popular Saturday night programme.

The vaudeville programme broadcast from the London studio on September 27 should please all listeners; it includes Mabel Constanduros and Michael Hogan in *The Bugginses at the Seaside*, a sketch by Harry Grattan entitled *Buying a Gun*, a recital of English and Viennese songs by Greta Kellar, and piano duets by Edgar Fairchild and Robert Lindholm.

Bernard Shaw's play *Captain Brassbound's Conversion*, specially arranged for the microphone, is down for performance at the London studio on October 16.

A spoken opera, *Roland*, a drama based on Turold's song by E. A. Harding, with effects composed by Haley Simpson, will be transmitted for the first time from 5GB on October 1.

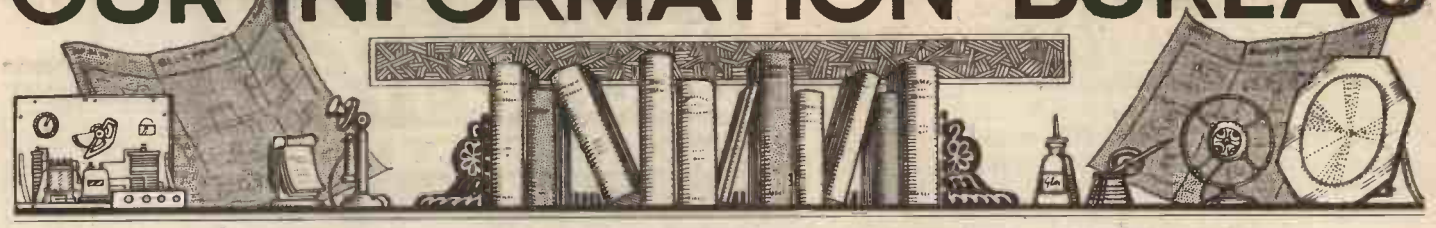
The B.B.C. is taking active cognizance of the Scottish "season," now in full swing. Inverness has been selected for a big broadeast, the relay being through Aberdeen, when the first of the famous balls in connection with the Northern Meeting is held.

Coinciding with the official opening of the new high-power Bukarest broadcasting station, the Rumanian Government proposes to equip all express railway trains with receiving apparatus for the benefit of passengers.

An experiment of interest is being made at the Cumbrae Lighthouse, on the Firth of Clyde, by the installation of a device to broadcast the fog signal from that lighthouse by wireless telephony simultaneously with the ordinary fog signal. By the new system there will be broadcast to synchronise with the sound of the signal the name of the station or lighthouse. By noting the time between receiving the sound by wireless and actually hearing it, seamen will be able to fix their exact distance from the shore. There will be broadcast the words, "one," "two," "three," and so on, in conjunction with the sounding of the fog signal every half-minute, and when the actual sound of the signal coincides with a wireless figure that will be the distance in miles of the vessel from the shore at that point.

(*Continued on page 441*)

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

Anti-motorboating Resistances.

Q.—*I have noticed that in many of your sets you incorporate anti-motorboating circuits consisting of a series resistance and a shunt condenser to earth. Is it possible to make use of the ordinary grid-leak type resistance in place of the wire-wound type?—L. F. (Walsall).*

A.—We see no reason why the ordinary grid-leak type resistances should not be used in anti-motor-boating circuits, except that care must be taken to see that they pass the correct amount of current. If you can procure grid-leak type resistances of suitable values, then make use of them by all means.—A. C.

Frame Aerials.

Q.—*What points should be considered when wishing to make up a frame aerial for long-distance reception?—B. F. (Tooting).*

A.—The frame dimensions should be reasonably large and should be of the box type. The turns of wire wound on the frame should preferably be spaced to reduce the capacity between the turns and the wire should be of the stranded variety. The number of turns for the frame will vary with the wavelength range required, the size of the frame, the spacing of the turns, and the type of wire used. A box-type frame having sides 2 ft. 6 in. high, with top and bottom pieces 1 ft. 6 in. long, and wound with twelve turns of stranded frame-aerial wire, would be found to be quite efficient and satisfactory on the broadcast band of wavelengths. The turns of wire should be spaced a quarter of an inch apart around the outer edge of the box arrangement of the dimensions suggested.—C. A.

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

Screen-grid Valve Sets.

