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Vol. XII. No. 292

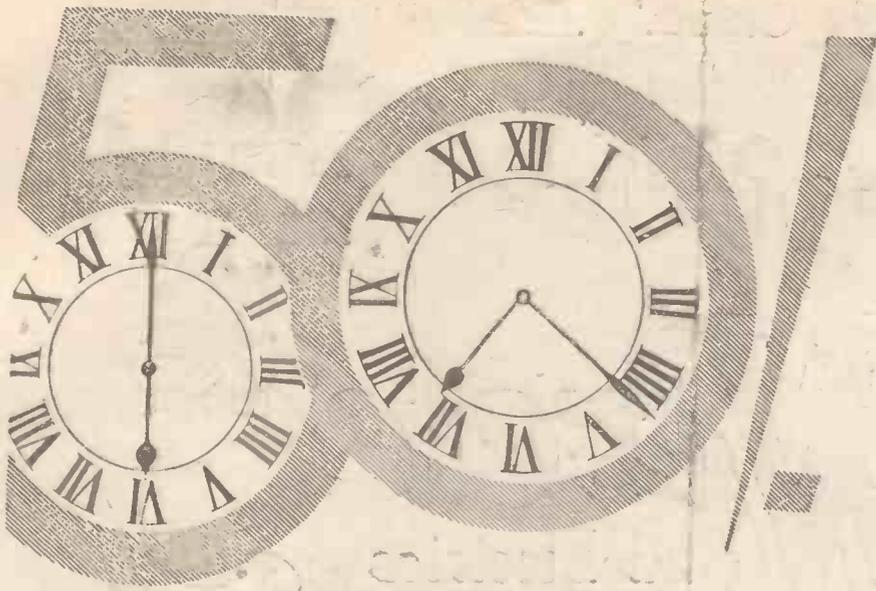
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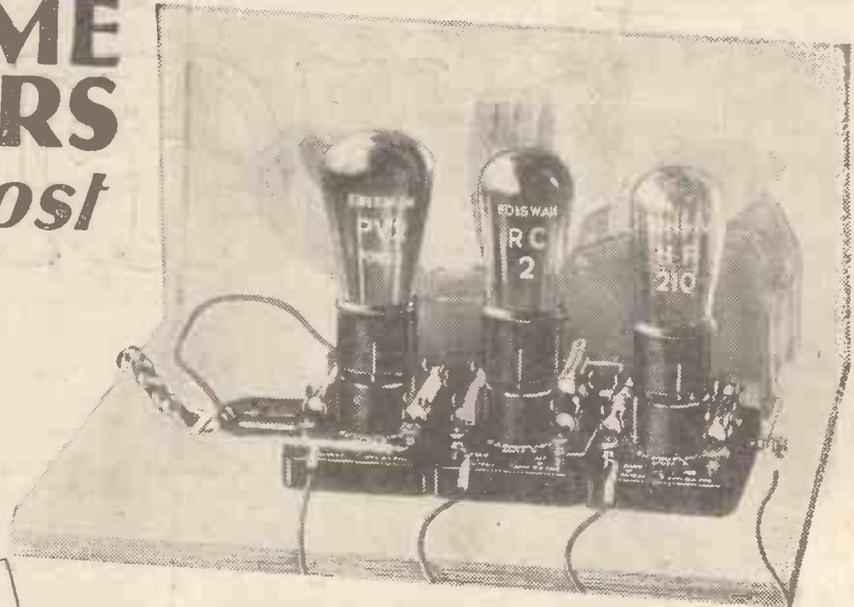
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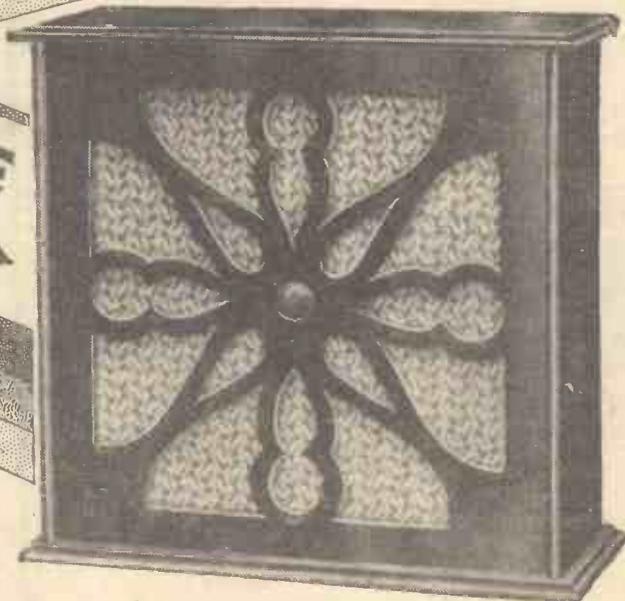
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Amateur Wireless

and Electricians

The Leading Radio Weekly for the Constructor, Listener
and Experimenter

Vol. XII. No. 292

Edited by BERNARD E. JONES
Technical Editor: J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

JANUARY 14, 1923

For the "Hams" — The "Dyna-flex" — French Broadcasting —
KDKA'S Transmissions — For "Super-Sixers"

The "Dyna-flex"

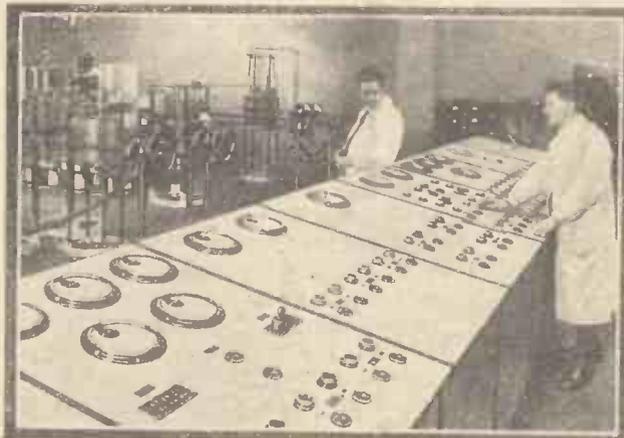
THE "Dyna-flex"—perhaps a rather unusual name for a receiver! Taking the Rice neutrodyned reflex circuit, the designer Mr. C. C. Prior proceeded to do a good deal of hard thinking! The result is a reflex one-valver with ordinary condensers and coils which any amateur can construct, which will bring in several English and Continental stations at full loud-speaker strength! But there, turn to page 60 and read about it!

For the One-valvers!

THE other constructional article in this number deals with a unit which, we do not doubt, will meet a hearty welcome in many homes. A one-valver, such as the "Constant-coupled One," is excellent so far, but a loud-speaker is essential for real family enjoyment! The "Utility" amplifier will give you the extra volume and, because of the R.C. and transformer coupling method used, the purity of signals will be retained.

KDKA

DID anyone over here pick up KDKA's transmissions on 2.5 metres? We fancy not! Anyhow, the transmissions have now been suspended, as the wavelength was considered to be too low to be of any practical value. The station, by the way, is still working nightly between 8 and 10 o'clock on 315.8, 27, 62.5, and occasionally 42.95 metres. A special short-wave transmission to the Arctic and sub-Arctic regions is to be tried at 11 o'clock Eastern Standard Time on January 14 and February 18 for the benefit of the posts of the Hudson Bay Company and the North-West Mounted Police



This photograph of one corner of the new German super-power station, Zeesen, conveys to the mind just a suggestion of what the complexity of the whole equipment must be like. The photograph shows a section of one of the control tables.

For the "Hams"!

THOSE of our amateur transmitters who participated in the International Test organised by the American Radio Relay League will be pleased to hear that a second test is being arranged for February. Some good prizes are again being offered. The League's address, if you are interested, is: Hartford, Connecticut, U.S.A.

For "Super-Sixers"

OWNERS of "Super Sixes" will be pleased to know that another Australian short-wave station will shortly open up. With 8 kilowatts behind it, 2BL,

on 32.5 metres, will just come "romping in" on the loud-speaker!

French Broadcasting

THAT French broadcasting will "crash" early this year when, owing to the rejection of the tax on receiving sets, there will be no funds available to pay the copyright dues which can now be demanded from that date is the optimistic outlook of the French Press. One Paris wireless journal says the radio position has been badly bungled and that it is not unlikely that a national board like the B.B.C. will be set up.

"Pep" in Broadcasting

THERE can be little doubt that the majority of listeners are behind Mrs. Snowden in her struggle for more latitude in the broadcasting of controversial matter. Open-minded discussion hurts nothing, but on the contrary does a great deal of good in helping people to a sound point of view. As Mrs. Snowden says, "Stimulus is lacking in the fare so far provided," and "The programme for listeners who *think* will arrive."

Next Week

IN our next issue Mr. J. F. Johnston will describe and give full constructional details of his new four-valve receiver. This will be great news for the thousands of "Simpler Wireless" enthusiasts who are awaiting a loud-speaker DX set from Mr. Johnston. The receiver will not disappoint them. The circuit comprises H.F., detector and two L.F. Reception is remarkably pure and stable, while the set itself has, of course, the inherent advantages of the "Simpler Wireless" system, namely, efficiency and ease in working and low initial cost. This four-valver costs no more to run than the "Simpler Wireless" three-valver!

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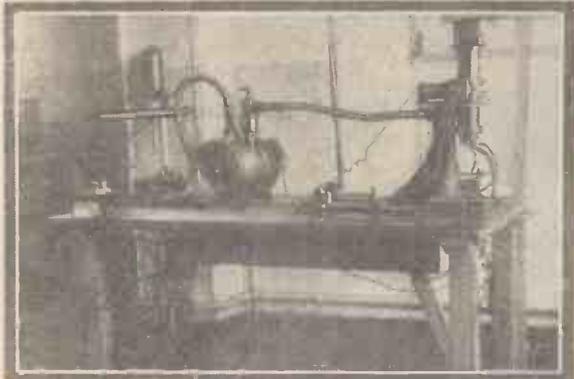
Television Developments in France

An Interview
with
M. Bélin

By WM. J. BRITTAIN

TWO men are working together on television near Paris. One is M. Bélin, and the other is M. Holweck.

M. Bélin, the scientist-business man, is an alert, busy man—a keen competitor in the world-television race. He showed me his transmitting apparatus.



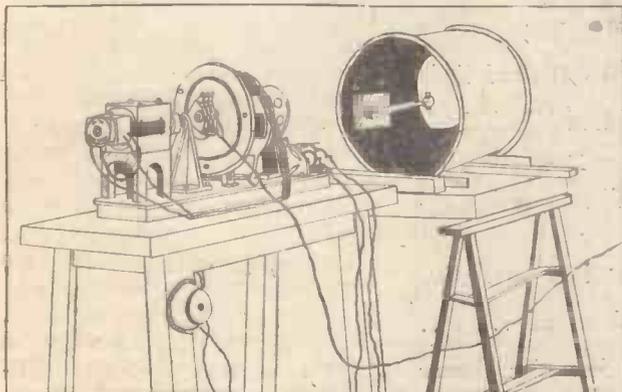
A Holweck Vacuum Pump

I saw before everything else a big concave mirror; it is at the end of a steel drum, this eighteen-inch mirror, and half-way along inside the drum juts an arm carrying a photo-electric cell.

Oscillating mirrors, M. Bélin uses to analyse his object, but not in an oscillograph like Mihaly's. His two tiny mirrors are oscillated at right angles to each other by cranks and rods. One twists at 200 times a second and the other at 10.

A beam of light from an arc, passing through a millimetre hole in a plate, and through a small lens, is directed on the mirrors which flash it zig-zag over the object.

For the object to be transmitted M. Bélin uses his hand. Point by point, rapidly, the hand is lit up and reflected in the large concave mirror at the end of the drum. The large mirror concentrates the light on the photo-electric cell placed at its focus.



A Sketch of the Bélin Television Apparatus

Here the flashes of light are transformed to corresponding electric impulses and are amplified through four stages before being sent out as wireless waves.

M. Holweck works on the receiver, and uses a cathode-ray oscillograph. It is not in glass, like Professor Dieckmann's bottle, but is in turned brass.

The air inside the oscillograph is kept at a fraction of a thousandth of an atmosphere pressure by a vacuum pump designed by M. Holweck. It is not necessary to keep the pump running always; it can be stopped for several hours without decreasing the flow of electrons.

The cathode stream is maintained by a potential of 1,000 volts. Magnets induce it to zig-zag over the circular screen at the top of the receiver.

When the image first comes on to the screen it is double, showing a disparity of phase between the mirrors and the cathode ray. This is remedied by adjusting the corresponding alternator energising the magnets.

In the experiments in their present state the shape of the hand appears clearly on the screen; the hand can be seen to move and the fingers bend. The shadow of the profile of a face has been transmitted, and also a simple photographic negative.

So far there has seemed nothing remarkable in the receiver, but there is. There is the increased luminosity of the screen; the result of the ingenuity of M. Holweck. And more important is the extraordinary sensitivity of the receiver.

This, again, is the result of long work by M. Holweck—work that is still going on. A negative difference of potential of five volts between the grid and the filament is sufficient to stop absolutely the flow of electrons.

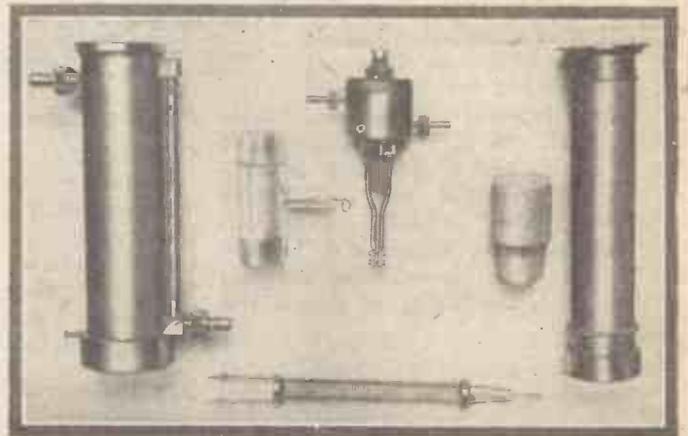
Mr. Baird needs a

difference of 100 volts for his neon tubes," proudly said M. Oglobinsky, the laboratory chief.

M. Bélin told me of the progress of their work. "We have found it better," he said, "to pass over the object whose image is to be transmitted a bright spot of light rather than illuminate fiercely the whole of the object.

"In our experiments at present we split up the object by 50 lines, that is into 2,500 points. We cover the object, generally eight times a second, which means that 20,000 signals are flashed a second. Our apparatus is capable of flashing 50,000 signals a second.

"I cannot say whether I have the secret of television. Our present apparatus is totally different from that I demonstrated at the Physical Exhibition here in 1923. Then I used a revolving drum with mirrors, and flashed light coming through a photographic plate through a slotted screen which combined with the movement of the wheel to split up the image.



The Units of the Holweck Oscillograph

"Our new apparatus is giving us encouraging results. By the winter we should have something to offer the world."

The figures given in this article show how the work at La Malmaison has progressed. Earlier in the year the object-image was being split into 1,000 points; now the figure is 2,500. Earlier in the year the receiver was sensitive to 10 volts; now the figure is 5 volts. These are two fundamental and vital improvements. And the work is still being pushed on.

Czecho-Slovakia is shortly to possess 10-kilowatt broadcasting stations at Bratislava and Maehrisch-Ostrau, according to the new plan submitted by the Prague broadcasting authorities.



SITTING UP FOR AMERICA

By
R.W. Hallows

THREE or four years ago the pastime of trying for American broadcasting stations operating on the medium waveband became one of the most popular amongst wireless enthusiasts. Conditions were then

station, New York, one of 50 kilowatts, and Boundbrook, one of 30 kilowatts, whilst East Pittsburgh, Chicago, and Springfield, all possess plants rated at 15 kilowatts or more. This being so, it seemed that something should be heard of them even if other conditions were not so favourable as they had been in past years. Therefore when the Editor suggested that I should sit up for America one night and record my experiences I readily agreed; in fact I went further, offering to make it two nights, of which one should be devoted to the short waves and the other to the medium.

Excellent Results

Let me say at once, that the results upon the medium waves far exceeded my high-

always a very strong signal the reaction coupling was quite loose; the set was, in fact, not at all in a sensitive condition, being simply miles from the point of oscillation. You may judge my surprise when with three valves only I heard a voice with the unmistakable accents of America reading a stock exchange report. A little careful work with the tuning controls, a slight tightening of the reaction coupling and WGY was coming through about as powerfully as Bournemouth usually does. The throwing into circuit of a second note-magnifying valve brought him up to excellent loud-speaker strength.

—and Good Quality

And the quality? The quality was remarkable. It was in fact quite as good as that of, say, Frankfurt or Vienna. The only thing that marred it in any way was the presence of slight fading of a slow kind at times. This, however, was never sufficient to render the words inaudible as



particularly favourable, so favourable in fact, that telephone reception of several transmissions was frequently possible with a good single-valve set. There were even those who claimed to have accomplished similar feats with a crystal, but that is another story!

Then the voice of America grew small by degrees and beautifully less. During the winter before last, reception was occasionally possible with a big set, but that was all. In the following autumn there appeared to be a promise of better things; for rather more than a fortnight in September, 1926, excellent reception of many stations was obtainable in places all over these islands. But this early promise was not borne out, for the winter itself proved almost barren of results.

Increasing Interest

Meanwhile interest in the short waves had been growing rapidly and those who built suitable sets found that they could keep in touch with America the whole year round.

Largely for this reason the medium-wave American stations have not received a great deal of attention during the present winter. On looking down the list of U.S.A. stations one cannot help being struck by the enormous power at present used by some of them.

Schenectady has a 100-kilowatt

est expectations. The first station to go for was obviously WGY at Schenectady, since his power is twice as great as that of any other, and one felt that if he were not coming in it would not be of much use continuing further. As soon as Stuttgart closed down, as he did shortly after 11 o'clock, the condenser dials were moved a little in order to drop down to WGY's 379.5 metres. Since Stuttgart is



reproduced by the loud-speaker. A little later dinner-time music was relayed from the Hotel van Curler, Schenectady, and this came through to perfection. I could have stayed with WGY for the rest of the night, but I felt that I must leave him in search of other stations.

The next one attempted was WEAF at New York, partly because his power is 50 kilowatts, and partly because his wavelength is exactly the same as that of 5GB so that the required settings offered no difficulty. WEAF was also picked



up at once without the set being allowed to oscillate. His strength was a little inferior to that of WGY and some interference was experienced at times from an annoying spark signal. The call-sign was, however, heard at the end of the first item and no word of any announcement was lost. Though the quality was not quite beyond criticism, reception was still such that musical items could be listened to and were listened to with real pleasure. A volume of sound, ample for an average room, was obtained on the loud-speaker with four valves.

WJZ

A drop was now made to WJZ, Bound-brook, on 454.3 metres. This is not a very good part of the band for broadcast reception, as those who have tried for Rome, Stockholm, or Paris PTT will realise. A great deal of spark traffic goes on night and day round about 450 metres in connection with the coastal direction-finding services. Interference was therefore to be expected. WJZ was, however, tuned in at the first attempt during a fortunate lull in spark activities and was found to be coming through about as strongly as WEA. The quality would have been excellent had it not been for spark interference.

