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And Electrics

Vol. V. No. 126.

SATURDAY, NOVEMBER 1, 1924

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PRINCIPAL CONTENTS

WITH A JUNK SET IN
IRAQ

MAKING A HETERO-
DYNE WAVEMETER

EXPERIMENTAL
TRANSMISSION

MULTI-PHONE RECEP-
TION

WIRELESS IN NEW
ZEALAND

ADDING THE AMPLI-
FIER

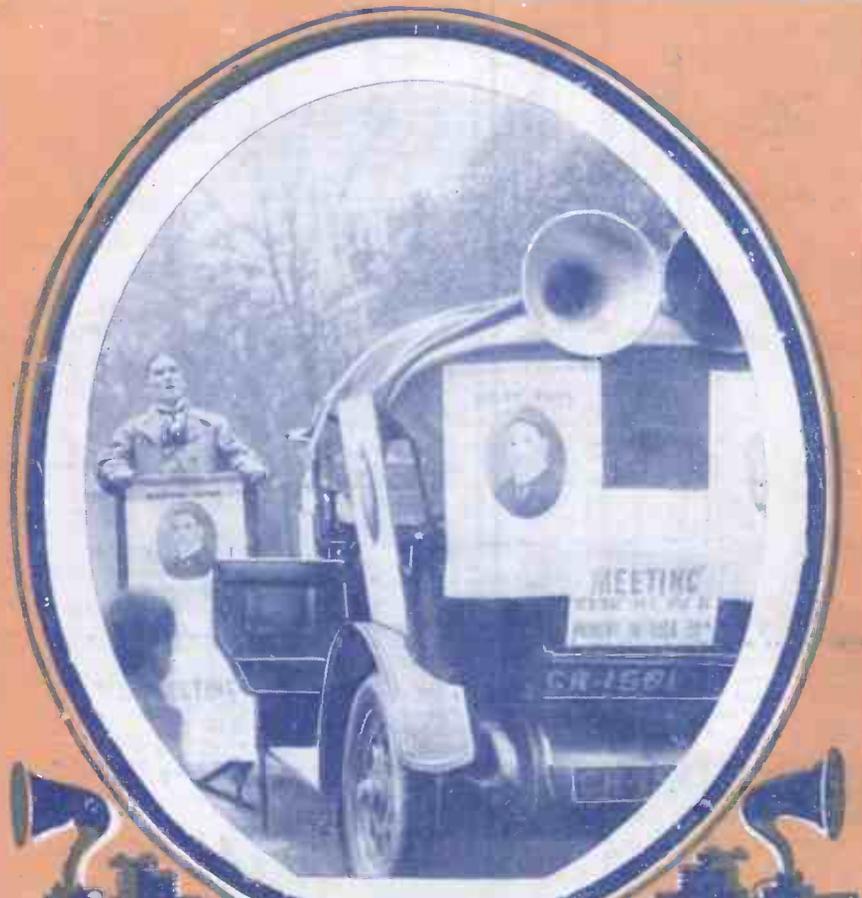
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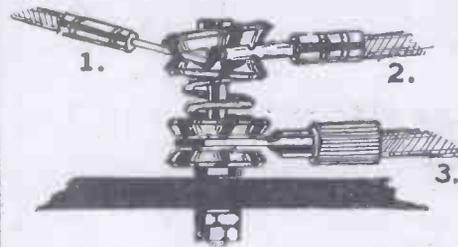
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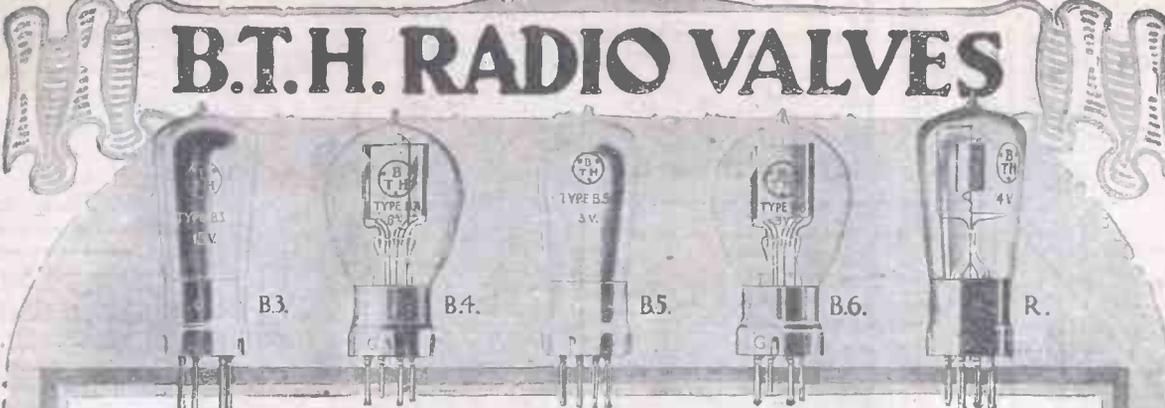
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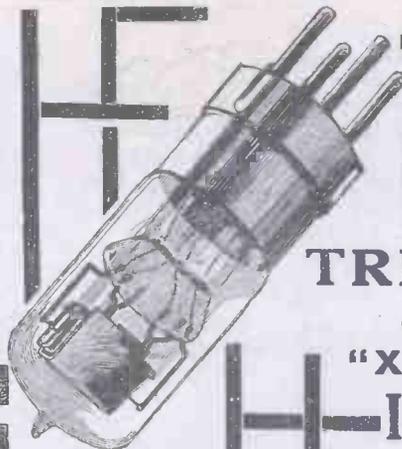
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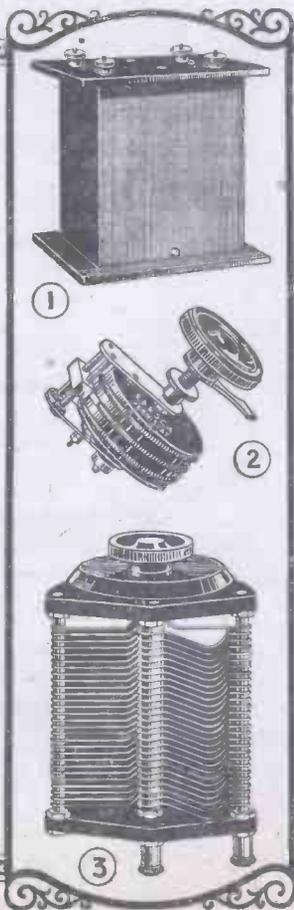
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Amateur Wireless

and Electrics

Vol. V. No. 126

November 1, 1924

WITH A JUNK SET IN IRAQ

THE following is a description of what the writers believe to be a unique effort to receive the British telephony stations in Iraq. The great initial difficulty was lack of apparatus, so it was decided to make anything unobtainable. It was originally decided to use seven valves, but owing to the high-frequency amplifier proving rather unstable the number was cut down to five. The arrangement of the valves was two high-frequency, one detector and two low-frequency, the H.F. being on the well-known tuned-anode system. The circuit is shown in the accompanying diagram.

The tuner consists of a solenoid coil 4 in. in diameter and 4½ in. high, wound with No. 26-gauge d.s.c. wire with five tappings and a .0005 variable condenser in series. This tuner is mounted on the same base-board as the H.F. amplifier, and gives a range of wavelengths from 280 to 600 metres.

The high-frequency unit is, as mentioned, of the tuned-anode type, the coils being of the basket type with tappings; the second anode coil is wound on an ebonite tube 2 in. in diameter and 6 in. long; these coils are also wound with No. 26 wire and the latter coil has twelve tappings taken from it.

Small condensers were placed across the anode coils; these were made by cutting discs of brass, two discs being used for each condenser; one disc is screwed to the baseboard and the moving disc is mounted on a brass spindle which screws into an insulated nut on the face of the fixed disc. As the spindle is rotated the moving disc is brought up to the fixed, and so varies the capacity.

The coupling condensers were made with copper-foil and mica dielectric, and grid leaks were made of red fibre with a pencil line between two terminals.

Filament rheostats consist of iron wire wound on pieces of wood, which are mounted on the baseboard; these are a little noisy, but were the best that could be produced under the circumstances. For the low-frequency unit, only two burnt-out

1½ in. with four pieces of waxed paper. All terminals were taken from old dry cells, these being mounted on odd pieces of ebonite.*

Valve holders were unobtainable and so it was necessary to make them. Pieces of ebonite were cut with holes drilled to conform to the valve pins, the sockets themselves being made by winding a few turns of brass wire round a drill shank; these were pushed through the holes in the ebonite and connections soldered to the brass spirals. Condensers were constructed to go across the primaries of the transformers, also across the telephones and H.T. battery.

Reaction was obtained by inserting a basket coil in the anode circuit of the detector valve and coupling it to the aerial coil by means of a hinged bracket.

The aerial was slung between two electric-light standards, one of the wires of the electric-light system being earthed.

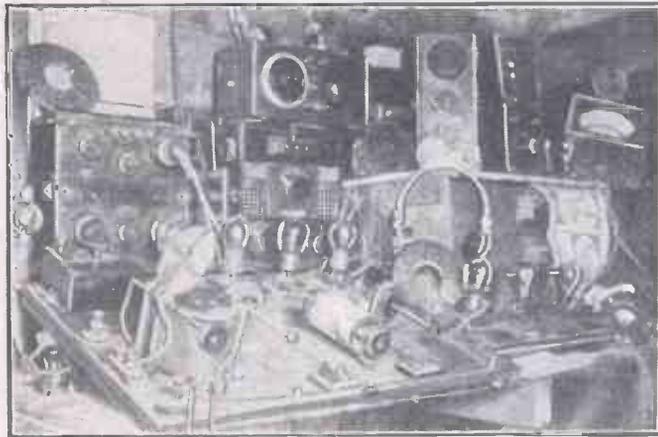
Readers will imagine the surprise when on testing the familiar sound of a carrier wave was heard. On tuning more carefully English speech was heard, and once or twice NO was distinguished. This was presumed to be 5 NO, for on tuning with a Townshend wavemeter the wavelength was found to be round about 380 metres.

The speech received at present is slightly muffled, but with a little more experimenting it is hoped to hear very plainly. Other stations are also heard, but they are not as distinct as

the assumed 5 NO. The distance of the received signals is about 2,900 miles and is practically all over land.

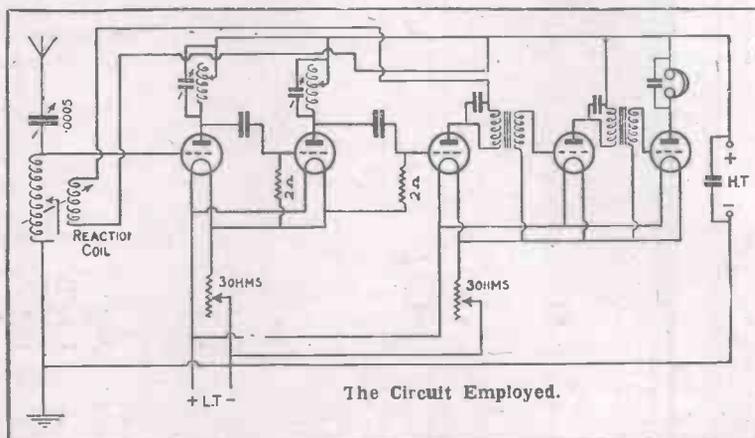
A study of the photograph of the receiving station will show how crude is most of the apparatus employed and serve to emphasise the remarkable results obtained.

J. A. and P. M.



The Apparatus Used by the Authors.

transformers of the army type were available. However, these transformers had to be rewound, and, thanks to Mr. Henry Ford, of motor-car fame, they were re-



The Circuit Employed.

MANY DIFFERENT PHONES ON ONE CRYSTAL SET

Constructional Details of an Adaptor Panel for the "A.W." System of Multi-phone Reception. Invented by John W. Miller.

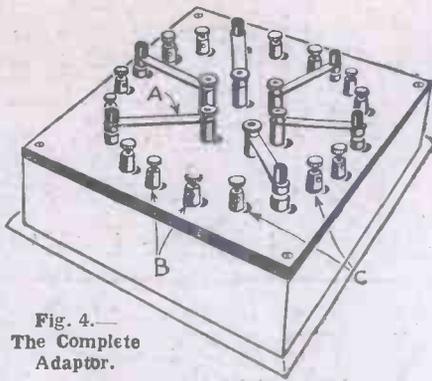


Fig. 4.—The Complete Adaptor.

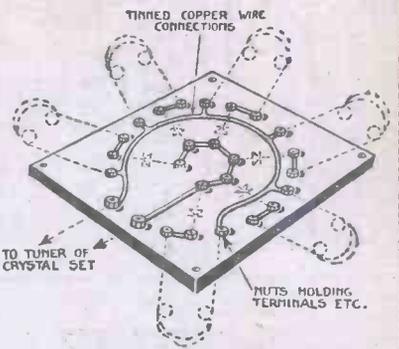


Fig. 5.—Details of Wiring.

THIS article describes the actual construction of an instrument to enable the reader to take advantage of the new "many phones on one crystal set" system (described in October 18 issue of "A.W.") without the trouble and expense of building a new set.

It will be remembered that when a crystal is connected in series with each phone in use the effect is to render the working of each phone entirely separate, as if, for instance, each one was in connection with a separate aerial, earth and set. In addition the system allows phones of any resistance to be used at the same time.

Multi-phone Detector

It is an easy matter to construct a panel having six crystals and suitably provided with six pairs of telephone terminals. With such a panel it will be possible for six people to listen in and each to have control over his own phones, and also to get the same strength as if they were using their phones alone on the same set. The others, in fact, would not be aware of any addition or removal of their fellow-listeners' phones.

As will be seen from Fig. 1, the ebonite for the panel should measure 7 in. square and should have six holes arranged in a circle to carry the mountings for the detectors, the type of which is shown by Figs. 2 and 3. Also there will require to be a larger circle of holes for the crystal cups actually fixed to the panel; a pair of telephone terminals (C, Fig. 4) are arranged one on each side of the detectors as shown. There will also be two terminals (B) to be connected to the set in use. Terminals with long stems should be chosen so that the connecting wires may be soldered to the ends without unduly heating the ebonite. It will be noticed from the wiring diagram, Fig. 5, that none of the connecting wires cross each other, so that thick bare wire may be used for the connections.

By tracing out the wiring diagram it will be seen that it is similar to the instrument illustrated in the previous article.

The detector may appear very crude and unwieldy, but it is actually the most efficient for the purpose. Although experi-

ments have not actually been made with any of the "whisker" crystals, there is every reason to believe that such crystals would be unsuitable for this particular purpose, if only for the fact that a knock

a height of 6 or 8 in. on to a bare wooden table. It is suggested that experiments should be made with various combinations of crystals in order to ascertain which are the best.

Stability

Stability is important when using this panel, as there will be six people adjusting their crystals at once, and a crystal detector which would not stand a certain amount of vibration would be useless, for every time one listener adjusted his contact he would probably put the other five off.

Of course any type of detector may be used in place of the one illustrated, but readers will find this type to be very stable. There are several types of detector using combination crystals that are suitable for external connection to existing sets.

In conclusion, it will be as well to remember that this system of "crystal-per-phone" applies equally as well to very weak signals, and should prove a boon to the enthusiast who is lucky or skilful enough to get long-distance stations and would like to share his reception with others.

When using this device for connection to an existing crystal set, the crystal on the set should be short-circuited or the whisker pushed against the brass part of the cup. When a crystal set is not available, this device may, of course, be connected direct to a variometer or any other tuning apparatus, without the addition of anything else except the phones.

PHONE DIAPHRAGMS

CHEAP phones are often provided with diaphragms which are thick and therefore not sensitive.

Thin and sensitive diaphragms can be easily made from the inner covers of hermetically sealed containers of invalid and baby foods (covers in which lettering is stamped are useless for the purpose). Great care should be exercised in cutting the metal to avoid buckling.

If after a time the diaphragms become "dished" by the pull of the magnets, reversing them will give them another span of service.

A. H. P.

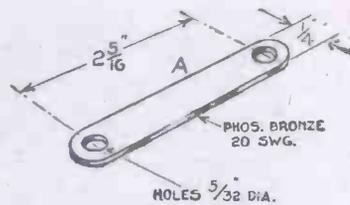


Fig. 2.—Detector Arm.

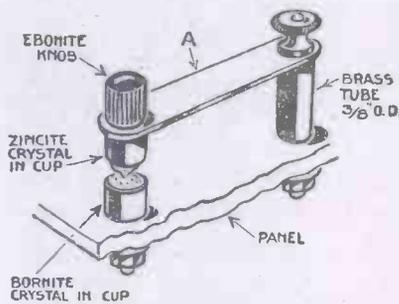


Fig. 3.—Details of Detector.

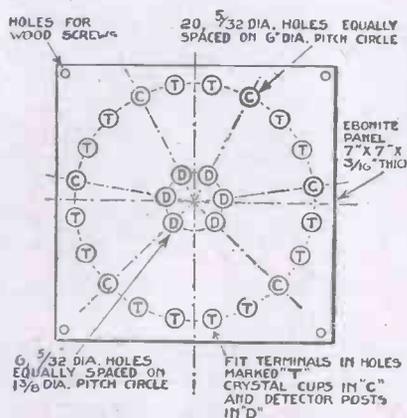


Fig. 1.—Plan of Panel.

or jar will easily put them out of action. With most of the combination crystals this does not usually happen. The writer has had crystals in use in detectors somewhat similar to those described which have resisted all reasonable efforts to jar them out of contact, even to the extent of picking the whole set up and dropping it from



Fig. 4.—The Complete Wavemeter.

ONE of the most essential things for the real experimenter to possess is an efficient wavemeter. Unfortunately they are expensive and not many amateurs wish to purchase one, as five pounds or so can be put to a more advantageous use. In this article the writer will attempt to remove all difficulties which may exist in the construction of this useful instrument, which need not cost more than twenty-five shillings. There are two main types of wavemeter, the buzzer and the heterodyne. The former, as its name shows, employs a buzzer to generate the necessary oscillations, whereas the latter takes advantage of the oscillating valve. The buzzer wavemeter, although slightly cheaper to construct, is by no means so efficient as the heterodyne from the point of view of accuracy.

The Circuit

The circuit shown by Fig. 1 will be recognised as being the usual local oscillator circuit. The inductance L1 is shunted by a variable condenser, which may be of the order of .001 microfarad. It will also be noticed that the coil L1 is coupled to a reaction coil L2 at a fixed angle. This angle must obviously be constant, because if the coupling is varied the wavelength of the tuned circuit will be altered and the condenser readings thrown out.

The best and easiest method of overcoming this difficulty is to clamp the coils together in a basket-coil holder as shown in Fig. 2, and connect up L1 to the plug and L2 to two extra terminals. Thus, when changing the coils, it is only necessary to remove one pair of wires. This method also keeps the coils rigid. The first pair of coils could have a range of, say, 150 to 300 metres, the second pair 300 to 500 metres, and so on, until the

A HETERODYNE WAVEMETER

desired range is covered. Probably the second pair will be most useful to the experimenter, as this band of wavelengths is crowded both with British and American broadcasting. The figures given are only approximate, and it may be impossible to cover the given range with one pair of coils, but it is certainly possible to cover the broadcast waves with one pair whatever winding is employed.

The coils used by the writer are of the ordinary basket type with single winding, although double winding may be employed with no decrease in efficiency. The coils were wound on fibre formers and not shellacked. If it is preferred, the reader may wind the coils on a spider former

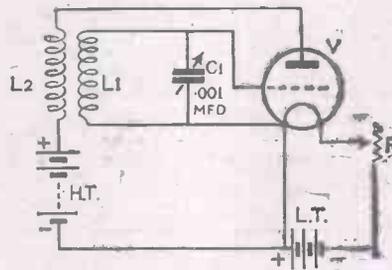


Fig. 1.—Circuit Diagram.

and shellac them, but as they are much more fragile in this condition the former method should be used.

The panel may conveniently be 9 in. by 5 in. by 1/4 in. in order to accommodate a Polar condenser, Ormond rheostat, valve holder and six terminals. Any standard hard valve will do, so an R-type valve holder is mounted on the panel. The valve in the photograph is a Cossor P2. The connections were made with No. 18 tinned-copper wire, all joints being soldered.

The variable condenser used was a Polar

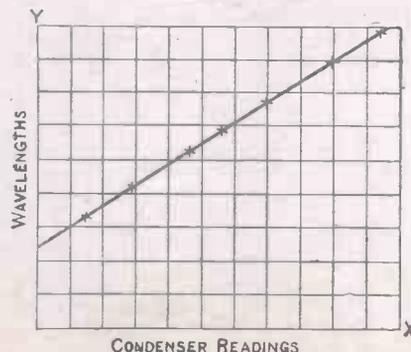


Fig. 3.—Example of Wavemeter Graph.

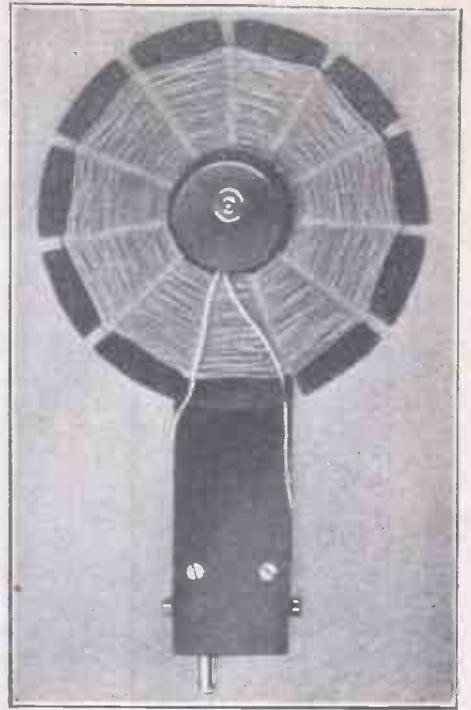


Fig. 2.—Pair of Coils.

with mica dielectric. The main advantage gained from using this type of condenser will be explained. When the pointer is moved towards the increase position the wavelength increases proportionately instead of the capacity, as is usually the case with air-dielectric condensers. This is a great advantage, for when the graph is plotted it will be a straight line. In the case of the ordinary condenser, the first few degrees of the scale cover a large band of wavelengths compared with the last few degrees. In the Polar condensers the wavelengths are equally distributed round the scale. This advantage will be more apparent when the meter is calibrated.

Calibration

When the components are mounted and wired up according to the circuit in Fig. 1, the next step is to calibrate the wavemeter. For this purpose it is necessary to have either (1) a wavemeter already calibrated, or (2) a valve set with direct aerial coupling and also at least one stage of high-frequency amplification. It should be noted that once the meter has been calibrated the H.T. and L.T. must be kept constant in value.

The wavemeter should, first of all, be placed near the receiver and connected up to high- and low-tension, separate batteries being employed where possible.

Le Petit Parisien station, which usually works on 340 metres, could be tuned in on the set. When clear signals are obtained, turn up the filament of the wavemeter valve and rotate the condenser knob until a chirp is heard in the phones. If there is no sound the reaction coil should be reversed. The object now is to find the silent point between the chirps in a similar way as an ordinary carrier wave would be treated. When this has been obtained with

the greatest possible accuracy, make a note of the wavelength and condenser reading, which should be as near to the beginning

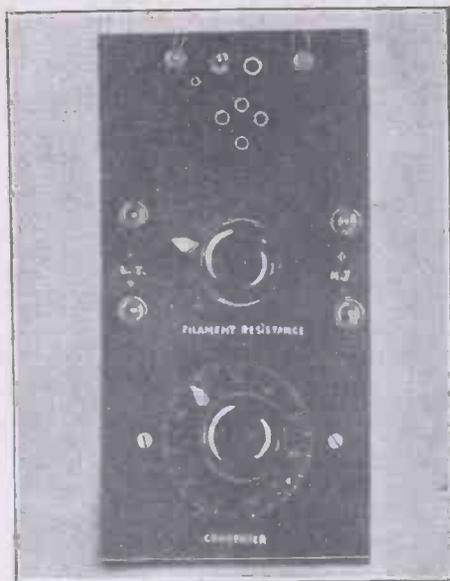


Fig. 5.—Top Side of Panel.

of the scale as possible. This, then, is the first point of the graph for the pair of coils in use. Other points must be plotted at, as near as possible, regular intervals.

