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Amateur Wireless

and Radiovision

Every Thursday 3d

Vol. XVI. No. 415 Saturday, May 24, 1930

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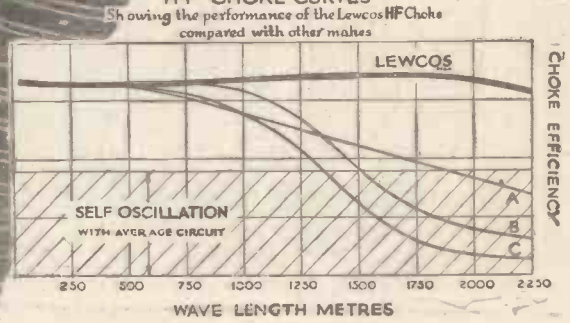

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RADIO PRODUCTS FOR BETTER RECEPTION

MAY 24, 1930 No. 415. Vol. XVI.

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

One of Ours—The Pool Broadcast—A Three-language S.O.S.—How Many Listeners?—A Road-Radio Rally—A Portable Next Week

One of Ours—The radio correspondent of the *Daily Express* has been trying out several three-valve sets to find which are capable of receiving the National, Regional and Midland programmes without interference. He says "Another set which came through the ordeal with flying colours was that known as 'Britain's Favourite Three'"

Behind the scenes at the "Pool of London" broadcast, when a description of this part of the Thames at night was a novel "O.B." Here is Mr. J. C. Squire, the well-known B.B.C. commentator, before the shielded microphones in the launch

(a very popular set which was described in "A.W." last year), "with Mullard valves, resistance-capacity coupled." The stations received without interference included 261 metres, 356 metres, 479 metres, 5 XX, Dublin and Belfast. During the test 18 foreign stations were received with perfect clearness, the coils being changed as required. The "Favourite" was built after a ballot of readers' opinions to decide the most popular set specification.

The Pool Broadcast—In a recent "Diversions," a rather thrilling outside broadcast was that made from the Pool of London at night, when the well-known commentator, Mr. J. C. Squire, and an official of the Thames police described this part of the river as it appears at night time. The commentators went down the river on a wreck ship, and explored the Thames between Tower Bridge and Limehouse Pier. The radio arrangements were very similar to those employed in the boat race broadcast. Two microphones were carried on the commentators' boat, and for acoustic reasons and to protect the "mikes" they were put in a little wooden box.

A Three-language S.O.S.—At the request of Scotland Yard, a B.B.C. S.O.S. was made recently in three languages—English, French, and Spanish. The purpose of the S.O.S. was to locate a young man who was missing after a walking tour in the Pyrenees. The broadcast reached its destination, and the unhappy ending to the tale is that the radio link was in return used to acquaint his parent quickly of the fact that he had met with a fatal accident.

How Many Listeners?—Statistics are dry things, but it is always interesting to see how many listeners there are in the various parts of England. We have just received the new list, which shows that the grand total is now 2,947,098! so the curve is still very much in the upward trend. As, unfortunately, there are still some "pirates" about, the total is probably well over the three million mark. Now, out of these there are no fewer than 540,833 listeners in the London area alone, which is a great deal more than in Scotland, which has a total 194,837, and in Ireland where there are only 29,367. The Lancashire district comes second best to the London area, for there there are 304,374 listeners. Last on the list is Anglesey, which has a total of 713.

A Road-Radio Rally—There will be busy scenes at Lille next Sunday, where a motor-car rally is being held, and where radio is taking part. Prizes are to be given for the best car radio receivers; these will be judged both on appearance and efficiency. The sets will be tested on a transmitter which will tour on another car. Over a hundred competitors are expected, so checking will take a considerable time.

Outdoor Portables—Although the Clerk of the Weather seems to have very mixed ideas about the differences between sunshine and storm, we may perhaps be optimistic enough to suggest that summer really *is* on the way, and that it won't be long before portables will be troubling many amateurs. Station centres and powers have altered a great deal since the summer of 1929, and a new portable is really needed to give good results out of doors. AMATEUR WIRELESS has already produced a good 1930 set, the "Merry-maker," and now our Technical Editor, J. H. Reyner, has finished final tests on a new portable—the "Sunshine 3." Next week we are giving details of this portable. It is full of unusual points—*an S.G. valve is used as a detector*, and, of course, there is an S.G. high-frequency stage as well.

PRINCIPAL CONTENTS

The Final B.B.C. Arrangements—by Frank Rogers

THE B.B.C.'s plans regarding the present series of Test Matches are to give a summary of each day's play during the early evening. Although this is different from what is done in Australia, there is little doubt that it is more suitable to our arrangements.

During the recent Tests "down under" a running commentary was delivered, so I am told, the whole time that play was in progress. Enthusiasm ran so high that not only were loud-speakers working in practically every house, but also in restaurant, factory and office. In fact the only place where they appear to have been dumb was the street, and that only because no retailer was allowed to advertise himself in this way.

Even motorists listened-in on portable sets. Many super-enthusiasts (I think this term scarcely describes them adequately) took their morning bath early so as to make sure of listening to our own commentator giving his critical summary. Australian time averages about ten hours ahead of ours so that 9 p.m. over here is 7 a.m. the next morning over there, and I believe it is a source of amusement to "Aussies" to listen-in to our news bulletins and pat themselves on the back for being a whole day ahead of the Mother Country.

Empire Transmissions

It is fairly certain that the B.B.C. will also send its summary out from 5SW, which will allow short-wave receivers in Australia to pick it up easily. The waves travel over Europe, Siberia and the East Indies, a distance of 9,000 odd miles. If the broadcast were made at two or three in the morning they would take another route, Atlantic Ocean, Brazil, Chile and the Southern Pacific Ocean, a distance of 12,000 odd miles.

Obviously direct waves cannot reach to Australia and broadcasting depends on the reflection of the Heaviside layer. Therefore, we can discover which direction will be taken by calculating whether darkness lies east or west of us. The earth is revolving from west to east so that in our evening the darkness lies in front of us, that is to the east, and vice versa for our morning period.

No one will dispute the wisdom of the B.B.C. in refraining from giving a whole-time running commentary of these matches. Cricket has not the wealth of incident to make a broadcast interesting from midday until half-past six. Not many of us would be able to hear the commencement because we should be otherwise engaged, and of those who could, not ten per cent. would be listening when a couple of hours had passed.

Obviating a Difficulty

There might be some difficulty, too, with the M.C.C. Not many weeks ago the football Cup Final was the cause of angry words and it is quite possible the cricket authorities would take the view that broadcasting would keep spectators away—especially as our summer has such mistaken ideas on sunshine and rainfall.

It is interesting to note that a difficulty of this nature cannot very well arise in Australia as the A.B.C. is composed of all the various entertainment businesses. Of a total licence fee of 24s. it receives half and in return guarantees the programmes. The other 12s. covers the cost of collection and maintains the whole plant.

Bulletins

The B.B.C. has considered the possibility of issuing cricket bulletins at, say, hourly intervals during play. But this is not likely to be done because the various sections of the broadcast programme have now attracted their own particular types of listener. There is, for instance, the Children's and the Women's Hour listener. Then there are the people who look forward to the afternoon concert. None of these would be very pleased to have the programme interrupted, and, to make it worse, those who would want to know the score would not be at the loud-speaker but at work. So little good would be done and perhaps a lot of harm instead.

Australian conditions are vastly different from ours. The country is sixty times the size of England and many of its homesteads are away from centres of amusement.

I believe short-wave receivers are quickly gaining favour in Australia. Listeners out there grumble about the programmes just as much as we do about ours, and to seek new fields they have turned to the short waves. They are certain to be tuning in on our news bulletins sent out from 5SW, even though it means being out of bed at five in the morning.

When, therefore, we give grudging admiration to a description of Bradman's brilliant century in a Test Match we can imagine some cousins 9,000 miles away jumping for joy and also, in their turn, imagining our discomfiture.

VOLUME-CONTROL

WHEN using S.G. amplification it is not good practice to place the volume-control after the detector stage, since in this position it will not prevent overloading by the local station where the best-quality signals should naturally be received.

It is better to insert a variable resistance either in the aerial circuit where it will control the input to the entire set, or else across one of the H.F. coupling transformers. If a potentiometer resistance is placed across one of the tuned circuits, the additional shunt capacity will slightly broaden the tuning. However, this is rather an advantage than otherwise where good-quality reproduction is desired.

M. B.

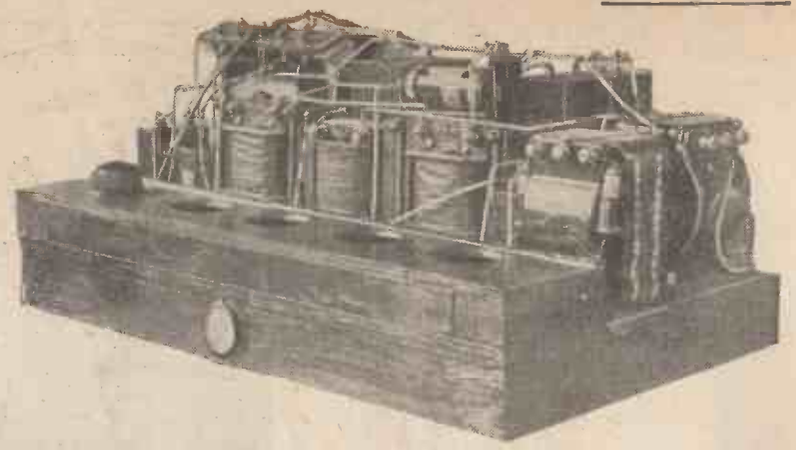
CAUSES OF FADING

THE Heaviside layer is often referred to as the "ceiling" beyond which wireless waves cannot penetrate. Sometimes, however, "holes" occur in the ceiling, i.e., areas of low ionization through which the signal waves can escape into outer space. This is one cause of fading.

Another is due to continual changes in the average level of the "ceiling." Observation shows that the layer rises and falls in cycles roughly every quarter of an hour. It lifts at the rate of six miles a minute, and falls three times as fast. This continual movement diverts the direction of the reflected ray, and creates fluctuations in signal strength at any given receivng station.

B. A. R.

WHAT CONSTITUTES A GOOD AMPLIFIER?



The general outline of a Gramo-radio Amplifier given in this article is in response to a number of requests from readers for the particulars of the equipment used by our Technical Editor

A SHORT time ago I wrote an article suggesting that electrical reproduction could be better than the real thing. This article, as I expected, aroused considerable interest, and several readers availed themselves of my offer and visited my laboratories to hear the equipment for themselves. In every case they went away considerably surprised with the results and inclined to agree with my contention. Other readers, "quality" enthusiasts themselves, have written to inquire what particular methods are employed to obtain the results.

The Best Principles

Any detailed description of the amplifier would, of course, be of somewhat limited interest, but it is possible to review broadly the underlying principles of good design in a radio-gramophone set, so that those readers who feel disposed can put into practice the principles involved and obtain for themselves the real naturalness of reproduction which is possible if sufficient care is taken.

I think what one may consider the outstanding feature of importance is the factor of safety which has to be provided. I remember Mr. Ferranti, son of the late Dr. Ferranti, telling me some years ago of some experiments he had been making to gauge the difference between the ordinary intensity of reproduction and the peak values which occurred during some transient effects, such as the beat of a drum, a sudden *fortissimo* chord on a piano, or even a top note of a soprano. This last effect is hardly a transient, but it produces an enormous increase in the modulation, and the general ratio between peak modulation and the average value was about ten to one.

Now we design our amplifier starting from the back, as a general rule, because we decide the power output which we are to obtain. Knowing the anode voltage and the valves in use, this gives us the grid bias, which is equal to the maximum peak grid swing on the output valve. Our previous stages are designed so that the signal applied will load each stage up to its maximum peak voltage at the same time, the balance being such that full input voltage must apply the maximum peak voltage to the output stage. This, of course, is fairly straightforward, but we have not taken any account in this design of the factor of safety necessary.

Output and Volume

It is quite possible to obtain comfortable room strength with an output of two hundred to three hundred milliwatts. Yet if we design our output stage to handle a power of this order only, we shall overload it considerably during the transient or *fortissimo* passages, and we must make our output stage capable of handling a power considerably in excess of this value if we are out for absolute purity of reproduction. The smaller type of amplifier which I use for my own personal delectation in my home is provided with an output stage capable of giving rather more than 2,000 milliwatts undistorted power, and yet I normally operate it at a volume of about 200 to 400 milliwatts. Here I have a factor of safety of between five and ten in the power output, and although, when I particularly desire the volume to be increased I can obtain quite a loud volume, for ordinary pleasant listening this is too loud and I keep the output down to the level already stated.

The photograph at the top of the page shows the amplifier with the case removed. Above is the complete unit with metal cover

A Factor of Safety

Therefore, at the outset I am using an amplifier capable of handling ten times the power that I normally wish to use. All the preceding stages are designed in exactly the same way, so that they are normally working well within the limits of their characteristics. The result is an inefficient set from the point of view of strength, but it is capable of responding to all the climaxes in the reproduction without any overloading. The volume control is, of course, on the input and is arranged not to distort the quality, which is as good soft as loud.

Another factor is that every stage is isolated. It is provided, to all intents and purposes, with an entirely separate battery system. Actually the equipment runs off the electric mains, and, therefore, I have to use extensive de-coupling arrangements to produce the same effect. Not only is each stage doubly de-coupled, once with a resistance, and once with a constant-inductance choke, but in addition the output stage is transformer-coupled to the loud-speaker. Free grid bias is provided on each valve, this system being equivalent to the use of an entirely separate grid-bias battery for each stage. By this means any form of common impedance coupling is avoided, and this adds its quota to the overall effect.

This may seem to be an extraordinary

(*Continued at foot of next page*)

Some Notes on Present-day Short-wave Conditions

Around the Short-wave Dial

By M. BARNETT

THE short-wave bands at the present time seem to be becoming smothered with commercial telephone stations. When the transatlantic telephone was opened, many amateurs reported hearing strange stations, with operators talking in strong nasal tones, and this caused some excitement among short-wave amateurs, although it was a kind of restrained excitement, because of the terms of the receiving licence, etc.! These stations, of course, become rather boring to listen to and so they are generally avoided by the amateur, as soon as he finds out which are the commercial stations on the dial. They can be a positive nuisance to the DX man, because some of the experimental stations, of which there seem to be many, change their wavelength very frequently. After carefully searching the ether and finding a new carrier wave coming over, which has not been heard before, it is very disheartening to hear a voice say, "Hallo, New York." There was a thrill in hearing these stations at first because of their fine strength and their consistency, but now that the novelty has worn off, are very carefully avoided by most. These stations are also sometimes responsible for some very strange noises, which are impossible to recognise because they sometimes use a form of speech distorter which renders the voices absolutely unrecognisable on the ordinary receiver.