A Powerful Station

Working downwards, WGY was heard again in passing and on 333.3 metres WBZ of Springfield was encountered. Curiously enough, this station, though rated at only 15 kilowatts, was more powerfully received than any other. With three valves only, both speech and music were clearly audible at fifteen feet from the loud-speaker. No interference was noticed and there was no fading of any kind. Reception was, in fact, quite as good as that usually associated with the Spanish or German stations.

A little below WBZ is KDKA on 315.6 metres. The power of this station is not given in most lists, though I believe that it is in the neighborhood of 30 kilowatts. Fading apart, the quality was first-rate; very marked waxing and waning of signal strength was, however, observed. Music came through extraordinarily well, no marked suppression of the upper or lower frequencies being noticeable.

Rather more than 10 metres lower in the scale is WGN of Chicago, rated at 15 kilowatts. He again was picked up without any trouble and came through at good strength.

Six Stations

The net result then of the medium-wave night was that all of the six high-power stations in the United States were heard. Probably several others might have been picked up had one tried for them, for there are quite a number rated at 5 kilowatts or more and a good many of these have been heard since. The object of the trial, though, was not so much to "bag" the greatest possible number of stations as to see whether really good reception could be obtained

from a few with a moderately efficient three or four-valve broadcast receiver.

The Set

The set actually used contains one neutralized high-frequency stage, with Litz wound coils, a grid-leak-and-condenser rectifier with modified Reinartz reaction and two transformer coupled note-magnifying stages, one or both of which can be used at will by inserting the loud-speaker plug into the appropriate jack. One word to those who think of trying for the American medium-wave stations. It is not really necessary to allow the set to oscillate in order to hear the carrier wave, though to do so naturally makes the picking up of stations rather easier. When a carrier-wave is heard do not try to "resolve" it. If you leave the set in oscillation and tune to the silent point you will find first of all that both speech and music are muzzy and



Mr. R. W. Hallows whose experiences of American reception are recounted in this article.

secondly that signal strength is not very great. As soon as you hear the carrier, slacken off reaction at once until the set is just below the oscillation point. Slight retuning will then bring in the transmission at its best.

On the Short Waves

The short-wave night was equally interesting and still more productive of results. As a matter of fact, it was rather more than a night for the first attempt was made during the afternoon when ANH, the Dutch station in Java, was well heard on 17 metres. This is an extraordinarily reliable transmission and any short-wave enthusiasts who are not familiar with it should tune to this wavelength on Thursday or Saturday afternoons between 2 o'clock and 4.30 p.m.

I would mention, by the way, that if you do not care about late hours you will find 2XAD relaying a football match from 7 p.m. onwards on most Saturday evenings. Signal strength at that time is usually excellent. On 26 metres KDKA was heard, but the transmission was too faint to be worth listening to. A little higher up on

30.91 metres good reception, though accompanied by a certain amount of fading, was obtained from WRNY, the New York station of the *Radio News*. Though the power used is only .5 kilowatt this transmission has been coming in very well on favourable nights of late. 2XAF came in with a positive roar when the 32.77 metre mark was reached and it was interesting to compare the quality of the short-wave relay with that of the long-wave, main transmission from WGY.

Though 2XAF was exceedingly good and came in at greater strength, I had no doubt that the 379.5 metre transmission showed rather better quality. Speech in both cases was equally clear but music came through more faithfully upon the higher wavelength. WIZ of New Brunswick was found on 43.35 metres relaying KDKA's programme. For the moment I thought that I had picked up one of KDKA's numerous experimental transmissions on different wavelengths, but a reference to the calibration chart showed that it must be WIZ and later an announcement to this effect was heard.

WLW

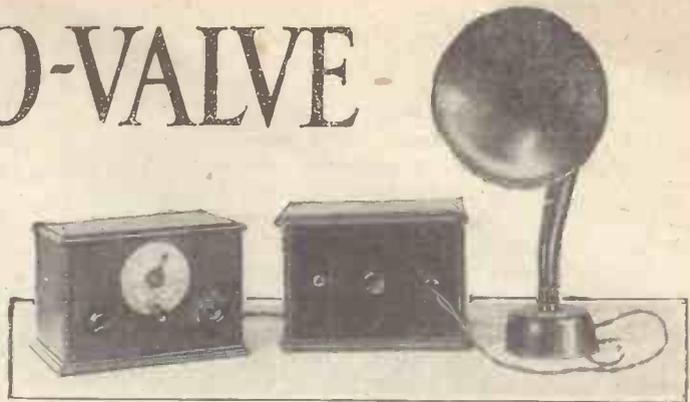
The .5 kilowatt relay of WLW of Cincinnati was found on 52.02 metres at very fair strength, though a certain amount of fading was noticed. No station appeared to be at work between this wavelength and 62.5 metres, upon which KDKA was heard with great strength. Often, though, one can find WCGU (Brooklyn) on 54.0 metres and 3XL (Bournebrook) on 60 metres. For some reason or other KDKA has not been too good in point of quality for some time now. On this particular night distinct distortion was noticeable, though speech was always clearly understandable.

The last station to be heard was 2XBA of Newark, New Jersey, on 65.18 metres. This is often an exceedingly good transmission and is well worth the attention of short-wave-ites. It was coming through with rather less than its usual strength, though the quality was remarkably good.

The short-wave set used for the test contains a rectifier, with a tight-coupled modified Reinartz circuit followed by one or two note-magnifiers as may be required. Only one low-frequency stage is used for searching, a second being brought into action either when a weak signal has been found or when a signal is strong enough in the telephones to make loud-speaker reproduction possible with an extra valve. On the short-waves, again, silent point tuning does not lead to the best results. Except in the case of very powerful transmissions such as those of 2XAF, 2XAD, and KDKA, the carrier wave must be picked up in the first instance, but when this has been done the reaction coupling should be loosened and the grid-circuit retuned. A gradual tightening of the reaction will then bring signals up to the maximum strength obtainable.

The "UTILITY" TWO-VALVE AMPLIFIER

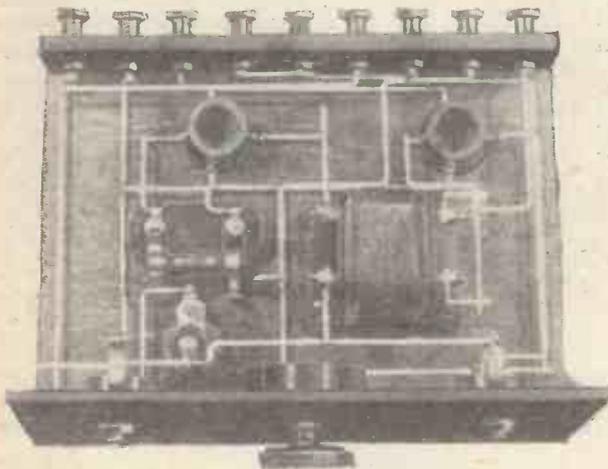
By THE "A.W." TECHNICAL STAFF



CONSTRUCTORS of the "Constant-coupled One," described last week, will find the two-valve amplifier illustrated herewith of considerable interest, as its addition will enable them to work a loud-speaker on many distant stations with great purity of reproduction. Almost any one-valve detector set can be used with the amplifier, although it is not advised that crystal sets be coupled to it owing to the R.C. coupler used in the first stage of the amplifier.

General Scheme

The general outline of the amplifier is



A Plan View of the Amplifier Unit

clearly shown in the photographic views, and the circuit arrangement is given by the theoretical diagram and blueprint. One of the minor disadvantages of a separate amplifier is the constant changing of leads when the amplifier is connected or disconnected from the one-valve receiver. In the amplifier illustrated here this disadvantage has been overcome by incorporating a simple jack-switching arrangement. It will be seen from the circuit diagram that there is a stage of resistance-capacity coupling followed by a stage of transformer coupling.

A 3-point jack is connected between the input terminals and the anode resistance in the manner shown, so that when the phone plug is inserted in the jack the anode resistance is cut out of circuit and the phones are inserted in the anode circuit of the detector valve. The terminals marked

Input are, of course, connected to the phone terminals of the detector set, but care must be taken to make sure that Input-negative goes to the particular phone terminal of the receiver that is connected to the anode of the detector valve. When the amplifier is in use the H.T.+ tapping from the one-valve receiver should be increased to the maximum, not less than 100 volts, because as the switch is arranged the detector anode potential is then supplied through the anode resistance.

On switching out the amplifier, by withdrawing the phone plug from the input jack and inserting the loud-speaker plug in the output jack, the detector H.T.+ should be reduced for smooth reaction control. The H.T.+ feed for the two amplifying valves is supplied by a single H.T.+ terminal on the terminal strip of the amplifier.

The values of the R.C. coupler components should be adhered to if really satisfactory results are to be ensured. The anode resistance of 250,000 ohms is the highest recommended, but as this resistance is of the "clip-in" type a 100,000 ohms resistance might be tried if desired. The .005-microfarad coupling condenser is quite large enough to pass even the lowest of low notes and a more expensive and unnecessarily large coupling condenser need not be used. Provided the first L.F. valve is properly biased the 2-megohm grid-leak will not "choke-up" Do not use a lower value of grid-leak, otherwise it will tend to reduce the effective value of the anode resistance.

Second Stage

The second stage of L.F. is a simple transformer coupler, and provided a reliable make is used very good results will be obtained. Two grid-bias negative terminals are necessary, one from the grid-leak of the R.C. coupler, the other from the I.S. connection of the L.F. transformer.

The output jack is a perfectly straightforward and standard arrangement.

As the loud-speaker plug is inserted, the filament circuit of the two valves is com-

pleted and the loud-speaker is connected in the anode circuit of the last valve. A single 6-ohm rheostat controls the filament current of the valves.

Components

The construction of the amplifier incorporating this circuit is a simple process necessitating the following components.

Ebonite or Bakelite panel, 9 in. by 6 in. by 1/4 in. (Ebonart, Raymond, Becol, Fertinax).

Ebonite strip, 9 in. by 2 in. by 1/4 in.

Panel-mounting rheostat, 6-ohms (G.E.C., Lissen, Igranic).

Loud-speaker jack (Lotus, Igranic, Forino, Bowyer-Lowe).

Loud-speaker filament-switching jack (Lotus, Igranic, Formo, Bowyer-Lowe).

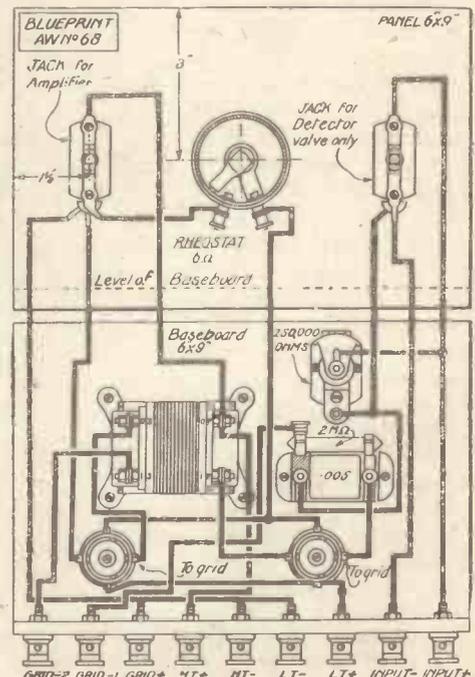
Anode resistance (250,000 ohms) (R.I. and Varley, Mullard).

.005-microfarad fixed condenser with series clip (Dubilier, Lissen, T.C.C.).

Low-frequency transformer, ratio 4-1 (B.T.H., R.I. and Varley, Ferranti).

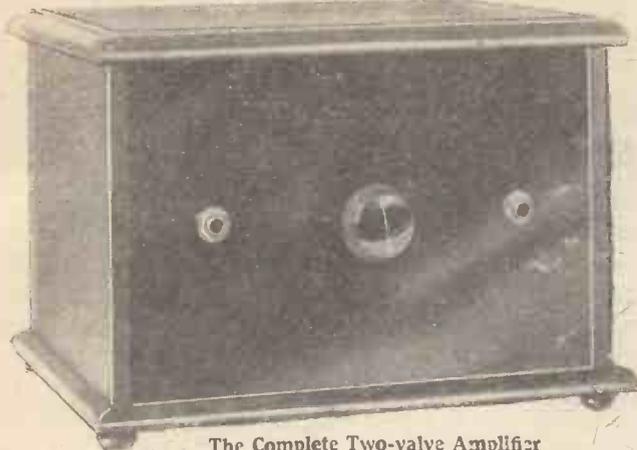
Two baseboard valve-holders (Lissen, Benjamin).

Connecting wire (Glazite or Junit).



The Wiring Diagram
Blueprint available price 1/-

Nine terminals, marked: Input +, Input -, L.T. +, L.T. -, H.T. -, H.T. +, G.B. +, G.B. - 1, G.B. - 2 (Eelex or Belling-Lee).

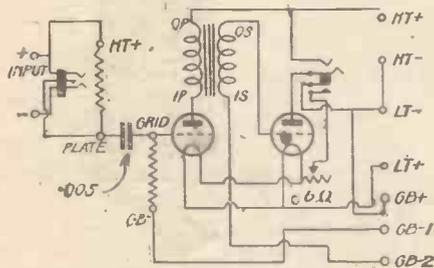


The Complete Two-valve Amplifier

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

Construction

As will be seen from the reduced reproduction of the full-size blueprint (price 1s.),



The Circuit Diagram

a 9 in. by 6 in. ebonite panel and a 9 in. by 6 in. baseboard accommodate all the necessary parts. On the panel, arranged neatly and symmetrically, are the input and output

jacks and the filament rheostat. The three holes for these components and the three wood-screw fixing holes complete the panel drilling, which should be done when drilling the 9 in. by 2 in. terminal strip. All the battery terminals and the input terminals are mounted on this strip in the order shown. The two valve-holders, L.F. transformer and R.C. components are conveniently disposed on the baseboard as indicated.

"Series" Clip

Note that the grid leak of the R.C. coupler is wired with a "series clip" which insulates the end of the grid leak remote from the grid from the condenser terminal to which it is secured. If an assembled R.C. coupler is used the four connecting points are G.B. -, Grid, H.T. +, and Plate, as shown by the circuit diagram.

Wiring is done with Glazite or Junit wire, and by carefully following the blueprint reduced reproduction, or theoretical circuit diagram, little difficulty should be encountered in this part of the work which completes the construction.

Before using the amplifier, carefully check over the connections, especially the jack-switch and battery wires.

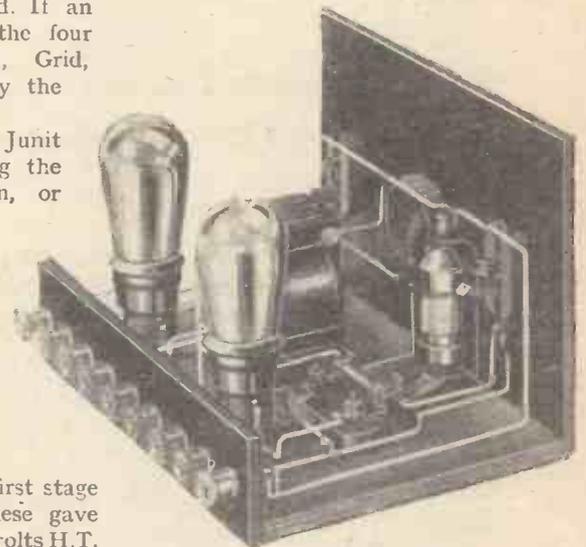
Valves

We used a B.T.H. B210L for first stage and B215P second stage and these gave very satisfactory results with 120 volts H.T. on both valves, 9 volts negative grid bias

on the last and 3 volts negative grid bias on the first. The detector valve in the one-valver can be an "R.C." valve or an H.F. valve, the former giving the more powerful results, although the latter will give satisfactorily loud signals on a number of stations.

When the batteries and rheostat are "on" the amplifier is switched on by inserting the L.S. plug in the right-hand jack. To switch out the amplifier remove L.S. plug and insert the phones plug in the left-hand jack.

N.B. The H.T. - and L.T. - of the detector set should be joined together and not H.T. - and L.T. +. As the accumulator leads are common to both receiver and amplifier there is no need for two H.T. - leads and one, either the H.T. - on the receiver or the H.T. - on the amplifier, can be dispensed with.



The Unit is quite Compact

"Which is Your Favourite Circuit?"

The Result of the Amateur Wireless "Favourite Circuit" Competition.

A VERY large number of entries were received for this competition, and the result is somewhat surprising as no competitor actually succeeded in forecasting the correct result of the voting.

In making the awards, therefore, it has been found necessary to combine the First and Second Prizes of £20 and £5 respectively, and to divide the total amount of £25 between two competitors. These two competitors are :-

William I. Dunn, 1 Fenwicke St.,
Seaton Delaval, Northumberland
and

W. F. Evans, Ivy Cottage, Holland Oxted, Surrey,
whose coupons most nearly forecast the vote of the majority.

The next most nearly successful forecast was also made by two competitors, and the Third and Fourth Prizes totalling £7, are therefore shared equally by

C. W. Warne, 1 Fort Clarence,
Rochester, Kent,
and

H. Dale, Osbournby, Sleaford,
Lincolnshire.

The Fifth Prize of £2 is awarded to
R. Taplin, 4 Parkside Grove, Leeds.

The Sixth Prize of £1 is shared equally by

W. Wagstaff, 20 Hughenden Road,
Hastings,

and

Walter Surgey, Pool Close,
Pinxton, Notts.

Cheques for the respective amounts have already been forwarded to the successful competitors, who have our warmest congratulations.

In early issues of AMATEUR WIRELESS receivers embodying the favourite circuits will be fully described and illustrated.



The master set that brings in station after station in daylight

In One Hour without soldering, you can build the Mullard Master Three—the receiver that makes the most efficient use of three valves.

Only 20 Wires to connect to terminals once you have mounted the few components by using the Simplified Plan of Assembly supplied FREE.

Easy to Handle. Only one dial for tuning, another for volume. As simple to operate as setting the hands of a clock.

Wonderful Results are certain. You have a choice of six or more programmes at loud speaker strength. Build the Mullard Master Three now! The cheapest and simplest 3-valve receiver ever designed.



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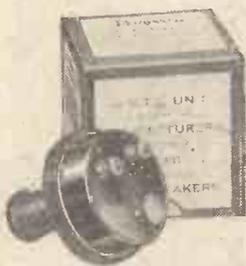
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WHEN we were very young didn't we just love 'making things'? And who is to say that, now we are older, we are not still proud to say "I made it myself"? At least, we are sure you would be of the loud speaker you can make with the BROWN Constructor's Unit. Can't you imagine the joy of building a real horn loud speaker? Or, if you would rather, with the addition of the BROWN C.T.S. Accessory Set, a handsome hornless type? The joy of making it would only be surpassed by the joy of hearing it when you had finished. You would agree that its tone was quite as pure and its volume quite as loud as many factory-made loud speakers. And yet it would only cost you 16/-. You would expect to pay far more for such a good loud speaker, wouldn't you?

With the BROWN C.T.S. Constructor's Unit, price 13/6, anyone can build a horn type loud speaker. By adding the BROWN C.T.S. Accessory Set, price 2/6, a hornless loud speaker can be made. At all Wireless Dealers.