Q.—*I have made up a screened-grid valve receiver using astatically wound aerial and anode coils with ordinary grid condenser and grid leak between the H.F. and detector valves. I am troubled with a kind of grid-choke noise—continuous crackles at regular intervals. I have tested the L.F. amplifier portion of the receiver separately and the trouble is not apparent in this part of the set. It occurs in the H.F. and detector side of the receiver, and although I have checked and resoldered every connection, the trouble still persists. Can you suggest a remedy?—J. D. (Balham).*

A.—You do not submit a diagram of your receiver circuit, but we are of the opinion that you have your detector-valve grid leak wired either to positive L.T. or to negative L.T. We suggest that you disconnect the grid leak from the L.T. circuit and interpose an extra grid-bias battery, connecting the grid leak to the negative wander plug and the negative L.T. to the positive plug of the grid battery.—C. A.

Pages 439 and 440 are missing

"RADIOGRAMS"

(*Continued from page 437*)

Broadcasting is being freely used in the effort to obtain the necessary public support for dental hospitals in Scotland. Edinburgh raised a large sum for its new building by such an appeal, and a generous response is anticipated for another broadcast from Glasgow to all Scottish stations.

Radio Normandie (Fécamp, France) has resumed its transmissions on 220 metres; the power has been raised to 500 watts. Musical programmes are regularly given on Tuesdays, Thursdays, and Saturdays between 8.30 and 10.30 p.m.

Some long-distance Berlin chars-a-banc have been equipped with wireless receivers with a view to the broadcast of news and radio entertainments during their daily trips.

In the Grand Duchy of Luxembourg tests are being carried out in telephony on 1,220 metres and on 212-223 metres between 12.30 and 1.30 p.m. on Saturdays, and from 9.30 p.m. onwards on Wednesdays and Fridays.

Listeners picking up a transmission in French with the announcement "*Ici station expérimentale* 21,401" should bear in mind that they have captured the new Radio Belgique 15-kilowatt station on 339 metres.

The Marconi Co. has been entrusted with the construction at Rome of a short-wave station for the purpose of relaying the U.S.A. concerts to the Italian broadcasting system.

Tests have been made at Sotten (Switzerland) with a military wireless transmitter with a view to the erection in that town of a 12-kilowatt station.

In 1930 a 35-kilowatt transmitter is to replace the present Brno (Czecho-Slovak) broadcasting station; another high-power transmitter is to be erected at Prague.

The new 5-kilowatt Paris P.T.T. Ecole Superieure transmitter has been brought into regular operation and now works daily from 4 p.m. onwards.

Ljubljana (Jugo-Slavia), which had closed down for repairs, resumed its broadcasts on 566 metres on September 1 last; the interval signal is the call of the cuckoo!

Many of the Russian transmitters have been overhauled during the summer months and will resume broadcasts during the autumn on higher power. Tiflis has been provided with a 35-kilowatt station, of which tests are to be carried out towards the end of September.

The Icelandic authorities have granted permission to a local company to raise a loan for the construction of a powerful transmitter in the immediate neighbourhood of Reykjavik.

BROADCAST TELEPHONY

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

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds (2LS)	0.13
*242	1,238	Belfast (2BE)	1.0
*261	1,148	Newcastle (5NO)	1.0
288.5	1,040	Swansea (5SX)	0.13
288.5	1,040	Stoke-on-Trent (6ST)	0.13
288.5	1,040	Sheffield (6LF)	0.13
288.5	1,040	Plymouth (5PY)	0.13
288.5	1,040	Liverpool (6LV)	0.13
288.5	1,040	Hull (6KH)	0.13
288.5	1,040	Edinburgh (2EH)	0.35
288.5	1,040	Dundee (2DE)	0.13
288.5	1,040	Bournemouth (6BM)	1.0
288.5	1,040	Bradford (2LS)	0.13
*301	995	Aberdeen (2BD)	1.0
*310	968	Cardiff (5WA)	1.0
*356	842	London (2LO)	2.0
*377	797	Manchester (2ZY)	1.0
*399	753	Glasgow (5SC)	1.0
*479	626	Daventry (5GB)	25.0
*1,554	193	Daventry (5XX)	25.0
AUSTRIA			
*246	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	7.0
*453	666	Klagenturt	0.5
*517	581	Vienna	15.0
BELGIUM			
216	1,391	Charleroy (LL)	0.25
246	1,219	Antwerp (Anvers) 4ED	0.4
246.1	1,218.8	Schaerbeek-Brussels	0.25
250	1,200	Ghent	0.5
280	1,071	Liége	0.1
312	961.4	Arlon	0.25
*509	590	Brussels	1.0
DENMARK			
*281	1,067	Copenhagen (Kjobenhavn)	0.75
1,153	260	Kalundborg	7.5

