Wireless Weekly, 6d. Net. Wednesday November 19th, 1924

Wireless Weekly

Vol. 5.
No. 5

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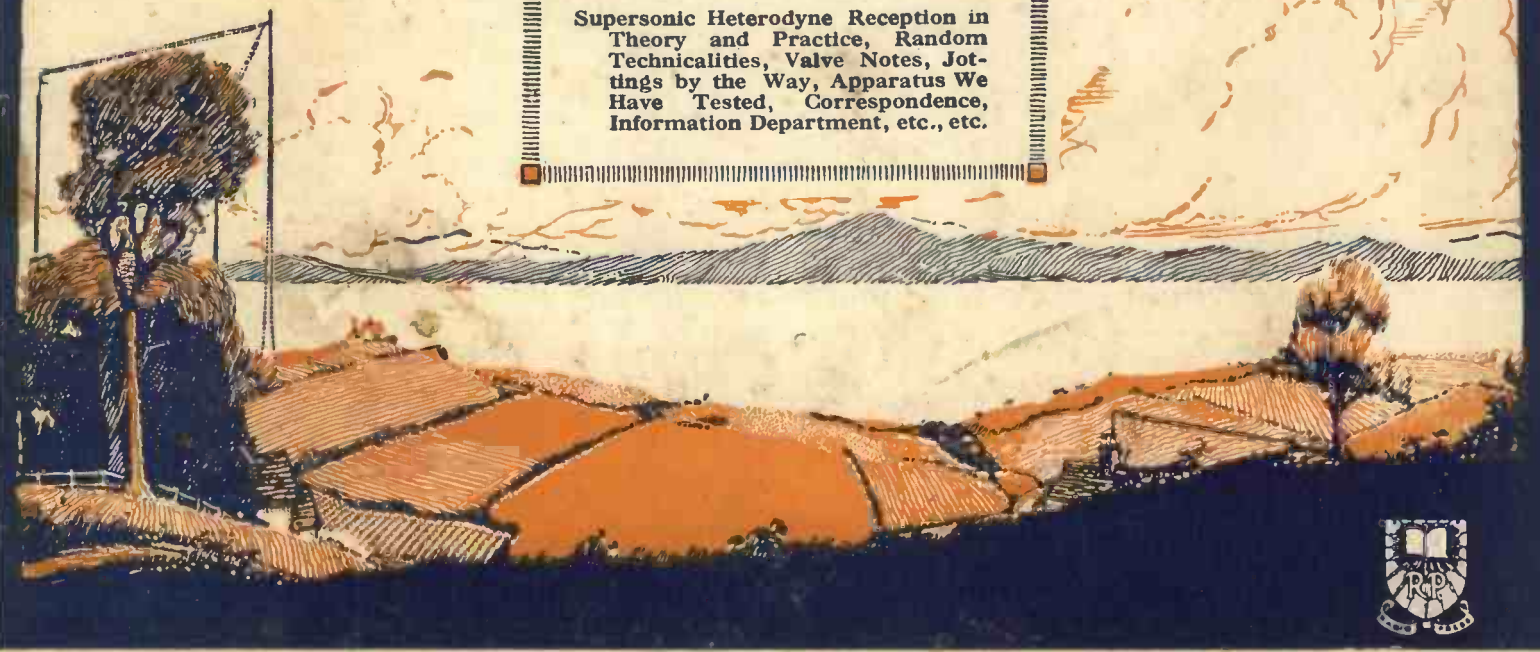
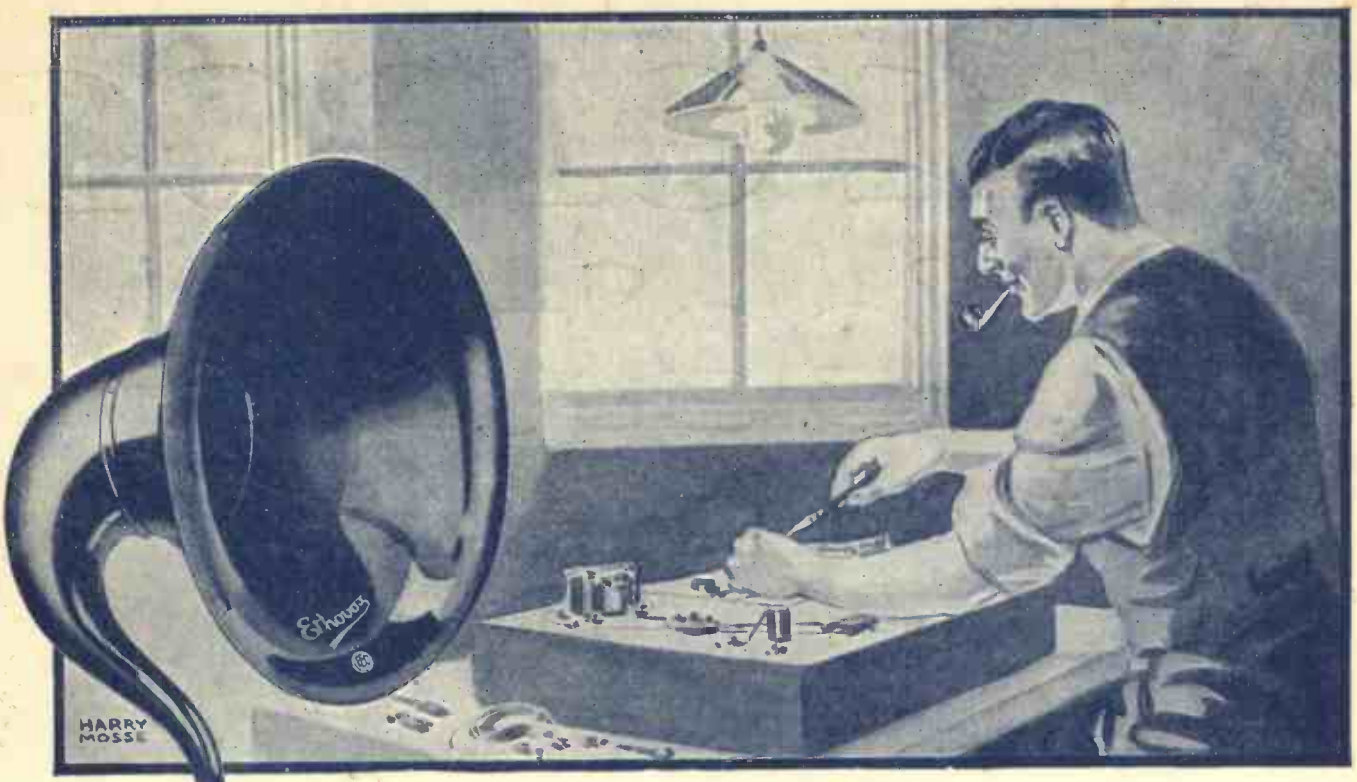


A Low Loss Tuner for Short Waves



It's worth the best loud speaker made

WHEN the set on which you have spent so much time and money is completed, give it every chance to show its power and efficiency by using a good loud speaker. Only if your loud speaker is one of proved merit can you judge your set fairly and get the best possible results from it.

The Ethovox Loud Speaker, a far-famed Burndept accessory, is noted for its faithful and *natural* reproduction of speech and music. It is capable of giving a great volume of pure sound without distortion. People who have heard "tinny," over-resonant loud speakers, have been amazed at the efficiency of the Ethovox and well pleased with its clarity.

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Issued by the Publicity Department of Burndept Ltd.

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EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

Vol. 5, No. 5 NOVEMBER 19, 1924. Price 6d. net.

The First Million

IT is officially announced that the number of broadcast licences now issued amounts to 997,000—one more proof that the great new art of wireless communication and the benefits it brings have penetrated into every quarter of the kingdom and into the humblest homes. It is still too early to estimate the full influence of broadcasting upon the life of the country, but we can, at least, draw certain definite conclusions of great importance.

The greatest charm of radio is, perhaps, its infinite diversity. The least technically-minded can enjoy the programmes so readily available by donning the headphones or switching on the loud-speaker. The young man of inquiring mind has available a wide variety of books explaining every aspect of the subject, and his enjoyment of the programmes will be all the greater by understanding just how they are distributed to the great listening public.

While the interest of the programmes only and the facilities with which they can be obtained with quite modest apparatus would assure the popularity of radio as a healthy amusement, the immense importance of the constructional side of the new art cannot be over-estimated. In the early days of broadcasting a few manufacturers endeavoured by all means in their power to prevent the home construction of wireless sets, taking the short-sighted view that the sale of finished sets would be prevented thereby. They entirely overlooked the well-established fact that a man will take far more pride in a piece of apparatus which he has constructed himself than in the best of manufactured gear. Another aspect of the case is that in the early days of broadcasting the difference in price between a manufactured and a similar piece of apparatus built by the home constructor was most marked, and had there been no facilities for home construction there is no question that many who are at present ardent devotees of the art would have been forced to abandon any thoughts of participating in it. At the present time the cost of manufactured sets is far more reasonable, and, indeed, on the whole, they are of a far higher quality than in earlier days.

The policy of Radio Press from its inception has been to give clear and simple explanations of every aspect of radio, and to provide complete practical instructions of how to build sets from sound designs. It may come as a surprise to many people who are just beginning to take an interest in the art, and who imagine that wireless listeners are not generally interested in the technical side, to learn that the combined circulations of the Radio Press journals, *Wireless Weekly*, *Modern Wireless* and *The Wireless Constructor*, all of which have much space devoted to constructional articles, is well over 400,000. This indicates very clearly that a very large percentage of licence-holders take a deeper interest than that of merely listening to the programmes. They want to know "how it works," and they want to make their own apparatus. For this reason we may, perhaps, be permitted a little pride in the fact that this organisation has played so large a part in building up the new art and industry. The figure we mention is, we believe, representative of all those interested in the constructional and technical side of wireless, the balance being composed chiefly of crystal users who are interested purely in the programmes, and, therefore, contribute little to the industry or the progress of the art.

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MR. GODFREY ISAACS

Doctor's orders and not any diminution in his intense interest in all wireless work have obliged Mr. Godfrey Isaacs, who for fifteen years has held the position of managing director of Marconi's Wireless Telegraph Co., Ltd., and the associated organisation, The Marconi International Marine Communication Co., Ltd., to relinquish his position. Radio Press, Ltd., on behalf of its numerous readers, wishes Mr. Isaacs a speedy recovery from ill-health and a happy retirement.

At the time when Mr. Isaacs joined the Marconi companies the organisation was far from perfect, and no dividends had been paid, although the capital had been increased on several occasions. From the day he entered the office Mr. Isaacs turned his full energies to re-organisation, and in a comparatively short time had placed the company in such a strong position that its shares were eagerly sought. Those who have been associated with him in business know that the ill-health from which he is now suffering is largely due to the unsparing way in which he has devoted his energies to the company's interests, working almost every day hours which would put many younger men to shame. As is often the case with a strong personality he has made both friends and enemies, but none will deny that the present position of the company is largely due to his individual efforts.

The Rt. Hon. F. G. Kellaway, K.C., succeeds Mr. Isaacs as managing director and deputy-chairman of the two companies. Mr. Kellaway has been a member of the board of these companies for the past two years, and has taken an active part in their management. His experience as Postmaster-General in a previous Government should help to smooth over any difficulties that may arise between the company and Government Departments.

What is the Best Wireless Weather?

By M. J. CAVENEY (Canadian 3GG)

An interesting article dealing with the effects of the rise and decline of the barometer readings on radio reception. The tests covered a period of two years, and enough data was collected to form definite conclusions. Note that the observations are all Canadian. Similar tests in this country would be valuable.

DOES the weather affect radio reception? If so, how?

Why do we get "good air" on one night and "poor air" the next night when both are clear, moonlight nights?

If the weather does affect our indoor pastime, then what kind of weather will give us those nights when the air is like clear, sparkling wine—when the receiver works well, and you can tune in DX stations from way over the other side of the radio map?

On the other hand, if the weather man is the real "nigger in the woodpile," then just what particular brand of weather does he use to spirit away those distant and infrequent visitors to our dials, and also seriously reduce the volume of those nearer stations which we always call upon for music, when sceptical friends or boasting radio rivals call on us?

Curves of Barometric Pressure

In an endeavour to answer some of these questions I began, two years ago, to keep a record of the weather in conjunction with daily curves of the atmospheric pressure as shown by the barometer.

The quality of the radio reception was also recorded each night on the barometer chart, with special notes of any exceptionally good or poor reception.

To eliminate as much as possible the chances of error or variation here at the receiving station, the design of the receiver and antenna were left constant, not a wire or a valve being changed during the whole period of two years. The valves have been burning over 4,000 hours now, and are still going strong.

Storage batteries were installed for both the filament and plate supply, and kept fully charged each day. Meters were used in the filament and plate circuits and when once the correct setting was found, it was never changed from year to year.

In addition, and in order to test the transmitting qualities of certain weather conditions here in this locality (Lat. 48, Long. 81, Northern Ontario, Canada), a low-powered radiophone was installed using 10 watts, a 500-volt storage battery for the plate supply, and a 10-volt storage battery supplying current for the filaments.

The transmitting tests were recorded each night to run concurrently with the reception records and weather chart, and it might be well to mention that this station is 500 miles from the nearest broadcast station and 250 miles from any radio transmitting station either amateur or commercial.

If the readings of any ordinary barometer are taken every few hours and the readings plotted on squared paper, with a line running from one reading to the next, it will be seen that the atmospheric pressure is constantly varying from day to day in an irregular manner, as shown in Fig. 1.

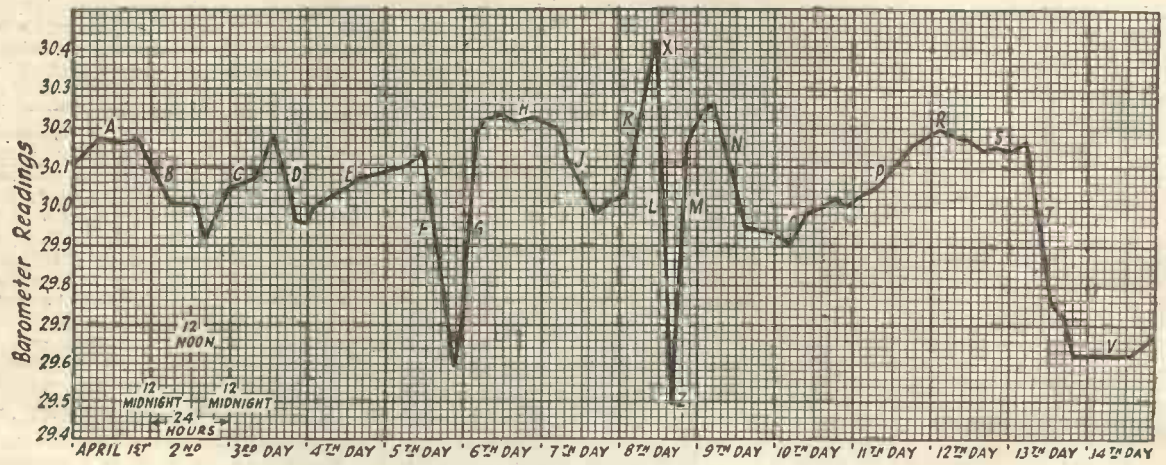


Fig. 1.—A graph of barometer readings for the first fourteen days in April. Radio reception is usually bettered by a rise of the barometer

Variations in Reading

A cursory glance will show that the "glass" or, to be more exact, the atmospheric pressure, rises and falls also at varying speeds. Sometimes it rises or falls slowly, sometimes not at all. Take the curve at the fourth day at the point E. Here we find our glass climbing slowly at an angle of about 25 degrees. If we now move along the curve to the right,

on the eighth day we reach the portion of the curve M. You will notice that the angle of climb now is about 88 degrees, the ascent being almost vertical in fact. A study of the curve at points marked R, S and V will show how the barometer at times moves steadily in an almost straight line at a comparatively high or low position on the pressure chart.

It should be clearly understood at the start that the barometer does not tell the present weather so much as the future weather, which may arrive within the next 24 or 48 hours. Almost without exception when the glass falls, making a steep curve, as shown at Fig. 1 at F, L or T, it will bring stormy weather, and short dips in the curve like those of B, D, J, etc., will usually foretell a change in the weather prevailing at the time of the barometer decline. When the barometer rises rapidly, making a curve like that shown at G and M, it usually ushers in an improvement on the bad weather caused by the previous swift drops on the curve, and invariably is accompanied by fresh, brisk or high winds, now and again amounting to a gale, but eventually clearing up for much better weather.

"Outdoor" Weather

The portions of the barometer curve most favoured by mariners, farmers and all those persons whose lives are spent mostly outdoors, are the sections shown at A, E, R and S. Here we find the glass either steadily rising at an easy sloping angle, or travelling leisurely in a somewhat straight line from one day to the next; an almost infallible harbinger of fine settled weather when the day sky is a clear blue, and beautiful white clouds sail stately overhead, and the dark purple dome of night shows the moon like a silver queen silently gliding in parade before the admiring gaze of a billion brilliant stars.

So the task in hand was to discover if there were any portion of the atmospheric pressure curve, or combination of curves which would be more favourable to radio reception than other sections. While an exhaustive study of the data accumulated within the last two years has failed to bring to light any formula, which by using the barometer curve as the major factor, would enable one to accurately forecast the quality of radio reception for two or three nights in advance, yet there seems to be quite a mass of evidence in favour of the theory that a slowly rising barometer, or better still, a barometer whose curve is virtually steady, or flat in any position, is the most favourable for radio reception. On the other hand, there is ample evidence on record which points to the rapidly falling glass as the most persistent enemy of good radio reception.

There are exceptions, of course, strikingly so in some cases, but as I am writing more for the sake of presenting the facts rather than trying to prove anything, it might be interesting for those who have kept a log of their radio reception for the last year or so, to check up on any dates I may mention as I go along. To begin with, 100 good nights were selected from the records which stated that these nights were ideal for reception, many, in fact, being what might be termed "super" nights with "DX" rampant from sundown to far into the following breaking day.

Results

On 48 of these nights the barometer was found to be rising—on 40 more it was steady and showing curves similar to A, H, R and S in Fig. 1, and on the remaining 12 nights the glass was falling, thus showing that out of 100 excellent nights for radio reception 88 per cent. of the total found the barometer either rising or set steady. Again, selecting 100 instances when excellent runs of good reception or average reception were broken up, we find that in 72 per cent. of these cases a rapidly falling barometer preceded them, in 12 per cent. of them the glass was halted in a "valley" similar to that shown under D and E in Fig. 1, preparatory to a "climb." The remaining 16 per cent. of the time, when our reception went bad, the glass was found to be climbing at various angles from 60 degrees to 85 degrees.

Specific Instances

For the benefit of those who desire to check their reception logs, I will quote a few instances, specifying the dates. In the following, the symbol R will mean that the glass was rising, and the symbol D will show that the barometer was dropping. The numbers accompanying the symbols R or D are used to show the rapidity of rise or fall; for instance, R30 would mean that the glass was rising at an angle of 30 degrees, and D48 would be used to show where the glass was dropping or falling at an angle of 48 degrees.

(To be continued.)

THE NEW POSTMASTER-GENERAL

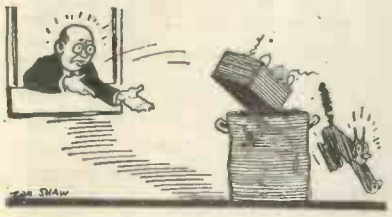
Sir William Mitchell-Thomson, who will now be responsible for wireless licences.

JOTTINGS BY THE WAY

By Wireless Wayfarer

How would you Feel?

IF you were in my shoes at the present moment you would probably be feeling decidedly uncomfortable. Let me add at once that I am not making rude allusions to the size of your feet, though I have no doubt that they might be a little pinched in my dainty Gent's Oxfords. What I mean to say is that I have asked some of the *élite* of Little Puddleton to come round this evening after dinner to hear what wireless ought to be. You, I repeat, would be at the moment little better than a dithering, perspiring, quaking jelly. You would have before you the constant



Into the dustbin.

fear that something would go wrong at the critical moment. I have no need to remind you of what really does happen to ordinary men like yourself on these occasions. It is the fact that your set is working phenomenally well and has been doing so for some days that makes you pluck up your courage to issue an invitation of this kind. When you switch on there is that semi-mythical background of absolute silence, and as you lightly turn a knob here, a knob there, 2LO, or whatever may be your best station, comes in with a strength and purity that could hardly be equalled by the products of Professor Goop and myself. In your enormous temporary vanity you pat yourself on the back (a difficult feat this, but I mean it metaphorically), saying, in a loud voice full of uppishness, "Now I can claim to be a genius of the equal of such men as Wayfarer. I will show the world what I can do." You see yourself being offered a fat retaining fee by some great company to design sets specially for them. You probably go round to several friends, and, having heard their miserable reproduction of broadcasting, do not hesitate to tell them quite plainly what you think of it. And then in the puffedupness of your conceit you suggest that on the following night they shall come round to you. You imply pretty plainly that if they do they will hear something really worth listening to, and that the probabilities are that having heard they will first jump upon their own sets, then fling them into the dustbin, and finally turn over a new leaf by setting to work to make something on the lines of your own pet model.

Asking For It

They duly turn up on the following evening. You switch on. There is not a background of absolute silence. There issues continuously from the loudspeaker the kind of noise that a sea lion makes when trying to swallow an outsize in fish. You murmur something about atmospherics. Your friends smile, and take the opportunity of assuring you that they tried their own sets before leaving home, and that there are no atmospherics. Becoming a little ruffled you begin to tune in. You twiddle. You go on twiddling. You do not tune in. Biting back a naughty word, you stride out into the night and attach the aerial. The friends smile. You do not smile. You twiddle again. There is an awful shriek. The friends giggle. You frown. You dim the filaments. You twiddle again. There is a worse shriek. You touch the aerial terminal to see that it is screwed up tightly. There is a super-shriek. The friends by this time are lying back in their chairs and shaking with joy. You meantime, purple in the face and perspiring freely, wave wild hands over the set, tightening up now this, now that. And whenever you touch anything a scream, not from you but from the loudspeaker, fills the room. At length, after many fruitless efforts, you manage to pick up 2LO. It is a funny little tinny

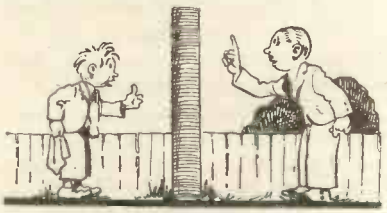
". . Waving wild hands . ."

noise, barely audible at the far side of the room and distorting everything in the most horrible way. The friends become sarcastic. They thank you very much for your demonstration of something new in reception, and say that they have no doubt that it is an acquired taste like beer, marmalade and Mah Jongg.