Assuming that a series of points covering the condenser scale have been successfully obtained, a graph may now be plotted. The graph will be a straight line, as shown in Fig. 3. Thus separate graphs may be plotted for any number of pairs of coils, giving the wavemeter an almost unlimited range, but it is rarely necessary to exceed 3,000 metres.

Utility

The writer finds it most useful on broadcast wavelengths, especially for testing the range of new receivers and for receiving American broadcasting.

When employing the wavemeter to find the wavelength of an unknown station the proceeding is similar to that of calibrating it. When clear signals are obtained, the condenser knob is rotated until the chirps are heard. Note the condenser reading at the silent point and read off from the graph the wavelength corresponding to that particular setting. If the wavelength of the station is known, a description of the transmission and the time, it is usually easy to deduce its origin.

Another use of the wavemeter is that of facilitating the finding of a distant station. Suppose it is desired to receive an American station on 385 metres; all that is necessary is to set the wavemeter to the position which corresponds to the wave-

length and tune the set until the chirp is heard. Having found the silent point, the receiver is tuned to 385 metres. Providing the apparatus is capable and the conditions good, the desired station should be heard when the wavemeter is switched off.

Such is the operation of an instrument which will prove of great value to any

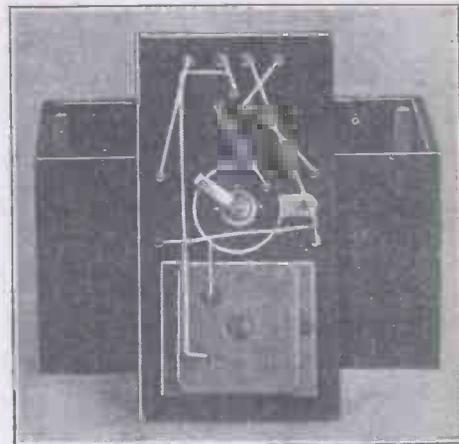


Fig. 6.—Under Side of Panel.

amateur who takes the trouble to construct one on these lines. The other photographs, Figs. 4, 5 and 6, show the completed instrument and the top and under sides of the panel. E. L. M.

WIRELESS IN NEW ZEALAND

IN New Zealand it is only during the last few months that the general public has become at all interested in wireless and even now the popular impression is that wireless is only for scientists and millionaires. To a certain extent there are some grounds for this belief, for anyone whose purse will not run to at least three valves has but little inducement to take up wireless.

Few Transmissions

Being so far from the commercial centres of the world, the ether is by no means overburdened, and the crystal enthusiast has but a poor time. There are usually a few messages to be picked up from ships, but air station transmissions are non-existent. There is not a great number of land stations either, for although each of the four centres—Auckland, Wellington, Christchurch and Dunedin—has its Government-controlled station, there are only two other high-power stations of any importance. These are Awanui in the north and Awaroa in the south.

Time signals are transmitted from the Post Offices of the four cities, but apart from these there is not very much doing except Government official messages, unless one is provided with the necessary

amplifiers to receive Sydney, Suva, etc., and the nearer American stations.

Broadcasting

Broadcasting is carried out in an entirely different manner from that in England. In Auckland there are now two broadcasting stations, and one of these is run by a corporation of wireless-apparatus dealers, while the other station is in the hands of a gramophone company. Up to the present the broadcast programmes have not reached a high state of perfection, owing possibly to a kind of deadlock existing between broadcasters and amateurs. The companies will not take any important steps to improve their transmissions until they are assured of a greater sale of apparatus, while people are not inclined to buy sets until the broadcasting shows a decided improvement in quality.

Auckland

The larger of the Auckland stations, 1YA, works four nights a week on a wavelength of 260 metres, with a power of 400 watts. Two of the remaining nights a week the other station, 1YB, transmits on 90 watts, and once a month, on Sundays, the same station broadcasts sermons. Several amateurs have taken out transmitting licences near Auckland,

and occasionally they do a little low-power broadcasting on 140 metres.

In New Zealand there is only one kind of licence for receiving apparatus, and this will allow the use of any kind of set, whether it is a crystal or multi-valve, bought or home constructed. The only restriction is that reaction must not be coupled direct to the primary of the aerial tuning inductance. The dimensions and type of the aerial are unlimited. The total cost of taking out the licence is eight shillings. C. G. P.

PRESS TRANSMISSIONS

FOR some time past Reuters, by agreement with the General Post Office, have been using Northolt for the transmission of Press news simultaneously addressed to numerous correspondents in countries abroad.

In view of the satisfactory results obtained, the French Administration, in conjunction with the Havas Agency, has decided to establish a similar service. The W.T. station of Tours (Saint-Pierre-des-Corps) YG, 6,000 metres, has been adopted for the purpose. Tests are already being made at 08.10, 08.50, 10.00, 13.10, 14.15, 14.40 and 16.00 daily. In most cases the transmission is in slow Morse.

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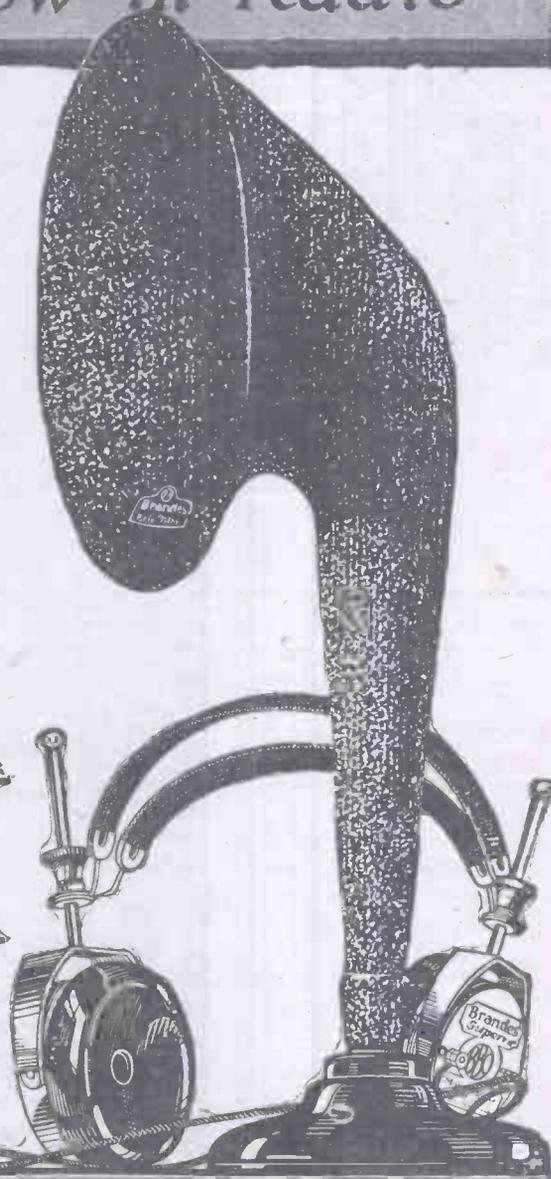
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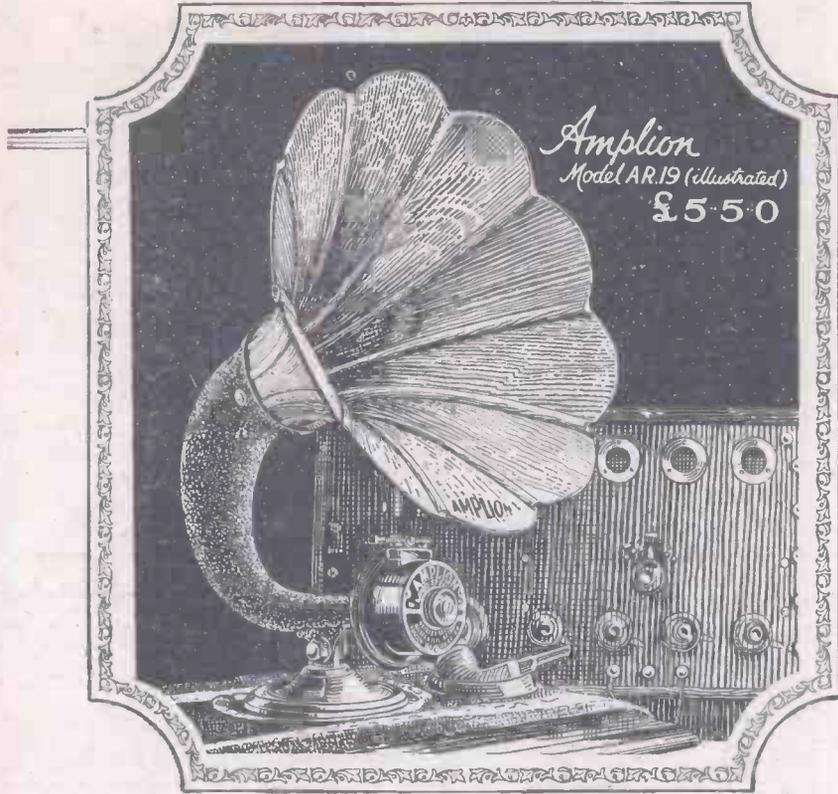
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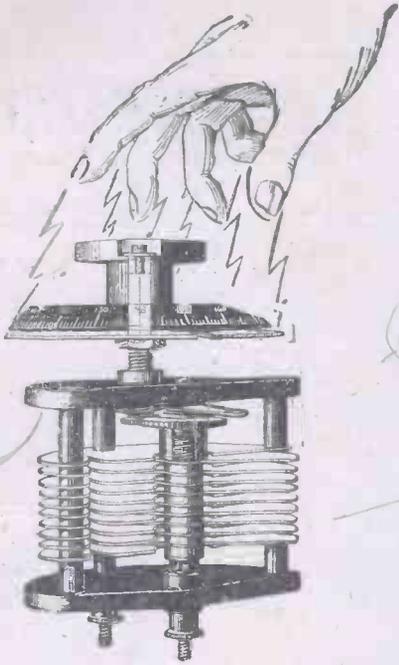
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On Your Wavelength!

American Stations

THE U.S.A. broadcasting stations are coming in extraordinarily well in this country at the present moment. In fact you may safely say that whenever two or three wireless men meet just now all with one accord start telling of their Transatlantic achievements. One in my neighbourhood, who had never before heard America, picked up WGY quite by chance the other night when he was not even attempting to get hold of anything from across the water. As a matter of fact, he was using an indoor aerial, so you may imagine his feelings of triumph. Since then he has tried three times for him and got him at once on every occasion.

WJZ and WBZ are also giving healthy signals, which are by no means difficult to get hold of if your set and aerial are efficient. On the short waves—that is, 100 metres and below—WJZ and KDKA are both going strong. The latter is now transmitting simultaneously on three wavelengths, his ordinary broadcast length, 100 metres and 68 metres. The 68 transmission is by far the strongest of the three in this country, but it takes a bit of getting down to with most receiving sets. One of the greatest difficulties is that there are, so far as I know, no reasonably-priced wavemeters on the market at the moment which register below 100 metres. There should be a good opening for an instrument reading from 40 to 180 metres if some maker cares to take up the idea.

American amateurs, by the way, are going in most heartily for short-wave transmission. The shortest wavelength allotted to them is 5 metres. Of course you cannot receive that kind of thing on any sort of straight set, but the super-sonic or the super-heterodyne is now one of the most popular types of receiver in the States and with its help you can go down without any difficulty to these amazingly low wavelengths.

Girdling the Earth

My very best congratulations to those amateurs who have recently achieved the remarkable feat of working with New Zealand confrères. Considering the small power used and the enormous distance to be covered this perhaps is one of the most remarkable feats yet recorded in wireless transmission. Mill Hill School is making quite a name for itself in wireless, for this station was one of the first, if not actually the first, to accomplish two-way working with American amateurs.

It is a pity, I think, that more schools do not make a special point of encouraging wireless as a hobby amongst boys. It is a thing that most boys are wildly keen

about, and it offers a wonderful opportunity of driving the elements of chemistry, physics and electricity into a boy's head without his realising that he is working. The schools are pretty well off in wireless gear, for O.T.C.'s obtained a splendid issue of transmitting and receiving sets, as well as gadgets of all kinds, after the war. Some of them do not go in for it very strongly.

The Big Station

It seems to be fairly well settled now that the B.B.C.'s permanent big station will be situated somewhere in the neighbourhood of Northampton. This should be quite a good position, since it is a very central one.

The chief consideration that has decided the B.B.C. to adopt this part of the world is that there is an underground main trunk telephone cable from London; the underground cable is essential for good working at any distance, and it must be a cable of a special kind. The existing north-west cable is the only one which fulfils all requirements.

I thought when we first started our big station that America would feel compelled somehow to go one better. I see now that a project has been mooted in the States for the erection of a central broadcasting station with a power of 50 kilowatts. If this comes into being, as I have no doubt it will, the reception of American broadcasting stations on a crystal set should become an everyday, or, rather, an every-night, matter in this country. Whether or not they will be able to overcome the enormous difficulty of modulating such an immense output is another matter altogether, but one feels sure that Uncle Sam's engineers will manage to tackle the problem in a satisfactory way.

The European Stations

If you have not picked up Madrid yet, do so without delay and you will be surprised. On most evenings he goes on for a long time after our own broadcasting stations have closed down. This is very fortunate, for otherwise he is apt to clash rather badly with Newcastle. His wavelength is given in all tables as 392 metres, but when I picked him up the other night I took the opportunity of measuring it with a very accurate wavemeter and found that it was actually 405. He seems to vary a little in his tuning, for slightly different adjustments were needed on the following night, though as I had no wavemeter by me I could not on that occasion verify the wavelength.

You will be amazed at the power with which he arrives. At my station he is quite as good as Birmingham only 75 miles

away, though his own distance as his waves wobble is ten times as far. You may say in your haste that this is due to his coming straight across the sea. Take your map and lay the ruler between London and Madrid. You will be surprised to find that he has first of all to travel over a very long stretch of Spanish country of a mountainous type, and after crossing the Bay of Biscay, Brittany must be passed on the way. Besides their strength the transmissions are amazingly good, there being a surprising absence of mush or of any of the other kinds of interference that so often accompany long-distance transmissions.

I picked up a quaint French station the other night that I have not heard before. It was very feeble at first, but I managed to tune him in to good audible strength. It was not the quality of his programme which attracted me, for this consisted entirely of gramophone records of the baser and scrapier sort. It was the fact that this station turned out to be that of the S.E.R. (Société Electrique à Radio-téléphonique), situated in the Boulevard Malesherbes in Paris. The power at which it is rated is only 100 watts. If this was all that he was using at the time—and he certainly was not using very much—it is rather remarkable for one to hear him so plainly over 259 miles.

A Cheerful Evening

Bournemouth's anniversary programme on October 17 was a great success. It had all been arranged before it was known that Mr. Asquith's speech was to be relayed from all stations in the early part of the evening. A less hardened soul than the Bournemouth Director of Programmes would have made big cuts in the items and would have finished up at some time round about the normal time. This kind of thing does not appeal to 6 B.M. They went straight through, giving every item as originally arranged, and closed down at what must be almost the record hour of 12.45 a.m. I do not know how many people heard the programme out, but I did, for I had decided on that night to sit up for America. Those who did prefer the delights of phones or loud-speaker to the comfort of bed will admit that they had a jolly good entertainment. The company seemed to be enjoying themselves most thoroughly—in fact I do not know when I have heard a cheerier piece of broadcasting than "The Little Tin Soldier," in the rendering of which the orchestra joined most enthusiastically, "helping" the singer with twiddly bits on various instruments. It is a good many years now since I first heard this song, and I must have listened to it scores of

On Your Wavelength! (continued)

times altogether, but I am quite sure that I have never heard a more effective rendering. At the close of the proceedings the station director apologised for, so to speak, closing down with the milk. Personally I was rather grateful, for it kept me pleasantly amused during what would otherwise have been a rather dead time and it gave me WGY's tuning, which might otherwise have been rather a trouble.

The Amateurs

Two stations which interested me immensely the other evening were 6UT and 6HC. They both appear to use alternating current as a source of high-tension and their speech consequently suffers with the usual "pea in the microphone effect"; but what interested me more than anything was the fact that they both constantly sent out test calls on wavelengths very close together, and that although I heard upwards of half a dozen stations respond to their calls both on C.W. and speech, neither of them appeared to hear these responses. I wonder if their local A.C. hum spoils their reception as well as their transmission.

I referred to 6TD the other week. I have since learned that his H.T. potential is 700 volts and on 93 to 113 metres his set is remarkably efficient in the way of aerial radiation. His aerial is badly screened locally, so that the way in which his signals travel is remarkable.

Less Oscillation

I don't know whether it is the same in all districts, but I notice that the oscillation nuisance is becoming less and less. It is true that someone a few weeks back shook half the London area with a superheterodyne or something similar, but apparently he was localised, for I heard some amateurs bitterly complaining about him. Apparently he heard it, for we have not been troubled by him since.

Sound Waves

Prof. Bragg's lecture from 2LO on "What is Sound?" has profoundly impressed some people. I have a friend who is almost afraid to move since then for fear that he should set up too many sound-wave trains and add to the noises of London. Apparently it has never occurred to many otherwise intelligent citizens that sound may be reflected. I have often heard a perfectly good loud-speaker accused of uttering uncouth sounds, when the cause of the trouble was really a hall or open space totally unsuitable for the instrument owing to the fact that the projected sounds were reflected and flung about by the echoing space.

Why Short Waves Travel

The remarkable travelling power displayed by the shorter waves as compared

with long waves is exercising the mind of the amateur at the present time, and various theories for this have been advanced. I have a friend, Pro. Microvolt, a man read and learned in the wireless art, and in order to place the opinion of this learned man before my readers I called and asked him to make a short statement on the subject. Before beginning to speak he took the R.M.S. value of a couple of incoming carrier waves, found the inductance value of a lattice-wound coil two feet in diameter, and calculated the velocity of an electron travelling between the plate and grid. After plunging his slide rule into cold water and setting a fan in motion to disperse the steam, he began to speak, whilst I hung on his carrier with eagerness.

"The use of short wavelengths result in a greater carrying power if they go further than the longer ones," he said. "Two amperes of current in an aerial transmitting on 100 metres or lower is likely to go further than a smaller reading on a higher wavelength. Providing that there are no hills, valleys or land intervening between the aeriels, the signals are likely to reach their required destination. If they are screened in the north you will receive them in the south if that is not screened." He fell into a brown study, and whilst he absentmindedly plotted out the angles of lag in my brain, I crept away to place this valuable information at your disposal. I learn that he has not spoken since that day.

Earths

I wonder if you have noticed what an enormous difference a bad earth makes to reception. If you have not, try the following little experiment and note the results. Tune in a distant station, first of all using your own good earth. Then remove the 7/22 earth lead, which is or should be there, and replace it with a piece of No. 30 or even finer-gauge copper wire. Twist the end of this round a metal rod—do not solder it—and push the rod an inch or two into the earth. Now try again and you will find some strange results. In the first place your stability will have gone to pot, whilst your wonted selectivity no longer exists. Lastly, you will most probably discover that the distant transmission has entirely disappeared or that it is so weak that you can barely get hold of it.

The moral is quite obvious. Many amateurs are so situated that they cannot obtain a really satisfactory earth. To these I would say, try a counterpoise instead. The simplest kind of counterpoise consists of a coil of, say, 20 yd. of flex, which is simply thrown on to the floor anyhow near the set. This gives surprisingly good results. A more ambitious counterpoise takes the form of a second aerial wire just as carefully insulated as the first

slung not less than a couple of yards from the ground. In most cases such a counterpoise gives greater signal strength than the best earth and it nearly always adds considerably to the selectivity of the set.

Be careful, though, of one thing: The aerial and counterpoise system is a very powerful radiator, therefore whatever you do, do not let your set oscillate when you are using it. A very good counterpoise can be made from a single length of the copper ribbon which is now sold for aeriels.

The Vicar of Mirth

I see that clever portrayer of clerical humour, Mr. Vivian Foster, is touring all stations. His friendly burlesques of the old-time unctuous country clergyman are thoroughly enjoyable, and evidently cause no offence to the real clergy. If I remember, Mr. Foster was the first real music-hall comedian to broadcast from Marconi House, as well as being in "Business as Usual" at the Hippodrome and "Tabs" at the Vaudeville. To quote his own famous catchphrase, "Yes, I think so."

Amongst the Moderns

I believe in being patriotic, but between ourselves I am not an enthusiast for the British composer of the ultra-modern school. If he would only try to write a tune instead of trying to describe catching the last train home on the tube railway, he'd be all right; but, no, he leaves off in the middle, and you spend the next minute or so trying to add the last notes for him or waiting till he's thought of it for himself, till you hear the dulcet tone, "Two minutes' interval, please."

However, Newcastle decided that we should hear some good modern pianoforte music, and we did too. Debussy's chromatic scales may not please everybody; personally they send cold shivers down my spine and make me think of the superstition that someone is walking over my grave. You know the kind of feeling, don't you? early morning before the Kruschen. Still, when it comes to pianoforte studies, Debussy is all there, and his "Poisson d'Or" and "Jardins sous la Pluie" (quite simple to translate) are excellent examples of pyrotechnics.

Tongues of Brass

I don't mean some of the election speeches, although—well, never mind, I mean some of those brass bands. The bands are all right, mind you, but their selections are not. I have the greatest admiration for the brass band that played last week, but when it comes to playing the "Entry of the Gods into Valhalla"—well, frankly, it sounded more like one of the German variety making for the nearest—er—Corner House. Choose suitable works, and then brass away for all you're worth.

THERMION.

WJAZ



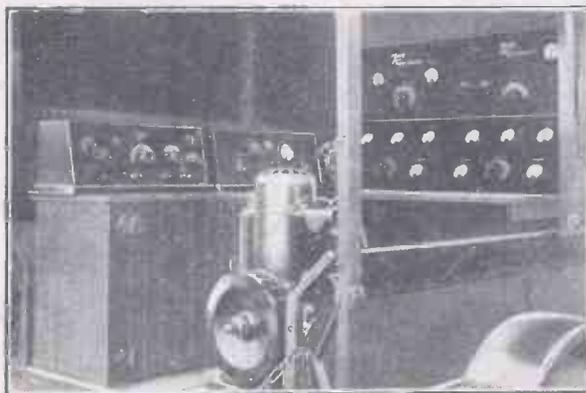
The Mobile Broadcasting Station, W J A Z.

THE photographs show the Zenith Portable Broadcasting station, W J A Z, which is claimed to be the first entirely self-contained broadcasting station in the world. The station can be set up in the middle of a field without any other power supply than its own and operate indefinitely, as it is equipped with a complete charging outfit which is able to charge the batteries while the outfit is in broadcasting operation. The transmitter has four 50-watt valves—two as oscillators and two as modulators.

