

GETTING AMERICA ON YOUR SET SEE PAGE 656

Amateur Wireless

Every Thursday ^{3^d}

and
Radiovision

Vol. XIV. No. 360

Saturday, May 4, 1929

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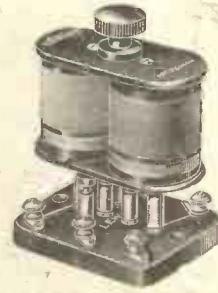
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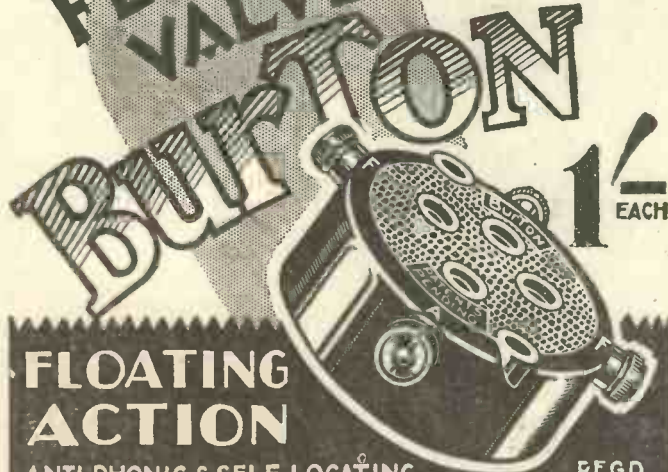


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send me the Fultograph International Picture
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FULTOGRAPH

LA/AW

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4. Finally, observe the construction of the anode. Actually two rectangular nickel plates are used and for greater rigidity each is diagonally ribbed.



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Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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Savoy Hill's Harmonium!—Rehearsals!—A New "Mike" Stand— Television Still Arriving!—Lloyd George and Broadcasting

Savoy Hill's Harmonium!

I had something of a shock, writes an AMATEUR WIRELESS correspondent, when I paid my usual visit to Savoy Hill and found the commissioner—a worthy soul familiar since the days of No. 2, Savoy Hill—encased in a contraption appearing to be something of a cross between a harmonium and a portable Turkish bath! This desk affair has a very forbidding appearance, and should go far towards keeping the unprivileged away from the B.B.C. portals!

No. 5's Metamorphosis—A vastly more important change at Savoy Hill is the complete rebuilding of Studio No. 5 which, quite early on, was used for talks. At present it bears little resemblance

to a studio, all the elegant furnishings and trappings, which you can see from a photograph on this page, having been removed. Walls may be knocked down, new partitions put up, and when the furnishing stage of the new No. 5 is reached an attempt will be made to give it a somewhat lighter atmosphere than it had before.

Rehearsals!—When I had extricated myself from large sheets of packing standing at the door of No. 5, I crossed to an adjacent studio and heard a rehearsal of one of De Courville's famous "hours." I shall never enjoy listening to one again, for once one has seen how the various effects are staged and gags arranged, half the fun of the invisible listening is destroyed. Some of the subterfuges which have to be employed before the microphone in order to get "fades in," "fades out," and combinations of orchestral effects are certainly very clever.

A New "Mike" Stand—One of the B.B.C. engineers has devised a new type of microphone stand, which is being tested out before becoming a standard job. A well-known firm of cabinet makers have built up experimental stands to the engineer's design, and the latest is a very



"Number Five," the talks Studio at Savoy Hill, from which many famous people have spoken, is being entirely rebuilt. (See accompanying paragraph)

innocent-looking affair, seeming to be simply a column about 8 in or 9 in. in diameter and, roughly, 4 ft. high. At the top, of course, is a box containing the two microphones. Actually, hidden in the interior of the column is a series of balance weights and an extension piece, so that at simply a touch the box can be made to shoot up to a height of about 9 ft. from the ground, which is the position "Mike" usually adopts for orchestral broadcasts and so on.

Television Still Arriving!

Are notices about the possibility of almost-immediate television broadcasts premature? One is tempted to believe so by reason of a notice which the B.B.C. has circularised, saying that negotiations have just now started between the Baird Co. and the B.B.C. The notice says: "There was a general technical discussion as a preliminary to the submission of definite proposals by the Baird Co." If this is to be believed, then we have a long way to go before any B.B.C. station will be regularly "pushing out" television transmissions.

Lloyd George and Broadcasting

Apparently the politicians themselves favour the use of the microphone for political propaganda. Mr. Lloyd George, in a note to a collection of extracts from his forty years of political oratory, says, "Broadcasting will give new life and sway to speech making." He scorns the idea that the cheap entertainment afforded by the film, gramophone, and broadcasting will ever slay the spoken word.

A British Scientist Honoured—It is notable that that well-known scientist, Dr. E. V. Appleton, has been awarded the Morris Liebmann Memorial Prize for 1929

by the American Institute of Radio Engineers for the most important contribution to radio progress during the last twelve months. Dr. Appleton has done some useful work for the Radio Research Board in connection with the Heaviside layer and other matters in connection with the upper atmosphere.

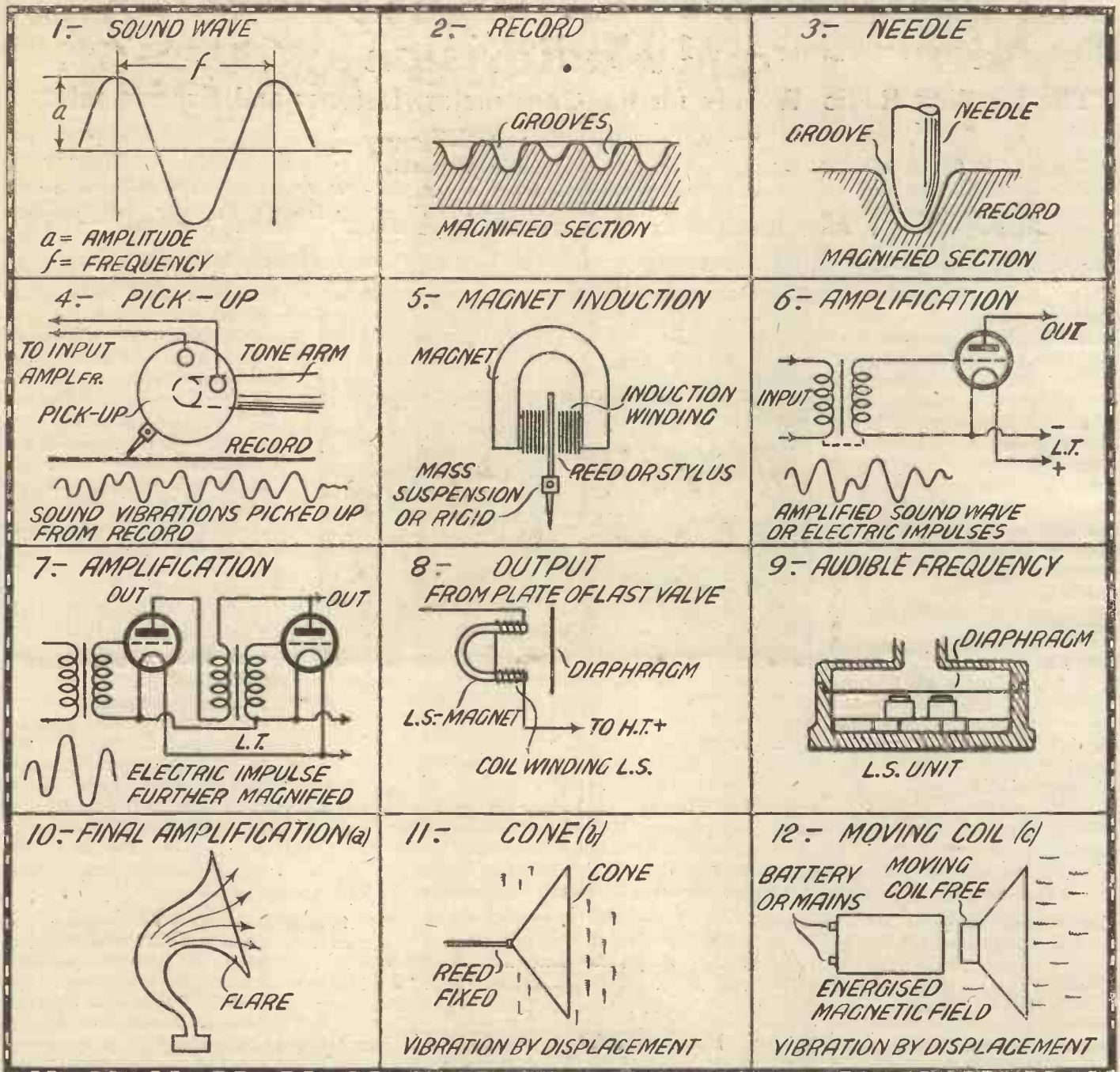
1929 Proms—Are you a keen Proms listener? If so, you will be pleased to know that the promenade season starts on August 10 and concludes on October 5. Sir Henry Wood will conduct. The orchestra will be specially augmented and, owing to the large amount of work to be carried out, there will be many extra rehearsals.

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FROM RECORD TO REPRODUCER

An A.B.C. of Gramo-Radio



1. The Sound Wave.—The sound wave is built up of two factors the first of which is frequency. Frequency is the number of vibrations per second when any sound is produced. Every sound has its own particular frequency, the lower the note the less the frequency and vice versa. The volume of the sound first produced has nothing to do with the frequency. For instance, middle C of the pianoforte has a frequency of 256 vibrations per second and the C above has 512, or just double. Therefore there is a distinct ratio between the frequency or vibrations produced by a given sound.

Amplitude.—The other feature of the sound wave is amplitude. Amplitude is indicated by the distance from the base of the curve to the peak, while frequency is indicated by the distance from one peak to another,

which represents one vibration, the total number of such per second representing the actual frequency of the note produced.

2. The Record.—If the grooves of the record are examined under a magnifying glass they will be seen to take the form of a wavy line, each of which represents an impression of a given frequency at a given amplitude of a given note or series of notes blended together in harmony.

3. The Needle.—The needle is a means provided for carrying these vibrations to the next stage. As the needle travels over the record it responds to the vibrations recorded and the same vibrations travel along it. That is to say, the needle now vibrates.

4. & 5. The Pick-up.—The needle is attached to what is termed a pick-up, being rigidly sus-

ended between a magnet around which a coil of wire is placed. The vibrations take place in the magnetic field and weak currents are induced in the coil windings.

6. Amplification.—The weak currents induced in the pick-up windings are led to the input. The input may be direct or through a transformer or any recognised source. Here they pass through a three-electrode valve, the filament of which is heated and a positive voltage applied to the plate. A flow of electrons is emitted by the heated filament and attracted to the positively charged plate.

7. Further Amplification.—Further to amplify, another similar stage of valve amplification is employed. This is coupled to the first by

(Continued on page 646)

Building Your Own

FULTOGRAPH

Component parts for building the Fultograph are now obtainable. This article describes the work entailed and gives some hints on the procedure

THERE is no doubt but that every listener with a receiver capable of picking up a B.B.C. station at good strength can find fascination in picture reception. As is well known, Wireless Pictures (1928), Ltd., introduced the Fultograph picture receiver and it is on the Fultograph system that picture broadcasts are made from 2LO, 5XX, and 5GB in this country, and also from many prominent Continental broadcasters. The B.B.C. gives a daily programme of pictures which can be received without any difficulty by the owner of broadcast picture apparatus.

What is particularly interesting to amateurs is the fact that a complete kit of parts for making up the Fultograph is available and the fascination of Fultograph reception is increased by the opportunities to make up your own picture receiver.

The home constructor kit consists of the twenty-six parts necessary for making a working Fultograph and the only parts not included in the kit are the wooden cabinets for the picture receiver and the relay panel.

Order of Assembly

All holes are drilled and tapped where necessary and screws are provided so that not even the full kit of tools necessary for making up a wireless set is needed. This is a great point and makes the job of building a picture receiver simpler than if it were made with Meccano!

Now assume that you are the fortunate possessor of a kit of parts. Before commencing construction it is a good plan to free all the parts from packing and dust and lay them out on the bench; also the threaded spindle should be wrapped with paper to prevent damage while assembling.

It is advisable to carry out the assembly in the following order. First mount the two small pillars which carry the runners for the stylus. When this has been done the clockwork motor may be added to the base, this being the only part which is

affixed to the underside. The components in connection with the motor, such as the speed regulator and crank support, are easily added.

The brass skew gear wheel has to be

stud and the small steel ring in the middle of this disc which acts as a distance piece. The stop wheel and the main body of the clutch may now be put together and the stop wheel fixed by tightening up the grub screw. Finally the pressure of the tiny coil springs which bear on the fibre plugs in the clutch body should be adjusted. The clutch should grip the spindle sufficiently to give it a slight dragging feeling.

When fitting the bearings to the two standards it should be noted that the holes are of different sizes corresponding with the two ends of the spindle. The one with the larger hole should be fixed first. When both are in position the picture cylinder can be mounted. The only point to note here is that the grub screw should sink into a small hole in the spindle and this, of course, prevents any loose movement of the drum.

Contacts

When the drum is fixed release the screw in the stop wheel of the clutch and turn the drum until the stylus rests about $\frac{1}{8}$ inch behind the paper clip when the catch is in the notch. When the correct position is found the screw may again be tightened.

No difficulty should be found in mounting the catch or the contacts for the clutch current. Matters should be adjusted so that when the stop is engaged there should be a gap of about $\frac{1}{32}$ inch between the armature and the magnet poles. A second point is to note that the lower switch blade is at the correct angle for resting on the wedge-shaped insulator, for a short may result if the blade touches the metal of the armature arm.

The contacts of the switches should be adjusted so that as soon as the wheel begins to revolve the middle blade makes contact and this contact is maintained until the

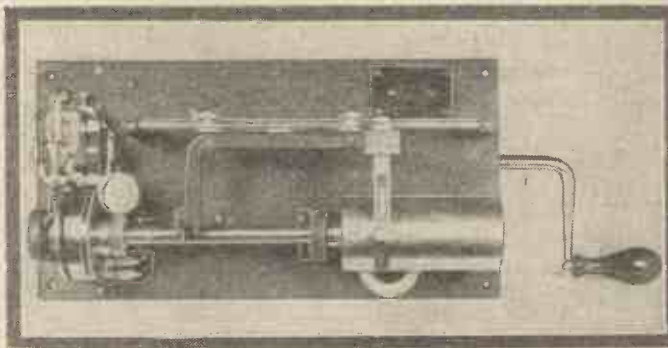
(Continued on next page)



Here is the complete kit of parts for building the Fultograph

attached to the top of the motor spindle, which should be put on with the recessed side uppermost, driven home with a few mallet taps so that the top of the shaft is practically flush with the recessed part of the gear wheel and then fixed by means of the small grub screw.

The next job is to assemble the electromagnetic clutch on to the threaded spindle.



—and this picture shows the assembled reproducing unit

Slip the main body of the clutch on the spindle, the fibre wheel end first

Clutch and Cylinder

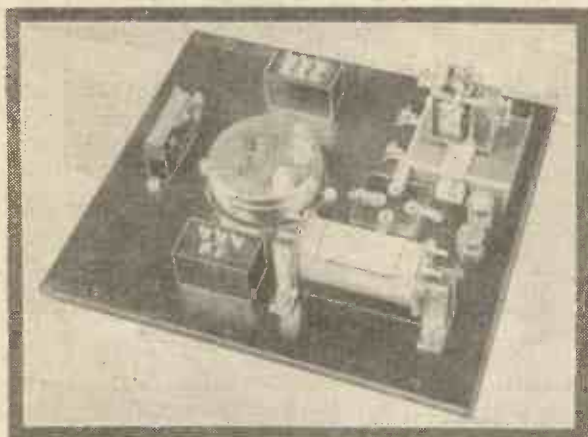
Now take the stop wheel (which has a notch in the edge) and assemble the triangular spring, the smaller disc with three

front edge of the notch in the wheel is just level with the catch block again. The adjustment for the contact is rather fine, but can fairly easily be effected by means

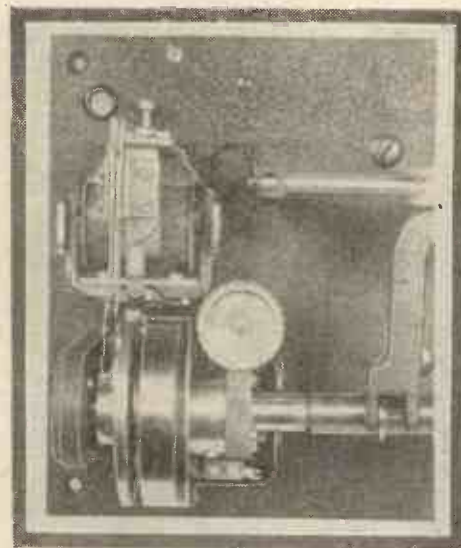
of the adjusting points provided. The stylus carriage is, of course, quite easily assembled.