Getting Ratty

Then you probably lose your temper, explaining with a wealth of gesture that this is emphatically not up to your proper standard. You tell them that only a few hours ago you were listening enraptured to the perfect strains delivered by your loudspeaker. They are quite kind about it, merely saying, with little knowing

looks at one another, that just the same kind of thing used to happen to them when they were beginners two or three years ago. They offer sympathy, which is like rubbing salt into your wounds. Though they were all good fellows but a short time ago, you now realise that you hate every one of them from the bottom of your heart, and that you never wish to see them again. Possibly you tell them so. In any case, you make yourself so unpleasant that they depart, leaving you with an empty decanter and a full heart. The world, you feel, is a hard, cold place, with little joy in it. You think of smashing up the set on the spot after what has happened, but on second thoughts decide to look at it again. There, staring you slap in the face, is some silly little thing such as an obviously disconnected lead which, in your paroxysms, you had failed to notice. You attend to it. You tune in again. At



Edward Bugsnipp, like a very Tarzan.

once the room is filled with the sweetest strains. Then you dash to the telephone and ring up your friends, to whom you convey the joyful news, asking them to retrace their steps. Their excuses for not doing so are many and varied, and you can tell quite well that they do not believe a word of what you say.

Ordinary Men

That, in brief, is what happens to ordinary men such as you, reader, and members of the staff of *Wireless Weekly*, with the exception of myself. It does not happen to me, simply because on these occasions I exercise a little common sense. I make quite sure before my friends come round that everything is in working order. I get my tuning done to a hair's breadth, and then I simply switch off and await their arrival. When they enter my den I flick the switch over, and that is that. For this reason I am waiting now without the slightest signs of nervousness for the arrival this evening of two of the most critical of Little Puddleton's expert sons, Poddleby and Bumpleby Brown. And now, I suppose, you will want me to tell you the secret of my success, the way in which I deal with my set so that I can rely always upon its performing as it should. Well, as I am always willing to lend a helping hand, I will tell you how I spent the afternoon. Very shortly after lunch you might have seen me standing at the foot of my aerial mast speeding young Edward Bugsnipp, who, like a very Tarzan, climbed aloft to clean the insulators. Later you might have seen this same lad clambering over the roof to see that all was well with the soldered joint of the lead-in.

Make Certain

Later still I watched him dig up the earth so that no disconnection here could come to mar a perfect evening. Then I myself conducted a minute examination of the set to satisfy myself that every one of its parts was perfectly connected and in efficient working order. With a pipe cleaner I carefully removed the dust from between my condenser vanes. Each coil, each transformer was tested out for a possible "dis." Every lead was seized with the pliers and pulled hard to ascertain that the solder had not come adrift. Soldering done by me never does so, of course, but I like to make assurance doubly sure. With a penknife I splayed the pins of all valves. The milliammeter assured me that none of them was failing to pass its proper quota of current. And so I went through the whole thing bit by bit with the utmost care, a process which I can confidently recommend to you.

So Simple

If you, dear reader, will just carry out the simple instructions you will be able to look forward to the advent of critical friends with the same philosophic calm that now surrounds me. You will be as certain as I am at the present moment that nothing can possibly go wrong, and that when your friends depart each of them will wring you by the hand, saying, with a slight choke in his voice, "By Jove, I only wish I could get results like that." Mind you, I do not boast. I merely record facts because I want to impress upon you the urgent necessity for being thoroughly systematic in these things. It is the little points of detail that really count, and if you attend properly to them you will be just as unperturbed as I am now on the eve of an important demonstration. Poddleby and Bumpleby Brown will be here quite soon now, and I think that I shall be able to show them just a thing or two. Both have been rather above themselves of late, but to my mind neither of them has a receiving set that is fit to install in a pigsty. If there is one thing that I do hate it is swollenheadedness, and that is why I trust to be able to set both of them thinking a bit this evening. Next week I hope to be able to tell you just how I

An empty decanter and a full heart.

flattened them out, flabbergasted them, wiped the floor with them, and proved to them absolutely that if you want consistently good reception you must have behind the receiving set not only an expert but also a man of method.

WIRELESS WAYFARER.

[*We think that the letter printed below, which has recently been received from Mr. J. Poddleby, secretary of Little Puddleton Wireless Club, may be of interest to readers.*—ED.]

To the Editor,
Wireless Weekly.

SIR,—It is not often that one has the privilege of being entertained at his own house by so distinguished an expert as your well-known contributor, "Wireless Wayfarer." Usually he manages to see that he is entertained by us. The other night Mr. Bumpleby Brown and myself

(*Concluded on page* 181)

Supersonic Heterodyne Reception in Theory and Practice

By JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

Part V.

Rectifying the supersonic currents

Once the supersonic currents have been obtained by heterodyning the incoming signals and rectifying the resultant beats, we can use ordinary high-frequency coupling to amplify the results.

In Fig. 19 we see a three-valve set in which the local oscillations are supplied by an oscillating valve V1, the circuit L1 C1 being tuned a frequency to one side of the incoming currents which affect the receiving circuit L2 C2. The resultant beats are rectified by the valve V2, and the new frequency currents, which are supersonic and resemble ordinary high - frequency currents corresponding to longer wavelengths, pass through the primary L3 of the high-frequency transformer L3 L4. These new high-frequency currents are then amplified by the second valve V3, and are finally applied to the grid of the detector valve V4. This valve is arranged to act as a detector, telephones being included in the anode circuit of this valve.

The object of supersonic amplification

What is the object of using this supersonic heterodyne method of amplification if the telephones are unable to respond to the supersonic currents? This is a perfectly natural question to ask when we are dealing with ordinary incoming high - frequency currents of continuous wave form, i.e., signals from C.W. stations.

In Fig. 19 we will assume that the transformers L3 L4 and L5 L6 have been designed to work best on a wavelength of 6,000 metres, i.e., a frequency of 50,000 cycles per second. The receiving circuit L2 C2 is assumed to be tuned to 300 metres, the wavelength of the incoming signals. This corresponds to a frequency of 1,000,000. The local oscillator V1 induces currents into the circuit L2 C2 having a frequency which we have set at 1,050,000. This corresponds to a wavelength of 286 metres. The induced currents into L2 C2 will mix and form beats with the incoming currents, the final beats having a frequency equal to the difference between 1,000,000 and 1,050,000, thus producing a beat frequency of 50,000. These beats of 50,000 frequency are rectified by the valve V2, and produce anode currents of 50,000 frequency, i.e., a wavelength of 6,000 metres. These 6,000-metre high-frequency currents will be amplified and will ultimately be detected by the valve V4. In supersonic heterodyne reception, the actual frequency of the beats is, within limits, not an important consideration, but it is important to see that the local oscillator is so adjusted that the high-frequency coupling in the receiver is suited to the particular beats produced. If, for example, the transformers L3 L4 and L5 L6 worked best on 5,000 metres, a slight readjustment of the condenser C1 would be required so as to produce a new beat frequency, and so a new set of high-frequency currents. These new high-frequency currents are generally termed the intermediate frequency currents, because they have a frequency intermediate between the currents in the aerial circuit, and the final low-frequency currents which I will explain shortly are finally obtained in the telephones. The two stages of amplification are generally termed the intermediate frequency amplifier, or intermediate amplifier. The valve V2 may be considered as merely the first detector, in which case the valve V3 will be considered as the single stage of intermediate high-frequency, or the first valve may also be considered as it really is, not merely as a detector, but also as a stage of intermediate frequency amplification. I will not, however, refer to the first valve except as the first detector. In a case such as Fig. 19 I will, in future, simply say that there is a first detector, a stage of intermediate frequency amplification and a second detector.

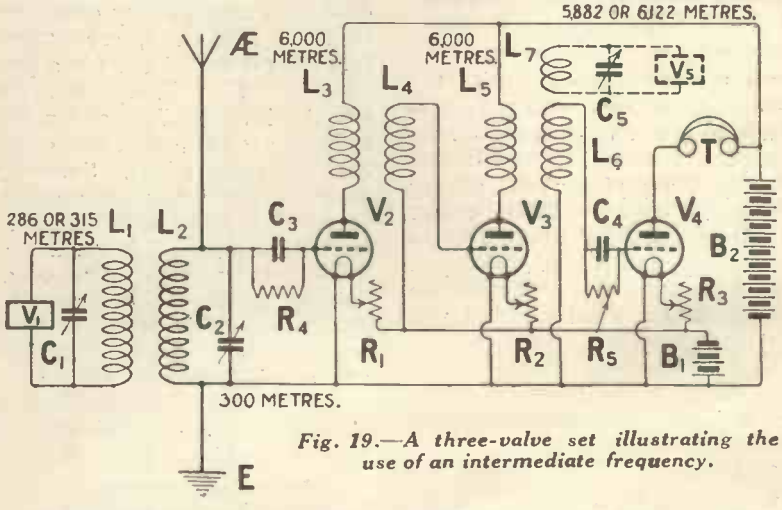


Fig. 19.—A three-valve set illustrating the use of an intermediate frequency.

The intermediate frequency

What are we to do with the high-frequency currents, or, rather, intermediate frequency currents of 6,000-metre wavelength? These currents correspond to a frequency of 50,000 metres, and consequently when the currents are rectified there will be no varying currents passing through the telephones because the currents in the intermediate circuit are simply alternating currents. In the receiving circuit L_2 C_2 beats are produced, but when these beats are rectified they produce alternating currents having the same frequency as the beat frequency, and this alternating current, being of 50,000 frequency, is unable to work the telephones T. The alternating currents, of course, thus produced are like incoming continuous waves of 6,000-metre wavelength, and the waves, and the figures attached to the drawing indicate the frequencies and wavelengths of the currents in different parts of the circuit. The incoming wavelength is 300 metres, and to produce a beat frequency of 50,000 corresponding to 6,000 metres, the local oscillator V_1 should be adjusted to a wavelength of 286 metres or 315 metres. The 6,000-metre signals, corresponding to a 50,000 frequency, are amplified, and beats are produced with them by the valve oscillator V_5 which corresponds to a wavelength 5,882 metres, or alternatively, 6,122 metres. It will thus be seen that there are two heterodyne processes and two detector processes, and the incoming signals produce three different frequencies at different stages. There are, first of all, the 300-metre signals; these are then converted into 6,000-metre signals, and finally we have the 1,000-frequency signals which operate the telephones.

Broadcast reception

When receiving broadcasting, we are not dealing with continuous waves, and in this case we do not use the final heterodyne V_5. The word heterodyne, be it noted, is sometimes used to denote the actual apparatus which produces the local oscillation.

Let us first of all take the case of incoming spark signals. These have a definite wavelength of, say, 300 metres, but the spark signals vary in amplitude. These currents are heterodyned by the local oscillator V_1, and will likewise produce currents of 6,000-metre wavelength, but these currents, instead of being alternating currents of fine waveform, will vary in magnitude, so that when rectified by the last valve the audio-frequency changes will be heard in the telephones. Spark signals, of course, are groups of waves of varying amplitude which come at more or less regular intervals, so that the amplifier is not amplifying a steady stream of continuous waves as before, but groups of waves which vary somewhat in strength according to whether we are considering the beginning or end of train or the middle.

Telephony

Telephony signals are rather different, because here we are considering continuous waves which are modulated by speech. A modulated incoming signal has no precise wavelength, although we certainly speak about 2LO, say, having a wavelength of 369 metres. This wavelength is not absolutely constant, although 369 is the average wavelength of the signals. What actually happens is that the wavelength is fluctuating in value, the incoming signals being capable of being divided up into three waves, one of them being the fundamental wave which may be 369 metres,

This photograph shows the aerial at the famous "Ecole Superieure" station. A full description of this station will be given in our next issue.

only way of receiving them in the telephones T is by applying a local oscillator V_5 shown in dotted lines in Fig. 19. If this local oscillator is tuned to a slightly different frequency than 50,000, say 49,000 or 51,000, beats will be obtained in the grid circuit of the valve V_4, and these beats, when rectified, will produce an audible signal in the telephones T having a frequency of 1,000.

Short wave reception

This method is used when receiving short continuous

and is the wavelength of the carrier wave, the second wave which will be this wavelength with a bit added, and a third wavelength with a bit taken off. Put more scientifically, if the incoming frequency is 1,000,000, and if we consider that a specified note of 1,000 frequency is being transmitted—e.g., the tuning note from a broadcasting station — then the incoming waves may be capable of three divisions, one being the main frequency, 1,000,000, the other a frequency of 1,000,000 plus 1,000, and the other 1,000,000 minus 1,000. The ordinary receiver cannot, of course, separate out these wavelengths, because the change of wavelength is only very small. Nevertheless, it is important to note this point at this stage.

Beat frequencies

If we heterodyne these incoming signals we will obtain new frequencies which, when rectified, will represent beat frequencies, the original frequency of 1,000,000 disappearing. These beat frequencies, if the average frequency difference between the local oscillator and the incoming signal is 50,000, will represent a wavelength of about 6,000 metres, although the actual current, if sub-divided, would represent three wavelengths, one 6,000 metres, one a little more, and one a little less of this value. The average value, however, will be 6,000 metres, and the high-frequency transformers in Fig. 19 will amplify these currents. Since the strength of the notes from a broadcasting station are continually fluctuating, there will obviously be fluctuations in the final output from the detector valve.

What really happens is that the high-frequency currents generated by the local oscillator convert the 300-metre signals into 6,000-metre signals, but otherwise does not affect their general result. This conversion process enables the long wave amplifier, with all its stability, to be used for the reception of shorter wavelengths. If found necessary, further theoretical consideration will be given to the problems involved.

□

How to Bare the Ends of Wires

WHEN baring the ends of double cotton-covered wire, especially if it is of small gauge, it is not a good plan to remove the insulation by scraping with a knife. One is very apt if this method is used to make nicks in the wire, which weaken it. By far the best way is to give the outer layer of insulation a twist first in one direction and then in the other with the finger tips. This will show in which way the covering is wound, and it can then be unwound quite easily. Do not cut the end off short, but make a half hitch with it round the wire. Then unwind the inner covering, which usually runs in the opposite direction, and again make a half hitch. The ends may now be clipped off.

Flexible wires

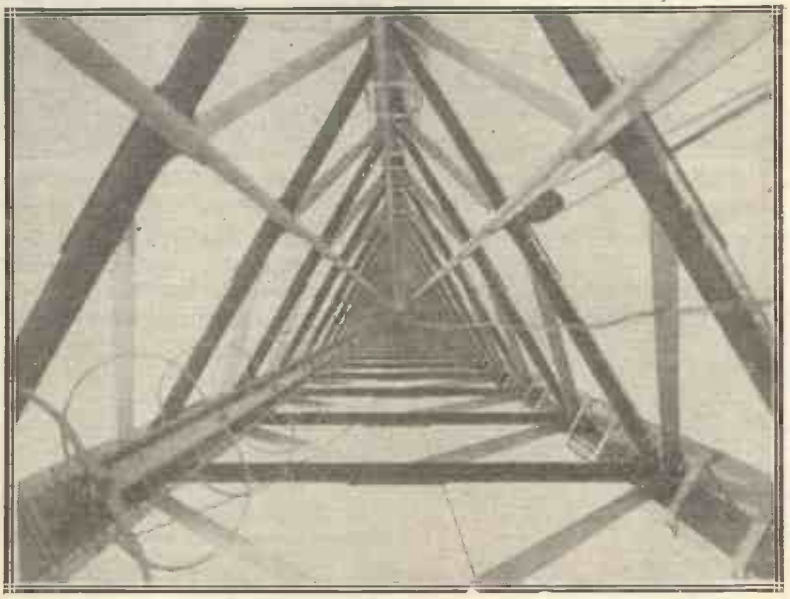
Great care must be exercised when baring the ends of flex, since its fine strands are very easily broken. If it is of the usual type with an outer covering of braided silk or cotton over a layer of rubber, within which is a cotton covering, proceed as follows:—With a pair of sharp scissors snip through the outer braid and remove it. Whip with a few turns of cotton so as to prevent the ends from fraying out. With a knife make a light cut all round the rubber just above the point where you have put the whipping. Take care not to cut into the wires. Hold the main part of the flex in the left hand and the rubber which has been laid bare between the thumb and the first finger of the right. Work the nails into the cut and pull. One or two pulls will usually suffice to make the rubber sheath slide off. Now unwind the inner silk or cotton covering and make a half hitch, as previously described, afterwards cutting off the end short and whipping with a few turns of silk.

One of the most difficult kinds of wire to deal with is Litzendraht cable, which consists of a great number of hair-like strands, each separately insulated. Any attempt at scraping or burning is almost certain to result in breakages. Enamel-covered Litzendraht strands are best treated in the following way:—Remove the outer covering from the cable and untwist the strands, taking care not to break them. Immerse the ends in methylated spirit and leave them to soak for some time. This will soften the enamel, which can then be wiped off with a soft rag.

R. W. H.

□

THE RUGBY STATION



A view looking up one of the masts at the new Hillmorton Station near Rugby. A better impression will be obtained by holding this picture above the head.

Some Interesting Valve Tests

By A. D. COWPER, M.Sc., Staff Editor.

Further trials of the D.E. 5.B., and some notes on repaired valves.

Marconi Osram D.E. 5.B. Valve

IN connection with the report on a sample of the new Marconi - Osram D.E.5.B. valve, designed especially for resistance-capacity low-frequency amplification with a high voltage-amplification factor (*Wireless Weekly*, Vol. 4, No. 22, p. 731), we were glad to have a further opportunity, by courtesy of Messrs. Marconi-Osram Valve Co., Ltd., of testing combinations of two further valves in resistance-capacity coupling, and in conjunction with a small power-valve of comparatively low impedance in the final stage, in the manner advocated by them. It is not generally realised to what extent the large anode-resistance required flattens the valve-characteristic: it was interesting, therefore, to determine the characteristics with and without the 100,000 ohm anode-resistance which the makers prefer to use, at 80 and 100 volts H.T., with a second valve of this type. The filament consumption corresponded exactly with the rating, viz., .22 ampere at 5 volts; the somewhat higher figure noticed with the isolated valve previously reviewed was—we have satisfied ourselves—not representative of the valves being issued to the public. The amplification factor came out at the extremely high mean figure of around 20, without the anode resistance.

Resistance Coupling

In a number of careful quantitative tests, measuring the actual signal-voltage obtained across the 'phones with a constant test-signal and various combinations of valves, two stages resistance-capacity coupling with R valves followed by a small power-valve for last stage gave about the same as one stage with one R valve and a very efficient transformer; but with two stages, using two D.E. 5.B. valves, the result was nearly three times that with two R valves, and markedly greater than one stage of transformer-coupling using one D.E. 5.B. valve. In another set of experiments using two valves to amplify an audio-frequency input, with transformer coupling, the substitution of an R valve by a D.E. 5.B. for the first stage gave an increased signal-strength almost exactly in the proportion of the higher amplification-ratio of the latter valve; an R valve coupled to the D.E. 5.B. by a step-up transformer of high ratio gave almost exactly the same result as a D.E. 5.B. coupled by resistance-capacity (100,000 ohm anode resistance) to a second D.E. 5.B. (the high amplification-ratio fully compensating for the inefficiency of the coupling here); and with two D.E. 5.B. valves coupled with the same efficient transformer an actual amplification of around 30 times resulted, compared with an R valve alone. Hence resistance-capacity coupling can replace transformer-coupling without loss of signal strength, if the ordinary low-ratio valve be at the same time replaced by this high-ratio valve.

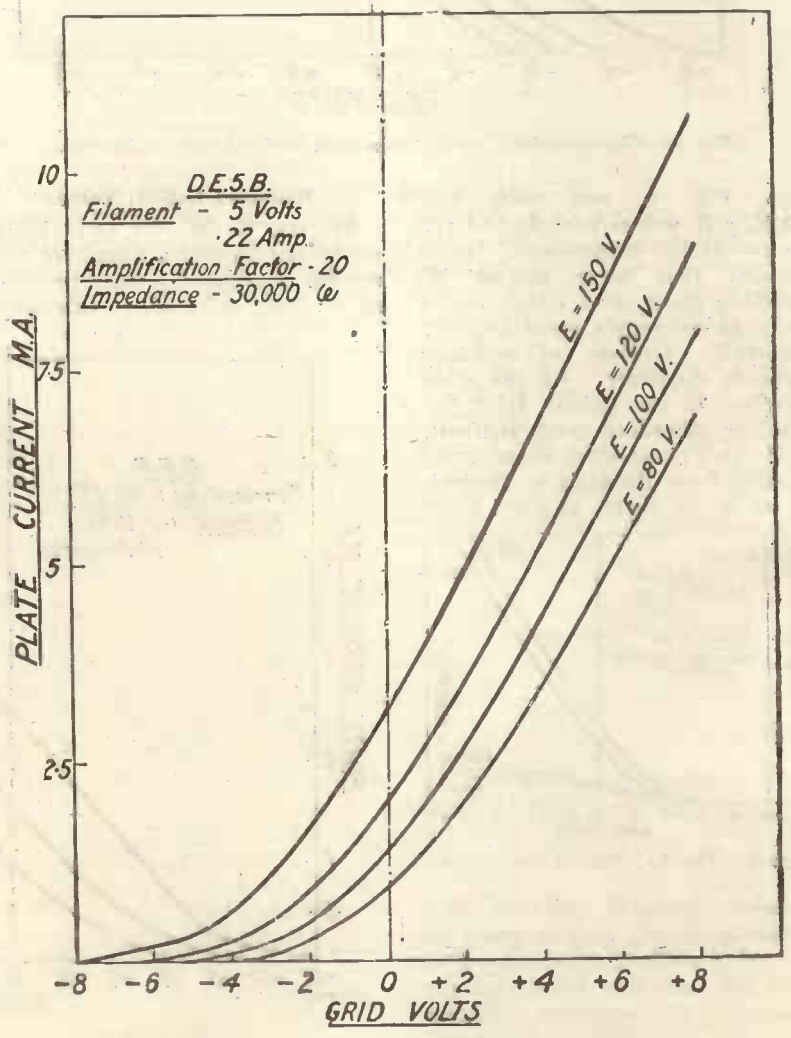


Fig. 1.—Characteristic curve of a D.E. 5.B. valve.

Tested in actual reception on an indifferent country test-aerial, a two-valve transformer-coupled reaction receiver, with a circuit substantially as given in *Wireless Weekly*, Vol. 4, No. 23, p. 750, Fig. 2, and using two D.E. 5.B. valves with 80 and 150 volts H.T. respectively, gave results that were almost incredibly good, and which would take an extremely good four- or five-valve receiver of ordinary type to duplicate. All the main stations in the British Isles (including Aberdeen and Belfast), and every short-wave Continental station from Brussels to Madrid, came in, at night, at good loud-speaker strength without any difficulty at all; and as many of the relay stations as one cared to look for, including Edinburgh (in Essex), at excellent 'phone strength. One obtained the impression that there was no transmission within a thousand miles that was not within its reach, thanks to the smooth reaction and wonderful amplification attained with these valves.

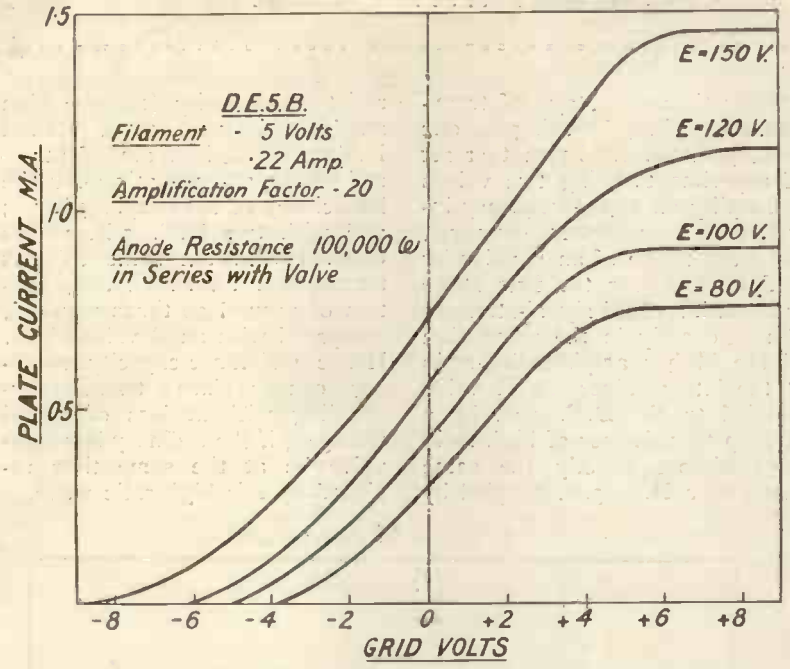


Fig. 2.—Characteristic curve taken with series anode resistance.