The aerial when raised is 53 ft. high. It consists of four heavily braided copper cables of extremely fine wire. These wires are provided at each end with snap hooks, which are attached to rings which fasten to two spreaders. The entire framework and body of the truck, including the iron strip on the floor, are connected together and earthed, the earthing strips all being brought to one point at the side of the truck, where a heavy connecting lug is attached.

A 24-volt battery is used, which is of 320 ampere-hours capacity. Three microphones may be used, one for announcing, one for

orchestral and one for studio purposes, where these are necessary. Cable is provided whereby the microphones can be



Close-up View of Interior.

A U.S.A. MOBILE BROADCASTING STATION

placed as far as 300 ft. from the truck, allowing the broadcasting of performances in halls, etc., whilst the truck is outside.

The wavelength is 268 metres and the call letters are W J A Z.

Special switching arrangements are provided whereby the generating outfit not only charges the 24-volt battery, but also charges the lighting and ignition batteries of the truck at the same time, and also operates a 24-volt to 350-volt motor generator which serves to charge the H.T. batteries.

A complete receiving set with loud-speaker is provided for checking the modulation and also for maintaining communication if this is desired at any time. In the transmitter proper the Hartley oscillator circuit is used with Heising modulation.

The truck is electrically lighted with lights on the panels as well as a number of lights so placed that they illuminate the aerial mast.

In a recent test the broadcasting was concluded at 12 a.m. and at 12.10 p.m. the aerial was down and packed up and the truck under way to another district in which to begin further operations.

FALSE ECONOMY

MOST listeners at some period of their wireless career decide that the reception of the local broadcasting station alone does not satisfy their ambition. The next step of those who possess a mechanical bent is the home construction of a more elaborate receiving set. Here the amateur should be warned against the purchase, from a point of view of economy, of cheap, unbranded or unknown components, mostly of foreign make, which are usually sold at "cut prices."

True and False Economy

To construct a two-, three- or four-valve set, which at the lowest estimate must cost several pounds, and then, with the idea of saving a few shillings on the total expense, to incorporate one or two cheap—or apparently cheap—components is truly false economy.

It is possible to cut down the cost of a receiver by using good seasoned wood as a substitute for an ebonite panel, providing all parts are adequately insulated. Such a method is quite a practical one, but to stint a few pence or shillings on such im-

portant components as fixed or variable condensers, coil holders, coils, valve sockets, etc., is not only courting disaster but further expense.

As a convincing proof of this argument, a few facts may be given regarding the unreliability of some of the wireless parts which find their way—mainly from Germany—to the English market. Take fixed condensers, for example. According to a statement made by a German engineer in a Berlin wireless journal, samples were drawn from various manufacturers, and the capacity of these goods varied from 43 per cent. to 90 per cent. of their stated value. In some tests the condenser leaked. This might at first sight appear to be an unimportant defect, but apart from one position, that is, where the condenser is included in a one-valve receiver, with the grid leak across it, it must be leakproof. If such a faulty component were used to connect the H.F. and detector valves in a tuned-anode circuit, the inevitable result would be that the second grid (detector valve) would be rendered totally ineffective. In the case of cheap

grid leaks and resistances it was found that out of ten samples chosen at random variation was equally considerable.

Several patterns of honeycomb coil of foreign manufacture have at various times been imported. Here, again, inaccuracy was established not only in the windings, but in the diameter of plugs and sockets, and their distance from each other. In some cases the mounts were so roughly made that actual contact did not exist.

Foreign Components

Against foreign-made valves less adverse criticism can be offered, but here again the mounts were of poor manufacture, of rough finish and diameter, and spacing of valve pins deviated from the standard.

Of all the foreign-made cheap components variable condensers were found to be the worst. Not only were some bought where bad contacts existed between spindle and bush, but many had wobbly plates.

The amateur is therefore strongly advised to buy his components from reputable firms. Most of these, if not all, advertise in the columns of "A.W." J. G. A.

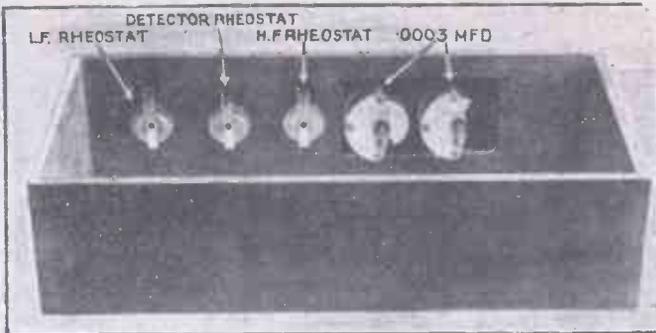


Fig. 17.—Rheostats and Condensers Mounted.

WE can now proceed to fix up the high-tension battery condenser and those shunted across the primary of the first transformer and the telephones. This being done, we can fix the first stiffener in place. The best position for it is between the two L.F. transformers. Lay the board face downwards upon the table and place the frame over it. Then push the stiffener down until it just touches the various wires which are already soldered up. At the point of contact with each lead make a pencil mark. Then withdraw the stiffener and make arches in it to clear the wires.

A simple method of doing this is as follows. Using a set-square, draw a line from end to end of the stiffener about $\frac{3}{4}$ in. from the bottom. At the points where the vertical and horizontal lines intersect drill $\frac{1}{8}$ -in. holes right through the wood, afterwards cutting into them from the edge with a small saw. A final trim-up with a rasp and some glass-paper completes the process. Fix the stiffener down by screws driven into it from the surface of the panel. We can now tackle the second stage of the wiring.

It is best to begin with the second low-frequency transformer, removing the first temporarily from the panel. If this is done one has a good deal more space to work in than would be the case if the first transformer were dealt with before the second. Take a lead from each of the transformer terminals to the terminals provided for its connections upon the panel. It is best that these leads should be soldered at both ends, but if the transformer had good strong screw connections these

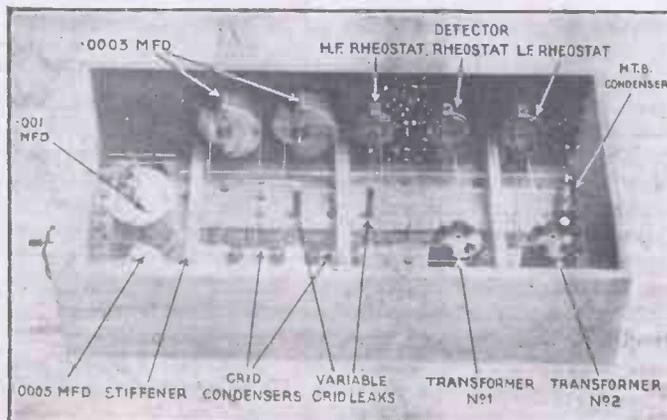


Fig. 18.—Another Stage of the Wiring.

will serve quite well, provided that the nuts are turned hard down. We now put back the first transformer and wire it up, connecting also the condenser which is in shunt with its primary. At this stage the telephone condenser and the high-tension battery condenser may also be wired up. We next wire the A.T.C. and the small variable condenser to their terminals. The photograph Fig. 16 shows this stage of the wiring completed.

It will be best now to turn our attention to mounting upon the frame the condensers and rheostats which it carries. Fig. 9 (p. 477, No. 123) shows how the front is marked out. To make the hole measuring 8 in. by 4 in. for the two anode condensers, drill a 1-in. hole near each of the four corners and cut with a keyhole saw.

The anode tuning condensers are now mounted upon their small panel, which is fixed to the frame by screws (see Fig. 17). The rheostats, which need not be insulated from the wood, for the reason already given, are fixed directly to the frame, and we are ready to continue with the wiring (Fig. 18).

Connect the positive grid-battery terminal to L.T. negative, and take a lead from the other grid-battery terminal to the single terminal which is placed just below the extra H.T. plus busbar. This lead may conveniently run along the top of the first stiffener, a space of $\frac{1}{8}$ in. or so being allowed between it and the wood. Next connect the legs of the fixed coil holders above valves 1 and 2 to the terminals provided. The second and third stiffeners are now fixed to the panel in the most convenient positions, being placed so that all three are as nearly as possible at equal distances.

THE THOUSAND-CIRCUIT BOARD.—V

Fixing the Components and Wiring

We now fix the panel to the frame by means of round-headed wood screws—do not use countersunk screws or you will probably split the plywood at the short edges.

And then comes the only stage of the wiring that is at all difficult; it is difficult simply because the sides of the frame rather cramp our efforts with the soldering-iron. Connect L.T. negative busbar

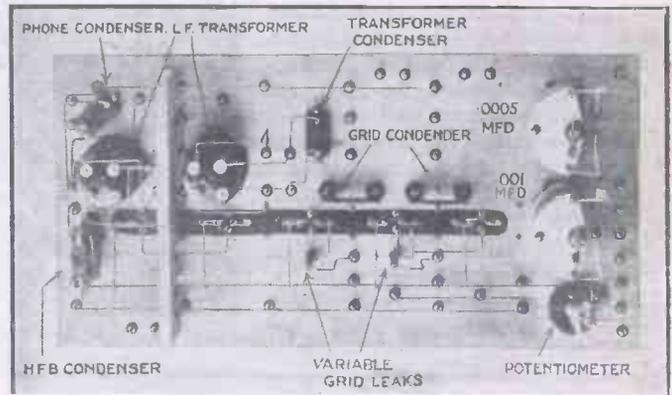


Fig. 16.—Wiring on Under Side of Panel.

to one contact of each of the rheostats, joining the other contact of the first to the wire between the negative legs of valves 1 and 2, that of the second to the negative legs of the rectifier, and that of the third to the link between the negative legs of valves 4 and 5. If five rheostats are used instead of three, each will, of course, be connected separately to its particular valve.

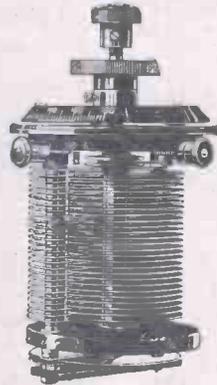
The last stage of all is to take leads from the anode condensers to the terminals, to which the coil holders above valves 1 and 2 are connected. The board is then complete, and nothing is required but to rub down the edges of the plywood with glasspaper so as to make the joints between the panel and the frame neat.

Some constructors may wonder whether it is really necessary to use the three stiffeners which have been recommended. The set will, of course, work without them, but their presence serves a double purpose. In the first place, plywood is rather inclined to warp, and even if it is quite thick the piece obtained will seldom be perfectly flat. If we fasten it to the frame merely by screws round its edges we shall probably find that it is

(Continued on page 645)



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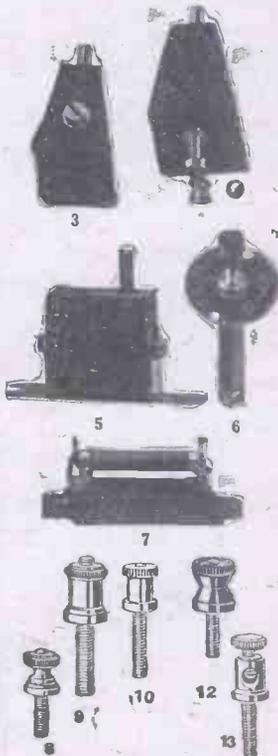
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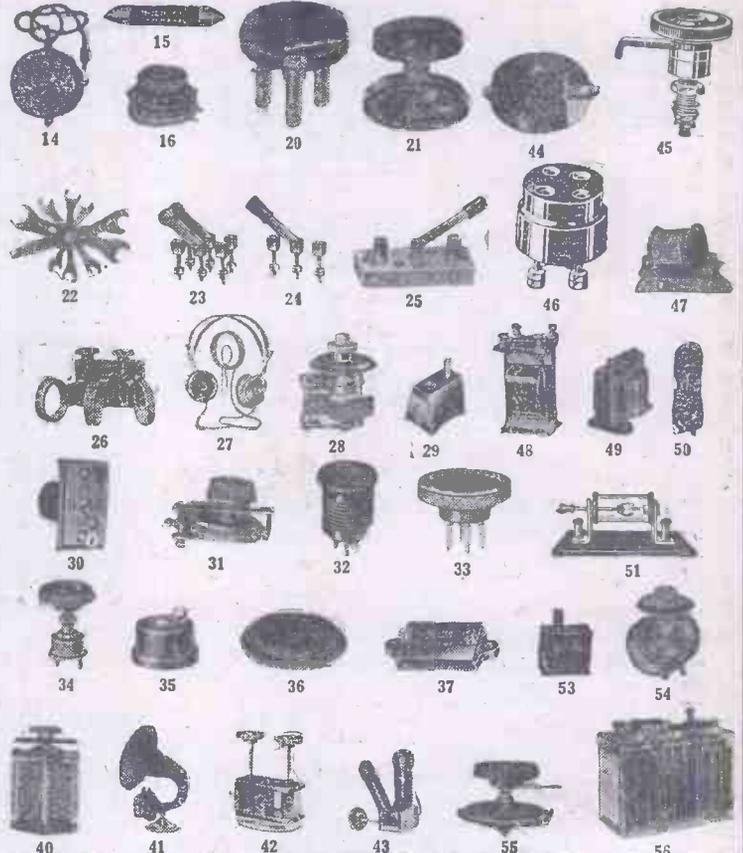
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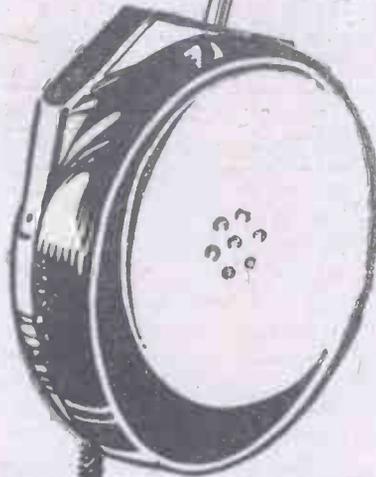
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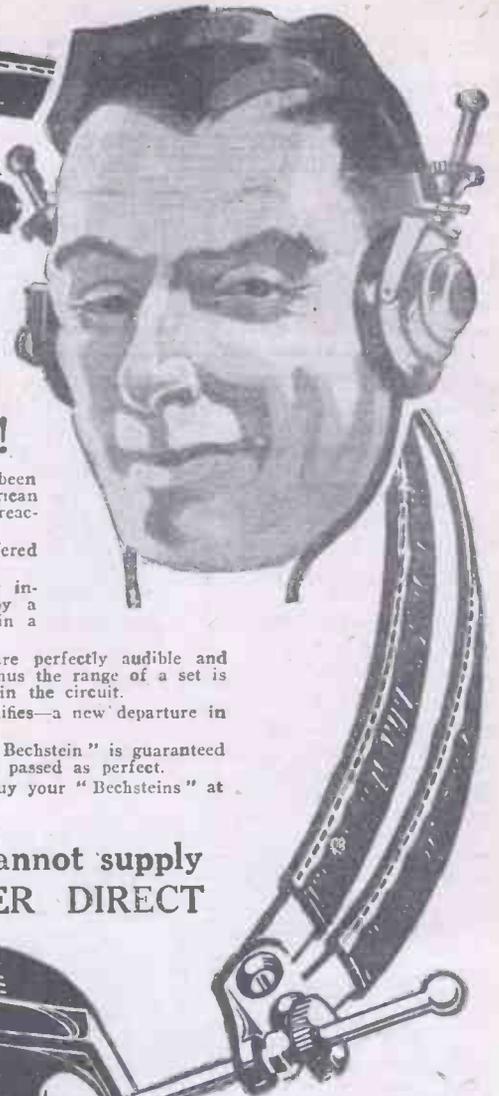
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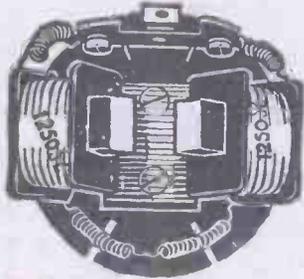
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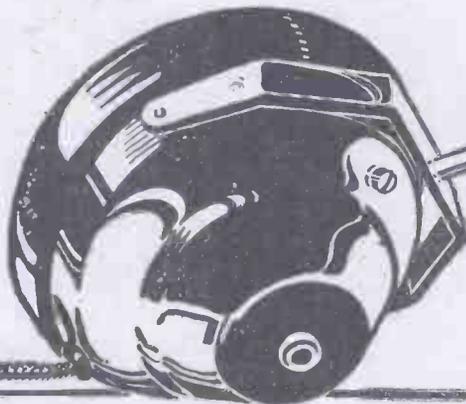


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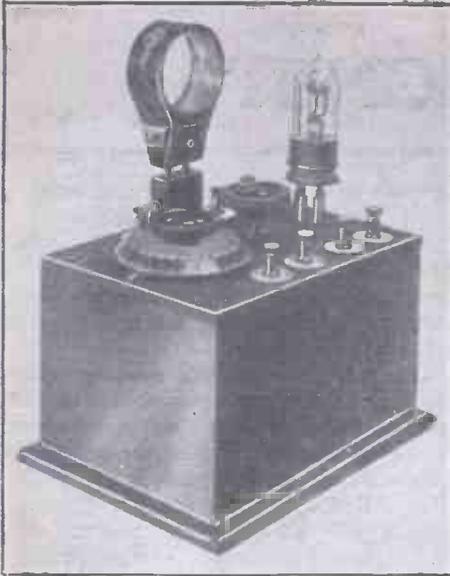
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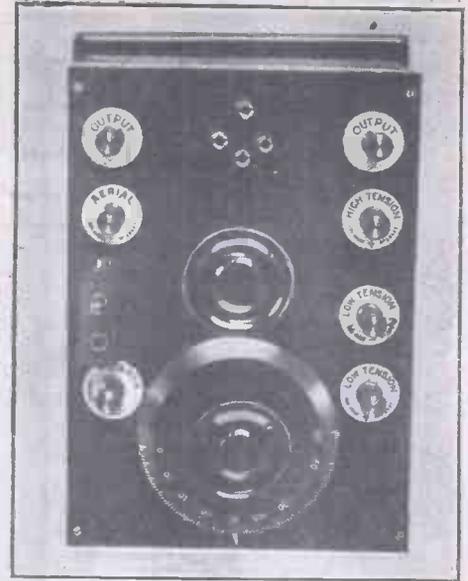
The Complete H.F. Amplifier.

ADDING THE AMPLIFIER

fication is employed, which, in the opinion of many experimenters, is more efficient than the well-known transformer coupling.

Readers who decide to construct the amplifier should obtain a hard-wood box as shown in Fig. 1 and a 1/8-in. or 1/4-in. ebonite panel to suit. Drilling details of the panel are given in Fig. 2, while Fig. 3 gives the positions of the various components. A .001-microfarad variable condenser of the one-hole fixing type is fitted in the 1 1/2-in. diameter hole; this, as an extra refinement, may be fitted with vernier attachment. The filament rheostat is of the general-purpose kind (in the set constructed by the writer a Microstat is used). The plug-in coil holder, terminals, etc., may be of any good type.

Wiring up, using the usual square- or round-section tinned-copper wire of a



Top View of Panel.

THE high-frequency amplifier described in this article has been designed for addition to any existing crystal set, and if correctly used will be found greatly to extend the normal crystal range without greatly sacrificing that purity of reception for which the crystal is unequalled.

The tuned-anode method of H.F. ampli-

gauge preferably not smaller than No. 18, should be carried out as shown in Figs. 4 and 5. Special care should be taken to space out all leads as much as possible in order to prevent possible interaction, particular attention being paid to the connections to the valve sockets.

(Concluded in third column of next page)

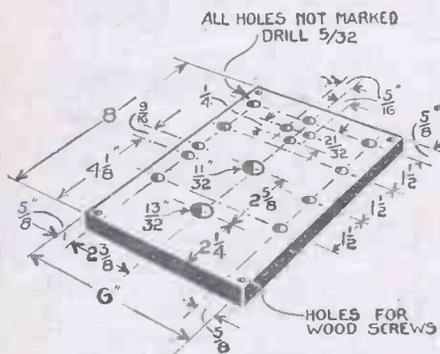


Fig. 2.—Panel Drilled.

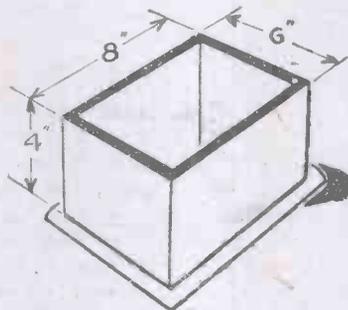


Fig. 1.—Details of Case.

Fig. 6 is shown on the next page.

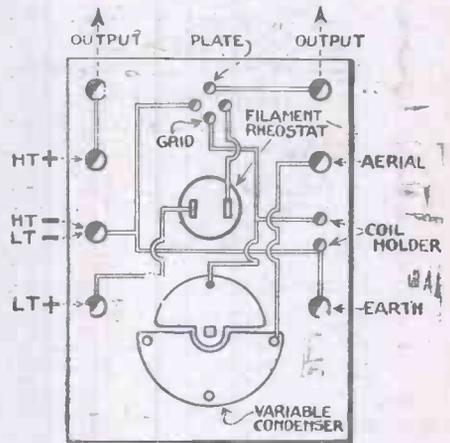


Fig. 5.—Details of Wiring.

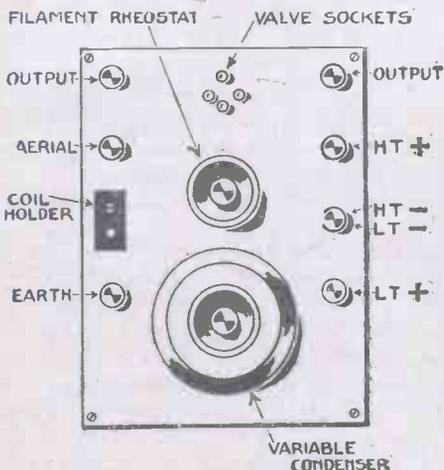
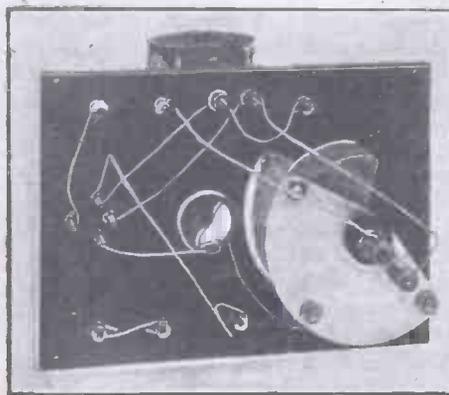


Fig. 3.—Plan of Panel.



Under Side of Panel.

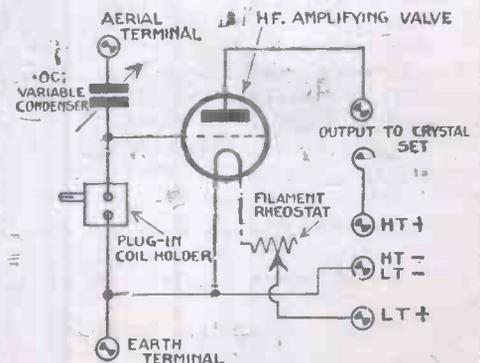


Fig. 4.—Circuit Diagram.

MUSINGS BY MAGNET



Climax Earthing Tube.

AFTER aeriels we come to "earth." I found a good earthing device at the All-British Exhibition at the Albert Hall. The device, which is shown by the photograph, is in the form of a copper pipe, with a pointed end, drilled with holes and fitted with a brass flange at the top to stand a fair amount of slopping. I have had two similar devices in use for the past eighteen months, and the idea is distinctly good.

The pattern on show could with advantage have a larger hole at the top, so that water could be poured in without slopping it over the earth terminal.