So far as the mounting of the parts on the relay panel is concerned this, of course, presents no difficulties whatsoever, as each component can be screwed down in just the same way as on the panel of an ordinary wireless set. The panel carries a millimeter sunk flush into the panel, a .01-microfarad condenser with a relay mounted above it, a transformer, switch and a resistance which is mounted on the socket container.

The wiring up of these parts, and also of the contacts and so on of the receiver unit will be described next week.



This shows the underside of the Fultograph relay unit panel



Here is the clutch and stop assembly

For the Newcomer to Wireless: WAVELENGTH AND FREQUENCY

I AM afraid that I am a little bit fogged over this wavelength and frequency business. One used always to hear the wavelengths of stations spoken of; nowadays many people do so, whilst some talk about their frequencies and some speak now of one and now of the other.

Long before wireless became a practical possibility a good deal was discovered about both ether waves and air waves. These two classes have one important point in common.

What is that?

That a length of a wave depends upon its frequency. You know, by the way, what the length of a wave is?

Isn't it the distance between any two consecutive "crests" or "troughs"?

Yes, that's right. And the frequency?

The number of complete oscillations made in one second.

Just so. Now if we know the frequency of any wave and its velocity we can find its length by dividing the velocity by the frequency. Similarly if the wavelength is known the frequency can be found by dividing the velocity by the wavelength.

Haven't all ether waves the same velocity?

Yes: in round figures 300,000,000 metres a second. Divide this figure by the frequency and you get the wavelength; divide it by the wavelength and you get the frequency.

I follow so far, but what about these tables of wavelengths and frequencies.

For some queer reason when wireless first assumed a practical form it became customary to convert frequencies into wavelengths. I say curious because though frequencies could be and actually were measured, wavelengths could not then be measured and can now only when they are very short.

I see. Then it became customary to talk about wavelengths. Why was any change suggested?

As more and more broadcasting stations came into operation in America and in Europe, the ether on both sides of the Atlantic began to get very crowded within the limits of the bands assigned to broadcasting. To prevent absolute chaos something had to be done.

And what was done?

The first thing to discover was just what separation a station needed from its neighbours on either side in order to avoid heterodyning or being heterodyned. You know that the modulated carrier

wave is accompanied by sidebands?

Yes, I know that.

Well, it was found that the minimum width of the channel for any station transmitting both speech and music was 10,000 cycles, or 10 kilocycles.

I see what you are driving at. You mean that any satisfactory scheme would have to be founded upon frequencies, don't you?

Yes, and the reason is this. Whether a station is transmitting on 200 or on 500 metres the sidebands occupy the same width. A ten-kilocycle separation is obtained at the very bottom of the broadcast band by a wavelength separation of less than two metres, whilst up at the top it runs into a good many metres.

Then clearly drawing up tables on a frequency basis greatly simplifies matters.

It does; the pity of it is that we have got wavelengths so into our heads that it is rather difficult to think in kilocycles!

I see another term used sometimes, the kilohertz.

Strictly speaking, the kilocycle is a thousand cycles, whilst the kilohertz is a thousand cycles a second. Most of us are content though to use the term kilocycle, it being taken for granted that "per second" is understood.

"FROM RECORD TO REPRODUCER"

(Continued from page 644)

means of a transformer, as shown, or by a resistance-capacity coupler. These are the two methods most generally employed.

8. **Reproduction.**—The amplified electrical impulses have now reached the output stage and once more use is made of magnetic principles. The impulses are passed round coils of wire surrounding the poles of a permanent magnet, and the attractive power of this is

caused to vary, so that a reed or diaphragm placed near is made to vibrate in unison with the varying current.

9. & 10. **Audible Frequencies.**—The sound produced by the vibrating diaphragm is diffused into space by means of a horn which also finally amplifies to some extent.

11. **The Cone.**—The cone is really a large diaphragm without any horn or flare; owing to its increased dimensions it is capable of acting in the same manner.

12. **The Moving Coil.**—The moving coil

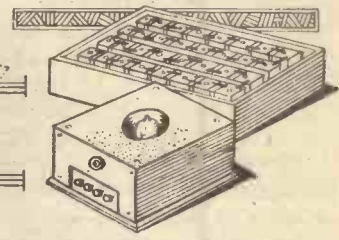
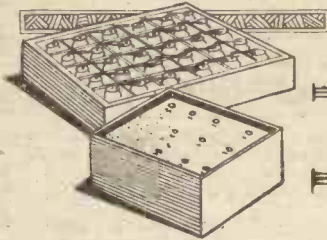
differs from the afore-mentioned speakers inasmuch as the magnetic field is excited by a special source of current supply while the coil attached to the diaphragm is connected to the amplifier.

Tone.—Distortion is the result of over-amplification or overrunning—that is, applying too much "juice" to the valves of the amplifier. Distortion will result if the grid bias and H.T. voltages are incorrectly adjusted and also if unsuitable valves are used in the various amplifier stages.

SOURCES OF H.T. SUPPLY

THE WET LECLANCHÉ BATTERY

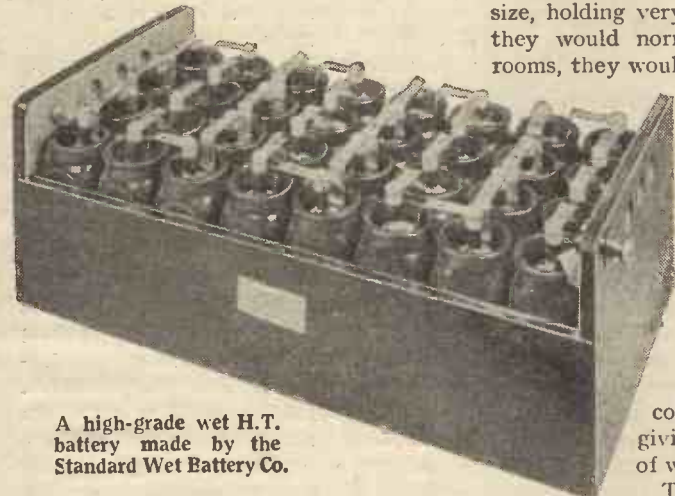
By R. W. HALLOWS



ONE of the most interesting developments in wireless during the past few years is to be seen in the adaptation of the wet Leclanché battery to a form suitable for the supply of plate current. In its original form, still largely used for bell ringing, the Leclanché battery consists of a glass jar, holding from one pint upwards,

wet Leclanché cell, in its ordinary form, shows a tendency to what is known as creeping. A solid deposit from the electrolyte is apt to find its way to the outside of the cell and to the terminals, which it corrodes rather badly. Next the matter of evaporation had to be tackled. For wireless purposes wet cells must be of miniature size, holding very little electrolyte. Since they would normally be used in warm rooms, they would soon dry up and go out

of action unless some means of checking evaporation were devised. Both creeping and evaporation were prevented by placing a little insulating oil in each cell. The oil floats upon the electrolyte and preserves it from contact with the outside air. Corrosion of the contacts was prevented by giving them a thin coating of wax. The weak point of the dry-cell H.T.B. is that once it has run down it is of no further use. The wet-cell battery scores obviously by the fact that it can be recharged when its E.M.F. has fallen below the useful figure. Wet batteries are now made with cells of three sizes, which correspond roughly to the standard, double, and treble capacities of dry batteries. I have put all three through extensive tests, and as a result of these I feel that there is a considerable future for the wet battery.



A high-grade wet H.T. battery made by the Standard Wet Battery Co.

which contains a zinc rod and a porous pot packed with depolarising compound which surrounds a carbon rod. In all Leclanché cells carbon forms the positive pole and zinc the negative. This type of battery is particularly useful when current up to about half an ampere or so is required intermittently for very brief periods with long rests between them. Since the zinc is simply in the form of a single rather thin rod, the internal resistance is always rather high and the battery very quickly polarises owing to the fact that the depolariser within the porous pot is of a slow-acting nature. Curiously enough, it was in the dry and not in the wet version of the Leclanché cell that efforts were first made to cut down the initial internal resistance and to keep it low under loads at reasonable rates lasting for considerable periods.

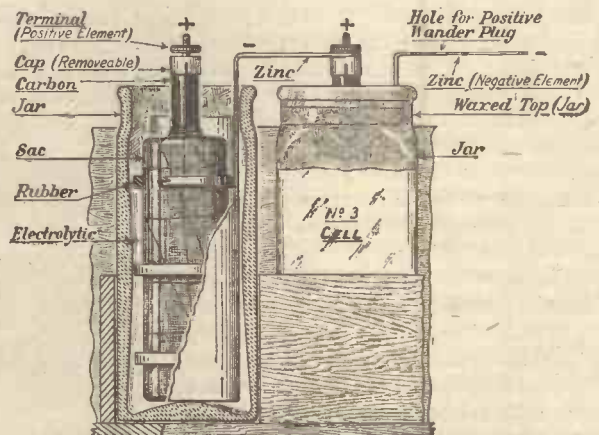
Modern Construction

For wireless purposes it became necessary to re-design the wet cell on lines similar to those adopted in the dry. The zinc rod had to give place to a cylinder, and in some cases the depolariser was packed into a sac instead of a porous pot. Other problems also cropped up. The

All that was said in a previous article about suiting the dry-cell battery to the load imposed upon it applies with equal force to its wet counterpart. For economical working the load upon a wet cell of the smallest size should not exceed 5 milliamperes; those of the intermediate size stand up well to a load not greater than 10 milliamperes, whilst the largest size may be looked to to supply 15 milliamperes, or perhaps a little more.

The Vital Element

It is, perhaps, not always



The construction of the Standard H.T. Wet Battery is shown in this drawing

(Continued at foot of next page)

The Troubled Coast Dwellers

JOTTINGS FROM MY LOG :: BY JAY COOTE

ON evenings when the reception of distant transmissions in London is marred by morse interference, I have often pitied the dwellers on our coasts who, in closer proximity to shipping, must listen to their evening programmes through an undercurrent of "spark." On those winter nights when a gale is blowing or when either snowstorms or fog prevail in the Channel, the interference caused by ships and D.F. stations is considerably increased, as most listeners will have experienced.

During some recent tests on the south coast I found that, generally speaking, reception was not so bad as I had imagined, and notwithstanding the fact that weather was far from favourable, most stations picked up at good strength in London could be equally logged on this coast. Curiously enough, however, they were not individually heard at the same volume of strength as, for example, Hilversum and Kalundborg, of which the waves appeared to lose some of their power on passing over the downs. Most of the French transmitters considerably gained in strength, Radio Toulouse, for instance, becoming a *bete noire* over a portion of the broadcast band. On an outside aerial, I admit that morse interference was too frequent to be pleasant, but with a small frame, it was possible to adjust direction sufficiently to cut down spark to a great degree, and thus render the reception of a continental programme possible.

Although on an air line the distance from the coast to London could not be much more than sixty miles, it is a curious fact that during this period from this position I was able to pick up stations of which I could not get a squeak in my house in town. It is true that most of the transmitters situated in an easterly direction were relegated to a quieter background, but on the other hand, my range towards southern Europe was

bered that this flow of current will take place even when a battery is on open circuit and that it can occur only as a result of the passing of metal into the solution. With impure zincs local action is continually going on, whether the battery is under load or not; the metal is thus eaten away rapidly and the cell gives out long before its proper time. No more need be said to prove that cheap zincs are usually a poor investment.

A well-made wet Leclanché battery of good quality demands little more attention than a dry H.T.B. Provided that each cell is properly oiled up to begin with, evaporation takes place so slowly that the cells require to

very much extended, and stations on the Mediterranean, in Spain and on the north coast of Africa showed a very great increase of strength.

The B.B.C. stations, apart from Bournemouth and Daventry 5XX, were much more difficult to find, but although I had been told that 5GB was not received well on the south coast, I experienced no difficulty in getting its programmes at good loud-speaker volume.

Reception of distant stations varies greatly in different parts of the British Isles, and it is for this reason that the same type of receiver made by six home constructors in as many districts of the United Kingdom, will give its owners curiously different results. Local conditions to a great extent, may be responsible for both success and failure.

Anybody heard Belgrade? The station was officially opened on March 24 last, and has been transmitting nightly. Whilst the tests were on I carefully searched on the wavelength of 260.5 metres allotted to it by the *Plan de Bruxelles*, as I did not anticipate that it would eventually be found working on 450/455 metres, a position in the wave band which is already hopelessly congested. You will find it on most nights just between Aachen and Porsgrund, although I cannot believe that it will remain there definitely unless some rearrangement is made. The call is *Radio Beograd*, the first two letters of the second word being pronounced as the English "bay" and although no interval signal has been adopted up to the present, all announcements are made in four languages, namely, Serbian, which you may not recognise, and in German, French, and English.

Belgrade is not a giant, but its power approaches that of 2LO, and there is no

doubt that, disentangled from its neighbours, it should be received in the United Kingdom, if not at the strength of Turin, but in any case quite loudly.

THE NEW PRAGUE WAVE-LENGTH PLAN

ACCORDING to the new proposals which have emanated from the Conference held at Prague during the period April 4—13, drastic measures will be taken with a view to relieving the present congestion obtaining in the ether, and if authority is obtained from the various interested Governments, on June 30 next, many transmitters will be called upon to operate on altered wavelengths. In some instances, in order to secure a general separation of nine kilohertz between stations, but slight differences will be necessitated, in others, the transmitters will be compelled to abandon the positions previously held under the Brussels Plan, and to work on totally different portions of the wave band.

From the draft list submitted by the Sub-Commission, it will be found that Huizen must be reconstructed as a short-wave transmitter, namely 298 metres, Hilversum altering its wavelength to 1,875 metres; Lahti is displaced to 1,800 metres and Kharkov (Narkompotschtel) falls to 1,304 metres. Reykjavik (Iceland) which hitherto has been broadcasting on the Naples wavelength, is pushed up to the long-waveband where it will be found on 1,200 metres in conjunction with Stamboul (Turkey). Possibly the new Oslo high-power transmitter which is now expected to test at any moment will work on 1,072 metres, thus giving its former neighbours in the broadcasting band a chance of being heard.

With these individual exceptions but small alterations have been made of the wavelengths in the lower band.

be looked over only occasionally. Topping up is done, when necessary, with a fountain-pen filler. If the zincs

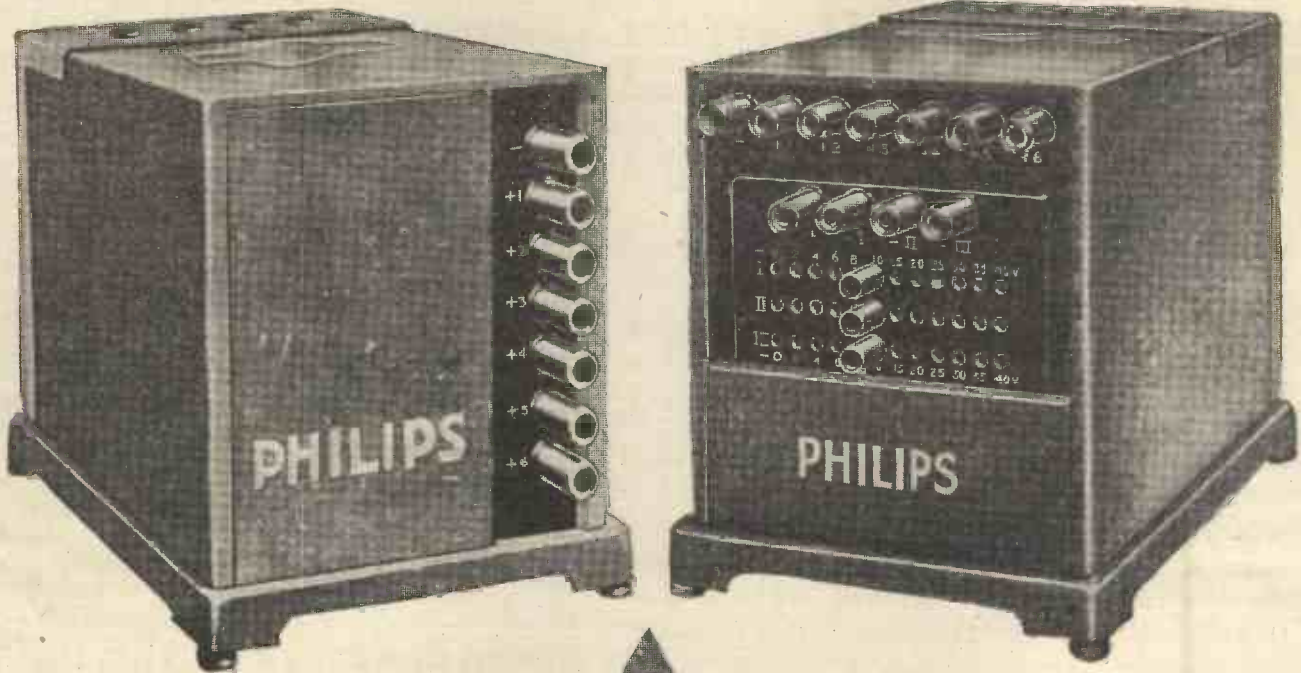


Porous pots, instead of sacs, are used in the batteries made by the Leyton Battery Co.

appear to be in good condition and have not become either very thin or eaten into holes, only the electrolyte and the sacs need be renewed when battery is run down.