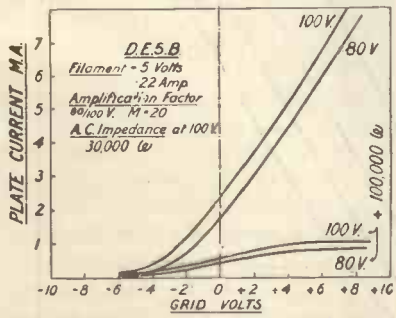


Fig. 3.—The two curves compared.

Renewed D.E.R. Valve

Messrs. G. W. I., Ltd., have submitted for test a sample of the results obtained by their process of renewing dull-emitter valves by substituting a new filament of but moderate consumption for the old one. This was an ordinary D.E.R. valve, the only noticeable change being a scar on the side of the bulb made in this process and a colouration of the bulb.

The new filament consumed, on test, approximately 0.3 ampere at 1.8 volts, at which rating the emission was liberal enough for any ordinary purposes. Since this type of valve is generally to be used with a 2-volt accumulator cell, 1.8 volts on the filament is a convenient figure: the characteristic, and general qualitative behaviour, were observed at this setting.

The curves for 50, 70 and 100 volts H.T. showed that the original characteristics of the valve had not been sensibly disturbed by the repair. The mean amplification between 50 and 70 volts was M=10, the A.C. impedance here being around 34,000 ohms. Tested in actual reception, the valve operated excellently. There were no signs of softness or distress with high H.T. values; good loud-speaking was obtained on 100 volts H.T. and 3 volts negative grid-bias.

It is evident that Messrs. G. W. I., Ltd., have effectively solved the problem of renewing the filament of this type of D.E. valve, giving it a new and very serviceable lease of life.

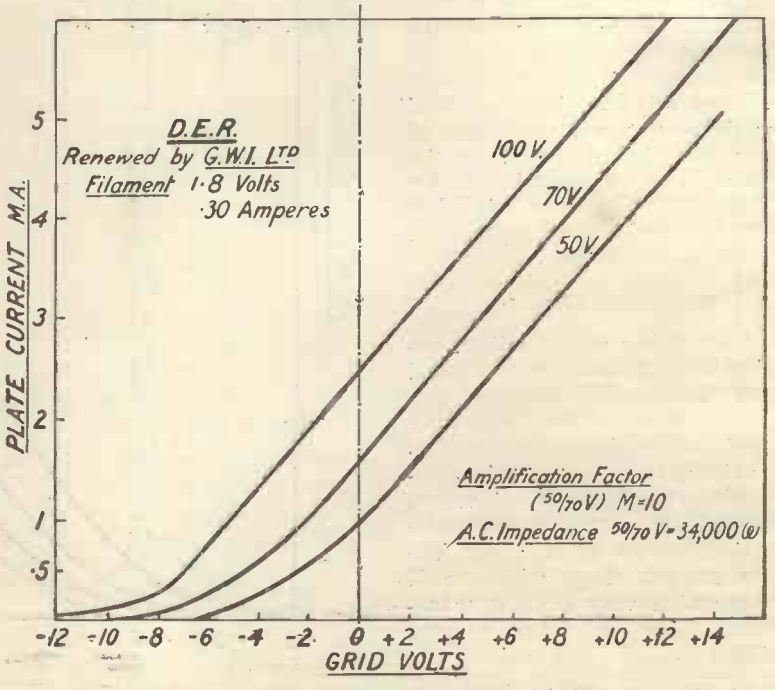


Fig. 4.—Curve of a repaired D.E.R. valve.

Valve Notes

By
JOHN SCOTT-TAGGART,
F.Inst.P., A.M.I.E.E.

Losses in Condensers

MORE losses occur in variable condensers than is generally supposed. These losses usually take the form of dielectric losses in the insulating bushes.

A variable condenser is nowadays regarded as purely a mechanical job, and as a result, while good mechanical construction is often embodied, the electrical side is neglected.

On a shorter wavelength, e.g., 75 metres or thereabouts, losses in the ebonite bushes become very appreciable, and even apparatus manufactured by leading firms suffers from this inefficiency which becomes increasingly great as the wavelength is reduced. Different qualities of insulating material produce different degrees of inefficiency, and without experiment it is not possible to arrive at the best arrangement.

Ebonite End Plates

Then again, having a very small bush separating the spindle from the main body of the condenser tends to increase the losses, and unless manufacturers pay immediate attention to this important point, they will find that those producing ebonite end-plates will gain hand over fist. A condenser with a generous bush will usually be preferable on short-wave work, and one excellent method of testing one condenser against another is to try the effect in a short-wave receiver and to note the alteration in the amount of reaction required. Many a short-wave receiver will not oscillate on the lower degrees of a variable condenser scale, owing to the excessive losses in the dielectric between the two sets of plate mountings. The more reaction required to tune in a station the greater the losses in the condenser under test. An air dielectric between the plates themselves is undoubtedly the best, and these delightful variable condensers with ebonite sheets between the plates, while useful and convenient for longer wavelengths, are not recommended for short-wave reception.

A great deal more publicity will probably be directed to variable condensers in the future, and manufacturers, in the meanwhile, may care to overhaul their designs, bearing in mind the points I have raised, and at the same time the question of minimum and maximum capacity.

Overstating the Capacity

Some suppliers of variable condensers are still giving short weight, and this is not only wrong in itself but may lead to serious troubles in a beginner's set. There are some variable condensers on the market having a supposed maximum capacity of .0005 μF which will not cover the proper wavelength range with plug-in coils. For example, in tuning an aerial circuit it happens that a station cannot be properly tuned in with the condenser full in on a No. 35 coil, and likewise cannot be tuned in at the bottom end of the condenser scale on a No. 50 coil. If the experimenter is unfortunate enough to experience this gap, he will be in a quandary because there may not be a particular coil which will tune in on a suitable value of the variable condenser. I am glad to say that some coils, e.g., those of Lissen's manufacture have a number in between the usual standards 35, 50, 75, etc.

The Lissen 60, for example, is a particularly useful size which I often use.

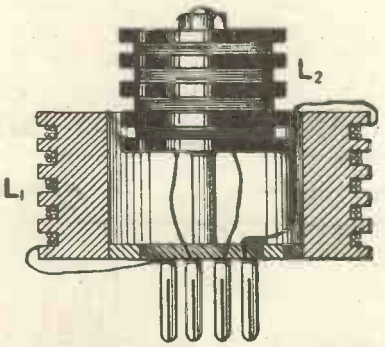


Fig. 1.—A useful type of variable high-frequency transformer.

Standardised Coils

There are a number of coils on the market at present which experimenters are using and which are all much of a muchness as regards efficiency. There is, however, a variation in the inductances for specified numbered coils. It is high time that inductances of coils were standardised. I do not know whether manufacturers regard 35, 50 and 75 as the actual number of turns employed; no doubt this was so originally, but in the case of different makes of coils it is, of course, highly undesirable that a No. 35 of Smith's coil should be entirely different from a No. 35 of Jones' coil simply because their method of winding is different. A standard should be drawn up showing the inductance of a No. 25, 35, etc., coil, and these numbers used to indicate the standard rather than the actual number of turns used.

Inductance Values

A difficulty which would arise, however, would be in connection with specifying the inductance in microhenries. This would not ensure all the coils being exactly the same, because the self-capacities might vary to a great extent. Another suggestion would be that the coils should all resonate to the same wavelength

when unconnected to a condenser at all. This, however, would be very unreliable because, if such a standardisation method were employed the slightest difference in design would alter the self-capacity, and so alter the natural wavelength of the coil. I am inclined to think, therefore, that an inductance standard, specifying the inductances in micro-henries to correspond to certain numbers would be the best plan.

Coil Connections

I would like to criticise strongly the carelessness of some coil manufacturers in sending out coils wound differently or having the connections made differently. The result, of course, is that an experimenter may readily make up a set according to a specified design, and then find that a reverse reaction effect is obtained instead of a normal reaction effect. Quite probably the beginner will not realise why his set is not working properly.

If a coil manufacturer is to be condemned for sending out coils connected the wrong way round, the high-frequency transformer manufacturer deserves far greater censure if he sends out a transformer wound the wrong way or connected the wrong way round. There is far more in high-frequency transformers than meets the eye, and it is very important to see that the connections are all made correctly. There is a great deal in transformer design, and even yet we have not reached perfection.

Variable High-Frequency Transformers

I was talking the other day about the need for a variable high-frequency transformer, and my remarks have brought forward a sample bearing the name "Mellowtone." This piece of apparatus is produced at a very reasonable price and works well.

It is of the disc pattern, and

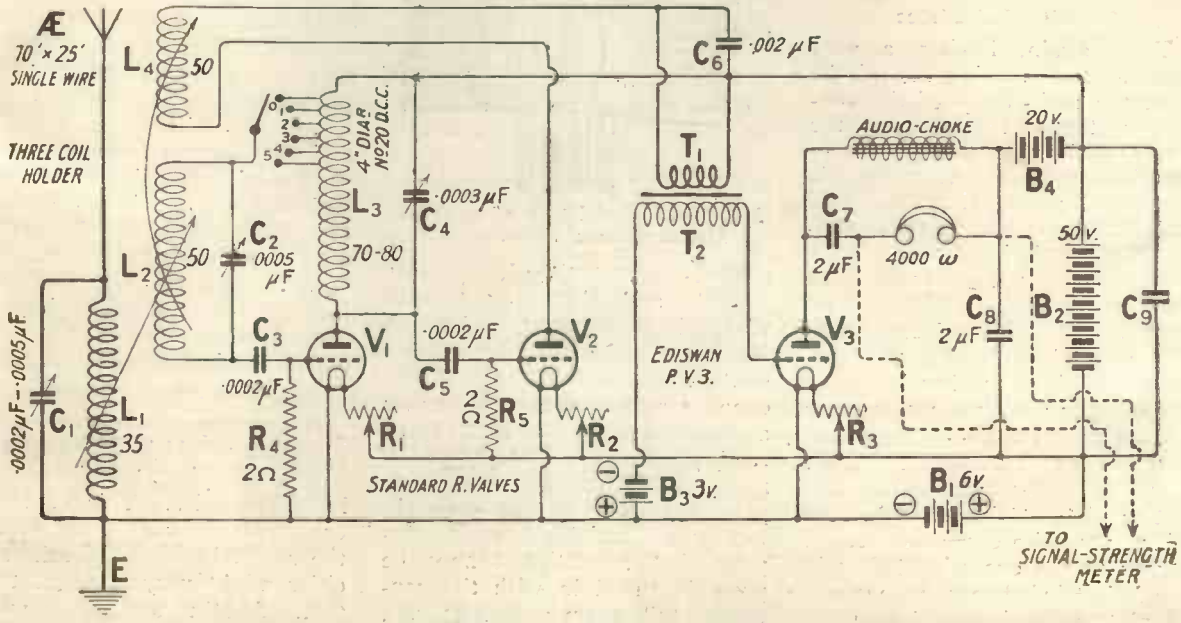
Fig. 2.—A back-of-panel valve holder incorporating a filament resistance.

I cannot help feeling that there would be a market for a more expensive article in which the self-capacity of the windings is reduced to a minimum. Fig. 1 shows some idea of the kind of thing that would be useful. One of the inductances L1 is wound in grooves in an outer ebonite tube, while inside is a similar tube L2 wound so that the coil L2 has a minimum self-capacity. The coil L2 can slide in or out of the coil L1. It is not important that the coupling should be smoothly variable; it would be sufficient if the coupling could be adjusted by means of a nut, or something of the sort, the experimenter adjusting the coupling to suit his particular circuit or receiver. Such an adjustment, of course, would give a great control over self-oscillation in multi-stage high-frequency amplifiers, and it astonishes me that no manufacturer has apparently set out to produce a transformer of this kind.

Back of Panel Valve Holders

I have received a very interesting back of panel valve-holder which employs a one-hole fixing, a method of attachment which I strongly commend to all manufacturers and experimenters alike. This particular valve-holder is illustrated in Fig. 2, and it will be seen that the rheostat portion marked R is of the carbon compression type. By means of a one-hole fixing, the rheostat with the valve-holder V at its end may be readily fitted to a panel. The idea is undoubtedly a clever one, and if the rheostat works well over prolonged service there should be a big demand for such a component.

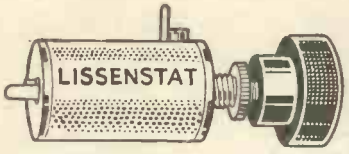
THE NEUTRAL GRID METHOD



The circuit of Fig. 4 of the article entitled "Long distance reception using the Neutral Grid method of H.F. Amplification" contained a slight, but obvious error in the switch wiring of L3. The corrected drawing is reproduced above.

LISSENIUM

Control the energies of your valve—



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LISSENSTAT UNIVERSAL (patents pending)—with its protective device for dull emitters .. **10/6**

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Made in three models—all have LISSEN ONE-HOLE FIXING, OF COURSE.

WITH LISSENSTAT CONTROL YOU CAN FEEL FOR THE POINT OF FINE DETECTION—AND UNERRINGLY FIND IT.

SENSITIVITY

and its allied control, the LISSEN GRID LEAK

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It covers a wide range of resistance values, with continuous variation throughout.

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Regular Programmes from Continental Broadcasting Stations

Reduced to Greenwich Mean Time.

Telephony except when otherwise stated. Corrected up to November 10th, 1924.
Number of corrections since last issue : 91.

Edited by CAPTAIN L. F. PLUGGE, B.Sc., F.R.Ae.S., F.R.Met.S.

Readers are advised to cut out this table for future use. In an early issue we hope to publish a key table which will enable them to use their table in an entirely novel manner.

WEEK DAYS

Ref. No.	G. M. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
	a.m.						
1	6.25	Hamburg ...	—— 395 m. ...	Germany ...	Time Signal in C.E.T.	5 mins.	700 Watts.
2	6.40	Eiffel Tower	FL 2600 m. ...	Paris ...	Weather Forecast	5 mins.	5 Kw.
3	6.55	Munster ...	—— 413 m. ...	Westphalia ...	Time Signal in C.E.T.	5 mins.	1.5 Kw.
4	7.05	Lausanne ...	HB2 850 m. ...	Switzerland	Weather Report	5 mins.	300 Watts.
5	7.55	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks, Shares and News ...	10 mins.	2 Kw.
8	9.23	Eiffel Tower	FL 2600 m.	Paris ...	Time Signal in G.M.T. (Spark)	3 mins.	—
9	9.55	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks, Shares and News ...	10 mins.	2 Kw.
10	10.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Sidereal Time (Spark).	5 mins.	—
156	10.00	Radio Wien	530 m. ...	Austria ...	Concert	Noon	1 Kw.
11	10.30	Lyons ...	YN 470 m. ...	Lyons ...	Gramophone Concert	30 mins.	500 Watts.
12	10.30	Kbel ...	—— 1150 m.	Prague ...	Exchange quotations	10 mins.	1 Kw.
13	10.44	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in G.M.T. (Spark)	3 mins.	—
14	10.55	Eiffel Tower	FL 2600 m. ...	Paris ...	Fish Market Quotations—Cotton Exchange.	10 mins.	5 Kw.
15	10.55	Frankfurt ...	—— 467 m. ...	Frankfurt ...	Time Signals (spoken) followed by News (in C.E.T.)	5 mins.	1 Kw.
16	11.00	Stuttgart ...	—— 443 m. ...	Wurtemberg	News and Opening Prices ...	10 mins.	1 Kw.
17	11.10	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks and Shares	20 mins.	2 Kw.
18	11.14	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Time (Spoken), followed by Weather Forecast.	5 mins.	5 Kw.
20	11.15	Voxhaus ...	—— 430 m. ...	Berlin ...	First News Bulletin and Weather Reports.	5 mins.	700 Watts.
19	11.55	Konigsberg	—— 460 m. ...	East Prussia	Time Signal in C.E.T.	5 mins.	1 Kw.
21	11.55	Voxhaus ...	—— 430 m. ...	Berlin ...	Time Signal in C.E.T.	5 mins.	700 Watts.
22	11.55	Leipzig ...	—— 454 m. ...	Germany ...	Time Signal Relayed from Baven	5 mins.	700 Watts.
23	11.57	Nauen	POZ 3100 m.	Berlin ...	Time Signal in G.M.T. (Spark)	8 mins.	—
157	12.00 noon	Zurich ...	—— 650 m. ...	Switzerland	Weather Forecast, Shares and News.	45 mins.	500 Watts.
24	12.00	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks and Shares	8 mins.	2 Kw.
	p.m.						
26	12.15	Geneva ...	HB1 1100 m.	Switzerland	Lecture	12.45 p.m.	300 Watts.
25	12.30	Kbel ...	—— 1150 m. ...	Prague ...	Exchange Quotations	10 mins.	1 Kw.
27	12.30	Lausanne ...	HB2 850 m. ...	Switzerland	Weather Reports, Time Signal in C.E.T. and News.	15 mins.	300 Watts.
30	12.45	Stockholm ...	—— 440 m. ...	Sweden ...	Weather Forecast	5 mins.	500 Watts.
31	12.45	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks and Shares	10 mins.	2 Kw.
32	1.00	Radio-Paris...	SFR 1780 m.	Clichy ...	Concert followed by News ...	2 p.m.	8 Kw.
33	1.00	Haeren	BAV 1100 m.	Brussels ...	Weather Forecast in French and English.	8 mins.	150 Watts.
34	1.00	Munich ...	—— 485 m. ...	Bavaria ...	News and Weather Report ...	10 mins.	1 Kw.
36	1.00	Stockholm ...	—— 440 m. ...	Sweden ...	Time Signal	3 mins.	500 Watts.
37	1.15	Voxhaus ...	—— 430 m. ...	Berlin ...	Stock Exchange News	5 mins.	700 Watts.
35	1.15	Komarow ...	—— 1800 m. ...	Czecho-Slovakia.	Stock Exchange and Late News	10 mins.	1 Kw.
40	2.30	Munster ...	—— 410 m. ...	Westphalia ...	Stocks, Shares and News ...	10 mins.	1.5 Kw.
38	2.40	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam	Stocks, Shares and News ...	10 mins.	2 Kw.

WEEK DAYS (Contd.)

Ref. No.	G. M. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
	p.m.						
39	2.45	Eiffel Tower	FL 2600 m. ...	Paris ...	Exchange Opening Prices (Sat. excepted.)	8 mins.	5 Kw.
158	3.00	Zurich ...	650 m. ...	Switzerland	Hotel Concert, Relayed	5 p.m.	500 Kw.
159	3.10	Radio-Wien	—— 530 m. ...	Vienna ...	Concert	5 p.m.	1 Kw.
42	3.30	Frankfurt ...	—— 467 m. ...	Germany ...	Light Orchestra	5 p.m.	1 Kw.
43	3.30	Konigsberg ...	—— 460 m. ...	East Prussia	Light Orchestra	1 hour	1 Kw.
44	3.30	Voxhaus ...	—— 430 m. ...	Berlin ...	Concert, followed by News ...	5.30 p.m.	700 Watts.
45	3.30	Munich ...	—— 485 m. ...	Bavaria ...	Concert	4.30 p.m.	1 Kw.
46	3.30	Leipzig ...	—— 454 m. ...	Germany ...	Concert	5 p.m.	700 Watts.
47	3.35	Eiffel Tower	FL 2600 m. ...	Paris ...	Exchange Quotations (Sat. excepted).	5 mins.	5 Kw.
48	3.55	Persbureau Vaz Dias.	PCFF 2125 m.	Amsterdam...	Stock Exchange and News ...	10 mins.	2 Kw.
49	4.00	Kbel ...	—— 1150 m. ...	Prague ...	Shares and News	10 mins.	1 Kw.
160	4.00	Breslau ...	418 m. ...	Silesia ...	Light Orchestra	5 p.m.	1.5 Kw.
51	4.30	Radio-Paris...	SFR 1780 m.	Clichy ...	Concert Preceded and followed by News.	5.45 p.m.	8 Kw.
52	4.30	Eiffel Tower	FL 2600 m. ...	Paris ...	Exchange Closing Prices (except Saturday).	8 mins.	5 Kw.
53	4.45	Stuttgart ...	—— 443 m. ...	Wurtenberg	Concert followed by Weather Report (Saturdays excepted).	6 p.m.	1 Kw.
54	5.00	Radio-Belg....	SBR 265 m. ...	Brussels ...	Concert followed by News ...	6 p.m.	2.5 Kw.
161	5.30	Munich ...	—— 485 m. ...	Bavaria ...	Light Orchestra	6.30 p.m.	1 Kw.
55	5.55	Lausanne ...	HB2 850 m. ...	Switzerland...	Weather Report	5 mins.	300 Watts.
162	6.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Concert followed by News Bulletin	6.55 p.m.	5 Kw.
163	6.00	Leipzig ...	—— 454 m. ...	Gernamy ...	Lecture (Saturdays excepted) ...	6.30 p.m.	700 Watts.
57	6.30	Kbel ...	—— 1150 m.	Prague ...	Concert and News	7.30 p.m.	1 Kw.
58	7.00	Eiffel Tower	FL 2600 m. ...	Paris ...	General Weather Forecast ...	8 mins.	5 Kw.
60	7.00	Radio-Wien...	—— 530 m. ...	Vienna ...	Concert	9 p.m.	1 Kw.
61	7.00	Konigsberg ...	—— 460 m. ...	East Prussia	Concert and News	8.30 p.m.	1 Kw.
62	7.00	Hamburg ...	—— 395 m. ...	Germany ...	Concert and Late News	9.50 p.m.	700 Watts.
63	7.00	Stuttgart ...	—— 443 m. ...	Wurtemberg	Concert and News	9.30 p.m.	1 Kw.
66	7.00	Lausanne ...	HB2 850 m. ...	Switzerland	Concert (Monday excepted)	9.30 p.m.	300 Watts.
64	7.15	Zurich ...	—— 650 m. ...	Switzerland	Concert followed by Late News	9.15 p.m.	500 Watts.
65	7.15	Leipzig ...	—— 454 m. ...	Leipzig ...	Concert and News	8.35 p.m.	700 Watts.
67	7.30	Frankfurt ...	—— 467 m. ...	Frankfurt ...	Concert and News	10 p.m.	1 Kw.
69	7.30	Breslau ...	—— 418 m. ...	Silesia ...	Concert	9 p.m.	1.5 Kw.
59	7.30	Munster ...	—— 410 m. ...	Westphalia ...	Concert followed by News ...	9 p.m.	1.5 Kw.
72	7.30	Voxhaus ...	—— 430 & 505	Berlin ...	Concert followed by News and Weather Report.	9.15 p.m.	0.7 and 1.5 Kw.
73	7.30	Munich ...	—— 485 m. ...	Bavaria ...	Concert and News	8.40 p.m.	1 Kw.
164	8.00	Radiofonica Italiana	—— 422 m. ...	Rome ...	Concert followed by News ...	9.30 p.m.	4 Kw.
74	8.15	Radio-Belg.	SBR 265 m. ...	Brussels ...	Concert preceded and followed by News.	10.10 p.m.	2.5 Kw.
75	8.30	Ecole. Sup. des P. & Tg.	FPTT 450 m.	Paris ...	Concert, sometimes preceded by Lecture, usually outside broadcast.	9 p.m.	500 Watts.
76	8.30	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Detailed News Bulletin	9 p.m.	8 Kw.
77	9.00	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Time Signal followed by Concert	9.50 p.m.	8 Kw.
78	9.30	Radio-Iberica	—— 392 m. ...	Madrid ...	Concert, Advertisements	Midnight	3 Kw.
79	10.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Sidereal Time (Spark).	5 mins.	—
80	10.10	Eiffel Tower	FL 2600 m. ...	Paris ...	General Weather Forecast ...	5 mins.	5 Kw.
81	10.44	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in G.M.T. (Spark) ...	3 mins.	—
82	11.57	Nauen ...	POZ 3100 m. ...	Berlin ...	Time Signal in G.M.T. (Spark) ...	3 mins.	—

SUNDAYS

Ref. No.	G. M. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
	a.m.						
83	7.00	Frankfurt ...	—— 467 m. ...	Germany ...	Morning Prayer	1 hour	1 Kw.
84	7.55	Hamburg ...	—— 395 m. ...	Germany ...	Time Signal	5 min.	700 Watts.
85	8.00	Leipzig ...	—— 454 m. ...	Germany ...	Morning Prayer	1 hour	700 Watts.
165	8.00	Konigsberg	—— 460 m. ...	E. Prussia ...	Morning Prayer	8.45 a.m.	1 Kw.