Earths are strange things, and, like sets made of soap-boxes and bell wire, often work "much better than they should." I know of an aerial which has a "lead-in" of about three feet, which part of the aerial is generally supposed to be the vital element of the collecting business. The "earth" goes upstairs, and is finally connected to a hot-water tank in the attic. And the results? They are unusually good, so excellent that I advised the user to let well alone.

Counterpoise Earths

Where circumstances allow and space is no object, I'll back the capacity or counterpoise every time. Some of the finest results I have ever obtained have been from fairly-well insulated capacities in lieu of direct earths. On one occasion a bank of area railings set in concrete gave splendid results. The railings were drilled and proper contact made by inserting a terminal. Concrete when dry is quite a passable insulator. Another type of counterpoise was made by putting five fence wires in parallel, the whole amount of wire comprising some 300 ft. Here again reception was excellent.

With regard to lightning arresters, the only really safe method of arresting lightning is to have the gap in a straight line from lead-in to earth. The usual "loop," formed when the lead comes in and the earth goes out, is just the thing to tempt high-power oscillatory currents, and the consequence is that should a really heavy charge accumulate in the aerial, the potential will leap across the loop and probably blow the side of the wall out.

Such an accumulation is naturally rare, as also are "direct hits." The average earthing arrangement is better than none, as it does keep the aerial constantly discharged, but it is not ideal by any means,

I am glad to see bright-emitters still going pretty strong. Candidly, I have never found a dull-emitter of the "nought six" type worth having. On the other hand, the former type is distinctly good.

A Personal Opinion

My own experience is that the ordinary type of dull-emitter is lacking in volume, microphonic in use, and dear to buy. I am no advocate of cheapness as such, but I do believe in getting something for the money, especially when the figure is 100 per cent. over and above that of the bright-emitter. Now if anybody has got a dull-emitter that will give equal results to the ordinary average "twelve-and-six" valve, I wish he would step right up with the dope. What a blessing the use of "getters" has been—to the makers—and what a mess these dopes make of the bulbs. In the case of dull-emitters it is extremely difficult to gauge the filament temperature and to see if the grid and filament are keeping at a respectful distance. For my own part I go for a clean bulb whenever possible, and the fact remains that one or two firms can and will take the trouble to exhaust the bulbs to a high state of vacuum without chemical wangling.

A Muse

After a wander right round the "at home" condescendingly held by the N.A.R.M. I sank into an easy chair and, after the manner of Magnet, I mused.

On the stand opposite was a type of loud-speaker I had not noticed before. The horn was a rather long funnel of square form, tapering up to a mouth of some three feet square, across which was fixed a sort of film or fine screen. As I speculated as to the purport of the device the screen lit up with a flicking light, which gradually cleared and finally resolved itself into a picture in colour. Sunshine flooded a sandy shore flanked with palm-trees, which waved and nodded in the breeze. The surf came rushing on in long rollers, which broke far up the beach with a soft muffled thunder. Beyond high-water mark lay several dug-outs, and through the palms came dusky figures, who deposited their weapons in the primitive craft and chanted as they ran the little vessels down to the water's edge. A moment's battle with the surf, the swift plying of paddles amid sharp cries from the skipper, and then a rhythmic stroke from the bronze arms and a resumption of the crooning chant as the craft swiftly passed out of the picture.

The sun went down a ball of fire, and darkness, following on the heels of day, as is the way in the tropics, brought out another flotilla with lights in the prow and Herculean arms wielding harpoons,

which now and then brought a writhing glittering victim to the surface.

The scene changed. It was Piccadilly Circus at night. Animated signs winked and flashed, advocating somebody's bread, someone else's gin and the motor-cars of yet another.

The theatres and halls were emptying, and the cries of the newsvendors and the roar of the traffic came up in an almost deafening chorus. As the various phases of the scene were revealed I read the words "Radio-chromo-scope," 1929 patents, on the side of the pavilion—and woke up. I had been asleep in the drawing-room!

MAGNET.

"ADDING AN AMPLIFIER" (continued from preceding page)

Fig. 6 illustrates the method of coupling the amplifier to an existing crystal set, which, it will be noticed, is of the parallel-condenser tuned type, the maximum capacity of the condenser being in the neighbourhood of .0005 microfarad.

Readers who desire to use crystal sets of the slider or tapped-coil types should shunt the turns included, or in the case of variometer-tuned set the whole wind-

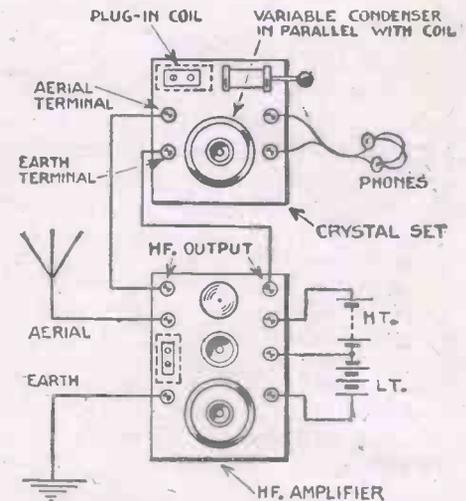


Fig. 6.—Method of Connecting Amplifier to Crystal Set.

ing, by a fixed condenser of .0002 or .0003 microfarad capacity.

A series-tuning condenser in a crystal set must, of course, be short-circuited or altered to the parallel position in order to allow of the free passage of the H.T. current in the amplifier circuit.

In tuning the combined amplifier and crystal set, as the aerial-tuning inductance value is increased or decreased the tuned-anode turns or inductance—that is, the inductance across the crystal detector and phones—must be increased or decreased simultaneously.

R. N. W.

PRACTICAL ODDS AND ENDS

Basket-coil Tip

WHEN making cardboard basket-coil formers one segment should be cut about an inch longer than the rest and a small hole made in it. This segment serves to mark a complete turn when winding,



Useful Tag on Former.

to hold the coil when shellac is being applied to it, and to hang it up when being baked.

It is also sometimes useful when mounting the coil. N. N.

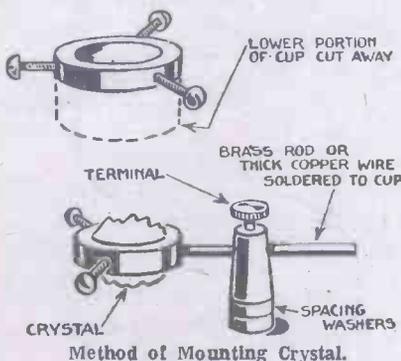
Soldered Connections

NO set is really as efficient as it might be until all the connections are soldered. When soldering use as little flux and solder as possible—better joints will result. The best flux for electrical work is resin. S.

Mounting Crystals

A NEAT method of securing a crystal so that either side can be brought into contact with the catwhisker without altering the setting of the crystal itself is shown by the diagram.

The lower portion is removed from an ordinary crystal cup by means of a metal saw or a half-round file. One of the



Method of Mounting Crystal.

clamping screws is then removed and is substituted by a brass rod or copper wire, which is held in a phone-pattern terminal attached to the base of the set. This is clear from the diagrams. R. N. W.

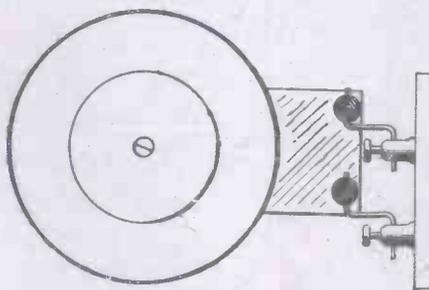
Valve Hints

NEVER leave valves lying about on a bench; put them in boxes when not in holders on a set. Clean valve legs and sockets periodically; the surfaces become oxidised when exposed.

Use the recommended value of H.T. and L.T.; do not overrun the filaments. A small fuse in the filament circuit may save you many shillings. Valves do not last for ever; the filaments all burn out sooner or later. R.

Coil Mounting

THE following method of coil mounting is efficient and easily accomplished. Basket coils are mounted by clamping them lightly between a strip of thin ebonite about 5 in. long by 1½ in. wide and a circular piece of cardboard. At the end of the strip two small phone terminals are fitted 1 in. apart with the wire holes in



Method of Coil Mounting

line. The ends of the wire forming the coil are clamped under the terminal nuts as shown.

The coil stand consists of a pair of phone terminals mounted on a piece of ebonite attached to the side of the cabinet, or direct on the panel if it is vertical or nearly so. The holes should be vertically in line, and a piece of stiff wire, shaped as shown, should be tightly clamped in each terminal. R. H. B.

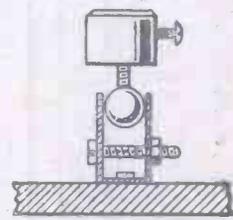
Short-wave Reception

FOR receiving on wavelengths of the order of 50 to 100 metres a long aerial is of no advantage over a short one—in fact a short wire will give better results. A loose-coupled tuner can be used, and the primary of this need not be tuned.

Between fifteen and twenty turns will be needed for 100-metre reception. The condenser for tuning the secondary should not be larger than .0005 microfarad, and a vernier adjustment should be provided for ease in tuning. D.

Crystal Holder

IT is frequently a matter of difficulty to explore the whole exposed surface of a crystal when using the ordinary type of crystal detector—that is, with single ball



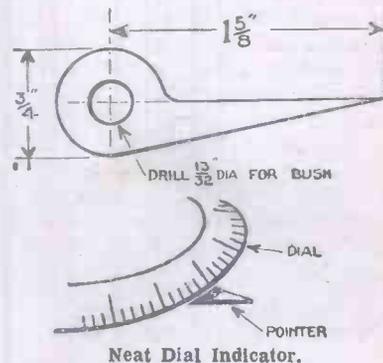
Improved Crystal Holder.

joint on the catwhisker arm. The following is a simple method of overcoming this trouble.

The crystal cup is provided with a ball-and-socket joint, so that the top or sides of the crystal may be exposed to the catwhisker. A steel cycle ball (¼ in.) soldered to a short piece of threaded rod may be utilised, while springy strip brass, bored and bent to shape, will provide the socket. If preferred, the ball joint of a bought holder may be adapted to serve the same purpose. W. W.

Dial Indicator

A DIAL indicating pointer which is clamped in position by the nut holding the variable condenser or variometer to the panel is shown below. Made preferably of white ivory or aluminium, the pointer is adjusted to its permanent position before tightening up the nut.



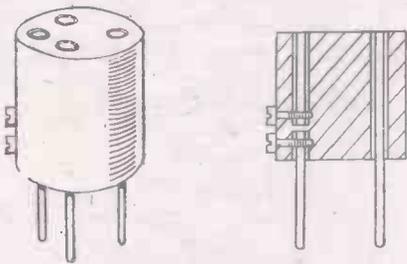
Neat Dial Indicator.

The dimensions given are for the standard size bush and dial. If other size parts are used the length of the pointer and diameter of the centre hole will have to be modified. R. N. W.

PROGRESS AND INVENTION

Adding Grid Bias

IT is well known that to get the best results from a low-frequency amplifying valve grid bias must usually be applied. The adaptor shown in Patent No. 221,571/24 (W. E. H. Humphrys, of Hendon, Middlesex) enables the operator



Adding Grid Bias (221,571/24).

to do this without making structural alterations to the set.

In use the adaptor is placed in the valve socket proper and the valve placed in the adaptor, the desired bias being easily applied.

The Kathodophone

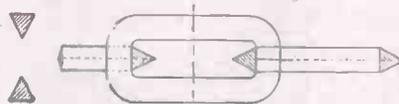
KNOWN as the kathodophone, a recently developed German microphone makes use of the fact that free

electrons are given off from the surfaces of certain oxide-coated metals when in a rarefied gas, this holding good in normal air pressures.

The usual high velocity of the electron is not apparent, however, for the free electrons settle on air molecules and become ions. If the glowing oxide body is made the cathode, the ions will drift comparatively slowly to the anode and thus become current carriers affected by speech waves in the air.

Aerial Insulators

WHETHER in reception or transmission, aerial insulation is an all-important point. Direct conduction and dielectric absorption losses must be avoided. In Patent No. 221,242/24 (W. J.



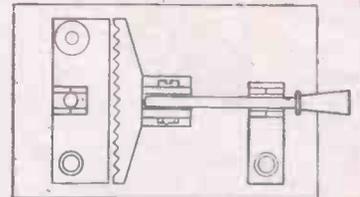
Aerial Insulator (221,242/24).

Polyblank, of the Air Ministry, London) it is proposed to use insulators made of a number of links in series, which are connected together with approximately point, knife-edge or line contact.

The links may be made of glazed porcelain, ebonite, or other insulating material. If they are made to twist relatively to one another the freeing of snow or other accumulations is facilitated.

Earthing Switch

TO combine as a single unit an aerial earthing switch, lightning and static spark-gap arrester, terminal block and



Earthing Switch (221,618/24).

lead-in tube is the object of Patent No. 221,618/24 (E. A. Brennan, of Hampstead, N.W.6), "thus economising space and time, reducing trouble, expense and damage to decorations; also affording protection to operators and instruments from lightning and static charges arriving upon aerials in or out of use at any time." The arrangement is clear from the diagram reproduced above.

AROUND THE SHOWROOMS

Murray Valve Holder

THERE are a number of excellent points about the new Murray valve holders of which every amateur should make note. Briefly they consist of four metal sockets, placed in the panel separately, which are covered by a disc of ebonite that is provided with holes for accommodating the valve. The result is that they lie practically flush on the panel.

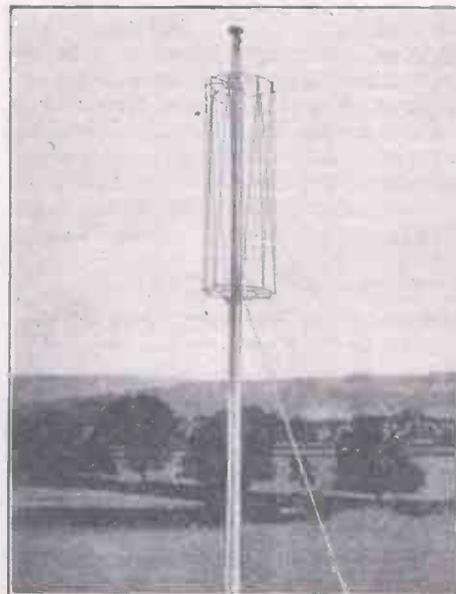
Clearing holes only have to be drilled, and the disc acts as a template. No nuts are required, as connections to the sockets are kept in position by set-screws. These holders, which sell at 1s. 3d. each, are made by Murray, Son and Co., of 387A, High Road, Tottenham, N.17. Each holder is supplied mounted on a card with full directions.

Novel Aerial

It seems that the good old 100-ft. single-wire aerial is gradually being superseded by more up-to-date types which take up less space. Such an aerial is shown by the photograph; this is made by Mr. H. Ashton, A.M.I.E.E., of 8-10, Bull's Head Chambers, Hopwood Avenue, Market Place, Manchester.

This aerial comprises seventeen vertical

loops, each 5 ft. 10 in. long, connected in series. The loops are laced on porcelain bobbins between galvanised-iron spreaders, the lead-in being taken from the bottom spreader. It is claimed that such



Ashton Aerial.

an aerial gives excellent results where space is limited and only one pole can be used.

Milophone Supertone Crystal

SUPPLIED carefully protected with cotton wool and enclosed in a glass tube, Milophone Supertone crystal has a "clean" look about it that leads one to suspect that it will give good results. Nor is one disappointed in this direction; a specimen that I tested gave excellent signals, and sensitive points were not difficult to find. This crystal is supplied by the Bancroftian Co., of 78, Bishopsgate, E.C.2.

Newey Snap Terminals

NOWADAYS everybody is in a hurry to get things done and wireless enthusiasts are no exception. The most pressing need is for a device that simplifies the changing of connections; a number of such devices have made their appearance recently.

The latest is the Newey snap terminal, which takes the form of a stud fixed on to a panel and a socket connector that fits over this. The principle is that employed for snap dress fasteners and results in a method of quickly changing connections when desired.

VANGUARD.

EXPERIMENTAL TRANSMISSION.—II

AERIAL EFFICIENCY

LET us now consider aerial efficiency from another point of view. Where I_t = current in transmitting aerial (amperes). I_r = current in receiving aerial (amperes).

shown by Fig. 4, but the effect of aerial capacity is not great, and the effects will only be touched on as found necessary. The fundamental wavelength of the standard L-type aerial is 4.6 (approx.)

along an oscillating unloaded antenna, for it is not generally realised that the voltage is greatest at the free end. In Fig. 5 E = voltage and I = current. The distance from aerial shows increase.

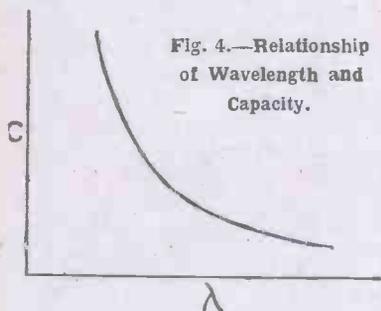


Fig. 4.—Relationship of Wavelength and Capacity.

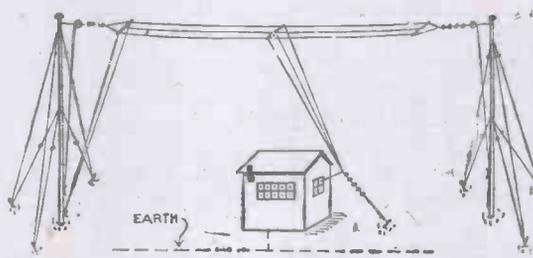


Fig. 6.—Arrangement of T-type Aerial with Direct Earth Connection.

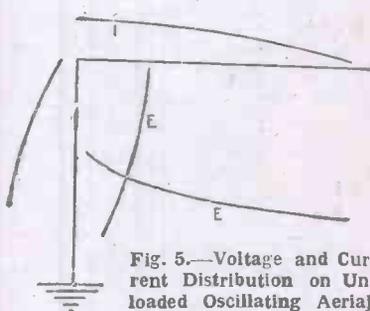


Fig. 5.—Voltage and Current Distribution on Unloaded Oscillating Aerial.

h_t = effective height of transmitting aerial (kilometres).
 h_r = effective height of receiving aerial (kilometres).
 R = total resistance of receiver (ohms).
 d = distance of stations apart (kilometres).
 λ = wavelength (kilometres).

$$\frac{h_t I_t}{\lambda} = \frac{d R I_r}{377 h_r}$$

The left-hand side of this equation is dependent on the transmitter, and it will be seen that, as in the formula for R_r , the transmitting aerial should be as high as possible; it will also be evident that the transmitting current should have as large a value as possible.

It would again appear from the position of λ that greater received current, and hence greater range, is obtained on short wavelengths. Absorption effects, however, tend to counteract this ideal state. The formula is correct in that for short distances a greater value of I_r is actually obtained; but it cannot be increased with a proportional diminution of I_r owing to absorption effects.

Transmission Formula

We have as yet no proof of the validity of the Austin transmission formula on these short waves and for long distances.

The power actually in the aerial is equal to $I^2 R$, where I is the aerial current, measured at the point of maximum current, that is, the earth lead. R is the radiation resistance. As mentioned before, this $I^2 R$, the power radiated, must be as large a percentage of the input power as possible. This percentage is known as the "per-cent. efficiency" of the transmitter, and, needless to say, should be the maximum. 0.85 efficiency is obtained by many commercial stations, while 0.7 should be obtained by most amateur transmitters.

The capacity of an aerial varies with the wavelength (a fact not often realised), as

times its length in metres from the free end to the lower capacity. It will be seen that at or near the fundamental, R_g and R_d are at minimum, while R_r is theo-

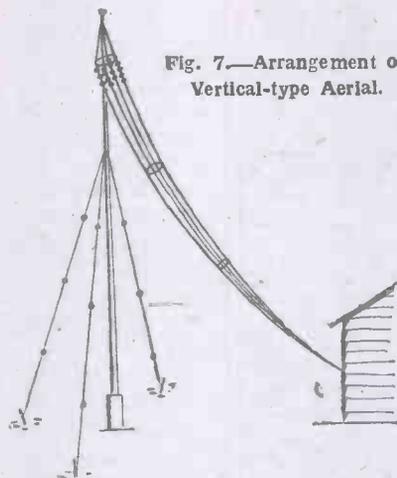


Fig. 7.—Arrangement of Vertical-type Aerial.

retically infinite, and so it appears that if the transmitter can be worked on its fundamental without loss, it is working at the most effective point. In most cases, how-

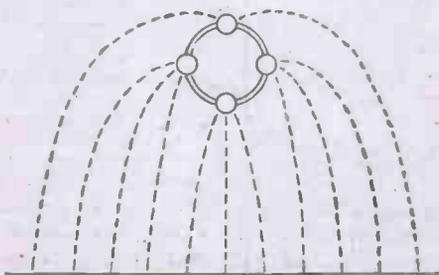


Fig. 8.—Electrostatic Field of Cage Aerial.

ever, it does not seem that any advantage is gained, since the condensers generally used are the seat of further losses.

It may be interesting to note the relative magnitude of the voltage and current

Practical Considerations

Sufficient theory has been now dealt with to show that the type of aerial used for broadcast reception is highly inefficient when employed for transmission purposes.

It would, of course, be futile to offer suggestions for the actual aerial construction and erection to those who are about to take up the more advanced side of wireless; but it is desirable, having enumerated the essential points of radiating system design, to point out the various types and their separate advantages.

Let us deal with the upper capacity first. The most suitable radiation for the wavelength band allotted to the amateur would consist of a metallic sphere having a radius of about 70 ft. and suspended at a considerable height from the ground. The writer cannot remember having seen a garden adorned by this ideal type. Omitting freak aerials (generally theoretically incorrect and practically unworkable) and special designs (dealt with later), we are left with the three types—that is, the inverted L- and T (Fig. 6) and vertical aerials (Fig. 7). Any of the three may consist of a number of parallel wires on horizontal spreaders or of the cage type, so popular in the U.S.A. Before deciding which of these three types is most efficient let us consider whether the flat-top or the cage type is the more preferable.

Fig. 8 shows a diagram of the electrostatic field that surrounds a cross section of a cage-type of antenna. Notice that all the wires have approximately the same number of lines of force connected to them; all wires are worked at the same efficiency. This type of aerial is also efficient because of its tubular construction, for it is well known that owing to "skin effects" the metallic tube is the most suitable and efficient conductor of high-frequency currents.

KENNETH ULLYET.

(To be continued)

THE object of the writer in designing and constructing this set was to meet the demand of the members of his family for a means whereby they could enjoy the programmes broadcast from 2 L O without being dependent on the rather complicated manipulation of the four-valve experimental set already available in the house,

but which could only be operated properly by the experimenter himself.

It was decided, therefore, to construct a set capable of operating a loud-speaker in an average-sized room situated about thirty miles from one of the main broadcasting stations, and possessing the following advantages: Neat in appearance, simple in construction and operation, low in cost and economical in upkeep, absence of complicated controls, proof against damage to valves and batteries when operated by inexperienced hands and true distortionless reproduction of speech and music. Truly an exacting ideal! Nevertheless, the set described and illustrated in this article fulfils all these conditions, and the writer can confidently recommend other experimenters, faced with similar demands, to construct such a set or, at any rate, to produce something on similar lines.

For the benefit of those readers of this journal deciding to construct this set who are unable to follow a theoretical circuit diagram (Fig. 1), a special wiring guide (Fig. 2) is included.