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
FRANCE			
170	1,750	St. Quentin	0.25
211.3	1,420	Béziers	0.1
220	1,364	Fécamp	0.5
230	1,304	Ste. Etienne	0.3
237	1,265	Juan-les-Pins	0.25
238	1,260	Bordeaux (Radio Sud-Ouest)	1.0
240	1,250	Radio Nimes	0.25
*255	1,175	Toulouse (PTT)	1.5
*265	1,130	Lille (PTT)	0.7
268	1,121	Casablanca	0.5
*277	1,083	Rennes (PTT)	0.5
277	1, 83	Pic du Midi de Bigorre (weather forecasts 9 p.m.)	
*286		Montpelier (PTT)	0.2
292	1,028	Radio Lyons	0.5
*294	1,020	Limoges (PTT)	0.5
304	986	Bordeaux (PTT)	1.0
304	986	Agen	0.25
309	970	Radio Vitus	1.0
*316	950	Marseilles (PTT)	0.5
326.5	918.9	Grenoble (PTT)	0.5
336	893	Petit Parisien	0.5
346	869	Strasbourg	0.1
364	824	Algiers	2.0
368	815	Radio LL (Paris)	0.5
*381	788	Radio Toulouse	8.0
411	729	Radio Maroc (Rabat)	2.0
436	687	Radio Flandre (Lille)	0.1
447	671	Paris (Ecole Sup. PTT)	1.5
468	640	Lyons (PTT)	5.0
1,350	222	Tunis (Kasbah)	0.6
1,461	205.3	Eiffel Tower	12.0
*1,725	174	Radio Paris	12.0
GERMANY			
*218	1,373	Flensburg	0.5
*227	1,319	Cologne	4.0
*234	1,283	Muenster	3.0
*239	1,256	Nurnberg	2.0
*246	1,220	Kiel	0.35
*246	1,220	Cassel	0.25

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
*253	1,184	Gleiwitz	2.0
*259	1,157	Leipzig	1.5
*270	1,112	Kaiserslautern	0.25
*276	1,085	Koenigsberg	2.5
*283	1,058	Magdeburg	0.5
*283	1,058	Berlin (E.)	0.5
*283	1,058	Stettin	0.5
*319	941	Dresden	0.25
*325	923	Breslau	1.5
*339	887	Bremen	0.35
*360	833	Stuttgart	1.5
*372	806	Hamburg	1.5
*390	770	Frankfurt	1.5
*418	716	Berlin	1.5
*453	662	Danzig	0.25
*456	657	Aachen	0.35
*473	635	Langenberg	13.0
*533	563	Munich	1.5
*560	536	Augsburg	0.25
*560	536	Hanover	0.35
570	527	Freiburg	0.35
*1,635	183.5	Zeesen	30.0
2,100 / 2,290	142 / 131	Norddeich	10.0
HOLLAND			
31.4	9,554	Eindhoven (PCJ)	25.0
*298	1,004	Huizen via Hilversum aerial (until 5.40 p.m. B.S.T.)	0.5
*1,071	280	Huizen via Hilversum aerial (after 5.40 p.m. B.S.T.)	0.5
*1,070	280	Scheveningen-Haven (from 10.30 a.m. to 5.40 p.m. B.S.T.)	5.0
*1,875	160	Hilversum via Huizen aerial (AVRO)	0.5
IRISH FREE STATE			
*225	1,337	Cork (1FS)	1.0
*413	725	Dublin (2RN)	1.0
ITALY			
248	1,209	Trieste (testing)	
*274	1,094	Turin (Torino)	7.0