SUNDAYS (Contd.)

Ref. No.	G. M. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
	a.m.						
86	9.00	Komarow ...	—— 1800 m. ...	Czecho-Slovakia.	Sacred Concert	1 hour	1 Kw.
87	9.23	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Mean Time (Spark).	3 mins.	—
166	9.30	Munich ...	—— 485 m. ...	Bavaria ...	Sacred Concert	10.30 a.m.	1 Kw.
88	9.40	Konigswuster-hausen	LP 680 m. ...	—	Concert	1 hour	3 Kw.
89	10.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Sidereal Time (Spark).	5 mins.	—
90	10.00	Kbel ...	—— 1150 m.	Prague ...	Classical Music	1 hour	1 Kw.
91	10.00	Breslau ...	—— 418 m. ...	Silesia ...	Concert	1 hour	1.5 Kw.
92	10.00	Radio-Wien	—— 530 m. ...	Vienna ...	Concert	2 hours	1 Kw.
93	10.30	Lyons ...	YN 470 m. ...	Lyons ...	Gramophone Records	11 a.m.	500 Watts.
94	10.30	Stuttgart ...	—— 443 m. ...	Wurtemberg	Classical Concert	1 hour	1 Kw.
95	10.44	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in G.M.T. (Spark) ...	3 mins.	—
96	10.50	Konigswuster-hausen	LP 2450 m. ...	Berlin ...	Concert	11.45 a.m.	6 Kw.
97	10.55	Eiffel Tower	FL 2600 m.	Paris ...	Fish Market Quotations, followed by Weather Report.	12 mins.	5 Kw.
98	11.00	Stockholm ...	—— 440 m. ...	Sweden ...	Divine Service	12.15	500 Watts.
101	11.57	Nauen ...	POZ 3100 m. ...	Berlin ...	Time Signal in G.M.T. (Spark) ...	3 mins.	—
	p.m.						
102	1.00	Radio-Paris...	SFR 1780 ...	Clichy ...	Concert, followed by News ...	2.00 p.m.	8 Kw.
103	2.40	Ned. Radio Industrie	PCGG 1070 m.	The Hague ...	Concert, followed by Announcements in English.	5.40 p.m.	1.3 Kw.
104	3.00	Breslau ...	—— 418 m. ...	Silesia ...	Children's Stories	3.45 p.m.	1.5 Kw.
105	3.00	Stuttgart ...	—— 443 m. ...	Wurtemberg	Light Orchestra	5.00 p.m.	1 Kw.
107	3.00	Frankfurt ...	—— 410 m. ...	Germany ...			1 Kw.
167	3.00	Zurich ...	—— 650 m. ...	Switzerland...	Local Hotel Concert	5.00 p.m.	500 Watts.
106	3.10	Radio-Wien	—— 530 m. ...	Vienna ...		5.00 p.m.	1 Kw.
168	3.30	Konigsberg ...	—— 460 m. ...	E. Prussia ...	Light Orchestra	4.30 p.m.	1 Kw.
169	3.30	Voxhaus ...	430 & 505 m. ...	Berlin ...	Light Orchestra	5.15 p.m.	1 Kw.
170	3.30	Leipzig ...	—— 454 m. ...	Germany ...	Light Orchestra	5.00 p.m.	700 Watts.
108	3.30	Munich ...	—— 485 m. ...	Bavaria ...	Concert	5.00 p.m.	1 Kw.
171	4.00	Frankfurt ...	—— 410 m. ...	Germany ...	Children's Corner	5.00 p.m.	1 Kw.
172	4.45	Stuttgart ...	—— 443 m. ...	Wurtemberg	Concert	6.00 p.m.	1 Kw.
110	4.45	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Concert, followed by News ...	1 hour	8 Kw.
111	5.00	Radio-Belg....	SBR 265 m. ...	Brussels ...	Concert	1 hour	2.5 Kw.
112	6.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Concert, followed by News ...	1 hour	5 Kw.
114	7.00	Radio-Wien	—— 530 m. ...	Vienna ...	Concert	8.30 p.m.	1 Kw.
115	7.00	Stockholm ...	—— 440 m. ...	Sweden ...	Concert	10.00 p.m.	500 Watts.
118	7.00	Konigsberg ...	—— 460 m. ...	East Prussia	Concert	9.00 p.m.	1 Kw.
119	7.00	Hamburg ...	—— 395 m. ...	Germany ...	Concert	9.00 p.m.	700 Watts.
120	7.00	Eiffel Tower	FL 2600 m. ...	Paris ...	General Weather Forecast ...	8 mins.	5 Kw.
124	7.00	Breslau ...	—— 418 m. ...	Silesia ...	Light Orchestra	9.00 p.m.	1.5 Kw.
125	7.00	Stuttgart ...	—— 443 m. ...	Wurtemberg	Concert	9.15 p.m.	1 Kw.
173	7.00	Frankfurt ...	—— 410 m. ...	Germany ...	Entertainment Provided by Frankfurter Zeitung.	10.00 p.m.	1 Kw.
121	7.15	Lausanne ...	HB2 850 m. ...	Switzerland	Concert	8.30 p.m.	300 Watts.
122	7.15	Zurich ...	—— 650 m. ...	Switzerland	Concert	9.15 p.m.	500 Watts.
123	7.15	Leipzig ...	—— 454 m. ...	Germany ...	Symphony Concert	8.40 p.m.	700 Watts.
116	7.00	Munster ...	—— 410 m. ...	Westphalia ...	Classical Concert	9.00 p.m.	1.5 Kw.
174	7.30	Munich ...	—— 485 m. ...	Bavaria ...	Concert	8.30 p.m.	1 Kw.
126	7.40	Ned. Seintoesl. Fabriek.	NSF 1050 m.	Hilversum	Concert	10.10 p.m.	1 Kw.
175	8.00	Radiofonica Italiana.	—— 422 m. ...	Rome ...	Concert, followed by Late News ...	9.30 p.m.	4 Kw.
176	8.00	Copenhagen...	—— 750 m. ...	Denmark ...	Concert, followed by News ...	9.30 p.m.	2 Kw.
127	8.30	Radio-Belg....	SBR 265 m. ...	Brussels ...	Concert, followed by News ...	10.10 p.m.	2.5 Kw.
128	8.30	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Detailed News Bulletin	9.0 p.m.	8 Kw.
129	8.30	Ecole Sup. des P. et Tgs.	FPTT 450 m. ...	Paris ...	Concert or Lecture. May begin 15 mins. earlier or later.	10.30 to 12 p.m.	500 Watts.
130	9.00	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Concert, followed by Dance Music.	10.0 p.m.	8 Kw.
131	9.30	Petit Parisien	—— 340 m. ...	Paris ...	Concert (Items announced in English as well as French).	11.30 p.m.	400 Watts.
132	9.30	Radio-Iberica	—— 392 m. ...	Spain ...	Concert	midnight	3 Kw.
133	10.00	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in Greenwich Sidereal Time (Spark).	3 mins.	—
134	10.44	Eiffel Tower	FL 2600 m. ...	Paris ...	Time Signal in G.M.T. (Spark) ...	3 mins.	—
135	11.57	Nauen ...	POZ 3100 m. ...	Berlin ...	Time Signal in G.M.T. (Spark) ...	8 mins.	—

SPECIAL DAYS

Ref. No.	G. M. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Day.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used
	p.m.							
137	4.00	Lausanne ...	HB2 850 m. ...	Switzerland	Mon.	Children's Stories ...	1 hour	300 Watts.
140	5.15	Zurich ...	—— 650 m. ...	Switzerland	Mon. Wed., Fri.	Children's Corner ...	5.50 p.m.	500 Watts.
141	5.15	Zurich ...	—— 650 m. ...	Switzerland	Thurs., Sat.	Lecture	30 mins.	500 Watts.
142	5.40	Ned. Seintoesl Fabriek.	NSF 1050 m. ...	Hilversum ...	Mon.	Children's Hour ...	6.40 p.m.	1 Kw.
146	7.00	Svenska ...	—— 470 m. ...	Stockholm ...		Concert	10 p.m.	300 Watts.
147	7.00	Stockholm ...	—— 440 m. ...	Sweden ...	Wed., Fri., Sat.	Concert	10 p.m.	500 Watts.
148	7.40	Smith and Hooghoudt.	PA5 1050 m. ...	Amsterdam	Wed.	Concert	9.40 p.m.	500 Watts.
149	8.10	Middelraad ...	PCMM 1050 m.	Ymuiden ...	Sat.	Concert	9.40 p.m.	300 Watts.
150	8.40	Ned. Radio In	PCGG 1070 m.	The Hague ...	Mon.	Concert	10.10 p.m.	1.3 Kw.
151	8.40	Amsterdam	PX9 1050 m.	Holland ...	Tues.	Concert	10.40 p.m.	600 Watts.
152	8.40	Ned. Seintoesl Fabriek.	NSF 1050 m. ...	Hilversum ...	Fri.	Concert	9.40 p.m.	1 Kw.
153	9.00	Le Matin ...	SFR 1780 m. ...	Paris ...	2nd & 4th Sat of mth.	Special Gala Concert ...	10.50 p.m.	10 Kw.
154	9.30	Petit Parisien	—— 340 m. ...	Paris ...	Thur.	Concert (Items announced in English as well as French).	11.30 p.m.	400 Watts.
155	10.00	Radio-Paris...	SFR 1780 m. ...	Clichy ...	Wed., Fri.	Dance Music	10.45 p.m.	8 Kw.

Some Readers' Results

The No. 3 Envelope

SIR,—I recently purchased your Envelope No. 3 (How to Construct the "Simplicity" Three-valve Set). I followed the instructions contained, and have completed a set which is giving satisfaction beyond expectations. I get all B.B.C. stations, also several stations in France and Germany, with very good results. The earphones, when placed on the table, give the effect of a loud-speaker, which can be heard all through the house. I cannot speak too highly of the results obtained.

Hoping your R.P. Envelopes will have a wide circulation.—Yours faithfully,

W. BAKER.

Horden, Co. Durham.

American reception with the ST 152

SIR,—On Wednesday, November 5, at 8 a.m., I received my usual number of *Wireless Weekly*. At 11 a.m. I happened to look at the photographs of ST152, and at 6 p.m. I started to make it. At 9 p.m. I was listening to 2LO on a loud-speaker, at 11.15 p.m. I was listening to Radio Iberica, and at 1.15 a.m. I was listening to WBZ, Springfield, Mass.

The set was not merely a "hook-up," but was made in exact accordance with the details and photographs given, even to the precise shape and disposition of the wire. The photographs are an invaluable help, and I sincerely hope that you will continue to publish them in subsequent numbers.

The reception from WBZ was about good crystal strength, but faded at times. Radio Iberica came in at splendid phone strength. The small-size coil for reaction allowed of delightfully smooth control. It is the best set for loud-speaker work that I have heard or made, the tone being beautifully mellow.

I consider this a very good illustration as to what can be accomplished with the sets described in your publication.

I have made about four dozen sets altogether from *Modern Wireless* and *Wireless Weekly*, all giving excellent results, but none so good as the ST152.—Yours faithfully,

FRED VINCENT.

Southall.

A Good Log

SIR,—With reference to Mr. Macdowell's letter in your issue of November 5, I can endorse the reception of the American station he claims. I was using the ST34 (two valves) on the night in question, and WGY came in perfectly, especially the congregation singing the hymns.

My condensers are Polar .001 and .0005 and Honeycomb coils. I also have a two-valve note magnifier for loud-speaker work made from instructions in *Modern Wireless*. The following are stations I receive on headphones, using the circuit I have referred to (ST34):—All B.B.C. stations and the following Continental stations: Brussels, Paris (all stations), Hilversum, Zurich, Breslau, Hamburg, Berlin, Frankfort, Stuttgart, Konigsberg, Munster, Leipzig, Konigswusterhausen, Vienna, Madrid, Munich.

On London I only employ a crystal detector and the two-note mag. stages, which makes a large Amplion roar.

On the four valves all the above stations come in on the speaker with great volume, especially Madrid, Brussels and Paris.

Up to the present this year I have received America about 12 times, including KDKA (high wave), WBZ, Boston, and the stations referred to already.

My aerial is just over 40 ft. high, single wire 100 ft. in all.

When first taking up wireless I went in for cheap material, but since have replaced everything for the very best.

I am sure if wireless enthusiasts would get good material in the first place the sets would more than justify their respective author's claims.

Wishing the Radio Press every success,—Yours faithfully,

E. H. WAKELING.

Walworth, S.E.

Stabilising Coils for H.F. Tuned-Anode Coupling by the "Neutral-Grid" Method

By A. D. COWPER, M.Sc., Staff Editor.

IN order to stabilise a high-frequency amplifying circuit which uses a tuned-anode circuit for coupling two valves, the writer has suggested that the inherent electrostatic coupling through the grid-plate capacity of the first valve should be neutralised by a kind of Wheatstone bridge arrangement, the usual "earth" end of the grid-inductance being actually taken to a tapping-point in the anode-inductance towards the H.T. plus end of it. The grid is then held strictly neutral with respect to any oscillations which are taking place in the anode inductance.

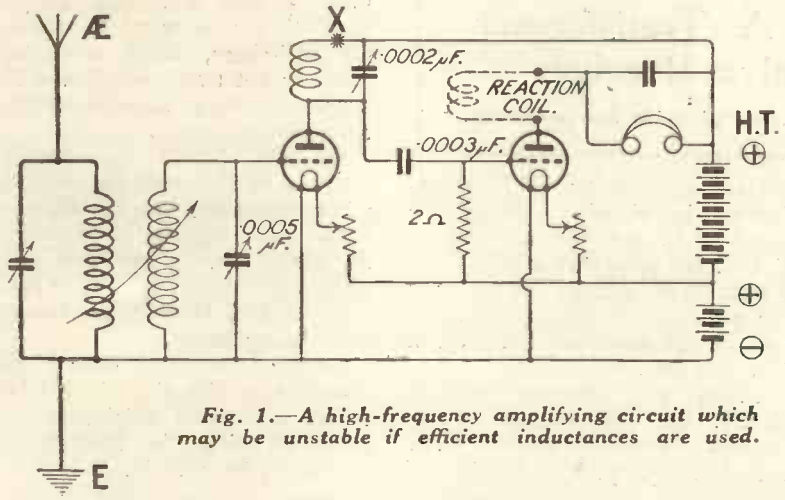


Fig. 1.—A high-frequency amplifying circuit which may be unstable if efficient inductances are used.

The Neutral Point

Theoretically, if the grid were exactly midway (electrically) between the filament and anode of the valve, the neutral-point would be exactly in the middle of the anode inductance. But since the grid is generally much nearer to the filament in ordinary valves, and there is a natural resistance-damping always present which allows a considerable latitude, the optimum position for this tapping-point may be anywhere from about $\frac{1}{5}$ of the length of the inductance from the H.T. plus end, down to only the 5th turn or so from the same end, in a continuously-wound inductance. A small amount of finely-controlled magnetic reaction in addition will then give the most sensitive reception.

Actually, with some valves of small electron emission and low amplification-ratio, and particularly when using the usual types of fine-wire plug-in coils of considerable H.F. resistance on the shorter waves, the electrostatic reaction via the valve-capacities may not be enough, even with a loose-coupled aerial circuit (such as is called for in this circuit), to give self-oscillation with critically-tuned anode and when only one H.F. stage is used. In that case, there is naturally no call for stabilising devices, though the selectivity will be poorer than with more efficient inductances which require stabilising. Home-made coils of the single-layer solenoid, basket, Harris frame-aerial type, etc., wound with No. 20 or 22 S.W.G. d.c.c. wire, have, if properly designed, the low H.F. resistance, which results in excellent selectivity if not resistance-damped; but require some device to produce stability in such circuits.

A Simple Stabilising Device

A simple device can be adopted, even in existing receivers with but small alteration, which will give complete stability without any minute adjustments, extra small condensers, etc., and which does not interfere (by

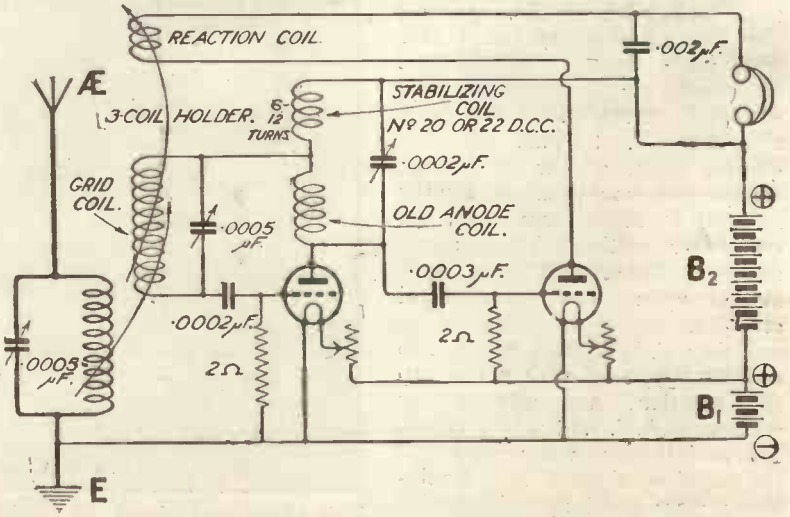


Fig. 2.—The same circuit stabilised. A coil of 6 to 12 turns has been introduced at the point X in Fig. 1.

introducing damping) with the build-up or selectivity of the circuit, by utilising the principle outlined. This is merely a small coil of up to a dozen turns of No. 20 or 22 S.W.G., d.c.c. wire, in the form of a basket-coil or short solenoid, say 3 in. diameter. This is introduced between the H.T. plus (and anode tuning-condenser) connection of the tuned-anode coil (point X, Fig. 1) and the end of that coil, thus putting it in series with the latter, like a small loading-coil. The condenser then tunes the whole composite inductance. This small coil can be coupled magnetically with the anode coil; or placed at some convenient point remote from other inductances. Naturally, its presence will make a small change in the anode tuning.

Other connections

The lower (or "earth") end of the loose-coupled aerial secondary or grid-coil is then disconnected from "earth" and connected to the junction of the small new coil and the old anode inductance, which provides the required tapping-point. The grid end is removed from its direct connection with the grid of the first valve, and an ordinary .0002 or .0003 μF grid-condenser interposed, a 2 megohm gridleak being taken to the L.T. minus, all as shown in Fig. 2.

Number of turns in the Stabilising Coil

The exact number of turns required on the small stabilising coil is a matter for simple experiment, as it depends on the effective resistance of the circuits, the size of reaction-coil in use (a number 50, quite loose-coupled, should suffice), etc., and on whether it is coupled with the anode coil or not. From 6 to 12 turns should suffice, while still permitting ready oscillation by moderate use of direct reaction, on the short broadcast waves.

□ □ □

French and German stations were picked up, and though much time was spent in waiting for call-signs, these were apparently not transmitted, and the origin of the signals remain therefore unknown.

In the hands of another member of the staff the receiver when connected to an outdoor aerial gave equally good results on 2LO, and in addition gave good signals from all B.B.C. stations and Madrid, no further tests being made.

Owing to a slight error in the components list given in our last issue, the panel thickness was stated as being $\frac{3}{8}$ in. This should, of course, be 3/16 in.

Test Report of "A Transformer Coupled Three-Valve Receiver"

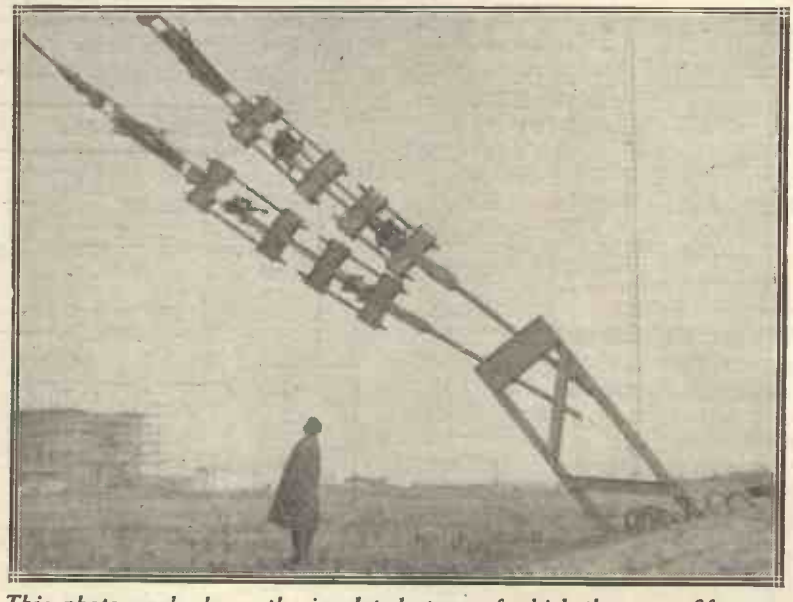
Constructional details of this set were given in our last issue.

DURING the first tests the receiver was connected to an indoor aerial in south-east London and constant aerial tuning was employed. Coil No. 50 was placed in the aerial socket with a No. 75 for reaction; 20 volts H.T. was used, with a 6-volt accumulator as L.T., the valves being a Cossor pink top, and two Marconi-Osrams, an R and an R5. The tuning for 2LO was sharp, whilst signals were so loud on an Allison loud-speaker that the set was detuned for comfortable signal strength. The No. 50 coil was then replaced by a No. 150 and the No. 75 changed for a No. 250, when tuning 5XX became an equally simple operation once the H.F. transformer had been also changed. Signals from this station were, as far as audible comparison would permit, equally as loud as those from 2LO, the condenser settings being again sharp. Subsequent tests were made upon the Continental stations.