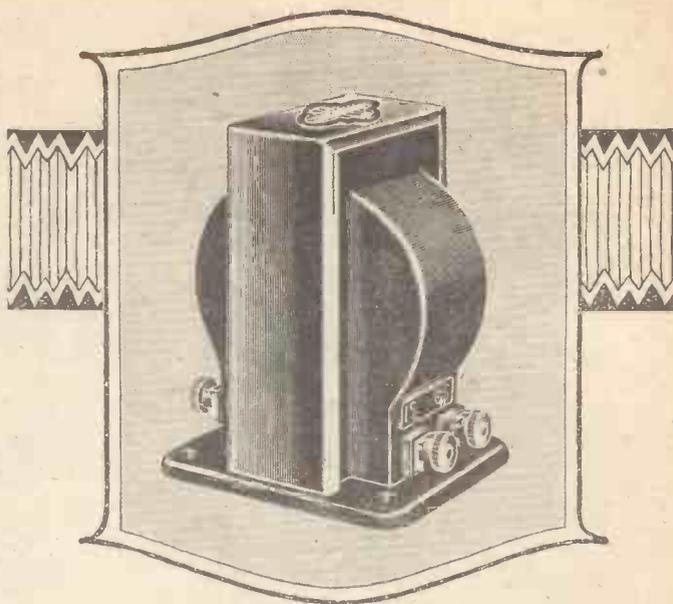
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North Acton, London, W.3.



BROWN

CONSTRUCTOR'S UNIT

No. 1393



The Best for YOUR Set

Perfect low-frequency transformer curves obtained under ideal laboratory conditions are utterly useless as an indication of performance under working conditions because of the numerous shunting capacities which exist in a set.

The Igranitic L.F. Transformer, Type "G"

has been designed by some of the leading experts in low-frequency transformers to give as near perfect reproduction as it is possible to attain while working in the average set. You cannot realise how good reproduction can be until you have used this transformer. The low notes and harmonics are brought out in their correct proportions, giving a life-like tone that can only be compared with the original. The Igranitic L.F. Transformer, Type "G," is made in two ratios—3.6 : 1, for first and single stages (with 20,000 to 30,000-ohm valves) and 7.2 : 1 for second stage (with low-impedance valves). Two 3.6 : 1 ratio transformers may be used if desired.

Price 30/-

Send for List No. D78, which gives curves and full information.



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For working off the Electric Light Mains

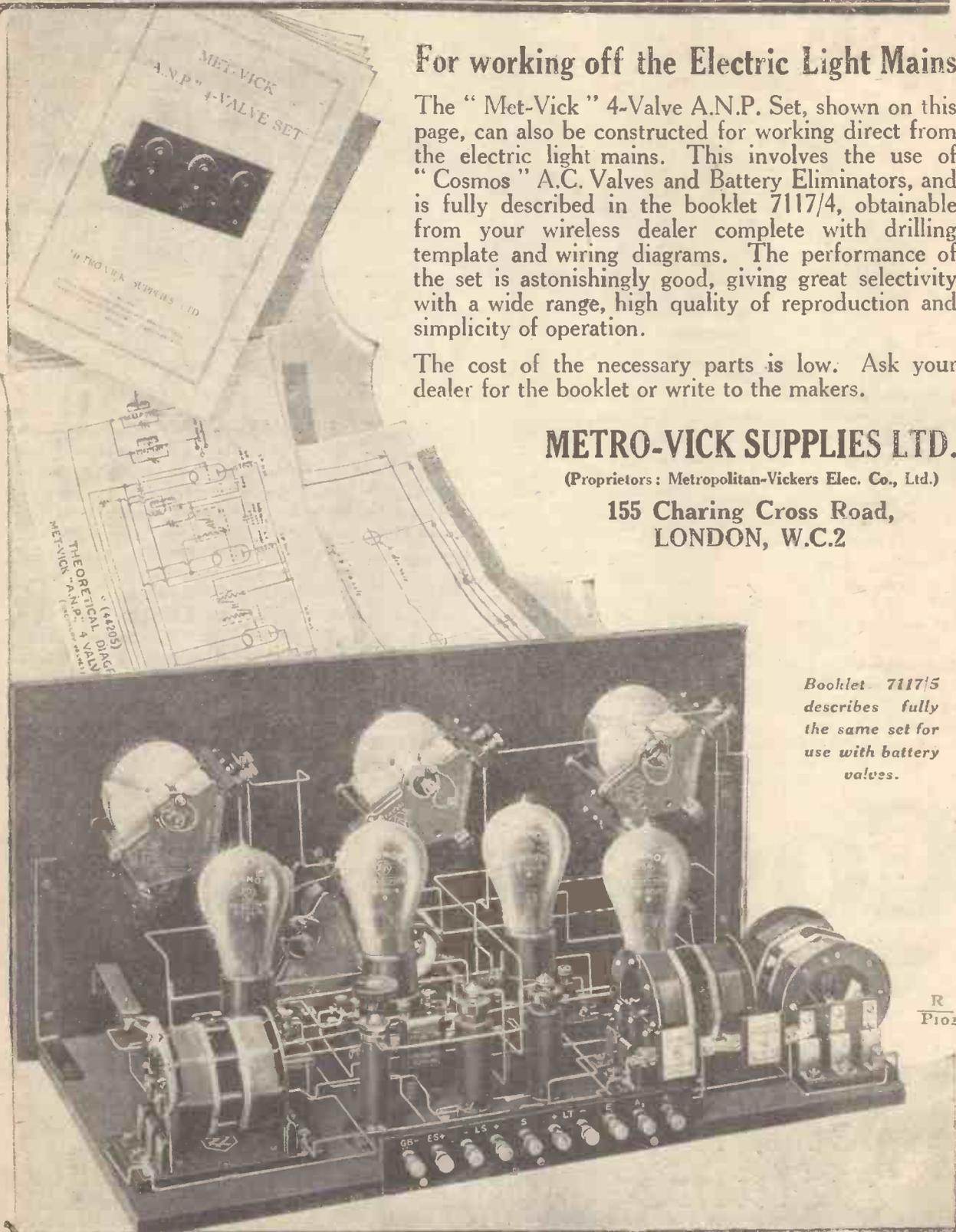
The "Met-Vick" 4-Valve A.N.P. Set, shown on this page, can also be constructed for working direct from the electric light mains. This involves the use of "Cosmos" A.C. Valves and Battery Eliminators, and is fully described in the booklet 7117/4, obtainable from your wireless dealer complete with drilling template and wiring diagrams. The performance of the set is astonishingly good, giving great selectivity with a wide range, high quality of reproduction and simplicity of operation.

The cost of the necessary parts is low. Ask your dealer for the booklet or write to the makers.

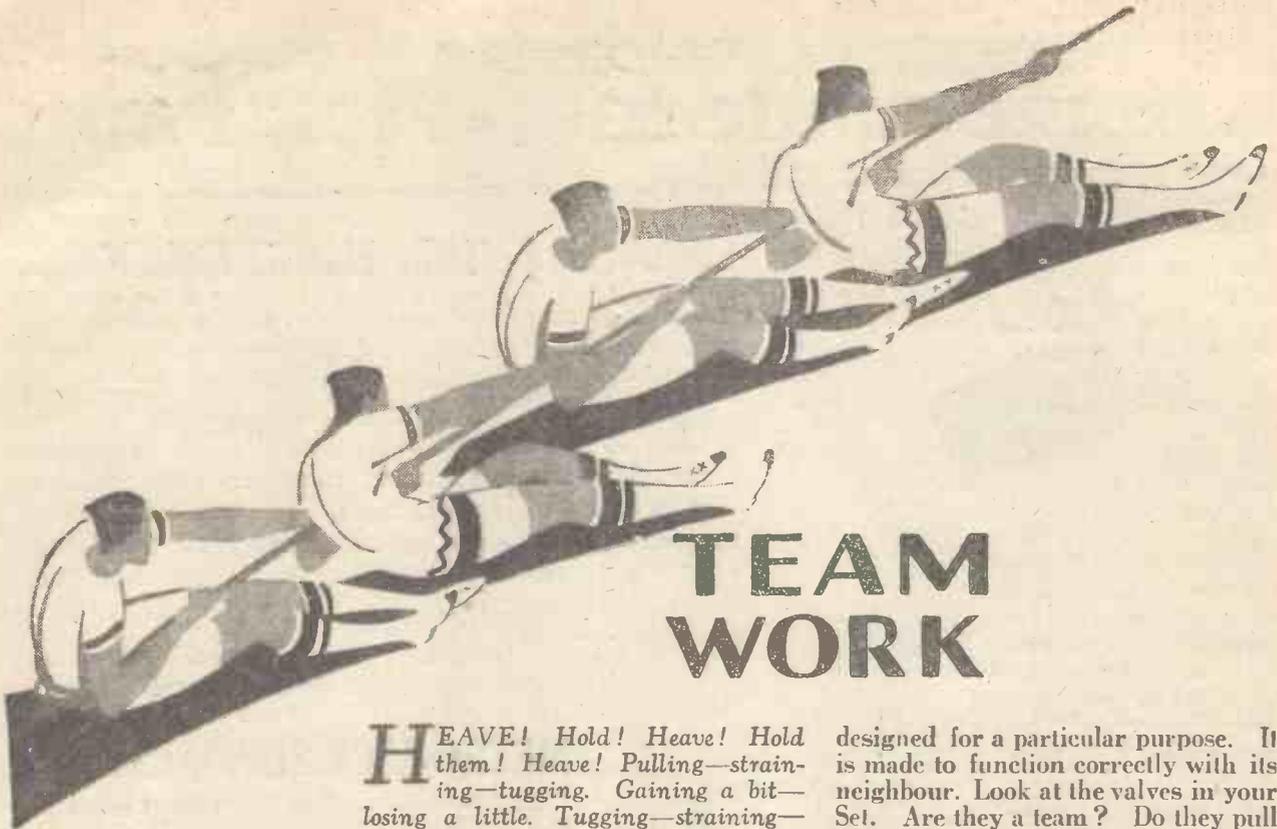
METRO-VICK SUPPLIES LTD.

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



TEAM WORK

HEAVE! Hold! Heave! Hold them! Heave! Pulling—straining—tugging. Gaining a bit—losing a little. Tugging—straining—pulling. Each man in perfect unison with the next—working together. Team work.

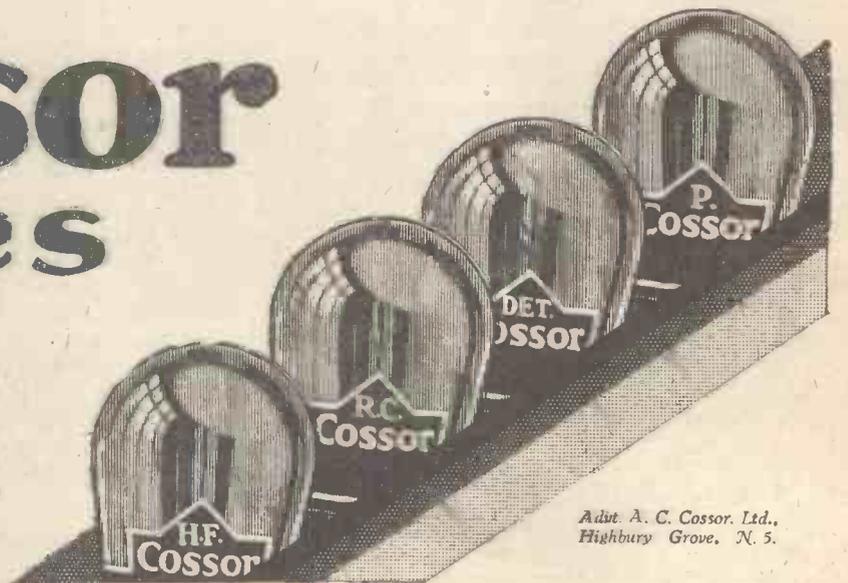
Team work is as essential to success in Radio as in tug-of-war. You have no idea of the capabilities of your Wireless Set unless your valves are “pulling together”—as a team. Using valves of different makes in your Set is like choosing men of different weights and physique for a tug-of-war team. They are not designed to “pull together.” Every Cossor Valve* is

designed for a particular purpose. It is made to function correctly with its neighbour. Look at the valves in your Set. Are they a team? Do they pull together? If not, replace them with the correct Cossor Valves. Immediately your Set will give you results of which you never before believed it capable. It will give you purer tone. And far more life-like reproduction. And greater volume—without distortion. And it will give you more economical performance, too.

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On Your Wavelength!

The Wireless Advisory Committee

THIS committee was started with a great flourish of trumpets by the B.B.C. at a time when there was a popular demand by the public for better programmes, but we do not hear the result of its activities. It seems that the committee, like many other Government commissions and committees, will continue to sit and deliberate, and keep the general public in the dark as to its work until it is well-nigh forgotten. Whether or not the guiding hand has been put into operation it is difficult to say, for nobody seems to remark any improvement in the quality of the programmes, and these appear to be much the same as they were a year or so ago. One thing that is noticeable is that "talks" have now encroached upon the station 5GB, which at its inception was stated to be "talk free." Is this the work of the Advisory Committee? because, if it is, it seems to have travelled a long way from the idea of the alternative programmes which was the original intention!

A Statement Wanted

In view of the absolute silence which prevails on the part of this committee, one begins to wonder how much interest is displayed by the members of the various organisations now represented by it. Even a brief bulletin published, say, once a month would assure the public that something is being done; the endless silence seems to indicate that the committee has found the task too great for it. It now seems to be the proper moment for the B.B.C. to come out with a statement on this matter, however brief it has to be.

French Programmes

So far as I can see from the reports which reach me from Paris, the programmes broadcast by the French stations from the opening of the New Year will provide but little entertainment to wireless listeners. The fact is that up to the present the official French broadcasters have not been compelled to pay any royalties on copyright works transmitted, but as from January 1 they have been compelled to do so. On the other hand, the authorities had hoped to secure the passing of the new Bill empowering them to collect annually respectively five francs and twenty-five francs from the owners of crystal and multi-valve receivers.

No Income

Although the tax was but a small one, it might, with economy, have sufficed to defray extra expenses incurred by the payment of copyright fees. Most certainly it would not do more. The Frenchman, however, has always been against the levy of

direct taxes, and consequently this proposal has been rejected, leaving, for the present, the official PTT stations without any income whatsoever. As stated by the French Press, it is quite possible that the result of this obstructive policy to the development of radio in France will compel the broadcasting stations to limit their transmissions to news bulletins, weather forecasts, and any other non-copyright matter on which they can lay their hands. The transmission of old musical works alone will come within their scope, unless authors and composers are willing to forgo their royalties.

The Position of the Amateur

With Washington behind us, we can review the position of the amateur experimenter in this and other countries with the certainty of knowing that the decisions arrived at will come into force in 1929, and remain so for a period of about ten years, unless something happens in the meantime to merit the calling of another international conference. The British amateur has lost certain concessions which he held before the conference took place, and these mainly consist of a goodly slice of waveband between 150 and 200 metres.

Recognition

One thing he has gained is his recognition by the various governments as a potential useful asset to the community, for the conference has decreed that amateurs of all nations shall have the use of the same wavebands, and has also decided that he shall have fresh call signs beginning with a nationality prefix. This means that during the next twelve months all British amateurs will receive a new call sign, which in all probability will be a three-letter one, instead of the present system of two letters and a number.

American Amateurs

American amateurs have lost very heavily as regards licence facilities, for their Government will have to come into line with other governments when the new arrangements are put into force. The situation is, no doubt, due to the fact that amateurs of all nations, with the exception of America, are by no means well organised, and they presented a very weak front when subjected to the attack of the many foreign delegates who attended the conference. The British delegates in particular were a great thorn in the side of the amateur, and were mainly responsible for the limitations which were eventually made.

The Result of Apathy

A prominent official of the Radio Society of Great Britain, which society can be said

to represent organised amateurs in this country, has informed me that there is no doubt but that the amateur has lost much by reason of his apathy to existing organisations founded for his protection and representation, and that unless he is able to show greater numbers in the future he cannot hope to retain the facilities which he now has. The society hopes to increase its membership to a considerable extent by opening its associate class to all applicants without requiring any technical knowledge as an essential qualification for membership. This means that applicants can become associates on payment of ros. per annum.

The wavebands which will be available to the amateur after January 1, 1929, will be as follows: 149.9 to 174.8, 74.96 to 85.66, 41.07 to 42.83, 20.82 to 21.42, 9.99 to 10.71, 4.997 to 5.354 metres.

Interesting Tests

How many short-wave enthusiasts, I wonder, have heard the friendly back-chat that is going on, these days, round about 20 metres, between our own 5SW and the American 2XAD? The two stations are testing together and are most outspoken in a restrained way, about one another's efforts. Most of the talk is by phone; but occasionally they take to the key, and 2XAD's delightfully steady interrupted C.W., at about eight words a minute, is a fine exercise for morse beginners. The Chelmsford station (5SW) seems to be in a little trouble with modulation; but, taking it on the whole, it is going out well, and is being well received in all sorts of outlandish places. Short-wave broadcasting certainly does make the world a small thing. On Christmas Day I heard some carols sung in Melbourne—they were singing on the morning of the 26th, of course—some excellent light music from New York, and something which sounded like the most jazzy jazz from a station in the Dutch East Indies; but that was very faint. All this was within the space of a couple of hours!

A Change of Wavelength?

Talking of 5SW reminds me that this station may shortly be moving from 24 metres. A re-allocation of the short waves was arranged at the Washington Conference, and, presumably, when this comes into force, 5SW will shift, if it has not pitched on a wavelength before the date given that will satisfy the majority of likely listeners and moved in advance. Possible wavelengths are 19 metres, 25.4 metres, and 31.5 metres. All of these are, so far, free, and within the bands allowed to broadcasting stations by the new allocations. 5SW has already been doing some experimental work on 31.5 metres, as

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On Your Wavelength! (continued)

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Mr. Marcuse's experiments, which were conducted on a wavelength closely adjacent, were especially well-heard in India.

Round-the-clock Transmissions

So great is the difference in time which separates the different units of the Empire that it is possible that the ultimate Empire broadcasting station will not only be in operation throughout the greater part of the twenty-four hours, but will transmit on two or more wavelengths, either simultaneously or at different times, so as to guarantee the maximum service over the whole world during convenient listening times for the different parts of the Empire.

Funny, Isn't It?

Whilst chatting the other day to the head of a firm responsible for a very good line in dry-cell high-tension batteries of what is known as the standard size I asked why they did not place upon the market a battery of the same quality but of considerably larger capacity. His answer was most illuminating. Not so very long ago, he told me, they put on sale tentatively a battery with, roughly, five times the capacity of the standard type at just double the price. You would think, would you not, that that was a pretty good bargain? You paid two shillings where you had previously paid one, and in return you received five hours of service for every one.

Possibly you imagine queues forming up outside the shops eager to avail themselves of this very real bargain. But the facts, dear reader, are quite otherwise. The public simply would not have the bigger batteries, preferring, for some quaint reason, to pay two and a half times as much as it needed to pay for its high-tension supplies! And so it goes on.

How Distortion Comes

Those of us who have done any laboratory testing of high-tension batteries know how futile it is to try to work multi-valve sets from those of standard size. Not only is the process costly, but it is also rather hard on the receiving set, for it leads inevitably to what I call "end-of-the-evening" distortion. Work a receiving set containing a power or super-power valve off a standard-sized battery, and you are in for a pretty fat drop in plate voltage during each evening's run. This means that towards the end of that time the grid bias is excessive and that your set is bottom-bending to beat (or, at any rate, to distort) the band.