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
*332	905	Naples (Napoli)	1.5
*385	779	Genoa (IGE)	1.0
*441	680	Rome (Roma)	3.0
453	662	Bolzano (IBZ)	0.3
*501	599	Milan (Milano)	7.0
NORWAY			
240	1,250	Rjukan	0.18
*288	1,058	Notodden	0.5
*365	820	Bergen	1.0
*394	761	Frederiksstad	0.7
453	662	Tromsoe	0.1
453	662	Aalesund	0.3
453	662	Porsgrund	0.7
*493	608	Oslo	1.5
1071	280	Oslo (testing)	7.3
SPAIN			
251	1,193	Almeria (EAJ18)	1.0
314	956	Oviedo (EAJ19)	0.5
*349	860	Barcelona (EAJ1)	8.0
*368	815	Seville (EAJ5)	0.5
368	815	San Sebastian (EAJ8)	0.5
*424	707	Madrid (EAJ7)	3.0
453	662	Salamanca (EAJ22)	0.55
SWEDEN			
231	1,301	Malmo	0.6
*257	1,160	Hoerby	10.0
270	1,112	Trollhattan	0.15
*322	932	Goeteborg	10.0
322	932	Falun	0.5
*436	689	Stockholm	1.5
*542	554	Sundsvall	0.6
*770	389	Ostersund	0.6
1,200	250	Boden	0.6
*1,348	222.5	Motala	30.0
SWITZERLAND			
*408	743	Berne	1.0
*459	653	Zurich	0.63
680	442	Lausanne	0.6
760	395	Geneva	0.25
1,010	297	Basle	0.25

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

TAKE YOUR CHOICE

M.P.A RESEARCH DEPARTMENT OFFERS YOU THESE 3 NEW M.P.A. SPEAKERS. SCIENTIFIC MASTERPIECES! EACH ONE A TRIUMPH OF GOOD LOOKS, TONAL PERFECTION AND VALUE! HEAR AND COMPARE!

THE NEW M.P.A. POPULAR PLAQUE

A BETTER INSTRUMENT THAN EVER BEFORE—and AT A LOWER PRICE! Fitted with the wonderful new Mark VI unit; with new robust protecting grille at back; mounted on wooden base. Remarkably sensitive, clear and loud! Even response over wide range of frequencies, attractive mahogany or oak finish. And look at the price! **25/-**

★ *Don't forget also to hear the new Mark VI Speaker Unit. It is only 12/6, chassis with 14" wood baffle and 9" cone costs 10/-; full mounting instructions are given.* ★

THE NEW M.P.A. POPULAR CABINET

ANOTHER EXAMPLE OF M.P.A. VALUE! An attractive speaker with a first rate performance. Yet low in cost! Like the Popular Plaque, it has the unique Mark VI movement. Extremely sensitive. Splendid reproduction. Exceptionally wide range. Handsome polished oak cabinet. Box resonance eliminated. Hear it and you'll buy it! Price **45/-**

Mahogany Cabinet 47/6

THE NEW M.P.A. MOVING COIL SPEAKER

SEE AND HEAR THIS AMAZING NEW SPEAKER! Whatever price you are prepared to pay, you will not get anything better! Here indeed is "Hearing that is almost seeing!" Built on entirely new principles. Permanent magnet. No separate energising current required. Patent baffling system eliminates box resonances. Glorious tone! Dignified design in polished oak. A delight for the eye and the ear! Complete **15 GNS.**

Unit only on base, 12 Gns.

RADIO EXHIBITION STAND 165 *and Demonstration Room "O" in Gallery*

M.P.A

Hearing that is Almost Seeing

M.P.A. products above £5 may be purchased on deferred terms. M.P.A. Wireless Ltd., Dept. 19, Radio Works, High Road, Chiswick, London, W.4

IGRANIC

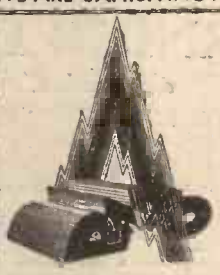
SMALL, BUT MIGHTY

IGRANIC proved that bulk was not essential to purity and amplification in an L.F. Transformer. Others followed, but the Igranic "J" Type still stands supreme as the small low-priced transformer with the long, straight curve.

For your portable, where space is restricted and weight must be kept down, use the Igranic "J" Type Transformer. Use it in your domestic receiver, too, and enjoy truly magnificent magnification.

Ratios of 3-1 and 6-1. Price 17/6

WE ARE EXHIBITING AT



If your dealer cannot supply you please write direct to Dept D.131

STANDS **161** and **162**

149 Queen Victoria St.

IGRANIC ELECTRIC Co. Ltd. LONDON

Works BEDFORD

WARNING!