Do not try to make the sacs last too long. Remember that they should contain one of the most active elements of the cell. If the manganese dioxide has parted with most of its available oxygen, little will be available for combining with the hydrogen bubbles that try to clog the action of the cell. The internal resistance will be on the high side at all times and it will rise very rapidly as soon as it is put under load. Treat your wet battery well and it will give you every satisfaction.

PHILIPS H.T. UNITS



Save money and improve your reception by using a PHILIPS High Tension Supply Unit, made by the manufacturers of the famous Philips Receiving Sets and Loud-speakers.

No battery renewal problems, but a constant and powerful current direct from the mains sufficient for any type of receiver. Built to last!

Ask your dealer for further particulars.

TYPE 3002 FOR A.C. MAINS.

6 different positive anode voltages. Price complete £7.0.0

TYPE 3003 FOR A.C. MAINS.

For H.T. and Grid Bias Supply. Similar in design to Type 3002 with the addition of 3 variable grid bias tapplings, giving grid bias up to 40 volts independent of anode current. Price complete £8.15.0

PHILIPS

for Radio



A sketch of 2LO



Do you know that to get the best results from a portable the edge of the frame aerial must be pointing in the direction of the broadcasting station? Many other practical points of this kind are discussed in the May "Wireless Magazine."

No matter how much you know about radio, you will always find many articles in the "Wireless Magazine" that you will understand and appreciate. Amongst its 45 features this month there are articles to suit everybody's tastes—a disclosure of Russian broadcasting activities, details for building four fine sets, a radio detective story, hints for decorating a linen-diaphragm loud-speaker, etc., etc. You cannot fail to find something of particular interest to yourself.

The May "Wireless Magazine" Meets All Your Portable Needs!

Whether you intend to build or buy, everything you want to know about the modern portable is dealt with in the May number of the "Wireless Magazine" which includes an extra 16-page supplement, printed on special paper, giving details of more than 100 portable receivers now on the market. Tell your friends about this great number!

THREE SPECIAL PORTABLE ARTICLES.

GETTING THE BEST FROM A MODERN PORTABLE. By

D. Sisson Relph (Assistant Editor).

THE WAYFARER. A Five-valve Portable Super-het described by

J. H. Reyner, B.Sc., A.M.I.E.E. (Technical Editor)

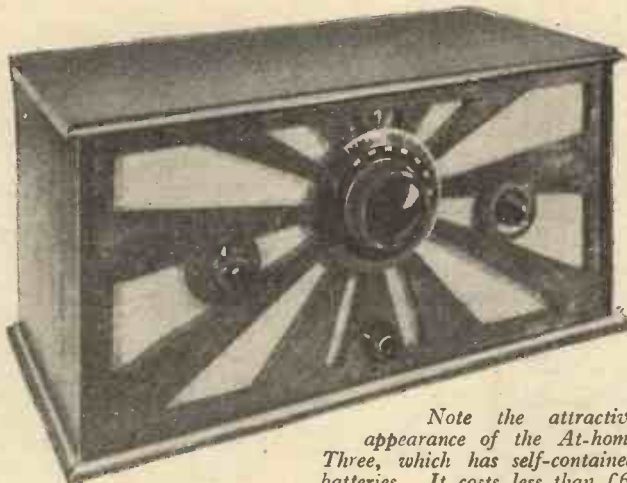
HOW I SHOULD DESIGN A PORTABLE. By

W. JAMES (Research Consultant)



Here you see J. H. Reyner's Wayfarer—a portable five-valve super-het which weighs only 27lb.

OTHER CONTENTS OF THIS ISSUE



Note the attractive appearance of the At-home Three, which has self-contained batteries. It costs less than £6.

By using the special coupon to be found in every issue of the "Wireless Magazine" you can get for half-price a full-size constructional blueprint of any set!

Valves to Use in Your Set
Wavelengths of the European Stations
In Tune with the Trade!
Do Your Pets Like Radio?
How Will Broadcasting Affect the General Election? By B.B.C. Officials
What Are Alternating Currents? Amp and Professor Megohm Discuss Some Fundamentals
Leaves from A Listener's Log. By Jay Coote
Curing Threshold Howl
The Twinflex. A Modern Reflex Two-valver without Crystal Detector
Japan Has the Most Powerful Station
The Inevitable Radio—in the U.S.A.
A Countryman's Diary
How the Law Acts When Your Aerial Collapses!
Speeding News by Air—and Radio, Too!

The Dominions Four.
Converting It to A Short-wave Super-het
Under My Aerial. Hal-ward's Chat on the Month's Topics
Is Your Turntable True?
Speed Traps for Records
Noisy Electric Drives
Building Your Own Gramophone
The Best Dance Records. By H. T. Barnett
Planning Your Aerial. By E. H. Chapman, M.A.
The Music Listener. By C. Whitaker-Wilson
The Horse-power of A Kilowatt
Broadcast Music of the Month. By Studius
Novelties and New Apparatus Tested
Reaction—A Mixed Business!
Reference Sheets. Compiled by J. H. Reyner, B.Sc.

Get Your Copy of "Wireless Magazine" To-day—Price 1/-



On Your Wavelength!

Plug-in Coils

THE popularity of plug-in tuning coils has been on the down grade for nearly two years. They have had a long "innings," but their demise will, I think, be entirely complete before the end of the year. Four years ago, the beauty of a wireless set was not what it contained, but what it succeeded in crowding into the face of its front or top panel. A really good set boasted a row of valves like footlights, surrounded by dozens of knobs, coils, dials, and terminals. The interior of the sets contained merely wiring, grid-leaks, transformers, and a condenser or two.

We Moderns

The reaction has set in with a vengeance, but has been in actual fact cut out of our sets in favour of high-efficiency H.F. stages. The knobs, dials, and terminals have gone the way of antimaccasars and waxed-fruit-in-glass-cases, leaving a stark, bold front panel as modern in appearance as the bold outline of Broadcasting House. The single-dial set is with us now, and that will in due course be superseded by the no-dial receiver. The luxury set of the future will be one that you can "fit and forget," a set worked entirely from the mains, feeding each room of your house, and switchable on to several stations by remote control. There is an immediate demand for a form of relay for making and breaking several H.F. and L.F. circuits, worked after the style of an automatic telephone. Tuning and strength of reception on each of several stations being preset, it will then be only a matter of "dialling" your stations at any of the loud-speaker extension points. I could do with some device of this kind right now, providing it was not too expensive. Manufacturers, please note!

The Last Stage

Meanwhile the current fed to the last stage of my L.F. amplifier goes up and up! Talking about the last stage of an amplifier reminds me of the fact that the talking film loud-speaker equipments are usually very mean in this department. Most systems specify a twenty-watt output for the average cinema auditorium holding 1,000 people, and for smaller halls, a ten-watt set is supplied. This probably explains that unpleasant "forcing" characteristic which mars the quality of reproduction of most talking films. Obviously, there is absolutely no margin of safety, and the reproducing amplifier is being forced and overloaded on loud passages. Speech and music reproduced by the installations at the Regal and Empire, two of London's largest cinemas, are particularly bad examples of over-loaded amplification, and the meagre

allowance of watts to that last stage is most probably the cause of all the trouble. The peculiar thing about it is that for adding another ten watts or so to the output the American talking film people charge a cool thousand pounds or so extra! It may come as a surprise to you that your local cinema proprietor will probably pay four of five thousand pounds for a "flash looking" talkie outfit with a simple inside. Do your duty and persuade him to buy a British outfit with a large output wattage! Show him this paragraph!

Something New

I happened to be over at Mr. Reyner's laboratories at Elstree when he suddenly said: "Have you seen the latest addition to our staff?" He then led me into his charging shed, where he displayed a small robin ensconced in the middle of a large box full of wood wool. Judging from the appearance, I should say that the robin was very heavily damped; but, at any rate, it exhibited no concern at our entry and sat there looking at us. I was told that there were several eggs underneath, presumably ranging in frequency from 50 to 8,000 cycles. At any rate the robin was quite at home, and did not even move when the box was lifted up in order to get at something underneath.

Incidentally, while I was down at Elstree I saw the beginning of a new development. The laboratory staff have been working on this for some considerable time and it was just beginning to show signs of coming to fruition. I am not at liberty yet to say what this development is, but I must confess that it should prove extremely fascinating to many listeners. I, at any rate, played with the arrangement for some time and was with difficulty herded out of the laboratory when they thought it was time for me to go. However, enough for the present. We shall hear more anon.

Back to Form

The improvement in short-wave conditions to which I have referred from time to time recently has continued so rapidly that reception on the wavelets is now back again to something like the first-rate conditions which prevailed some eighteen months ago. All last summer the majority of the short-wave stations were unreliable, and as winter came on both ranges and signal strength grew, on the whole, worse rather than better. There were, in fact, days when one's short-wave set refused to produce a telephone signal from any place more than a thousand miles or so away. At the present time it is a very different business. The set seems full of life, and all over the dials one finds stations coming in with amazing strength and quality.

"Skip" Areas

Curiously enough, one of the worst so far as I am concerned is 5SW, the big fellow at Chelmsford. The reason is, of course, that I am too near him for good reception, being within his "skip" area. PCJ, the famous Dutch station, also behaves in rather an odd way. At night time his "skip" area extends to my locality, so that I receive him rather poorly; by day he is an immense signal, roaring in on the loud-speaker. Short-wave reception is one of the most fascinating sides of wireless, and now conditions have returned once more to normal I have no doubt that it will again achieve the wide popularity that it deserves.

More Pictures

A photo-electric Fultograph still-picture transmitter was installed at Hilversum recently and test transmissions have already begun. This is good hearing, for Hilversum has always been well received in Great Britain. For some reason or other, Radio-Paris has delayed starting his transmissions, though possibly experiments are already in progress, and I have not been lucky enough to tune him in whilst they were going on. As soon as these two long-wavers bring a regular picture service into operation Fultographers will be well catered for in the matter of stations receivable in daylight hours, for we already have pictures from 5XX and Königswusterhausen. Vienna still continues to be reliable on the medium waves, though I do wish that he could let us know his picture time definitely, instead of just saying that the transmission will take place at the end of the evening programme. Brussels, I believe, is also contemplating the installation of a picture transmitter.

For Ships at Sea

For a long time past there has been a special news service for ships at sea, messages in morse being sent out on 5,000 metres from the G.P.O. station at Rugby. At the present time experiments with a new and very interesting method are in progress. Typewritten sheets containing lists of Stock Exchange quotations are placed on a photo-electric picture transmitter working in conjunction with the giant plant. Three ships at present on the high seas have been fitted with receiving apparatus, and it is expected that reception of the typewritten lists will be possible from one end of their voyages to the other. If this experiment is successful—and previous experiments on the same lines leave little doubt that it will be—all sorts of new avenues are opened up. Besides news, storm warnings and all kinds of information for the use of shipping can be sent out in facsimile.

On Your Wavelength! (continued)

A New Wavelength Plan

Details were published the other day of a new wavelength plan, which may be regarded to some extent as a revision of the Brussels Scheme, since the basis of both is a 9 kilocycle separation between stations. One reads with considerable pleasure that the Prague Plan has been subscribed to not only by the broadcasting authorities in various countries, but also by the governments of those countries. This means, one imagines and hopes, that there is a real chance of its provisions being definitely enforced. Hitherto it has been easy enough to assign wavelengths to stations, but utterly impossible to compel stations to use them. Now there is a distinct hope of an improvement in this direction. Our own country is not very greatly affected, the only station undergoing a change really worth talking about being Cardiff, which is to drop from 323 to 261 metres. The Welsh station should certainly benefit by the change, for 323 metres is a bad wavelength at present, and for the last month or two Cardiff has been pretty badly interfered with by other stations. I am rather sorry to see, though, that the Eiffel Tower is to be allowed to continue on 1,444 metres, for this transmission, which surely cannot be necessary in addition to all the others that take place in Paris, invariably causes rather widespread interference.

Better Wireless

One thing that strikes me to-day is the way in which the public at large is insisting upon good quality in wireless reproduction. Not so very long ago the set belonging to the average person, who made no claim to know anything about wireless, was often far from pleasant to listen to, distortion of various kinds and the partial or complete suppression of considerable parts of the musical scale being very marked. There has been a big change of late, and now there is a general realisation that wireless reproduction not only can be, but ought to be, something closely approaching perfection. The improvement has, I think, been brought about very largely as a result of the advances made in gramophone reproduction.

Gramophone Comparisons

When broadcasting first began, the wireless set of that day, bad as we now know it was, was better than the average gramophone; in fact, we used to refer to a distorting receiving set as being "gramophony." The gramophone people, by adopting electrical recording methods and by spending a great deal of money on research into the acoustics of reproducing instruments, very soon made up the leeway. The wireless set installed a year

or two previously was found to be definitely less pleasing to the ear than a newly purchased gramophone. A new standard was set and there followed a natural demand for better wireless sets, a demand which was splendidly met by designers of valves, components, and complete receiving apparatus. There is no excuse to-day for poor reproduction of the broadcast programmes.

B.S.T.

With the coming of Summer Time the long-distance enthusiast will have to begin his medium-wave trips a little later if he wants them—as, of course, he does—to result in a big bag of stations. But don't forget that on the long waves there are many stations which come in astonishingly well in the broadest of daylight. Hilversum, Motala, Kalundborg, Eiffel Tower, Königswusterhausen, Radio-Paris, and Huizen are all receivable at any time when they are working in ordinary circumstances. Even on the medium band the number of daylight stations is often considerable. Nuremberg, Cologne, and Turin are generally there before dusk when they are required, whilst higher up Leipzig, Stuttgart, Hamburg, Frankfurt, Langenberg, and Brussels are all worth the attention of the early bird at the controls.

Eyes in the Dark

Did you notice that a leading Sunday newspaper devoted a good deal of space quite recently to the "New Wonder Ray to make Britain Air-proof"? This was referring to Noctovision and pointed out how the development of this branch of television would provide our air defences with eyes in the dark. It was quoted that, quietly and without ostentation, dramatic progress had been made within the past few months towards solving this critical problem of national defence.

Mr. Baird little thought, when he initially turned his attention to invisible-ray experiments, that such an important commercial and military possibility would materialise. He has pointed out on more than one occasion that in his first television experiments he found the very greatest difficulty in reducing the intensity of the lighting required and that led first of all to experiments with ultra-violet rays. Then, finding that ultra-violet rays were rather objectionable to the sitter, and also very objectionable in that the lenses filtered out quite a big proportion of the active rays, he turned to the other end of the spectrum; that is, to the rays below red.

Great Penetrating Power

The infra-red rays have very great penetrating powers and no bad effect on the sitter, but they have also a very small photo-electric effect, and at first it was

difficult to obtain results using infra-red rays. By increasing the optical efficiency of the apparatus and the sensitivity of the cell, however, results were secured using these rays in place of light, so that images could be seen with the object in *total darkness*. Now, for television purposes there is really no advantage whatever to be gained by using infra-red rays. In fact, one might say that there are disadvantages. To begin with, it is rather difficult to use these rays and, secondly, it is very inconvenient for the person being noctovisioned to sit in total darkness. Furthermore, infra-red rays give the wrong colour value, red appearing almost as white and blue not appearing at all; the effect, therefore, is to give a rather ghostly appearance to the image of the person being transmitted.