The Old Story

Too many wireless men are volt-wise and milliamp-foolish. What I mean is that they think that any H.T. battery will do so long as its initial voltage is 66 or 108, or whatever they generally use; but they

don't consider the milliamperes that are taken out of the battery when it is in use. They forget, in a word, that the H.T. battery, unlike the grid-bias battery, is called upon to supply juice as well as potential. If you want satisfactory, economical working with dry batteries, always purchase those of a size suitable for your set. The little fellows are excellent for single-valve sets, or even two- or three-valvers unprovided with power valves. If the set is a small one, used for loud-speaker reproduction of the local station at short range, with a power valve in the last holder, a middle-weight battery will be a much better investment.

The U.S.A. Position

It is rather interesting to notice the different lines upon which wireless has developed as a popular hobby in the United States and in this country. One of the fundamental differences is that very few Americans go in for home-workshop jobs to anything like the same extent as we do. The British constructor will wind his own coils and make quite a number of bits and pieces for himself. The American has never done so to any extent, and at the present time he is showing a greater and greater disinclination even to making up a receiving set by connecting up a complete set of ready-made components.

The Matter of Patents

Another point of importance is the difference between the patent laws in this country and in America. Here it is legal to make up any patent device oneself with a view to trying it out, though it may not, of course, be sold or even given away unless the royalty is paid. In the States there is no such right; anyone, in fact, who makes up a patented circuit and operates it, even for five minutes, is actually breaking the law. As a nation, America possesses greater wealth per head of the population than we do, and therefore people have not quite the same inducement to economise by making up their own receiving gear.

Royalties

There is a difference, too, in the royalties payable on finished sets. With us there is a flat rate of 12s. 6d. per valve-holder, irrespective of the value of the apparatus. American manufacturers pay a combined royalty of 5 per cent. on the price of the receiving set; thus, on a five-valver priced at \$100 the royalty would be \$5 (£1), and on a set of similar size priced at \$60 it would be \$3 (12s.). The royalty in this country would be £3 2s. 6d. in either case. This means that two- or three-valve sets can be marketed very cheaply in the States, for the lower the price is, the

less is the amount payable for royalties.

Push-pull Amplification

In these days of high-power amplifiers and moving-coil loud-speakers, it is often difficult to obtain valves capable of handling the large grid voltages applied to them. In many cases, push-pull amplification forms a satisfactory solution, since by connecting two valves across the output of the last inter-valve transformer, and connecting the grid bias to the centre-tapping of the output winding, the voltage swing is divided equally between the valves and, in consequence the amplifier handles twice the amount of power.

The popularity of push-pull amplification appears to have suffered owing to the fact that special transformers are required. Mr. Reynier tells me, however, that ordinary transformers can be centre-tapped, to form a push-pull transformer, by connecting two similar grid leaks in series across the secondary and taking the centre point of the resistance to a common grid bias. Any good transformer can be utilised in this manner with success, and I believe details of such arrangements will be forthcoming very shortly.

Those Speakers Again

Moving-coil speakers are delicate and puzzling instruments; they must be treated correctly, otherwise they are capable of giving dire results. On a recent occasion I was demonstrating such a speaker, and pointed out that the tones would be far more pleasing if a baffle were used. Whereupon somebody suggested that a temporary baffle could be rigged up and placed in position. A pair of scissors and the lid of a hat-box were soon obtained, with the result that a crude, but perfectly efficient, baffle was obtained. At this point a little auto-suggestion is required, otherwise one's friends are apt to tell you that they can detect no difference with the baffle in place; for the curious point about the whole affair is that, whilst one is fitting the baffle, one cannot detect any marked change in the quality of reproduction; yet, after a while, it is apparent that there is a very distinct improvement.

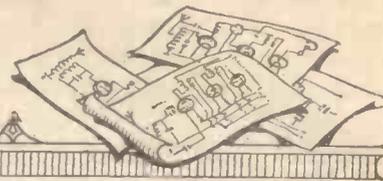
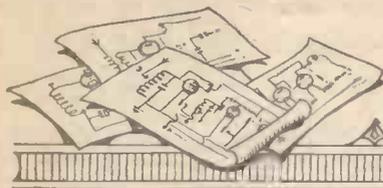
Speaker Position

A friend of mine is building his moving-coil speaker into the corner of a room, which strikes me as being a very sensible position for any type of speaker, since the sound, by reflection, is projected uniformly throughout the room. I have frequently experimented with the position of loud-speakers in different rooms. Sometimes one seems to obtain the best results with the speaker in the centre or two speakers at either side.

THERMION.

CIRCUITS FOR YOU

TO TRY



One of a regular series of articles by our Technical Editor which will appear about every

month and contain descriptions of various forms of circuit which can be tried out by the experimenter.

SOME SIMPLE SINGLE-VALVE CIRCUITS

THERE are many readers who like to hook up single-valve circuits of various kinds in order to see how far they can receive with the simplest possible apparatus. Quite long distances can be obtained on a good single-valve set, using telephones, of course, the actual reception being largely a matter of the smoothness of operation with the particular circuit used.

The circuits given in this article all have some spice of novelty about them, although they are none of them particularly outstanding in character.

The circuit shown by Fig. 1 is a very useful arrangement for obtaining reaction irrespective of the actual coils in use. Often cases arise where it is not desired to use two coils or to take a tapping on the particular coil, and in such circumstances the use of an arrangement such as that shown by Fig. 1 will prove of use.

The circuit is, in essence, a capacity-tapped one, the actual sub-division of the voltage necessary being obtained by using two condensers in series instead of tapping the coil. The tuned circuit consists of a coil L_1 tuned with the condensers C_1 and C_2 in series. C_1 is a variable condenser of .0005 and C_2 is a fixed condenser of the order of .001 or .002, depending upon the circumstances. C_3 is the reaction condenser, which should have a maximum capacity of at least .0001 and possibly a little more. A .0002 or .0003 may be used here if desired, it being remembered that the larger C_2 is made, the smaller is the effective tapping, and thus the larger must be the reaction condenser. Consequently,

if C_2 is about .001, C_3 need not be greater than .0001, and as C_2 is increased so C_3 must be increased with it. L_1 is a simple coil, being about No. 60 or No. 75 for the

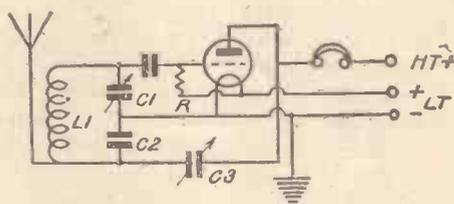


Fig. 1—A Capacity-tapped Circuit

short-wave band and No. 200 or No. 250 for the long-wave band.

This circuit is capable of giving good reception. It has the advantage of being

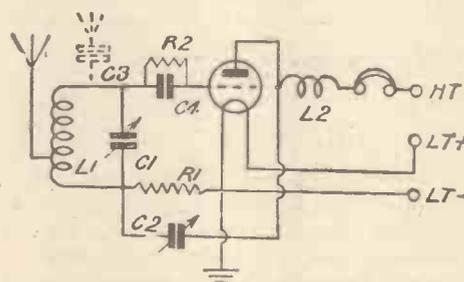


Fig. 2—Another Arrangement for Obtaining Reaction Without Tapping the Coil

fairly constantly coupled, tending to oscillate rather more readily at the top of the scale. This is because the effective tapping of the circuit gradually increases as the value of the condenser C_1 is increased, and therefore the tendency to oscillate is rather greater towards the top of the tuning range. The aerial is connected to the bottom end of the coil so that it is effectively connected across the tapped portion of the circuit, and thus the aerial tapping also increases as the wavelength range is increased. This is an advantage in some ways, because it overcomes the difficulty of blind spots, which is often experienced with the tapped coil in which the tapping remains constant throughout the tuning range. In such circumstances the aerial has a definite natural tune, and when the circuit comes approximately near that point a flat spot is obtained, whereas with the present

capacity-tapped method this is avoided.

The circuit given by Fig. 2 is another interesting arrangement, enabling reaction to be obtained without the necessity for tapping the coil. This arrangement was first suggested to me by Captain Round, and is a system which he himself has employed quite successfully for short-wave work. The minor difficulties in obtaining reaction on short waves are well known, so that an arrangement of this character, which will oscillate without much difficulty, is all the more valuable. It will be seen that the ordinary tuned circuit $L_1 C_1$ is not connected directly across the grid and filament of the valve, but through a resistance R_1 connected in the negative return. The grid leak contains the usual condenser and leak $C_4 R_2$, these having conventional values.

For ordinary practical purposes .0003 and 2 megohms is suitable, while a rather smaller condenser, with a higher value of grid leak, is more suitable for short-wave work. The resistance R_1 should have a value of about half a megohm. Reaction is obtained by connecting a condenser between the anode and the bottom end of the tuned circuit. A high-frequency choke L_2 is connected in the anode circuit of the valve in order to prevent the high-frequency current from passing through the telephones or the low-frequency amplifier if one is added.

Beyond this, the circuit requires little comment. C_2 need only be quite a small condenser, to the value of about .0001 maximum, while L_1 and C_1 are of usual values. A tapped coil has been shown at (Continued on page 76)

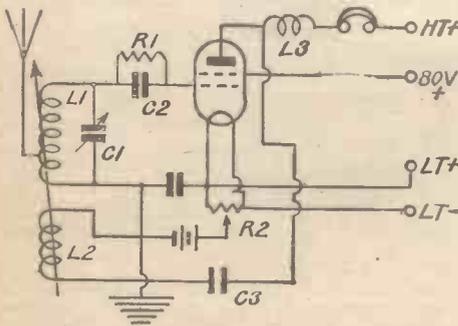


Fig. 3—A Circuit Using the Screened-grid Valve

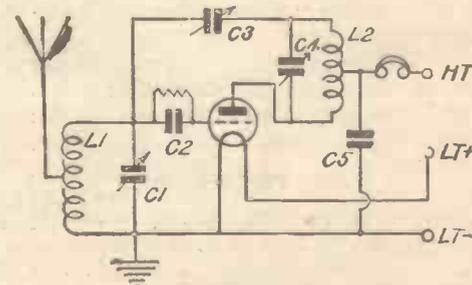
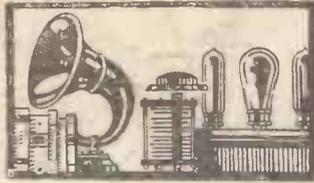
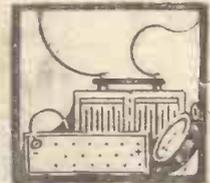


Fig. 4—A Circuit with High Impedance in the Anode Circuit



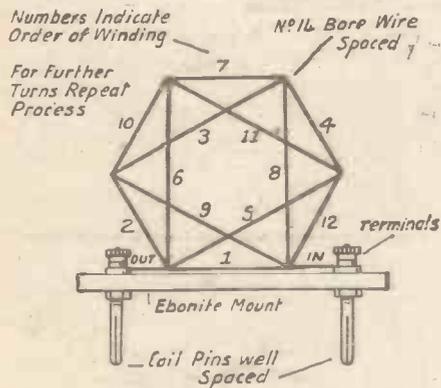
PRACTICAL ODDS & ENDS



Making a Short-wave Coil

HOW to make a short-wave coil of simple design, on somewhat new lines, is shown in the drawing.

The arrangement is particularly low loss, the spacing being very noticeable. Wire of a fairly stout gauge should be used, say No. 14. The coil pins or nails are arranged on a wood base, and the wire followed around them from 1 to 12, as indicated. The slots of the pins or nails should, however, first be removed, in order that the coil so shaped can be gently lifted off the nails when finished. As this coil is primarily intended for short wave work, only a few turns in any case will be required. When the coil is so formed it is easily mounted upon the ebonite base piece, the extremes being



Making a Short-wave Coil

secured to two valve pins which are spaced well apart, sockets being provided upon the receiver at corresponding distances to receive the plug-in coil.

This coil has proved very efficient in use. H. B.

Mounting Crystals

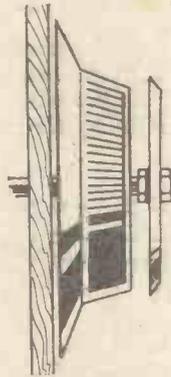
FIXING crystals in their cups by means of Wood's metal is not at all difficult, and if properly done makes a far more efficient mounting than packing with tin-foil.

The correct method of mounting in the metal is to place one or two small pieces of the alloy in the crystal cup and to heat this latter on a piece of sheet metal held with pliers over a clean flame. The sheet metal prevents carbon from the flame rendering contact between the crystal and the cup imperfect.

Only a very little heat is necessary, and immediately it appears to be soft the crystal should be floated on the surface with tweezers. B. B.

For Delicate Adjustments

THOSE amateurs who possess square-law tuning condensers with a vernier driven by a small knob mounted on a

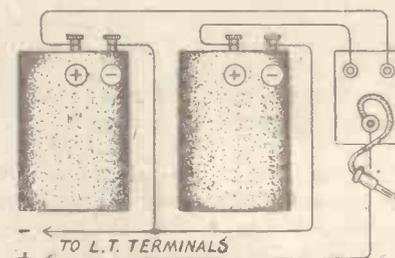


By Substituting a 4 in. dial for the small vernier knob a more delicate adjustment is obtainable.

spindle projecting through the dial, will find the following tip of interest. The smallness of the vernier knob makes delicate adjustment almost impossible. If the knob is taken off and a 4 in. dial mounted in its place as shown in the drawing given above, the larger diameter will enable finer adjustments to be made. W. J. M.

Cell-resting Device

IN cases where dry cells are used for filament lighting it is always advisable to duplicate the cells and use them in conjunction with a change-over switch so that either cell can be "rested" and allowed to recuperate after being worked for a reasonable period; thus full advantage is taken of the recuperating properties of dry cells.



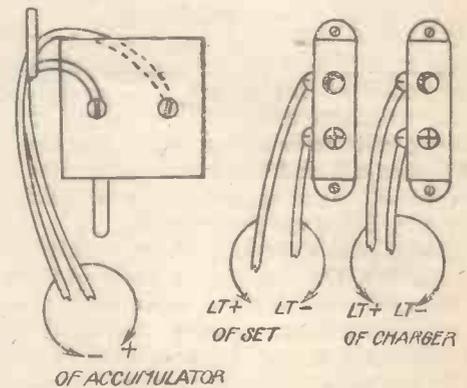
A Cell-resting Device

The sketch shows a simple change-over arrangement. The cells are placed in a box, and on one side of the box is screwed a small ebonite panel which is fitted with two sockets and a terminal. A short flexible lead with plug is clamped firmly under the shoulder of the terminal, or taken through a hole in the panel and soldered to the shank. The panel is shown on the right

of the sketch, and it will be seen that the two positive terminals of the cells are connected to the sockets, the negative terminals being joined together with a lead which goes direct to the L.T. negative terminal on the receiver. The terminal on the small panel is connected to the L.T. positive terminal of the receiver, so that in order to select either cell it is only necessary to insert the plug in the appropriate socket. The plug also serves as a filament switch, for when disconnected the filament circuit is broken. O. J. R.

A Time-saving Tip

THOSE who charge their own accumulators often waste a great deal of time in disconnecting the accumulator from the



A Good Time-saving Tip

set and connecting it up to the charging device.

To obviate this, two ordinary coil-holders should be fixed at right angles to the wall, and connections should be made to these as shown in the sketch. If the accumulator is now connected to another coil-holder, this latter coil-holder may be plugged into the coil-holder connected to the leads going to the set, or to those going to the charging device. Any number of accumulators may be interchanged by connecting each to a coil-holder, and connecting this coil-holder to the coil-holder connected to the charger or to the set. It is quite impossible to connect + to - or to make any such mistake. The sketch makes the connections clear. When the idea is used all the accumulators and chargers can be kept very conveniently out of sight. W. J. P.

LET "Amateur Wireless" solve your Wireless problems

E. Blake Tells of

THE MAN WHO CAN'T CATCH UP



THERE is nothing in his ancestry, immediate or remote, which appears to explain why Emanuel Lyback possesses an incurable lag, unless you count the facts that he was born in 1883 A.D., which is a very long time after Adam, and that he made his appearance some three weeks



After Adam

after the christening cake had been pronounced stale beyond hope of mastication.

His name, possibly, . . . but Lyback is only a corruption of Libbuck, the family name of the squires of Marshy Mold, Rutland, who were backward in nothing except in coming forward. Indeed, at the battle of Sedgmoor a Libbuck, coming late to the fray, was unable to determine which side was getting the best of it, and took a chance with Monmouth's crowd, eventually finding himself deported to Jamaica where he spent the rest of his life hoeing sugar-cane.

A Mere Five Years

Nevertheless, at the present time, there is actually living amongst us one, E. Lyback, who is for all important matters—I mean radio—a good five years behind, though it is doubtful whether he knows it. It is a disability, as I said, chronic and incurable.

When other kids of his age were basting their nurses he had reached only the stage of lying on his back and blowing bubbles at the ceiling; these he blew conscientiously, in a studious kind of way, on some special theory of his own. At school he was always at the top of his class, but always some three years' older than his classmates. By the time he was cock of the school his young brother had for two years kindly assisted Sir Robert Tilberry to run the famous Tilberry Soap Works—nomin-

ally as office boy. And when Emanuel had been married to Jane Jones for nine years he had already begun to see her defects, a clarity of vision which is the sole prerogative of husbands who have just outlived the honeymoon. He settled down in life as a railway guard, because in that job he could always be behind. He has no family. Ten years too soon for that!

And then this wireless! He used to see the word in his newspaper through a sort of mist, just as you and I might see "bimetallism" or "erythema." He passed it over hurriedly, conscious of a lacuna in his general information, though being a railway man, a trade unionist, and a great frequenter of political meetings he had no end of big words in his vocabulary, such as you and I have not.

New Ideas

Presently the snippets about wireless became longer and somewhat more intelligible to a plain man and he gained by 1921 the slightest possible conception of what wireless is and can be. He used to tell station masters about it, and once he gave Marconi clean away to the driver of the 7.16 "up." "You see," he said, "the aledrizer flies away, as you might say—if you see my meaning, so to speak—and sort of buzzes like, across the air, till it passes the wire and the wire draws it down till the telegram comes out of the telephone. 'Smarvellous, Henry.'"

Henry said, "Yerr," and spat on the coals to prove it.

The year 1922 gave "broadcasting" to

an astonished, but doubtful public, and by this time Emanuel had just heard about the *Titanic* disaster of 1912—or rather, of the part played by wireless in that tragedy. Behold him, therefore, pestering his cronies with the dull details of marine wireless (early types) while their minds were a medley of Uncle Arthur's dulcet announcements about Arabs stealing away with tents, inexpressible criticisms of squawky gramophone records, "blasted" piano solos, breakdowns, breathless spasms of Eckersley, and the dawning of a realization that those birds in the monastery garden ought to be baked in a pie or doped.

A Hopeless Task

Imagine the hopelessness of his task when he tried to sound a ticket-collector on the subject of rotary *versus* fixed spark-gaps, while the afore-mentioned official was trying to puzzle out why *Tannhauser*, and it so, when.