Using C.A.T. with a No. 200 coil for the aerial with a No. 250 for reaction, and alternatively without C.A.T. and a No. 150 in the aerial with a No. 200 coil for reaction, signals from Radio-Paris were good and clear with the receiver connected to the same indoor aerial as before and a 1,200-2,600 metres H.F. transformer in circuit. Using the same H.F. transformer without C.A.T. the reception of the Eiffel Tower was equally good upon the same aerial, using a No. 250 coil in the aerial socket with a No. 300 for reaction.

Using the receiver without C.A.T. on the shorter wavelengths (300-600 metres H.F. transformer), quite a number of

AT RUGBY



This photograph shows the insulated stays, of which there are fifteen to hold each mast. An idea of the size may be gathered by comparison with the height of the man.

Random Technicalities

By PERCY W. HARRIS, Assistant Editor.

Some Notes of interest to the Home Constructor and Experimenter.

I AM not much given to theorising, being convinced that so far as wireless is concerned most of the existing theory is built on very shaky foundation. There is, however, one theory I formulated several years ago (getting not the slightest support from anybody, so far as I could see, at the time) which has received further confirmation by the recent successful two-way communication with New Zealand.

Present Beliefs

Existing theory has it that when the wireless waves leave the transmitting aerial they slide over the surface of the ground (not penetrating to any great depth) in ever-widening circles, or to put it another way, in ever-growing hemispheres. In a short time those waves which travel upwards reach the conducting layer of the atmosphere known as the "Heaviside Layer." As the waves cannot pass through a conductor this layer confines them within its shell, preventing them from penetrating into outer space. We may therefore consider the wireless waves as travelling in the space between two concentric spheres, the inner sphere being the earth and the outer sphere the Heaviside layer. If we accept the above statements as facts let us see what follows.

□ □ □

Imagine, for a moment, a wireless transmitting station situated exactly at the North Pole. A continuous stream of waves is radiated, these spreading in ever-widening spheres until at some distance from the transmitting station they may be considered as rings, the height of each ring being the distance between the earth and the Heaviside layer and the radius of each ring, the distance it happens to be at that moment from the station of origin. When the first wave reaches the Equator the length of the wave front, or, expressed in another way, the circumference of the ring, will be the circumference of the earth. This, I think, is quite easy to follow.

At the Equator

What will happen when we pass the Equator? Obviously the ring will decrease in size as the wave proceeds until at the South Pole all the energy will converge on one point—that is, all the energy that is left, representing the energy in the original wave which left the transmitting station, minus the losses incurred in its passage from one pole to the other.

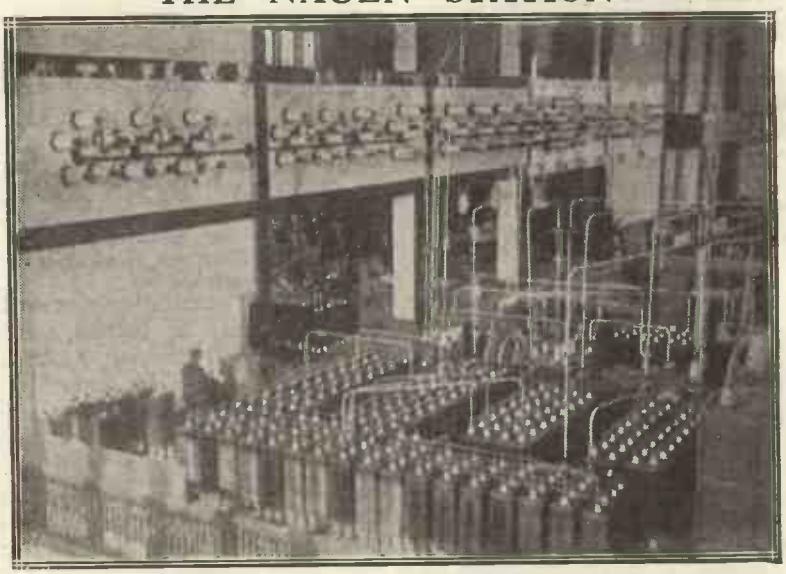
The receiving end

Now the aerial of a receiving station is affected not by the whole of the wave front but only a small portion of it, the aerial wire abstracting from the wave front some of its energy. If the energy stored up in the wave front is distributed over a ring having a circumference equal to that of the Equator, there will be far less per unit area than when the wave is only a few miles in circumference. From all of which it follows that, according to my theory, signals at the antipodes of a transmitting station should be considerably stronger than at half the distance. As New Zealand is practically the antipodes of Great Britain, and as by the time the wave front reaches New Zealand there must have been a considerable reconcentration, I am not at all surprised at the success Mr. Goyder and others have achieved.

Practical Confirmation

About two years ago the French Government sent a warship, the "Aldebaran," on a special cruise in the Southern Seas for the purpose of investigating the strength of signals from, and general receiving conditions appertaining to, Lafayette (Bordeaux) and Lyons, two high-power stations belonging to the French Government. Lyons and Bordeaux were received quite

THE NAUEN STATION



A view of the transmitting room at the famous German station. This station is carrying out tests on short waves.

easily in Australasian waters, and it was found that at the antipodes of Lyons and Bordeaux good signals were receivable *both by day and by night*, whereas 50 or 100 miles away from the point signals were only receivable at night.

□ □ □

The operators in the New Zealand coastal stations very frequently log European stations, and the Eiffel Tower time signals are taken down quite regularly. My theory may be wrong, of course—I am afraid it is too simple to be acceptable to some people—but in any case it will serve until a better one is put forward.

A New Crystal Detector

Speaking of theory and practice reminds me that I have just been trying a new form of crystal detector, decidedly more foolproof than any I have seen previously. It consists of a short, fat cartridge made up of two metal end-pieces separated from one another by an insulating ring. These end-pieces are hollow and contain inside them a number of sharp points. The complete cartridge is clipped between a pair of clips similar to those used for holding the Dubilier anode resistances, and a terminal is attached to each clip. To operate the detector you simply open the cartridge and place inside a piece of one of the many fancy crystals now available, close the cartridge, and slip it between the clips. The crystal is thus inside the cartridge, protected from dust. It rests on one or more sharp points at each end of the cartridge, the two sets of points being insulated from one another. When connected in circuit the detector acts in the usual manner, and if the point of contact is not particularly sensitive, you rotate the cartridge until signals are found at the best strength. In practice the adjustment takes but a moment; there is no need to fix the crystal in Woods metal, and it is protected from dust and dirt by its enclosed position. Goodness only knows what the theory is, as apparently it is rectifying both ways at once or something absurd. Anyhow, there it is and it works excellently. If somebody had suggested the idea to me without trying it I could have proved quite easily that it could not possibly work!

Referring to my notes on the new supersonic heterodyne last week, I am afraid the matter is not quite so simple as I at first imagined. The constant *frequency* difference requires not the ordinary square law condenser in which the *wavelength* varies directly as the scale, but a special condenser in which the *frequency* varies directly as the scale; not the same matter, of course. Such condensers are not yet made.

□ □ □

A Combined Filament Resistance and On-and-Off Switch

MANY readers have, no doubt, experienced considerable trouble in obtaining the correct filament current adjustment, especially when operating a plain single-valve circuit employing reaction. It would therefore be a great advantage to be able to leave the filament resistance knob in its adjusted position, without having to employ an additional filament on-and-off switch. This may be easily done by slightly altering the design of an existing rheostat, as shown in Fig. 1. The two fixing screws are equipped each with a condenser spacing washer and a spring clip. The clips may be made out of brass strips. The spindle is altered as shown in the diagram. A spiral spring is placed under the ebonite knob; the tension of this spring should be slightly less than the combined tension of the two spring clips. A terminal head may be used for the spindle

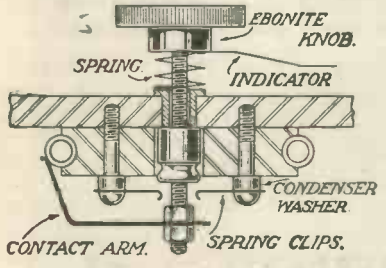


Fig. 1.—Showing the alterations necessary to the filament resistance.

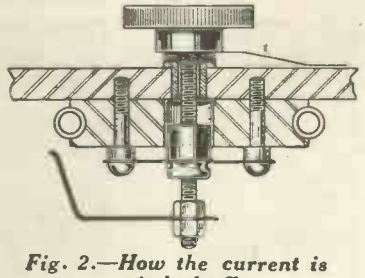


Fig. 2.—How the current is switched off.

fitment, or, alternatively, round brass bar may be turned down to shape and tapped 2 B.A. This piece should be locked on to the threaded spindle by jamming the threads. Fig. 1 shows the device in the on position. In Fig. 2 the off position is shown. The ebonite knob is pushed downwards. This releases the contact arm from the resistance winding, the spindle fitment at the same time securing itself in the two spring clips, as shown. To adjust the filament current again, as before, all that is necessary is to pull the ebonite knob upwards, when the contact arm will once more come into action on the resistance winding in the same position as previously.

H. B.

* * *

"Some Reaction Effects Explained"

Owing to an oversight, certain alterations to Mr. Johnston's article in our last week's issue were not made on the copy sent to the printer. The section entitled "Why the Optimum Reaction Coupling is not Necessarily the Closest" and the following section should have been deleted.

How to Use One or Two Pairs of Telephones at Will

By R. W. HALLOWS, M.A., Staff Editor.

HERE is a very neat little device easily fitted to any set, which allows either one or two pairs of 'phones to be placed in circuit as desired with the minimum amount of trouble. In place of the usual telephone terminals, two plugs and two sockets are fitted to the panel of the receiving set as shown in Fig. 1. These are placed at the corners of a square whose sides are 9-16 inch in length. Flush fitting plugs and

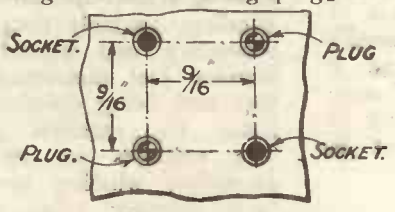


Fig. 1.—Plug and socket fitting.

sockets should be used for the job, for, besides their neat appearance, they are exceedingly easy to fit. All that one has to do is to drill four holes in the ebonite, to insert the plugs and sockets, and to fix them securely in place with the nuts provided. The writer carried out the wiring as shown in Fig. 2. The plug A was connected to the plate of the last valve and the socket D to H.T. plus, a telephone condenser with a capacity of .002 μF being placed between this pair. The socket B and the plug C were connected by a lead as shown. The 'phone leads

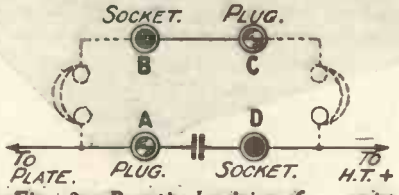


Fig 2.—Practical wiring for series connection.

are attached to an ordinary plug and socket mounting such as can be purchased for a few pence from advertisers, or may be made up quite easily in the home workshop. If only one

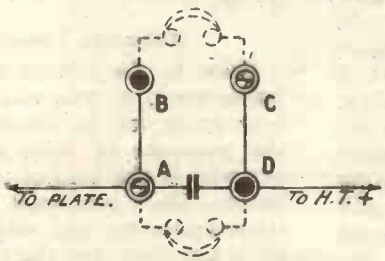


Fig. 3.—For parallel connection.

pair is in use it is plugged into A and D (Fig. 2). When two pairs are required they are plugged into AB and CD respectively. One can thus make the change from one pair to two in a moment.

If parallel wiring is preferred the connections should be made as shown in Fig. 3, that is, the plug A should be attached as before to the plate, and the socket D to H.T. plus with the telephone condenser between them. Instead, however, of connecting the socket B to the plug C, wire A to B and C to D. A single pair of 'phones can then be plugged into AD, and if two are required the additional pair is fitted into BC.

It is not, of course, necessary to use plugs and sockets, though

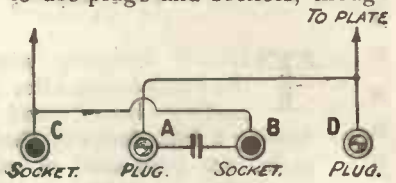


Fig. 4.—An alternative.

this form of connection is one of the handiest. Instead, four terminals may be used, the wiring being either as in Fig. 2 or as in Fig. 5.

Another way of carrying out the idea is shown in Fig. 4. Here the plugs and sockets are placed in a row, the distance between their centres being 9-16 inch. A single pair of phones is plugged into AC, AB or BD. If two pairs are in use, the plugs are inserted into AC and BD respectively. This method may, of course, also be carried out with terminals instead of plugs and sockets.

□

Good American Reception

SIR,—Just a few words in praise of one of your receivers. Last May I built up the two-valve cabinet set described in your book, "Twelve Tested Sets." I have had all B.B.C. stations, but Cardiff and Bournemouth are very difficult to tune-in.

I have since made the one-valve amplifier described in the same book, and the results have been far beyond my expectations. I have wound all my own coils by hand (enough to tune to 1,800 metres). Radio-Paris (1,780) comes in with splendid volume on an Amplion Junior loud-speaker.

The volume from Brussels fills the sitting-room easily. 5XX can be heard all over the house, and is vastly superior in tone to the local station (6KH). A week last Sunday I tuned-in Madrid and got very good volume in the phones. A very good orchestra was playing at the time. However, last night I decided to "burn midnight oil and "go broadcatching." I succeeded in tuning-in WGY, General Electric Co., New York. They were just finishing what I took to be the children's hour. There was then an interval, during which I managed to tune-in a soprano. This proved to be Pittsburgh (KDKA).

On going back to WGY, a talk was in progress, after which I enjoyed a concert until 3 a.m. A military band played "Grand March" from Tannhauser, "Poet and Peasant" Overture and an American medley. The other items, including a song, were not familiar. Atmospherics were in evidence, but for all that the words could be distinctly heard without any straining. This performance is exceedingly good, I consider, seeing that only a "straight" circuit is employed. Also, I am situated about half-mile from 6KH and using direct aerial coupling with the secondary for a wave trap, I can completely eliminate that station whilst receiving Manchester (or above).

Aerial.—90 ft. single wire (including lead-in), just clear of the house tops.

Earth.—10 ft. to brass water tank buried in garden.

Valves.—Marconi D.E.R. (all three).

Allow me to congratulate you on this receiver and its splendid results.

I also wish you success with your new venture, *The Wireless Constructor*.—Yours faithfully,

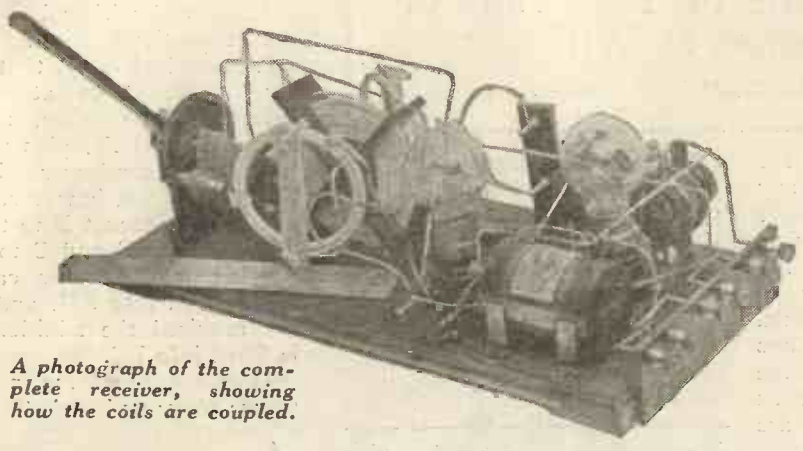
ROLAND HILL.

Hull.

A Low Loss Short W

By PERCY W. HARR

A remarkably simple yet e wavelengths nou



A photograph of the complete receiver, showing how the coils are coupled.

THOSE listeners who don the headphones after broadcasting hours, and who, having a knowledge of the Morse code, are interested in amateur transmissions, will have noticed that the medley of signals once heard on the 200-metre band has quietened down considerably. The reason is that lower wavelengths have been found much more efficient. Within the last few weeks the additional carrying power of wavelengths in the neighbourhood of 100 metres has been amply demonstrated by the success which has attended two-way communication with New Zealand, and, as the shorter waves are likely to become increasingly popular, the following description of a tuner specially designed for very short waves may not come amiss.

Efficiency before Appearance

Admittedly, it is not a thing of beauty. Efficiency, however, has been most carefully considered, for however well these waves may carry it is useless to attempt to work with them unless we have the highest possible efficiency in our tuning arrangements. On very short waves (and the present instrument is designed to cover the band between 40 and 160 metres) tuning is so exceedingly sharp that simplicity of control is a prime requisite. Furthermore, it has been found impossible (without elaborate circuits) to get any appreciable high-frequency amplification on these short waves, and even if it were obtained the difficulty of control connected with the excessive sharpness of tuning would make it hardly worth while, especially as a detector and one stage of note magnification seems to bring in practically "anything that is going."

Dielectric Losses

Prior to the advent of short-wave work, it was not realised how great can be losses due to the presence of solid dielectric material in the field of an inductance. On broadcast waves these losses are not very noticeable, but they are there, and if they are eliminated efficiency goes up appreciably. It is, as a matter of fact, the absence of solid dielectric in the field (or, rather, the elimination of a great quantity of it), and the use of low-resistance windings, which make the crystal receiver which I described in the September issue of *Modern Wireless*, so effective. As we reduce the wavelength, so the losses occasioned by the presence of this solid dielectric mount up very rapidly. Put in a nutshell, for very short wavelength work we must have a coil which is practically self-supporting.

Appreciably better results are also found if we use a thick wire of No. 16 gauge or even larger. Several kinds of low-loss coils are available, but I have found the X type of coil, which I introduced about a year ago, combines efficiency with simplicity of winding. I have therefore adopted it in the present instrument. The circuit used consists of a semi-aperiodic primary winding, variably coupled to a secondary coil wound in the manner just mentioned, a further coil being coupled to this latter for reaction purposes. The voltages set up in the secondary winding are applied to a detector valve operating with condenser and grid leak, and tuning is effected by a low-loss variable condenser of the square law pattern. I have not used low-capacity valves in this instrument, for the simple reason that they are not needed. It is only when we use high-frequency amplification that we have to take such pains to avoid valve capacities, these capacities providing a "feed-back" which is undesirable. When our circuit contains a detector valve only, or a detector followed by one or more stages of note magnification, we have in any case a certain amount of tuning capacity

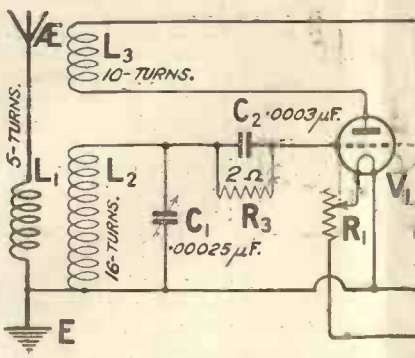
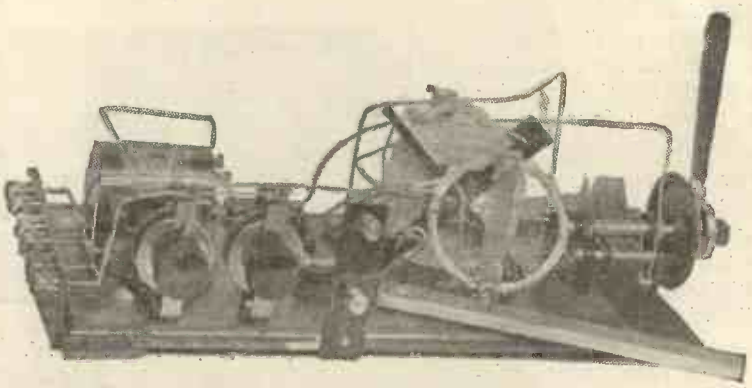


Fig. 1.—The c

Tuner for Waves

RIS, Asst. Editor.

fficient set covering the popular.

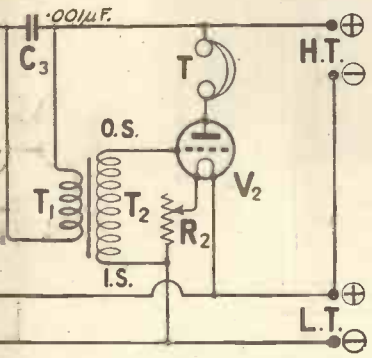


The filament resistances are suitable for board mounting. Note that very little ebonite is used in the set.

shunted across our inductance coil and therefore across the grid and filament of the valve.

Losses in Condensers

It is not always realised that very considerable losses can be set up in variable condensers even on broadcast wavelengths. I have known a number of cases where the substitution of a high-grade variable condenser for a cheaper instrument has brought about almost a doubling of signal strength on the broadcast band. The whole subject of variable condenser losses is one which would well repay studying, and, in any case, there is not space here to enter into a discussion of the causes. It may be stated, however, that many of the losses arise through the use of composition end plates of inferior quality, and in bad contacts between the washers and plates. Variable condensers with metal end plates, in which the spindle of the moving plates is separated from the metal end plates by a thin insulating washer, are useless on these waves. If a metal end plate condenser is used, it *must* have a good big washer of the finest grade of insulating material. Many variable condensers now sold will not allow the set to oscillate on wavelengths below 100 metres, so do not try and save a few shillings by the use of an inferior product.



ircuit used.

Mounting the Components

I do not advise you to build the present instrument in a cabinet. The technique of short-wave reception is changing so rapidly, and there are so many experiments to be tried with such a receiver, that it is best to follow the board-mounting principle, in order that changes can be made rapidly and inexpensively. I have found it highly desirable to make the coupling of the aperiodic aerial coil to the secondary coil variable, and as hand and body capacity effects are very pronounced on such short waves, I have adopted a special form of mounting. This consists of a strip of wood with a screw passing through one end to form a pivot, the aperiodic aerial coil being fastened to an upright attached to this by the simple expedient of tying it with string. The aperiodic aerial coil consists of five turns of No. 16 gauge d.c.c. wire wound round a three-inch former, from which the coil is removed and afterwards tied with string. Flexible leads, made of single electric lighting flex, are soldered to the two ends of the coil and taken to the aerial and earth terminals. The secondary coil is wound in a X shape former, 1½ inches wide, made up of two strips each six inches long, fastened together "egg-box fashion." A fairly wide slot, sufficient to take the 16-gauge wire, is cut two inches deep in each strip, and 16 turns of No. 16 d.c.c. wire wound in, the ends being threaded through holes in the former in the positions indicated. To save the trouble of making special brackets, this X shape former is fastened down with string passed through holes in the baseboard. The reaction coil, which consists of 10 turns of No. 16 wire, is made and secured in exactly the same fashion as the aperiodic aerial coil, flexible leads being used as before.

Half a pound of No. 16 double cotton covered wire will be ample for the three coils.