The Box

The case (see Fig. 3) is made of 3/8-in American whitewood, stained dead black and polished with ordinary french polish to which has been added a little gas black. A not too highly polished surface gives the article a real ebony appearance. Provided the wood is well trued up, the box can be assembled by means of countersunk screws, the holes in the wood being neatly filled in before

polishing. The loose lid or door consists of three-ply wood, framed with fancy beading of sufficient thickness to allow for the insertion of a small ball catch at the bottom edge of the lid; the top edge merely rests against a thin strip of wood fixed inside the opening of the box. By this means the lid is easily slipped into position when the set is not being used, the ball catch keeping it secure. This form of loose lid was found preferable to a hinged door in many ways, one being that it can be placed right out of the way when the set is opened for use.

The Panel

This is of good-quality matted ebonite 1/8 in. thick. It is fixed at right angles to the baseboard by means of two metal angle brackets or wooden supports. The panel should, of course, be drilled, as shown by Fig. 4, before being fixed to the baseboard. The absence of brass parts on the front of the panel enhances the latter's appearance, and the following devices have been adopted to achieve this end.

The connections for aerial, earth, loud-speaker and accumulator are ordinary valve sockets treated with black enamel, except, of course, at the threaded portions and the fronts where contact is required. Plug connections for the loud-speaker and

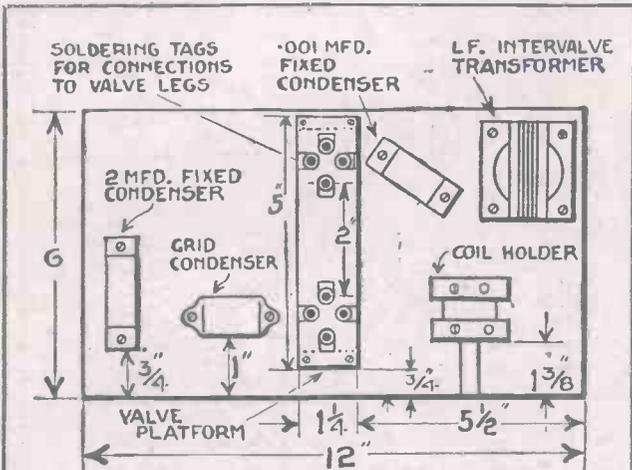


Fig. 7.—Arrangement of Components on Baseboard.

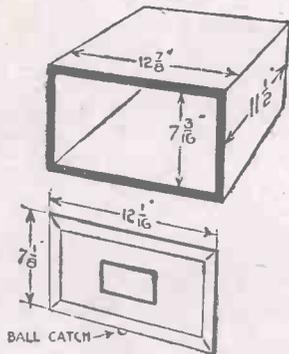


FIG. 3

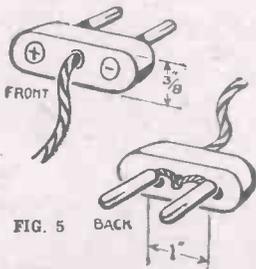


FIG. 5 (right).—Plug Connectors.

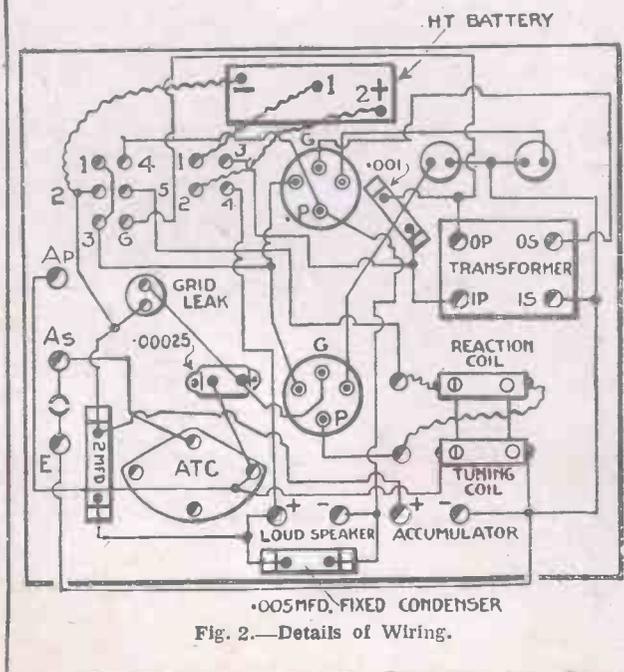


Fig. 2.—Details of Wiring.



The Receiver in Use.

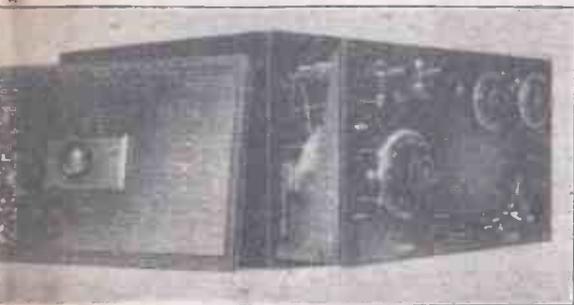


The Panel

A FAMILY BROADCAST RECEIVER

IN SIMPLE FOOL-PROOF LINES

The Making of an Ideal Two-valver



The Receiver Partly Open.

accumulator are illustrated in Fig. 5. This arrangement not only provides quick connections and a smart appearance, but accidental short-circuiting becomes practically impossible when the accumulator leads are hanging loose. This form of plug is easily made from scrap ebonite, drilled and tapped to a sufficient depth to receive short valve pins and nuts to which the connecting wires, after being passed through the small hole in the centre, are secured. The heads of the screws fastening the panel to the baseboard and supports are also enamelled black; and the labelling is done with the white-on-black variety obtainable in celluloid strips. The whole presents a pleasing black-and-white effect.



Case.

The valve window is merely a hole $\frac{3}{4}$ in. in diameter, with a piece of plain glass secured at the back of the panel by means of Chatterton's compound.

With regard to the switches, the key pattern with black ebonite levers has been adopted by the writer, but this is a matter of individual taste. The circuit diagram shows the ordinary panel switch, but the constructor desiring the most efficient and convenient switch should obtain the latest anti-capacity type with the black ebonite lever.

The series-parallel arrangement, illustrated in Fig. 6, requires no further ex-

planation except perhaps with regard to the brass strips. These should be fairly wide and the ends at the plug hole should be slightly shaped and turned back to facilitate the insertion and withdrawal of the plug. The latter can be made from any scrap piece of metal rod of fairly large diameter, with a small ebonite knob affixed thereto.

Baseboard

Fig. 7 shows the distribution of the various components required on the baseboard, all other parts of the set being fixed to the panel. The board should be fixed to the panel before finally arranging the position of the coil holder;

the two-coil holder in the writer's set is of the vertical or V-type, which, placed in the position shown, allows for the use of either honeycomb or basket coils without fouling any other component. If any other type of holder is to be used, the distribution of parts on the board will probably require a little modification.

The ebonite valve platform, which is screwed to two narrow strips of wood of sufficient depth to raise the ebonite just high enough to prevent the nuts of the valve sockets touching the baseboard, is secured from underneath by means of countersunk screws. Care should be taken that these, or any other screws used on the baseboard, do not project underneath and so interfere with the smooth withdrawal of the instrument from its box. Ordinary valve legs are used, with copper tags at their bases to which the wire connections are soldered.

It will be seen from the dimensions of the base-

board and box that when the instrument is pushed far enough inside the latter to allow the loose lid to fit flush with the front, a space of about 4 in. is reserved at the back of the box for the H.T. battery. It is obvious, therefore, that flexible leads sufficiently long to allow for the withdrawal of the instrument

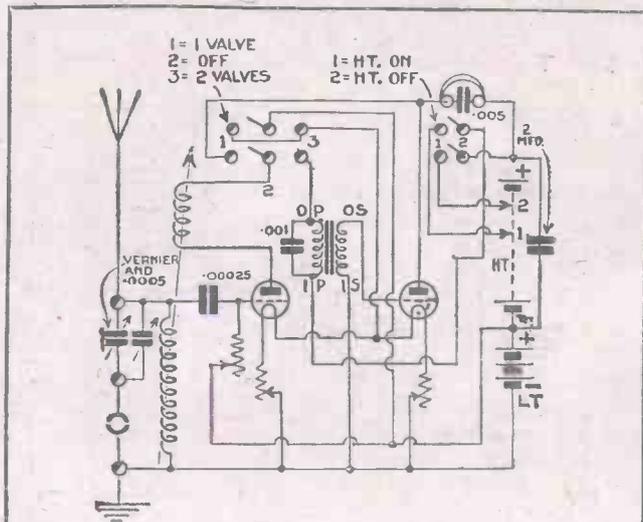


Fig. 1.—Circuit Diagram.

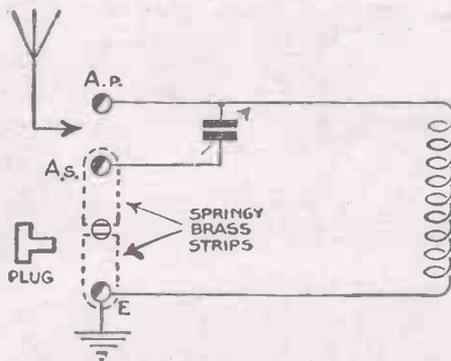


Fig. 6.—Series-parallel Connections.

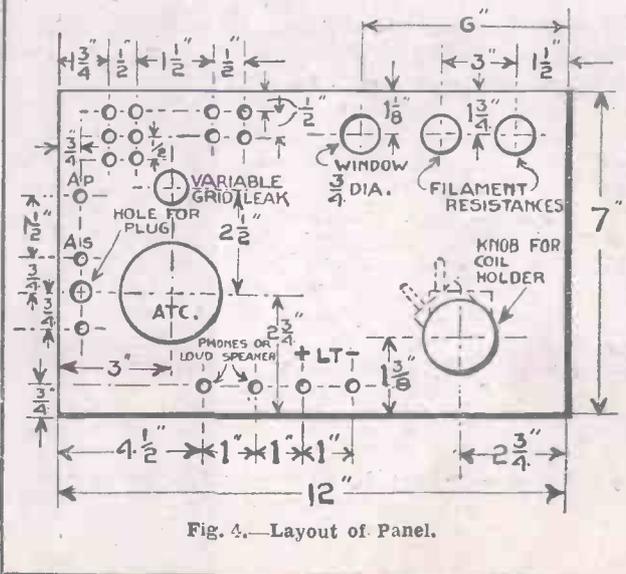


Fig. 4.—Layout of Panel.

must be used for the connections to the battery. These should be three in number, one for the negative and two for the positive, the two latter having their wander plugs numbered 1 and 2 respectively, as shown on the circuit diagram and wiring guide. When two valves are in use, No. 1 (feeding the detector) plugs into the lower voltage, while No. 2 (feeding the amplifier) plugs into the higher voltage—45 and 66 volts respectively in the case of DE3 valves, as used by the writer. When the detector valve only is in use, No. 1 wander plug can be left disconnected and No. 2 shifted to the 45-volt socket of the battery.

Miscellaneous Notes

A good variable condenser suitable for this set is Raymond's one-hole-fixing type of .0005 microfarad capacity, having a three-plate vernier controlled by a small knob on top of the knob proper. This condenser is cheap, takes up little room and is very efficient.

A carbon-granule type of filament resistance (the Microstat) controls each valve; and once the setting of these resistances has been found it is seldom necessary to touch them, as the switch on the panel puts the filament current on or off as required. When, however, it is desired to use the detector valve only, the filament current to the second valve should be turned off at the right-hand resistance.

The L.F. transformer should be carefully selected. An alternative position for the fixed condenser is across O.P. and I.S., instead of across I.P. and O.P., but this depends to a great extent on the nature of the valve and of the transformer; therefore both should be tried before finally soldering the connections. A negative grid bias on this set is not considered necessary.

Dull-emitter valves are recommended, preferably of the 06 variety. A 6-volt 20 ampere-hours (actual) accumulator will last fully a month on one charge with two such valves, working them from three to four hours daily.

The variable grid leak should be carefully set, having detector the valve only and a pair of headphones in use when doing so, until clear undistorted speech is obtained. After that it need not be touched unless, of course, the valve is changed.

A word or two in conclusion about wiring the set. The amateur constructor who knows how to use a soldering-iron successfully is advised to solder all connections; one not experienced in the art of soldering should confine himself to nuts well screwed home. Soldered connections are undoubtedly better, but a well-tightened nut is far more reliable than a badly-soldered joint. J. H. W.

Please mention "AW" when you write to Advertisers.

ANOTHER EXHIBITION

A WIRELESS exhibition is to be held at the White City, Shepherd's Bush, London, W., from November 15 to November 29 inclusive.

Many of our readers will be aware that the firms who exhibited at the recent exhibition at the Albert Hall were mostly members of the National Association of Radio Manufacturers, which organised that exhibition for its own members only. The choice of exhibitors was the affair of the association, and they were therefore able to include or debar whom they wished. This being the case, many firms were unable to show the public their goods.

Free to readers of
"Amateur
Wireless"

A Copy of

"The Amateur Mechanic"

Edited by Bernard E. Jones. The contents of this money-saving weekly for handy men are always Practical, Reliable and Straightforward. Week by week it gives just the kind of advice on the thousand and one domestic jobs and hobbies which every handy man or woman needs to ensure the best results from his or her work. Whether you own only a few simple tools or a fully equipped workshop, "The Amateur Mechanic's" weekly help will make all the difference to your pleasure and your success, and will show you how to make and save money by using your spare time profitably.

Send a postcard with your name and address to the Editor, "Amateur Mechanic," Room 97, Cassell's, La Belle Sauvage, E.C.4, and a free copy of this practical weekly will be forwarded to you post free.

Feeling that the public desire to see all that the industry has to show instead of the products of a section only, Radio Exhibitions and Wireless Conventions, of 46, Cannon Street, London, E.C., are organising an exhibition, which will be open to the entire British industry regardless of associations.

Without doubt everything that is new will be seen on the various stands, and the exhibition will be a really representative show of the entire industry. One point which will make a special appeal is the attention that the organisers are giving to catering for the home constructor. Component parts will take an important place in the exhibition and many new ideas will be shown.

The new Copenhagen station has not yet definitely fixed its wavelength, but tests and concerts are being given almost daily.

Haeren (B A V) now transmits every Monday at 13.00 G.M.T. a short survey of aerial traffic with Belgium during the preceding week.

BRIDGING 12,000 MILES OF SPACE

How English Amateurs Communicated with New Zealand

SOMETHING of the romance of Senatore Marconi's first "S" signals across the Atlantic has been recalled during the last fortnight by the accomplishment of two-way communication between English and New Zealand amateurs. On this occasion the amateur has shown the professional what short-wave transmissions can do, and, although still in the nature of freaks, too much attention cannot be given to the results that have been achieved. If short-wave signals have travelled 12,000 miles once there seems to be no logical reason why they should not do so again.

To Mr. E. J. Symonds (2 O D), of Gerrards Cross, goes the honour of being the first English amateur to hear a New Zealand station and also the first amateur to have his signals received in that Dominion. For reception this enthusiast uses a four-valve super-heterodyne set and transmits with an input power of only 105 watts on a wavelength of about 90 metres.

"ZAAA Calling U6ARB"

Whilst listening at 6.30 a.m. on Thursday, October 16, Mr. Symonds heard the call sign Z4AA, which was transmitted for half an hour. Z4AA was calling U6ARB, an American amateur station, on a wavelength of 80 metres. The New Zealand station is operated by a Mr. F. Bell, of Waihenno, Dunedin.

On Friday 2 O D transmitted test signals to Z4AA on 95 metres, and it was afterwards learnt that these were received strongly in New Zealand. Mr. C. W. Goyder, using the set at Mill Hill School (Z S Z) established two-way communication with New Zealand for an hour early Saturday morning. Thus the feat of exchanging messages across the world was achieved.

Afterwards Mr. J. A. Partridge (2 K F), of Merton Park, and Major Secretan (5 L F), established two-way communication with New Zealand. It seems that conditions were favourable in other countries than England, for an amateur in the Pyrenees is reported to have received messages regularly from New Zealand and Australia.

Dawn and Dusk Overlap

It is thought that communication was only possible because of the overlap of dawn and dusk in both countries. In every case signals were best between 6.0 a.m. and 7.0 a.m., and 6.30 a.m. in England is approximately 6.0 p.m. in New Zealand.

The New Zealand Prime Minister, Mr. Massey, has congratulated both Mr. Bell, of New Zealand, and Mr. Goyder, of Mill Hill, on their achievement, which he characterised as a very important event in the history of wireless—as, indeed, it is.



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, lay-outs, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 663).

Condenser Losses

Q.—Recently I came across the word "hysteresis," evidently used to cover losses in condensers. What losses do condensers have?—A. K. (Wimbledon).

A.—Condenser losses may be put down to resistance losses in the plates. Resistance losses are very low in parallel plate condensers. Leakage over the edges of the plates and conduction currents through the dielectric are two other losses to which condensers are subject.—D. R.

L.F. Transformer Terminals Unmarked

Q.—I have a low-frequency transformer with the four terminals mounted on a strip of ebonite on the top of the transformer. These terminals are unmarked, however. Is there any method whereby I may find out which is the primary and which the secondary of the transformer?—F. F. (Leith).

A.—You may make the following test with a small dry battery and a pair of phones. Connect one transformer terminal to one

phone lead, and the other phone lead to one terminal of the dry battery. Another connection must be made from the other side of the dry battery to the three remaining terminals of the transformer in turn. You will hear a click in the phones when a complete circuit has been made through one of the windings of the transformer. Note how loud the click is heard in the phones. Now connect the phones and battery across the other pair of transformer connections and note the loudness of the click in the phones. The winding which gives the louder click is the primary, the other winding, of course, being the secondary.—D. R.

Charging Accumulators.

Q.—With reference to your article on the accumulator appearing in "A.W." No. 120, I am desirous of charging my accumulator from the house mains if possible. Unfortunately my house is supplied with A.C. Is it possible to apply the principle of your sketch to this case? If not, please inform me what

is required to alter the current from A.C. to D. C.—S. B. H. (Bristol).

A.—The method of charging accumulators from direct current is quite different from that of charging from alternating current. Unfortunately you have omitted to give the voltage and frequency of your supply, without which it is impossible to give details for the construction of a suitable static transformer. Besides a transformer you will need a rectifier. Particulars of charging accumulators will be found in the "Work" Handbook "Electric Accumulators" (1s. 8d. post paid).—D. C. R.

Flux for Electrical Connections

Q.—What sort of flux should be used for soldering the wires to the terminals of a wireless set?—Q. (Islington).

A.—Resin is the most suitable flux for all soldered connections in electrical work. Spirits of salts should never be used, as the soldered part will soon corrode under the chemical action of these salts on the metal.—H. R.

SIMPLE CRYSTAL CIRCUITS

WHATEVER kind of crystal circuit is used, the aerial and earth system is of the utmost importance, for it is almost entirely on the efficiency of this part of the installation that good results depend.

Normally the catwhisker side of the crystal detector is connected to the aerial end of the tuning coil. It is desirable that the coil itself should be wound with thick wire, so that the resistance to high-frequency currents is low.

In all the circuits shown the phone condenser (which should not be omitted) should have a value of approximately .004 or .002 microfarad.

Good insulation is an important factor in getting strong crystal results, and the cost of a few square inches of good ebonite should not be begrudged. It is true that dry wood is a good insulator, but it is safer to use ebonite.

In wiring up any of the sets the resistance should be kept as low as possible. This means that leads should be kept short and made with thick wire. Attention to details such as these makes a great difference in the results obtained. Never be satisfied with signals that are merely "good enough."
D. S. R.

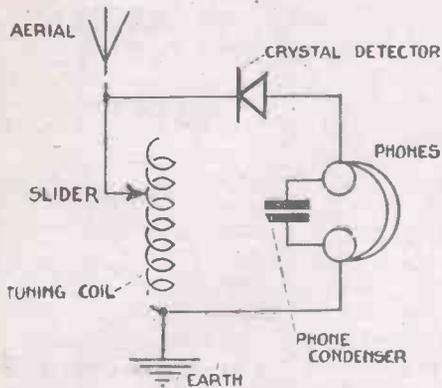


Fig. 1.—In this circuit use is made of a tuning coil with one slider, which is very simple to adjust. The crystal detector is first adjusted and the slider moved up and down.

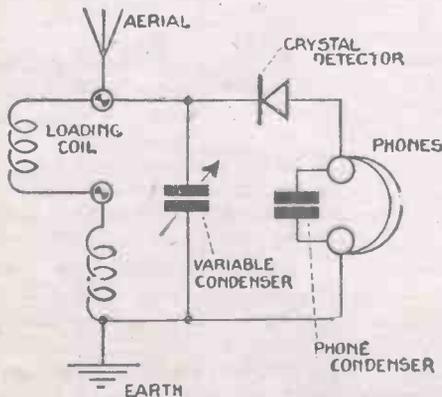


Fig. 3.—Should it be desired to receive on long wavelengths, a loading coil can be inserted as shown above. Note that the variable condenser is connected across both coils.

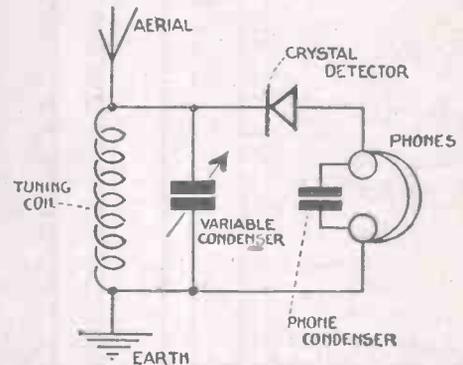


Fig. 2.—Here tuning is effected by means of a coil and variable condenser. The latter should have a value of .001 or .0005 microfarad. Adjustment is made by turning a knob.

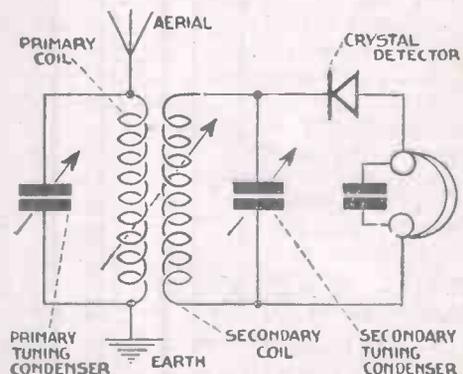


Fig. 4.—This circuit should be used where interference is experienced from other stations. The primary tuning condenser should have a value of .001 microfarad and the secondary condenser of .0005 microfarad.

A GREAT EVENING WITH WGY

THE AMERICAN SEASON BEGINS

THE darker nights are, of course, by far the best for general wireless reception. For some reason which is at present unknown November and December are out and away the best months of the year for receiving Transatlantic broadcasting. It is possible to hear American stations at other times of the year—in fact, the writer actually picked up two of them on midsummer night this year—but at no time can you rely upon such steady and uninterrupted reception as during the two months mentioned.

With a Single-valver

I believe that it is now possible for anyone who possesses an efficient valve set, even if it only a single-valver, to hear American broadcasting, if not regularly, at any rate upon specially favourable nights. One further proviso must be made: it is essential that both the aerial and earth should be thoroughly good. Of this we will speak more in detail in a moment. There is no need to get down to the very short waves—in fact, to reach the 68 metres upon which KDKA is now transmitting is quite beyond the powers of all sets but those constructed with special attention to the elimination of stray capacities and unnecessary resistance.

The powerful station WGY transmits upon 380 metres, which brings it well within the compass of any broadcast receiver. Nor is it necessary to sit up all night, as used to be the case, for you can now pick up WGY as a general thing about midnight, and sometimes, if he is doing an early afternoon transmission—remember that New York time is seven hours behind our own—you can get him almost as soon as our own broadcasting stations close down.