Believe me, that in those days, before

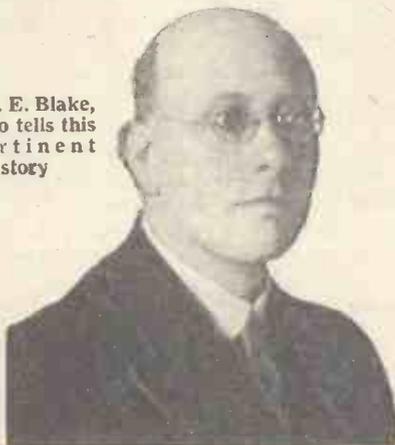


He decided to work right through it

Sir Walford Davies undertook to explain the inwardness of the meaning of B flat minor, played on a moonless night *staccato* in *tremolo* spasms, at a distance and in aural perspective, both in time and space, on a mediæval spinet, by a reformed burglar brought up on Bach—believe me, I say, the average Englishman was brought by broadcasting to a state of complete bewilderment in a morass of music. He didn't know there was so much of it, or why there was so much. Nor did he dream that there were or had ever been people with names like Koussevitzky, Zaverthal, Rachmaninov or Smetana. He lived in a nightmare of mingled delight and suspicion. But our Emanuel escaped all this, for he discovered the crystal receiver.

(Continued on page 64)

Mr. E. Blake, who tells this pertinent story



"A.W." TESTS OF APPARATUS

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

Ferranti Meters

THE experimenter who requires a type of measuring instrument which is accurate under all conditions will



A Ferranti Meter

be interested in the range of high-class meters marketed by Ferranti, Ltd., of Hollinwood, Lancs.

We were recently afforded the opportunity of testing a number of these instruments, which are made with full-scale deflections of from 5 milliamps up to 20 milliamps and from 7.5 volts up to 250 volts. The resistance of the standard range is 200 ohms per volt, which is a high figure and sufficient for most purposes. For special requirements where the current demand is important, meters are made with a resistance of 1,000 ohms per volt. These take very little current, and are specially suitable for testing battery eliminators.

On test, these meters proved of excellent design and workmanship. A moving-coil system is employed which gives a dead-beat reading, the needle moving straight to the indication and remaining there. We have seldom seen low-priced instruments so good in this respect. Accuracy was of a high order, and we have no hesitation in recommending these meters.

Pertrix H.T. Battery

THE "shelf life" (or ability of a battery to retain its voltage when not in use) is a matter of great importance to the wireless public. It often happens that, although a set is little used, the H.T. battery partially loses its voltage after a very short time; this may be due to the unavoidable corrosion of the zinc elements.

The Pertrix dry battery made by A.F.A., Ltd., of 120 Tottenham Court Road, W.1, dispenses with the chemical known as sal-ammoniac, which tends to intensify this action of corrosion, and in consequence the makers claim for their battery a longer life both in and out of use. Some weeks ago we were supplied with one of these batteries, which has since been in constant

use; although the cells have a fairly small capacity, there has been no appreciable voltage drop, indicating that the battery should have a long life.

The possibility of accidental short circuit, due to metallic objects being placed on the battery and any leakage which might occur due to the collection of dirt and dust on the surface, is obviated by the provision of a cardboard cover in which holes are drilled over the eight tapping points. Tappings are taken every $1\frac{1}{2}$ volts between 0 and $10\frac{1}{2}$ volts for grid bias, whilst further tappings at 20, 30, 40, 50, and 60 volts are provided.

The battery can be recommended for general use.

Magnetic Microphone Bar Amplifier

THE crystal receiver is still a popular form of broadcast receiver, owing to its simplicity and low cost. Although



New Wilson Microphone Amplifier

many are satisfied with the results obtained from their sets, there are some who desire to increase the volume, but do not wish to utilise a valve amplifier owing to the necessity and expense of high- and low-tension batteries.

An amplifier which will operate off a small 3-volt dry battery is made by the New Wilson Electrical Manufacturing Co., of 18 Fitzroy Street, Fitzroy Square, W.1. Briefly, it consists of a magnetic unit similar to a normal telephone carpiece; in place of the usual diaphragm there is a special form of bar microphone, consisting of two poles separated by a number of finely divided carbon granules. A piece of soft iron attached to one pole can be adjusted so that it is almost in contact with the poles of the magnetic unit.

Any pulsating current through the magnetic unit will cause the soft iron armature to move with respect to the outer pole, and thus vary the current flowing from a local battery through the microphone. These variations will be magnified

according to the adjustment of the microphone.

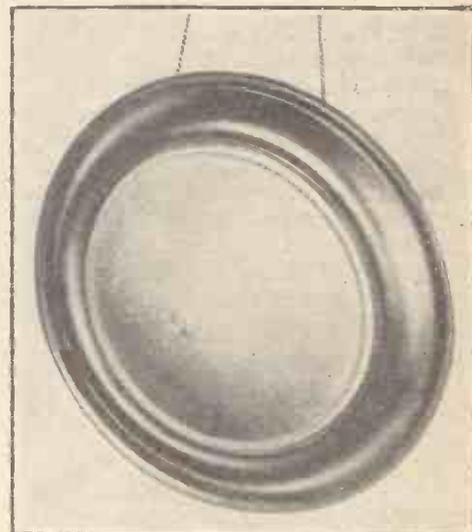
The amplifier was tested in conjunction with a simple crystal receiver and, after careful adjustment, we were able to obtain satisfactory amplification without noticeable distortion. When approaching the position of maximum sensitivity there was a slight tendency for the instrument to become noisy, although this could be remedied by careful readjustment.

This interesting and practical instrument should appeal to readers.

Amplion Cone Speaker

CONE loud-speakers are becoming increasingly popular on account of their realistic tone, pleasing appearance, and convenient dimensions.

We have recently received one of the latest Amplion cones, type A.C.2, from the makers, Graham Amplion, Ltd., of 25-26 Savile Row, Regent Street, W.1. This speaker is certainly an outstanding example of the moderately priced cones, since its general appearance and performance can compare with many high-priced instruments.



Amplion Cone Speaker

The standard Amplion gold-finished diaphragm is fitted, whilst a wide dark-brown rim enhances the general appearance. A brown cord is attached to the baffle plate behind the speaker, which can consequently be hung on a picture-rail or in any other suitable way. In such a position the speaker occupies a small space.

On test, good quality reproduction was obtained on both speech and music. Naturally, a speaker of this size is more suitable for use in a small room.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

RECENTLY I stayed for a few days at a house in London which boasted a three-valve set. I never realised so much before how abominably deficient these sets could be. And my friend tells me that his is a good set in comparison with others he has heard! Well, if that be so, I can quite understand the caustic criticism that one hears from time to time. I found it impossible to arrive at a true estimate of what was going on. Artistes for whom I have the greatest regard sounded wheezy, distorted, and amateurish. It comes to this: A good many people have never really heard pure wireless transmissions at all. Will these listeners please kindly look to their sets or, better still, study the technical articles in AMATEUR WIRELESS?

I should have suggested in my last notes some New Year resolutions for the B.B.C. It is perhaps not too late to indicate one or two glaring faults which we have heard repeatedly during the year—and even within the last few days.

One recurs in those supposed outside transmissions of house-parties. Here the stunt is to convey "atmosphere" and the result is chaos. Music, conversation, wit (if any) are destroyed by this absurd fetish of realism. For instance, the last concert party of the New Year was supposed to take place on board a yacht. Why, heaven knows! I should have imagined that yachting parties in the New Year were more appropriate in Luxor than London. There was a constant strumming on the piano, what time sundry banter was taking place between the "guests." Not that one lost very much worth hearing in the din. Gags which are not unusual in the turns for which Clapham and Dwyer are responsible were as insipid and pointless as ever. But why all this should take place on a yacht in the snow, the only background being this irritating strumming and constant references to "booze" and the refreshment bar, I could not understand.

You do not need television in order to get a pretty shrewd idea of what this type of entertainer is like. His reiterated invitation is to "Have one?" or "Not too much soda, please!" or some such public-house talk of that kind. You know the sort!

These poor fish seem to imagine that house-parties or yachting parties are one long round of cork-popping, and that, since the mother-in-law joke is "very dead," the booze banter will serve. Good heavens, I am not prohibitionist, but I certainly do object to the vulgar tone which is constantly introduced in these parties.

In order to show that I do not exaggerate, I took down some of these imbibing references:—

"Have a glass of port."

"Drink! That's the important thing."

"We'll have one in a minute."

"Put that bottle down!"

"Pass the soda!" (This in the middle of Megan Thomas's song.)

"I have been having one at the bar!"

"Not too much soda!"

"Just going down to the bar," etc.

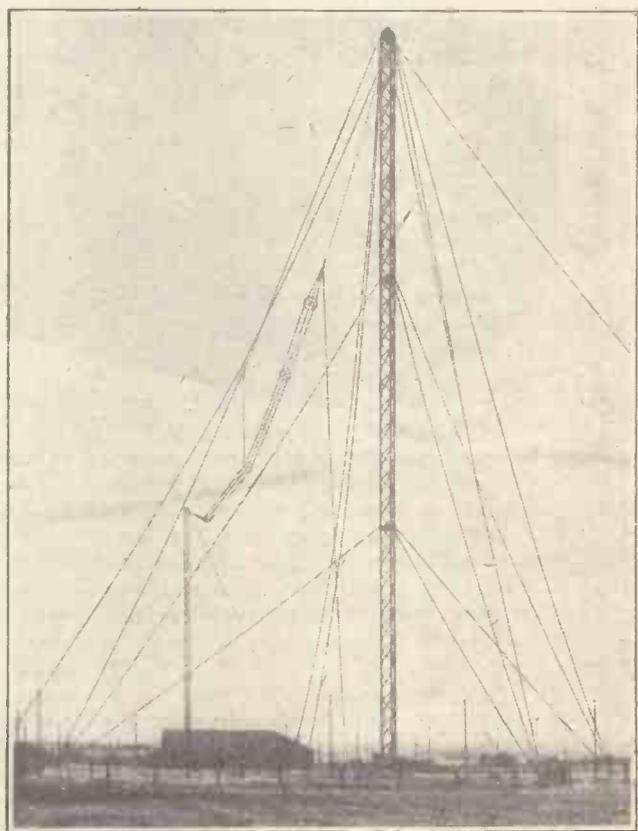
There was one line which was worth nothing, viz., "Everybody's fed-up with Cissie." *They are!* I could almost hear the listeners' loud cheers.

You find, too, in these parties (and I stress the point because it applies to nearly all these efforts) that the artistes themselves get more laughs than the listeners. One lady of the Clapham and Dwyer party apparently enjoyed herself hugely. She was a claqué all on her own.

I must pay my annual tribute to the "Grand Good-night" of Mr. Stobart. When I heard his first effort I personally thought it could not be improved upon. It was certainly more concise, but not less inspiring. In endeavouring to satisfy the claims from every conceivable quarter—including Mars!—Mr. Stobart achieved a veritable *tour de force*, and undoubtedly sent every one of us to bed feeling the better for it. The day

will come when we shall be able to deliver a similar heart-felt message direct to the peoples of other nations. That would achieve more than miles of written messages.

There is yet one other method of production with which I cannot agree; and that is "Reminiscences"! I cheerfully admit that the B.B.C. have responded with goodwill to much of the constructive criticism that is offered them, but here and there they make no signs. Last year they had the same sort of business in recalling some of the chief events of the year. One had the usual uninteresting cross-talk and merely snippets from numbers which we should have loved to hear in full, and I cannot understand why the error should have been repeated this year. One was cut off in the middle of a fine number in order to give some young ass the opportunity of airing his views on jazz.



3LO, Australia—An interesting photograph showing the aerial system of the station that recently broadcast a programme to London.

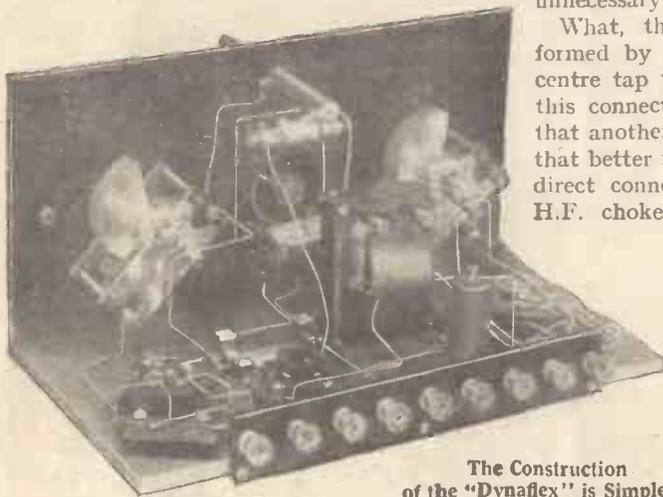


The "DYN" A ONE-VALVE LOU

by C. C. PR

DURING recent months many experiments have been made in connection with reflex circuits of various types—some admittedly "stunt" circuits, others more or less straightforward—and much has been accomplished in the removal or elimination of the more common defects in these circuits.

The neutrodyne system has been quite successfully applied; but in all cases the circuits appeared to the writer to be encumbered with complications, and were consequently discarded.



The Construction of the "Dynaflex" is Simple

The writer, therefore, set about conducting a number of experiments to determine whether it might not be possible to produce a reflex receiver, using ordinary condensers and coils which could be wound by any ordinary constructor. The result of these experiments is the receiver described in this article.

The Circuit

The circuit which seemed to offer the most promising results is the well-known Rice neutrodyne circuit, shown by Fig. 1. Now, in the investigation of any circuit

it is very useful to re-draw it in different ways. We will accordingly turn it upside down (Fig. 2). The object of the neutralising condenser NC is to counter-balance the capacity between the grid and filament of the valve. If we now replace the valve capacity by a capacity Cg, and neglect for the moment the aperiodic aerial coil, we can draw the circuit in its essentials in the form of Fig. 3. With respect to the point x in this figure, if the capacity NC is exactly equal to the capacity Cg, the coil L is, in fact, electrically centre-tapped, and it appeared to the writer that, for the purpose of neutralisation, the mechanical centre-tap on the coil itself is unnecessary.

What, then, is the function performed by joining this mechanical centre tap to earth and L.T.—? In this connection it is to be observed that another experimenter has found that better results are obtained if the direct connection is replaced by an H.F. choke or a resistance of the order of 100,000 ohms (Fig. 4). This being the case, it appeared that the function of this direct connection, choke or resistance was the anchoring of the grid, which would otherwise be "in the air." If this deduction is right, then the resistance may be connected directly between the grid and L.T.—, which renders the centre tap on the coil unnecessary.

Neutralisation

With these considerations in mind, the writer proceeded to experiment, and found that good neutralisation was obtained without a mechanically centre-tapped coil, the resistance between grid and L.T.—serving not only to anchor the grid, but to choke back all H.F. currents (Fig. 5). Now, this circuit lends itself to reflexing, because we can replace the resistance by the secondary

of a L.F. transformer. Experiments showed that with the secondary of the L.F. transformer alone there was a tendency to L.F. oscillation. A resistance of the order of ¼ megohm was inserted between the grid and the secondary of the L.F. transformer, and much better results were obtained. This modified circuit is shown by Fig. 6. It was then decided to use the parallel feed to the detector circuit in order, by means of an H.F. choke in the anode of the valve, to prevent H.F. currents finding their way into the L.F. transformer.

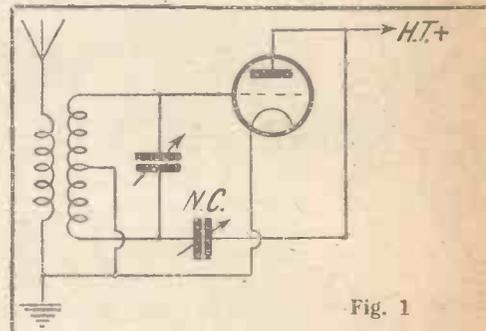


Fig. 1

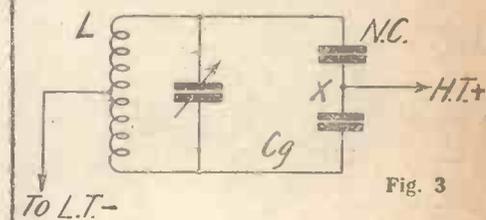


Fig. 3

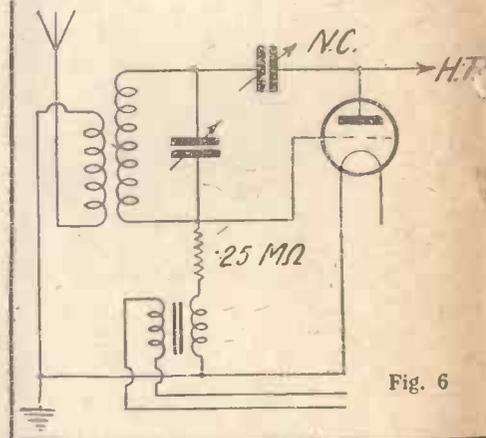


Fig. 6

Figs. 1 to 6—Diagrams Explanatory of the

AFLEX

D-SPEAKER SET

FOR



neutrodyne condenser, that this must take up very little room on the panel. The tubular form is thus called for, and as it is to be used to obtain reaction also, the Gambrell neutro-vernier was chosen, because its maximum capacity allows reaction over the whole tuning range of the set. Others tried, though excellent, had too low a maximum for the purpose of this circuit.

Fine Tuning

It may be noted also that an earthing shield is not advisable with this circuit. Such a shield flattens the tuning and makes reaction difficult. Plain 4-in. dials have, therefore, been used, and fine tuning is obtained by a small vernier attachment consisting of a bush and a knob and pin fitted with a small rubber ring which engages with the edge of the dial. The position of the hole for the bush depends on the dial used. An extension rod of about 3 in. in length should be used between the knob and the pin, which completely obviates hand-capacity effect that may be experienced.

Components

The following components will be required for the construction of the set:—

Two .0005 variable condensers (Jackson Bros., Cyldon, Burton, Formo).

One valve-holder (Wearite, Benjamin, Lissen).

One crystal detector

(Carborundum, R.I. & Varley, Jewell Pen).

One low-frequency transformer (Ferranti, R.I. & Varley, Powquip, B.T.H.).

One H.F. choke (Wearite, R.I. & Varley, Trix, Lissen).

Two fixed condensers (Lissen, Dubilier, C.D.M., Watmel).

One baseboard-mounting resistor (Ethoplus, Lorientat).

Two 6-pin bases (Colvern, Wearite, Keystone).

Nine terminals (Eastick, Belling-Lee).

Two jacks (Igranic, Formo, Bowyer-Lowe).

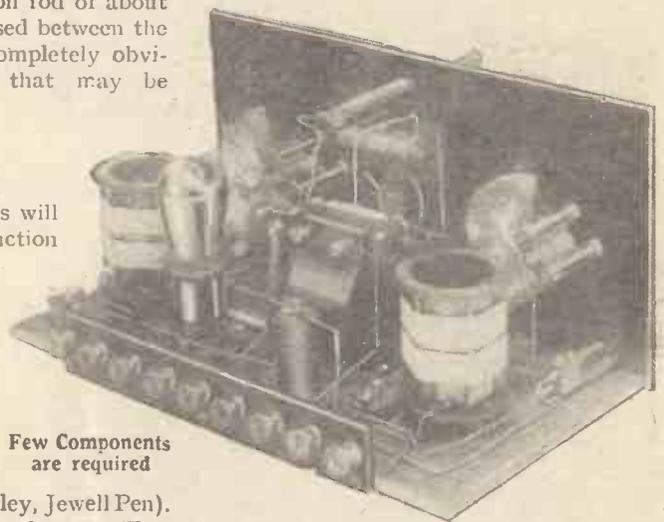
One neutralising condenser (Gambrell, Jackson Bros., Lissen, Wearite).