The Regular Transmissions

The regular short-wave stations still continue to give rather poor results. The new Rome station, 3RO, appears to be heard less frequently than formerly. W2XAD has been good on occasions but has, on the whole, been much below standard. The early evening Sunday transmissions from W8XK, using its lower wavelength of 25.25 metres, generally come over rather well. If you have been missing this station, which seems to work mostly on its longer wave of 48.86 metres, try for it at this time. In the early evenings, when Copenhagen, Zeesen, and PCJ are all working at the same time, these stations spread out on the dial and interfere badly with each other. The writer can generally receive the PCJ station louder than his local! By the way these stations interfere with each other, we can easily see that, although the tuning of a short-wave receiver is very sharp, the selectivity is really very poor and only *appears* to be good because one turn of the dial covers such a tremendous range of kilocycles compared with that of the ordinary receiver. As more and more short-wave stations come into operation greater attention will have to be paid to the selectivity of the short-wave receiver which, at present, is not of a particularly good standard.

"WHAT CONSTITUTES A GOOD AMPLIFIER?" (*Continued from page* 687)

length to which to go, but one of the evils of common impedance or battery coupling is that it may operate in the reverse direction from that required to produce oscillation, in which case its presence is often unsuspected. If a receiver howls or motor-boats, we know at once that battery coupling is present. If the battery coupling is in the reverse direction, however, the indications of its existence are indefinite. The amplifier just fails to give the brilliance of tone that it should give, and I believe that the complete elimination of all common-impedance coupling, whether in the anode or in the grid circuit, has a good deal to do with naturalness of the reproduction obtained.

Valve and Speaker Matching

The matching of the loud-speaker to the output stage is of the greatest importance. It is often not appreciated what a difference can be made to the reproduction by such a simple matter as the alteration of the output transformer ratio. There is perhaps little difference in the actual volume of sound produced, but whereas in one case an amplifier will handle extra volume without any overloading, in another case quality is unpleasant as soon as anything like full volume is used. What is more, the setting which gives the maximum power output is not that which gives the maximum undistorted power. Generally speaking for the best undistorted results, the effective speaker impedance should be at least twice that of the valve, and in the case of low-mu valves like the LS5A this figure should be increased to three or four. Once again we see that we are deliberately losing efficiency in order to obtain the quality we require, and this is very much the story all the way through.

Finally we have the question of the input to the amplifier. This may be either from the pick-up or from the radio set. The output from the pick-up depends entirely on the make of pick-up used, and here the personal preference of the user must exercise some considerable effect. The pick-up should have a rising characteristic in the bass, a slight peak in the treble (although this should not be very marked), and it should be capable of free lateral movement, as otherwise distortion of the waveform will occur. This subject, however, is one which requires discussing in detail, and must be dismissed in the present article with a few words.

John Ansell—a Slade impression

As far as radio is concerned, here again a great deal can be said and I may perhaps deal with this aspect of the question on another occasion. It will suffice to point out that the detector valve must give substantially linear rectification. I use a grid rectifier, so arranged that it will handle 2 to 3 volts high-frequency input without difficulty. It is then necessary to supply this rectifier with a fairly strong signal, as distortion may arise if the volume is kept too low. The detector must be by-passed, the H.F. being filtered away.

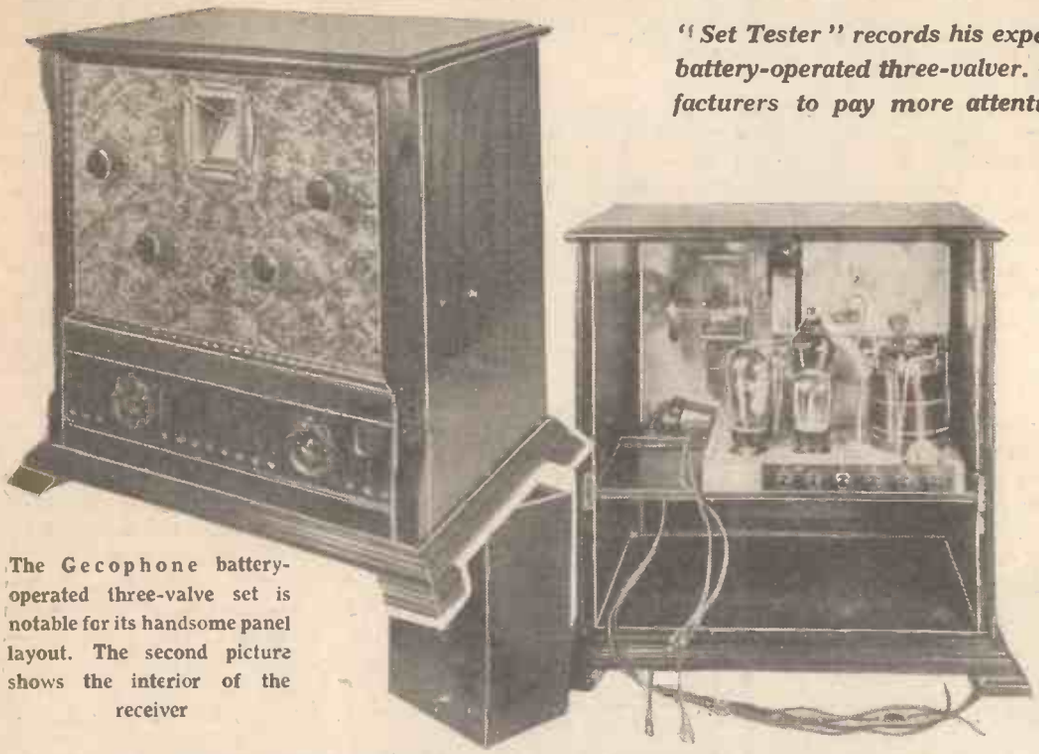
There are many points on which a great deal more could be written, but these brief remarks will serve to indicate the general lines on which the design of an up-to-date radio-gramophone must be constructed.

A PAGE FOR THE SET BUYER

Every set referred to in this regular feature by "Set Tester" has reached a certain standard of efficiency in the "Amateur Wireless" Laboratory. Reports are not given on sets that fail to reach this standard. This will explain why reports that do appear express general satisfaction with the set's performance.

THE NEED FOR BATTERY SETS

"Set Tester" records his experiments with the Gecophone battery-operated three-valver. He urges British set manufacturers to pay more attention to battery-operated sets.



The Gecophone battery-operated three-valve set is notable for its handsome panel layout. The second picture shows the interior of the receiver

BECAUSE I live in a modern suburban area of London, the blessings of electric light are conferred upon me; my soldering iron, radiators and the domestic flat-iron and vacuum cleaner are all electrically energised; so also is my radio set. Good-quality reproduction is easily accomplished, because I feed the last two valves, which are in push-pull, with 400 volts. Batteries I utilise for the short-wave set and general experimental work. But I know many listeners who have to use batteries for the family set.

The Preponderance of Battery Sets

There are probably millions of listeners who still use, and will continue to use, battery-operated sets, simply because they have no electric light. Nor does the Central Electricity Board seem to be unduly hurrying itself to remedy what is really a ghastly backwardness in electricity distribution.

The best efforts of British set-makers are being devoted to the production of all-electric sets. I was amazed last autumn to find that battery-operated sets were being written off the programmes of several big firms. I should be the last to defend the battery-operated set against the all-electric set. But until that distant millenium—an electrified Britain—is a little nearer realisation, let us have more development work put into sets for those whose only motive power is the dry battery or secondary cell.

The General Electric Co., Ltd., enjoys a big advantage in set-production. It has the Osram valve factory at the back of it. I have tested this firm's short-wave set, which was reviewed some weeks ago. And now, apropos of my opening remarks, I can give AMATEUR WIRELESS readers the results of a test of the Gecophone battery-operated three-valver. The price is very moderate, being £12 including valves. Moreover, the construction is robust and the cabinet work excellent.

H.T. Current

This cabinet is made large enough to accommodate the high- and low-tension batteries. The untidy appearance of external connections is avoided. Only the loud-speaker and aerial system have to be externally connected. While they were allowing space for batteries, the makers might have been a little more generous. Double-capacity batteries would not fit inside the space provided. Standard-capacity batteries fit nicely, but the three valves take 12 milliamperes anode current, a total drain too great for the economical use of standard batteries.

The screen-grid valve took three milliamperes, the detector four milliamperes and the small power valve five milliamperes. The total current consumption required by these three valves will ruin a standard-capacity battery within two or three months. The makers are quite frank about this. Four or five replacements per annum will be required, they say.

A box is supplied to take a standard Gecophone two-volt accumulator. As this is 30-ampere-hours in actual capacity, the set will give approximately 70 hours reception per charge.

The internal arrangement of this set is neat. The valve-holders are most accessible. By following the book, even the novice should be able to connect up the batteries and insert the valves in their correct positions.

The circuit is a well-tried three-valve sequence. It consists of a screen-grid valve for high-frequency amplification, followed by leaky-grid detector, which is transformer coupled to the output power valve. The two tuning circuits are ganged; in other words, both sets of moving condenser plates are operated by a single knob.

This knob also turns a scale calibrated in wavelengths. Medium waves from 600 metres down to 250 metres are marked at the left of the dial scale and long waves from 2,000 to 800 metres on the right. A centre division of degrees is added to fill in the gaps. A hair line across the scale would have improved what is, in any case, an unusually well-planned tuning arrangement. I liked the feel of the tuning knob.

The inevitable reaction knob, a knob for vernier tuning and a knob for changing the wavelength range, share a common robustness that is all too uncommon in factory-built sets. Of course, one pays for these refinements, but many will willingly do so, I feel sure.

A filament on-off switch completes the handsome panel layout. When I pulled out this switch my test began in earnest. Now for results: With an aerial of 70 ft. overall length in south-west London, terminal "A" of the three aerial connections available had to be utilised for adequate signal strength.

Midland Regional at 76 degrees was a very strong signal requiring very little reaction. As 76 degrees corresponds to a position between 450 and 500 metres on the scale, the calibration is fairly accurate, Midland Regional's wave being 479 metres. To test the utility of the wavelength calibrations, I set the dial 2 degrees below the

(*Continued on next page.*)

MY WIRELESS DEN

By W. JAMES

Weekly Tips, Constructional and Theoretical—

For the Wireless Amateur

For Motorist Portable-users

IT would appear that one of the chief difficulties met with in motor-car wireless reception is the suppression of noise due to the ignition. Experiments have shown that the noise may be considerably reduced by a very simple means, namely, the inclusion of a fixed resistance in the cable to each sparking plug.

A suitable value appears to be about 20,000 ohms. The question arises as to whether these added resistances affect the performance of the car, but as they are used in America, where some attention has been given to this matter, one may conclude that no material change in performance results.

Those Valve Pins

The advice to open valve pins with the blade of a knife is often given, but a little experience of mine a few days ago showed that this must be done with care.

I was shown a valve which had been somewhat roughly dealt with in this way, with the result that one of the connecting wires was broken. It proved possible to effect a repair. The valve leg was cut off and a piece of wire was soldered to the short length sticking out of the valve. This wire was then taken direct to the terminal of the valve holder when the valve was plugged in.

The point to remember is that the wires from the valve pass through the valve legs and are soldered to their tips. It is, therefore, possible for a wire to be cut when the blade of a knife is pushed through one of the slits in a valve pin.

Valve holders or valve caps vary so greatly in size, that it is often necessary to open the pins a little to ensure a good contact. Obviously the work must be carried out with care.

Finding Valve Figures

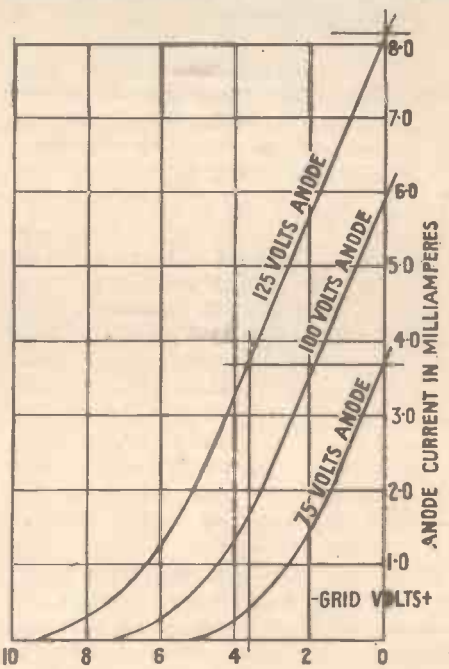
A reader has asked me to explain how the amplification factor and the impedance of a valve may be found from its characteristic curves.

Three curves are given in the accompanying diagram. One of them shows how the anode current varies with the grid bias when the high-tension is 75 volts. A second curve shows the current and grid bias when the anode voltage is 100, whilst the third is for 125 volts.

When the grid bias is zero and the anode voltage is 75, the anode current is 3.7 milliamperes. For 125 volts the current is 8.15. An increase in the anode voltage of from 75 to 125 (50 volts) has, therefore, raised the current from 3.7 to 8.15 milliamperes. Thus the impedance of the valve about 100 volts and zero grid bias is 50/4.45 multiplied by 1,000, which is 11,000 ohms.

Actually, the change in voltage is divided by the change in current in amperes.

To find the magnification factor we choose points of equal current and note the



These valve curves illustrate the point raised by W. James in the accompanying paragraph

increase in grid bias required to compensate for an increase in the anode voltage. At 75 volts and zero grid bias the current is 3.7 milliamperes. If we increase the anode voltage to 125, the current goes up to 8.15, but by adding 3.6 volts grid bias the current is reduced to 3.7.

Therefore, 3.6 volts change in grid bias has an effect equivalent to 50 volts of high tension, from which it follows that the amplification factor is 50/3.6, or 14. These examples show how easy a matter it is to estimate both the impedance and magnification factors from characteristic curves.

Reaction and Tuning

A peculiarity of some reaction circuits is that the tuning is hardly affected by adjustment of the reaction.

Now and again, however, one meets with a circuit having parts of such values that the tuning is considerably altered, with the result that an amount of skill is needed to bring in a weak signal.

Reaction of this sort is fatal in a single-tuning control set for obvious reasons. In a set of this type the tuning must not be affected by adjustment of either the volume control or reaction, or at least, not by a material amount, for some slight change is inevitable.

By suitably proportioning the parts of the reaction circuit it is possible to obtain the desired results as regards tuning and also to have a smooth control of self-oscillation. As a rule, a combination of a fairly small reaction coil with a large condenser is more satisfactory than a large coil and small condenser.

But much depends upon the actual valve used for detection, as well as upon the grid coil. Also, the value of the coupling of the reaction and grid coils is important. In spite of the numerous factors, it is possible, however, to obtain the desired results.

"THE NEED FOR BATTERY SETS"

(Continued from preceding page)

450-metre mark. Sure enough, there was Rome on 441 metres, corresponding to 68 degrees. This was a moderate loud-speaker signal using maximum reaction.