Other Possibilities

Apart from use in warfare, there is another and useful commercial possibility which depends upon the fact that these invisible rays penetrate fog. Fog or mist is penetrated by light or by ether waves in proportion to the fourth power of the wavelength. In other words, short waves are dispersed very quickly and long waves have great penetrative power. The old observation that the sun turns red when it sets is simply an indication of this phenomenon. In the case of the setting sun the light is passing through a great deal of fog, mist, and atmosphere, and all the visible light, except the red, is filtered out. The infra-red rays possess that property proportionately and they penetrate fog better than the red rays, just as the red rays penetrate fog better than the blue rays.

The First Experiment

Mr. Baird is fond of pointing out the peculiar manner in which this fact was drawn to his notice. He gave a demonstration of the Noctovisor to members of the Royal Institution at the end of 1926, and one of the members at a previous demonstration had seen an office-boy smoking and wanted to see a repetition of this with infra-red rays. The boy was placed in front, and he smoked, but only just a little wisp of the smoke could be seen, and although he puffed vigorously nothing more came through. At first this amounted to a disappointment, but later on it occurred to the inventor that the explanation was perfectly simple. The smoke from the cigarette was quite transparent to the infra-red rays. In developing that idea a dummy's head was placed in a thick artificial fog, and the head could be seen quite clearly on the Noctovisor screen. That opened up at once a possible use for a development of this apparatus in giving actual vision through fog.

THERMION.



Some simple methods of locating and curing interference due to electrical apparatus and machinery which is often a great annoyance to listeners resident in towns

ASSUMING the amateur to be bothered with a noise which he has ascertained is not due to oscillation or morse interference, the first step is to make quite certain that it arrives from an outside source. This may be done by first removing the aerial and then the earth lead and noting whether any material reduction in the intensity of the noise is apparent. If there is no reduction, it is clear that the interference is due to induction between the set and electric light, or power wires. If the interference stops when either the aerial or earth is removed, it is equally clear that it is being picked up by some portion of the aerial system, either the earth or aerial may be to blame. In this event the amateur is referred to a later part of this article.

If noises are present with both the aerial and earth disconnected, the first item to suspect should be the mains unit if one is used. It may be possible for the amateur to carry out a few experiments in listening with dry battery H.T. instead of the H.T. unit when perhaps the noises may disappear. If they do not, try moving the set to different parts of the room or house, taking care to keep it away from switch points of the electric light. If it is found that such treatment reduces the noises, the



Fig. 3. A D.C. Smoothing Circuit

set should be screened by a metal screening box which may be earthed through a large capacity condenser of not less than 2 microfarads. Alternatively, the detector valve and associated rectifying condenser, grid leak, and coils may be screened by a metal box, or fieldless toroidal or binocular coils be used.

It may also be found that noises are being experienced owing to a break down in some part of the set and the interference will then take the form of a crackling sound which may develop at odd times and be heard at any time of the day or night. Electrical

interference will be identified by the fact that it is fairly regular and either takes the form of a musical hum or a steady hiss or regular crackling.

There are many possible sources of electrical interference and the reader can with confidence suspect any machinery or apparatus operated by electricity to be potential sources of interference, especially

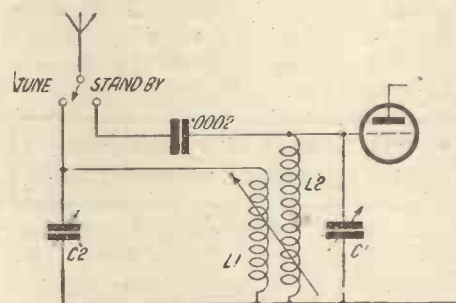


Fig. 1. A particularly selective circuit

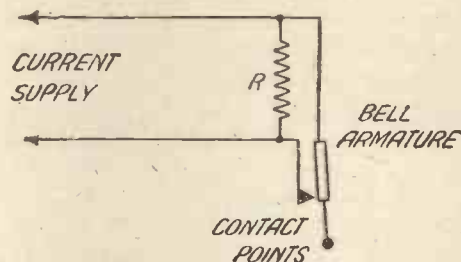


Fig. 4. A method of dealing with interference from a bell

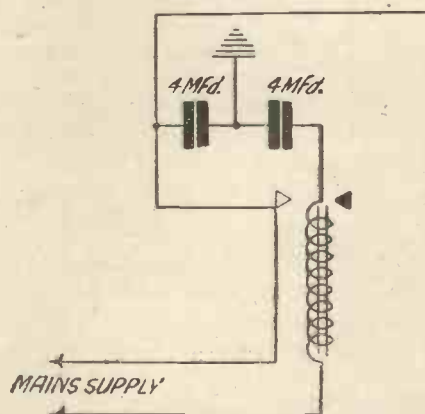


Fig. 5. Flashing signs may be dealt with in this manner

plant which is operated by a motor. To name a few: trams, motors, generators, refrigerators, bells, signalling systems, oil-fired furnaces, ultra-violet ray machines, X-ray apparatus, cinema plant, flashing signs, etc., often cause a great deal of disturbance when the set is in close proximity to them.

It is, no doubt, in the mind of the reader that it would be a good thing if it were possible to devise a set which would reject noises of this kind, but unfortunately this is not possible. All noise, however unpleasant, has a musical component and if this is cut out, naturally the musical reproduction of the set would suffer to a like extent. Nevertheless, the use of a counterpoise or very selective set is sometimes useful in overcoming a certain percentage of the noise arriving on the aerial. The diagram Fig. 1, shows a circuit which can be made so selective that the musical quality of the set can be made to suffer owing to side-band cut off.

The Use of a Counterpoise

If a counterpoise is used, this may consist of four or five wires suspended immediately beneath the aerial and very carefully insulated at both ends from earth. It may be 6 feet above the earth's

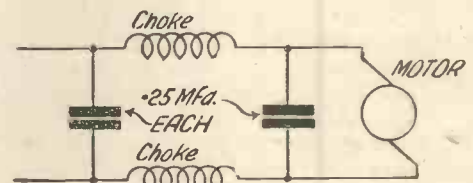


Fig. 3. A filter for A.C. interference

surface, the free ends of the wires nearest the house being joined together and connected to the earth terminal of the set. This arrangement is particularly useful when the noise is coming through the earth lead. Sometimes a small fixed condenser in the earth lead (.002 microfarad) is useful.

In general it should be borne in mind that the use of reaction is likely to increase to a great extent the amount of interference experienced. Also, sometimes, the moving of the aerial so that it points at right angles

(Continued at foot of next page)

THE "TALISMAN" PORTABLE

Some Preliminary Details of a Set Capable of Yielding Remarkable Results



LAST week concluding details were given of the "£5.5.0 Portable," a simple two-valve set for outdoor or indoor use. The great point about this "two" is that it has no incorporated loud-speaker or frame aerial, and thus the cost is reduced to the absolute minimum.

Guaranteed Performance

Now we introduce the "Talisman," which is a four-valver, and a more ambitious type of portable receiver for those who want to put performance above everything else.

Of course, AMATEUR WIRELESS is in touch with readers' requirements, and particularly so far as portables are concerned, for they seem to fall into the hands

of the most enthusiastic amateurs who never hesitate to write in about their experiences with what the AMATEUR WIRELESS Technical Staff has designed for them. The result is that it is easily possible, knowing thus just what is wanted, to make a discreet combination of performance, lightness, cheapness, and all those other good features which one expects to find in a 1929 portable.

Latest Practice

All the elements for a really satisfactory portable are now easily to hand, with the advent of screen-grid valves, increased experience with this form of H.F. amplification, better L.F. couplings, and, by no

coupled by means of the latest special-core transformers. This form of L.F. coupling is becoming increasingly popular for portable use, since it can be made very compact and yet at the same time perfectly stable.

All Wavelengths

A great point which will be appreciated by all set users is that all wavelengths can be covered simply by the movement of two simple push-pull wave-change switches.

In the cabinet of the "Talisman" is included a cone-type loud-speaker and a frame aerial, and ample battery space.

The use of the "Talisman" is not confined to outdoors alone. A complete set such as this, with no loose wires and no batteries likely to spill, should find ample scope in many homes where the word "wireless" immediately suggests long lengths of trailing wires. The fact, too, that the "Talisman" is easily operated adds to the charm of it for indoor working.

Results? On a brief test thirty-five stations were obtained on the loud-speaker, under average conditions, and most of them were really worth listening to continuously, without any fading. There is no doubt but that even an inexperienced operator can obtain twelve alternatives to his local broadcaster, and this without having to display any form of gymnastic effort with many control knobs at once.

Full constructional details of the "Talisman" will be given in our next issue. The particulars will be well worth reading by all intending constructors of portables for the forthcoming season.

**THE LATEST IN PORTABLES
DON'T MISS NEXT WEEK'S ISSUE**

means least, developments in tuning arrangements.

From the brief specification, although conventional up to a point, the "Talisman" appears obviously to be of the latest line of thought on portable design.

It is a four-valver, incorporating one screen grid H.F. stage and two L.F. stages

"CUTTING OUT MAN-MADE STATIC"

(Continued from page 653)

to the source of interference is a remedy, although in so doing care should be taken to ensure that the wire does not come into contact with any overhead power lines.

Machine Interference

Interference from various electrical machines is best overcome at the source. In the case of electric trams there is very little that can be done and the only relief possible is to try some of the arrangements already described.

If it has been ascertained that the noises are due to an electric machine, the first thing to be done is to make a friend of the owner of the machine and suggest that you be allowed to carry out a few experiments in silencing the machine. It should first be ascertained whether the machine is running from D.C. or A.C. mains. If D.C., a smoothing circuit on the lines of Fig. 2 may be useful. When applying the circuit, all the leads used for connecting the condensers,

fuses, etc., should be kept very short and on no account should these be placed at a distance from the interfering machine, but actually be on the machine itself; the earth lead should also be kept short and thick.

In certain cases a great relief may be gained by merely cleaning up the commutator of the machine.

If the interfering machine is run from an A.C. supply, a trap, or filter unit on the lines of Fig. 3 may be useful if the machine is merely a motor and does not rectify or transform the current in any way. In no case should large-capacity condensers be connected across the A.C. mains.

Lifts

Lifts are sometimes very difficult to silence, but treatment of the motor on the lines already indicated and cleaning up the contacts of the control gear may be helpful. It should be borne in mind that the hoisting gear and ropes make very good radiators similar to an aerial and that it is important that they should be well earthed if radiation is to be avoided.

Electric Bells

When electric bells, electric clocks, and other devices working with intermittent contacts cause annoyance, it is helpful to connect a very high resistance across the contacts. These resistances should not have a resistance of less than 250,000 ohms (.25 megohm), (see Fig. 4).

Flashing Signs

Flashing signs are apt to be annoying, and treatment of these will depend very largely upon the type of sign. Unfortunately, there is very little that can be done to the neon-gas type of sign, but signs working on direct current can be treated with good results as shown in Fig. 5.

Listeners who live close to cinemas will know that the plant used to supply the projectors may cause quite an appreciable amount of annoyance. This generally arises at the D.C. end of the machine and may be treated on the lines of Fig. 2. Incidentally, this circuit will prove useful on all motors or generators handling direct current.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

I AM glad to see that a correspondent has given his opinion as to who is the best broadcasting comedian. Apparently he disapproves of my choice and prefers Tommy Handley.

Now, the matter of broadcast comedians is always a pressing one, and, judging from the experiences we have had in the past week or two, it may perhaps be helpful to get more listeners' views on the subject.

While I admit that Tommy Handley is quite good, where he fails to get top marks in my view is that one soon sees through his box of tricks. Like John Henry, there is a little too much sameness about him. Comedians ought to realise that the same listeners hear their repeated broadcasts, whereas on the halls the same crowd only hear them periodically, so that there is always "an interval for refreshments."

You recollect, too, that I printed the note of a correspondent who said that he visited a seaside show and saw two broadcast comedians and approved of them. He was doubtless referring to Clapham and Dwyer. Of course, I printed his views with the same freedom that I give my own, but two points occur to me: One is that he saw this turn and we can only hear them. And just as the studio audience may find their grimaces a help to their rather stupid patter, so do the seaside audiences. As it happens, another friend of mine—not a

listener—saw the same pair and volunteered the information that while the programme was generally good it was somewhat spoilt by one of these comedians announcing the turns "in an irritating fashion."

This critic did not know it, but he bore out entirely my complaint. As I say, funniness over the microphone is an art in itself, and the fact that visual audiences are amused is no criterion whatever.

I wonder how many people really are interested in bridge plays? I wonder?

Listeners have been recently discussing the somewhat pedantic way in which announcers give foreign names.

Sometimes they are so beautifully pronounced that you do not really know what they mean. But here is W. Oliver, of Routh Road, S.W.18, complaining to me that in a broadcast talk the speaker mentioned the name "Kootwijk." He admits that there was a difficulty in pronouncing this name, but hopes that no Dutchmen were listening! He thinks that when wireless lecturers have occasion to mention the names of foreign places that they should take the trouble to find out beforehand what the correct pronunciation is, "instead of making very bad guesses at it."

Pity the poor announcer!

Echo of an old controversy:—

"The banning of dance tune titles is wrong," writes G. L. of Hampstead. "My friends and I say quite definitely that the same tune by the same band on the same evening was scarcely ever played more than once—therefore, how is it possible that certain songs were 'boosted'? To play the tunes without singing the chorus and announcing the titles is like coupling a grid condenser without its leak!"

A recent surprise item—representing the deck of a ship homeward bound—was spoilt by being too theatrical. Some of the sea songs were finely sung, and the anonymous gentleman with the rich bass voice deserves special mention. On the other hand, most of the characters sounded as if they were reading their parts, and the ship's bell was a hollow sham.

variety turns to flog a good song or sketch to death. Once they find it goes down well we are given repetitions *ad nauseum*. A case in point is that nonsensical little ditty, "I lift up my finger and I say 'Tweet-tweet'." They all sing it, and I think it's about time we were given a change.

All political views aside, I regard Lloyd George as one of the most entertaining speakers who has yet broadcast. Whatever one's views, there is no denying that his personality "gets over" in a remarkable manner.

A correspondent who signs himself "A Tired Business Man" wants to know why he is given a scientific talk after nine o'clock in the evening? A recent talk by Professor Eddington was advertised as "being something which even the ordinary unscientific man would be interested to hear. If I can judge by the opinions expressed by many friends, the main interest was in how long the talk would take.

"Apart from the way in which the talk was delivered, I am sure I am not alone when I say that 9.20 is absolutely the wrong time for broadcasting such a subject. The B.B.C. should realise that the hours between 7 and 11 should be used to supply the wants of the tired business man who needs music and amusement—not school lessons."

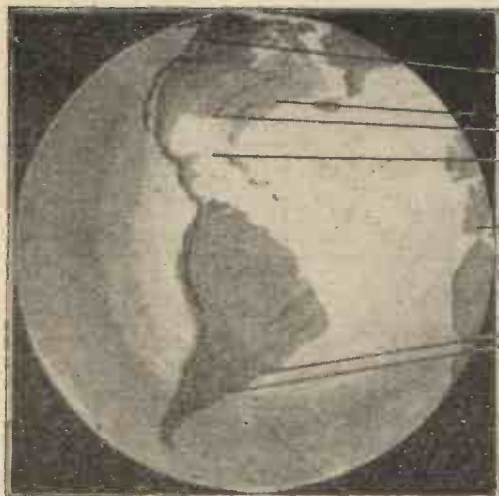


An impression of Walter Fehl



Mario de Pietro—a caricature

There is a tendency amongst some of the



WORLD ON YOUR



A GLANCE at any list of short-wave stations shows in a striking manner how wireless engineers are getting away from rigid rules such as the Austen-Cohen formula, which states that the effective range of a station depends, in a certain proportion, upon its wavelength, and are putting their faith in short-wave stations for very long-distance work. To a comparatively extensive degree this is contrary to radio theory as believed, say, ten or even five years ago. At about the beginning of this time the marvellous distance-getting possibilities of short waves were put down as freaks of reception, and that old stand-by the Heaviside layer was blamed, or thanked—whichever way you like to look at it—for the exceptional results and the divergence from well-known formulae.

World-wide Reception

Well, years of experience, with short-wave transmitters, and most of the pioneer work having been done by British and American amateur transmitters, have resulted in many large commercial concerns adopting short-wave transmitters when reliable communication has to be effected over a large part of the globe.

What this means for the average listener is that it is often very much easier to pick up distant transmissions—Australian or American stations, for example—on the ultra-short waveband, say, between 20 to 100 metres, than it is to attempt the same reception on the normal medium or long waves. Thus you find many of the prominent transmitters in the States having "twin" medium and short-wave transmitters, frequently putting out the same programme, and with the short-wave *poste* easily receivable in this country, but with not a squeak audible on the medium waveband.