Ebonite or bakelite panel, 7 in. by 14 in. (Becol, Ebonart, Raymond, Pertinax).

The Coils

The primary of each coil consists of 15 turns of No. 30 wire wound in a slot cut in the ribs in the centre of the former. The secondary consists of 90 turns of the same wire wound in two parts of 45 turns each. The best way to wind these coils is to wind the primary, first connecting the beginning to pin No. 1 and the end to pin No. 2, passing the wire through holes drilled in the wall of the coil former; then, commencing from the middle, wind 45 turns in the opposite direction outwards, towards the top of the coil former. Connect the beginning of the winding to pin No. 4 and the end to pin No. 3; then again, commencing in the middle, wind 45 turns outwards, towards the bottom of the coil former in the same direction as the primary connecting the beginning of the winding to pin No. 5 and the end to pin No. 6. The two parts of the secondary should each be separated by about $\frac{1}{16}$ in. from the primary windings.

Both coils are wound identically. It will be found that the condenser readings do not vary by more than one or two degrees, except at the bottom of the scale. The London station comes in with both dials at 87 degrees.



Few Components are required

Wiring

Note the method—in the wiring diagram (Fig. 8) and photographs—of fitting the .25-ohm resistance. Two clips are used, one fitted direct to the terminal on the L.F. transformer and the other soldered to stiff busbar leading to the grid. Note also the connections from the crystal to the L.F. transformer, the "earth" side of the crystal going direct to the terminal marked "Plate."

It is essential that a power valve should

The Final Circuit

The final circuit adopted for the receiver is shown in Fig. 7, the crystal being tapped across only half the coil. The crystal used in the circuit is that made by the Carborundum Company, and was found to give excellent results, both from the point of view of volume and selectivity, which were all that could be desired.

The Neutrodyne Condenser

It should be noted, with regard to the

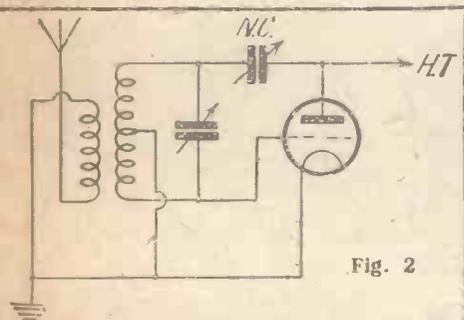


Fig. 2

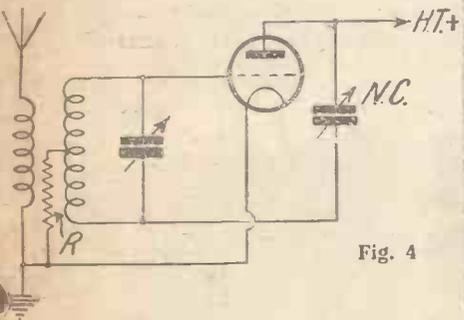


Fig. 4

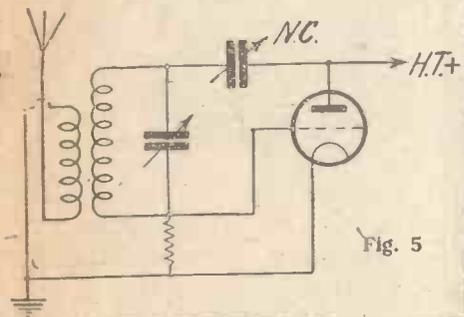


Fig. 5

Development of the "Dynaflex" Circuit

be used to get the best results; other valves will only cause disappointment. The H.T. voltage should be 120 and the negative grid bias $7\frac{1}{2}$ to 9 volts.

With this set the writer, at seven miles from 2LQ, obtains full loud-speaker

London is on. The selectivity, for a reflex set, is very good, careful setting of the condenser being required even on London.

This is not a set for the absolute novice, but any amateur with a little experience will find it extremely fascinating.

results depends on the two speakers, but the cone and the horn—used by the writer—give excellent results in series or parallel, the low notes coming out full and clear on the cone. The circuit of this unit is shown in Fig. 9. Three jacks are used,

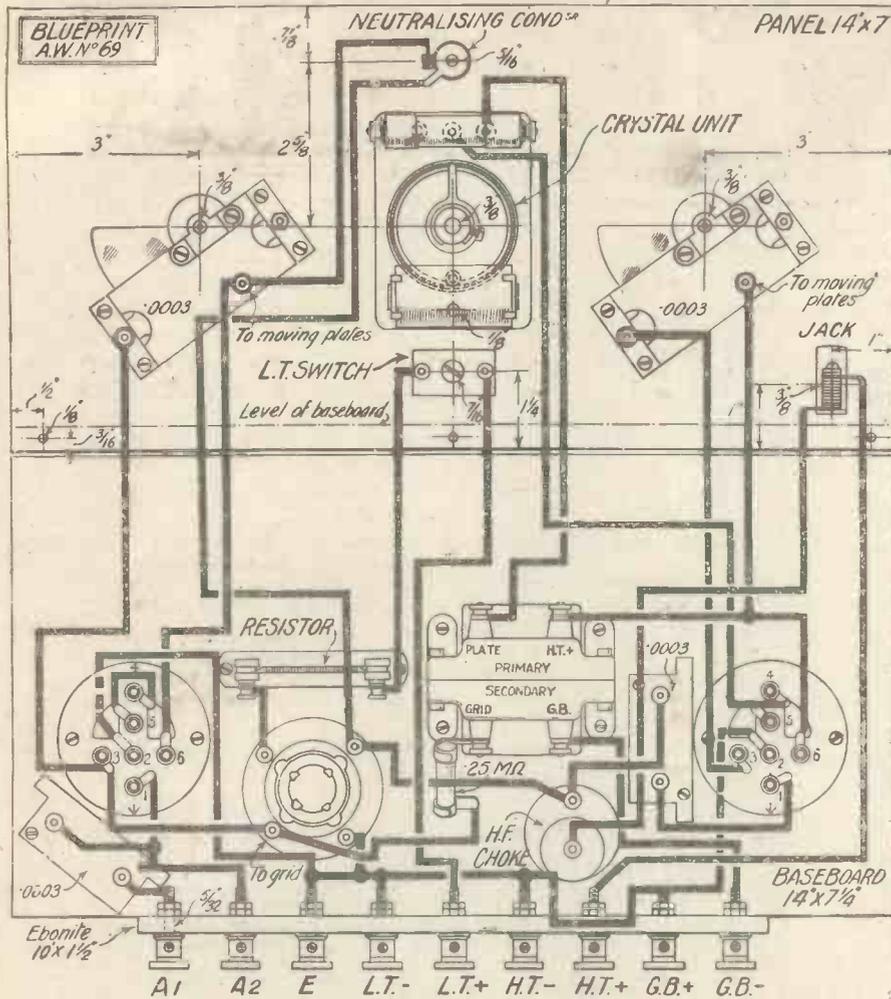


Fig. 8—The Dynaflex Wiring Diagram. Blueprint available, price 1/-

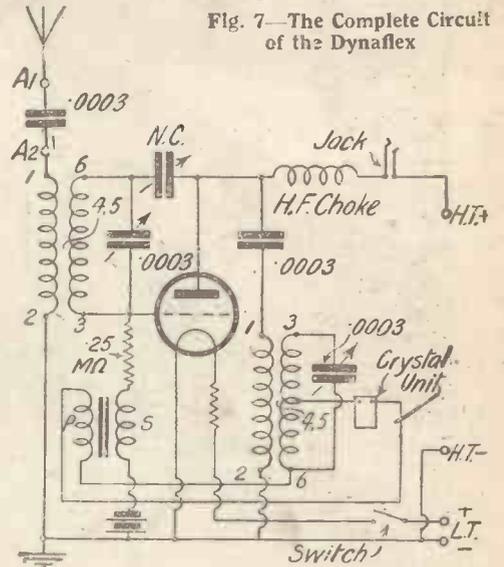


Fig. 7—The Complete Circuit of the Dynaflex

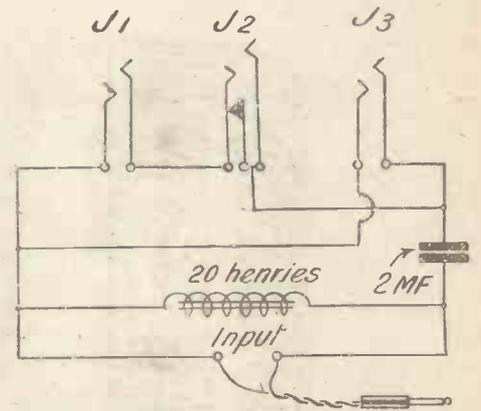
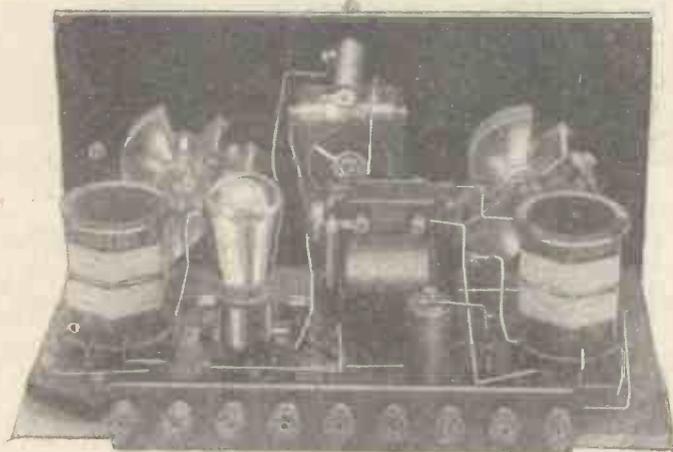
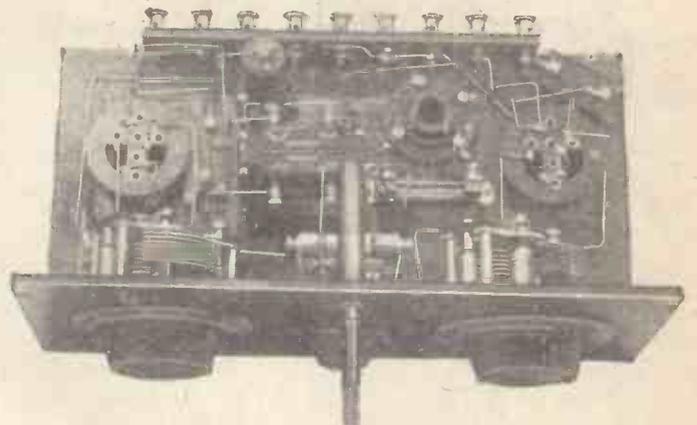


Fig. 9—Method of connecting Loud-speakers



A rear view of the Dynaflex



This is a view from above

strength on two loud-speakers in parallel, one being a cone. Four or five French and German stations, and one or two English stations, have been received at good loud-speaker strength on one loud-speaker (horn), and a very large number of other stations on the phones, and this whilst

As the set takes some 7 to 9 milliamperes, it is better to use a choke filter than to connect the loud-speaker direct in the anode circuit; and the writer has constructed a separate unit by which it is possible to connect two loud-speakers in parallel or series. Which will give the best

two being "single open" and the third being "single closed."

It may be added, finally, that there is not a trace of any L.F. howl until long after the oscillation point is passed. In other words, the set must be oscillating wildly before any howl is produced.



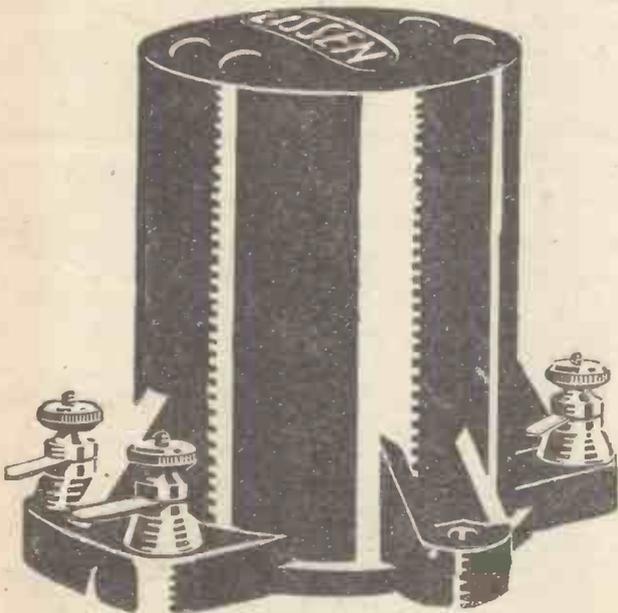
CAN BE BUILT WITH LISSEN PARTS

Congratulations to Messrs. Cossor on an excellent set

IT has been definitely proved that LISSEN parts can be used for this Set with eminently satisfactory results, as well as for every other type of Circuit which may be popular at a given time, and which requires Standard parts of recognised quality.

LISSEN parts are guaranteed to give satisfaction every time they are used. Test the LISSEN TRANSFORMER against any other, and if you are then willing to part with your LISSEN, and return it within seven days of purchase, your money will be willingly refunded.

Use the other LISSEN parts as well, resistances, condensers, rheostats, valve-holders, batteries, etc.



Lissen parts for the Cossor Melody Maker

- 1 Lissen L.F. Transformer (price 8/6).
- 1 Lissen .001 Fixed Condenser (to be put across the primary of the L.F. Transformer) (price 1/-).
- 1 Lissen Baseboard Rheostat, 7 ohms (price 1/6).
- 2 Lissen Key Switches or Lissen 2-way Switches (price 1/6 each).
- 2 .0003 Lissen Mica Fixed Condensers (Grid Leak Clips are included) (price 1/- each).
- 1 Lissen .0001 Mica Fixed Condenser (price 1/-).
- 1 Lissen .001 Mica Fixed Condenser (price 1/-).
- 1 Lissen .002 Mica Fixed Condenser (price 1/6).
- 1 Lissen Mansbridge Type Condenser, 2 mfd. (price 3/6).
- 1 Lissen Grid Leak, 3 megs. (price 1/-) and 1 Lissen Combinator (price 6d.).
- 1 Lissen Grid Leak, .25 megs. (price 1/-).
- 1 Lissen Grid Leak, 4 megs. (price 1/-) and 1 Lissen Combinator (price 6d.).
- 3 Lissen Valve Holders (price 1/- each).
- 1 Lissen 9-volt Grid Bias Battery (price 1/6).

Also use the Lissen H.T. Battery

All these Lissen parts for the Cossor "Melody Maker" are obtainable from 10,000 radio dealers throughout the country. Ask for Lissen parts in a way that shows you will take no other, and be sure of perfect results.

LISSEN

LISSEN LIMITED

16-20 Friars Lane, Richmond, Surrey
MANAGING DIRECTOR: THOMAS N. COLE



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



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

Coils, Screened and Unscreened.

Q.—Recently I have seen it stated that when the screen is removed from a standard screened coil or H.F. transformer the inductance of the coil or transformer windings is increased. If such is the case, then how does this affect the neutralising system incorporated in an H.F. transformer circuit, apart from the fact that a few turns should be stripped from the secondary winding, as advised by the authority in question?—J. L. (Worthing).

A.—The transformer, in the first place, is designed so that the inductances of the primary neutralising windings are identical in value. When the screen is removed the increase, if any, in the inductance value of the primary winding is reciprocated by a similar increase in the inductance of the neutralising winding. Consequently as the neutralising condenser setting is adjusted to balance out or neutralise the inter-electrode capacity of the H.F. valve, the whole system functions in the same way as if the screen were not removed. It is certainly advantageous to remove a few turns from the secondary winding of a screened H.F. transformer or aerial coil if the use of the screens is permanently dispensed with, but such an undertaking should not be attempted except by an advanced amateur.—L. A. C.

The "Economy Three."

Q.—Would you kindly oblige by letting me have details as regards suitable coils for use with

When Asking Technical Queries—

PLEASE write briefly and to the point

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

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

the "Economy Three" set, as described in "Amateur Wireless," No. 281. Coils for both the B.B.C. and Daventry senior stations wavelengths would be of interest to all who have made this set, I feel sure.—F. J. (Cardiff).

A.—A No. 60 centre-tapped coil for the aerial, with a No. 60 or No. 75 plain coil for reaction will be satisfactory for reception of the ordinary B.B.C. stations, whilst a No. 200 centre-tapped coil for the aerial, with a No. 100 or 150 plain coil for reaction will be suitable for the reception of Daventry senior. It will only be necessary to use a No. 150 coil for reaction purposes on the long wavelengths when the aerial and earth system employed has a high resistance.—C. L.

"M.C.4" Receiver.

Q.—My "M.C.4" receiver, which has been giving me excellent results, has developed a fault which I cannot trace. All batteries give practically full voltage when on load and there appears to be no poor or broken connections in the wiring of the set. Can you suggest a likely cause for the sudden failure?—S. M. (Windsor).

A.—The most likely cause of your trouble is due to the fact that the continual changing of your coils has caused the coil-pins to become closed up, so that they do not now make good contact in the sockets of the bases. If you open out all of your coil-pins so that the pins need to be gently forced into the coil-holder sockets, then probably you will have traced the cause of your poor reception.—L. A. C.

"THE MAN WHO CAN'T CATCH UP"

(Continued from page 57)

Yes, in some long-forgotten magazine he found instructions for building—Shades of the Pyramids!—building a crystal detector. And he took seriously to the hobby—in 1923—while mere junior porters were talking of adding L.F. amplifiers to their one-valve sets! He wound his mighty coils laboriously, with due regard to "dead-end" effects and proper sliding contacts. He thrilled at the sound of a tramp-steamer's morse signals, or a bit of gibberish from Croydon Aerodrome, whilst his fellows thrilled at Melba.

One day a carriage-cleaner told him about ZLO; told him that a fellow called "John Henry" was the "blooming limit." This caused him to spurt so violently that he scamped the proper investigation of coupled circuits; he has always been weak on reaction since and wants to connect the aerial direct to the anode.

In 1924 Emanuel got hold of a book; always an unfortunate thing for a slow mind. He decided to work right through it, and began on valves. This was a terrific complication for a simple man and led him into unbudgetted expenses, chiefly on account of accumulators which declined to accumulate anything more than deposits of lead sulphate. But he mastered the one-valve detector about the time when the

head porter at West Wigham was thinking of adding two H.F. stages to his reflex circuit.

When this head porter told Emanuel that he had heard Aberdeen, Emanuel told Jane that the head porter was a plain liar. Jane said, "That's more exciting than being nothing at all." A habit of brutally plain-speaking was one of the defects Emanuel had discovered too late in her, but he took it as a man takes a tonic, and added one stage of L.F. to his very bright-emitting valve, getting Paris the same night. But Jane would not believe him; said it was his imagination and how much longer was he going to burn the gas in the parlour.