Before searching for other distant stations London Regional was tuned in, much too strong, even without reaction, at 49 degrees. The volume control, by means of the vernier tuner, was not effective. De-tuning was necessary to reduce volume. The National station came in well at 10 degrees. As regards selectivity, the Regional had just faded out completely as the dial approached the National's wavelength. There was not much doing between the Regional and National programmes.

Quality of reproduction was excellent. Using a linen-diaphragm type of speaker, speech was clear and music pleasing.

Worked under average conditions, the Gecophone three-valve battery set can be relied upon to give good-quality reproduction from local stations and possibly several alternative distant stations at varying degrees of signal strength.

On Your Wavelength!

The Solution to My Problem

I WONDER how many people were able to discover the fault I referred to a fortnight ago concerning an A.C. set at Mr. Reyner's laboratories. As a matter of fact the A.C. had very little to do with it, except in so far as that the high-tension voltage was fairly high, and the same curious effect is just as likely to occur on a battery set given suitable conditions.

Readers will remember that the symptoms of the fault were annoying hum with poor performance, and that during the testing operations a 2-microfarad condenser was inadvertently connected between the grid of the detector valve and H.T.+. This charged with a loud crash, and thereafter the fault was found to be cured.

Not Very Apparent

The subsequent tests showed that it was the actual charging of this condenser which had eliminated the trouble. There was a bad contact in the grid circuit of the detector valve. This fault was not easily apparent, but was introducing appreciable high-frequency resistance in the circuit. The sudden pulse of current due to the charging of the condenser, which, of course, had practically the full H.T. across it, was sufficient to weld the bad joints together and overcome the high-frequency resistance at the point of contact. Needless to say the weld was not a very permanent one, and the trouble was located and the defect made good as soon as possible, but the current pulse was sufficient to produce a temporary weld which entirely overcame the difficulty.

Vision and Sound on One Wavelength

With reference to my remarks last week concerning a transmission of speech and vision on one wavelength, I find that the Baird Company have suitably protected a scheme on more or less the same lines. At the transmitting station there must be a means for recording the sound signals at the rate at which they are produced. These signals are then transmitted at a higher rate and intercalated with the vision signals so that the same channel can be used for both. Turning to the receiving end, the sound signals are recorded at this same high rate and reproduced simultaneously with the vision signals at the rate at which they were recorded initially at the transmitting station.

A Future Possibility

For example, the sound may be recorded for nine-tenths of a second and transmitted during the following one-tenth of a second. The medium for communication, that is wire or wireless, is thus only occupied for one-tenth of a second, leaving the remaining nine-tenths for the vision signals, the transmission of which need not be expedited under this arrangement. To ensure continuity in the reception of these sound signals, two recording devices may be employed alternately at the transmitting end and then one be engaged in transmission while the recording on the other is being effected. Suitable recording devices were mentioned last week, and the whole idea, while on the surface apparently complicated, should be capable of development. The achievement of sight and sound transmissions on one communication channel would certainly be a great step forward and it is to be hoped that the day of accomplishment is not far distant.

Sparking-plug Broadcasts

In the ignition system of a motor-car you have all the elements of a perfectly good transmitter; a tapping key as represented by the make-and-break and an oscillatory circuit carrying 10,000 volts or so with a gap across which a spark takes place. And some of these ignition circuits are particularly powerful broadcasters, as any short-waver who lives near a highway has probably discovered for himself. Possibly he may have been puzzled by the rat-tat-tat noise, faint at first, but growing rapidly in volume and then diminishing again, which was heard every now and then in his telephone receivers. Ignition systems are the cause of this kind of broadcasting and the trouble is that the natural wavelength of many of them is a very short one. They send out fairly powerful trains of undamped waves, set the aerial oscillating at its natural frequency and make the would-be receiver of distant stations cuss heartily. I have come across cases of people living right on roads carrying heavy traffic where reception at the bottom of the short-wave band was almost impossible for that reason. Bear in mind that even the L-shaped aerial has certain directional properties and that a little experimenting in this direction is often worth while.

'Ware Trees

Many modern accumulators housed in glass cases have no wooden or celluloid separators between their plates. The latter fit into moulded recesses and are therefore kept in position automatically. Advantageous though it may be in some ways the absence of the separators has one rather serious drawback which is not always realised. It sometimes happens that one or more of the plates may start to sprout growths technically known as "trees." These look rather like miniature mushrooms. They do no harm so long as they are small, but if they are allowed to increase in size they may result in an internal short-circuit, with very serious consequences to the battery. If you have a glass-cased accumulator make a point of examining it carefully each time it goes to be charged, and if you see any signs of treeing, have the plates removed and treated.

Which Should Be Sharper?

The average receiving set nowadays contains a high-frequency valve, a rectifier and either one or two note-mags. This means that it has two tuned circuits and one nearly always finds that one of these is rather sharper than the other. Sometimes the aerial tuning is comparatively broad, whilst that of the grid of the rectifier is of the knife-sharp variety; sometimes matters are reversed, the aerial tuning being sharp whilst that of the second circuit is broad. Which is the better combination? My own view, which will I think be borne out by the majority of experimenters, is that if you cannot get both circuits equally sharp it is desirable that the aerial tuning should be the more selective. This seems to make searching easier and it will allow much sharper tuning to be used without detriment to the quality. Myself, I always use an aerial-grid transformer for the first stage. In the secondary I have the smallest number of turns that will allow the desired range to be covered with the variable condenser with which it is employed and the primary is generally tapped so that the degree of aerial coupling can be varied to a fairly large extent. Though the aerial is aperiodic I like to have in series with the lead-in and the top of the coil a semi-variable condenser with a maximum capacity of about .00025-microfarad. With this and the tappings one can adjust matters so that one obtains the most desirable compromise between adequate signal strength and good selectivity.

Trying it on the Dog!

Why, I wonder, does the B.B.C. inflict upon its long-suffering listeners such appalling musical balderdash as the thing they gave us a little time ago, which was supposed to be a musical description of an aeroplane flight by Commander Byrd or Lindbergh, or somebody of the sort? And this bilge was put out, if I remember aright, as a "national" item, which means that it occupied the programme time of the majority of transmitters in this country. I found it pretty bad myself, but, not being a musical high-brow, I thought that possibly I was not appreciating something that musicians might find too beautiful

On Your Wavelength! (continued)

for words. However, I was consoled when I opened my Sunday paper and read the gorgeous comments on this particular tosh by Mr. Ernest Newman, the famous musical critic. His suggestion was that the composers (the thing was, I believe, especially written for Austrian stations) should be put into an aeroplane and sent out into the Atlantic, a musical description of their fate being written by Lindbergh and Commander Byrd.

Come Down to Earth

Another perfectly footling piece of entertainment, to my mind, was "Intimate Snapshots," again sent out as a National item a week later. The theme of the bit to which I listened (and it wasn't a very big bit) appeared to be that life was monotonous for most of us. Much the same theme was used in another silly item transmitted some time ago called *The Squirrel Cage*. Just why the B.B.C. should strive to bring home to listeners who are seeking relaxation in the evening from the monotony of a day's toil that life is dull and monotonous I cannot for the life of me follow. The whole purpose of entertainment is to provide the variety that is lacking in the daily round. Broadcasting's essential function is to provide entertainment—and there you are.

"Losing Their Filaments"

In the early days of the British Broadcasting Company, as it then was, I spent a fair amount of time at headquarters in and out of the studios. In those days you would hear officials, who were listening to some performer in the control-room, say to one another with a shake of the head, "I'll bet he loses his filaments." This always struck me as a beautiful expression. What it meant, of course, was that if the said performer didn't brighten up a bit the filaments would be switched off in receiving sets, here, there, and everywhere. I don't know whether the expression is still in use at Savoy Hill. I think not, for if it were we should possibly not have quite so many items of a definitely filament-losing kind. It is a great pity, when you come to think of it, that, in addition to all the other meters and dials at a transmitting station, there cannot be one recording the number of sets receiving the transmission at any moment. Can't you see the pointer leaping and bounding towards zero when some caterwauling high-brow musical item is in progress?

Did You Notice It?

I wonder if you happened to be using your short-wave set at the time of the last new moon. If you were, you must have noticed peculiarly interesting conditions. Shortly after midnight foreign stations were coming in very badly, signal strength being weak and fading unusually pronounced. Then, quite suddenly, a remarkable change occurred. In the early hours of the morning, stations previously weak became strong, fading was almost entirely absent, and wonderful reception was obtainable from very distant places. The effect was particularly noticeable in the case of signals from South American amateur stations. I shall be interested to know if any short-wave enthusiast among my readers observed similar changes upon this or other recent nights.

A Blessed Relief

Readers who live both on the coast and inland must have noticed with joy the considerable reduction in the amount of spark interference that has taken place in recent months. Under the Washington Convention, liners no longer use their spark sets when they are comparatively close to land, and shore stations are being converted from spark to tonic train as rapidly as possible. Many of our own shore stations have been dealt with in this way; in fact, I am not quite sure that any important spark stations still remain. In foreign countries progress is not quite so rapid, though something is being done. Before so very long our old friend (?) FFB, the Boulogne station, may cease to inflict his raucous interference upon us, though it is, perhaps, too optimistic to prophesy that even when converted to T.T. he will stick to one wavelength. The last spark transmitters to go will be those used by trawlers. But go they eventually must, for none will be permitted after the year 1940.

Front Screens

The many-dialled, many-knobbed ebonite panels of early broadcast receivers have given way to metal panels which act as screens and add some decorative effect to the general appearance. I am not so sure, though, that certain classes of these metal front panels are any improvement on ebonite, which was plain and neat, substantial for mounting components on, and which could be easily made into an electrical screen by fixing a thin sheet of copper behind it. Many of the metal panels to be seen in the radio shops are flimsy affairs of tinned-iron sheet with unpleasant crustings of black paint on their fronts. Peculiar designs and patterns and extraordinary imitations of wood and leather have run riot on the cheaper examples of metal panels, surpassing even the morbid imaginations of wallpaper manufacturers.

The Novice's Choice

There are, of course, plenty of good metal panels available. But some of these are thick and heavy, and the designs on their fronts are simple and plain; besides, they cost a bob or two more than the "flashy" type. The novice is apt to forget that the front panel will have a dial or two and a switch on it, and he invariably chooses the panel having the most elaborate design. This may appear quite innocent on the counter of the radio shop, but it becomes a veritable nightmare when it has a couple of ornamental tuning dials on it. The safest plan and the moral of this treatise is: choose a panel which is plain or has a very restrained decorative effect.

An Old Discussion Again

Experiments conducted by the B.B.C. Research Department show that, in the reception of the new regional stations, anode-bend rectification has no advantages over the ever-popular grid-leak and condenser method. It appears that the modulation of the regionals is very much deeper than the old B.B.C. stations, the new circuits of the transmitters allowing this to be done without distortion or "blasting." As a matter of fact, much better reception results can be obtained with grid leak and condenser, provided the values are correct; these are .1 megohm and .0001 microfarad, the leak being connected to the positive side of the filament lead. These values are lower than usual for leaky-condenser rectification, and it must be admitted that the sensitivity is less, but quality better.

B.B.C. Experiments with "Transients"

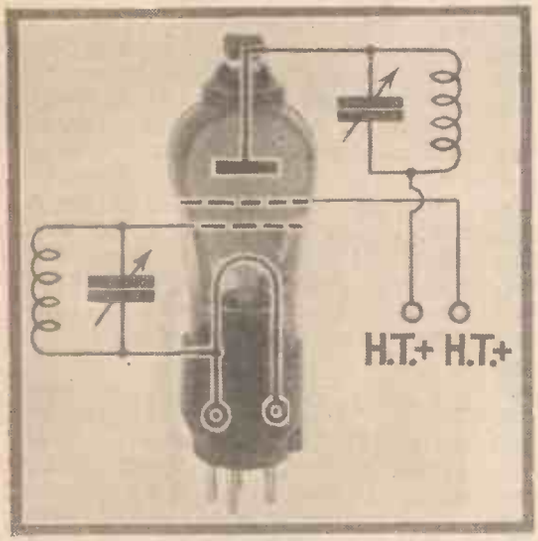
The frequency characteristics of the B.B.C. amplifiers and transmitters are pretty well perfect. The Research Department is now devoting itself to the curing of "transient" distortion. This is the correction of the relative strengths of sounds, especially in the commencements and endings. The chief difference between the reproduction from the finest loud-speakers and the sound itself is the loss of bi-aural effect. The loud-speaker reproduces what would be heard by *one* ear only. The second most noticeable defect is a certain lack of crispness and "attack," particularly in the reproduction of orchestral music. The correction of faults in receiver and transmitter design will minimise the amount of transient distortion from this source. As to the "one-ear" effect, I am afraid that will always be with us. Stereophonic broadcasting is possible, with two microphones placed in the same relative positions as the human ears, and with each microphone connected with a separate broadcast transmitter. The listener would then have to receive the transmission on two sets, with one earphone listening to one transmitter (and microphone) and the other earphone to the second transmitter. I say it *is* possible; but it is not probable!

THERMION.

The BEST THREE-VALVE CIRCUIT

Improved broadcast transmissions and wireless receiving apparatus warrant a reconsideration of views on which is the best three-valve circuit. In this controversial article Alan S. Hunter analyses the problem

YEARS ago, we used to discuss the best way to utilise three valves. Whether to follow the detector with two stages of low-frequency amplification or to precede the detector with a stage of high-frequency amplification was hotly debated. In those days, we came to the conclusion, rightly, I think, that the best arrangement of three valves was a detector, with reaction, followed by two stages of low-frequency amplification. The main reasons for this decision are interesting.



Typical H.F. amplifier arrangement

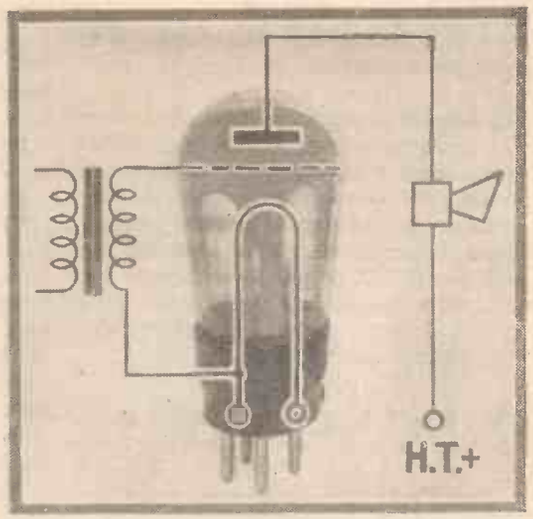
High-frequency amplification was then in its infancy. In the days of which I am speaking even neutralising was unknown. Valves connected up for high-frequency amplification were extremely unstable. Losses had to be introduced to prevent uncontrollable oscillation. Some sets relied upon the inherent instability of a tuned-anode high-frequency amplifying circuit to produce reaction, as the grid and anode circuits were brought into tune.