Something Different

This has been emphasised many times before in the pages of AMATEUR WIRELESS,

and particularly when the construction of a short-wave receiver is described. But here we have something which is a little different, namely, a short-wave adaptor unit which can be added to very many types of existing receiver and which enables you to bring in the short-wavers without any alteration whatsoever to an existing set. This short-wave adaptor is really simply a detector unit with tuning arrangements suitable for the ultra-short waveband and with a simple plug arrangement so that the detector

course, is simplicity itself to effect.

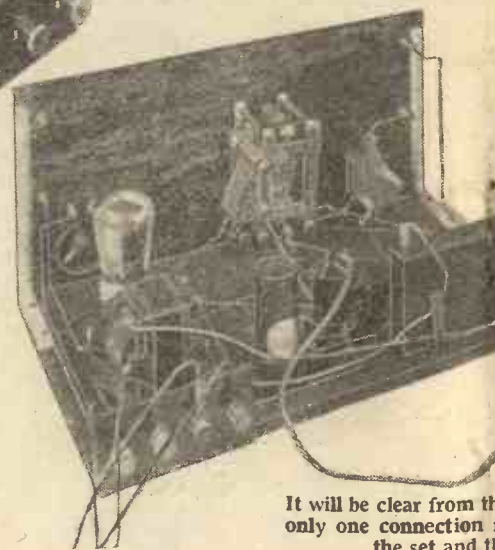
Another advantage is that very many people leave their broadcast sets "semi-permanently" tuned-in to one of the Daventrys or the local transmitter, so that

non-technical members of the family can operate it. With the aid of this short-wave adaptor *pater familias*, or any other enthusiasts in the family, can roam over the world on the short waves and, when he returns, simply remove the adaptor from the broadcast set and not interfere with the tuning setting for picking up the B.B.C. programme.



The parts required are few—

valve may be taken out of its holder in the broadcast set and placed in the unit, and the plug then inserted in the broadcast set's detector socket. This couples up both H.T. and L.T. batteries, and the only further connection necessary is the changing over of the aerial and earth leads to a small strip at the back of the adaptor. The whole process of switching over to the adaptor takes about half a minute and, of



It will be clear from the only one connection the set and the

COMPONENTS

- Ebonite or bakelite panel strip, 3 in. by 2 in. (Radio Radion).
- .00015-mfd. variable capacitor (J.B., Burton, Ormond, D.C.C.).
- .0001-mfd. reaction capacitor (Peto-Scott, Lissen, Bulgin).
- 7-ohm rheostat (Lissen).
- Baseboard, 9 in. by 4 in. (Camco).
- Six-pin base (Lewcos, Scott).
- Valve holder (Benjamin, Mullard, T.C.C.).
- .0001-mfd. fixed condenser (Mullard, T.C.C.).
- 5-megohm grid-leak (Lissen).
- Grid-leak holder (Lissen).
- Short-wave choke (Wear).
- Connecting wire (Glazite).
- One aerial and one earth lead (Igranic, Belling-Lee).
- Slow-motion dial (Igranic, Ormond, Burton, Burndep).
- Three yards of thin flexible wire (Glazite).
- Valve-holder plug (Clis).
- Short-wave coils (Lewcos, AMS9).

RECEPTION SET!



Few Components

As with most other additions to an existing set, the average amateur likes an add-on gadget to be simple and cheap, and this unit is both. It comprises simply a small panel and baseboard carrying the components shown on this page.

COMPONENTS REQUIRED

Panel, 9 in. by 6 in., and
 Raymond, Becol, Paxolin,

short-wave condenser
 Dubilier, Cydon).
 Condenser (Polar, J.B.,
 Burton).

9 in. (Pickett, Clarion,
 Lissen, Tunewell, Peto-

Formo, W.B., Wearite).
 Condenser (Lissen, Dubilier,

sson, Mullard, Dubilier).
 n, Dubilier, Mullard).
 ite, Igranic, Polar).

earth terminal (Ealex,
 ranic, R.I. & Varley,
 t).
 (Lewcoflex).

Wacos, types AMS₄ and

There are one or two points noticeable in the list, apart from the fact that, as usual, alternatives are given in many cases, and these should be closely followed, for the alternatives mentioned have nearly the same electrical characteristics as those used and illustrated in the original unit.

—and the
 wiring
 is simple

The tuning condenser is of the short-wave type and has three moving and three fixed plates. It is provided with a slow-motion dial and the reaction condenser, also has a slow-motion device so that critical control of reaction can be effected. Both the tuning and reaction condensers are carried on the panel, together with a rheostat on the panel which regulates the detector valve current. This is quite a useful control when making critical adjustments, for the detector-filament temperature is relatively

of correct values for the grid condenser and leak. It will be noted that a .0001-microfarad grid condenser is used in conjunction with a 5-megohm grid leak. A slight gain in sensitivity is obtained when the grid leak is connected to positive L.T.

Simple Construction

A blueprint is available for this adaptor and can be obtained, price 1s. post free, from AMATEUR WIRELESS, 58-61, Fetter Lane, London, E.C.4. A reproduction of this is given herewith and clearly shows the wiring, but the full-size print is particularly valuable, for it gives the exact position of the components on the baseboard and panel. In a short-wave receiver, where stray capacity effects must be cut down to the very minimum, component positioning is important. Not only should the various parts be mounted in just the positions shown, but the wiring should be copied closely.

It is advisable to use the blueprint as a guide for the holes in the panel. The reaction condenser and the rheostat are both one-hole mounted components. The J.B. tuning condenser is also a one-hole mounting component, but the Indigraph dial necessitates an extra small hole for the positioning bolt. Don't forget when drilling to form the two small holes through which wood screws are passed to attach the panel to the baseboard.

The small terminal strip carrying the aerial and earth terminals and, again, two screw holes, is attached to the back edge of the baseboard. The valve holder is of the anti-microphonic type, for when working on the ultra-short waves, it is particularly important to insulate the valve electrodes from mechanical vibration. The valve holder, six-pin coil base, grid condenser and grid leak holder are each screwed to the baseboard, but the Wearite cigar-type H.F. choke is supported just above the surface by means of the rigid leads attached to it.



important. So far as the short-wave coils are concerned, only two coils are necessary to cover the range from 20 metres to approximately 90 metres. The adaptor was tested with the six-pin Lewcos AMS₄ and AMS₉ coils, which cover the range mentioned. It was not considered necessary to include a potentiometer because with a small unit of this type very much the same control can be effected simply by adjustment of the battery values and by the choice

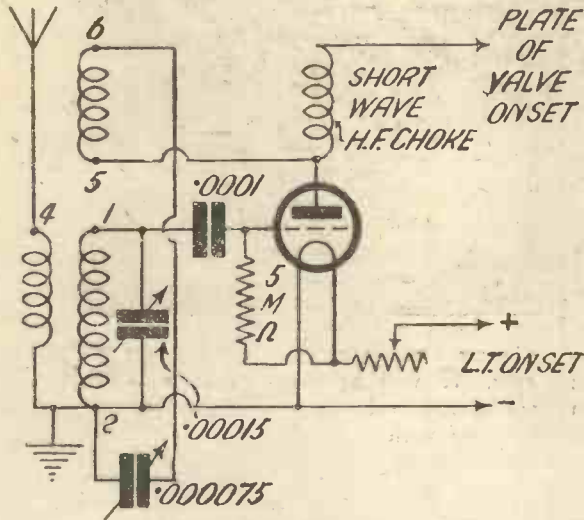


This photograph that
 is required between
 the adaptor

“WORLD RECEPTION ON YOUR SET” (Continued from preceding page)

Wiring

All connections are carried out with rigid bare wire, while insulated flex is used for the connections between the baseboard components and the plug which is inserted in the broadcast set. It will be noted that

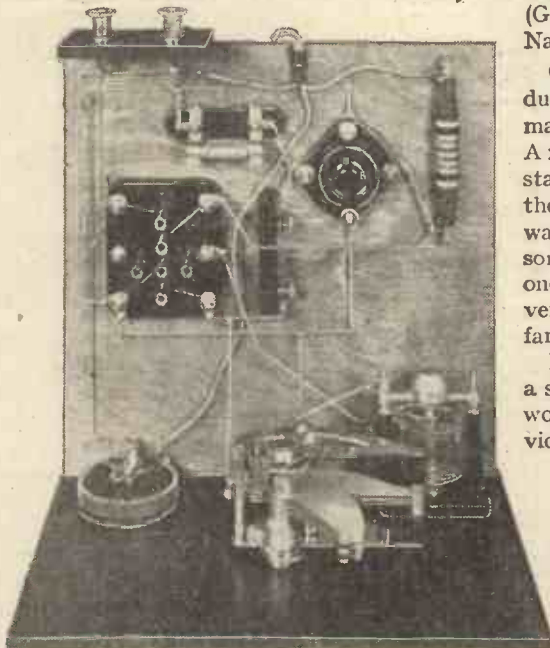


The Circuit of the Short-wave Adaptor

three leads are taken to this plug and the total length should be as reasonably short as possible. Generally the adaptor can be placed at the side of the main set and the length of the lead need not exceed 18 inches or so.

Any Type of Set

It must be emphasised very strongly that this unit can be added to almost any



A plan view of the Short-wave Adaptor

type of set. Reflex receivers would raise some complication, but sets of this type are not popular at the present. Any “straight” set, however, can be used in conjunction with this short-wave adaptor, no matter

whether the existing receiver incorporates any H.F. stages or not.

The best way to illustrate this point is to take as a guide a number of receivers which have recently been described in AMATEUR WIRELESS. “The Arcadian Portable,” No. 354, “The Clarion Three,” No. 352, the “Auto Two,” No. 351, the “All-Europe Four,” No. 350, the “Binowave Three,” No. 349 and the “Listener’s Three,” No. 347, are all receivers with which this unit may be used without any modification whatsoever. It is also of interest to note that with the exception of “The Globe D.X. Two” all receivers described in the booklet “The Season’s Sets and Speakers” (given away with AMATEUR WIRELESS, No. 346) can also be used with this short-wave adaptor.

A question you will be asking is: “What can I get?”

Some Results

Well, during a short test of this adaptor in conjunction with “The Clarion Three” the following stations were heard. W2XO (G.E.C., Schenectady), Rocky Point (NY), W8XK (East Pittsburgh), 5SW (Chelmsford), W2XAL (New York), W2XAF (G.E.C., Schenectady), and Nauen (Germany).

Owing to the limited period during which this test was made only the foregoing American and German stations were received, but there are prominent short-wavers the world over and some of the more modest ones in Europe alone provide very good meat for the DX fan.

It is not necessary to use a special detector valve when working this unit, for provided that the detector valve in a broadcast set is reasonably efficient and works well in the existing combination, then it will be found to be quite in order in the short-wave adaptor. The plate voltage required will be about

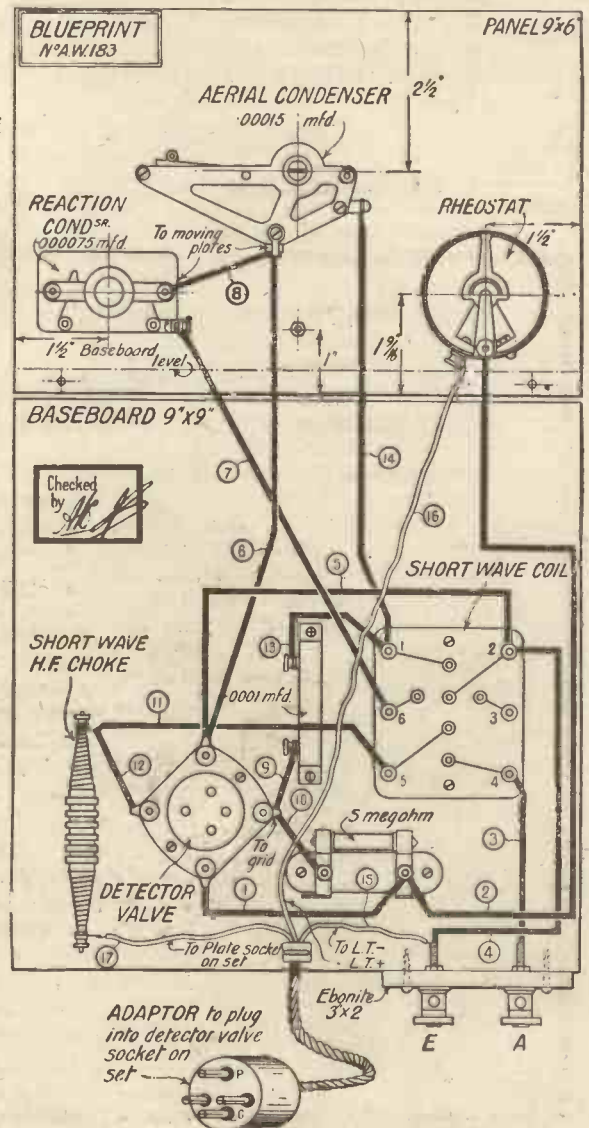
the same as that for broadcast reception, although a little experimenting in this direction, and also a little careful adjustment of the filament rheostat

will cure any reaction irregularities and eliminate motor boating or threshold howling.

TRANSMISSION QUALITY

THE beating of drums or pizzicato playing on the violin are amongst the more severe tests of transmission efficiency. From another point of view the high-frequency components in such letters as “s” and “c” and the diphthong “th” are very difficult to get across the microphone. A characteristic test for high-frequency losses would be a sentence like “The fifth street is seething with sightseers.”

The magnetophone type of instrument handles this type of high-frequency sound better than the carbon microphone. The magnetophone consists of a fine-wire mesh or grid which is vibrated by the sound waves across a strong magnetic field. The grid may be immersed in oil, or damped with cotton wool, to render it aperiodic.



The Wiring Diagram. Blueprint available, price 1/-

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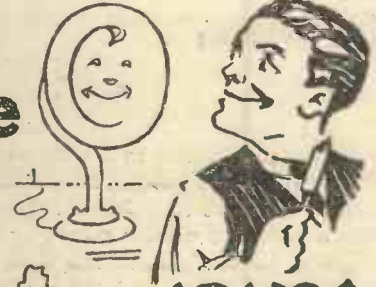
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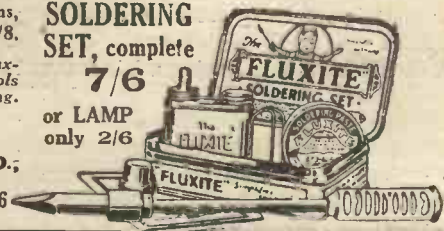
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DEN

By
W. JAMES

For the
Wireless
Amateur

Improving a Speaker

THE cheaper cone type loud-speakers are often rather hurriedly assembled and provided they function fairly well are passed by the test department. A careful amateur may therefore very often improve the results by a considerable amount by dismantling the unit and refitting the parts. It may, for example, be necessary to true the support of the reed by filing it in order that the two sides of the reed may come into contact with the two poles at the same instant, and in other instances, careful fitting alone will materially better the results.

Incidentally, reeds of different dimensions and therefore of different natural frequencies may be tried and the result noted. Bad resonances should, of course, be avoided as far as possible, but it is of no use overlooking the fact that all reeds have a natural frequency.

"Hand Effects"

One of the worst mistakes that an experimenter can make is so to arrange the circuit and the parts used in a receiver so that hand effects are troublesome. Everyone will understand what is meant by the term "hand effects." It means that the tuning is altered when the hand is placed near one of the controls, and the result is that when the position of the hand is varied, the tuning is not under the control of the operator.

At one time there used to be many receivers which were faulty in this respect, but nowadays only an occasional one is met with. Fortunately, it is possible by using suitable dials to arrange that the hand does not too closely approach a dangerous part. Thus, for example, one may employ a slow-motion dial of the type comprising a small knob which, when turned, drives the tuning condenser or other part through a reduction gear that is made up from an insulating material.

A slow-motion dial having a fair amount of metal in its construction would probably make matters worse and should therefore not be used. The best type has the minimum of metal, and it will be found that in spite of a tendency to hand effects when the hand is placed near the spindle of the component, the operation is greatly simplified

by the employment of a suitable dial, and then the circuit may be used to advantage.

A Puzzle!

Reception which is not clear even when the valve circuit and loud-speaker are satisfactory, may be due to many factors. One of them may be new to readers. I came across it some time ago when experimenting with a portable receiver which, of course, had a frame aerial arranged in the cabinet with the receiver.