By the time the radio fraternity was talking of "low-loss" and straight-line condensers, our honest railwayman had got a reflex hook-up howling like a banshee and had begun to talk confidently, and even saucily, about the ratio of plate voltage to received micro-volts or some such bilge. He bought a milliammeter at an auction; it had a bent needle and a bias of 1,000 m.a. but it proved to him that his valves did the right kind of things and he used to give the figures to the outside porter at Barnside West, who thought him slightly dotty.

Christmas, 1926, found Emanuel wondering what super-heterodyne meant. It did not seem necessary, as he was just getting loud-speaker results from Daventry, and he considered that an engineering feat

equal to that of Mr. Ferguson, who reduced the coal consumption of the 7.36 "down" by .26 ton per week.

And now Emanuel is just boggling between super-het and the Blogski circuit which was all the rage last year. By the time we are all kilocycling amongst waves of one metre in length he will have discovered the U.S.A., and Australia, and when we are blinking our eyes at our television screens he will be asking about Mr. Baird.

When the last trump sounds, poor Emanuel Lyback will not hear it. He will not have got himself properly buried. Just a clod or two will be missing, and the tombstone won't be carved.

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

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

"How clear the Radio is to-night"



HOWEVER long the programme, with a Lissen Battery in your set you will find your loud speaker from first to last reproducing with a clarity of tone and a truth of utterance which will make your Radio thoroughly enjoyable.

If this is what you want to say buy to-day a-

For the Lissen Battery yields power without a ripple, without a sign of hum, without a trace of noise—it is absolutely safe for children and all at home. Its energy is chemically generated by a new process known only to Lissen. This results in a free liberation of oxygen and the power is so great that the last notes of a long opera or the longest concert come through as loud and clear as the opening bars hours before.

Buy a LISSEN Battery now—not only will it give you fine power, but it will continue to do so for months and months.

LISSEN NEW PROCESS BATTERY

Obtainable at practically every Radio dealer's in London and throughout the Country.

Economical Power and without a ripple!

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LETTERS TO THE EDITOR

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

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

Thirty Stations on the Loud-speaker

SIR,—I have not, so far, seen any letter in your columns proclaiming the excellent merits of the "Ether-searcher Three" with more than two or three stations.

It may interest you and your readers to know that I built the set immediately it was published, and have so far received over thirty stations. All these have been traced with the loud-speaker (I do not possess 'phones), and I am within four miles of a main station.

On a No. 40 centre-tapped Atlas coil the set is "alive" with stations. Your claims for it are more than justified.

—W. P. (Lancs).

Talks from 5XX

SIR,—Many thanks for publishing my letter of last week. Through some oversight, my figures for talks from 5XX are given as 100 minutes instead of 700—a vast difference!

—J. T. S. (Penzance).

The "All-wave Roberts Four"

SIR,—I wired up the "All-wave Roberts Four" last week, and was surprised with the results. The purity and volume are excellent on both B.B.C. and Continental stations. I had a six-pin split-primary H.F. transformer, so I used that; the rest of the components are as stated.

B. J. (Lancs).

2XAF's Programme

SIR,—For the information of "Thermion," on Saturday night, at 11.40, I heard very clearly from 2XAF New York the short-wave programme for the week and was able to write it all down.

J. G. (Southampton).

(Readers may be interested in trying to obtain this weekly programme.—Ed.)

A Happy Choice

SIR,—I had been wanting to try my hand at making a wireless receiver, and bought AMATEUR WIRELESS to learn how to do so. Being absolutely ignorant on the subject, I decided to "blood" myself with the next three-valve set that was recommended. Fortune favoured me, and I sent to you for one of the blueprints of the "Ether-searcher Three." I could not possibly afford to buy the components specified, but I bought everything for it that Lissen could supply. I got old second-hand terminals (not insulated), two very

ancient variable condensers, three new valves, the dearest of which cost me 6s. 6d. I have still to save for the two slow-motion dials. Now for the result.

I finished it late at night, and the realisation far exceeded my anticipation. Four stations on the long waves, Daventry almost too loud. Shorter waves, 5GB almost equal to 5XX, and several foreign stations. The dealer from whom I bought the parts said I would be disappointed with the volume and that I, like all other amateur set-makers, would eventually have to take the set to him to correct the errors and to make it function!

C. R. S. (Sussex).

The "Hartley" DX Three

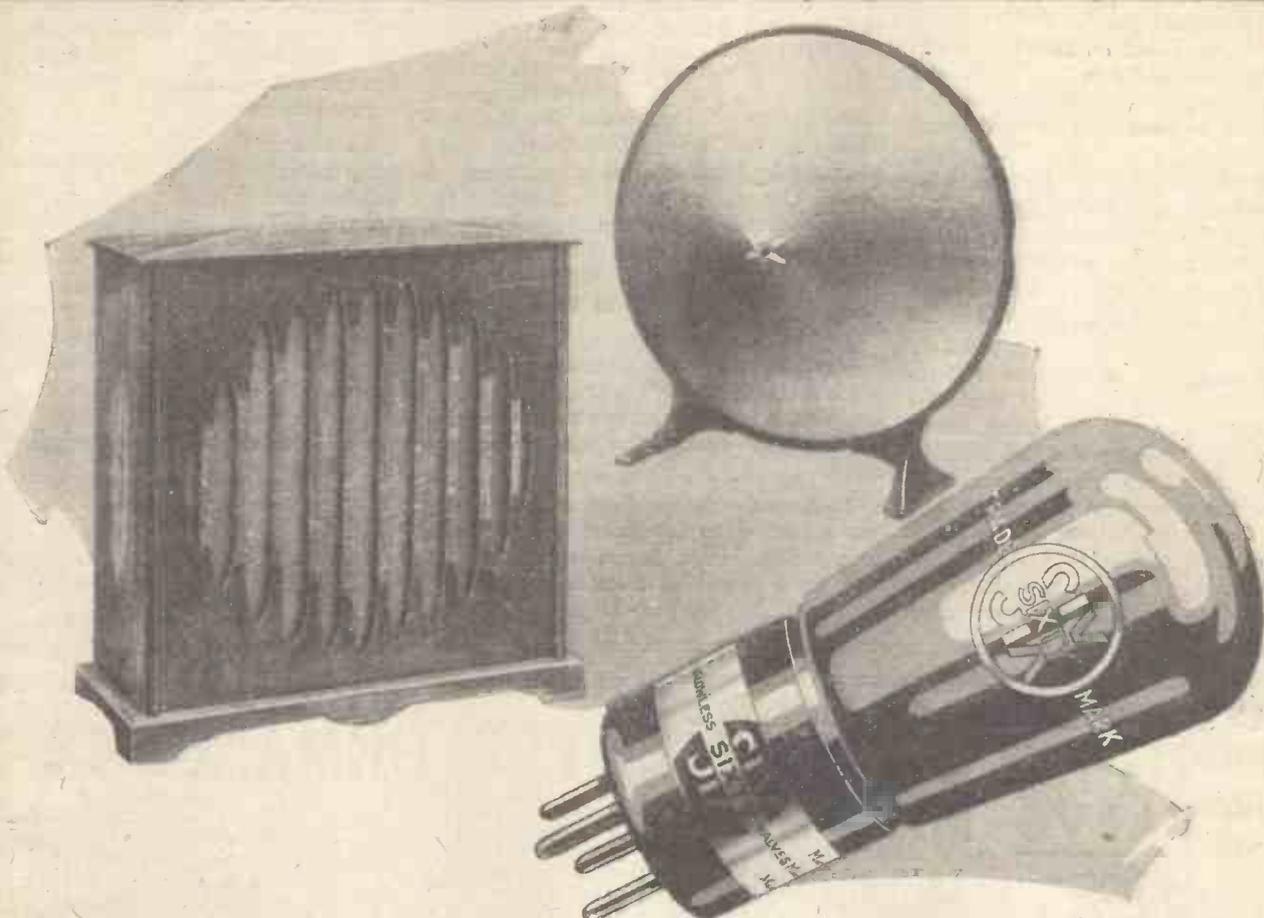
SIR,—I am writing to let you know my results with the "Hartley DX Three,"

BROADCAST TELEPHONY

(Broadcasting stations classified by country and in order of wavelength).

Table with columns for Country, Station and Call Sign, Power Kw., and Wavelength (Metres cycles). Countries listed include Great Britain, Italy, Irish Free State, Norway, Poland, Rumania, Russia, Germany, Austria, Belgium, Czechoslovakia, Denmark, Estonia, Finland, France, Hungary, and Iceland.

THE IDEAL COMBINATION for EVERY RECEIVER



Six-Sixty Valves for 2-volt Accumulator

Type	S.S.210 H.F.	S.S.210 L.F.	S.S.210 R.C.	S.S.213 P.
Filament Voltage	2	2	2	2
Filament Current	0.1 amp.	0.1 amp.	0.1 amp.	0.15 amp.
Anode Voltage	50-100	50-100	125	100
Mutual Conductance	0.50 ma/volt	.46 ma/volt	.52 ma/volt	0.88 ma/volt
Anode Impedance	27,000 ohms	18,000 ohms	68,000 ohms	7,300 ohms
Amplification Factor	43-14	8.5	35	6.4
Price	10/6	10/6	10/6	12/6

Write for attractive brochure describing the full range of Six-Sixty Valves.

Six-Sixty the perfect valve, Six-Sixty the perfect cone speaker, therefore Six-Sixty the ideal combination for your receiver.

Six-Sixty Valves commend themselves to every wireless enthusiast by virtue of the fact that practically every set manufacturer in the country standardises Six-Sixty. A.J.S., General Radio Co., Langham Portable, McMichael, are a few of the famous receivers in which Six-Sixty Valves are standardised.

The Six-Sixty Cone is the only speaker obtainable which successfully combines the clear-cut notes of the Horn Type of speaker with the mellow richness of the Cone Type. Your own Cone Speaker, when compared with Six-Sixty, is but a shadow of a Loud-speaker.

Try the combination of Six-Sixty Valves and a Six-Sixty Cone Speaker in your receiver. You will never regret it.

PRICES OF SIX-SIXTY SUPREME CONE SPEAKERS

Pedestal Type - £2 5 0
Cabinet Type - £4 4 0

SIX-SIXTY

MORE RADIOGRAMS

(Continued from page 68)

Liège, Belgium, is already arranging for its second international broadcasting exhibition, which will be held in the Palace of Arts from March 10 to 25, 1928.

Chiong Ke Leong, a famous Oriental hypnotist now in Chicago, proposes to exert his hypnotic influence through the microphone of a wireless station in that city on a subject listening-in at Cleveland, 500 miles distant. This unique experiment will be watched with interest by scientists, as Chiong claims to have already performed a similar feat in China and is quite confident of success.

Juan-les-Pins, which lies by the blue Mediterranean of the French Riviera, has come on to the air again after transformation. The studios are in one of the salons of the Casino, and microphones have been placed in the restaurant and the hall of the Casino for jazz and music.

Allegations made in the House of Commons recently by Mr. Fenby that the British Post Office was incurring heavy losses in connection with the transatlantic radiophone service, elicited admission from officials of the American Telephone and Telegraph Company that the service is not a paying proposition from New York either. It costs £66,000 per annum in maintaining the Rugby super-power station from which

the transatlantic phone service is handled, and an average of only two calls per day are made.

Under a new scheme proposed by the U.S.A. Radio Commission, some 300 of the 690 broadcasting stations holding licences to operate, are to be closed down by March 15. The process of elimination will begin on February 1. Owing to congestion in the ether, WHAR, Atlantic City, N.J., one of the pioneer stations of America, has ceased to operate.

According to a Paris newspaper, the city of Nimes (France) is to have its private broadcasting station, funds for the purchase of the transmitter having been collected by local wireless associations. A site for the station has been chosen in the neighbourhood of the old Roman Arena. If sufficient capital can be raised, it is hoped to equip the city with a transmitter of the same type and power as that of Radio Toulouse.

Germany has now reached the two million mark in respect to registered broadcast listeners, a further 250,000 licences having been issued during the last quarter of 1927.

To meet a widespread request, the B.B.C. has arranged to broadcast a short religious service daily, Sundays excepted. It will be transmitted from Daventry 5XX only, on 1604 metres, at 10.15 a.m., and

is to be followed by the usual weather forecast for shipping.

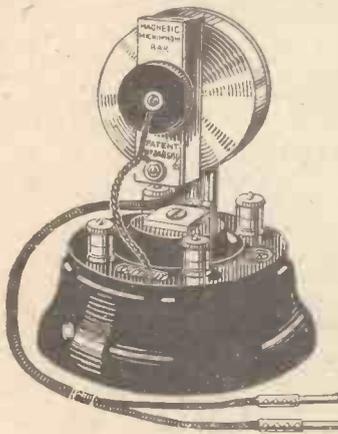
The famous 4.40 p.m. Paris-Bordeaux express is now equipped with broadcast telephony receiving apparatus enabling passengers to hear transmissions from the Paris stations during the seven-hour run. Some sixty pairs of headphones have been installed in the first-class smoking carriages and results have been quite satisfactory except for those parts of the line on the outskirts of Paris which are electrified. The Orleans Railway Company is now considering a similar equipment of other express trains on its system.

Bandoeng (Java) now broadcasts concert transmissions on every Wednesday, Friday, and Saturday, between 13.00 and 16.00 G.M.T. on a wavelength of 17 metres.

Now that the 1927 Italian Wireless Telegraphy and Telephony Bill has come into force, the present broadcasting company—Unione Radiofonica Italiana—will become the Ente Italiano per le Audizioni Radiofoniche (EIAR). This Corporation takes over the broadcasting monopoly for a period of twenty-five years from December 13, 1927.

A private broadcasting station was recently opened at Akureyri (Iceland); its power is 1-kilowatt. The transmitter tests almost nightly on a wavelength of 192 metres.

NO CRYSTAL SET USER SHOULD BE WITHOUT THE NEW NON-VALVE MAGNETIC MICROPHONE BAR AMPLIFIER



(Patent No. 248581/25) which operates a loud-speaker direct from any crystal set up to six miles or more (according to strength of original reception) from main Broadcasting Stations, or makes weak reception loud and clear in headphones under any conditions. A great boon to deaf persons. May be used with small valve sets.

Works perfectly on one or two dry cells; no other accessories required.

PRICE 34/- Post free. (Without Battery)

Every Amplifier guaranteed. 2 Dry Cells (lasting 3 mths.), 4/-

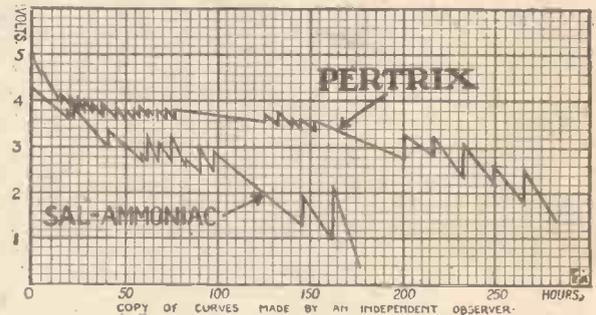
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NO Valves, Accumulators or H.T. Batteries Fragile parts Distortion

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DOES NOT THIS PROVE THAT OUR CLAIM THAT THE

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LONG LIFE DRY BATTERY IS "THE BATTERY WITHOUT A RIVAL" IS JUSTIFIABLE?

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-in design,
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Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

should now bring in KDKA at good loud-speaker strength. Other stations can now be searched for by following the readings given in the table below and going through the same procedure.

If the strength varies apart from fading, this is due to a badly swinging aerial. The best aerial to use is of the single-wire type; if a twin-wire aerial is used, the spreaders must be securely fastened. If it is not possible to prevent an aerial swinging in a strong wind, a larger aperiodic aerial coil of about 25 turns can be used, loosely

clockwise
is heard
ncy valves
to work is
t readjust-
condensers
t-Wave

Station	Wavelength metres	Coil No.	Aerial Con.	React'n Con.
5SW	24	S.W.3	39 — 40.5	39
KDKA	67	S.W.1	58.5 — 65	35
2XAF	32.79	S.W.3	78 — 80.2	57
GLK	37.476	S.W.3	85 — 88	57
2ME	28.5	S.W.3	6.02 — 6.15	42

coupled to the grid coil, with satisfactory results.

A super-heterodyne receiver is a very sensitive instrument, and particularly so on the short waves. The ignition system of a car can cause considerable interference on wavelengths between 15 to 25 metres. The writer's receiver is used in close proximity to a busy thoroughfare, and it is quite possible to hear the sparking of a car as it comes up the road, gradually getting louder as it passes the house. Interference of this type has often been prevented by loosely

(Continued on page 74)

and insert suitable variable capacitor coil in the aerial coil-holder and a No. S.W.1 coil into its respective holder, taking care that good contact is made.

Now turn the potentiometer control in a clockwise direction until the stop is reached. Set the extreme left condenser at 58.5 degrees and the reaction condenser (the right-hand dial) to about 35 degrees. This setting is for KDKA on 67 metres, a station which can nearly always be relied upon to be working after 11 p.m. If the set seems dead, increase the potentiometer

Station	Wavelength metres	Coil No.	Aerial Con.	React'n Con.
Mullard	610	PM 5X	PM 5X	PM 256
Osram	610	DEL 610	DEH 610	DEL 610
Cosmos	50	DE 50	DE 50	SP 55R
Six-Sixty	SS6075 H.F.	SS6075 H.F.	SS610 P	SS625 P

PERFECTLY TRUE!
—to instrument and voice. This is because the "W.B." Cone Reproducing Unit is designed on a new principle which eliminates old faults.

Bakelite Cabinet Model (as illustrated)
A very pleasing design embodying the "W.B." principle. Cabinet made entirely of Bakelite beautifully finished, £4 : 4 : 0

Oak or Mahogany Cabinet Models
A perfect loud-speaker in a perfect cabinet at a popular price, £3 : 0 : 0

"Junior" Model
Size 10 in. X 10 in. X 4 in. Suitable for portable self-contained sets, £2 : 10 : 0

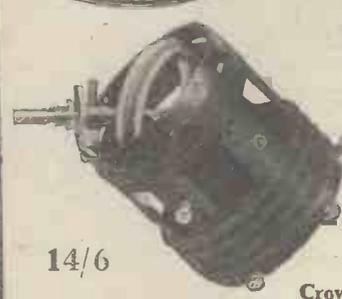
4-GUINEA MODEL

Obtainable from all high-class dealers



WHITELEY, BONEHAM & COMPANY, LTD.,
Nottingham Road, Mansfield, NOTTINGHAM

FORMO
LOW LOSS TWO RANGE COUPLER
250 to 550 and 1500 to 2000 metres



This Tuner is constructed on Low Loss Principles with Solenoid and Bankwound Coils, acknowledged to be the most efficient form of coil winding. It is so arranged that a two-contact Push-Pull Switch shorts the high wave coil, leaving only the low wave coil in circuit.

Crown Works, Cricklewood Lane, N.W.2
Phone: 1787 Hampstead

14/6
Full Catalogue free on request

TWO WONDERFUL LOUD-SPEAKER SETS

These wonderful instruments incorporate all 1928 improvements, and are the finest sets money can buy. 22 STATIONS on the two-valve and 48 STATIONS on the three-valve have actually been received, and most of these at good volume on the loud-speaker. The latest all-wave tuner is used, thus eliminating coils entirely, and any amateur can build these sets in two hours.