The operation of such unstable arrangements was a feat in itself. And the measurable amplification before detection was extremely minute. There were no special valves for high-frequency amplification. What we called general-purpose valves were utilised for all stages, including the output stage.

These and other reasons quite naturally prejudiced most of us in favour of the detector and low-frequency amplifying circuit. Broadcasting conditions also favoured this arrangement. There were very few stations broadcasting telephony. Those that were pioneering the European ether were sufficiently separated in frequency to be picked up with a fairly crude tuning arrangement. The local station, if one were fortunate enough to have such a boon, was of minute power, easily cut out without resorting to such a device as the wavetrap.

How the position has altered since those far off days! Yet I still meet people who swear by, and not at, the old circuit. Every available kilocycle between 250 and 550 metres on the medium band, and between 1,000 and 2,000 metres on the long band, is now fully occupied—and not by stations of diminutive power. Many European broadcasters exceed 10 kilowatts. A few, including some of our own, exceed 20 kilowatts. A general all-round increase in transmitting power is now in process.

A single stage of tuning is no longer adequate. If a second tuning circuit is added, a big loss of energy follows, a loss that should be made good by an intervening stage of high-frequency amplification.

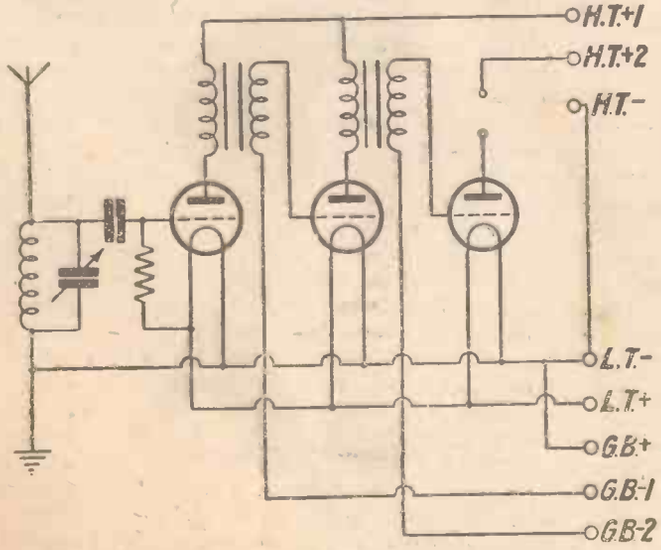


Here is the arrangement when an L.F. valve is used

In these days, selectivity does not mean the ability of a set merely to cut out the local station. It also implies an ability to differentiate between distant stations. A wavetrap may confer a fictitious degree of selectivity on an inherently unselective set. Many amateurs congratulate themselves on cutting out the local station by a wavetrap, only to find that distant stations are coming in two or three at a time.

The need for more selectivity has been accentuated by the Regional centre at Brookmans Park. A further outcry will undoubtedly arise when the Manchester Regional gets going. To achieve the necessary selectivity without undue loss we must, therefore, introduce high-frequency amplification. It is correct practice to insert a high-frequency valve between successive stages of tuning.

(*Continued at foot of page* 707)



Old-fashioned 3-valver with two stages of L.F. amplification

SYDNEY MOSELEY'S WEEKLY PROGRAMME CRITICISM

WITHOUT FEAR OR FAVOUR

Television Programmes

An Innovation in Talks

Contemporary Music

The Debates

FROM about nine o'clock in the morning till past midnight recently I listened to a score of stations. I heard gramophone records galore, and I have come to appreciate more and more the way we do these things in London. Whoever heard, for instance, a broadcast of a record running down in the middle of a tenor solo! Or again, have you ever heard a record with a notch in it broadcast so that phrases go on repeating themselves?

◆ ◆ ◆

The notes in this journal about the television programme are naturally gratifying to me, since I have had something to do with the broadcasts. But I am far from satisfied. An attempt to put out good all-round programmes helps one to sympathise with the B.B.C. programmes department. But, then, while remaining constructively critical, I have always been thoughtful, kind, and sympathetic.

◆ ◆ ◆

The Rev. A. R. Browne-Wilkinson knows how to make an intimate appeal, but I submit that his talk to children is mis-timed. It should certainly not be dove-tailed into the Sunday afternoon programme, and I am sorry for those listeners who have to rely on the National programme. Unless they are seriously inclined, all they have up till nine o'clock is one hour's concert. If *everybody* is able to switch on to London or the Midland programme — well, that's another matter.

◆ ◆ ◆

Marguerite de Pachman made an auspicious début with her pianoforte recital.

◆ ◆ ◆

Bright idea to broadcast Strauss' *The Bat*, but a pity the first act was not given with the tuneful overture. Tastes change. I first "wrote up" this opera for the old *London Evening Times* in 1911, when it was produced in London under the title of *The Night Birds*. Recently I saw and heard it in Berlin, produced by Max Reinhardt. Jolly bright stuff, and, with due respect to the German Master, I should think it would better stand broadcast in full than *The Rhinegold*, which is rather on the heavy side. I love Wagner, but I nearly fell asleep when I saw the opera in Paris last year.

◆ ◆ ◆

Did you listen to Dr. Cyril Burt on the study of the mind? Quite a good idea to bring children to the microphone and test their intelligence by reading. One, the girl, was particularly good. Is this a fair test, though? I once asked the governor of a London prison and he agreed with Dr. Burt. I have my doubts, however. When I was a kid I read *long* words well enough, but stumbled over the word "gas"!

◆ ◆ ◆

The orchestral concert by the Midland Wireless Augmented Orchestra, under Joseph Lewis, was inspiring in another way. The whole musical programme on that evening was first rate.

◆ ◆ ◆

I fear I am rather behind-hand with my correspondence.

Here is one from H. G. (Dewhurst) :—

"I want to ask you something: Highbrow that you are, can you see anything likeable or admirable in this wretched contemporary music? I am a music-lover myself, and I can go into rhapsodies over the beauties of Chopin, Wagner, and Schumann; but, for the life of me, I'm hanged if I can discover a single good quality in the awful stuff broadcast from the Central Hall."

My correspondent goes on to describe the recent broadcast of Milhaud's "L'Homme et son Desir" as "a horrible, tuneless din." He asks how this "nightmarish stuff" can be compared with *Aida*, *Tosca*, or the "Unfinished Symphony." "Later in the programme a concerto by Hindemith for organ and orchestra further convinced me that this stuff is not the work of musicians, but of cranks."

◆ ◆ ◆

H. G. wonders why the B.B.C. broadcasts such compositions. The answer is that the B.B.C. contrive to give an opportunity to those who have hitherto been denied a chance. You must remember that many composers who are very popular to-day were rather hounded off the field when they first appeared. H. G. says: "if a crank offered to broadcast a talk on 'Why the World is Flat,' they would turn him down. Then why broadcast at great length cacaphonies which must be the products of musically-distorted minds?"

◆ ◆ ◆

Well, frankly, I do not at all care for much of this modern musical stuff, but I should be the last to put up a general bar against innovations. Incidentally, I have found that foreign stations try more varied and new musical pieces than we do.

◆ ◆ ◆

I have commented before on Wish Wynne's "slum kid" act, and am sorry to say that further acquaintance with it has by no means changed my mind about it. I do wish Wynne would give it a rest.

◆ ◆ ◆

A Hampstead correspondent apparently approves of the Sandler applause. She thinks that "all the applause Mr. Sandler gets he richly deserves, and I have yet to meet the listener who objects to it." Also, "that the broadcasts from the Park Lane Hotel are the most enjoyable of the Sunday evening programmes, and occur only too rarely." My only view is that other light orchestras are just as good and much less fuss is made of them.

◆ ◆ ◆

My protest against the manner in which the B.B.C. debates are conducted is most timely. Unfortunately, I did not hear the recent discussion on "Happiness," when Miss Violet Sackville-West and Harold Nicholson did the honours. "Honours," did I say? Well, my correspondent describes them as "offenders," and for the following reasons. "Neither made but little attempt to tackle the subject seriously; both were more concerned in trying to score off each other. Mr. Nicholson set the standard when he challenged Miss West's pronunciation of the word 'premise'; from then on they reminded me of a couple of back-chat comedians"

Richard Austin in Cartoon

THE NEW P2 VALVE

First details of the new 2-volt valve which provides greater power output

THE 2-volt power valves issued a few days ago are interesting for two reasons. First, they provide considerable power output, and, secondly, they do this with less grid excitation than earlier types.

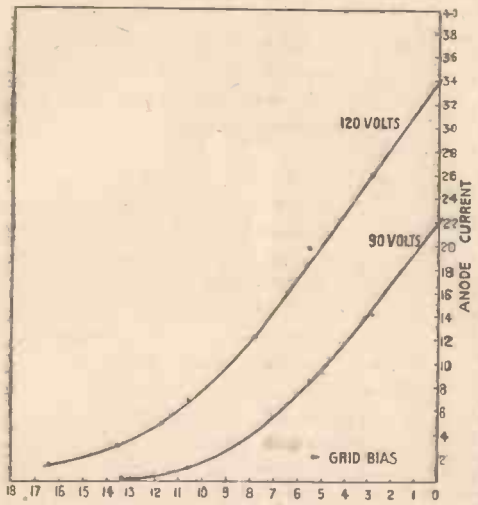
Now how does this affect users? In the past, 6-volt power valves have been employed by those wanting full volume from a good cone-type loud-speaker. The output from the more economical 2-volt types was much less, in fact, barely satisfying.

In portable sets, for example, only moderate quality and strength have been tolerated, because the use of a really good power valve involved the expenditure of too much in proportion on low- and high-tension supplies. A good 2-volt power valve would be the Osram P240, for example, taking .4 ampere at 2 volts. This valve would be biased about negative 15 volts for a high-tension of 100 and 24 volts for a high-tension of 150, the anode currents being about 11 and 17 respectively.

Low Impedance and High Magnification

The valve has an impedance of 2,500 ohms and a magnification factor of 4, that is, the normal slope is 1.6 milliamperes per volt. Now let us look at the new Osram P2. This valve takes 2 volts .2 ampere. Its impedance is 2,300 ohms, about the same as that of the P240, but its magnification factor is 6.5, giving a slope of 2.8. Thus the valve, whilst taking only half the filament current as the P240, has about the same impedance and over 50 per cent. greater magnification factor.

It will, therefore, provide about the same output power, but for less grid input. Expressed in another way, the new valve is more sensitive. It is provided with less grid bias and the full output is obtained from weaker signals. Alternatively, if the signals are of sufficient strength to load up an earlier pattern of power valve, the volume control will have to be used. The improved characteristics are obtained by using a long filament, and by closer spacing of the parts. With a high tension of 100, a grid bias of negative 7.5 is enough, the anode current being 7 milliamperes.



Typical curves of the new P2 valve

Importance of Correct Grid Bias

There are one or two points to note when first using one of the new-type valves, which I believe are being issued by Marconi and Cossor as well as Osram. The first is the value of grid bias. If you have been using an old-type power valve and you merely fit one of the new ones, poor results will be obtained.

The grid bias will be excessive and should, therefore, be reduced. From this it follows that the signal strength applied to the last valve must also be reduced (in the case of strong signals) or the valve will be overloaded

Owing to the increased amplification factor the new valve is more sensitive and will give its full power with comparatively little input. Signals which were weak will now be heard at greater volume.

Anode-current Variation

The second point is that a small change in grid bias will effect a considerable alteration in the anode current. If, for instance, you tried a grid bias of negative 3 volts for a high-tension of 120 volts, the anode current would be 26 milliamperes. At zero grid bias the anode current amounts to as much as 34 milliamperes. If you overbiased, say, to negative 12 volts, the current would be as little as 4 milliamperes.

The point that I wish to emphasise is the big change in anode current brought about by altering the grid bias. A user ought, therefore, to be very careful that the correct value is used. If the grid bias is too much, the anode current will be small and the valve will partially rectify, thereby distorting.

When, on the other hand, if too little grid bias is used, the output to be obtained will be below normal and, most important of all, the anode current will be excessive.

A user should, therefore, first set the grid bias to the value suggested by the makers and then fit the valve. Adjust the set and note the quality of the reproduction, setting the loud-speaker, if necessary. The set should then be turned off and the grid bias increased by 1.5 volts. Test for quality of reproduction once more and compare it with that first obtained.

The object of these tests is, of course, to obtain as much volume as possible with good quality with the least anode current. This may not be of so much importance to those having a mains unit, but I know how necessary it is for battery users to obtain the desired results with the expenditure of the least amount of current, and it is only by testing properly that the most economical results can be obtained.

A Great Improvement

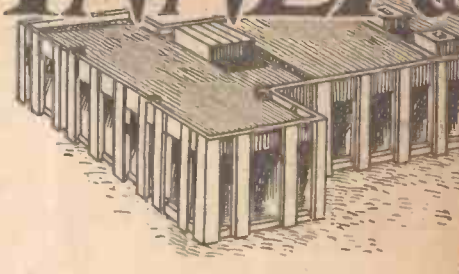
The new valves, properly used, are a great improvement on the old. Quality of reproduction should be better, the lower notes being brought out at greater strength, if a change is made from a valve having a higher impedance.

Full tone is appreciated by most listeners, and while a valve cannot correct faults in a loud-speaker, the reproduction as a whole can be improved. The use of low-impedance power valves is a step in the right direction, and when sensitivity is high, good results are assured from simple sets.

Those having a set of the S.G., detector, and power type and able to use 150 volts of high tension, will be able to obtain ample volume for domestic purposes when one of the new power valves is used. Fair results will be obtained from a moving-coil loud-speaker, and good results with two valves used in push-pull.

Enthusiast: "Ah! This is Barcelona."
Friend: "Indeed! I suppose that cracking noise will be the nuts?"