The loud-speaker, too, was in the cabinet, and the noises were the result of the wires of the frame aerial vibrating. There may be readers who will wonder how on earth noises could be set up by the frame aerial wires, but I think it will be clear to them if they will consider what happens when an ordinary outdoor aerial swings to and fro.

The strength of the signals is found to

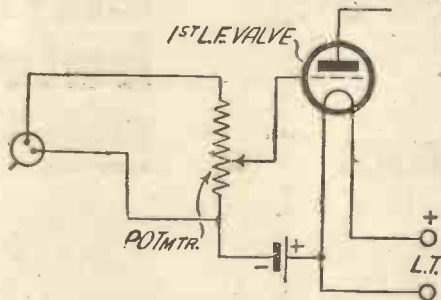


Fig. 1. Simple Volume Control for Pick-up

vary. But the frame aerial wires move much more rapidly than the wire in the outdoor aerial, so rapidly, in fact, that a noise is heard from the loud-speaker. At all events, when the wires were "packed" in position the noises ceased.

Gramophone Reproduction

Pick-ups for converting gramophone record impressions into electric currents are nowadays widely used with amplifiers and loud-speakers. Those who have used them agree that it is important to employ a volume control in order that the strength of the reproduction may be varied to suit conditions. It is further agreed that the control should be so arranged that the quality is not varied as the strength is regulated, and for these reasons a potentiometer having a not too high value of

resistance is usually connected between the pick-up and the first valve (see diagram).

I have used a potentiometer of 100,000 ohms, but the value is not critical, although it should not be too high. The grid of the valve is, of course, connected to the sliding contact, and it will be observed that grid bias is employed. A single dry cell, giving approximately 1.5 volts, is suitable for the grid bias of the first valve, but when convenient the grid bias may be taken from the battery connected to the amplifying or power valves.

Screen-grid H.F. Limits

There is, I am afraid, still in the minds of some people a very stupid idea that one is bound to obtain more high-frequency amplification from a shielded valve having a magnification factor of say, 200, in comparison with another whose magnification factor is 100.

As I have explained before, the amount of the magnification per high-frequency stage, using a shielded valve, is limited by two factors. The first of these is the coupling of the anode and grid circuit, whilst the second is the effectiveness of the coils.

In order to minimise the anode-to-grid coupling the circuits are usually either partly or completely shielded, but it is important to remember that even when the shielding is almost perfectly effected, there remains the anode-to-grid self-capacity of the valve. This depends upon the construction of the valve, and whilst it is very much smaller in the case of a shielded valve than an ordinary amplifying valve, this valve capacity is sufficient to limit the amount of the magnification that can be obtained with stability.

The new Montpellier (PTT) broadcasting station has started its official tests on a wavelength of about 285 metres. On June 30 it will work on 329 metres.

Belfast is to give another musical comedy pot-pourri, entitled *Everything in the Garden*, on May 15.

WNYC (New York), in co-operation with the college of the City of New York and the Board of Education, is planning the installation of loud-speakers and receiving sets in 600 public schools in that city.

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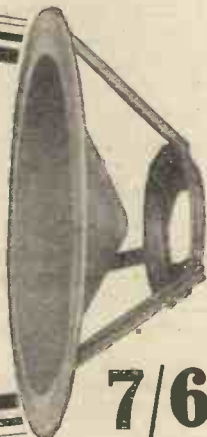
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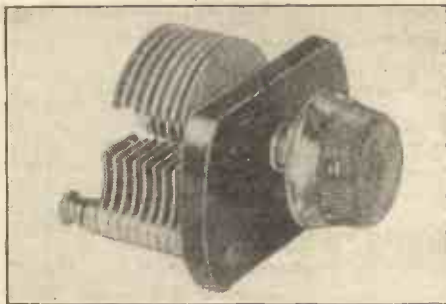
"A.W." TESTS OF APPARATUS

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

Keystone Reaction Condenser

WE have received for test a very neat and compact Keystone reaction condenser, which is a product of Messrs. Peto-Scott. In design it is extremely simple, the fixed plates and the bush for carrying the moving spindle being attached to a single ebonite end plate. The advisability of a single end plate for a reaction condenser which often carries a high-tension potential across it may be questioned. In the case of the Keystone condenser, however, there is so little play in the long bush for the moving spindle and the fixed plates are so rigid, that contact between the two sets of plates can scarcely be made, even if the component is subjected to severe treatment. Good electrical contact between the moving vanes and the corresponding terminals is obtained by a strong spring washer, whilst terminals are arranged on either side of the fixed plates. Some idea of the compactness of this component may be gauged by its overall dimensions, which are $2\frac{1}{4}$ in. by $1\frac{3}{8}$ in. by $1\frac{1}{4}$ in. high when mounted in position behind the panel. One-hole fixing, of course, is provided.

When placed on test, we found the condenser had a minimum capacity of .000011 microfarad and a maximum capacity of



Peto-Scott Reaction Condenser

.00009 microfarad. We should like to see the maximum a little higher, for some circuits require rather over .0001 microfarad, but apart from this point the instrument is to be recommended.

Bulgin Non-inductive Resistance

WE have learned so much recently of the low-frequency amplifier, that now it is possible to couple a large number of stages together without any signs of distortion or back coupling, even when battery eliminators are employed using high anode voltages. One of the chief reasons underlying the success of modern well-designed amplifiers is the thorough manner in which every circuit is filtered: that is to say, the

audio-frequency oscillations are only allowed in certain parts of the circuit. Any parts of common resistance, such as the battery or eliminator itself, are entirely cut out, and in consequence, coupling between the stages becomes almost impossible.

Our knowledge of the low-frequency amplifier has been applied with great success to high-frequency stages in which back coupling leads to instability and consequently loss of signal strength and control.



Bulgin 600-ohm non-inductive resistance

Therefore, in designing a multi-stage or even a single-stage high-frequency amplifier, particularly when utilising the screen-grid valve, it is of great advantage to place a filter circuit in the leads to the high-tension supply.

We have received for test from Messrs. Bulgin, of 9-11 Cursitor Street, E.C.4, a 600-ohm resistance, wire wound on a small insulated former, $\frac{1}{2}$ in. diameter, $1\frac{1}{4}$ in. long. The winding, which comprises No. 48 gauge Eureka, is placed in two slots, placed $\frac{3}{8}$ in. apart. This resistance is intended for use with a suitable condenser to form a filter in a high-frequency circuit. The winding in the slots is placed in opposite directions in order to give an overall non-inductive effect.

We subjected this resistance to a severe test by passing heavy currents through it, and found that values up to 30 milliamps could be passed without damaging the resistance or altering the value to any appreciable extent. It would only be in very extreme cases that currents as high as 30 milliamps would be required in high-frequency circuits, therefore the resistance may be taken as entirely satisfactory for its purpose and can be recommended to readers.

Marconiphone Loud-speaker

MARCONIPHONE products have maintained a high standard of workmanship and performance, whilst the makers have always kept their apparatus up to date with the most recent developments.

Thus it is that the new Marconiphone Plaque fretwork loud-speaker is in appearance and performance, a high-class instru-

ment. Extremely light and occupying a minimum of space, it is at the same time of handsome appearance, for the baffle board and vignette are made of an attractive brown wood suitably carved. The electromagnetic unit is mounted outside the vignette, but it is entirely encased in a brown insulated moulding to match the woodwork. The diaphragm consists of a 9-in. cone resting at the periphery against a thick felt washer. The motion is conveyed to the diaphragm by a reed attached to an armature, vibrating in proximity to the electro-magnet. The end of the high-resistance winding is taken out to a couple of terminals mounted on the back of the wooden baffle.

For a 10-in. cone with a 14-in. octagonal baffle, the results, both in the reproduction of speech and music, are quite good. The sensitivity is well up to standard, whilst reproduction of high, medium, and low frequencies shows a satisfactory balance without undue resonance. The reproduction obtainable from this speaker appears



Marconiphone Loud-speaker

to be above the average for an instrument of its type.

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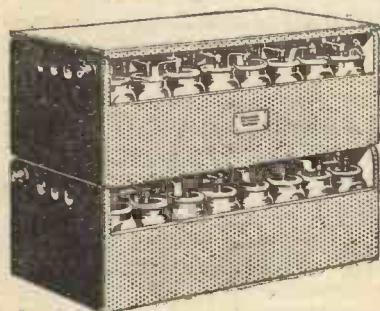
The Glasgow B.B.C. station is again under the fire of criticism. Recent objectors to the programmes call for a ban on "lectures on wine, and the cutting out of all swear words," stating that there seems to be a tendency to "tolerate very rough elements on the wireless."

Saturday afternoon concerts given by the Aberdeen B.B.C. Station Octet in the Sculpture Court of the Art Gallery of that city, which are now coming to an end for the season, have proved most popular, both with wireless listeners and those who frequented the concerts.

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absence of mush ... well satisfied
and consider it a good investment.

Leicester, 22/1/29.
NO TROUBLE WHATSOEVER
No trouble whatsoever ... perfectly
silent in operation ... absolutely
no battery noises ... highly satis-
factory. (Signed) C. M. ROBERTS.

Mill Hill, 24/1/29.

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highest grade and amply fulfilling the claims of its makers.

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WHY USE A MILLIAMMETER

In this article our Technical Editor tells you exactly what are the limitations of the Milliammeter in revealing distortion

A RECEIVER or amplifier in which an effort is being made to obtain good quality usually contains a milliammeter in the high-tension circuit so that an indication can be obtained of the anode current flowing. This milliammeter may read the total anode current or the anode current to the last valve only, and its function is to indicate the presence of distortion. Overloading of the valve will be indicated by a flickering of the needle, and there has accordingly grown up a sort of cult of the milliammeter coupled with a quite misplaced confidence in the interpretation of its indications.

Limitations of the Meter

Briefly the theory is that distortion of

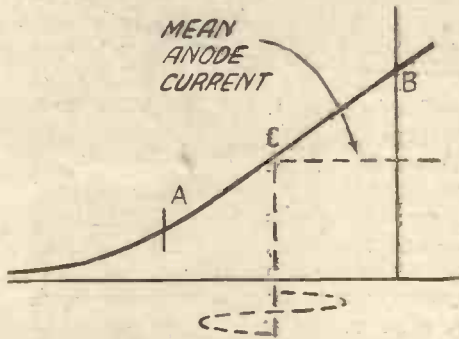


Fig. 1. The grid swing must be within the limits A and B

any form will be indicated by a flickering of the milliammeter needle, that no flickering of any sort must be permitted, and that if the needle is perfectly steady then the reproduction is perfect. Actually this is far from the case. The milliammeter in the anode circuit will only indicate certain particular forms of distortion and there are other forms which have still to be overcome by the taking of suitable precautions.

One of the first things that a milliammeter can take no account of is distortion in the loud-speaker itself due to overloading or some other cause, nor will it indicate distortion in the detector circuit preceding the amplifier. This matter is one of great importance, but the consideration of the points involved must be

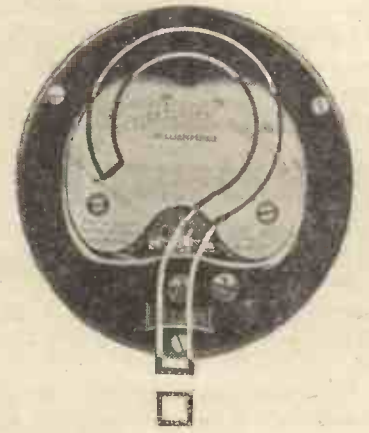
held over, however, for a future occasion.

Let us investigate the reason for the use of a milliammeter at all. Our first essential for distortionless working is that the dynamic or operating characteristic of the valve shall be effectively a straight line. It is necessary to insert the word "effectively," for in the case of any form of coupling involving inductance, the theory becomes slightly complicated and the variation of anode current during the time that the grid voltage is increasing is different from that on the reverse cycle, the effective characteristic being in the nature of an ellipse. We need not consider the problem in this detail, however, and we will assume that the effective characteristic of the valve under working conditions is as illustrated by Fig. 1.

This will be seen to be virtually a straight line between points A and B, but becoming increasingly curved below A. For distortionless working we must operate between the limits A and B, for if we go below A the anode current is no longer directly proportional to the grid voltage, while if we go above B we run into grid current and this introduces damping on certain parts of the wave only and not on others and therefore it tends to introduce distortion.

No Indication of Grid Current

It may as well be pointed out straightway that the anode current meter gives no indication of the presence of grid current and that it is quite possible to operate a circuit with a steady value of anode current



and to have the peak voltages running into grid current the whole time so that this is the first point at which the milliammeter test breaks down. Now see Fig. 2.

Let us now consider that we are working at a point c somewhere within the limits A and B. We shall have a mean value of anode current as indicated by the dotted

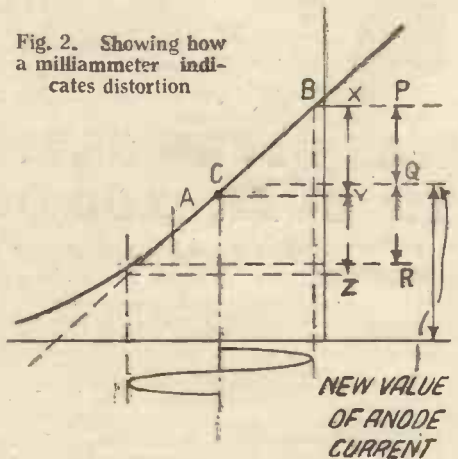
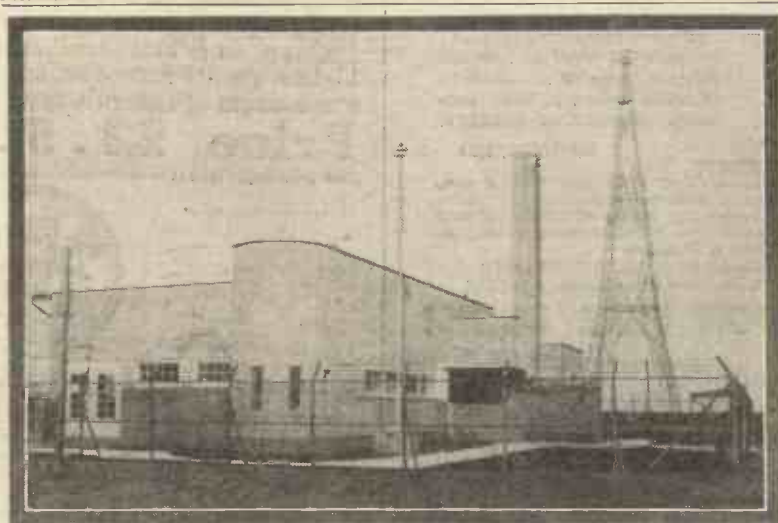


Fig. 2. Showing how a milliammeter indicates distortion

line. We apply grid voltages which are varying above and below the mean value and these variations are equal in value so that the increase and decrease in the anode current will also be equal in value provided that we are still working within the limits A, B. Thus the mean value of the anode current is unaltered and the milliammeter will remain steady.

Let us suppose, however, that we now increase the value of the voltage swing on the grid until we go beyond the point A in the negative half-cycle. I have chosen the point c somewhat towards the negative end of the characteristic so that it is possible to work below the point A without working above B and so running into grid current. This is simply for the purpose of argument so that we only introduce one form of distortion at a time.

We now immediately run into an asymmetrical state



Huizen—the Dutch station well known to English listeners

of affairs. Due to the curvature of the characteristic below A, the decrease in anode current on the negative half-cycle is no longer equal to the increase on the positive half-cycle. The dotted line in Fig. 2 shows a continuation of the straight line portion and indicates the difference between the actual minimum anode current (i.e., at the most negative part of the grid voltage swing), under the actual conditions and the theoretically ideal conditions. Under the ideal conditions xy and yz are equal and the mean value is unaltered. Under the actual conditions the mean anode rises so that xq and qr are equal. A milliammeter in the anode circuit therefore would show a slight rise in the anode current. In other words, it would flicker.

Overloading

This is the sort of thing which happens in a valve which is being overloaded. On medium or small strength signals, the voltage is within the limits AB and the milliammeter remains steady. On a strong signal, however, we run outside these limits and rectification occurs, resulting in an increase in the anode current and causing the milliammeter needle to flicker. *This is the only form of distortion which the anode-current milliammeter will determine.* It is an important form because it indicates at once whether the valve is capable of handling the volume applied to it and if no adjustment of grid bias is able to keep the needle steady, then a larger capacity valve must be used, or the volume cut down.