Extension Handle needed

The variable condenser I have used in this case is a Sterling square law, this being very suitable for board mounting as it is secured to the baseboard without any additional fittings. The extension handle shown, which was obtained from the Marconi Scientific Instrument Company, is merely a strip of ebonite with a copper ring which is made to fit the condenser

knob. Any long extension handle will do here, provided it is not made of metal. The condenser used has single-plate vernier, but unless an extension handle is fixed to the vernier knob it will not be found practicable to use it.

The other components needed are :—

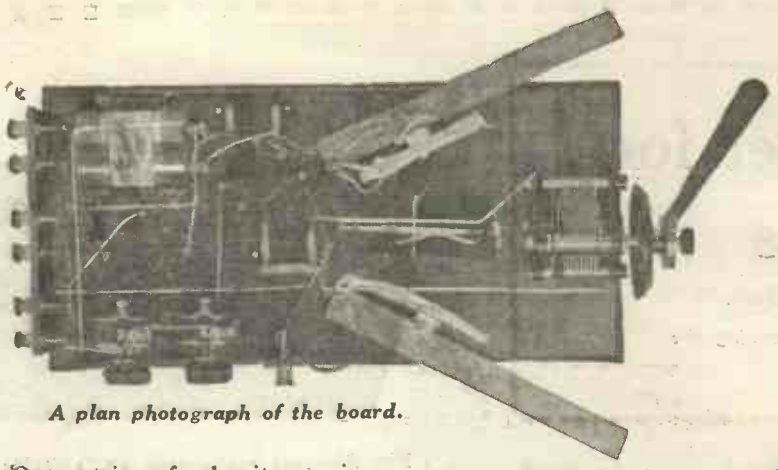
Two valve sockets for board mounting (I have used the Burndept " Antiphonic " as I desired to use dull-emitter valves in this set).

Two filament resistances, suitable for the type of valves it is desired to use. (I have used the Igranic dull-emitter pattern. As these will carry .3 of an ampere with safety, one can change from the .06 type of valve to the .25 ampere type without changing the filament resistance.)

One intervalve transformer of good make. (That shown is Eureka Concert Grand.)

One fixed condenser .0003 mfd with grid leak of 2 megohms. (The value of the grid leak can be varied experimentally to see which gives the best results.)

One fixed condenser .001 μF. (Both of these fixed condensers are Dubilier.)



A plan photograph of the board.

One strip of ebonite 1 in. by 4 in.

One strip of ebonite 1¾ in. by 7 in. (These two strips are for the terminals.)

Eight terminals.

Wiring Up

Wiring up is a simple matter. The parts are arranged in their logical order, and, although the criticism might be advanced that the telephone terminals are a long way from the front of the instrument, this is not a disadvantage in practice. In wiring up, the bottom end of the secondary winding is earthed—for stability. Keep all wiring as short as possible. The baseboard used may be chosen to suit your circumstances. It may be that you have a suitable baseboard available.

Valves to Use

The set is by no means critical as to valves, and any of the good makes will do here. A valve of the B4 or DE5 type suits excellently in the note magnifier.

Operation

When you have finished wiring up, it is a simple matter to test whether the reaction coil is connected the right way round, for if it is not so connected the set will not oscillate. Notice particularly that the oscillation control is very smooth, and at first

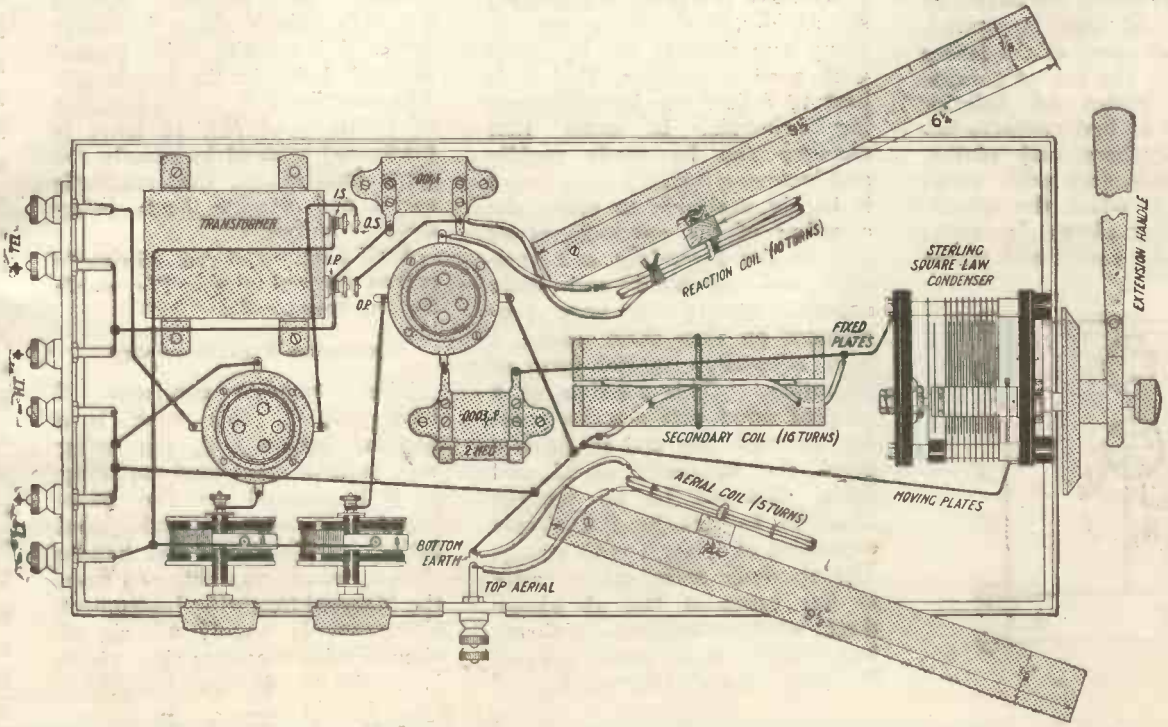


Fig. 2.—The lay-out of the instrument. Wires which cross are not shown looped, as heretofore, joins being indicated by a black square.

you may not notice just when the set goes into oscillation. If you have a heterodyne wavemeter for short waves, so much the better. If you have not, you will soon succeed in picking up short-wave signals, although at first you will miss them owing to the sharpness of tuning. You will find it best to keep the aperiodic aerial coil a little distance from the secondary (say at an angle of 45 deg. to the secondary coil). The size of the reaction coil has been chosen after a good deal of experimenting, so as to be of just sufficient value to make the set oscillate when all the tuning capacity is in circuit.

If the set is made exactly as shown, the maximum wavelength with the .00025 Sterling variable condenser will be about 160 metres, while the minimum

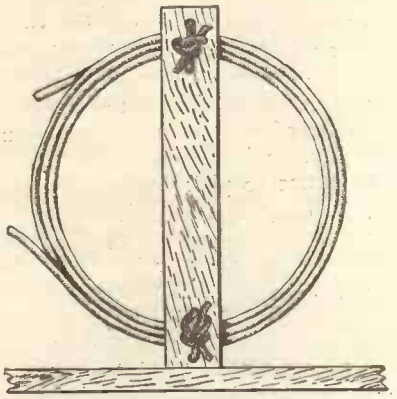


Fig. 3.—The aerial and reaction coils are made in this manner.

will be below 40 metres. KDKA on his 68 metres transmission thus comes in easily on the scale, and most of the amateurs will be found working between 80 deg. and 120 deg.

A Dead Spot

You will probably find that there is one dead spot on the tuner—that is to say, at one adjustment the set will not oscillate, even with the reaction coil tightly coupled. On each side of this point the set will oscillate with ease. You may wonder what is the cause. The reason is that on this adjustment your secondary circuit is tuned to the natural wavelength of the aerial plus the small aperiodic aerial coil. It is essential in this method of tuning to keep the aerial detuned, and, indeed, you cannot get satisfactory results with this set if the aerial is in tune with the secondary circuit. On the instrument shown, with my own big outdoor aerial, the dead spot is at 132 metres. If you should want to work on the wavelength of the dead spot, it is a simple matter to insert in series with the aerial a 25 or 50 coil, which will detune the aerial sufficiently to remove the trouble. I prefer this method to the insertion of a variable condenser in series.

Results

Within a few moments of completing this tuner, I was listening to British amateurs all over the country, and to experimenters in Denmark, Sweden, and France. A number of French amateurs were easily heard with the aerial and the earth disconnected—such is the efficiency of transmission on these short waves! KDKA is

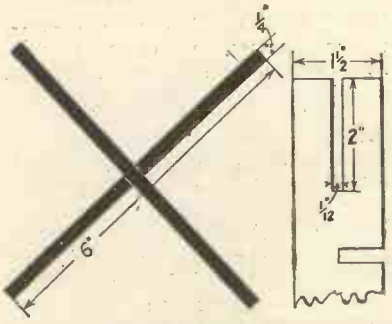


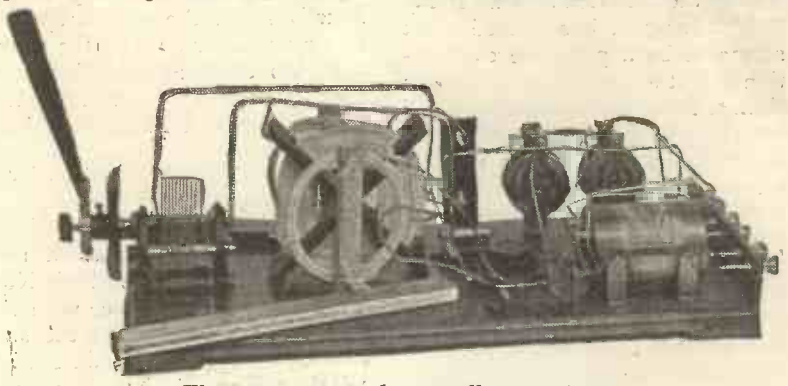
Fig. 4.—Dimensions of the X former for the secondary coil.

tuned in without difficulty, American amateurs have been heard as early as 11.30 p.m.

Jottings by the Way

(Continued from page 159).

availed ourselves of one of his rare invitations to visit him, and



The tuning controls are all convenient.

to see what his set (the Goop-Wayfarer No. 761 *modèle de luxe*) could do. We have come away filled with admiration for this circuit, for, quite apart from its qualities as a wireless receiver, it has succeeded where we have all failed for many months. In a word, it has taken "Wayfarer" down a peg. After giving us a long harangue on the way in which he ensured perfect reception, the fellow switched on. Signals were quite good at first, but within five minutes they had died down to the point of bare audibility. It strikes us that he might possibly find it an advantage to extend his system of examination to the accumulator. Even those belonging to experts require charging, one imagines, occasionally. We left him, as Mr. Bumpleby Brown remarked to me, with an empty decanter and a full heart.

—Yours faithfully,

J. PODDLEBY.

Little Puddleton.

Radio Notes and News

Signal Strength in the Arctic

MR. DONALD MIX, of the American Radio Relay League, has offered what seems to be a plausible explanation for the weakness of radio signals from Eastern sections and the strength of radio signals from Western sections when the receiver proceeds directly to the north, as was the case during the recent trip of the *Bowdoin* in the Arctic Ocean, when Mr. Mix acted as wireless operator.

This strange shifting to the westward of the strength of radio signals is due to geographical conditions rather than to atmospheric electricity, according to Mr. Mix. The *Bowdoin* was located directly behind a 1,300-ft. cliff when the experiments were made, and this may have acted as a shutter in the case of signals from the East while allowing those from the West to pass. This view seems reasonable because of the known existence of dead spots, but does not explain the repetition of the same phenomena on the return trip of the *Bowdoin,* nor the results reported at a much later date by the Canadian Government scientists who took part in a similar later trip to the Northern Passage.

New Broadcasting Station for New York

Gimbel Brothers, of New York, have inaugurated a new broadcasting station in their New York department store, with the call WGBS, because of the success of their Philadelphia station WIP. The station is on the eighth floor on the 33rd street side. The wavelength is 316 metres.

American Amateurs Vote Against High-Power Stations

In reply to a canvass conducted by the New York *Evening World* Radio Section, amateurs came out strongly against the construction of super-power radio stations capable of dominating the ether in a large section of the country to the detriment of the smaller stations now in existence.

In and around New York City the vote was 8 to 1 against super-radio, while in a section of the East from 50 to 500 miles away from the city the voting was only 3 to 1 against super-radio. Nevertheless, super-power has been over-ruled and rejected by the amateurs, and a list of the replies will be tabulated and sent to Secretary of Commerce Hoover, whose interest in radio is well known.

Some of the replies averred that the only possible reason for the construction of a super-radio station in New York would be to permit amateurs in South Africa or New Zealand to hear American concerts broadcast, and that it would be better to establish stations in those countries than to subject American broadcasting to a foreign demand. Small, good stations seem to be the choice of the American amateur to-day, with plenty of programmes to pick from.

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A READER'S RESULTS

SIR,—*Re* your three-valve dual as described in *Modern Wireless*, April, 1924, you will be glad to hear some of the results obtained. Having built several of your sets for myself and friends (my first being a three-valve set out of *M.W.*, March, 1923), I was so struck with the three-valve dual that I decided to convert my own and also to assist a friend to convert his. Result—all the B.B.C. stations on loud-speaker, practically all the Continental stations on the loud-speaker—Manchester, Birmingham, 5XX, Radio-Paris and Berlin—with great volume; in fact, they could be heard quite clearly 300 yards from the speaker. On Monday evening at 11.10 p.m. I was fishing around for anything, when I tuned-in a station on a wavelength between 400 and 500 metres. It was probably a Spanish station, as it did not sound like French. It was transmitting till 12.30 a.m. Tuesday morning, and appeared to come from some opera house or concert hall.

The station then closed down and I could not get the call sign, as it was so distorted and I could not get it clear as the least touch on condensers or filament and the carrier wave was gone; it was practically as loud as Birmingham. I got on with another station, but could not tune-in as it was very critical and set was going into violent oscillation over or under the wave. At 1.25 a.m. I was fishing around and, to my surprise, I heard the announcer say "WGY, General Electric Co., Schenectady; stand by one moment," then "WGY Orchestra will now play a piece of the opera called ——." It sounded like "Mal Gall" to me; anyway, the music was very clear; at 1.30, song, piano and soprano; 1.35 a.m., piano and soprano again; 1.42, 'cello or violin; 1.45, 'cello or violin; 1.50, WGY Orchestra; 1.55, piano and soprano again; 2 a.m., announcer said: "This concludes our programme for studio, we are now going to relay Mr. Charles Davies' Democrat candidate speech from the Albany, New York"; 2.9 a.m., chairman announcing speaker, band or orchestra struck up with "The Star Spangled Banner"; 2.12 a.m., Mr. Davies' speech, which concluded at 2.35 a.m., when the announcer said that WGY was closing down. The above was very clear. No. 1 I could have got through the loud-speaker, as it came through in great volume in the headphones. A cup of tea after the excitement and then another fish round. At 9 minutes to 3 a.m. a fox-trot suddenly came in, and then the announcer said "WHAZ," pianoforte solo, announcer; 3.10, man singing "Old Kentucky Home," announcer, another song called "Just a Song at Twilight"; 3.18, comic song with what I should call step time at the end of the song, announcer; 3.30, fox-trot, announcer, fox-trot called "Somebody Stole My Girl," and then I switched off as I had had enough excitement for one night.

Now *re* the set itself.

Valves, Marconi H.F., transformer as specified, L.F. Sterlings, filament controls, Lissenstats anode res., Lissen grid-leak. I think it is the best three-valve set that has been before the public for all-round work; in fact, nothing to beat it with three valves, so I take this opportunity of thanking you for the circuit, and also for many of your others which I have tried, as your circuits are very popular in this district through the medium of your humble.

Wishing yourself and *Modern Wireless* the success that it deserves,—Yours faithfully, F. JONES.

Penketh.

Some Notes on Comparing Circuits

By R. W. HALLOWS, M.A., Staff Editor.

It is often desirable to make comparative tests of different circuits, and this article shows how change-over switches may be utilised.

IT is almost impossible to test the respective merits of different circuits on either the high- or the low-frequency side of the set unless some means can be devised of making an instantaneous change from one to the other. If several wires have to be undone and reconnected whilst changing over, it is next to impossible to make a proper comparison, since the mind cannot retain a definite impression of signal strength or quality to act as a standard. Again, suppose that you are testing on a musical

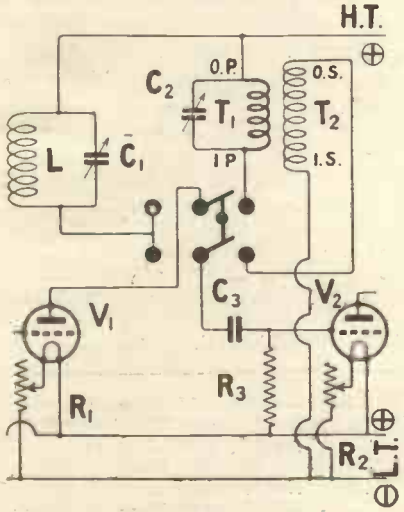

Fig. 1.—Comparing tuned anode and tuned transformer.

transmission. You try one circuit whilst a loud orchestral passage is in progress. By the time that you have re-wired, no matter how quick you may be, the orchestra may have reached quite a soft passage. Further, owing to atmospheric conditions, the signal may not be coming in quite so strongly as it was a minute or two before.

Tuned high-frequency circuits

Fig. 1 shows how, with the help of a D.P.C.O. switch, an instantaneous change may be made from tuned anode to tuned transformer coupling. The plate and grid connections are taken direct to the top and bottom pivots of the arms of the switch. The clip contacts on the left are connected together, and a lead from them is taken to the lower end of the anode tuning circuit. The upper end of this circuit, as well as OP of the transformer, are connected directly to H.T. plus. The upper right hand clip contact goes to IP of the transformer whilst the lower is taken to OS. IS of the transformer is joined directly to L.T. −. If the switch is turned over to the left there is a connection *via* the upper arm from the plate through the tuned circuit L.C. to H.T. plus, and by way of the lower arm through the grid condenser to the grid of the valve. Turning the switch in the other direction connects the plate to IP of the transformer and the grid to IS. It will thus be seen that a change over can be made in a moment. The greatest care must be taken when switches are used on the high-frequency side that they are of a type which does not introduce a large amount of capacity. Very small D.P.C.O. switches are quite unsuitable for

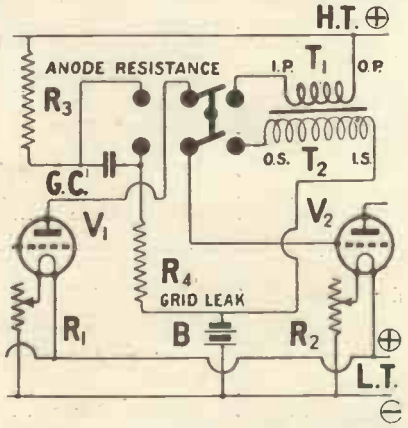

Fig. 2.—Comparing L.F. amplifiers

the purpose on this account. The best thing to use is either a barrel switch or something such as the Minicap specially designed for the avoidance of capacity.

Turning to the note magnifiers, we have in Fig. 2 a simple means of testing the respective merits of transformer and resistance-capacity coupling on the low-frequency side of the set. When the switch is thrown over to the right the anode of the first valve is connected to IP of the transformer, OP being already taken to H.T. plus. The grid of V2 is joined to OS, whilst IS is connected through the grid biasing battery to L.T. −. By turning the switch to the left the transformer is cut out altogether, the resistance-capacity circuit being substituted for it. The plate of

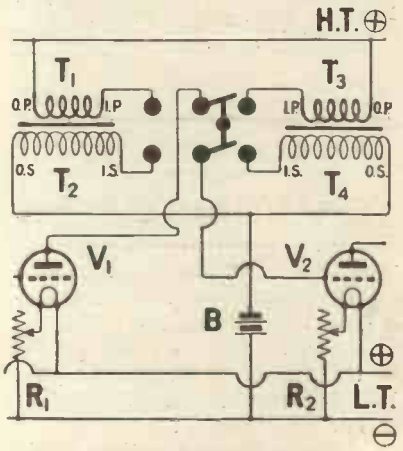

Fig. 3.—A simple method of comparing two transformers.

V1 is joined by the upper arm of the switch to the bottom of the anode resistance and to the left side of the grid condenser. The grid leak is already connected to the left side of this condenser and to the grid biasing battery. In this simple way it is possible to discover in a very short time exactly what gain in signal strength is obtained by using a low-frequency intervalve transformer, as well as any increase in purity produced by employing instead the resistance capacity coupling. The Fig. 2 circuit may, of course, be adapted for high-frequency work where it is

desired to try resistance capacity against H.F. transformer coupling. In this case the biasing battery will, of course, be unnecessary. If V2 is an amplifying valve, the grid leak and condenser will be wired as shown in Fig. 2, but if it is a rectifier its grid connections will be those given in Fig. 1.

Low-frequency transformers

It quite often happens that one wishes to determine which of two low-frequency intervalve transformers is the better as regards both signal strength and purity. Of a pair, for example, we may wish to know which has a primary impedance most suited to a particular valve; or we may desire to find out which of the two step-up ratios is the most suitable in a given position. Again, we may want to discover whether the set would work better if an existing transformer of rather old-fashioned design were replaced by a modern product. Any of these points can be settled very quickly in the way shown in Fig. 3. OP of each transformer is taken direct to H.T. plus, OS going by way of the grid biasing battery to L.T. −. The two IPs are connected to the upper clips and the two ISs to the lower. The plate of V1 is wired to the pivot of the top arm and the grid of V2 to that of the other. By

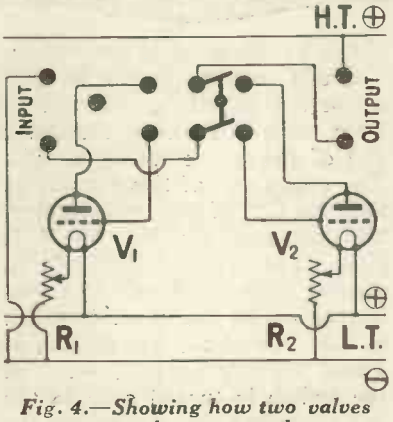

Fig. 4.—Showing how two valves may be compared.

moving the switch to right or left either transformer can be brought into action in an instant.

Valves

In Fig. 4 we see how two valves may be compared without trouble. On the left of the diagram are the input terminals, the output terminals being on the right. The connection of the upper input terminal will depend, of course, upon the position in the set that the selected valve is intended to occupy. The plate of V1 is connected to the upper left hand clip and its grid to the lower. The connections of V2 are made similarly to the right hand pair of clips. To the pivot of the lower arm runs the second input lead and the upper arm is connected to one of the output terminals, the other being taken to H.T. plus. This simple arrangement is most useful in all kinds of ways. It gives, for example, a simple means of trying out a power valve against one of the general purpose variety, of ascertaining the merits of a valve designed specially for rectification, or of seeing whether much is gained by using any particular kind of valve on the high-frequency side of the set.

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TRANSATLANTIC TEST PROGRAMMES

WE give below the programmes for November 27 and 28 from the Calgary station, CFAC, details of the tests from which we published in our last issue.

The artistes are:

Madame Mami Gardiner (Gold Medallist of Glasgow, Scotland).

Mr. J. Hodgkinson, Violinist.

Miss Ruth Mathews, Pianist.

Mr. Clifford Higgins, Musical Director of the Church, at the organ.