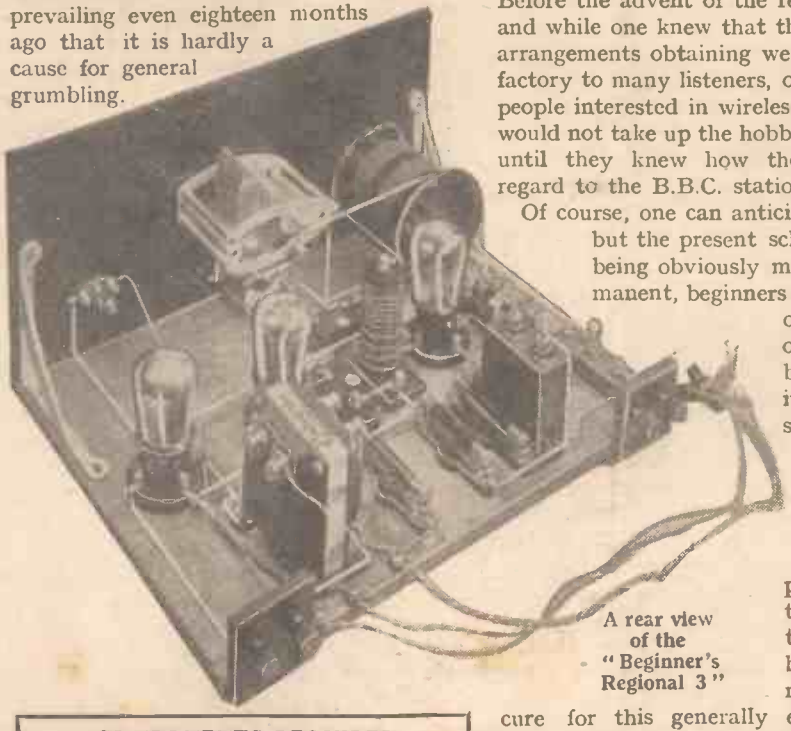
The BEGINNER



AN IDEAL SET FOR FAMILY USE

DEVELOPMENTS take place fairly rapidly in broadcasting. The kind of reception that was general in 1928 was quite different from that which practically every listener in the country is experiencing to-day. Even listeners in the extreme west of England and in the north of Scotland are finding that the number of "giants" on the medium-wave band has vastly improved the chances of getting good loud-speaker strength on only two valves—and that at distances about twice as great as the B.B.C. recommend for normal service.

The main body of enthusiasts living nearer to the towns and generally somewhere within reach of the service area are finding an even greater benefit from the regional scheme. Naturally there are complaints. There are many instances where the local strength is so great as to wipe out many of the foreigners: but that is so different a state of affairs from that prevailing even eighteen months ago that it is hardly a cause for general grumbling.



A rear view of the "Beginner's Regional 3"

The regional scheme has come to stay, and no matter what modifications are made when it comes nearer to completion, listeners have now the satisfaction of knowing that the kind of reception which they now enjoy will never be impaired, and may even be improved.

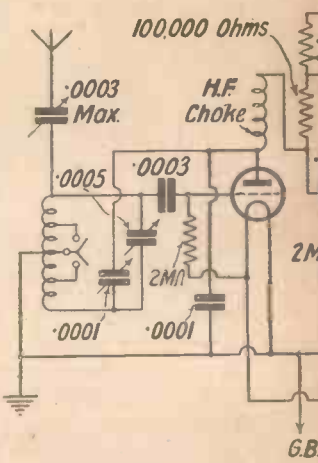
Beginners are therefore on a safe footing. Before the advent of the regional scheme, and while one knew that the older station arrangements obtaining were still unsatisfactory to many listeners, one heard many people interested in wireless say that they would not take up the hobby or make a set until they knew how they stood with regard to the B.B.C. station changes.

Of course, one can anticipate too much, but the present scheme of things being obviously more or less permanent, beginners will realise that one of the least of the B.B.C.'s benefits is that it is making for simpler sets, at least so far as the number of valves is concerned.

As many people have cause to know, selectivity is often a bother at close range, but the cure for this generally entails efficient circuits and not an added valve stage or expensive components. With the regional scheme—and, it must be added, with the foreigners all trying to out-rival one another so far as they possibly can under the Prague Plan—a three-valver with no screen-grid stage not incorporating any particularly expensive parts, will give entirely satisfactory reception.

For Present-day Conditions

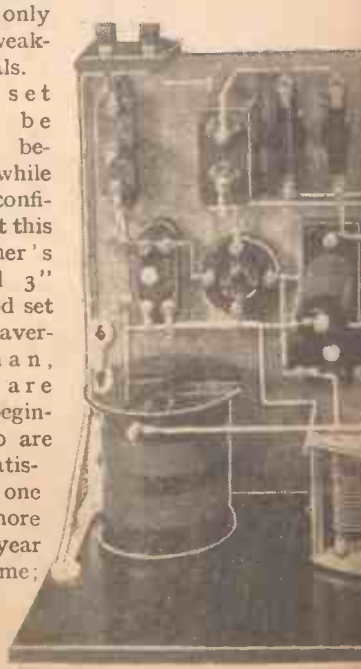
The "Beginner's Regional 3" here described is a three-valver to suit these new conditions. This claim is perhaps becoming hackneyed owing to the rapidity of development, but it really is justified in this "three." A glance at the photographs will show that but few parts are needed, and that the layout is quite straightforward owing to the simple circuit employed.



The circuit is of the Hartley

Obviously the best set for a beginner must be cheap, simple to construct, easy to tune, and yet quite efficient, so that very careful adjustment to get good results will be needed only on the weakest signals.

The set must be cheap because, while we are confident that this "Beginner's Regional 3" is a good set for the average man, there are many beginners who are never satisfied with one set for more than a year at a time; and as they will have



Comparison of this photograph with th

COMPONENTS REQUIRED

Ebonite panel, 14 in. by 7 in. (Trolitax, Becol Lissen).
Baseboard, 14 in. by 10 in. (Pickett, Camco).
.0005-microfarad variable condenser (Lissen, Ready-Radio, Dubilier, Igranic, Lotus, Burton, Polar, J.B.).
.0001-microfarad reaction-condenser (Lissen, Bulgin, J.B, Dubilier, Lotus, Burton).
Dual-range coil (Bulgin, type A, Tunewell).
Push-pull filament switch (Bulgin, Lissen, Lotus, Benjamin, Igranic, Wearite).
Panel brackets (Ready-Radio, Lissen).
Three valve holders (Brownie, Igranic, Benjamin, W.B., Lotus, Formo, Burton, Trix).
.0003-mfd. fixed condenser, with grid-leak clips (Watmel, T.C.C., Dubilier, Graham-Farish, Atlas).
.0001-mfd. fixed condenser (Watmel, T.C.C., Dubilier, Graham-Farish, Atlas).
.005-mfd. fixed condenser (Watmel, T.C.C., Dubilier, Graham-Farish, Atlas).
2-mfd. fixed condenser (T.C.C., Dubilier, Lissen, Hydra).
100,000-ohm resistance, 50,000-ohm resistance, 2-megohm resistance (Graham-Farish, Ready-Radio, Ferranti, Dubilier, Bulgin).

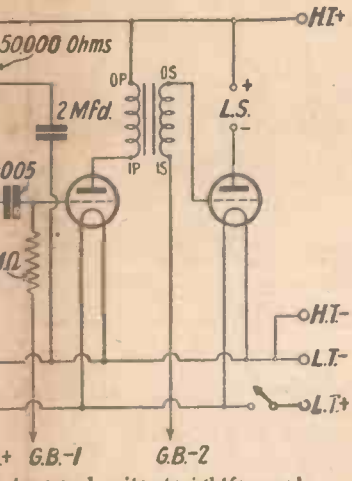
's REGIONAL 3

CHEAP TO BUILD

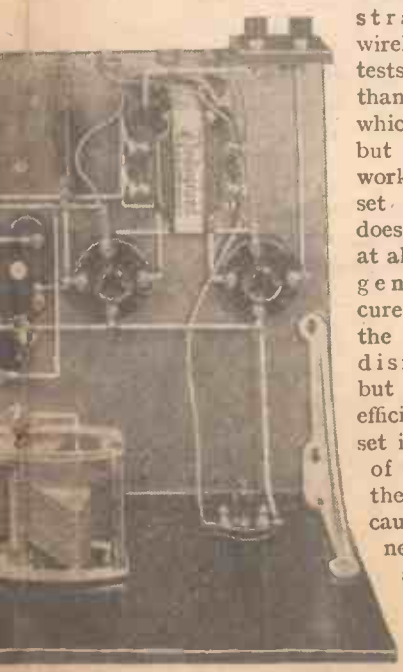
SIMPLE TO OPERATE

to scrap their first set they will not want the initial cost to be high

A beginners' set must be simplicity itself, both in building and working, but it would be unwise to carry this simplicity so far that it is productive of a set which gives poor reception just because it is inefficient. There is nothing that a man who is a little strange to wireless, detests more than a set which *works*, but fails to work well. A set which does not work at all, he can generally cure or find the heart to dismantle: but the inefficient first set is a kind of thorn in the side because beginners, hazy about technical points, are usually loth to disturb a set which they have made work, no matter how poorly. There is no hint of inefficiency about the "Beginner's Regional 3."



y type and quite straightforward

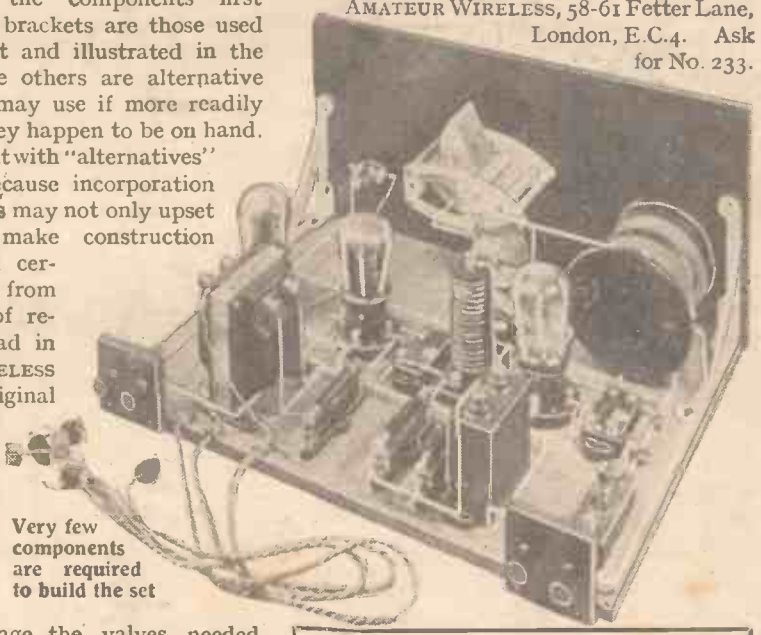


he wiring diagram will simplify construction

Cheap to Build

Far more convincing than mere talk about the economy is an examination of the list of parts which you will need. This list is given in accompanying panels and, as is the case with all AMATEUR WIRELESS sets, the components first mentioned in the brackets are those used in the original set and illustrated in the photographs. The others are alternative parts which you may use if more readily obtainable or if they happen to be on hand.

Don't experiment with "alternatives" of your own because incorporation of unsuitable parts may not only upset the layout and make construction difficult, but will certainly prevent you from getting the type of results we have had in the AMATEUR WIRELESS laboratory. The original components suggested are all very cheap and yet of proved efficiency, and are the products of well-known firms.



Very few components are required to build the set

As there is no high-frequency stage the valves needed are all fairly cheap; there is no need for expensive screening, or H.F. coupling.

The Circuit

The tuner used is of a special type giving a remarkable degree of selectivity and works on both the medium- and long-wave bands at the touch of a switch. This tuner is cheaper than a complete set of plug-in coils needed to cover the same wave band, and it is much more efficient. Readers who are at present using plug-in coils need shed no tears when scrapping them; for dual-range tuners, and particularly the coil used in the "Beginners' Regional 3," are vastly superior.

Beginners who are interested in the technical points of this set may care to refer to the theoretical circuit diagram given herewith. Those who are interested only in the construction, however, may pass on to the full details for making the set which will be given next week.

Most beginners will want to make up the set with the aid of the blueprint, for this almost entirely prevents the possibility of making an error in drilling the panel or mounting the components: and as all AMATEUR WIRELESS blueprints give every wiring connection, there is no need for a beginner to study each circuit of the set. One can simply wire up direct from the print without bothering to refer to the theoretical diagram.

A small reproduction of the blueprint is given herewith, and this will be an aid to those who are sufficiently skilled in set construction to make up the "Beginner's Regional 3" without the aid of a full-sized sheet as a template. The full-size blueprint is obtainable, however (price 1s., post free), from the Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. Ask for No. 233.

COMPONENTS REQUIRED (Contd.)

Three resistance holders (Graham-Farish, Bulgin, Lissen).

Pre-set condenser, .0003-.000025-mfd. (Sovereign, Formo, Igranic, Lewcos).

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

High-frequency choke (Lewcos, Lissen, Tunewell, Sovereign, Watmel, Igranic, Bulgin).

Low-frequency transformer (Telsen "Radiogrand," Lissen, Igranic, Lewcos, Ferranti, Brownie Varley, Burton, British General, Bulgin).

Slow-motion dial (Ormond).

Two ebonite strips, each 2 in. square (Trolitax, Becol).

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

Five wander plugs marked: G.B.+, G.B.—1, G.B.—2, H.T.—, H.T.+ (Belling-Lee, Eelex).

Two spade terminals marked: L.T.+, L.T.— (Belling-Lee).

Four yards of thin flex (Lewcoflex).

Connecting wire (Glazite).

"THE BEGINNER'S REGIONAL 3" *(Continued from preceding page)*

There are so many uses to which the blueprint can be put, seeing that it gives every part full size and in its exact position, that all genuine beginners are advised to obtain a copy. There is nothing difficult about constructing this set, and while it is a great advantage to solder all the connections when it comes to the wiring stage, it is not vitally necessary to do so.