The Conditions

What conditions make a specially favourable night? In the first place, we want one when atmospheric are not bad. You can easily tell whether this is the case by means of your reception of British stations during the evening. Secondly, there are certain nights, as you have probably noticed, when near-by stations seem to take on added strength and clarity whilst distant ones, which cannot be picked up in the ordinary way, come in quite well.

If you are thinking of sitting up for America one night, make preliminary tests by tuning in the most distant British or European station that is within your range, and do not bother to stay awake beyond your normal time unless you find that reception is really good. Reference to my diary shows that the best results from

America have been obtained on the whole on thoroughly dirty nights, the kind of night, I mean, when rain is coming down in torrents from a pitch-black sky and the wind is blowing half a gale. The barometer, too, seems to give a fairly good indication of what one may expect. If it is quite steady, and if there have been no violent variations in the temperature during the preceding twelve hours, atmospheric are usually not very bad. So much for conditions. Now a word about the apparatus itself.

Aerial Requisites

The aerial, in the first place, must be as high as you can get it, and so far as is possible unscreened by buildings or trees. Personally I have strong preference for a single wire with at least two shell insulators in series at each end and a lead-in made of well insulated 7/22 cable. Care must be taken to see that there are no leaks on the way in through wall or window frame; a thoroughly good lead-in tube is therefore necessary.

If you cannot get a first-rate aerial, then pay particular attention to your earth, for if the aerial is bad any extra resistance in the earth makes a tremendous difference to reception. You cannot beat an ascending water main or a biscuit-tin buried in damp soil. All connections should, of course, be soldered. In the set it is desirable to use inductances of an efficient type, so that no losses may occur through the presence of self-capacity or of high resistance. The variable condensers should not be too large—.0005 is as big as should be used in the aerial circuit and .00025 or .0003 for tuning secondary or anode circuits. If larger condensers are used fine tuning is extremely difficult, since quite a small movement of the knobs makes a big difference in the wavelength.

Tuning

WGY's wavelength of 380 metres makes him quite easy to find. If you can get Bournemouth, tune your set sharply to his wave earlier in the evening, and then advance your condensers a tiny bit. The reaction coil should be brought up to such a position that the set, though in a sensitive condition, is away from the oscillation point. Should Bournemouth be outside your range, either Manchester or Newcastle will help, the former being 20 metres above WGY and the latter 5 metres below him. It is not usually difficult to guess the adjustment which will give approximately the right difference in wavelength, and as WGY's is a very strong transmission you can often hear him when your tuning is not dead sharp.

Having adjusted the set as nearly as possible to 380 metres switch off, leaving the controls untouched. Make a note on a piece of paper of the exact reading on each scale. At midnight switch on and see whether anything can be heard. Before you touch the condensers try very slight adjustments of the reaction coil, but avoid getting the set into oscillation so far as you possibly can. Should nothing be heard wait half an hour and try again. If the second attempt produces no result the chances are that you will be successful at one o'clock, when there is usually a musical programme to hear.

Strength

As an indication of the strength of WGY's signals I may tell you that I have had him more than once on an indoor aerial consisting of a piece of double-cotton-covered bell wire slung across the room corner-wise and uninsulated except for its own covering and the short lengths of string by which it was attached to nails on the picture rail.

His strength at my station, which is thirty miles north-west of London, is about the same as that of Aberdeen. On a good night speech and music come through so well on the loud-speaker that the low-frequency valves must be dimmed a little to avoid waking up other members of the household who are all in bed and sound asleep. There is one point, by the way, that is of importance. Like nearly all long-distance transmissions, WGY is apt to suffer from fading at times. Therefore, if signals become faint after a period of good strength, do not try to chase them by moving your controls. If you do so you are quite likely to lose them altogether. Leave things alone and signals will soon return to their normal loudness. Though it is a little bit early in the year yet, conditions just now are quite favourable, and WGY may be picked up with a fair amount of certainty on any night. On October 17 he was as good as I have ever heard him.

A Personal Experience

I could not try for him very early, since Bournemouth, who was doing an anniversary programme, did not close down until 12.45, but I got him within two minutes of the time that 6BM said good night. A song was in progress at the time, which was followed by a duet. By the time that this had finished I had switched over from phones to loud-speaker, and was sitting in the next room with the folding doors between the two rooms open.

The announcer then stated that WGY

(Concluded on page 656)



"BLOSSOM" will have a busy time on November 4, when John Henry (as concert director, announcer and general factotum) gives a programme from his own studio. The fun begins at 8.45 p.m.

The Ministry of Health approves of the installation of broadcast receivers in work-houses—apparently more for their educational value than the entertainment they afford.

Listeners who hear a bird's song on November 3 should not jump to the conclusion that it is another nightingale. It will be Mde. Marie Saberonne, who is a whistler of extraordinary ability.

On November 5 a new instrumental trio will make its bow at 2 L O with a chamber-music programme.

Provided that no interfering regulations are adopted, an American corporation is reported to be ready to erect a 50-kilowatt broadcasting station near New York.

Songs by Mr. George Parker (baritone) and the Beethoven No. 3 Concerto in C Minor, played by Mr. Maurice Cole, are to be included in 2 L O's "Night with the Old Masters" on Nov. 7.

Although broadcasting has only just started there, Johannesburg already has a bus equipped with a four-valve set.

A series of puns on musical terms forms the foundation on which the "Roosters" programme on Nov. 8 is built up.

Successful experiments have been carried out in Port Phillip between the *Maloja* and a lifeboat equipped with a special Marconi set.

At the time of going to press no announcement has been made, nor can any official information be obtained, as to whether or not the closing ceremony at Wembley will be broadcast. It is to be expected, however, that, equally with the opening, the closing of Wembley will attract the enterprise of the B.B.C., especially as on this occasion the Prince of Wales will make his first public appearance since his return from the United States and Canada.

It is estimated that £8,692,135 worth of apparatus was manufactured in the U.S.A. last year. This includes 1,889,614 pairs of phones, 414,588 valve sets and 116,497 crystal sets.

A new military band, that of Princess Patricia's Canadian Light Infantry, will perform for 2 L O on Nov. 2. In the evening De Groot and the Piccadilly Orchestra will "appear."

Prof. Edouard Branly's eightieth birthday will be celebrated on November 6 by a great banquet, organised by the Radio Club de France.

Suitable premises for the Dundee station have been found. The studio and adminis-

CHIEF EVENTS OF THE WEEK

SUNDAY (November 2)

London	3.0	Band of Princess Patricia's Canadian Light Infantry. Religious Address. De Groot.
Bournemouth	8.35	Religious Address.
Aberdeen	9.0	Old Psalm Tunes. Anthems and Choral Pieces.
Glasgow	3.0	Orchestral Concert. Religious Service.

MONDAY

ALL STATIONS (Except Belfast)		"Old Times" Programme.
Belfast	7.35	Popular Night.

TUESDAY

London	7.30	City of Birmingham Symphony Orchestra. Popular Programme.
Birmingham	7.30	Symphony and Dramatic Programme.
Bournemouth	7.30	Band of 2nd Battalion (Loyal North) Lancashires.
Newcastle	8.55	"The Man in the Street" (a play in one act).
Glasgow	7.45	Irish Night.
Belfast	7.30	Ulster Poetry in Song.

WEDNESDAY

London	7.30	Chamber Music and Songs.
Birmingham	7.30	City of Birmingham Police Band.
Bournemouth	8.0	Bournemouth Municipal Orchestra.
Cardiff	7.30	Two Plays.
Manchester	7.30	Harmony—Humour—History.
Newcastle	7.30	Delius and Vaughan-Williams Programme.
Aberdeen	7.30	Special Dance Night.
Glasgow	7.45	Festival Prize Winners' Night.

THURSDAY

ALL STATIONS (Except Manchester and Belfast)		"La Cigale" (Audran).
Manchester	7.30	Glees, Madrigals and Some Humour.

FRIDAY

London	7.30	Third Night with Old Masters.
Birmingham	7.30	Popular Programme.
Bournemouth	7.30	Light Symphony and Operatic Night.
Manchester	7.30	A Trip to Fairyland.
Belfast	7.30	Scottish Programme.
Glasgow	7.0	Opening of New Studio.

SATURDAY

London	7.30	The "Roosters" Concert Party.
Birmingham	7.30	"A Tale of Two Cities."
Aberdeen	7.30	Operatic Night.
Belfast	7.30	Belfast Mayfair Glee Singers.

tration offices will be at 1, Lochee Road, and the transmitter in rooms at Caldram Works (Harry Walker and Sons, Ltd.), St. Salvador Street.

The afternoon programme at 4 p.m. on Nov. 1 is being given by the Wireless

Octet under Mr. S. Kneale Kelly. After 7.30 p.m. the programme consists of comic opera items and variety turns, together with ballads.

A new site for the Leeds transmitter has been found in Stanley Road, Harehills.

At 10 p.m. (S.B. to all stations), on October 30, Mr. A. J. Alan, the successful raconteur who made such a success with his "Adventure in a Flat in Jermyn Street," and later his quaint information concerning the "B.B.I.," will tell of his adventure on Dartmoor.

There is a movement on foot to erect a wireless station on Guernsey Island.

Readers of AMATEUR WIRELESS may like to listen-in to Russia. On October 30, at 1.45 p.m., G.M.T. (wavelength 3,200 metres), the Moscow station will broadcast a talk in Esperanto on "The Seven Years' Dictatorship of the Proletariat." The speaker will be P. F. Jakovlav, president of the Sovietland Esperanto Union.

Some enthusiast has estimated that 2 L O's transmissions total over 15,000 hours.

That a broadcasting company should be formed to serve all parts of India and that it should receive 80 per cent. of the licence fees is a provisional proposal of the Government.

Four Greek firms have installed Marconi sets as an aid to the conduct of their business, the regulations permitting the private use of this means of communication.

Nearly 10,000 licences have been issued in the Nottingham district already.

Wireless seems to offer the best medium for the transmission of photographs, for greater power can be used than can be sent over a telegraph line. This is the opinion of an expert in that branch.

That wireless distracted the pupils' attention from more essential subjects and found no real part in modern education was a protest made at an educational committee meeting.

A seaplane built for service in British Guiana between plantations and the nearest town, 200 miles distant, has been equipped with wireless apparatus.

Two French scientists have carried out experiments with mercury-vapour arc amplifiers.

Recently a New York broadcasting station "imitated the sounds of a boiler shop." Perhaps they had their pet Ford tied up in front of the microphone?

Compared with England and America, France has been rather behind in manufacturing dull-emitters.

Mental patients frequently write to the Ministry of Health and complain that they are being poisoned by wireless.

When a rumour went round the Hyson Green district that a raid by the authorities

was to be made on all houses where it was suspected that unlicensed apparatus was installed, a large number of people rushed home and took down their aerials!

Ceylon wireless is in its infancy. No amateur transmitting licences have yet been issued and no receiver must tune to more than 900 metres. The Government Telegraph Department is making experiments in broadcasting, but in Colombo (the capital) there is only one wireless dealer.

At a sitting of the Royal Commission on Awards to Inventors it was suggested that, while the use of a loop for direction finding was well known to experts at home, the knowledge did not seem to have penetrated to G.H.Q. in France during the war!

For over six months severe practical tests of an experimental wireless beacon have been carried out by Marconi's at Nash Point (between Swansea and Cardiff) with most satisfactory results.

At least one French amateur is annoyed by the clause in the new transmitting licences that forbids English amateurs to work with other countries.

"Pirating" seems to be causing trouble in Australia in much the same way that it did here when broadcasting started.

School broadcasting facilities have been extended by the L.C.C. Education Committee, but it has been decided that no

school shall receive broadcast lessons on more than two afternoons a week.

In France furniture is always "period" in style, but it seems a little odd to speak of a Louis XV five-valve set!

Most Soviet wireless stations are allocated call signs beginning with R.

Wireless "spongers" are so numerous in Germany that the authorities have threatened a general raid on all houses suspected of harbouring unlicensed apparatus.

In order to increase the number of sensitive spots on a crystal it is suggested that it should be powdered and the cat-whisker placed in a small heap!

As the result of a workman being injured by a fallen aerial, Blyth Corporation have asked a committee to consider the whole question of aeriols with a view to preventing such accidents.

"THE THOUSAND-CIRCUIT BOARD" (continued from page 630)

curved a little in the middle. Even should it be quite flat when fastened it will tend to warp when exposed to varying temperatures. The stiffeners flatten out the panel and prevent it from warping. If they are not a very tight fit for the frame they may be secured to it by screws driven in at the front and back.

The second duty of the stiffeners directly

concerns the quality of one's reception when using the set. You have probably noticed that if you tap one of the valves in any set a "pong" is heard in the receivers. This is caused by the valves being to some extent microphonic. The tap which you administer jars the electrodes, causing the distance between the grid, filament and plate to vary.

If the panel is not supported by stiffeners it will be like the top of a drum and will vibrate with the slightest shock, communicating its vibrations to the valves mounted upon it. Hence whatever type of valve is used the set, if the panel is unsupported, will be very microphonic. In an early model of the Thousand-circuit Board I made the mistake of using no stiffeners. The result was that when one walked across the room the loud-speaker registered a "pong" at each footstep. Further, the vibrations set up by strong signals upon certain notes were sufficient to cause the panel to vibrate with the most horrible results upon reception. Should the particular valves used be at all microphonic this nuisance can be checked by standing the set upon a pad of felt.

(To be continued) J. H. R.

An automatic system of transmission and reception, capable of reaching a speed of 190 words a minute, works by means of musical notes, and is claimed to solve the problem of keeping transmissions secret.

The mechanically sound Variometer

Amateurs with an appreciation of soundness in design will value the Woodhall No. 1 Variometer as being right mechanically.

The spindles of the Rotor are not screwed in; they are firmly moulded in, in perfectly true alignment. They cannot come loose or out of alignment, causing the Rotor to foul Stator.

Because of the degree of accuracy in alignment, we do not need a "safety-margin" of clearance, and therefore the coupling between Rotor and internally wound Stator is closer than in any other Variometer.

The spindle also has a metal bearing, giving a smooth "feel" of rotation that makes extremely fine tuning possible.

All connections are internal, by spring contacts from Rotor to Stator. Two

terminals are provided. One-hole fixing for panel mounting; brackets adjustable for upright or horizontal mounting. Wave length 250 to 750 metres on 100 ft. aerial.

Sold by all Wireless Dealers, who can obtain supplies through their usual Factors

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not the actual singing you are listening to. Only a copy. With an Ediswan Valve you would probably not notice the difference. That is one of the advantages of a really good valve.

Ediswan Valves are highly sensitive and operate with a complete absence of noise. They are the outcome of 30 years' experience.

Ediswan Valves will bring the best out of your wireless set—get some on the way home and enjoy a better programme from to-night onwards. All dealers sell them.

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The first valve ever made was produced in the Ediswan laboratory

EDISWAN VALVES

An interesting study of early wireless history may be made at the Science Museum, South Kensington, London, where the complete series of Dr. Fleming's experimental valves can be inspected.

162-6



Loud-speaker Results

SIR,—I notice in No. 124 a letter from Messrs. Alfred Graham and Co. which infers that most present-day imperfect results from loud-speakers are due to the receiving set and not to the loud-speaker.

My experience until recently was that the average loud-speaker results obtained by most amateurs were really not worth listening to. Having constructed a three-valve resistance-coupled receiver that gives me wonderful volume with absolute crystal clarity of tone and no distortion on an Amplion Junior, I have come to the conclusion that, provided one has a good loud-speaker, faults should be sought in the sets themselves.

I might mention that the only interest I have in Alfred Graham and Co. is that of an extremely satisfied user.—H. L. C. (Staines).

Amplification

SIR,—Being a firm believer in the superiority of H.F. over L.F. amplification for both range and purity of recep-

tion, I recently carried out a series of comparative tests to settle the question to my satisfaction. My aerial, situated about 15 miles south of 2 L O, is unfortunately a poor one, but the earth connection is short and efficient.

On a valve detector alone 6 B M, S B R, 2 B D and S F R were received at excellent phone strength; the other B.B.C. stations were rather weak. A stage of L.F. was then added. 6 B M, S B R, 2 B D and S F R could be heard on the loud-speaker, but the weaker stations, owing to Morse jamming, were not so good.

After this the L.F. valve was switched off, and replaced by a carefully-designed H.F. unit employing tuned-anode coupling.

There was certainly not much difference so far as the nearer stations were concerned, but for the more remote transmissions the improvement was remarkable; mush and other interference were far less troublesome with this H.F. unit

To sum up, the merits of H.F. and L.F. amplification for the reception of fairly-

powerful transmissions are about equal, but for weak signals and for selectivity the former is miles ahead.—G. J. M. (Sutton).

The Thousand-circuit Board

SIR,—Many correspondents have written to ask questions about the Thousand-circuit Board, constructional details of which are appearing in current issues of "A.W." Rather than send individual replies to each querist, I should be greatly obliged if you would allow me to sum up the questions and to answer them in one general letter.

(Continued on page 650)

WIRELESS ACCUMULATOR TROUBLES BANISHED

A.M.C. is a business devoted entirely to Wireless Accumulator HIRE or MAINTENANCE.

A.M.C. hire charged accumulators of suitable size for any set, and deliver regularly every week. Or maintain your own, and if you have only one, lend you one alternate weeks while your own is being re-charged.

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6-6 Edison Valves, R.A.F. "C" Type. The finest all-round English Valve. Ostram 8/6 "C.H." with 4 lugs (as illustrated) Alternators, 200 watts, 70/-; 500 watts, 23/10. Accumulators from 4/8. Hydrometers, 2/-. Milli-ammeters, 6ms. 30/-; 50 ma, 35/-. Wire, all types, 4-in. stocked. Amplifiers, 3-valve, 23; 5-valve, 28; 6-valve, 27; 7-valve, 28. Buzzers, 1/8. 3/6. Valve Boxes and Coil Boxes, 1/6. Cabinets, 10/-. Condensers up to 24 mfd., all types, '001, 6d. Dynamos, 6v. and 12-v., 6-amp., 60/-; H/T 1,000-v. Hand, 28. M.G. 12 to 1,200-v., 422. Earth Clips, 6d. Mats, 15/-. Spikes, 1/3. Ebonite Panels, 3/6 lb. Meters, fine selection, all sizes from millivolts to 1,000-v., low prices. R.A.F. Insulators, 1d. Loud Speaker Units, 7/6. Microphones, 1/-. Phones, 2/- to 39/6. Plugs, 6d. Potentiometers, 3/6. Receivers, Crystal, 5/-, 17/8, 18/6, 37/6; 2-valve, 22; 3-valve, 23/15; 5-valve, 25/5. Switches, Dewars, to 200-amps. Special: 2-valve C.W. Transmitters, 23/10. Ammeter Panel for do., 17/8. 1-Valve French Transmitters, 25. Spark Sets, 100/000 metres, 15/6. Large 52B 100 watts do., 33/-. Telephone Sets, No. 24, 25. Tuners, R.A.F., 8/- to 40/-. Valves, all types: Dull Emit, 17/6; Marconi Rounda, 3/6. Variometers, 3/-. Sq. Panel Wire, 2d. per 24-inch rod. Wire, Rubber Flex, 1d. per yard. Thunderstorm Arresters, 3/-. Prompt delivery by mail all over the world. Send 41 stamps for illustrated Catalogue of Radio Bargains.

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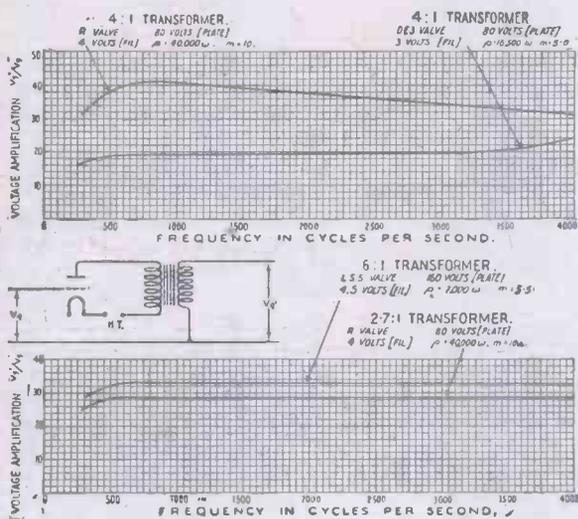
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The sound construction of the Marconiphone "Ideal" Transformer starts by unsparing use and exhaustive tests of the highest grade materials, and is completed by an entirely new method of checking the assembled instrument for actual amplification at various frequencies. Its perfect design is particularly well demonstrated in the successful way the "Ideal" is used in multi-stage amplification, without risk of low-frequency oscillation.

The great claims of the Marconiphone "Ideal" Transformer for highly efficient and distortionless amplification are upheld by the guarantee which each instrument carries.

And apart from its excellent performance, it is only necessary to examine the materials and workmanship of the Marconiphone "Ideal" Transformer to realize that in price it is moderate.



The Guarantee

which goes with each Marconiphone "Ideal" Transformer guarantees that the amplification curve at all points comes within 5 per cent. of the examples shown above, when used with a valve with the same constants as quoted. The guarantee also provides for free replacement where a break in the winding occurs within six months.

IN THREE RATIOS:
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Marconiphone "IDEAL"

TRANSFORMER

GUARANTEED DISTORTIONLESS

THE MARCONIPHONE COMPANY LTD.,
Marconi House, Strand, London, W.C.2.

CORRESPONDENCE (continued from page 648)

Question 1. *Is it necessary to use components of the makes specified?* No, any components of reliable make will answer. It should, however, be remembered that the Thousand-circuit Board does not merely exist on paper. It is the result of practical experience and of a great many tests with parts of all kinds. The components mentioned in the specification do give thoroughly good results, and if the constructor uses them he need have no fear about the working of his set when it is finished. The greatest care should be exercised in the selection of condensers if makes other than those mentioned are employed. It would certainly be an improvement to use square-law condensers in place of the ordinary type. When the Board was originally made up the only square-law condensers on the market were sold at a very high price.

Question 2. *Can the set be constructed in a cabinet behind glass doors with the panel in a vertical position?* Yes, but it must be remembered that in the original design the condensers and rheostats are mounted upon the front member of the frame. It would therefore be necessary to make the dimensions of the panel 24 in. by 16 in. instead of 24 in. by 12 in. in order to allow the space necessary for them. Stiffeners would be absolutely essential with a panel of this size. If the panel is made vertical the constructor must be careful to see that his variable

condensers are so adjusted that the moving plates will not fall back by their own weight.

Question 3. *Is it better to use ebonite rather than ply-wood for the panel?* Ply-wood fitted with bushes of good quality answers very well, and no fear need be entertained that if the set is made in this way the insulation will not be efficient. The original set, made nine months ago with a ply-wood panel, has never failed to work efficiently whatever circuit was wired up on it. It has been in daily use since that date and is in every way as good as ever it was. Remember that the bushes *must* be of the best quality and that care must be taken not to let Fluxite or glue cover the under surface of their bosses or there will be leaks between the brass of the terminals and the wood of the panel. This state of affairs actually occurred in a circuit board made up by a friend.

Question 4. *Would it not be better to use Clix instead of terminals?* Clix are very handy, and if expense is no object then they may be used with advantage. It will be necessary to keep on the wireless table a selection of flex leads of different lengths fitted with a Clix at each end.—J. HARTLEY REYNOLDS.

"An Interesting Experiment"

SIR,—Regarding the letter in "A.W." on page 558, under the above heading, the effect referred to is due to nothing more

or less than the excess current which will always flow from an accumulator when first switched on, and it has nothing to do with the valves warming up.—H. P. (Highbury).