Organ 4 manuals, 76 speaking stops and 68 couplers, etc., built by Casavant Frères, St. Hyacinth, Quebec, Canada.

Assisted by the Knox Choir which won premier honours this year at the Alberta Musical Festival, comprising 85 voices, the largest choir in Western Canada.

In addition to these tests, the station will be transmitting as usual on Monday evenings from 10 to 12 midnight, mountain time, this being 5 a.m. to 7 a.m. on Tuesday mornings.

The station also works on Thursdays, from 9 p.m. to 11 p.m., corresponding to 4 a.m. to 6 a.m. on Fridays, and readers are invited to listen-in for the station on these days. As stated in our last issue, reports will be welcomed by "The Calgary Herald," Calgary, Alberta, Canada.

Nov. 27th. TRANSATLANTIC TEST PROGRAMME.

Piano Solo ...	Selected	Ruth Mathews.
Contralto Solo ...	Angus Macdonald	Madame Mami Gardiner.
Violin Solo ...	Souvenir (Drdla)...	Mr. J. Hodgkinson.
Contralto Solo ...	Out Where the West Begins ...	Madame Mami Gardiner.
Violin	Thais (Massenet)	J. Hodgkinson.
Song	My Ain Folk	Madame Mami Gardiner.
Violin	Bolero (German)	J. Hodgkinson.
Solo	Goodbye (Tosti)	Madame Mami Gardiner.
Violin	Allegro Animato	J. Hodgkinson.
Contralto ...	Softly Awakes My Heart ...	Madame Mami Gardiner.
Violin	Nocturne in D. (Leo Stern) ...	J. Hodgkinson.
Solo	Annie Laurie	Madame Mami Gardiner.

Nov. 28th. TRANSATLANTIC TEST PROGRAMME FROM KNOX CHURCH, CALGARY.

Organ	Fantasia	Berens.
Organ	Anitra's Dance	Greig.
Choir	Sun of My Soul	Turner.
Organ	Extemporisation on a Theme ...	Higgin.
Solo	The People Walked in Darkness (By Elgar Higgin).	Handel.
Organ	The Dream of Celesta	David Clegg.
Choir	Hear, Lord Our God	Tschaikowsky.
Solo	My Redeemer and My Lord (By Mrs. C. T. Heribson).	Dudley Buck.
Organ	Grand Chorus in D Major ...	Duilamnt.

Correspondence

THE RESISTOFLEX AND THE BUZZERDYNE

SIR,—I fixed up the Resistoflex Circuit, Fig. 5, *Modern Wireless*, October, on the day I got the magazine, and am most pleased with it.

There is not the immense volume I had with the Double-Dual Circuit, *Modern Wireless*, March, 1924, page 484, but it is so much more delightful to use and so astoundingly selective. I have just added potentiometer control to first grid as described in *Modern Wireless* for November, and find considerable improvement well repaying the little extra trouble.

What I want to tell you is this. I used to have difficulty in separating Radiola and 5XX with the old circuit; in fact, I could not listen to Radiola when the latter was working. Now I find that they are miles apart, and when I want either I have to tune-in *carefully*. It is no longer a case of sticking in the correct coils and turning the juice on and finding 5XX in full blast. I can nearly tune out Radiola with the verniers only.

This circuit is so selective that I should have found some difficulty in working it if I had not fixed on my board the wonderful Buzzerdyne Wavemeter which was described in *Wireless Weekly* some weeks ago; this was not an expensive addition, and its usefulness is astonishing. I can tune-in every station in a few moments.

I have a five-ply birch panel 2 ft. 6 in. square which is hinged vertically like a door, and all the outside connections are made with single-throw switches down one side. I can unmake all the switches and swing the panel open and have all the back exposed and get-at-able in a few seconds, and as I make alterations to my set several times every day, I find I can make several alterations and trials in the same time that I used to take over simply undoing loose leads and getting to the back of my original cabinet.

All components are mounted on ebonite, and the wood cut away well clear. I have plenty of room and have a two-valve amplifier and a single-valve reflex and also the wave-meter and a crystal set all on the same panel.—Yours faithfully,

A. GOROMEY OWEN.

Bexhill-on-Sea.

Apparatus we have tested

Filament Rheostats

Messrs. L. Michael, Ltd., have sent us samples of three types of filament rheostats intended for use with ordinary bright-emitter valves, dull-emitter of the very low-consumption type, and for dual purpose, respectively.

These are of the circular pattern, with a flat spiral of resistance wire bent round a circular former. Two No. 4 B.A. screws fix the latter behind the panel, and a knob and small bevel scale are provided for above-panel. It was noted that care had been taken in the design and manufacture of these instruments to ensure smooth and silent working, by the provision of a central spring-contact to the moving contact-finger, and by flattening and trueing off the top of the resistance spiral in the path of the finger. A positive "off" position is provided by a simple device which lifts the finger off the spiral at one end of its travel, and a positive stop at the other end. Soldering tags are the means of electrical connection.

The dual-purpose rheostat has one-half of the spiral of fine, and the latter half of coarse resistance-wire, transition from one to the other being made smoothly by a short brass bridge.

The resistance ranges measured were up to about 6 ohms for the bright-emitter pattern; 30 ohms for the D.E., and to 7 and 27 ohms respectively for the dual-purpose. Of the finish and workmanship we need only say that they were up to the usual standard set by Messrs. L. McMichael, Ltd.

A New Galena Crystal

From A. Hinderlich have been received specimens of a new and extremely interesting type of galena crystal which is shortly to be put on the market. The samples submitted resembled closely the ordinary large cubical-crystal type of natural galena, or that which has been cooled slowly after fusing. Such galena, as is well known, is not usually sensitive to any extent, and that only in isolated spots at flaws, etc., in the crystals. But with this material, sensitive spots were found in plenty, even on the apparently smooth faces of the large crystals; and the rectification-efficiency of these was found, by actual measurement, to be on a par with the best of fine-grained synthetic galenas. On breaking open a specimen, fresh

surfaces were found with similar properties, so that it is not a matter of mere superficial sensitivity.

Variable Gridleak

Messrs. A. H. Hunt, Ltd., have sent for test samples of a variable gridleak, giving by a 7-point switch a corresponding number of steps of resistance-value, ranging from ½ to 3, 5 or 8 megohms, or in a special pattern from 10,000 to 100,000 ohms by the makers' rating. The instrument takes the form of a square panel about 2 in. square, to be mounted directly behind the panel of the set by four small screws, the controlling knob and handle projecting through; a special anti-capacity handle 5 in. long is also provided to operate it from a safe distance. The switch and two small terminals are arranged on the rear of the panel.

Samples gave, on test, a convenient range from .5 to 7, and from .8 to 10 megohms respectively. The resistance values appeared to be fairly constant and reproducible, and were not altered appreciably by the passage of a steady leak-current. In actual reception they operated satisfactorily and silently, giving critical control.

A Crystal Detector

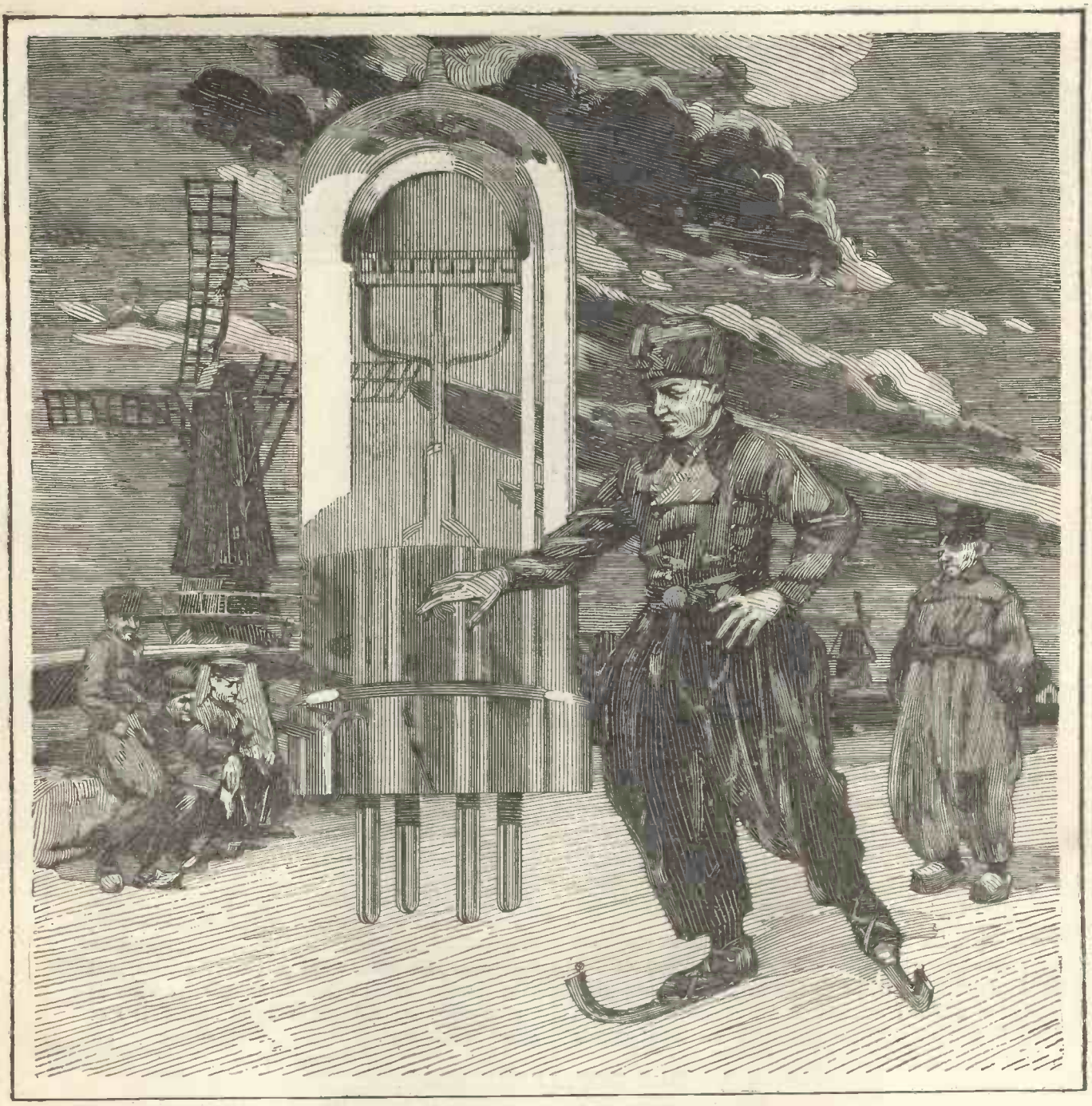
Messrs. A. H. Hunt, Ltd., have sent for test samples of their No. 922 pattern crystal detector. This is of the vertical glass-enclosed type, and has a cat's-whisker adjustable lengthways by means of a fine-thread screw, as well as the usual sideways adjustment by a ball-and-socket joint. The latter is made adjustable in this detector by means of a screwed cap. The detector is mounted on an insulating base 1¾ in. square, the glass tube being secured to this by a frame screwed down to it. This has to be removed to get at the crystal-cup, an operation which proved a little troublesome. Two very small terminals are provided on the base; a spare cup can be fixed in place of the unusually thick and clumsy cat's-whisker provided with the instrument. On practical trial, with exception of the points mentioned, the instrument operated satisfactorily, and gave a steady and sensitive adjustment of the whisker.

Baty Panel-Mounting Components

We have received from E. J. Baty samples of the unique types of panel-mounting components marketed by the maker, including the latest pattern of the well-known low-minimum two-plate mica-and-air condenser; tuned-anode units with a basket-coil mounted behind the standard condenser; aerial loose-coupler with an aperiodic aerial coil mounted close to, but adjustable relative to a secondary or grid coil, the latter tunable by a co-axial two-plate condenser; inductance coils of the same general type; a neat grid-condenser for use in conjunction with these components, etc. In a previous report in these columns we have given details of tests made on these ingenious and compact types of panel-components; these latest patterns conform generally to the standard already commented upon.

Hertzite Crystal

A specimen of "genuine" Hertzite crystal has been sent us for trial by L. G. Russell. This is put on the market in sealed boxes. On test it proved to have the properties of a high-class galena, giving an excellent percentage of sensitive spots, cutting readily without crumbling to give fresh surfaces of good sensitivity, and measuring up to the standard quantitatively in actual reception. It can certainly be recommended with every confidence.



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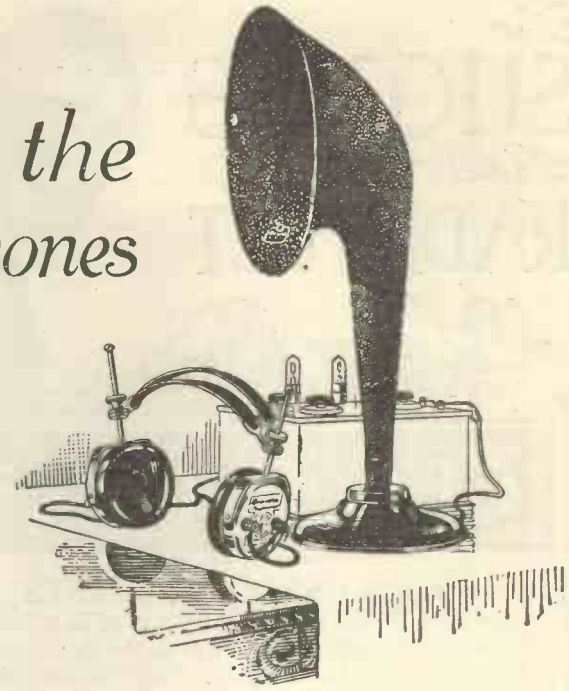

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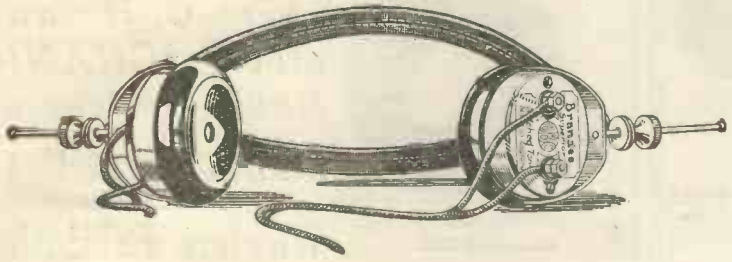

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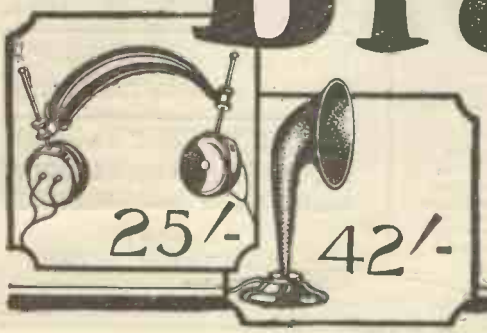

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8	×	6	× 3/16	..	2/6	24	× 12	× ¼	..	17/6	12	× 8	× ¼	..	6/–
8	×	6	× ¼	..	3/3	8	× 5½	× ¼	..	2/9	10	× 8	× ¼	..	6/9
10½	×	8½	× ¼	..	5/3	10½	× 7	× ¼	..	4/7	7	× 5	× ¼	..	2/3
12	×	10	× ¼	..	7/3	12	× 6	× ¼	..	4/6	10	× 9	× ¼	..	5/8
12	×	12	× ¼	..	8/6	12	× 9	× ¼	..	9	× 5½	× ¼	..	3/5	
14	×	12	× ¼	..	10/–	22	× 11	× ¼	..	15/3	10	× 5	× ¼	..	3/3
16	×	12	× ¼	..	11/6	16	× 9	× ¼	..	9/–	12½	× 9½	× ¼	..	7/6

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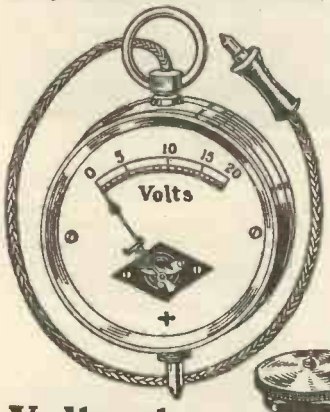

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Dead-beat Type. Very reliable. Nicely made and finished. Readings, 0–3, 0—6, 0—12, 0—15, 0—20 volts. Price, each **5/-** Post 6d.

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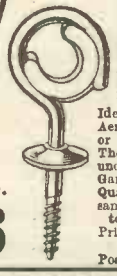
This Basket type Coil Holder is beautifully made and finished in best ebonite. The quality is of Gamages usual high standard. Post 3d. Price **1/6**



Insulated HOOKS

Well made and nicely finished. Ideal for Indoor Aerials. Size 2 ins. or 1½ ins. over all. These hooks come under the usual Gamage guarantee of Quality. Send for a sample lot to-day. Price per dozen **1/6** Post 3d.

Volt - Ammeters

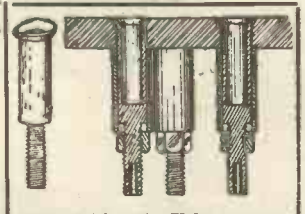
Beautifully made and nicely finished. **Watch Type Combined Dead-Beat Volt-Ammeter.** In Nickelled Brass Case. Readings, 0—12 volts; 0—30 amps. In the usual high standard of quality. Post 6d. Price **7/6**

New Coil Socket

Pay us a visit of inspection

Order direct from this announcement on money-back guarantee

New Type Coil Socket with support for Home-made Coils. Best ebonite and socket. Each **1/6** Post 2d.



VALVE HOLDERS.

Latest type for Flush Mounting. Reduced height makes for compactness, reduced capacity and reduced solid dilectric for efficiency. Flush for protection of velvet. Easy to mount. Brass finish. Price per set of 4 **1/-** Post free.

A. W. GAMAGE, Ltd., Holborn, London, E.C.1
And at BENETFINKS, CHEAPSIDE, E.C.2

Ericsson intervalve transformers "transform" a set. Powerful and distortionless. Ratios 1—4, 1—2 .. 17/6 each.

Condensers of precision Stout Vanes, narrow-spacing. Cap. guaranteed. .0005, 12/6; .001, 17/6.

No more burnt-out valves. The Ericsson Patent Wander Plug "blows" when too much juice goes across. Plug with fuse, 2/-, spare fuses, 5d. each.

This dual resistance allows the use of bright or dull emitters. Resistance can be varied from 6 to 60 ohms. Works like velvet. Complete, 8/6.

"You can't build an A1 receiver with C3 parts"

WELL begun is half done—make up your next set from Ericsson *tested* parts—transformers, condensers, grid leaks, rheostats, valve holders, etc.

Use short straight connections, solder all joints, and you'll get maximum results, all other circumstances being favourable.

Ericsson *tested* parts are made by a firm old in the business (our telephones were adopted as standard by the Admiralty back in 1909).

Selling Agents:

MANCHESTER: 19, Bridge Street
NOTTINGHAM: W. J. Furse & Co., Ltd., Traffic Street.
COLCHESTER: 121, High Street.
SCOTLAND: Malcolm Breingan, 57, Robertson Street, Glasgow.
BIRMINGHAM: 14–15, Snow Hill.
N.E. ENGLAND: Milbourn Ho., Newcastle-on-Tyne.
LEEDS: North British Engineering Equipment Co., Lands Lane.
IRISH FREE STATE: Stocks carried by A. W. Doyle, Kelly & Co., 174, Pear Street, Dublin.
BELFAST: J. Robertson, Ltd., 46, May Street.
CARDIFF: E. Thompson & Son, Western Mail Chambers.

Write us to-day or apply to our agents for lists containing full information of these parts and our famous receivers, telephones and Super Tone Loud Speaker.

The British L.M. Ericsson Mfg. Co. Ltd.
67/73 KINGSWAY, LONDON, W.C.2.

Ericsson

BRITISH PARTS

BBC

Buy British Goods Only

It will pay you always to watch WIRELESS WEEKLY *Advertisements.*

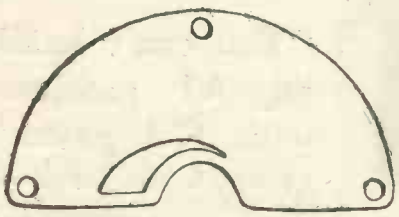
A real Square Law Condenser at a moderate price———

ALTHOUGH every experimenter realizes the tremendous advantages of square law Condensers many who would otherwise use them are deterred by the necessarily higher price. The new Peto-Scott square Law Condenser shown here is an attempt to place on the market a really good instrument possessing most of the advantages of higher priced condensers at a figure within the reach of all.

It is substantially made with fine spacing washers and solid ebonite end pieces—both ends of which are brass bushed to prevent wear. It is affixed to the panel with one hole only—a great convenience to the home constructor.

A special feature is its two-piece dial which is absolutely self-centreing. Any dial that must be set on its shaft with some form of set screw cannot be true and develops an unsightly wobble.

Remember that such authorities as Mr. Percy W. Harris and others emphatically state that every Variable Condenser ought to be of the square law type.



Note the novel design of the special Peto-Scott Square Law Plate (registered design No. 707587). Actual tests have proved that the Peto-Scott Square Law Condenser gives absolute straight line reading over the whole of the Dial.

PRICES:

·0001 mfds.	7/–
·0002 mfds.	8/6
.0003 mfds.	10/–
.0005 mfds.	10/6
.001 mfds.	11/6
Dual Condenser for two stages of H.F. Each half .0003 mfds.	15/6

Send for our large Illustrated Catalogue.

Forty-eight pages fully illustrated—every possible component described. Should be in the hands of every experimenter for reference purposes. Sent post free together with other literature on receipt of 3d. in stamps.
Large Free Folder on the Pilot Panel System, showing how to build all principal Radio Press Receivers at cost only of the components. Send us your name for a free copy to-day.

PETO-SCOTT Co. Ltd.

Registered Offices: **77, CITY ROAD, E.C.** *(For all Mail Orders.)*

Branches—
LONDON - 62, High Holborn, W.C.1, and 230, Wood Street, Walthamstow.
CARDIFF - - 94, Queen Street.
LIVERPOOL - 4, Manchester Street.
PLYMOUTH - Near Derry's Clock.
Gilbert Ad. 1799.

CABINET AND PANEL WORK A SPECIALITY.

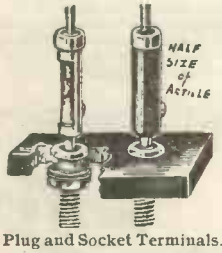
Non-standard Cabinets and Panels to Customers' designs produced at short notice.

We supply Cabinets, drilled and engraved Panels and any Components for all Radio Press Receivers. Send 2d. stamp for our new 100-page Catalogue and descriptive Leaflets.

Examples:—	Cabinet.	Panel.
Four-Valve Family	18/–	15/6
Simplicity Three-Valve	21/–	12/–
All Concert-de-Luxe	26/–	15/–
Extra for carriage and packing on post orders ..	1/6	9d.

All Cabinets are best-seasoned walnut, hand-made and polished. Panels are guaranteed electrically, matt non-metallic finish, edges squared, accurately drilled and engraved.

RADION Panels supplied if desired at slight extra cost.



Plug and Socket Terminals.

S.A.C. "Tapa" Plug and Socket Terminals

"the gadget of a thousand uses," in red or black and five other colours. "Once used always used." 6d. each. Sample pair free to all Clients ordering Panels or Cabinets.