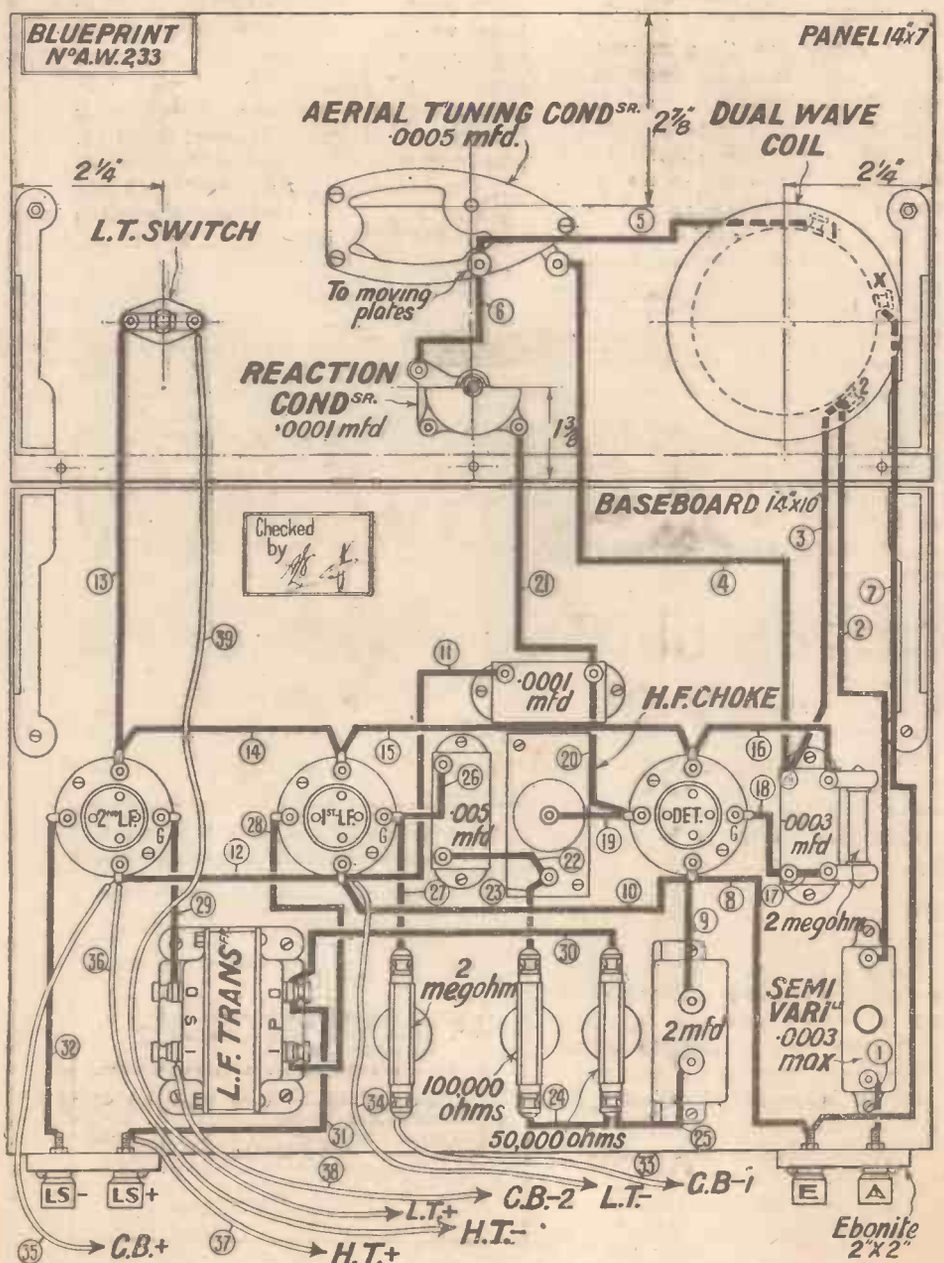
The only tools, apart from the soldering kit, which may be required, are a couple of screw drivers, one with a fairly long shaft, and the other with a narrow blade, and a pair of wire-cutting pliers.

Assembling

The ebonite work necessitates the use of a hand drill and a few bits of ordinary size. In this set the drilling of the terminal strips and the panel is quite a straightforward job, but terminal strips can be bought with the terminal and mounting holes already drilled, and the local radio dealer will generally undertake the small amount of panel work if one shuns this job. Remember, though, that good ebonite is easy to drill and does not readily crack.

The whole work of construction should be easily accomplished in one evening with nothing more elaborate than the aforementioned tools and the kitchen table to work on.

The simplicity of control will be apparent from this picture which shows the set ready for testing



The wiring diagram of the "Beginner's Regional 3." A full-size blueprint, which can be had for 1/-, will facilitate construction

ASSEMBLED SETS

THERE are probably many readers who are interested in one or other of the sets which are described week by week in AMATEUR WIRELESS, but who do not wish to go to the trouble of doing the constructional work themselves. Messrs. Ready Radio, of 159 Borough High Street, London Bridge, S.E.1, specialise in making up AMATEUR WIRELESS receivers, and we have no hesitation in recommending readers who are not fond of home construction to get Messrs. Ready Radio to make up a set for them. This firm also specialises in supplying kits of parts exactly as specified in the components lists and by merely mentioning the name of any AMATEUR WIRELESS set, constructors can obtain the full kit of all the correct parts, either for cash or on easy terms.

Truly this is an ideal set for a beginner. Enthusiasts in the London district can take the opportunity of seeing the "Beginner's Regional 3" in the Somerset Street windows (the Radio Department) of Messrs. Selfridge & Co., Ltd.

Further constructional details of this receiver will be given in our next issue.

Wireless pirates are a die-hard race in Glasgow. Despite the stringent measures taken recently by the Post Office authorities, and the repeated warnings, illicit listening is still prevalent. The latest offender to be brought to a Glasgow Court came from one of the city's fine new suburbs. He was fined £1.

A Handy Valve Adaptor—It should be noted that the price of the Six-Sixty valve adaptor, the test report of which was published last week, is 2s. This holder enables A.C. valves to be used without serious alteration of the wiring.

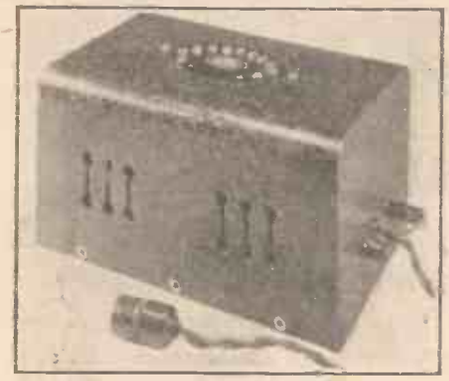
"A.W." TESTS OF APPARATUS

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

Tannoy Electrolytic Eliminator

WE have tested a Tannoy H.T. battery eliminator made by the Tulsemere Manufacturing Co. This unit comprises essentially a double-wave electrolytic rectifier, consisting of small cells each containing the positive and negative electrodes. A special type of electrolyte is placed in each cell, and does not require attention other than occasionally refilling with distilled water to correct vaporation.

Should the electrodes deteriorate, as they obviously must after some months of use, a complete panel mounted with new electrodes may be obtained at a price varying from 4s. 6d. to 8s. according to the size, and may be fitted in a few seconds. The remainder of the apparatus in this unit consists of a step-down transformer, operating from 200 to 250 volts mains, two alternative mains tappings being provided. The output goes to the rectifier, after which there is the usual filter, and finally a potentiometer taken across the output with eight tappings. These tappings provide the various voltages, and give the necessary



The Tannoy electrolytic eliminator

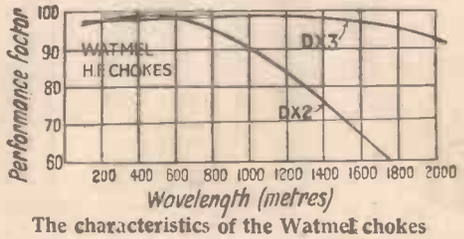
graduation for all practical purposes.

The eliminator was tested on a three-valve set consisting of screen-grid, detector, and power stage, and operated quietly and effectively. A decoupling circuit was already fitted in the amplifier, so that no trouble was experienced with motor-boating, but the potentiometer system may give trouble with some sets if this precaution is not observed. The output was 11 milliamps at 120 volts, a value sufficiently high to give good quality with a power valve. There was slight residual hum, but this was not noticeable when any broadcasting was being received. The voltage remained quite steady throughout the test and appeared to give as reliable results as a valve or metal rectifier.

So well are the cells and other components boxed in that one is apt to forget that an electrolyte is being used, and consequently one is liable to turn the eliminator over on to its back, with consequent spilling of the electrolyte. Reasonable precautions taken by the user will guard against this trouble. This unit may be recommended.

Watmel H.F. Choke

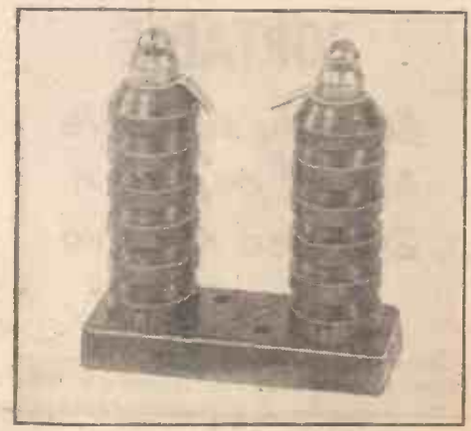
AN H.F. choke plays a very important part in a modern set, even if it is only used to prevent the flow of high-frequency current to low-frequency circuits, for it is realised that good quality reproduction cannot be obtained unless the high-frequency and low-frequency currents are well separated from each other, and are not passed on to be amplified after the detector. A well designed H.F. choke can also be used with considerable advantage in coupling high-frequency valves together, but if it is desired to cover a wide range of wavelength from 200 to 2,000 metres, the set must be of special design.



The characteristics of the Watmel chokes tested

Messrs. Watmel Wireless Co., Ltd., have recently placed on the market two types of binocular H.F. choke. One of these is designed to give maximum choking effect up to 2,000 metres, and has a high inductance combined with a low self-capacity. This pattern, known as the DX3, sells at 6s. and will be suitable for all purposes for which H.F. chokes can be used. It has an inductance of 200,000 microhenries.

A second pattern known as the DX2, selling at 4s., is suitable for use in simple types of receiver between the anode of the detector and the low-frequency coupler. If there is any tendency for the circuit to oscillate, however, we find the choke is unsuitable above about 1,200 metres. The inductance is 40,000 microhenries.



One of the range of Watmel H.F. chokes

Curves for these chokes are shown here. The performance figures represent the percentage of high-frequency current which will flow through a .0001 by-pass condenser in preference to the H.F. choke. With a perfect H.F. choke this figure should be 100 per cent. It will be noted in the case of the DX3 that the value remains almost constant at an exceedingly high figure showing the exceptionally good characteristics of this choke. In the case of the DX2 the figure falls away somewhat earlier and is only 48 per cent. at 2,000 metres. This choke is thus of more limited application as mentioned above.

New Bulgin Switch

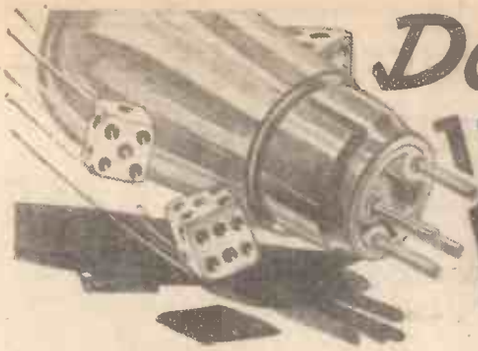
AS was pointed out previously in these columns the simple push-pull switch has a slow "make" and "break," and therefore, when dealing with high values of current is liable to suffer from arcing and,

A useful Bulgin switch

as a consequence, pitting of the contacts.

Messrs. Bulgin & Co. have evolved an ingenious type of quick-break push-pull switch possessing all the most desirable features one may require in such a switch. The operating spindle slides a metal lever in a suitably shaped guide, causing a spring-loaded plunger to rotate on a given centre. The action is such that this rotation is delayed until the spring has considerable potential energy, ultimately causing it to accelerate with a very rapid motion. In one position of the switch the rotating plunger comes into contact with and short-circuits two metal strips connected to the terminals. The action is extremely pleasant to operate and is entirely satisfactory from an electrical point of view.

Those who have been troubled with bad contacts in their switches can be recommended to purchase this small component.



Don't take chances WHEN BUYING VALVES

Practical Information that Will Enable You to Make the Best Choice

JUST about this time of year one is often a little puzzled by reception. Things don't seem quite so good as they should be, and there is a rapid calculation of the dates when the L.T. was last charged, and when the H.T. battery was bought.

The chances are that the H.T. (and perhaps a new grid-bias battery) was bought round about September in anticipation of good things to come for the winter season. This means that, with luck, they are still working after seven or eight months use, and new ones will certainly be needed. But the valves—ah, that's a different matter; when *was* that new set of valves bought? It wasn't last September, but it was *a* September. So it must have been the September before!

Therein, in the proverbial ninety-nine cases out of one hundred, is the cause of that frequent puzzling springtime reception. The puzzle nowadays is in choosing the right valve for the job in hand. Partly, this is the pidgin of the valve makers themselves, who are called upon to supply valves to suit everybody.

To take just one thing, there's the low-tension problem. Valves have to be made in two-volt, four-volt and six-volt ranges. Then there are the mains valves, and to suit every purpose these have to be available in the .8 volt 1 amp., .8 volt .8 amp., and 4 volt 1 amp. types.

Again, not only must there be H.F., detector, L.F. and power valves, but there must be super-performance H.F. valves with very high impedances, R.C. coupling valves, screen-grid valves, special detectors, and super-power valves. Then there is the newcomer, the pentode.

The average listener is often confused by the wide range and is content to go to his wireless dealer, burnt-out or worn-out valve in hand, and say, "I want a valve like this,

(*Continued at foot of next page*)

Three-electrode—Two Volts

Make	*Type*	*Impedance*	*Amp. Factor*	*Fil. Current*	*Mutual Conduct.*
Triotron ...	WD2	62,000	43.5	.07	.65
P.R. ...	PR4RC	60,000	32	.09	—
Dario ...	Resist.		30	.1	.5
Mazda ...	H210	59,000	47	.1	.8
Lissen ...	H210	58,000	35	.1	.6
Six-Sixty ...	210RC	55,500	39	.1	.7
Mullard ..	PM1A	51,000	36	.1	.7
Cossor ...	210RC	50,000	36	.1	.72
Marconi ...	H210		35	.1	.7
Osram ...	H210		35	.1	.7
Tungsram...	R208		35	.1	.7
P.R. ..	PR2HF	28,000	13	.09	—
Six-Sixty ...	210HF	25,000	19	.1	.75
Tungsram...	H210		25	.1	1
Puratone ...	DE5HF		20	.1	—
Triotron ...	HD2	24,000	16.7	.07	.7
Marconi ...	HL210	23,000	20	.1	.87
Osram ...	HL210		20	.1	.87
Mullard ...	PM1HF	22,500	18	.1	.8
Dario ...	Super HF	21,000	25	.15	1.2
Lissen ...	HL210		18	.1	.85
Mazda ...	HL210		26	.1	1.25
Cossor ...	210HF	20,000	20	.1	1
Fotos ...	BA9		9	.05	—
Puratone ...	DE5	16,000	12	.1	—
P.R. ...	PR3LF	15,000	8	.09	—
Triotron ...	TD2	14,400	10.8	.07	.75
Six-Sixty ...	210LF	12,500	10.6	.1	.85
Triotron ...	SD2	12,400	21	.14	1.7
Cossor ...	210LF	12,000	10	.1	.83
Marconi ...	L210		11	.1	.9
Mullard ...	PM1LF		11	.1	.9
Osram ...	L210		11	.1	.92
Six-Sixty ...	225D	11,000	13.5	.25	1.2
Mullard ...	PM2DX	10,700	13.5	.25	1.25
Puratone ...	P1	10,000	6	.2	—
Dario ...	Univ.		9	.1	.9
Lissen ...	L210		10	.1	1.6
Mazda ...	L210		15.5	.1	1.55
Tungsram..	LG210		10	.1	1
Fotos ..	BC9	9,000	9	.12	—
Puratone ...	RC1	8,000	40	.1	—
P.R. ...	PR20	7,000	6	.15	—
Puratone ...	SP1		5	.35	—
Triotron ...	ZD2	6,200	6.2	.14	1
Marconi ...	P215	5,000	7	.15	1.4