"STANDARD" MODEL

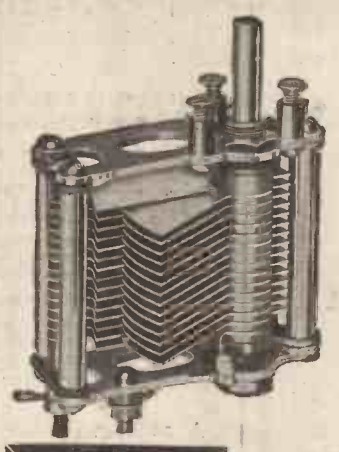
BECAUSE OF THE ENORMOUS POPULARITY OF "CLAROSTAT" (Regd. Trademark) VARIABLE POWER RISISTANCES, A NUMBER OF IMITATIONS AND SO-CALLED "SUBSTITUTES" HAVE APPEARED. WE HAVE VERY CAREFULLY EXAMINED ALL OF THESE AND NONE ARE ENTIRELY SATISFACTORY. SOME ARE EXCEEDINGLY POOR.
THEIR ONLY CLAIM TO MERIT IS A SLIGHTLY CHEAPER PRICE. A RESISTANCE THAT IN ANY CASE HAS TO BE CHANGED LATER TO A GENUINE "CLAROSTAT" WILL, INDEED, BE DEAR IN THE LONG RUN! OVER 3,000,000 "CLAROSTATS" ARE IN USE. OVER 500,000 ARE SOLD ANNUALLY IN THE U.K. ALONE. THERE MUST BE A REASON?

CLAROSTAT REDUCED PRICES!

STANDARD, 18 WATTS, for Eliminators	Was 10/6	NOW	9/6
STANDARD, ditto, BRASS FINISH MODEL	,, 9/6	NOW	8/6
VOLUME CONTROL, 100-500,000 Ohms	,, 8/6	NOW	7/6
POWER CLAROSTAT, 35 WATTS	,, 15/-	NOW	13/6
SUPER-POWER CLAROSTAT, 250 WATTS	(A New Model)		30/-
TABLE TYPE (Distant Volume Control)	Was 13/6	NOW	12/-

Advt. of Claude Lyons, Ltd., 76 Old Hall Street, Liverpool.

AN INSTANTANEOUS SUCCESS!



PRICE ·0005 One Hole Fixing 8/9

Note: If three-hole fixing is preferred, a set of collars, nuts, screws and washers, can be supplied at 6d. extra per set.

Advt. of Sidney S. Bird & Sons, Ltd., Cyldon Works, Enfield Town.
'Phone: Enfield 2071-2.
Grams: Capacity, Enfield.

THE NEW CYLDON "JUNILOG" CONDENSERS

INTRODUCED at Stand No. 155, Olympia, and already selling in thousands all over the country, the new Cyldon "Junilog" condensers are meeting with unqualified and striking success. And justly so.
The same Cyldon "Quality and Efficiency," sturdy construction and minute attention to the smallest detail, place this new range in a class entirely apart. They are remarkably compact and entirely suitable for any receiver, from the smallest portable to the most elaborate radio-gramophone.
Your dealer can show you samples of "Junilog" Condensers:—the ·0005 mfd. at 8/9 and the ·0003 mfd. at 8/6. If you have any difficulty in obtaining supplies, write us direct. Latest lists free on application. Mentioning "Amateur Wireless."

CYLDON CONDENSERS

5 YEARS GUARANTEE

WHY PAY 10/6 FOR A VALVE? HERE IS JUST AS GOOD FOR ONLY 3/6

3/6 Post 4d.
2 VALVES OR MORE POST FREE

Type	Fil. Volts	Amp.	Imp. Ohms	Amp. Fac.	
PR 2	2	.095	28,000	13	H.F. Det.
PR 3	2	.095	15,000	8	L.F.
PR 4	2	.095	120,000	32	R.C.
PR 9	3.5-4	.063	18,000	14	H.F. Det.
PR10	3.5-4	.063	10,000	8.7	L.F.
PR11	3.5-4	.063	68,000	40	R.C.
PR17	5-6	.1	18,000	17	H.F. Det.
PR18	5-6	.1	9,500	9	L.F.
PR19	5-6	.1	80,000	40	R.C.
PR20	2	.15	7,000	6	Power
PR40	4	.15	7,000	6	"
PR60	6	.1	5,000	6	"
PR120	2	.3	2,750	4	Super Power
PR140	4	.2	2,500	4	"
SG 25	2	.2	220,000	150	S.G.

POWER 6/6 EACH Post 4d.
SUPER POWER 10/6 EACH Post 4d.
Screened Grid 15/- EACH Post 4d.