Other Correspondence Summarised

W. H. B. (Co. Durham) wishes to know the identity of the station that transmitted at 10.20 p.m. on a wavelength of about 250 metres on October 6. The final word spoken was "Cheerio." He would also like to know the identity of the station which transmitted a concert, apparently in French, the same evening on a wavelength of about 240 metres.

E. A. (Deptford) would like to know which station it was that transmitted "Abide with Me" on October 12 at 10.45 p.m.

F. T. L. (Hanwell) gets consistently good reception of K D K A on his one-valve dual set, and was successful in receiving Capt. Eckersley's talk on October 12.

E. H. B. (Wavertree) states that his crystal set, made from instructions given in No. 121, gives as good results as a one-valve set.

S. P. (Redcar) wishes to know which station transmitted a Church service at 12.35 a.m. on October 13. The wavelength used was about 380 metres.

J. C. S. (Westcliff-on-Sea) found that his phone leads being wet was the cause of the faint signals which he was receiving.

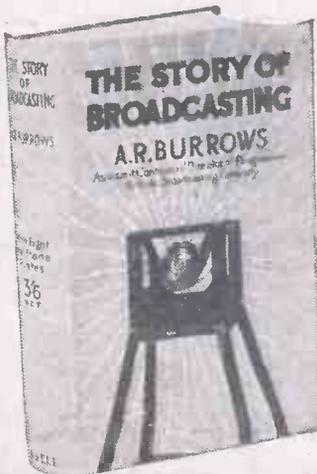
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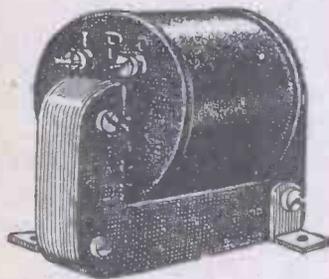
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NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; and sig. for signal.

GREAT BRITAIN

The times given are according to Greenwich Mean Time.

London (2LO), 365 m. 1-2 p.m., con.; 3-15-3-45 p.m., lec.; 4-5 p.m., con.; 5-30-6-15 p.m., children; 6-40 p.m. talk; 7-7-30 p.m., time sig., news, talk; 7-30-9-30 p.m., music; 9-30-10-0 p.m., time sig., news, talk; 10-0-1-30 p.m., music. Mon. and Wed. the Savoy Bands are relayed until 11-0 p.m., and on Sat. until midnight. Sat. only, 4-5-30 p.m., con.

Aberdeen (2BD), 495 m. **Belfast** (2BE), 435 m. **Birmingham** (5IT), 475 m. **Bournemouth** (6BM), 375 m. **Cardiff** (5WA), 351 m. **Glasgow** (5SC), 420 m. **Manchester** (2ZY), 375 m. **Newcastle** (5NO), 400 m. Much the same as London times.

Bradford (2LS), 310 m. **Edinburgh** (2EH), 325 m. **Hull** (6KH), 320 m. **Leeds** (2LS), 346 m. **Liverpool** (6LV), 315 m. **Nottingham** (5NG), 322 m. **Plymouth** (5PY), 335 m. **Sheffield** (6FL), 301 m. **Stoke-on-Trent** (6ST), 306 m. Programmes relayed.

CONTINENT

The times are according to the Continental system; for example, 16.30 is 4.30 p.m., and 08.00 is 8 a.m. (G.M.T.).

AUSTRIA.

Vienna (Radio-Wien), 530 m. (1 kw.). 10.00, con.; 11.50, time sig.; 12.15, weather; 14.25, Stock Ex., news, con.; 17.00, children, lec.; 18.40, news, con.

BELGIUM.

Brussels (SRB), 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.00, lec., con., news (opera, Mon. and Wed.).

Haeren (BAV), 1,100 m. 13.00, 14.00, 16.50, 18.50, weather.

CZECHO-SLOVAKIA.

Kbely (OKP), 1,150 m. (1 kw.). 18.15, lec., news, weather, con.; 10.00, con. (Sun.).

Komarov (OKB), 1,800 m. (1 kw.). 13.00, Stock Ex., sport, news; 09.00, con. (Sun.).

Prague (PRG), 1,000 m. 18.00, weather, orch. (irr.).

Straschnitz (near Prague). Will shortly take over Kbely programme.

DENMARK.

Copenhagen (Radio-Klub), about 500 m. 19.00, con. (irr.); 16.00, con. (Sun.).

Lynby (OXE), 2,400 m. (10 kw.). 09.30, 15.50, 20.45, weather; (2,700 m.) 18.20, (2,400 m.) 20.00, news; 11.00 and 19.10, con. (Sun.).

Ryvang, 1,025 m. 19.00, con. (Tues., Fri.); 11.00, con. (Thurs.).

Yorks Passage, 440 m. New station testing almost daily, 19.00.

Viborg, 1,400 m. 19.00, con. (irr.).

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun.); 11.15, time sig., weather; 14.5, 15.35, 16.30,* Stock Ex. (exc. Sun. and Mon.); 18.00, con.

(Mon., Wed.); 18.30, news only (Sun., Tues., Thurs., Sat.); 19.00, weather; 22.10, weather (exc. Sun.).

* From Nov. 1, on 1st and 15th of each month, at 16.45.

Radio-Paris (SFR), 1,780 m. (10 kw.). Sundays: 12.45, orch.; 13.45, news; 16.45, con.; 20.30, news, con.; 22.00, dance. 12.30, news, Stock Ex., orch.; 16.30, markets, Stock Ex., con.; 17.45, Stock Ex., news, women's hour; 20.30, lec., news, con.; 22.00, dance (not daily).

L'Ecole Sup. des Postes et Télégraphes (PTT), 458 m. (500 w.). 15.00, con. (irr.); 16.30, lec. (Thurs.); 20.00, Eng. conv. and con. (Tues.); 20.30, lec. or con. On 3rd Sun. of each month, organ recital, 20.45.

"Le Petit Parisien," 340 m. (500 w.). 21.30, con. (Sun., Tues., Thurs.).

Lyons-la-Doua, 470 m. 10.30, news and con.; 11.30-11.45-12.15, 16.15, Stock Ex.; 20.00, news and con.

Toulouse Aerodrome (MRD), 1,525 m. 09.42, 19.42, weather.

Agen, 300 m. New high-power station testing daily.

GERMANY.

Berlin (1), Vox Haus, 430 m. (700 w.); (2), 300 m. (1½ kw.). 09.00, markets; 09.15, news; 10.35, markets*; 11.15, Stock Ex.; 11.55, time sig.; 12.05, news; 13.15, Stock Ex.; 14.00, markets*; 15.00, markets*; 15.30, orch.; 16.00, markets*; 17.30, lec., children (Wed., Sun.); Eng. conv. (Mon.); 18.00, Eng. conv. (Mon.), children (Wed.), lec.; 18.45, lec. (exc. Sun.); 19.30, con., news, time sig.; 21.30, dance (Thurs. and Sat.). Evening lec. and con. from 18.00 relayed by Berlin (2) on 500 m. * On W.L. 500 m. only.

Berlin (Telefunken Co.), 750 m. (1 kw.). 10.30, con. (almost daily); 19.00, con., tests (irr.).

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Königswusterhausen (LP), 680 m. (4 kw.). 09.40, con. (Sun.). 2,450 m.: 10.20, con., 2,550 m. (5 kw.): Wolff's Büro, 06.30-19.40, news. 2,800 m. (4 kw.): 10.50, con. (Sun.). 3,150 m.: Telegraphen Union, 06.00-20.00, news. 4,000 m. (10 kw.): Express news service, 06.00-20.00.

Breslau, 415 m. (1½ kw.). 10.00, sacred con. (Sun.); 10.15, Stock Ex., weather; 11.55, time sig., weather (Sun.); 12.25, time sig., weather, Stock Ex.; 14.00, Berlin news; 15.00, children (Sat. and Sun.); 16.00, orch., lec. (Sun.); 18.30, Esperanto (Mon.); 19.30, con. (Sun.); Eng. conv. (Thurs.); con., lec. (other days).

Frankfort-on-Main, 467 m. (1½ kw.). 07.00, sacred con. (Sun.); 10.10, news; 10.55, time sig. and news; 14.00, children (Sun.); 15.10, news; 15.30, orch., lec. (Tues.); 18.30, lec., Esperanto (Fri.); 19.00, lec., Eng. conv. (Wed.); 19.30, con., opera (Thurs.); 20.30, news, weather; 20.50, tech. lec., women's corner; 21.00, time sig.; con. (exc. Sun., Mon. and Thurs.).

Hamburg, 387 m. (1½ kw.). 06.25, time sig. and news (07.55, Sun.); 10.15, sacred con. (Sun.); 10.55, markets; 11.58*, time sig.; Stock Ex.; 12.15, con. (Sun.); 14.00, lec.; 16.00, women; children (Sun.); 17.00, con., lec.; 17.30, children (Wed.); 19.00, con. or play; 21.00, weather, markets, sport; 21.50, news (in English).

Königsberg, 460 m. (1½ kw.). 07.10, markets (Wed., Sat.); 10.15, markets; 10.30, sacred con., sermon (Sun.); 11.55, time sig.; 13.15, news, Stock Ex.; 15.00, markets; 15.30, orch., children (Wed., Fri.); 18.00, lec.; 19.00, con., weather, news; 20.10, dance (Sat.).

Leipzig, 452 m. (1½ kw.). 08.00, sacred con. (Sun.); 10.55, markets; 11.58*, time sig.; 12.00* and 15.00*, Stock Ex. news; 15.30, con., children (Wed.); 17.00*, markets (exc. Sat.); 18.00, lec., Esperanto (Mon.); 18.30, lec., chess (Wed.); 18.45, Eng. lec. (Tues.); 19.15, lec., con. or opera; 20.30, news; 21.00, dance (Sun.). * Except Sunday.

Munich, 485 m. (1½ kw.). 09.30, sacred con. (Sun.); 13.00, time sig., news, weather; 15.30, con.; 16.00, children (Wed.); 16.30, Eng. conv. (Mon.); Esperanto (Thurs.); 17.00, markets, news, women's hour (Tues. and Fri.); 17.30 and 18.30, con., lec.; 19.30, con., news, weather, time sig.; 20.00, dance, news, weather, time sig. (Sat.).

Munster, 407 m. (1½ kw.). 06.55, time sig.; news; 11.15, Stock Ex.; 12.00, time sig.; 14.00, markets, news; 14.45, orch.; 18.15, weather, news; 19.00, con., dance (Sat.); 20.15, news. Sun.: 14.45 and 19.00, con., news, dance.

Nuremberg (relay), 340 m. Programme relayed from Munich (q.v.).

Stuttgart, 437 m. (1½ kw.). 10.30, con. (Sun.); 11.00, markets; 15.00, con., time sig., news (Sun.); 15.30, news; 16.30, markets, con., weather, time sig., children (Wed., Sat.), women (Fri.); 17.00, news, time sig. (Sun.); 17.30, weather, time sig.; 18.30, lec. (Mon. and Tues.), Eng. lec. (Fri.); 19.00, lec., con., weather, time sig., news.

HOLLAND.

Amsterdam (PA5), 1,050 m. (200 w.). 11.00, con.; 19.40, con. (Wed.); 20.40, news; 21.10, con. (irr.). (PCFF), 2,125 m.: News and Stock Ex. almost hourly from 07.55 to 16.10.

Ymuiden (PCMM), 1,050 m. 20.10, con. (Sat.).

Hilversum (NSF), 1,050 m. (500 w.). 19.40, con. (Sun.); 20.40, lec. (Fri., irr.); 19.45, children (Mon.).

HUNGARY.

Buda-Pesth (MT1), 950 m. Half-hourly from 06.45, news, Stock Ex., con. (irr.).

ITALY.

Rome (1RO), 422 m. (1½ kw.). 19.30 to 21.30, con.

(Continued on page 654)



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BROADCAST TELEPHONY (continued from page 632)

PORTUGAL.

Lisbon (Aero-Lisboa), 375-410 m. 20.30, tests, music, speech (irr.).

Montesanto (CTV), 2,450 m. (15 kw.). Tests, music (irr.); 13.00 and 23.00, weather.

SPAIN.

Madrid (Radio Iberica), 392 m. (1½ kw.). 19.15, weather, time sig., Stock Ex., con.; 22.45, con., time sig. (23.14); 23.30, con., dance.

Barcelona, 325 m. (100 w.). New station testing. 18.00 and 21.00.

SWEDEN.

Stockholm (TV), 440 m. 10.10, service, relay (Sun.); 11.35, weather, time sig.; 18.15, con., news.

Stockholm (Radio-Akt), 470 m. 19.10, con., news (exc. Mon., Wed. and Fri.).

Gothenburg, 460 m. 18.10, con. (Tues., Fri. and Sat.). 680 m.: 18.10 (Mon., Wed. and Thurs.).

Boden, 2,500 m. 17.40, con. (Tues. and Fri.); 16.40, con., news (Sun.).

SWITZERLAND.

Geneva (HB1), 1,100 m. (500 w.). 12.15, lec. No Sun. transmissions.

Lausanne (HB2), 850 m. (500 w.). 07.05, weather; 12.30, weather, markets, time sig., news; 16.00, children (Wed.); 17.55, weather, news; 19.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 650 m. 12.00 and 16.00, weather, news, Stock Ex.; 17.15, children (Mon., Wed., Fri.), women's hour (Thurs.); 18.00, weather, news; 19.15, lec., con.; 21.00, news. Sun.: 11.10 and 19.15, con.; 21.00, news.

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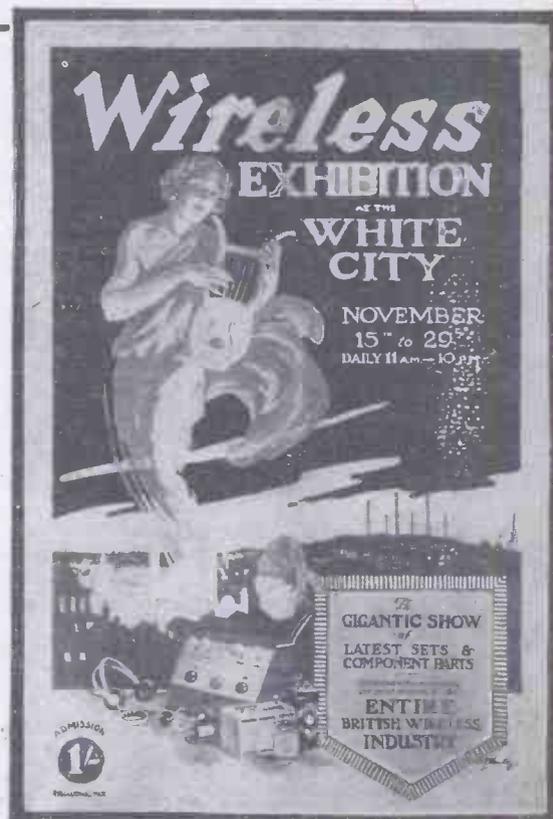
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THE same spirit of progress which was responsible for the design of the Cossor Valve still dominates the research workers responsible for the new Wuncell—the Cossor Dull Emitter.

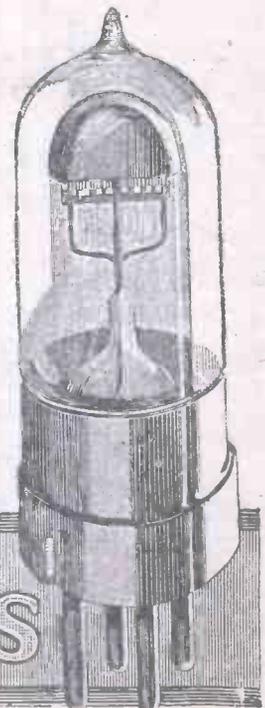
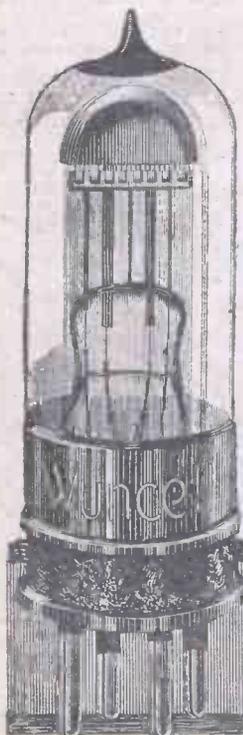
Instead of merely producing another Valve of similar characteristics to any already on the market, the Cossor Research Staff went boldly to the root of the problem and succeeded in producing a Valve which will be as popular in its class as the wonderful P-type Cossor Bright Emitter.

Operating at a temperature of only 800 degrees (as against the .06 type of Valve operating at 2,000 degrees) its filament glow is barely noticeable in daylight. And owing to its extremely low current consumption and robust filament design (in diameter the Wuncell filament is approximately the same as the standard bright Valve) its life should be almost indefinite.

But true progress does not end with Valve design—service counts for something, too. In

the new Cossor packing scheme every Valve will be finally packed in its wrapping of cotton wool and sealed in its carton. Your Dealer will not find it necessary to break the seal to prove to you that the filament is intact. His Cossor Showcard will prove it by a flash when the carton is placed in contact with it.

Thus every Cossor user is guaranteed an absolutely new and unused valve.



Cossor Valves

"A GREAT EVENING WITH WGY" (continued from page 644)

was switching over to Chancellor's Hall in Albany, New York, where Mr. Secretary Hughes was to address a meeting. There was a slight pause and then the announcer said that as it would be ten minutes before Mr. Hughes spoke, two more vocal items would be given. During this time conditions were becoming better and better, and the second song, "If I Built a World for You," came through as clearly and with almost as good strength as if it had been transmitted from 2 L.O.

After this the relay board switch was turned over, the confused murmur of the crowd talking quietly in the hall coming through. There followed a burst of applause as the chairman rose to introduce Mr. Hughes. The chief speaker

received a tremendous ovation, and his speech, which lasted for more than an hour, was splendid. He spoke upon the American Constitution and of his country's great need of personal service from all ranks of his citizens. When I tell you that his speech came through just as well as that of Mr. Asquith, relayed earlier in the evening from Paisley, you will realise something of the thrills of Transatlantic reception.

Just before the end of the speech spark interference became rather bad, and this marred the next two items. Atmospheric conditions also were on the increase. The last part of the programme that I heard consisted of the relaying of the proceedings at a students' meeting, which was a very cheery business. Delegates from various places were introduced first of all, each being

greeted with shouts, songs, witty remarks, with the blowing of a whistle and the ringing of a cow bell. The chairman thumped the table heartily in vain attempts to obtain order. This was still going on at half-past three, when I decided that it was high time for me to close down and go to bed, especially as atmospheric conditions had become very bad indeed.

That is what we may call a sample evening, and I have no doubt that if you go for WGY you will succeed in picking him up, provided that you select your night carefully and that your apparatus is in an efficient condition. J. H. R.

Owing to the continued expansion of Amplion business both at home and abroad, Alfred Graham and Co. have decided to organise an independent overseas section.

"Radio-Wien," the Vienna broadcasting station, has made a good start, the city already having 15,000 licence holders. A relay station is to be erected at Graz.

MIKRO Ltd.,

The Proprietors and Patentees of the

SKINDERVIKEN BUTTON and LOUD SPEAKER CRYSTAL SYSTEM

are now in a position to supply parts to all experimenters who wish to make their own sets. WRITE TO-DAY FOR PRICE LIST AND BOOKLET—"The Marvels of the Microphone"

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43/- Including B.C. Coils. Plus Royalty Genuinely worth 5/-

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Packed in airtight tin, with silver catswhisker 1/6



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The volume of clear bell-like reproduction yielded by this wonderfully sensitive crystal is such that it will effectively work six pairs of 'phones—or even more, under suitable conditions. It is not only completely sensitive (with no "dead spots") and at least 50 per cent. "louder" than the hosts of "ites"—it is also fully guaranteed.

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Manchester (38 miles away) received on Neutron as clear and loudest crystal I have ever known.—"H. B.," Liverpool.
Bakewell.

Concert Tested and Guaranteed



The World's Greatest Radio Crystal Stocked by the Best Radio Dealers. Insist on Neutron, in the Black and Yellow Tin—or send 1s. 6d. and Dealer's name, and this wonderful Crystal will be mailed by return.
Neutron, Ltd., Sicliff House, Southampton Row, London, W.C.1. Phone—Museum 2577.
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See Stand No. D2, British Wireless Exhibition, White City, Nov. 15 to 29



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Inside winding, suitable for broadcast reception on any P.M.G. Aerial, extraordinary close coupling ensuring large tuning range. Inductance, the highest possible—9.5 to 1. Metal feet can be adjusted to four different positions. As used in the Single Valve receiver for all wavelengths, described and illustrated in "Moderna Wireless," July issue.

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BRITISH MADE

ELEGANT APPEARANCE
HIGHLY SELECTIVE
SIMPLICITY IN TUNING

Designed for receiving on any Wavelength. The Two-Valve Set clearly receives British Broadcasting and Continental Stations, and for Loud Speaker Reception the Three, Four- and Five-Valve Sets have proved entirely satisfactory in all parts of the Kingdom. Polished Cabinet. Removable back. Ebonite Panel, fitted with Valve Holders, Filament Resistances, Condensers for Tuning Aerial and Anode Circuits, Knife Switch for High and Low Tension Circuits, etc.

Provided with Plug-in Coils, to receive British Broadcasting Stations. Plug-in Coils to receive Paris, Berlin and other high-wave stations are interchangeable and can be supplied.

Both the Low Tension and High-Tension Batteries can be fitted inside the Cabinet, and the only wires on view are the aerial and earth.

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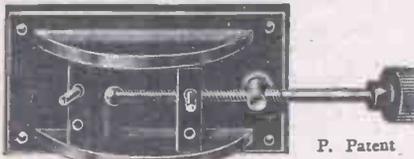
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P. Patent

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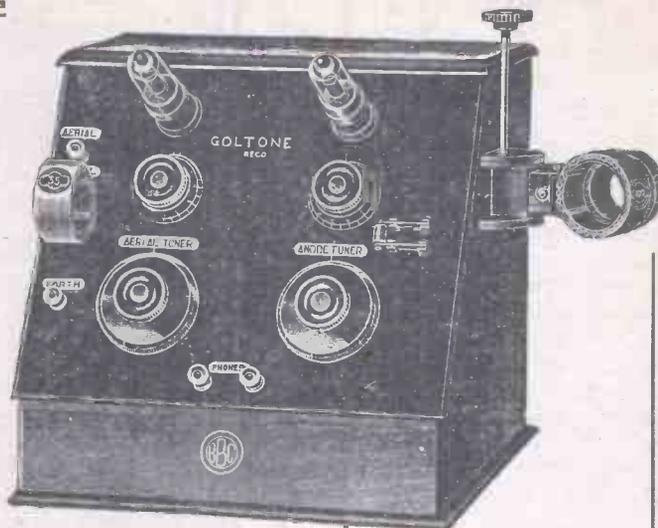


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Unsurpassed for silence, efficiency and reliability. Provides remarkable amplification with freedom from noise and distortion. Equally suitable with every type of valve. No make of Transformer gives better results than this one.

We can also supply at same price ratio to to a Transformer recommended with "Undyne" High Tension Circuit. W. H. M., Brougham, Lancs.—I am very pleased with the results from using W & G. Low Frequency Transformers. I have built many sets with them, and have always found them to be free from distortion, though I can in volume. They give much better results than any other make I have tried.

These lines are stocked by all high class Radio Stores. Write direct if unobtainable.