Three-electrode—continued

Make	*Type*	*Impedance*	*Amp. Factor*	*Fil. Current*	*Mutual Conduct.*
Osram ...	P215	5,000	7	.15	1.4
Six-Sixty ...	220P	4,800	7.2	.2	1.5
Lissen ...	P220	4,700	7	.2	1.5
Dario ...	SP	4,500	9	.15	2
Fotos ...	BD9		9	.2	—
Mullard ...	PM2	4,400	7.5	.2	1.7
Cossor ...	220P	4,000	8	.2	2
P.R. ...	PR120	3,800	4	.3	—
Mazda ...	P220	3,700	12.5	.2	3.4
Triotron ...	UD2	3,350	5.35	.22	1.6
Tungsram...	P215	3,300	5	.15	1.5
Six-Sixty ...	230SP	2,750	5.5	.3	2
Dario ...	Hyper	2,700	5	.3	1.8
Mullard ...	PM252	2,600	5.4	.3	2.1
Marconi ...	P240	2,500	4	.4	1.6
Osram ...	P240		4	.4	1.6
Tungsram...	SP230		5	.3	2
Cossor ...	230XP	2,000	4	.3	2
Lissen ...	PX240	2,000	4	.4	2
Mazda ...	P240	1,900	7	.4	3.7

Screen-grid—Four-electrode—Two Volts

Mazda ...	215SG	400,000	450	.15	1.1
Dario ...	SG	250,000	250	.15	1
Mullard ...	PM12	230,000	200	.15	.87
Puratone ...	SG1	220,000	180	.15	—
Fotos ...	C150	—	200	—	—
Six-Sixty ...	215SG	220,000	190	.15	.87
Cossor ...	220SG	200,000	200	.2	1
Lissen ...	SG215		180	.15	.9
Marconi ...	S215		170	.15	.85
Osram ...	S215		170	.15	.85

Pentodes—Five-electrode—Two Volts

Lissen ..	PT225	64,000	90	.25	1.4
Six-Sixty ..	230PP		80	.3	1.25
Mullard ..	PM22	62,500	82	.3	1.3
Dario ..	Pent.	55,000	100	.3	1.8
Marconi ..	PT240		90	.4	1.65
Osram ..	PT240		90	.4	1.65
Fotos ..	D100	—	—	—	—
Lissen ..	PT240	22,500	50	.4	2
Cossor ..	230PT	20,000	40	.3	2
Mazda ..	230Pen	—	—	.3	1.5

TO-NIGHT'S COMMAND PERFORMANCE

THERE is a familiar ring about to-night's relay of variety's royal performance. It comes from the London Palladium, of which the acoustics have been tested many times and are well known to all of us. Jack Payne and his band is one of the principal numbers, and Will Hay likewise is no stranger. The only one who is missing is Tommy Handley, and he, but for a confusion of dates, might well have been chosen to be at the microphone.

Gillie Potter has charge to-night, and if he is "in his usual good form," we shall be in for a treat. He will be standing in the "prompt" corner—a position right in the front of the stage, behind the folds of the curtain when it is drawn back.

There will be three microphones, two in the footlights and one for Gillie Potter. When he intends speaking he will press a button to warn the engineers, who will then fade his microphone in and the others out. One press will mean he is about to start and two that he is finishing.

His chief job is to give us something to listen to while the "dumb" acts are on, such as dancing and juggling. He attended a rehearsal yesterday to acquaint himself with the programme and prepare a rough outline of his patter. Naturally most of it must be left for last-minute inspiration, as jokes which are carefully prepared beforehand do not always get over successfully.

He will also tell us listeners the order of the programme and fill in the gaps while the scenery is being changed. The most nerve-wracking part of the whole evening for him is waiting for the King to arrive. The trouble is timing his remarks to finish just as the welcome burst of cheering goes up. From his position it will be impossible to see the King enter the theatre, and he will have to rely on a signal from some one else.

The longest "dumb" act is usually the dancing, and the commentator has to be at his absolute best or the fifteen minutes or so will drag horribly. Perhaps Gillie Potter has prepared a small "act" of his own. If so I hope the B.B.C. will not decide to choose that period to go back to the studio for the news bulletin! F. R.

"WHEN BUYING VALVES"

(*Continued from preceding page*)

please," regardless of the fact that better valves may now be obtainable for that particular purpose and perhaps even the old valve was not the best one for its job.

When the average wireless dealer waxes technical he talks about such things as amplification factors, impedances mutual conductances and "mu's." It is well that the listener too should know something about these things so that he can choose the right valve.

If you open nearly every valve box, you will find inside a curve showing the operating conditions. These characteristic curves show how the current passed by the valve varies with the voltage on the grid. Two or three curves may be shown, each for a different value of H.T.

Now, the impedance really represents the "resistance" between the filament and plate to the flow of electrons from one to the other. Obviously it would be a good plan to have this as low as possible, because the lower the impedance the greater would be the current for any H.T. voltage; and within reason the H.T. could be reduced. Unfortunately, however, we cannot work things out in this way because there is a practical relationship between the resistance of a valve and the performance it puts up.

For a reason which is fairly obvious, but which need not be explained here, the impedance of a valve should as nearly as possible match that of the component (no matter whether it is an H.F. coil, resistance, L.F. transformer or loud-speaker) in the anode circuit. There is always a little confusion between the conductance and "mu" (μ), the Greek letter given to the term amplification factor. The amplification factor shows how much the anode current changes as the result of any change in the voltage on the grid.

It is not the whole story, however, for it is the mutual conductance which does more nearly represent the "goodness" of a valve. This is calculated from the relationship between the amplification factor and the impedance.

Those who are interested can always discover the impedance amplification factor and mutual conductance from any valve curve, but those who are more interested in the purchase of a reliable valve will take a greater interest in the effect of these three quantities.

There is just one thing to note, and it is that one valve curve alone is not a good indication. For one thing, it may be plotted under conditions which do not obtain when the valve is in use. With valves known to be of good make the impedance figure is a good guide to type (for instance, a valve with an impedance of 50,000 ohms is an H.F. valve, and a valve with an impedance of 5,000 ohms is a power valve), but with unknown valves impedance, amplification factor, and mutual conductance must be taken into consideration.

Many manufacturers publish their impedance figures so that buyers can use these as a more reliable guide to type.

Just one final point: when you put a new valve in your set, adjust the grid bias to that recommended by the manufacturers. Then measure the anode current and see that it corresponds to that which the manufacturers say will flow at that given H.T. and G.B. setting.

If the current is greater, then readjust until it is at the correct value, even if the grid bias is slightly higher than that recommended. In this way you will save H.T.

RADIOGRAMS

IN the National programme on May 26 the Savoy Hill studios will present *Talkie Town*, a burlesque written and produced by John Watt, ex-dramatic director of the Belfast station.

Under the title of *The Girl from——*, the Midland Regional evening broadcast on May 27 will recall to listeners memories of *San Toy*, *Monsieur Beaucaire*, *The Merry Widow*, *Florodora*, and *The Belle of New York*.

"How the Sun Never Sets" is the main feature of the special programme to be heard on Empire Day, May 24; it will include a panorama in sound from the Mother Country to "somewhere East of Suez." The Prime Minister will broadcast during the evening.

On Saturday evenings during June and July some of the members of the Detection Club will broadcast a serial story, each instalment being the work of a distinguished author. In the list of members of the Detection Club are names familiar to all readers of English fiction.

Readers who were interested in the broadcast of such anti-war plays as *The White Chateau*, *Journey's End*, and *Brigade Exchange*, should make a note to switch on their receivers during the evening of June 12, when *The Rumour*, a play of a different sort, by C. K. Munro, will endeavour to prove the futility of armed strife.

On June 8, Reginald Foort, the organist, will play the part of solo pianist in a concert conducted by Sir Dan Godfrey, and broadcast on the National wavelength from the Pavilion, Bournemouth.

The B.B.C. has now concluded all arrangements for the annual broadcast of the Aldershot Military Tattoo on June 17.

Copy, "the story of a journalist in search of copy," specially written for the microphone by Cyril L. Ashurst, will be included in the London Regional programme on May 29.

A new short-wave transmitter at Teheran (Persia) is now in operation, and its signals can be picked up at good strength in this country. The call-sign of the station is RVA, and the transmissions are in continuous-wave morse.

A direct wireless telephone service was officially opened between Austria and Brazil on May 10.

A receiver has been designed in America which makes it possible for listeners to select and lay out a continuous programme for the entire day and arrange for the set automatically to change from one feature to another.

Radio telephonic communication between Rio de Janeiro and Bangkok, Siam, was maintained successfully for twenty minutes recently. The distance between the two points over the circuit, which was operated by way of Berlin, is estimated at 16,080 miles.

Efforts are being made to raise a fund to supply the fleets of small fishing boats which sail from the coasts of France each year to the Newfoundland cod fisheries with wireless sets.

At the recent disastrous fire at the Ohio State Prison, an eye-witness account of the catastrophe at the time of its happening was broadcast throughout the Columbia Broadcasting System by Convict X46812, a negro, serving a life sentence for first-degree murder.

Notwithstanding the repeated warnings of the Federal Radio Commission in America that the broadcast band is overcrowded with radio stations, applications for new ones continue to pour into the commission's offices. Nearly 200 petitions for new stations await action by the Federal Commission. Forty-three applications for new stations were received during March.

Radio Normandie at Fécamp has opened a studio at The Havre with a view to a relay of concerts from that city. In the near future the station will regularly take programmes from Rouen and Paris. Although the wavelength normally used is 213 metres, tests have recently been made on 168 metres.

Brussels No. 2, the new transmitter which is being tested at Forest in the immediate neighbourhood of the Belgian capital, may be heard on Saturdays between 3 and 5 p.m. and on Sunday mornings from 10.30 a.m. until mid-day. On Tuesdays and Thursdays the station is temporarily used by the Katholieke Vlaamsche Radio Omroep and by a Socialist organisation at Antwerp. On Sundays, following the evening programme, a special broadcast of gramophone records is carried out by the International Broadcasting Company of London and announcements are made both in French and English. The wavelength is 339 metres.

When Asking Technical Queries

PLEASE write briefly

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.

Queries cannot be answered personally or by telephone.

FULL-SIZE BLUEPRINTS

When ordering, please send Postal Order, NOT STAMPS

CRYSTAL SETS (6d. each)

B.B.C. Brookman's Park Set	AW206
Regional Crystal Set	WM176

ONE-VALVE SETS (1s. each)

B.B.C. Official One	AW208
[illegible]	WM153
Hartley Single-valver	WM199

TWO-VALVE SETS (1s. each)

Loud-speaker America Two	AW190
Talisman Two (D, Trans)	AW194
British Broadcast Two (D, Trans)	AW215
Easy-tune Two (D, Trans)	AW226
Wavelets Two (D, Trans)	AW229
No-battery A.C. Mains Two (D, Trans)	AW230
Clipper Two (D, Trans)	WM135
Brookman's Two (D, Trans)	WM168
Programme Two (D, Trans)	WM177
New Crusader (D, Trans)	WM182
Radio-Record Two (SG, D)	WM187

THREE-VALVE SETS (1s. each)

All-wave High-mag. Three (D, 2 Trans)	AW199
Knife-edge Three (D, RC, Trans)	AW201
Talisman Two-three (D, RC, Trans)	AW203A
Wide World short-wave Three (HF, D, Trans)	AW207
Everybody's Three (SG, D, Trans)	AW209
1930 Ether Searcher (SG, D, Trans)	AW211
New All-Britain Three (HF, D, Trans)	AW214
Best-by-Ballot Three (SG, D, Trans) Price 4d. free with copy of "AW"	AW217
Brookman's By-pass Three (D, 2 Trans)	AW220
Everybody's all-electric Three (SG, D, Trans)—A.C.	AW221
1930 Clarion Three (SG, D, Trans)	AW223
Auto-coupler Three (D, 2LF)	AW225
Beginner's Regional Three (D, 2LF)	AW233
Standard Coil Three (HF, D, Trans)	WM117
Short-wave Link (D, RC, Trans)	WM142
Fanfare (D, 2 Trans)	WM157
Brookman's Three (SG, D, Trans)	WM161
Community Three (D, RC, Trans)	WM164
New Q3 (SG, D, Pentode)	WM167
Brookman's Push-Pull Three (SG, D, Trans) 1/6	WM170
Celerity Three (SG, D, Trans)	WM173
All-nations Three (D, 2 Trans)	WM178
Inceptordyne (SG, D, Pentode)	WM179
Brookman's A.C. Three (SG, D, Trans) 1/6	WM184
Music Marshal (D, 2 Trans)	WM190
Gramo-Radio D.C. Three (SG, D, Trans)	WM196
Concert Three (D, 2 Trans)	WM198

FOUR-VALVE SETS (1s. 6d. each)

Clarion All-electric Three (SG, D, Trans—A.C. Rectifier)	AW200
Music-Lover's Gramo-radio (SG, D, RC, Trans)—1s. 6d.	AW202A
Music-Lover's Gramo-radio (Loud-speaker)—1s.	AW202B
Standard-coil Four (HF, D, 2 RC)	WM122
Dominions Four (2SG, D, Trans)	WM134
Arrow (SG, HF, D, Trans)	WM154
1930 Monodial (2SG, D, Trans)	WM158
Electric Four (All A.C.—SG, D, RC, Trans)	WM162
Outpost Four (SG, D, 2 Trans)	WM165
Brookman's Four (2SG, D, Trans)	WM174
Transportable Four (SG, D, 2 RC)	WM180
Super Q (SG, D, 2 Trans)	WM189
Lodestone Four (HF, D, RC, Trans)	WM193
Searcher's Four (SG, D, RC, Trans)	WM194

FIVE-VALVE SETS (1s. 6d. each)

James Quality Five (2SG, D, RC, Trans)	AW227
All-wave Lodestone Five (HF, D, RC, Push-pull)	WM146
1930 Five (2HF, D, RC, Trans)	WM171
Dual-screen Five (2SG, D, RC, Trans)	WM185
Radio-Record Five (SG, D, Trans-parallel)	WM188
Overseas Five (3SG, D, Trans)	WM191

AMPLIFIERS (1s. each)

A.W. Gramophone Amplifier	AW205
Brookman's Separator (HF Unit)	AW212
Two-valve Amplifier	AW216
"Mag" Gramo Unit	AW224
Concentrator H.F. Unit	WM169
Radio-Record Amplifier (DC Mains)	WM183

MISCELLANEOUS (1s. each)

Short-wave Adaptor (1 v.)	AW183
Simplest H.T. Unit	AW197
By-pass Unit (Wavetrap) with copy "AW"—4d.	AW218
"Twin" Brookman's By-pass (6d.)	AW222
"A.W." Paper Loud-speaker	AW231
James H.T. and L.T. Charging Unit	AW232
James H.T. Unit for D.C. Mains	WM133
Short-wave Adaptor for Dominions Four	WM140
Two Ampere Low-tension Unit	WM147
A.C. Mains Amplifier	WM149
H.T. Unit for A.C. Mains	WM159
"W.M." Linen-diaphragm	WM172
Trimmer (Selectivity Unit) (6d.)	WM181
Brookman's "Wipe-outs"	WM186
Short-wave adaptor for Overseas Five	WM19[illegible]

PORTABLE SETS

Holiday Portable Three (D, RC, Trans)	AW138
Music Leader (SG, D, RC, Trans) with copy "AW"	AW203
Merry-maker Portable (D, 2 Trans)	AW228
Wayfarer Portable (Super Het)	WM139
Pedlar Portable Two (D, Trans)	WM195
Pedlar Portable Three D, 2 Trans)	WM197

Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of any of these sets can be obtained at 1s. 3d. and 4 respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine" sets.