S.A.C. Fireside Plug.

The last word in comfort and efficiency, for plugging in distant headphones, loud speakers, etc. 2/6 each.

Our London Office is in a central position: we welcome inspection of our Cabinets and Panels.

"S. A. CUTTERS,"

15, Red Lion Square, London, W.C.1.

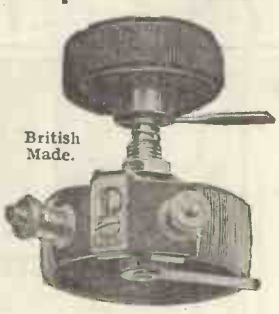
'Phone: Chancery 8042.

As yet the effect of good filament control upon perfect reception is not fully appreciated. Try the difference between bad and good control by fitting the SHIPTON.

THE MOST PERFECT RHEOSTAT YET INTRODUCED

A special tension spring fitted on the spindle ensures a good, smooth contact. It is silent in use. Three models are available, so that whatever valves you may use there is a SHIPTON Rheostat to give you perfect filament control. Ask for it by name.

The SHIPTON New Type Strip Rheostat and Potentiometer



British Made.

PROTECTS YOUR VALVES

However careful you may be, an occasion *will* arise when the H.T. will short across the filament. Avoid accidents by fitting the SHIPTON 7 ohm model which is *fitted with a fuse.* A spare fuse is packed in every box.

SHIPTON New Type STRIP RHEOSTAT 7 ohm (with fuse) .. 3/-
SHIPTON New Type STRIP RHEOSTAT 30 ohm 3/-
SHIPTON New Type STRIP RHEOSTAT 60 ohm 3/-
SHIPTON POTENTIOMETER 600 ohm 4/6

Packed in neat linenette boxes.

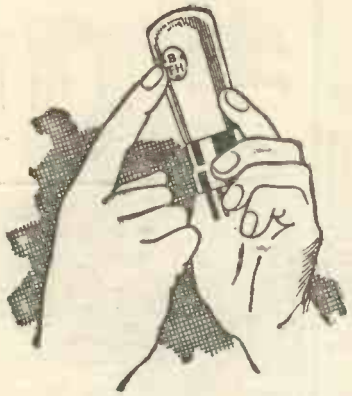
Apply to your local dealer; or direct, giving your dealer's name and address.

E. SHIPTON & CO., LTD.

37, TOTHILL STREET, WESTMINSTER, S.W.1.

Telephone: Victoria 7. Telegrams: "Rentfones, Parl."
Also at **14, KING STREET, COVENT GARDEN, W.C.**

Barclays 322



The Significance of the Marking

GENERAL PURPOSE VALVES:

Type R. ... 12/6 each

Filament Voltage.....4 volts
Filament Current.....0.7 amp.
Maximum plate voltage...100 volts
Plate resistance.....27,000 ohms.

Type B 3 ... 21/- each

Filament voltage.....1.8 volts
Filament current.....0.35 amp.
Maximum plate voltage...80 volts
Plate resistance.....27,000 ohms.

***Type B5. ... 25/- each**

Filament voltage.....2.8—3 volts
Filament current...0.06 amp.(at 3 v.)
Maximum plate voltage...80 volts
Plate resistance.....17,000 ohms.

POWER AMPLIFYING VALVES:

Type B4. ... 35/- each

Filament voltage ..... 5—6 volts
Filament current...0.25 amp.(at 6 v.)
Maximum plate voltage...120 volts
Plate resistance ..... 6,000 ohms.

***Type B6 ... 35/- each**

Filament voltage.....3 volts
Filament current.....0.12 amp.
Maximum plate voltage...120 volts
Plate resistance ..... 9,000 ohms.

***Type B 7 ... 37/6 each**

Filament voltage.....6 volts
Filament current.....0.06 amp.
Maximum plate voltage...120 volts
Plate resistance ..... 9,000 ohms.

*For use with Dry Cells

B T-H

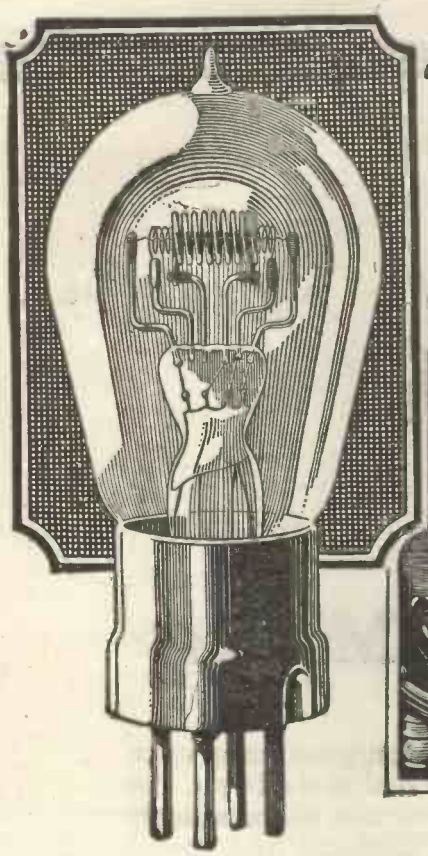
The B.T.H. Monogram on a valve means a great deal to the buyer. For one thing, it signifies an exceedingly high vacuum produced by a special patented process. It means a valve which has been thoroughly tested in every respect before leaving the factory. Above all, it signifies a valve of great sensitivity, absolutely free from distortion – a valve which will last longer and give infinitely better results than "soft" foreign (or English) valves.

USE B.T.H. VALVES AND MAKE *SURE* OF GOOD RESULTS

From all Electricians and Radio Dealers

B.T.H. RADIO VALVES

Advertisement of The British Thomson Houston Co. Ltd. 2173



Louden

The Secret

10/-

Stands 1 and 22, British Wireless Exhibition, White City.

Magicians and Sorcerers had their "Secrets of Healing" and "Secrets of Success," which they would dispense for a consideration, but in these less romantic times success is more apt to be won on sheer merit.

Take the case of the Louden Valve. Four months ago it was unheard of—to-day there are thousands of enthusiastic "slaves of the lamp" who will never go back to the old type of valve.

Why? Well, because however you consider the Louden Valve it is a sound investment.

It costs only ten shillings. It takes so little current that your accumulators will last twice as long as they do with ordinary bright filament valves, and in spite of the fact that the anode is "full of holes" volume is, if anything, above the normal, showing that a full use is made of the electron stream.

It is the *unwanted* charges that escape through the turns of the anode, and strangely enough this is precisely what we intend to happen.

It gives a silver clear reproduction which is the delight of all who have heard it, and the life of the filament is exceptionally long.

So naturally the Louden is outstripping all other valves in popularity.

There is no secret—only merit.

The Plain Louden for Detecting and Low Frequency Amplifying.
The Blue Louden for H.F. Amplification.
Filament Volts ... 4.8-5
Filament Amps.... 0.4
Anode Volts ... 40-80

FELLOWS WIRELESS

Manufactured throughout in Great Britain.

All Loudens are silver clear and free from mush.

The current consumption is very low and the life long.

Louden Valves - Silver Clear

Get that International feeling by using Cossor Valves!

THOSE who have not searched the ether for Continental stations have never really dipped into the pleasures of Broadcasting. A song from Spain—a dance from Holland—a typical melody from Italy—all these are yours with a little care and the exercising of good judgment.

Exercise your judgment in buying or building a good Set and the selection of the correct Valves and learn how to use your Set—that's all there is to it.

Numbers of car owners never really appreciate the capabilities of their cars because they never take the trouble to understand the peculiarities of their engines. In a like manner, plenty of Broadcast listeners think that they cannot get much beyond their local stations because they have not taken the trouble to learn the capabilities of their Sets, or, perhaps, because they are using the wrong kind of valves.

Obviously, the Valve that has been developed specially to give a loud volume of sound from a near-by Station will not function very satisfactorily on the extremely faint signals produced by a Station hundreds of miles away. And a Valve designed for long distance cannot be expected to operate a Loud Speaker with any great measure of success.

There are three main functions for a valve. (1) To rectify. (2) To amplify at low frequency, or to act as a note magnifier. (3) To amplify at high frequency.

Any valve that will perform all these diverse operations must be—at its best—a compromise.

That is why Cossor Valves are sold in two distinct types; the P.1 capable of rectifying and amplifying at low frequency, and the P.2—the valve with the red top—specially produced for long distance work in connection with the P.1.

Both of these Valves conform to the master principles which are rapidly making the name Cossor known throughout the whole world—the arched filament, hood-shaped Grid and Anode. This design is the only known method of utilising the whole of the electron stream. Any observant person must have noticed that in the ordinary Valve with straight filament and tubular Anode quite an appreciable proportion of the electron stream must inevitably escape from each end of the Anode to the detriment of the strength and quality of the reception.

But that is not all. Cossor Valves besides being more sensitive actually last longer. We all know that metals expand when heated, therefore the ordinary valve utilises either a coiled spring or springs the electrodes apart to prevent the filament, when heated, from sagging and touching the Grid. Obviously, such a drastic method of curing the stretching and contraction of the filament inevitably finds a weak spot—and a fracture is the result.

This cannot happen in a Cossor because its filament is arched—just like a bridge—for strength, and it can always support its own weight.

Therefore, when buying Cossor Valves you get not only improved reception but a longer life at the same time. Next time see that you get Cossor Valves—the only valve sold in a *sealed* carton—our patented method of guaranteeing you a new and unused Valve.

BRIGHT EMITTERS

P1, for Detector and L.F. use 12/6
P2 (with Red top), for H.F. use 12/6

WUNCELL DULL EMITTERS

Model A. (*With resistance in base for use with 2-, 4-, or 6-volt accumulator.*)
WR1, for Detector and L.F. use 23/6
WR2 (with Red top), for H.F. use 23/6

Model B. (*Without resistance, working direct from 2-volt accumulator.*)
W1, for Detector and L.F. use 21/-
W2 (with Red top), for H.F. use 21/-

Valves

Gilbert Ad. 1809.

A new de-luxe Accumulator

Acid cannot collect on its dome top.

EVERYONE knows that an accumulator sheds acid vapour which oozes through the vents and remains on the top of the case to collect dirt. As a result most accumulators are neglected and in a short while become very unsightly. When we set about the job of building a really superlative accumulator, we decided to re-design the whole of the container.

This new Oldham de-luxe has a dome shaped top, large terminals and adequate filler caps. As a result it can be kept clean with ease. A rinse under the tap after charging will remove all traces of acid and prevent the accumulation of dust.

And each 4 or 6-volt Oldham is made up of 2-volt units connected by removable straps so that the cells can be connected in parallel for use with Wecos, Wuncells and other Dull Emitters.

Decidedly a wise investment!

Prices:

2-Volt	20 amp-hours actual	14/3
	30 amp-hours actual	17/10
4-Volt	20 amp-hours actual	28/6
	30 amp-hours actual	35/8
6-Volt	20 amp-hours actual	42/9
	30 amp-hours actual	53/6

Oldham & Son, Ltd., Denton, Manchester.

LONDON - - Gt. Chapel Street, Oxford Street, W.1

NEWCASTLE: 1, St. Mary's Place

Special Activation Process

OLDHAM ACCUMULATORS

Gilbert Ad: 1792

WIRELESS WEEKLY SMALL ADVERTISEMENTS.

HEADPHONE REPAIRS. — Rewound, remagnetised, readjusted. Lowest prices quoted on receipt of telephones. Delivery three days. Est. 26 years.—Varley Magnet Co., London, S.E.18.

TELEPHONE RECEIVERS and Loud Speakers Rewound, 2,000 ohms, 3/6.-A Roberts & Co., 42, Bedford Hill, Balham, S.W.12.

BATY Condenser, High Max., Low Min.. High insulation, Min. weight, 5/3 postfree Coil to match, 230/4,000 metres, 6/9 pos. free. Combined space 4"x1", weight 2 oz" Suitable for all circuits. Technical reprints giving circuits, 1/3 post free. Ernest L. Baty, Luton.

PARTNER or Director required for Involute Helical Inductor Cylinder Generators and Motors, D.C. (Self-commutated) and A.C. Adapted for press tool mass products, suitable all sizes and purposes. Patented in all countries. Great opportunity to obtain large or controlling interest (£5,000 upwards) in British Patent as affecting aircraft and wireless, for which large orders are promised. Invaluable first hand knowledge and experience could be acquired.—Reply to Box 'A22, "Wireless Weekly," Barclays, Bush House, Strand, W.C.2.

AERIAL SATISFACTION! Use clear reception Radiowire for your aerial and lead direct to set. Easily fixed, requires no insulators. Only 1/8d. for 100 ft. with instructions! Useful for earthing and 'phone extensions and is waterproof insulated. From your dealer or post free from David Green & Son, 656 Department, Lytham.

PATENTS AND TRADE MARKS.—Inventor's Advice, Handbook and Consultations free.—King, Registered Patent Agent, 146a, Queen Victoria Street, London. 'Phone: 682 Cent. 38 years' references.

FOUR VALVE RECEIVER in handsome Oak Cabinet, with folding doors. Complete, but requires cleaning and overhauling. Together with large Claritone Loud Speaker. £20. 10. 0. Write A. 266, Windmill Road, W.5.

WIRELESS CABINETS. Solid Oak, Flat.

Inside Measurements.	Price.	Sloping Panel.	Price.
7"×5"×5"	3/9	8"×9"	9/9
8"×7"×5"	4/9	8"×12"	11/6
10"×8"×5"	6/-	10"×12"	13/3
12"×10"	7/6	10"×15"	15/-

Post free. Mahogany cost 20% more. All well polished. Specials to order. J. W. Walker, 9, Manor Park Parade, Lee High Road, S.E.13.

AGENTS Wanted. Wireless valve repair business. Deal with the actual repairers. Lowest trade terms. All types repaired. A hard vacuum guaranteed. Also old valves bought for cash, 6d. each. Cossors 1/- each. M. & G., 60, Churchfield Road, Acton, W.3. Telephone Chiswick 2681

CABINETS YOU WANT

PICKETT'S Insulated Cabinets = for 100% results. From 1/6 each, highly polished. All designs and sizes

"MADE for CONSTRUCTORS." *Write now for Constructors' Lists Free.*

PICKETTS Cabinet (W.L.) Works, Bexleyheath, S.E.

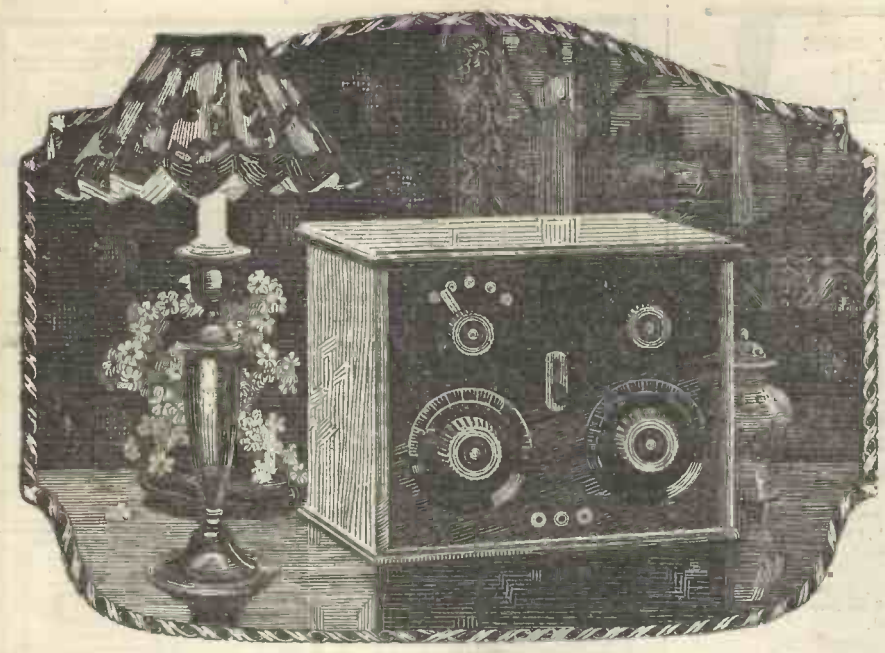
RADIO PRESS INFORMATION DEPT.

2/6 QUERY COUPON

WIRELESS WEEKLY.

Vol. 5. No. 5. Nov. 19, 1924.

(This coupon must be accompanied by a postal order of 2/6 for each question, and a stamped addressed envelope.)



—a cheap Panel may be the most expensive item in your Set

IF you have built a Set, you may have experienced the mortification of having spent several hours in drilling a panel and wiring it up only to find that not a note can be obtained from it. You may remember how, at great inconvenience, you looked carefully over the whole circuit. How you tested every component and still never a sound from your Set. And then, perhaps, you discovered you were using a low grade piece of leaky ebonite for your panel.

Not everything masquerading as ebonite is worth using as a panel—in fact, it is difficult to conceive a greater test for any insulation material than to use it in a Wireless Set.

The extremely weak impulses received upon your aerial, when conveyed to your Set, so readily leak away that the greatest care must be taken to preserve them if you are going to receive any signals at all. That is why a cheap panel can be easily proved to be a waste of time and money.

Radion is the highest grade of insulation in the world, and has been specially developed for wireless use. Its highly polished surface, **which need not be removed before use,** enhances the appearance of the finished instrument and prevents the formation of dust.

Radion is sold in black and mahoganite —a beautiful colour, very similar to old mahogany—with dials and knobs to match. It is packed in stout envelopes in the convenient sizes shown below. For your next Set choose Radion—every panel is stamped—then you can be certain that it will look better and work better.

Radion Sizes and Prices:

Size	Black	Mahoganite	Size	Black	Mahoganite	Size	Black	Mahoganite
6"×7"	3/6	4/3	7"×14"	8/-	10/3	8"×26"	17/6	21/3
6"×10½"	5/3	6/6	7"×18"	10/6	12/9	9"×14"	10/6	12/9
6"×14"	7/-	8/6	7"×21"	12/3	15/-	10"×12"	10/-	12/-
6"×21"	10/6	12/9	7"×24"	14/-	17/3	12"×14"	13/3	16/-
7"×9"	5/3	6/6	7"×26"	15/-	18/6	12"×21"	19/9	24/3
7"×10"	5/9	7/3	7"×30"	17/9	21/6	14"×18"	19/9	24/3
7"×12"	7/-	8/6	7"×48"	28/-	34/6	20"×24"	39/6	48/-

Special Note:—All ¼ thick—quite sufficient owing to Radion's tremendous strength.

RADION FOR PANELS

From all Dealers.

American Hard Rubber Co. (Britain), Ltd., 13a, Fore Street, London, E.C.2

Gilbert Ad. 1791

THE BOOKS for Beginners and Experts

The Radio Press Series.

No.		Price
1	Wireless for All ... ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	5d.
2	Simplified Wireless ... ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	1/-
3	How to Make Your Own Broadcast Receiver ... ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	1/6
4	How to Erect Your Wireless Aerial... By *B. Mittell, A.M.I.E.E.*	1/-
5	The Construction of Wireless Receiving Apparatus ... ... By *P. D. Tyers.*	1/6
6	The Construction of Crystal Receivers By *Alan L. M. Douglas.*	1/6
7	How to Make a "Unit" Wireless Receiver ... ... By *E. Redpath.*	2/6
8	Pictorial Wireless Circuits ... ... By *Oswald J. Rankin.*	1/6
9	Wireless Valves Simply Explained... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	2/6
10	Practical Wireless Valve Circuits ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	2/6
12	Radio Valves and How to Use Them By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	2/6
13	500 Wireless Questions Answered ... By *G. P. Kendall & E. Redpath.*	2/6
14	12 Tested Wireless Sets ... ... By *Percy W. Harris.*	2/6
15	More Practical Valve Circuits ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	3/6
16	Home-Built Wireless Components	2/6
17	Wireless Sets for Home Constructors By *E. Redpath.*	2/6
18	Tuning Coils and How to Wind Them By *G. P. Kendall, B.Sc.*	1/6

RADIO PRESS PANEL CARDS.

1	How to Make the W.1. Receiver ... By *Herbert K. Simpson.*	1/-

SIMPLEX WIRING CHARTS.

1	For 2-Valve Set	1/-
2	For 3-Valve Set	1/-
3	For 4-Valve Set	1/-

RADIO PRESS WIRELESS PANEL TRANSFERS ... 6d

*** "MODERN WIRELESS" COIL TABLE for Aerial, Anode and Re-action Coils ... ... 6d.**

RADIO PRESS ENVELOPES.

1	How to Build an S.T.100 Receiver ... By *John Scott-Taggart, F.Inst.P., A.M.I.E.E.*	1/6
2	How to Build a 4-Valve Receiver ... By *Percy W. Harris.*	2/6
3	How to Build the "Simplicity" 3-Valve Set By *G. P. Kendall, B.Sc.*	2/6
4	How to Build the All-Concert-de-Luxe Receiver By *Percy W. Harris.* ...	2/6
*8	How to Make a 1-Valve Reflex Receiver By *Herbert K. Simpson* ...	1/6
*9	How to Build an Efficient Single Valve Set By *Herbert K. Simpson*...	1/6

The Radio Press Envelopes are the most complete guide to wireless construction ever devised. They contain exact size panel and wiring blue prints, complete working drawings, sheets of instructions regarding construction and working, lists of components, and many photographs on beautiful art paper showing the set and wiring from every possible angle. Every possible detail is explained and you cannot go wrong.

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Observation and application

About the year 1749 an engraver named John Sadler, of Liverpool, whilst taking proofs off a plate he had engraved, was suddenly startled by shouts of jubilation from his children in the room. On turning round to see the cause he found that one of them had picked up a still wet spoilt copy that he had thrown on the floor and applied it to a piece of crockery, and was triumphantly holding up the decorated piece of china. This accidental revelation was pursued by Sadler, and it is on record that together with a master printer named Green they, a short time afterwards, printed "1,200 earthenware tiles in about six hours, better and neater than one hundred skilful pot-painters could have painted in the common and usual way of painting with a pencil."

This is probably the earliest known transfer printing; after Liverpool many other factories, such as Battersea, Worcester, Bilston, Staffordshire, Swansea, Coalport and others, made transfer-printed ware.

Transferring is a common process in Lithography where it is used for "making up work," viz., transferring a lot of impressions either all of the same matter or different to a large stone so that they can all be printed at once.

Ladies use transfers for getting their designs on material for silk and other fancy work, in fact, its uses are innumerable.

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Printed for the Proprietors, RADIO PRESS, LTD., Bush House, Aldwych, W.C.2., by THE AVENUE PRESS (L. Upcott Gill & Son, Ltd.), 55-57, Drury Lane, London. W.C.2. Published on Wednesday of each week at 3, Bolt Court, Fleet Street, London, E.C.4. Address for Subscriptions and Editorial Communications :—Bush House, Strand, London, W.C.2. Advertisement Managers :—BARCLAYS ADVERTISING, LTD., Bush House, Strand, London, W.C.2. Registered as a newspaper and for transmission by Canadian Magazine Post. Subscription rates : 32/6 per annum, 16/3 for six months, post free. Sole Agents for Australasia :—GORDON & GOTCH (Australasia), LTD. For Canada :—IMPERIAL NEWS, LTD. For South Africa :—CENTRAL NEWS AGENCY, LTD. For Japan :—SALE & FRAZAR, LTD.