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Eliminates all loose wiring and minimises the risk of burning out valves. Each conductor is distinctive in colour and enclosed within an outer braiding. Complete with wander lugs. Price 3/.

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Every Phone Its Own Amplifier!

You don't require valves to be able to use more phones on your crystal set. Owing to a new discovery, tested, approved and fully explained in "AMATEUR WIRELESS" article, October 8th, MANY PHONES ON ONE CRYSTAL SET. It is now possible to use as many phones as you wish, irrespective of resistance, without weakening strength of signals.

THE EXTRAPHONE

WONDER-DETECTOR

Patents Pending

Designed and manufactured by the inventor of "Amateur Wireless" system, John W. Miller

WHAT THE "EXTRAPHONE" DOES

1. Enables phones of any resistance to be used at the same time.
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 3. Equally as efficient on weak or strong signals. Every phone in use is as strong as it would be if used alone.
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THE RULER OF WIRELESS WAVES

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The "NELSON MULTI" contains three separate filaments, each of which can instantly be brought into use by a switch device incorporated in the valve cap. Adapted to fit any standard Four-pin socket. No loose wires. Three times the life of any other valve. Filament Voltage 4-6

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From all Wireless Dealers and Electricians.

B.B.C. WINTER PROGRAMMES

EVERYONE is aware of the splendid advance in the technique of broadcasting that has been made by the B.B.C. within the last year, and it is with hesitation that one ventures to grumble at an organisation which, on the whole, so ably caters for our entertainment. But in the matter of winter programmes, which came into operation on September 29, there seems to be reason for fair criticism.

Throughout the summer the B.B.C. provided excellent programmes that lasted until 11 p.m. every evening, except Saturday, when the Savoy bands were relayed until midnight. Now that winter is approaching (!), however, they have seen fit to start their evening programmes half an hour earlier, but, and this is the grievance, the transmissions are also to end half an hour earlier. That is, instead of having something to which to listen until 11 p.m. every evening, all stations will normally close down at 10.30 p.m.

Perhaps there is a good reason for this, but it is difficult to see. Although people do not stay out so late in winter as in summer, they *do* sit up later. Rather than finish half an hour sooner in winter, most listeners would appreciate an extension of the evening programme until, say, 11.30 p.m. That at least seems to be a more logical course than the arrangement now adopted.

G. W.

ELIMINATING THE FILAMENT BATTERY

AMERICAN scientists have discovered that it is possible to extract quite a considerable stream of electrons from an unheated filament by using 200,000 volts on the plate. If this is boomed as a solution to the problem of "eliminating the L.T. battery," the time will be ripe for the long-suffering amateur to show signs of peevishness.

M. A. L.

WIRELESS IN THE NEXT WAR

IN a recent lecture before the Académie de Marine, General Ferrie, the head of the French Wireless Service, pointed out that although short waves of the order of 100 metres or less were rapidly proving their superiority for ordinary long-range transmission, they were practically useless for submarine work. The power of wireless energy to penetrate depths of water increased in proportion to the wavelength employed.

He added that amongst the factors to be reckoned with in the next war were the wireless-controlled torpedo-boat and the bombing aeroplane. These were in fact already *un fait accompli*, the control mechanism being not only effective and accurate, but also immune from interference by enemy jamming.

Secret systems of transmission in which the emitted wavelength was continually varied in an irregular manner would remove one of the present drawbacks of wireless signalling for war work. Directional installations would eliminate much of the danger of secret naval movements at night or in foggy weather, whilst the new cable leader-gear system would prove invaluable both for guiding aeroplanes to difficult landing-places and for steering submarines through a maze of harbour mines.

M. A. L.

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"AMATEUR WIRELESS"
HANDBOOKS—1s. 6d. EACH

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RECEIVING SETS

WIRELESS COMPONENT
PARTS

SIMPLE VALVE
RECEIVING SETS

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"Uncle Tom," Newcastle's First Station Director, Calling "UNCLE TOM" OF PAYNE & HORNSBY, LTD.
The Pioneers of Cheap Prices in the North and the Only Firm in Great Britain with actual Broadcasting Experience

INSULATING TAPE, per box, 6d.
KNOBS—2 B.A. bushed 1 1/2 in. dia., 2d.; 2 B.A., 1d.; 4 B.A. bushed 1 in. dia., 1 1/2d.
LOUD SPEAKERS—Ampion Junior, 27/6; T.M.C. (Copper Horn), 57/6; Baby Sterling, 55/-; Sterling (Black and Gold), 60/-; Claritone Junior, 55/-; Claritone Senior, 115/-; Sparta (Fullers), 95/-; and many other makes kept in stock.
LEADING IN TUBES—6-in., 8d.; 9-in., 10d.; 12-in., 1/-.
NUTS—4 B.A., 2d. doz.; 2 B.A., 2d. doz.
NAME TABS—Circular with hole for fixing under terminal, 1d.; straight type, 1d.; strips of 12 names, 8d.; Aerial, Earth and Phones, 1/6; Pointers, 1/6.
PHONES—Sketaphones, 16/6; The New T.M.C., 6 ozs., 22/6; Brown's Feather Weight, 25/-; Sterling, 25/-; G.E.C., 25/-; B.T.H., 25/-; Western Electric, 25/-; Claritone, 25/-; Siemens, 25/-. All 4,000 ohms.
SINGLE EAR PHONES—2,000 ohms, 6/6; 4,000 ohms, 7/6.
PULLEYS—Aerial, 6d. and 8d.
POTENTIOMETERS—Special line, 4/6; T.C.B., 5/-; Igranite, 7/-; Lissen, 12/6.
PHONE PLUGS—G.E.C., 2 pin, 1/8.
ROTORS—Wood, 2 1/2 in., 1/-; Ebonite, 2 1/2 in., 1/9.
ROTORS AND STATORS—2 Statots and 1 Rotor, complete set, 3/-.
RESISTANCES (FIXED)—Mullard, 100,000 ohms, 2/8. (Clips for above, 8d. per pair.)
RESISTANCES (VARIABLE)—Woodhall 100,000 ohms, mounted on Ebonite, 2/8; Allen, 50,000 to 100,000, 1/6; Lissen, 50,000 to 100,000, 2/6; Watmel, 50,000 to 100,000, 3/6.
RUBBER PHONE EAR-CAPS—"Sorbo," per pair, 1/6.

SCALES—Half circle, 0-180°, 2d.; complete circle, 300°, black or white, 4 1/2d.
STAPLES (Insulated)—Per doz., 3d.
STAPLES (Tin)—Per doz., 1d.
SLIDERS AND PLUNGERS, 3d.; G.W. type, very efficient, 9d.
SHELLAC—Per bottle, 5d., 7d., & 10d.
SWITCHES—S.P.D.T. Miniature panel mounting, 1/-; D.P.D.T. Miniature with nut and mounting, 1/6.
SWITCHES (EARTH AND AERIAL)—Mounted on Ebonite, S.P.D.T., 1/3 & 1/9; D.P.D.T., 3/6. (Above fitted with Terminals.)
SYSTOFLEX—Per yard, 4d.
SPRING WASHERS—(Copper), per doz., 5d.
SWITCHES for Flush Panel mounting, 1/11; Switches, round, (Toggle), 2/-.
SWITCH ARMS—Best quality, 10d.; second quality, 6d.
TERMINALS—Small fancy, 1d.; small W.O., 1d.; large W.O., 1 1/2d.; Telephone, 1 1/2d.; Nickelled, 2d. (All above complete with nut and washer.) Red and Black Terminals, per pair, 1/-; Screw Spade Terminals, each, 1d.; screw pins, each, 1d.; "Clix" Terminals, complete, 4d.
TERMINAL TAGS for connecting Aerial Wire to Earth Wire, per pair, 1 1/2d.
TRANSFORMERS (Low Frequency)—General Radio Co., 15/-; Powquip "Bucks" for Reflex Circuits, 12/-; Powquip Shrouded, 18/6; Burndept Cheap Type, 15/-; Lissen T.2, 16/6; Lissen T.3, 25/-; Silvertown, 21/-; Igranite, 21/-; Fuller Shrouded, 22/-; R.J. new type, 25/-; Eureka Concert Grand (the finest transformer made), 30/-; Eureka 2nd stage, 22/6.

TINFOIL—Per sheet, 4d.
TRANSFERS—"Easic-fix" Aerial, Earth Phones, per set, 2d.; large sheet of Words and Scales, 9d.
VARIOMETERS—Small Brown, excellent value, 1/11; L. Variometer, 2/8; L. Variometer with Ball Rotor, 3/8; Ebonite Variometers with Knob, 4/3 4/11 and 5/6. Igranite and Sterling always in stock.
VALVES—Thorpe K.4 for Unidyne circuit, 17/6; Cossor, B.T.H., Marconi R., Marconi R.5V., Mullard-Ora, Ediswan, Myers, all at 12/6.
DULL EMITTER VALVES—Marconi D.E.R., 21/-; Ediswan A.R.D.E., 21/-.
VALVES, DULL EMITTER, .06—Marconi D.E.3, 25/-; B.T.H. B.5, 25/-; Ediswan A.R., 25/-; B.T.H. 6 Volt Power Valve B.4, 35/-; Mullard and F.A.I., 35/-.
VOLT METERS, 0 to 15 Volts, 5/-; double reading, 0-10, 0-100 volts, 12/-.
VALVE HOLDERS—With 8 nuts and washers, 8d.; 5 Leg Valve Holders for K.4 Valves, 1/3; Valve Holders for Flush Panel Mounting, per set, 8d.; Valve Pins, 1d.; Valve Sockets with nut and washer, 1d.; Valve Windows, 8d.
BELL WIRE—Single, 2 yards, 1 1/2d.; Bell Wire, Twin, per yard, 1d.; Bell Wire, Rubber-covered, for connecting up, per yard, 1d.
WIRES—Tinned, No. 18 gauge, 3 yards, 2d.; Tinned, Square, 2 ft. lengths, 1 1/2d.; Tinned, No. 18 gauge, for connecting up or for Aerial, 100 ft., 1/6.
DOUBLE COTTON-COVERED WIRE—No. 20, 1/2 lb. Reels, 8 1/2d.; No. 22, 1/2 lb. Reels, 8 1/2d.; No. 24, 1/2 lb. Reels, 10 1/2d.; No. 26, 1/2 lb. Reels, 11 1/2d.; No. 28, 1/2 lb. Reels, 12/6; No. 30, 1/2 lb. Reels, 14/6.
WIRE (Rubber-covered)—For Lead-in, Earth, Earth or Aerial, 2d. and 2 1/2d. per yard.

Valves and High Tension Batteries sent through post at purchaser's risk only and are not returnable. Price Lists Free.

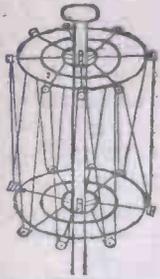
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with new type headbands, very comfortable. No callers.

4,000 ohms **9/6** PAIR

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Can be mounted on Valve Holder or Valve Sockets on Panel.

Perfect micrometer adjustment, giving absolute positive pressure spring control.

The most sensitive "spot" being rapidly found and permanently held.

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LOUD SPEAKERS 12/6

fitted with flexible connection to fit any gramophone or horn. Stalloy diaphragm, Adjustable magnets Brand new, not reconditioned. 2,000 ohms, 12/6. 120 ohms, 13/6. Post free, complete in box, with money-back guarantee. Quick delivery.

STALLOY DIAPHRAGMS, all sizes, 12 in. 4d. to 4 in., 1/2. Micro-nut fitted, 8d. extra.

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EVERYTHING for WIRELESS

Send for new bargain list of all components. Headphones from 15/6. Loud Speakers 22/6. Crystal Sets from 19/6. Amplifiers from 42/-. Valve sets from 77/6. Direct from actual manufacturers.

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This book gives more practical information about building wireless instruments than others at ten times the price. **HOW TO ERECT, CONNECT AND MAKE** all kinds of wireless apparatus, including crystal and dual amplification sets, one and two valve amplifiers, also the latest two, three and four valve tuned anode receivers. 100 pages including 28 diagrams. **SAXON RADIO CO.,** (Dept. 12), South Shore, BLACKPOOL. **POST FREE 1/3**

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Wonderful results from using the New and Improved

CATSEYE

FIXED DETECTOR **PRIC 2/6**

Listen-in in comfort at once. No waiting, no adjusting. Users are delighted. Order from your dealer, or send P.O. 2/6 and 2d. stamp to **COMREX CO. (DEPT. 2), 119, FLEET ST., E.C. 4**

SINGLE RECEIVERS

2,000, ohms, British make tested and guaranteed **5/-**

BRITISH PHONES, 4,000 ohms, Double Headband, guaranteed, 13 3 per pair.

L.F. TRANSFORMERS 5 : 1 10/6

FILAMENT RHEOSTATS 1 hole fixing 1/9

VARIABLE GRID LEAK 5-5 1/9

Trade Supplied

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Louden



Have you noticed it?

10/-

IF you listen intently to your gramophone you will become aware of the light scratching of the needle. But although you hardly notice it unless you listen specially, it is there all the while.

Once you could hear gramophone music against a background of complete silence you would never be content to return to the obligato of scratches and hisses which you now cheerfully endure.

It is the same with Wireless Reception; you hardly notice the continuous breathing sound going on in your loud speaker, but—unless your set is fitted with Louden Valves—it is there, and it is preventing you from getting the best possible results from your set. The Louden Valve has been designed specially with the object of eliminating all those "mush" or breathing sounds so prevalent with valves of the ordinary type. If you would care to know how this is achieved, your dealer will supply you with a folder giving full information.

But we feel that you are concerned with *results* rather than with *reasons*, so our advice is that you should not consider your present reception perfect, but fit Silver Clear Louden Valves and see how much better it can be.

Louden VALVES



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

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Manufactured throughout in Great Britain. All Loudens are Silver Clear and free from "mush." The current consumption is very low and the life long.

Louden Valves - Silver Clear

ADVT. OF THE FELLOWS MAGNETO CO., LTD., PARK ROYAL, WILLESDEN, N.W.10.



Dorking and District Radio Society

Hon. Sec.—A. J. CHILD, High Street P.O., Dorking. The opening meeting was held on October 6, when Mr. R. J. Hibberd gave a lecture on "The Development of Wireless."

South Croydon and District Radio Society

Hon. Sec.—G. H. TOZER, 218, Brighton Road, South Croydon. At the last meeting a lecture was given by Capt. L. F. Plugge on "My Experiences with a Portable Receiver in Central Europe." The society meets every Tuesday at the headquarters, "The Swan and Sugar Loaf Hotel."

Croydon Wireless and Physical Society

Hon. Sec.—H. T. P. GEE, Staple House, 51, Chancery Lane, London, W.C.2. At the meeting of the society held on October 14 Capt. A. Hinderlich delivered a lecture on "Winding with Fine Wire." He gave practical demonstrations showing how to solder wires together, including partial winding of telephone magnets, and explained how such coils can be successfully wound by hand.

Sale and District Radio Society

Hon. Sec.—J. L. RICHARDS, 14, John Street, Sale. The annual general meeting of the society was held on October 17. Councillor J. U. Thornton gave a resumé of the year's working, and the secretary presented the balance-sheet. It was proposed to open the society's rooms every evening on and after October 27.

Sunderland Wireless and Scientific Association

Hon. Sec.—H. W. HODGES, Westfield House, Sunderland. The association held its first meeting of the new session on October 18. Mr. Jeffrey, the new president, gave a paper on "Scientific Ideals."

City of Belfast Y.M.C.A. Radio Club

Hon. Sec.—J. T. COWLEY, 4, St. Paul's Street, Belfast.

On October 14 Major R. Stanley delivered a lecture on "The Electron Theory and the Fundamental Principles of Valve Action." He described electrons in relation to different forms of matter; also the theory of the valve as used in wireless receivers.

Kensington Radio Society

Hon. Sec.—J. MURCHIE, 33, Elm Bank Gardens, Barnes, S.W.13. At the October meeting multi-valve resistance-capacity coupled receivers, special types for transmission and reception work, buzzer and valve wave-meters, and coil winders were exhibited and explained.

Coventry and District Co-operative Radio Society

Hon. Sec.—A. CURTIS, West Orchard, Coventry. At a recent meeting members submitted papers on "Aerials and Earths," which were read and submitted to the vote for a monetary prize which had been offered to stimulate interest in the theory of wireless. The chairman described a one-valve set with reaction, and components were wired up in this circuit and the set given a trial on the society's aerial.

Stoke-on-Trent Wireless and Experimental Society

Hon. Sec.—W. H. REID, 73, Stafford Street, Lenton, Stoke-on-Trent. At the meeting held at the Y.M.C.A., Hanley, on October 16 a talk was given by Mr. H. Bishop on "The Broadcasting Company and the Difficulties It has been up Against."

Battersea and District Radio Society

Hon. Sec.—G. P. PHILLIPS, 183, Lavender Hill, Battersea, S.W.11. At the headquarters on October 9 Mr. A. E. Duffield, chairman, gave a most interesting lecture on "Resistance-capacity Coupling."

**"Wireless Telegraphy
and Telephony"**

The most Practical Handbook for the Amateur. The price is 1/6 net.

Cassell & Co., Ltd., La Belle Sauvage, London, E.C.4

Eiffel Tower (F L) has altered its wavelength to 2,650 metres and also its times of transmission, and it is not likely that the spark set will close down yet awhile. Experiments have been made with the new valve transmitter, but this has made other reception, even on short wavelengths, impossible in many Paris districts.



ANNOUNCEMENTS

"Amateur Wireless and Electrics." Edited by Bernard E. Jones. Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. It will be sent 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 the Proprietors, Cassell & Co., 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," La Belle Sauvage, London, E.C.4.

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A perfect Crystal, sensitive in every point. Cash refunded if not satisfactory. All specially selected. Price 1/- (per Box). 1/3 (in Glass Tubes).

"O.V." INDOOR AERIAL

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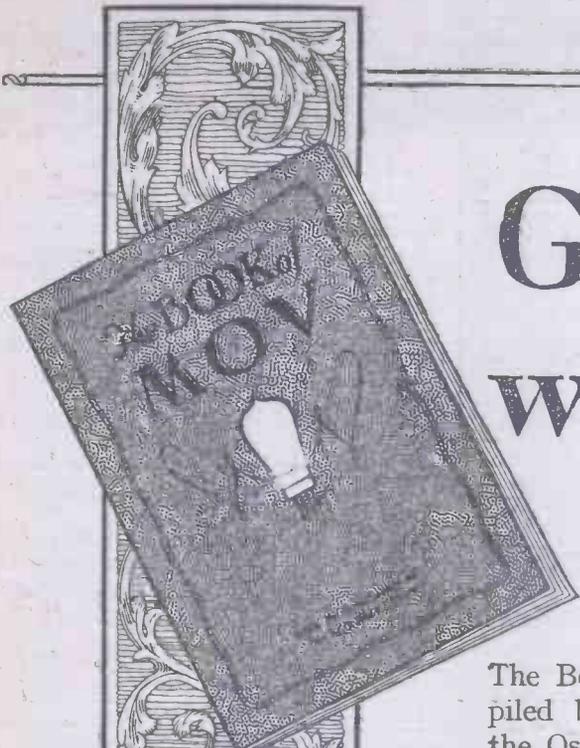
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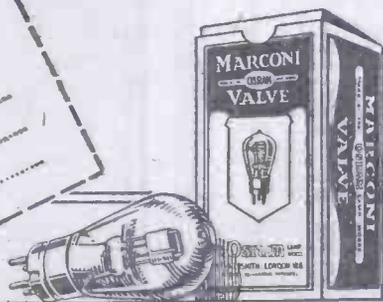
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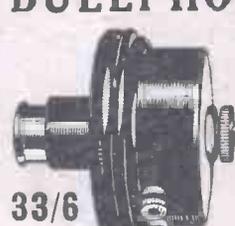
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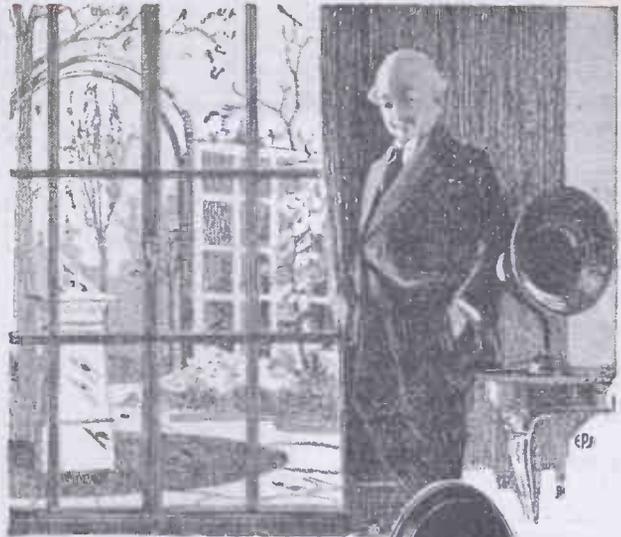
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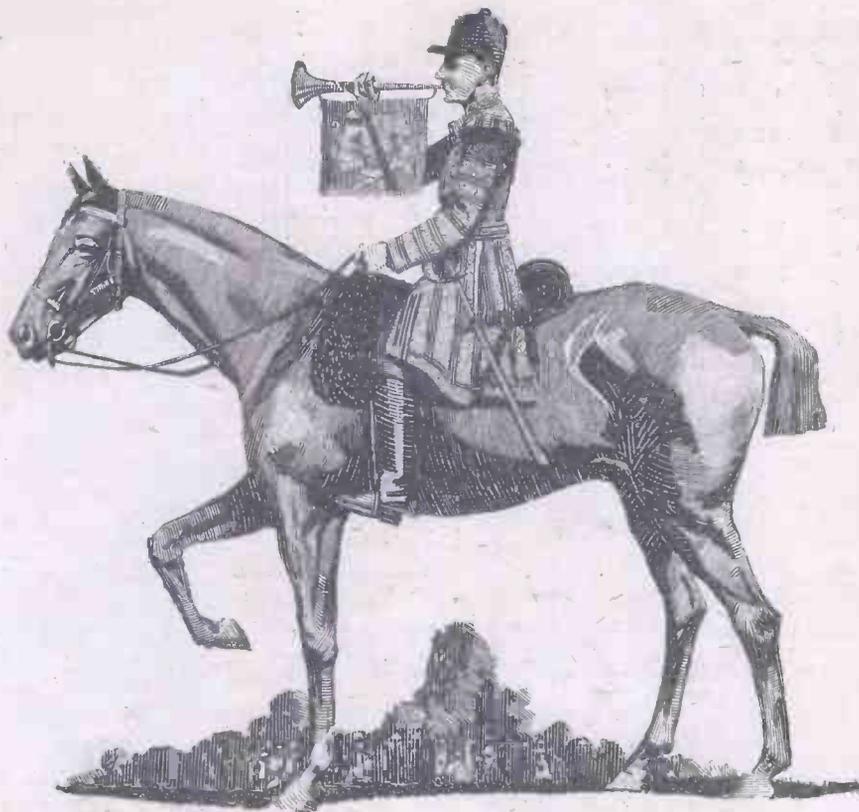
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LISSEN VARIABLE ANODE RESISTANCE, 20,000 to 250,000 ohms, same outward appearance as LISSEN Variable Grid Leak 2/6

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It is hard to realise that with those parts behind the ebonite, a glass bulb with its filament glowing, and the turning of this simple looking LISSENSTAT knob, the music, speech, and song of so many stations can be brought in.

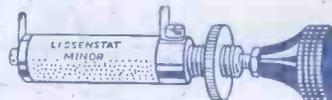
Hard to realise that from the putting of these parts together, one has the right to expect anything but—silence.

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