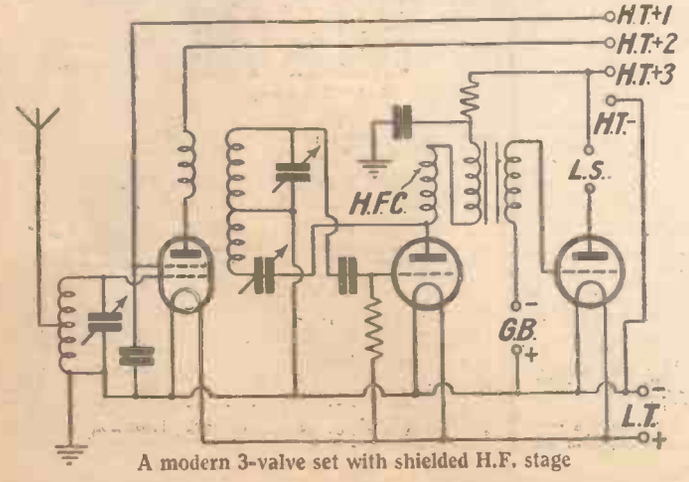
AMATEUR WIRELESS 58-61 FETTER LA[illegible] LONDON, E.C

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	Kilocycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN			
25.53	11,751	Chelmsford (5SW)	15.0
*200	1,500	Leeds	0.13
*242	1,238	Belfast	1.0
*261	1,148	London Nat.	30.0
*288.5	1,040	Newcastle	1.0
288.5	1,040	Swansea	0.13
288.5	1,040	Stoke-on-Trent	0.13
288.5	1,040	Sheffield	0.13
288.5	1,040	Plymouth	0.13
288.5	1,040	Liverpool	0.13
288.5	1,040	Hull	0.13
288.5	1,040	Edinburgh	0.35
288.5	1,040	Dundee	0.13
288.5	1,040	Bournemouth	1.0
288.5	1,040	Bradford	0.13
*301	995	Aberdeen	1.0
*310	968	Cardiff	1.0
*356	842	London Reg.	30.0
*377	797	Manchester	1.0
*399	753	Glasgow	1.0
*479	626	Midland Reg.	25.0
1,554	193	Daventry (5XX)	25.0
AUSTRIA			
*240	1,220	Linz	0.5
*283	1,058	Innsbruck	0.5
*352	851	Graz	7.0
*453	666	Klagenfurt	0.5
*517	581	Vienna	15.0
BELGIUM			
206	1,460	Antwerp	0.2
220	1,364	Chatelineau	0.25
244.7	1,226	Ghent	0.25
246	1,218	Schaerbeek	0.25
338	887	Forest	3.0
*509	590	Brussels	1.0
CZECHO-SLOVAKIA			
*263	1,139	Moravska-Ostrava	10.0
*279	1,076	Bratislava	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)	0.75
1,153	260	Kalundborg	7.5
ESTHONIA			
*296	1,013	Reval (Tallinn)	1.5
FINLAND			
*221	1,355	Helsinki	10.0
*1,796	167	Lahti	50.0
FRANCE			
29.70	10,280	Radio Experimental (Paris)	1.4
175	1,714	St. Quentin	0.1
212	1,410	Beziers	0.1
214	1,401	Fécamp (Radio Normandie)	0.7
237	1,265	Bordeaux (Radio Sud-Ouest)	1.0
240	1,250	Nimes	0.25
249	1,204	Juan-les-Pins	0.5
256	1,171	Toulouse (PTT)	1.5
265	1,132.2	Lille (PTT)	0.7
268	1,121	Strasbourg	0.7
*272	1,102	Rennes (PTT)	0.5
286	1,045	Radio Lyons	0.5
*287	1,046	Montpellier (PTT)	0.3
295	1,016	Limoges (PTT)	0.5
306	980	Bordeaux (PTT)	1.0
313	958	Radio Vitus	1.0
*316	950	Marseilles (PTT)	0.5
329	914	Poste Parisien	0.5
329	914	Grenoble (PTT)	0.5
369	812	Radio LL (Paris)	0.5
*381	788	Radio Toulouse	8.0
447	671	Paris (Etat)	3.0
466	644	Lyons (PTT)	5.0
1,446	207	Eiffel Tower	12.0
*1,725	174	Radio Paris	16.0
GERMANY			
*218	1,373	Flensburg	0.5
*227	1,319	Cologne	4.0
*227	1,319	Münster	3.0
*227	1,319	Aachen	0.35
*232.2	1,292	Kiel	0.35
*239	1,256	Nürnberg	2.0
*245	1,223	Cassel	0.25
*253	1,184	Gleiwitz	2.0
*259	1,157	Leipzig	2.5
*270	1,111	Kaiserslautern	0.25
*276	1,085	Königsberg	2.5
*283	1,058	Magdeburg	0.5
*283	1,058	Berlin (E.)	0.5
*283	1,058	Stettin	0.5
*315.8	951	Bremen	0.35
*320	937.6	Dresden	0.25
*325	923	Breslau	1.5
*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
*473	635	Langenberg	15.0
*533	563	Munich	1.5
560	536	Augsburg	0.25
*560	536	Hanover	0.35
569	527	Freiburg	0.35
*1,635	183.5	Zeesen	37.0
1,649	182	Norddeich	10.0
HOLLAND			
31.28	9,599	Eindhoven (PCJ)	30.0
*209	1,003	Hilversum (between 12.20 and 6.20 p.m. B.S.T.)	6.5
*1,071	280	Hilversum	6.5
*1,071	280	Scheveningen-Haven	5.0
*1,875	160	Huizen	6.5
HUNGARY			
210	1,430	Budapest (Csepel)	1.0
550	545	Budapest	20.0
ICELAND			
*1,200	250	Reykjavik (shortly testing)	16.0
IRISH FREE STATE			
*225	1,337	Cork (1FS)	1.0
*413	725	Dublin (2RN)	1.0
ITALY			
25.4	11,810	Rome (3RO)	9.0
291	1,030	Turin (Torino)	7.0
*332	905	Naples (Napoli)	1.5
386	777	Genoa (Genova)	1.0
*441	680	Rome (Roma)	50.0
453	662	Bolzano (1BZ)	0.3
*501	599	Milan (Milano)	7.0
LATVIA			
*525	572	Riga	7.0
LITHUANIA			
*1,935	155	Kovno	7.0
NORTH AFRICA			
364.5	823	Algiers (PTT)	16.0
416	721	Radio Maroc (Rabat)	10.0
1,250	240	Tunis Kasbah	0.5
NORWAY			
364	824	Bergen	1.0
368	813	Frederiksstad	0.7
445	674	Rjukan	0.18
453	662	Aalesund	0.3
453	662	Tromsö	0.1
453	662	Porsgrund	0.7
*493	608	Oslo	60.0
POLAND			
214	1,400	Warsaw (2)	2.0
234	1,283	Lodz	1.5
*313	959	Cracow	0.5
*335	896	Posnan	1.2
385	779	Wilno	0.5
385	779	Lvov	2.0
*408	734	Katowice	10.0
1,411	212.5	Warsaw	8.0
ROUMANIA			
*394	761	Bucarest	12.0
RUSSIA			
720	416.6	Moscow (PTT)	20.0
824	364	Sverdlovsk	25.0
938	320	Moscow-Stchelkovo (C.C.S.P.)	100
1,000	300	Leningrad	20.0
1,060	283	Tiflis	10.0
1,103	272	Moscow Popoff	40.0
*1,304	230	Kharkov	25.0
1,380	217.5	Bakou	10.0
1,481	202.5	Moscow (Kom)	40.0
SPAIN			
250	1,202	Almeria	0.5
266.5	1,125	Barcelona (EAJ13)	10.0
*340	860	Barcelona (EAJ1)	8.0
368	815	Seville (EAJ5)	1.5
424	707	Madrid (EAJ7)	2.0
462	649	San Sebastian (EAJ8)	0.5
SWEDEN			
231	1,301	Malmö	0.6
*257	1,166	Hörby	10.0
299	1,003	Falun	0.5
*322	932	Göteborg	10.5
*436	689	Stockholm (tests)	60.0
*542	554	Sundsvall	0.6
*770	389	Ostersund	0.6
1,251	239.8	Boden	0.6
*1,348	222.5	Motala	30.0
SWITZERLAND			
*403	743	Berne	1.0
*459	653	Zurich	0.63
660	454.6	Lausanne	0.6
760	395	Geneva	0.25
1,010	297	Basle	0.25
TURKEY			
*1,220	245.9	Istanbul	5.0
1,958	153.5	Ankara	7.0
YUGOSLAVIA			
307	977	Zagreb (Agram)	0.7
431	696	Belgrade	2.5
574.7	522	Ljubljana	2.5

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



A modern 3-valve set with shielded H.F. stage

"THE BEST THREE-VALVE CIRCUIT"

(*Continued from page 693*)

To-day, amplification without selectivity, as is achieved with the detector and low-frequency amplifier arrangement, is worse than useless. In a three-valve set, there is now every inducement to use one high-frequency valve instead of two low-frequency valves. One of the most notable advances in radio has been the development of the screen-grid high-frequency valve. Really foolproof and appreciable high-frequency amplification is now easily attained, in contrast with the unstable "passenger" valve of the old days.

The famous choral society composed of coloured students of the Hampton University (Virginia, U.S.A.) now on a world tour will broadcast through the Vienna station on May 29; the concert may be relayed to Swiss and German transmitters.

LETTERS TO THE EDITOR

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

Economy in H.T.

SIR,—"Set Tester's" repeated comments on the high H.T. current taken by some of the recent sets with screen-grid and pentode valves induce me to bring the following points to the notice of your readers.

1. The high anode current of a pentode makes it inevitable that the actual voltage on the anode is very appreciably less than that of the H.T. tapping from which the current is drawn. Using a 2,000-ohm speaker or choke, the drop at 10 milliamps is 20 volts. The auxiliary grid potential must (taking the Mullard PM22 as example) thus be 130 volts (or a little less), and to connect the lead to "H.T. +" (as one firm recommends in the slip accompanying the valve), i.e., the same tapping as for the anode, will mean a greatly increased anode current, with the usual undesirable results.

The correct procedure is to measure the plate current with various voltages for the auxiliary grid until, by calculation, the drop in voltage through the speaker or choke is found to be equal to, or a little less than, the difference between "H.T. + (plate)" and "H.T. + (aux. grid)".

The auxiliary grid current may now be measured. If this is, say, 1.5 milliamps, then a resistance of 13,333 ohms in series in the lead, which is now taken to "H.T. + (plate)," will do the trick. In this case one would use 15,000 ohms and, as an additional precaution, measure the current in both anode and auxiliary grid leads once more.

2. A negative bias of from 0.9 volts (Siemens S.G. cell) at 120 volts H.T. to 1.5 volts at 150 volts H.T. reduces the plate current of S.G. valves; in disagreement with Mr. James, all the 2-volters I have tried work excellently when thus biased.

3. W. Greenwood (in *World Radio*) has recently shown that grid detection can only give "quality" results—and we all want such, I hope—when used with 150 volts (or more) H.T. (and lower values of grid condenser and leak than usual). This means several milliamps of H.T. current, whereas anode rectification requires 1.5 m/a. at most at 150 volts and gives better quality *for this current* than the grid-leak method.

I am sorry to write at this length, but I regard the S.G. valve and the pentode as great advances, of which the advantages will not be realised until the "H.T. current" bogey is laid; my own receiver (two S.G., anode-bend, pentode) takes 19 m/a. at 150 volts and about 13 at 120.

In conclusion, may I urge readers to follow the advice in a recent article and *use a meter?*

J. R. G. (Llanelly).

Superhets and Short-wave Work

SIR,—I notice that recently there was mention of superhet sets being of great use for short-wave work.

I can verify this as I have been picking up 5SW almost every broadcast for the last 18 months on a superhet of my own make, made up to a blueprint I obtained from you when last in England. (Mc. Michael Supersonic block.)

I have made several alterations to the original set. I have brought out an H.T. lead from the first det., the three I.F. coils and the second det., and I have put condensers in each H.T. tap and a choke.

I have had London dance bands loudly on a moving-coil speaker and eighteen people have danced to it.

I can get down to 16.88 the Dutch station easily at 70 degrees, on a 180-degree condenser using a coil 3-turns grid and 3-turns reaction.

The greatest trouble with these sets seems to be, in my case at any rate, a very pronounced hiss or rushing sound, and I cannot separate near morse well enough. If this hiss could be got rid of, nothing could beat this set.

It is funny, however, that when receiving the London dance bands I do not seem to be troubled with this hiss to any extent, nor when receiving American stations, but these both come on rather too late for me in the ordinary course.

A. H. W. T. (Northern Nigeria).

"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.

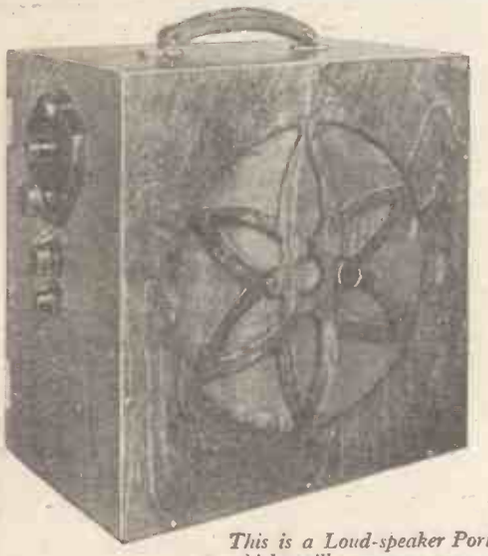
Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

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.

A 3 Valve Portable for £9

including

Cabinet, Valves & Batteries



This is a Loud-speaker Portable and one which will answer your requirements whether used as an outside portable or as a room-to-room set. It is easy to make and is fully described in the "Wireless Magazine" for June.

Other contents of the "Wireless Magazine" are:—

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