Why pay fancy prices when you can get a perfectly finished British made valve with a superior coating giving astonishing selectivity with a minimum H.T. consumption, which is the general opinion of the thousands who use P.R. valves. There are many valves on the market but none are guaranteed—Ask yourself why.
The P.R. guarantee covers seven months with the right—not a favour, remember—but a right to exchange the valve under the guarantee. All you have to do is to post any defective valve to us, complying, of course, with the terms of the guarantee which is attached and enclose a note stating defect—**You will receive a new valve by return of post.**

P.R. PRODUCTS

7, P.R. HOUSE, NEWGATE ST., LONDON, E.C.4
Opposite G.P.O. Tube Station.

3/6 POST 4d.
Money back if not satisfied in 7 days.

Tell us your set—we will send correct valves. Matched Valves 1/- extra.
Sent C.O.D. if desired.
Telephone: CITY 3788
ASK YOUR DEALER FOR THEM. ACCEPT NO OTHER.

You MUST have the "Wireless Magazine"

Every Month *Price 1/-*

Is Your Set Old-fashioned?

Bring it up-to-date with the

VOLTRON WIRE WOUND R.C.C. UNIT

If you are still using the old blotting paper and Indian ink R.C. Unit, you are missing the best of the broadcast. Substitute the VOLTRON R.C. Unit to-day and enjoy pure, crisp reproduction with generous and abundant volume. The difference will amaze you.

9/6

From your dealer, or direct

VOLTRON

VOLTRON COMPANY, LIMITED
Queensway, Ponders End, MIDDLESEX

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Sept.	29	Harvest Festival Service from St. Giles' Church, Stoke Poges.
,,	30	Vaudeville programme.
Oct.	1	Excerpts from Queen's Hall promenade concert.
,,	3	Military band concert.
,,	4	A light feature programme—"The World We Listen In."

DAVENTRY EXPERIMENTAL (5GB)

Sept.	30	Queen's Hall Promenade Concert (Wagner).
Oct.	1	*Roland.*
,,	2	Queen's Hall Promenade Concert (Brahms).
,,	3	Light orchestral programme.
,,	4	*Made in Brummagem.*

CARDIFF

Sept.	30	West Country programme.
Oct.	2	Musical comedy programme.
,,	4	Welsh programme.

MANCHESTER

Sept.	29	Legends retold in music.
,,	30	Programme of works by Gustav Holst.
Oct.	2	Programme of marches and waltzes.
,,	5	*Calais to Dover*, a farce.

A 10-kilowatt broadcast transmitter is to be erected in the neighbourhood of Kingston (Jamaica).

MORE RADIOGRAMS

IT is reported that within 5 kilometres of the German-Polish frontier the German authorities have vetoed the use of wireless receiving apparatus in view of the political propaganda broadcast by the Polish stations. Former possessors of licences have been warned that all apparatus must be immediately dismantled.

According to a North German wireless journal, tests carried out by the new Oslo high-power station on 1,072 metres were recently picked up. Transmissions were made with a power of 7 kilowatts in the aerial and took place at midday and between 9.30 and 10.30 at night.

The organisers of the International Radio Exhibition in New York have offered a prize of 1,000 dollars for the best one-hour broadcast programme. The entertainment which secures the prize will be transmitted from a model studio specially constructed for the period of the exhibition.

With the advent of the Servicio Nacional de Radiofusion, a broadcasting organisation controlled by the Spanish State to take over and develop the present system, some seventeen transmitters will eventually operate in that country. Roughly speaking, in the matter of listening licence, the possessor of a crystal set will only pay the small amount of 2s. 8d. per annum; of this sum the Post Office authorities will retain 10 per cent. for administrative costs. A tax is also collected on valve receivers.

The new high-power Prague transmitter has started testing. As its ultimate power will be 60 kilowatts, the Czecho-Slovakian programmes will be easily picked up in the United Kingdom.

BLUEPRINTS

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of all these sets can be obtained at 1s. 3d. and 4d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

All Post Free

CRYSTAL SET (6d. each)

A Daventry-Local Crystal Set AW185

ONE-VALVE SETS (1s. each)

Reinartz One WM127
The A.1 .. .. WM153

TWO-VALVE SETS (1s. each)

East to West Short-wave Two (D, Trans) .. AW159
1929 Favourite Two (D, Trans) AW186
Loud-speaker America Two AW190
Talisman Two (D, Trans) AW194
Hyper-selective Two (D, Pentode) AW198
Meteor Two (D, Trans) WM114
Clipper Two (D, Trans) WM135
Continental Two (D, Trans) WM143
Stay-put Two (All-AC, D, Trans) WM155
Ether Ranger (D, Trans) WM156
ABC Two (D, Trans) WM160