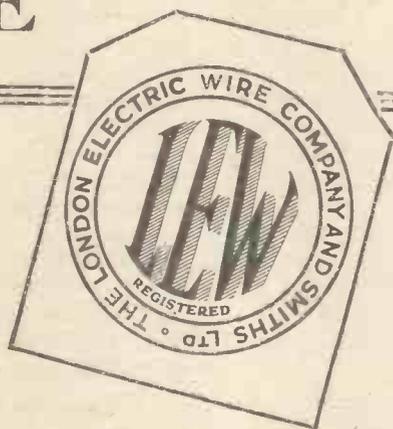
NO SOLDERING—NO DRILLING—NO COILS TO CHANGE

Booklet describing the 'Saxon' Two-valve Loud-Speaker Set, with diagram and full instructions, 3d. Post Free.

Booklet describing the 'Saxon' Three-valve Loud-Speaker Set, with diagram and full instructions, 3d. Post Free.

SAXON RADIO CO. (Dept. A.W.) HENRY ST. WORKS, BLACKPOOL

Be sure to see
this mark on
all COLOURED
CONNECTING
WIRE



This LEW trade mark on the label guarantees that it is the original GLAZITE Coloured Connecting Wire. Since its introduction, hundreds of thousands of home constructors have proved the advantages of GLAZITE. It makes wiring simpler, quicker, more efficient, and cheaper. Always wire your sets with GLAZITE Coloured Connecting Wire. But be sure it is genuine—insist on the LEW trade mark.

Made in Red, Blue, Green, Yellow, Black and White. Price 10d. per 10-ft. coil; 9d. per packet of four 2-ft. lengths (assorted colours).

The
LONDON ELECTRIC WIRE CO. & SMITHS, LTD.
Playhouse Yard, Golden Lane, E.C.1

GLAZITE
BRITISH MADE REGD.

THE ORIGINAL
COLOURED CONNECTING WIRE



Made in the Mazda Lamp Works, Rugby.

**VOLUME-TONE
-LONG LIFE**

FOR volume, tone and long life B.T.H. Nickel Filament Valves are without equal. This is not an empty statement but one based on tests carried out under actual broadcast conditions and endorsed by thousands of users. Their volume and tone you can judge yourself by putting them in your set. Their long life you can only appreciate in use. You will be getting good results from B.T.H. Nickel Filament Valves when other valves have declined into inaudibility. If you use two volts use B.T.H. Nickel Filament Valves.

B 210 H	B 210 L	B 215 P
R.C. and H.F.	General Purpose.	Power Amplifying.
Fil. Volts 2	Fil. Volts 2	Fil. Volts 2
Fil. Amps. 0.10	Fil. Amps. 0.10	Fil. Amps. 0.15
Max H.T. Volts 150	Max H.T. Volts 120	Max H.T. Volts 120
10s. 6d.	10s. 6d.	12s. 6d.

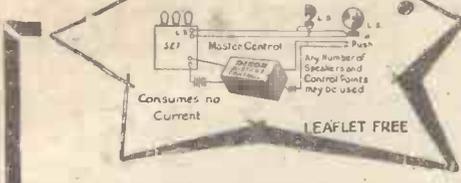
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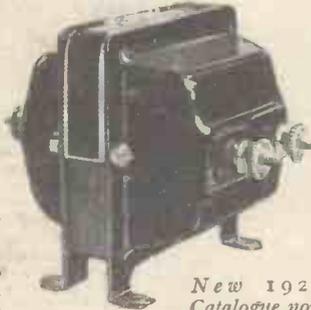
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OPERATING THE SHORT-WAVE "SUPER-SIX"

(Continued from page 72)

coupling the aperiodic aerial coil to the grid coil, and sometimes by using a short vertical aerial inside the house.

The "Short-wave Super Six" has given remarkable results. The recent broadcast of the Dempsey-Tunney fight was heard from 2XAF perfectly on a moving-coil loud-speaker. The Australian broadcast from 2FC Sydney was remarkable for its clarity and volume, the announcer's voice at times being too strong to be comfortable in a large room.

A Correction

An error occurred in the text matter relating to this receiver. The following wording should be substituted for that given in the lower half of the second column on page 20 of last week's issue:—

"Thus, to convert the 10,000,000-cycle signal to a frequency of 85,710 cycles, we must, in the ordinary super-het. way of things, generate a local oscillation with a frequency of either 10,085,710 or 9,914,290 cycles. If we consider the difference in wavelengths between the incoming signal and the oscillation required to create an intermediate frequency of 85,710 cycles we shall realise that this will be approximately .2 metres."

CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Jan. 15 Orchestral concert. Religious service relayed from Central Hall, Westminster, conducted by Rev. Dinsdale T. Young.
 - " 16 The Ceremony of the Keys, relayed from the Tower of London.
 - " 17 Reminiscences of musical comedy.
 - " 18 *The Return of Ulysses* (Monteverdi).
 - " 19 *Charlotte's Revue* (No. 2).
 - " 20 National Concert relayed from People's Palace, conducted by Sir Henry Wood.
 - " Running commentary on the England v. Wales Rugby match, from Swansea.
- DAVENTRY (5GB)**
- Jan. 15 *Athalie*, an Oratorio by Mendelssohn.
 - " 16 *The Return of Ulysses*.
 - " 18 *Love and Humour*, a weathery ballad-recital.
 - " 19 Hallé concert, from Manchester.
 - " 20 Light music and *The Safe*, a comedy by Geoffrey Benn.

- CARDIFF**
- Jan. 15 Orchestral programme. The Cymric Madrigalists.
 - " 16 *The Freak of Chance*, a sketch by Jack Hayward. *Courtship—Ancient and Modern*, a comedy by Fanny Morris Wood.
 - " 17 *My Programme*, by Ben Davies.
 - " 21 *Harlequin and Columbine*, orchestral and vocal programme.

- MANCHESTER**
- Jan. 17 Marches and waltzes, orchestral programme. Band music and duets.
 - " 19 Hallé concert from the Free Trade Hall.

- NEWCASTLE**
- Jan. 16 *The Blue Corpse*, or *Drama and the Extraordinary Listener*, a tragedy in two lifts by an Undertaker.
 - " 17 Uppeth Collieries Silver Band and vocalists.

- GLASGOW**
- Jan. 16 *Clydebuilt*, a play by George Blake.
 - " 18 Italian-instrumental and vocal programme.
 - " 21 The Radiophonists will compete in a Musical Festival.

- ABERDEEN**
- Jan. 20 Recital of Scottish part-songs.
 - " 21 *Refractions*, an original radio revue written by A. F. Hyslop.

- BELFAST**
- Jan. 16 An Elgar orchestral and vocal programme.
 - " 19 The second round of a post-war cocktail.

BLUEPRINTS

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

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One-valver for Frame Aerial	...	W.M. 4	1 0
One-valve All-wave Reinartz	...	A.W. 2	1 0
All-in-all One-valver	...	A.W. 13	1 0
Hartley DX One-valver	...	A.W. 27	1 0
Alpha One*	...	W.M. 26	2 3
Reinartz Plug-in One-valver	...	A.W. 46	1 0
The Dynaflex (One-valver)	...	A.W. 69	1 0
Constant-coupled One	...	A.W. 65	1 0

TWO-VALVE SETS	No.	Price.	s. d.
All Broadcast Two*	...	W.M. 5	2 3
Wide World Short-wave Two	...	A.W. 11	1 0
All-wave Two-valver	...	A.W. 15	1 0
Loftin-White Two*	...	W.M. 20	2 3
Reinartz Two	...	A.W. 21	1 0
One-dial Two	...	W.X. 23	1 0
Empire Short-wave Two	...	A.W. 28	1 0
"Next-step" Receiver	...	A.W. 34	1 0
Girdle Two*	...	W.M. 30	1 3
Centre-tap Two	...	A.W. 42	1 0
Mains-fed Two	...	W.M. 37	1 0
Three-option Two	...	A.W. 51	1 0
The Rover Two	...	A.W. 53	1 0
British Broadcast Two	...	W.M. 44	1 0
General Purpose Two	...	A.W. 55	1 0
All-wave Two	...	A.W. 57	1 0
The "Yule" Two	...	A.W. 50	1 0
The 30/- Two-valver	...	A.W. 61	1 0
Economical Two	...	A.W. 66	1 0

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Continental Three	...	W.M. 7	1 0
Victory Three	...	A.W. 9	1 0
Hi-mu R.C. Three*	...	W.M. 9	2 3
M.C.3 Star	...	A.W. 16	1 0
Wave-catcher Three	...	W.M. 19	1 0
Excelsior Three	...	A.W. 20	1 0
Split-primary Three	...	A.W. 24	1 0
Purity Three-valver	...	A.W. 33	1 0
A Modern Tuned-anode-Three	...	A.W. 35	1 0
Tetrode Three for Shielded Valves	...	A.W. 36	1 0
Alternative-programme Three	...	A.W. 38	1 0
A "Mains" Three-valver	...	W.M. 34	1 0
Screened-grid Three	...	W.M. 21	1 0
"Simpler Wireless" All-from-the-Mains Receiver	...	A.W. 41	1 0
"Simpler Wireless" Special Three-valver	...	A.W. 44	1 0
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Screened-grid Short-waver	...	W.M. 51	1 0
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"A.W." Gramo Radio	...	A.W. 40	1 6
All-purpose Four	...	A.W. 43	1 6
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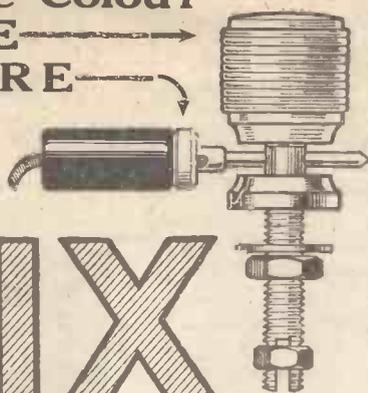
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Countryside Four	...	W.M. 17	1 6
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M.C. Three Portable	...	A.W. 22	1 0
Handy Three	...	W.M. 27	1 0
Holiday Portable (three-valver)	...	A.W. 32	1 0
Club Portable (three-valver)	...	A.W. 30	1 0

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Crystal Set for the R.C. Enthusiast	...	W.M. 13	0 6
Hi-lo Crystal Set	...	W.M. 18	0 6
Two-programme Crystal Set	...	W.M. 25	0 6
Alternative-programme Crystal Set	...	A.W. 39	0 6
Half-Hour Crystal Set	...	W.M. 28	0 6
Centre-tap Crystal Set	...	W.M. 50	0 6
Super Crystal Receiver	...	A.W. 64	0 6

MISCELLANEOUS	No.	Price.	s. d.
Loud-speaker Tone Control & Filter Unit*	...	W.M. 1	2 3
Heterodyne Wavemeter	...	A.W. 7	1 0
Made-to-measure Wave-trap	...	A.W. 19	0 6
New Current Supply Idea	...	A.W. 26	1 0
DX One-valve Unit	...	A.W. 37	1 0
Volume Control Unit	...	W.M. 40	0 6
Battery Eliminator for A.C. Mains	...	W.M. 41	1 0
"Simpler Wireless" Rectifying Unit A.W. 62	...	A.W. 62	1 0

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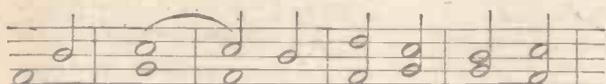
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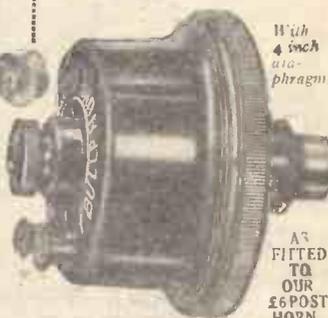
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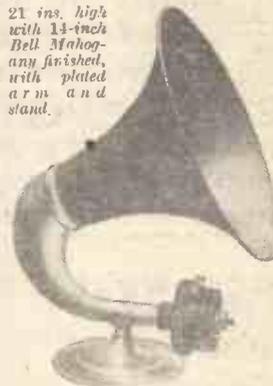
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"CIRCUITS FOR YOU TO TRY"

(Continued from page 55)

LI, so that the aerial circuit is tightly coupled to the tuned circuit; while for very short waves it is preferable to connect the aerial direct to the top of the coil through a very small condenser of perhaps .00005 capacity. This has been shown dotted in the figure.

This latter is virtually an ultra-audion circuit, the principal function of the resistance RI being to stabilise the grid of the valve, which would otherwise be left free. As an experiment, the resistance RI should be removed, and it will often be found that, if the valve is very slightly soft, the circuit will work quite satisfactorily without the stabilising resistance at all. Alternatively, if desired, a high-frequency choke can be connected in place of the resistance RI.

Particularly on short waves, the use of a small short-wave choke in the position RI is of advantage. There are one or two short-wave chokes on the market now which can be inserted in this position, in which case a very suitable short-wave circuit will result.

The New Valves

The circuit shown by Fig. 3 is a simple detector valve utilising the new screened-grid valve. A number of these are available on the market now, so that their performance in a single valve circuit can readily be tried out. The customary tuned circuit, consisting of a coil LI tuned with a condenser CI, is connected across the inner grid and filament, the usual condenser and leak C2 RI being connected in the grid lead in order to produce rectification. In order to obtain the best polarising potential on the grid, the negative return has not been taken direct to the filament, but has been connected to a potentiometer so that the operating point can readily be varied until the best position is found. The outer grid is connected to a positive potential of 80 volts in the normal manner, this serving to remove the space charge whereby a valve having a very large amplification factor with a correspondingly high internal resistance is obtained.

An H.F. choke coil L3 is inserted in the anode of the circuit in series with the telephones, whilst from the anode itself the reaction circuit, consisting of the fixed condenser C3 in series with the reaction coil L2, is connected to earth. A variable reaction coil has been shown, the actual effect being controlled by moving the coil L2 in relation to LI. C3 should be a fixed condenser of about .001. Alternatively, the reaction coil L3 may be made fixed and C3 a simple variable condenser having a maximum of about .0003, so that Reinartz reaction is obtained.

In order to produce the best amplification from this circuit, it is essential to use a high-grade choke L3, so that the effective anode impedance of the circuit to the high-frequencies is large, otherwise the results are apt to be a little disappointing and

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little, if any, better than with an ordinary three-electrode valve. The other fixed condenser is to by-pass the high-frequency current across the portion of the potentiometer not in use. If desired, various forms of rectification may be tried by adjusting the bias on the inner grid of the valve. To this end, a small battery has been shown in series with the negative return to the potentiometer, and by adjusting the value of this voltage, in conjunction with the potentiometer, a variety of different positions can be obtained and some interesting results can be produced.

This question of obtaining the best amplification from the valve at high-frequency is an interesting one and a point which is often overlooked when dealing with single-valve circuits. It is essential that the anode circuit of the valve shall possess a high impedance at high frequencies if high amplification is to be obtained; and this is the only way of obtaining DX reception on a single-valve set. The circuit shown by Fig. 4 is an interesting method of obtaining the necessary high impedance in the anode circuit. The grid circuit of the valve contains a coil and condenser L1 C1, the coil being X-tapped so that a tight-coupled aerial is employed.

Smooth Control

In the anode circuit, however, we have not a simple pair of telephones, but a tuned circuit, the centre point of which is taken to the telephones through the high tension. The top end of the circuit is connected through the condenser C3 back on to the grid of the valve. This condenser C3 is a neutralising condenser and serves to neutralise the arrangement which would otherwise oscillate violently. Thus by varying the value of C3 a very smooth control over the oscillations can be obtained, and the circuit will be found to be particularly sensitive to weak signals.

L1 and L2 can be simple plug-in coils or more efficient coils if desired. A No. 60 or No. 75 is suitable for broadcast waves and a No. 200 or No. 250 for long waves. Care should be taken that these coils do not couple to each other. They should be kept a fair distance apart and preferably placed at right angles. All oscillation is then completely under the control of the neutralising condenser C3, and excellent results can be obtained.

The condenser C5 is a by-pass condenser connected across the telephone to allow the high-frequency currents to flow down to earth, while the low-frequency currents pass through the telephones and produce the necessary audible response. The grid return is shown going to the negative of the filament. This position gives the greatest selectivity owing to the minimising of the valve damping. Slightly better signal strength is obtainable, however, if the return is connected to the positive filament lead, although this makes the circuit somewhat less selective.

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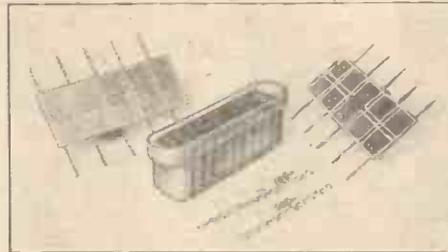
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battery at the remarkably low price of 3½d. per volt.

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The Litanode Co. manufacture accumulators for practically every purpose. Two types are made, one of the ordinary pasted-grid pattern and another in which the active material consists of the special substance "litanode," round which the molten lead-antimony alloy is poured to form the frames, the process being the reverse of general practice. These accumulators are guaranteed against damage even by a short circuit.

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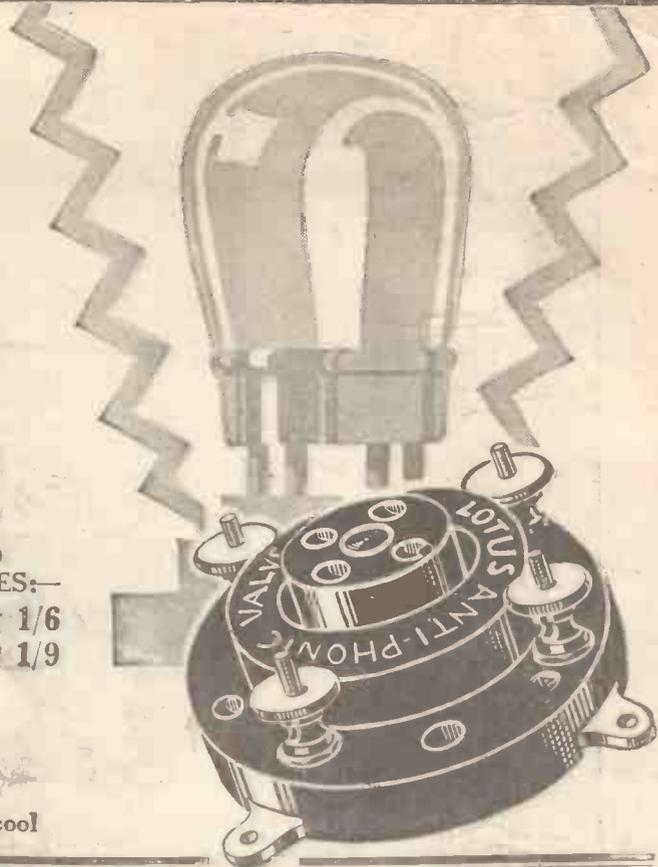


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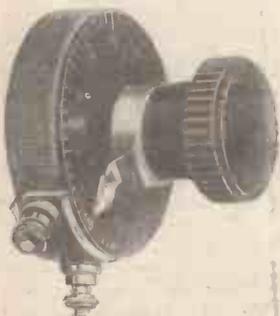
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