Having got the milliammeter steady, however, we are not entitled to assume that the circuit is functioning in a distortionless manner. It is still necessary to guard against the flow of grid current for, as we have seen, if the grid voltage swing is sufficient to make the grid positive, grid current will flow, introducing attendant distortion without any indication of the milliammeter, unless this is heavy, when the anode current characteristic ceases to be straight. This should therefore be checked independently.

There is a third form of distortion which is equally likely to occur and this is the distortion due to back coupling. The battery or eliminator used to provide the high-tension supply has a certain internal impedance which is common to all the circuits unless precautions are taken to avoid this. This introduces reaction effects which may be either positive or negative. They are perhaps more desirable when they are positive because they give definite indication of their presence by causing self oscillation, whereas when they are negative the damping introduced into the circuit is not heavy (even under the worst possible conditions it can only reach a value of something like 20 per cent), but it is different for different frequencies and therefore introduces distortion which is difficult to determine. A milliammeter gives no indication whatever of the presence of this form of distortion.

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ON the occasion of the Royal Academy dinner, on May 4, Daventry 5GB will relay the speech to be given by Prince George in reply to the toast of the Royal Family. Listeners will also hear the President of the Royal Academy, Sir William Llewellyn, Lord Plumer, Lord Salisbury, and the Right Hon. J. H. Whitley.

On Sunday morning, May 5, 5XX and 2LO and other stations will relay a military service from York Minster. Listeners will hear the bands of the 5th Inniskilling Dragoon Guards, the 1st Northumberland Fusiliers, and the 1st Green Howards; also an address by the Archbishop of York.

A relay from the Royal Albert Hall will be made by the London station on May 4, when Sam Steward and Fred Webster, the ex-amateur lightweight champion, will fight for the lightweight championship of Great Britain.

Artistes taking part in the 2LO vaudeville programme on May 11 will be Norman Long, Jack Morrison, Ronald Frankau, and Mabel Marks; also the Four Aces, a banjo quartet.

The vaudeville programme on May 9 will include a relay from the Alhambra Music-hall.

Community singing and a running commentary on the Rugby League Challenge Cup Final will be relayed from the Wembley Stadium on May 4. The singing will be conducted by A. C. Caiger, and will be accompanied by the Band of the Welsh Guards.

Clapham and Dwyer return to the 2LO studio on May 4; also Sid Phillips (saxophonist), Stainless Stephen, in comedy, and Yvonne and Alexis Brothers, in harmony.

A brilliant blind violinist, Mr. Ernest Whitfield, is to broadcast from 5GB on May 13. Mr. Whitfield has toured England for St. Dunstan's and for nearly two years has acted as leader of a West End theatre orchestra.

On May 12 Cardiff will relay a programme arranged by the Great Western Railway Social and Educational Union from the Romilly Park, Barry. It is to be a festival of song, including the massed G.W.R. choirs of Aberystwyth, Barry, Bristol, Caerphilly, Cardiff, Carmarthen, Newport, Port Talbot, Romilly, and Swindon, and will be conducted by W. M. Williams and H. Bumford Griffiths.

Cardiff on May 13 will broadcast *The Bracelet*, by Alfred Sutro, presented by the Bristol Playgoers.

Listeners interested in pigeon racing should not miss Mr. W. Haslam's talk, entitled "The Sport of Pigeon Racing," from all northern stations on May 10.

A clever young pianist, Kenneth Watson, who is only sixteen years of age, and possesses thirty-seven first prizes won in open competitions, will be heard by listeners to the northern stations on May 6. His first broadcast was at the age of eleven.

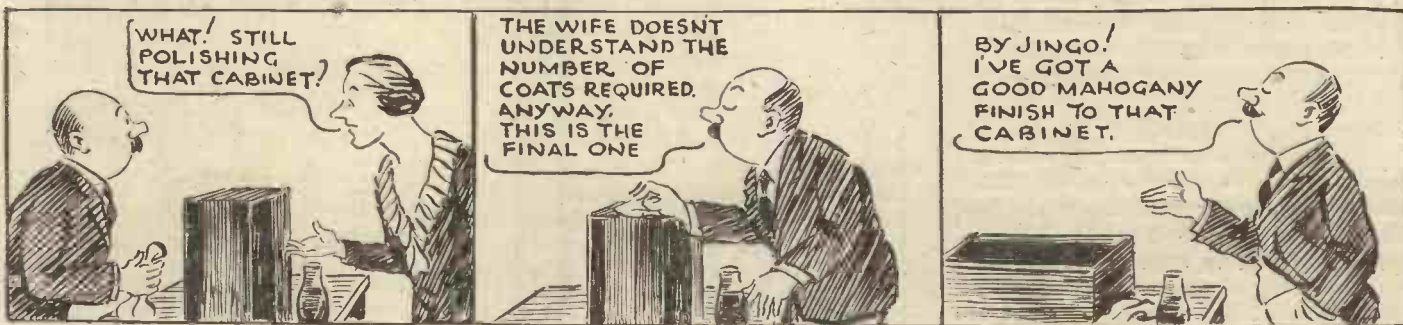
The Optimist, by Vincent Douglass, is the fourth of the series of plays representing "Playwrights of the North" to be broadcast from the northern stations on May 9.

The Pie in the Oven, a "kitchen comedy" by J. J. Bell, will be presented by the Belmont Dramatic Society to Aberdeen listeners on May 15.

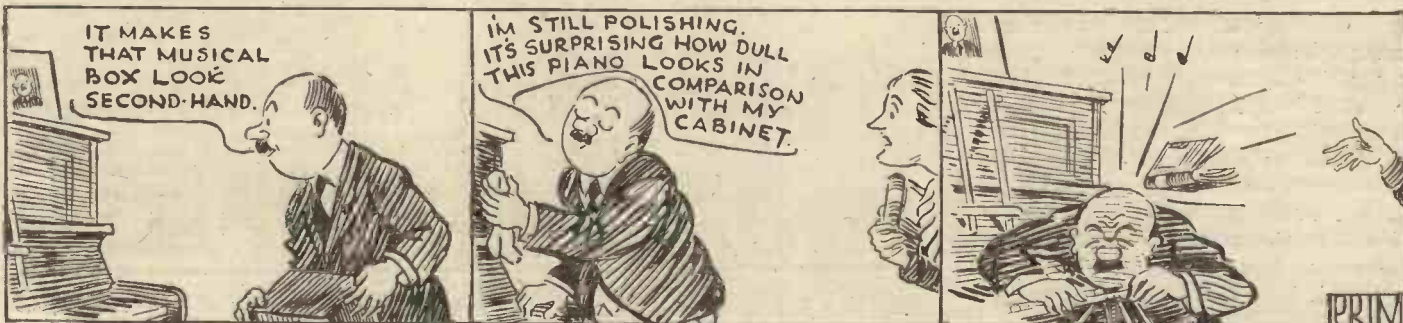
It is reported that Union Radio, Madrid (EAJ7) will shortly broadcast pictures on the Fultograph system.

According to the new Prague Plan, the following wavelengths have been allotted to France: 1,725 metres, Radio-Paris; 1,444 metres, Eiffel Tower; 468 metres, P.T.T. Lyons; 447 metres, Ecole Supérieure, Paris; 381 metres, Radio Toulouse; 346 metres, Strasbourg (under construction); 329 metres, Montpellier; 316 metres, Marseilles; 293 metres, Limoges; 286 metres, Rheims (projected); 272 metres, Rennes; 265 metres, Lille; 255 metres, P.T.T. Toulouse; and 237 metres, Nice—Juan les Pins. Two further wavelengths, namely, 304 and 220 metres, are also available, and it is these that Radio L.L., Vitus, Petit Parisien, Grenoble, Nimes, Bordeaux Sud Ouest, and Radio Lyon will be expected to share!

MR. FLEX TRIES HIS HAND AT POLISHING—



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LETTERS TO THE EDITOR

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

Safety in Battery Eliminators

SIR,—In your article "The Safety Factor in Battery Eliminators" in the issue dated March 9 a harrowing picture is drawn of the strain to which condensers may be put; but no mention is made of the safety valve, as employed, I believe, in the G.E.C. eliminators—to wit, a "Neon" lamp across the output terminals. I have often wondered why other makers do not employ this simple method of relieving the condensers of surge voltages. It has other advantages, too—it serves to indicate by its glow whether the eliminator is in action, and it acts as a voltage regulator up to certain limits of output current. I know of no objections to its use.

H. H. C. (London, W.).

Decorating Linen Speakers

SIR,—I have constructed your linen speaker and have discovered a way of decorating it. I doped the linen with "Luc" paint and found that water colour would go on over this if used fairly thick. It is therefore easy to paint a picture on the linen.

My speaker is made on a round frame, the wood used being eleven-ply about 5/8 in. thick. By using this plywood the large frame can be cut out of a solid square, leaving the centre piece for the smaller circle.—B. O. (Wisbech).

Resistance Capacity

SIR,—With reference to the comments under the heading "On Your Wavelength," in your issue for March 23, there is another aspect of the anode-bend rectification and resistance coupling problem which I think should be considered.

High amplification with resistance coupling necessitates the use of high-impedance valves, and high anode-feed resistances, and this inevitably results in the audio frequencies of 6,000 cycles and over being cut off to as much as 50 per cent., which cut-off does not occur with a good transformer-coupled amplifier and a moderately low impedance valve.

It should also be observed that the tendency nowadays is for stations to modulate to a great extent, and if a high-impedance valve having a very sharp bottom bend is used, the audio-frequency modulation tends to be rectified as well as the radio-frequency, owing to the short length of straight characteristic on the negative side of the zero grid-bias point.

For this reason it is desirable to use a valve having a relatively low impedance—say, 10,000 ohms—as an anode-bend rectifier and apply a large signal to it by means of an H.F. stage, so that the audio-

(Continued on page 668)

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LETTERS TO THE EDITOR

(Continued from page 667)

frequency modulation occurs entirely on the straight portion.

It should be observed that a valve with a sharp bottom bend is certainly more sensitive and will give possibly slightly better reproduction of very weak signals than will the use of a low-impedance valve as indicated; but, on the other hand, when the signal is weak the reproduction is generally poor in any case, so that the overall advantage lies with the use of a low-impedance valve in the manner indicated.

So as to get a long straight characteristic it is essential for the voltage actually on the plate of the valve to be of the order of at least 100 volts, and if resistance coupling is used and an effort is made to obtain anything like the maximum amplification out of the valve, this means that the total H.T. applied to the detector has to be of the order of 500 volts. This difficulty, of course, does not arise in the case of transformer coupling.

The remarks on the subject of grid current are certainly very much to the point, and it occurs to the writer that if the B.B.C. used some good transformers in connection with their amplifying arrangements their reproduction would be rather better, as there is not the slightest doubt that occasionally distortion in the actual transmission is clearly apparent, and such distortion is identical with that caused by running into grid current.

It is important to note also that with the best valves available, and the largest permissible H.T. voltages and big margins to allow for overloads, it is at present practically an impossibility to avoid running into grid current occasionally on powerful transients, and it is on this point, above all others, that transformer coupling is superior. J. B. (New Moston).

Sunday Programmes

SIR,—With reference to "Thermion's" remarks about starting Sunday evening concerts at 8 o'clock, it is about time someone hit out about it. I should welcome Sunday religious services during the morning. A. G. C. (East Ham).

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

Tapping Ebönite

SIR,—The amateur often finds it necessary to tap holes in ebonite to take small screws. Failing the possession of a set of taps, this may be easily done by boring a hole of approximately the correct diameter, heating the screw to be inserted to almost a red heat, and screwing it into the hole with a pair of pliers.

J. I. (Lochgelly).

Eleven years after the Great War, P.T.T. Paris has decided to broadcast a German language course every Thursday at 8 p.m. G.M.T.

A German wireless amateur at Munich has succeeded in securing two-way communication with a South African radio fan on a wavelength of 10 metres.

Easeful Battery Filler. It should be noted that the address of the makers of the Easeful battery filler, which was described in AMATEUR WIRELESS No. 358; is now the Leyton Battery Co., 305, Church Road, London, E.10.

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RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau 58⁶¹ Fetter Lane, London, E.C.4

Reflex Receivers.

Q.—Having worked with a reflex receiver for some considerable time, and not having seen the design of these receivers mentioned in recent wireless publications, I am wondering what can be against their use. Is there anything against the use of reflex circuit receivers which does not conform with present-day practice?—G. H. (Middlesex).

A.—The only argument against the use of reflex receivers to-day is that in attempting to make one valve perform two separate duties some inefficiency results, and as the valve has to deal with both radio and audio frequencies, it follows that some distortion must result. This is borne out in practice, and as most listeners of to-day seek purity of reproduction, the reflex set has been robbed of its former popularity. Where economy is essential the reflex circuit still has its uses.—C. L.

Anode-bend Rectification and the Super-het.

Q.—I notice that most super-heterodyne receivers of American design make use of anode-bend rectification in both the first and second detector stages. In the few super-het sets of British design I have seen both stages, or at least the first detector stage, seem to be of the grid-leak rectification type. As the Americans are

the pioneers of this type of set, why is it that we have not followed their lead in this respect?

When Asking Technical Queries

PLEASE write briefly
and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

Surely anode-bend rectification is to be preferred in both stages in a super-het?—J. G. (Liverpool).

A.—There is much to be said for and against both systems of rectification, but before going into details with regard to the super-het type of receiver it would be advisable to see the conditions under which reception is accomplished in America and in England. As the stations in cities are situated more closely together, it follows that a selective form of detector, such as the anode-bend system, is to be preferred. Looking at the subject from the British point of view, we realise that a more sensitive detector is required to "get" the stations, and as we are usually out for purity as well as range, a more unselective form of detector is preferable, so that the speech side bands shall not be cut off. So far as the second detector stage is concerned, it must be agreed that anode-bend rectification has many advantages. First and foremost is that of power. The signal reaching the grid of the second detector is likely to be of a powerful nature, and anode-bend rectification is less likely to become overloaded than grid-leak rectification. Where an adequate system of intermediate frequency amplification is used, anode-bend rectification is to be preferred, but if only one or two stages of L.F. amplification are used, and these are not fully efficient, then leaky-grid rectification will have its advantages.—C. L.

Player's please



REGD No 154011.