THREE-VALVE SETS (1s. each)

All-Britain Three (H.F., D, Trans) AW158
Bantam Three (D, RC, Trans) AW160
Listener's Three (HF, D, Trans), price 4d., free with copy of "AW" AW169
The Binowave Three (D, RC, Trans) AW172
Clarion Three (SG, D, Trans) AW175
1929 Favourite Three (D, RC, Trans) AW179
Local and Continental Three (HF, D, Trans or D, RC, Trans) AW189
Broadcast Three (SG, D, Trans) AW192
James dual-range Three (HF, D, Trans) .. AW196
All-wave High-mag. Three (D, 2 Trans) .. AW199
Knife-edge Three (D, RC, Trans) AW201
All-wave Screen-grid Three (HF, D, Trans) .. WM110
Standard Coil Three (HF, D, Trans) WM117
Wide-world Short-waver (SG, D, Trans) .. WM120
New Year Three (SG, D, Pentode) WM123
The Q3 (D, RC, Trans) WM124
Lodestone Three (HF, D, Trans) WM129
Simple Screen Three (HF, D, Trans) WM131
Dynamic Three (AC—SG, D, Trans) WM136
At Home Three (D, 2RC) WM141
Short-Wave Link (D, RC, Trans) WM142
Binowave S.G. Three (SG, D, Trans) WM152
Fanfare (D, 2 Trans) WM157
Brookman's Three (SG, D, Trans) WM161

FOUR-VALVE SETS (1s. 6d. each)

Overseas Short-waver (HF, D, 2 Trans) .. AW133
Clarion All-electric Three (SG, D, Trans, AC Rectifier) AW200
Music-lovers Gramo-radio (SG, D, RC, Trans.) AW202
Touchstone (HF, D, RC, Trans) WM109
Binowave Four (SG, D, RC, Trans) WM119
Standard-coil Four (HF, D, 2RC) WM122
Dominions Four (2SG, D, Trans) WM134
Short-wave Adaptor for Dominions Four .. WM140
The Drum Major (HF, D, RC, Trans) WM137
Music Player (HF, D, RC, Trans) WM144
Arrow (SG, HF, D, Trans) WM154
1930 Monodial (2SG, D, Trans) WM158
All-electric Four (All AC—SG, D, RC, Trans) WM162

FIVE-VALVE SETS (1s. 6d. each)

Fidelity Five (HF, D, 2RC) WM130
All-wave Lodestone Five (HF, D, RC, Push-pull) WM146

SIX-VALVE SETS (1s. 6d. each)

Short-wave Super-6 (Super-het, Trans) .. AW671
Eagle Six (3 HF, D, RC, Trans) WM106

AMPLIFIERS (1s. each)

"A.W." Gramophone Amplifier (3RC) .. AW162
Searcher Unit (HF) AW176
Gramophone Amplifier (3 v.) AW187
Signal Booster (HF Unit) WM128
Auditrol Amplifier WM132

MISCELLANEOUS (1s. each)

H.T. Eliminator for A.C. (200 v. output) .. AW102
L.T. and H.T. Mains Unit (D.C.) AW123
Arcadian Linen-diaphragm Loud-speaker (Full-size) AW177A
D.C. Unit (HT) AW178
Short-wave Adaptor (1 v.) AW183
High-tension Battery Charger AW191
Mains Unit for S 8 Valves AW193
Scratch filter (6d.) AW195
Simplest H.T. Unit (1/-) AW197
H.T. Unit for A.C. Mains WM125
Lodestone Loud-speaker WM126
James H.T. Unit for D.C. Mains WM133
Two Ampere Low-tension Unit WM147
A.C. Mains Amplifier WM149
A.C. Mains Unit for All-wave Lodestone Five WM151
H.T. Unit for A.C. Mains WM159

PORTABLE SETS

Arcadian Portable (SG, D, 2 Trans) with linen-diaphragm loud-speaker (half scale)	AW177	1/6
£5.5.0 Portable (D, Trans)	AW181	1/6
Talisman Portable (SG, D, 2 Trans) ..	AW184	1/6
Holiday Portable Three (D, RC, Trans)	AW188	1/-
Wayfarer Portable (Super-het)	WM139	1/6
1929 Chummy (SG, D, Trans, RC) ..	WM145	1/6
Picnic Portable (D, RC, Trans)	WM148	1/-
Enchanter Portable (2HF, D, RC, Trans)	WM150	1/6

When ordering Blueprints please send Postal Order NOT STAMPS

AMATEUR WIRELESS 58-61 FETTER LANE LONDON E.C.4

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

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

Radio programmes are broadcast in Canada by eighty-seven stations. Thirteen of these belong to the Canadian National Railways.