NCC 207

BROADCAST TELEPHONY

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

Kilo-Metres	Station and Call Sign	Power (Kw.)	Kilo-Metres	Station and Call Sign	Power (Kw.)	Kilo-Metres	Station and Call Sign	Power (Kw.)
GREAT BRITAIN								
25.53	1,751 Chelmsford	(5SW) 15.0	201.3	1,030 Radio Lyons ...	1.5	276	1,080 Turin ...	7.0
243.0	1,230 Newcastle (6NO) 1.0		304	982 Marseilles (PTT) 0.5		339	900 Naples (Napoli) 1.5	
258.4	1,161 *Leeds (2LS) ... 0.13		305	982 Agen ... 0.3		387	775 Genoa ... 3.0	
288.5	1,040 *Sheffield (6LF) 0.13		322	930 Vitus (Paris) ... 2.0		443.8	676 Rome (Roma) ... 3.0	
288.5	1,040 *Bournemouth (6BM) 1.0		353	892 Petit Parisien ... 0.5		450	666 Bolzano ... 0.3	
288.5	1,040 *Bradford (2LS) 0.13		370	817 Radio LL, Paris 1.0		504.2	595 Milan ... 7.0	
288.5	1,040 *Edinburgh (2EH) 0.35		382.2	785 Toulouse (Radio) 9.0		JUGO-SLAVIA		
288.5	1,040 *Hull (6KH) ... 0.2		400	749 Mont de Marsan 0.1		308.3	973 Zagreb (Agram) 1.25	
288.5	1,040 *Dundee (2DE) 0.13		414	724 Radio Maroc (Rabat) 2.0		458	655 Belgrade ... 4.0	
288.5	1,040 *Liverpool (6LV) 0.13		423.7	708 Radio Flacdre Lille 0.25		522	567 Riga ... 2.0	
288.5	1,040 *Stoke-on-Trent (6ST) 0.13		428	701 Grenoble (PTT) 1.5		LATVIA		
294.1	1,020 *Swansea (5SX) 0.13		450	666 Paris (Ecole Sup., PTT) 0.7		LITHUANIA		
302.6	991.1 Belfast (2BE) ... 1.0		468.8	640 Lyons (PTT) ... 5.0		2,000	350 Kovno ... 15.0	
311	964 Aberdeen (2BD) 1.0		1,470	203 Eiffel Tower ... 8.0		NORWAY		
323	928 Cardiff (5WA) ... 1.0		1,744	172 Radio Paris ... 8.0		242	3,240 Trondheim ... 1.0	
358	838 London (2LO) ... 2.0		210	1,370 Flensburg ... 1.5		297	1,070 Notodden ... 0.7	
373	793 Manchester (2ZY) 1.0		240	1,250 Nürnberg ... 4.0		365	820 Bergen ... 1.0	
396	757 *Plymouth (5PY) 0.13		250	1,200 Kiel ... 0.7		387	774 Fredrikstad ... 1.0	
401	748.3 Glasgow (5GC) ... 1.0		250	1,200 Cassel ... 0.7		456	657 Alesund ... 1.0	
482	622 Daventry Ex. (5GB) 25.0		263.2	1,140 Cologne ... 4.0		459	653 Porsgrund ... 1.0	
1,500.5	191.5 Daventry (5XX) 25.0		267.8	1,120 Muenster ... 1.5		496	604 Oslo ... 1.5	
* Relay stations. 1 Relays 2LO.			273.1	1,098.8 Kaiserslautern 1.5		500	600 Tromsø ... 1.0	
AUSTRIA								
150	1,200 Linz ... 0.5		280.4	1,070 Königsberg ... 4.0		568	350 Hamar ... 0.7	
277.8	1,080 Salzburg (under construction) 0.5		281	1,056.7 Berlin (E) ... 0.7		POLAND		
354.2	847 Graz ... 0.5		284	1,056.7 Stettin ... 0.7		811	955 Cracow ... 1.5	
456	694 Klagenfurt ... 0.5		284	1,056.7 Magdeburg ... 0.7		338	890 Posen ... 1.5	
456	694 Innsbruck ... 0.5		317.5	945 Dresden ... 0.75		415.5	722 Katowitz ... 10.0	
620	577 Vienna ... 20.0		320	937 Breslau ... 4.0		456	658 Wilno ... 1.5	
BELGIUM								
220	1,360 Chatelneau ... 0.25		329	920 Bremen ... 0.75		1,401	214.1 Warsaw ... 10.0	
249	1,203 Schierbeek-Brussels 0.5		326.4	919 Gleiwitz ... 6.0		PORTUGAL		
275	1,090 Ghent ... 0.5		329	920 Bremen ... 0.75		945	Lisbon CTIAA (Wed. and Sat. 10—midnight)	
280	1,070 Liège ... 0.5		361.9	829 Leipzig ... 4.0		ROUMANIA		
312	970 Arlon ... 0.25		374.1	802 Stuttgart ... 4.0		395	757 Bucharest ... 4.0	
612	880 Brussels ... 10.0		391.6	766 Hamburg ... 4.0		RUSSIA		
CZECHO-SLOVAKIA								
265	1,128 Kosice ... 2.0		423	717 Frankfurt ... 4.0		825	363.5 Moscow (PTT) 25.0	
273	1,080 Feriby (testing) 12.0		453.9	654 Danzig ... 0.75		925	327 Homel ... 2.5	
299.3	1,000 Bratislava ... 4.0		456	651 Aachen ... 0.75		1,002.4	299.2 Leningrad ... 20.0	
343	873 Prague (Praha) 5.0		462.2	649 Langenberg ... 25.0		1,450	216.9 Moscow ... 30.0	
482.3	694 Brunn (Brno) ... 2.4		476	630 Berlin ... 4.0		1,500	178 Kharkov ... 15.0	
DENMARK								
339	887 Copenhagen (Kjøbenhavn) 1.0		537	559 Munich ... 4.0		SPAIN		
1,158	160 Kalundborg ... 7.5		566	530 Augsburg ... 0.5		314	956 Oviedo (EAJ19) 0.5	
ESTHONIA								
408	935 Reval (Tallinn) 1.3		568	530 Hanover ... 0.7		350	855 Barcelona (EAJ1) 3.5	
FINLAND								
374	800 Helsingfors (Helsinki) 0.8		577	520 Freiburg ... 0.7		370	801 Seville (EAJ5) 0.5	
1,502	199 Lahti ... 20.0		1,053	181.4 Zeesen ... 20.0		400	750 Radio España ... 1.0	
FRANCE								
80.75	9,755 Agen ... 0.25		1,048.3	182 Norddeich ... 10.0		401	748.1 San Sebastian (EAJ8) 0.5	
200	1,500 Fécamp ... 0.3		GRAND DUCHY OF LUXEMBOURG					
211.8	1,420 Beziereux ... 0.1		1,280	234.2 Radio Luxembourg 0.25		HOLLAND		
235	1,260 Bordeaux (Radio Sud-Ouest) 2.0		81.4	9,554 Eindhoven (PCJ) 25.0		456	658 Salamanca (EAJ22) 0.55	
240	1,250 Radio Nimes ... 1.0		LUXEMBOURG					
245	1,224 Lille (PTT) ... 0.8		81.4	9,554 Eindhoven (PCJ) 25.0		SWEDEN		
252.1	1,100 Juan-les-Pins ... 0.4		88.8	— Kootwijk (PCL) 32.0		261	1,150 Hörby ... 10.0	
253	1,185 Montpellier ... 0.25		HUNGARY					
254	1,180 Rennes (PTT) 1.0		326.3	891.5 Huizen (until 6.40 p.m. B.S.T.) 5.0		265	1,130 Trollhattan ... 0.4	
255	1,175 Toulouse (PTT) 1.0		1,072.8	279.6 Hilversum (ANRO) 5.0		333	900 Falun ... 0.5	
263	1,118 Strasbourg ... 0.8		1,152	162 Huizen (after 6.40 p.m. and on Sundays) 5.0		340.8	865 Goteborg ... 6.0	
274	1,092 Limoges (PTT) 0.5		1,152	162 Schvevningen-baven 5.0		437	686 Stockholm ... 1.5	
ICELAND								
IRISH FREE STATE								
222.2	1,351 Cork (5CK) ... 1.5		ICELAND					
411	739 Dublin (2RN) ... 1.5		833.3	900 Reykjavik ... 1.0		550	545.5 Sundsvall ... 1.0	
ITALY								
276	1,080 Turin ... 7.0		IRISH FREE STATE					
339	900 Naples (Napoli) 1.5		222.2	1,351 Cork (5CK) ... 1.5		770	390 Ostersund ... 2.0	
387	775 Genoa ... 3.0		411	739 Dublin (2RN) ... 1.5		1,200	250 Heden ... 2.0	
443.8	676 Rome (Roma) ... 3.0		ISLAND					
450	666 Bolzano ... 0.3		ISLAND					
504.2	595 Milan ... 7.0		ISLAND					
JUGO-SLAVIA								
308.3	973 Zagreb (Agram) 1.25		ISLAND					
458	655 Belgrade ... 4.0		ISLAND					
522	567 Riga ... 2.0		ISLAND					
LATVIA								
LITHUANIA								
NORWAY								
POLAND								
PORTUGAL								
ROUMANIA								
RUSSIA								
SPAIN								
SWEDEN								
SWITZERLAND								
TURKEY								

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MAKE THE MOST OF GOOD RECEPTION!



Get a TRIX H.F. Choke—get one TO-DAY! There's no time like the present, especially if you want really first-class reception. When you have tested the TRIX H.F. Choke you will realise what choke EFFICIENCY means. Mounted either horizontally or vertically, its improved design enables it to function over a wave-band of 5 to 3,000 metres. Highest-grade ebonite, brightly plated nickel parts, and low price are other pleasing features of the TRIX H.F. Choke. TRIX Condensers are also amazingly efficient. Fully guaranteed for capacity, insulation, and voltage tests. Price from 1/- each. Full particulars of the complete TRIX range of tested components from the manufacturers:

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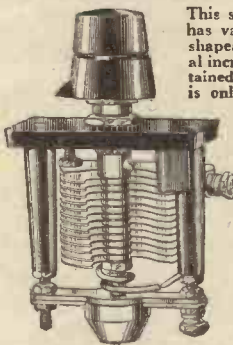
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Here is the Polar Condenser specified for the Short-wave Adaptor described in this issue.

THE POLAR 'CAPCON'



This slow motion condenser has vanes that are specially shaped so that a very gradual increase in capacity is obtained from minimum which is only 6 mmfd. The slow motion movement is totally enclosed in a brass case making it impervious to dust and external damage. Solid brass throughout. Frame of best Bakelite. The ball-bearings at each end of the spindle ensure rigid suspension of the moving system. Control is smooth and noiseless.

PRICES:

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Direct Drive Type, 5/6 each with Pointer Knob. With Knob-dial, 9d. extra.

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CHIEF EVENTS OF THE WEEK

Date	Event
May 6	(LONDON AND DAVENTRY (5XX)) The Prisoner of Zenda, by Anthony Hope, retold for the microphone by Holt Marvell.
" 7	De Courville's Hour. No. 6, "Gay Sparks."
" 8	Covent Garden opera.
" 9	A vaudeville programme.
" 11	The Island Princess, a musical comedy: book and lyrics by Guy K. Austin. music by Hubert W. David.
DAVENTRY EXPERIMENTAL (5GB)	
May 6	A vaudeville programme.
" 8	A military-band concert.
" 9	B.B.C. popular orchestral concert from the People's Palace.
" 10	Moonshine, a new radio show by Charles Brewer: sketches by Edwin Lewis.
" 11	Two plays by W. W. Jacobs.
MANCHESTER	
May 11	I Tell'd Yer So, a comedy by Claudia L. Wood.

Date	Event
May 8	NEWCASTLE North of England Musical Tournament.
" 11	North of England Musical Tournament.
GLASGOW	
May 8	A Scottish concert.
" 9	"Sea Ways," a programme arranged by Gordon Gildard.
BELFAST	
May 11	An Irish programme.

A number of new wireless stations are planned in Costa Rica, reports Mr Roy T. Davis, Government Minister at San Jose. They will be located at El Pozo, Buenos Aires del Canton de Osa, Los Chiles, Punta Arenas, San Lucas, Dominica, and Liberia.

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LARGEST
RADIO
STORES

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27,
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LEICESTER SQ.
LONDON, W.C.2

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ALL DAY EVERY DAY
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Sunday morning 11-1

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GENUINE IDEAL BLUE SPOT
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4-pole Balanced Armature
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**HANDSOME OAK POLISHED
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12/11 Post 1/3-

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66K (101)
See above for specifications.

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12" CONE
The Lot Carr. Pd.

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With fitted 10 in. Floating Cone and 12 in. Square Baffle Board. Takes all Bal. Armature Units.

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BRITAIN'S FAV. 3 (De Luxe)

A.W. 6/4/29
Ormond Log .0005, 6/-; .00025, 5/6; 7-ohm panel Rheo 2/6; 3 Benjamin V.H., 4/6; Formodensers Type "J", 2/-; .0003 and series clip, 2/-; 2-meg. Leak, 1/-; Tunewell All purpose H.F. Choke, 5/9; R.C.C. Unit Dubilier, 7/-; 50,000 ohm wire wound, 5/6; 2-mfd. Mansbridge, 3/6; L.F. Transformer R.I. Varley, 15/-; (add balance any other). Push-pull Switch, 1/3, complete with Panel Brackets, Indicator, G.B. Clips, 6-pin Base, Connecting Wire, Thin Flex, 7 Engraved Terminals, EBONITE Panel 16x8, and 16 x 9 Baseboard.

Above Lot 63/- Tunewell Dual Coil 6-pin, 7/9; Lewcos Short Wave, 20/45 or 40/90, 7/6 extra.

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2 Polar .0005, No. 3, at 5/9. .0001 Reaction 4/-.
2 Dual range O.T. Coils, with Reaction (Tunewell), Anode, 10/6; Aerial, 10/6. 3 Lotus or Formo V.H. at 1/3. Formodensers, "J", 2/-. Dubilier 1 mfd. 2/6. .01 Fixed, T.C.C., 1/9. 3-meg. Lissen or Edison Bell, 1/-. S.G. H.F. Choke, Peto-Scott, 5/-. H.F. Choke, Lissen, 5/6. L.F. Transformer, R.I. & Varley, 15/-. Ebonite Strips.
14x7 Ebonite Panel. Screen, 2x6. 8 Engraved Terminals. Push-pull Switch, Flex, Plugs, 10-g. Wire, 2 S.M. Dials.

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Cossor S.G. Valve S.G. 220, 22/6. 2 Cossor Pattern S.M. Dials for 6/- Pair Long-wave Coils 12/6

TUNEWELL CLARION COILS

ANODE or AERIAL
10/6 each
Push-pull panel mtg.

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£8 : 12 : 6
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L.F., H.F. or Det. 4/-
Screen Grid. 2v. 12/6
POST 6d. (3 Post Free).

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H.F. Choke, Silk Loud-Speaker Cord, 9-volt Grid Bias, Pair Panel Brackets, .0001 Reaction, 2 mfd. Mansbridge, 100 ft. Insulated Aerial, 4- or 5-way Battery Leads, 30 ft. Coloured Connecting Wire. S.M. Dial, 12 yds. Lead-in, Fuse and Holder, 12 Nickel Terminals, 60X Coil, Permanent Detector, Battery Switch, .0003 and 2-meg. Leak, 6-pin Coil base, 12 yds. Twin Flex, 100ft. Indoor Aerial, .0005 Variable, Set of 12 Plugs and Sockets (red or black), Set of 3 Coil Plugs with Terminals, Wave Change Switch, .01 Fixed Condenser.

Ultra Short Wave Coils for Cossor New Melody Ward and Goltone 7/6

PAIR (Post 6d.)
Ebonite cut while you wait at 1/4. square inch, also 1/2 inch at 3d. Only the best supplied. Drilled Panels for all circuits.

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H.F., Det., R.C., 5/2 each ; Power, 6/9. 2-v. or 4-v. Post 6d. (3 post free).

DARIO RADIO-MICRO
2-v. or 4-v. G.P. .. 5/6
Super Power 7/6
Super H.F., 2-v. or 4-v. 7/6
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Lewcos C.A.C.5 10/6; C.A.C.20 12/6; C.S.P.5, 10/6; C.S.P.20, 12/6; P4 to 14, 3/- each; P16 to 22, 4/- each. Touchstone Coils, 30/- pair. C.T. Coils, 3/6, 5/3. Q.Coils: Q.A., 15/-; Q.S.P., 21/-; Q.A.R., 21/-; Q.A.A., 15/-; Q.S.G., 21/- . All Lewcos Products.

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QA, 15/-; QSP 21/-;
MASTER 3 STAR 15/-
ALL LOTUS PARTS.

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Massive All Purpose H.F. Choke 5/9
Dual Range Coil - 7/9
Master 3 Star - 3/11
5XX do. - - - 5/9
Globe DX pr. - - 21/-
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Valve Holders, 1/-; Fixed Condensers, 1/-, 1/6; Leaks, 1/-; Switches 1/8, 2/6; Latest 2-way Cam. Vernier, 4/6; Rheostats, 2/6; D.D., 1/6; Lissendola, - 13/6; L.F. Transformers, 8/6; Coils, 60X, 6/4; 250X, 9/9; -60-v. H.T., 7/11; 100-v., 12/11; Super 60-v., 13/6; Grid Bias, 1/6; 4.5, 5d.; Super L.F. 19/-; Variable .0003, 6/- . 0005, 8/6.

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SIX-SIXTY 22/6
COSSOR 22/6
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WATES' Three in One Radio TEST METER

Readings: -0-150 volts.
0-30 milliamps.
0-6 volts. Res., **8/6**
5,000 ohms.

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Wireless in Parliament.

MR. ORMSBY-GORE, Under-secretary for the Colonies, informed Lord Sandon that he was not aware that there was any reason to apprehend the establishment of an American broadcasting monopoly in the British West Indies and adjoining colonies, but he could promise that any proposals which might be submitted for the establishment of a British service would be carefully considered. No such proposals had reached the Government hitherto.

Mr. Day asked the Postmaster-General whether any agreement had now been arrived at between his department and the British Broadcasting Corporation by which facilities would be granted for the purpose of broadcasting by television; could he state which station the British Broadcasting Corporation would be utilising for these experiments; and would he give particulars.

Sir W. Mitchell-Thomson said he had already announced his willingness to agree to a station of the British Broadcasting Corporation being utilised for television experiments outside broadcasting hours. The Corporation, however, could not provide the desired facilities for simultaneous transmission of speech and television until the completion of their new station at Brookmans Park, which was expected to be ready in July next.

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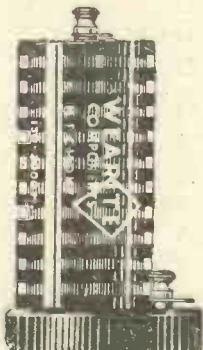
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