EAJ13 (Radio Catalana, Barcelona), which has been closed down for some weeks, has now resumed its transmissions. Although a wavelength of 268 metres was allotted to this Spanish station, its broadcasts at present will be found on about 275 metres, between those of Turin and Konigsberg, with which it causes interference.

PLE (Bandoeng, Java) is to be heard almost daily between 1 and 2 p.m. and 6 p.m. On Tuesdays between 2 and 3 p.m. a concert of gramophone records is broadcast. The call is: "*Hier Bandoeng, PLE Radio Laboratorium*," and the announcement is given in both Dutch and English.

CARE OF THE H.T.

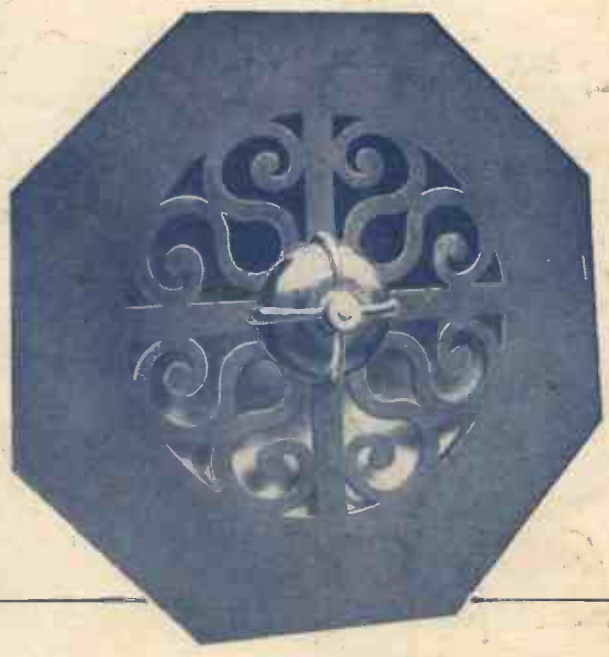
THOSE who take an interest in effecting the greatest economy in connection with H.T. should read an interesting booklet which has just been issued by Messrs. Siemens Bros. & Co., Ltd., of Woolwich. This is called "Inside Knowledge on the Correct Use of Radio Batteries," and explains just how to choose and use an H.T. battery. It can be obtained free on application by AMATEUR WIRELESS readers upon mention of this journal.

Burton's Olympia Stands.—In Messrs. C. F. & H. Burton's advertisement in last week's issue the stand numbers were given incorrectly owing to a printer's error. Messrs. Burton's stands at Olympia are, of course, Nos. 36 and 37.

During the period of the Radio Exhibition, Messrs. F. A. Hughes & Co., Ltd., have arranged a special demonstration of Bluespot loud-speakers and units at Maclise Mansions, Addison Road Station, Kensington, W. An invitation is extended to all AMATEUR WIRELESS readers to pay a visit and inspect the Bluespot range.

A handy leatherette case with a celluloid window, designed to hold a wireless licence, has been marketed by Rex Patents Co., Rex Works, Park Road, Kingston-on-Thames. This case is particularly handy if it is desired to carry the licence in a portable set, as is convenient in view of the new G.P.O. regulations regarding the licensing of portables.

The newly designed frame of the Marconiphone Octagon . . . now reduced from 39/6 to 30/-. The original style is still obtainable.



Now reduced to 30/- !

. . . this famous Cone Speaker

ALREADY in thousands of homes the Marconiphone Octagon Cone Speaker has won a splendid reputation for first-class, thoroughly reliable service. Delighted listeners declare it the equal of speakers costing far more; every kind of programme — music, speeches, entertainments — is reproduced with full power and rare delicacy of tone.

And now the Octagon is still lower in price ! Today 30/- buys this cone speaker — made by experts of world-famed skill and experience, and with the name " Marconi " as a guarantee. It has, too, a newly designed front; or you can have it in the old style if you prefer.

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Printed in England. Published by Bernard Jones Publications, Ltd., 58/61 Fetter Lane, London, E.C.4
Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH, LIMITED. Saturday, September 28, 1929