

Modern Wireless

Vol. XIX. No. 75.

BRITAIN'S LEADING RADIO MAGAZINE

MARCH, 1933.

Our Sets This Month—The Ideal Broadcasting Scheme—A New Rectifier Invention.

THE "S.P." Three receiver, which we describe in this issue of MODERN WIRELESS, is a three-valver employing a variable- μ screened-grid valve, detector and pentode output. The set is described in dual form, so that it can be built in two ways, i.e. first as a straight set, and secondly by employing the new quiescent method of push-pull output stage coupling. It can be safely said that the "S.P." Three includes all the latest developments in modern radio receiver technique, and is capable of providing first-rate power and quality.

Either to go with it, or to be used separately if desired, we recommend the simple but powerful A.C. mains unit described in this issue; while for the man who wants a lot of power we also include full details of the A.C. "Diodion." And when we say a lot of power we mean it, for it gives an output of 5,000 milliwatts.

Emphatically, this is not a receiver for the beginner; but the experienced constructor, who is on the look-out for a really powerful set, will be well-advised to study the circuit and read the article with the greatest of care.

The Ideal Broadcasting Scheme

SEVERAL years ago our Chief Radio Consultant, Capt. P. P. Eckersley, then Chief Engineer of the B.B.C., revealed the details of his great Regional Scheme. Since the scheme was made known, it has been accepted the world over as the ideal technical method for broadcasting, and at last this great scheme is nearing completion.

The last step will be marked by the completion of the new station for Northern Ireland. London, Northern and Scottish Twin Regionals are working; the Western Regional station is well on its way to making its debut in the ether; the site and plans are ready for the rebuilding of National 5 X X and Midland Regional at Droitwich. And, finally, a site is now being selected for the new Belfast transmitter.

Captain Eckersley has never received his full due for his inventive genius, and for pioneer work in putting the B.B.C. properly on its feet as a first-class technical concern. Let us hope that, when the Regional Scheme is finally completed, a little gratitude will be shown by those concerned, and due honour given to the man who has made the technical side of British Broadcasting what it is.

To Replace the Detector Valve

HAS the dream of radio inventors come true? For years now we have been hearing of the cold valve.

Well, a few days ago radio manufacturers had a chance of examining a new device that, it is claimed by the "News-Chronicle," may soon take wireless sets back to the simplicity of the old-fashioned crystal sets. Perhaps!

We understand that this new device—which we have not yet had an opportunity of testing ourselves—is known as the "Westector," and will shortly be on sale throughout the country at a price of not more than 10s.

It is said that the "Westector" needs no filament accumulator and no H.T. battery, and can be used in place of the detector valve in practically any type of wireless receiving set.

Metal Rectifier Principle

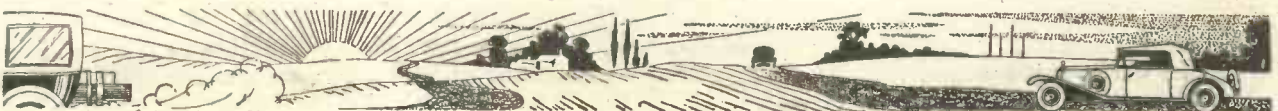
IT is further claimed by a correspondent in the "News-Chronicle" that its outstanding technical advantage is that it can handle very large inputs giving correspondingly large outputs, "thus bringing wireless appreciably nearer the day when low-frequency amplification will be unnecessary."

It appears the new invention has one disadvantage: that it cannot at present be used as an amplifier. Its magnification factor is said to be zero. It can, however, according to reports, be adapted to automatic volume control.

"May be Regarded as a Cold Valve"

An official of the Westinghouse Brake and Saxby Signal Co., Ltd., stated recently in an interview: "For business reasons we cannot divulge full details of the 'Westector' for about a fortnight. Briefly, however, it is a development of our metal rectifiers that we have been working on for some time. It may be regarded as a cold valve, but, of course, it cannot magnify signals in the way that a valve does."

We are hoping shortly to have one of these new "Westectors" for test, and to be able to report to our readers in an early issue of MODERN WIRELESS on what appears to be, at first sight, an extremely interesting new invention with a good future.



WATCHING THE WAVELENGTHS

OUR SPECIAL CORRESPONDENT

describes a visit to the official listening-post at Tatsfield, where the B.B.C. is playing its part in straightening out the European ether after the finding of the experts at Madrid.



TATSFIELD, where the energetic Mr. Partridge and his assistants have become the official listening ears of the B.B.C., is a hive of industry.

Here, at a lonely spot twenty miles from London, the B.B.C. is conducting a check on the frequencies of all British and Continental broadcasts in conjunction with the U.I.R. experts at Brussels.

Modest Aerial Array

One night recently I went down with a B.B.C. friend to the Tatsfield station in Surrey, and saw how the B.B.C. is aiding the International Union in sorting out the wavelengths for the forthcoming Lucerne meeting.

The road rises near the listening station. They tell me that it is 800 feet above sea level. Two small brick buildings and a modest aerial array mark the listening-post of the B.B.C.

Outside, it was windy and unpleasantly cold. Inside the main room of the listening station the temperature was that of a summer morning!

"It's not just to keep the officials here comfy," said the visiting B.B.C. man. "They're hardy fellows, but the delicate wavemeters are more easily affected by the cold, and go 'up the loop.'

"So we keep the temperature even by having double air-spaced walls in this larger building. The adjoining building, although also of brick, has only single walls, as no sensitive wavemeters are housed in it.

"Do you remember the days—back in 1924 or thereabouts—when our listening was done at Keston?"

We reminisced for a while about the little wooden hut at Keston in Kent, where the B.B.C.'s first transatlantic relays were done with a superhet which would now look very clumsy. The Keston hut was not a homely place in cold, wet weather, and I have no doubt the listening staff were not a little bucked when the verdict came out that the site was no longer suitable, that the B.B.C. could not buy the land, and that they would have to shift a short distance away to Tatsfield—there to be ensconced in the comfort of a proper brick building with central heating!

Tuning-Fork Control

"They are not always toasting their toes," continued the B.B.C. man, "for they do a lot of aerial experimenting. Some of the testing in connection with the new Droitwich aeriels was done here, while a year or so ago, when the transatlantic relays were done here, one unlucky wight occasionally had the chilly job of inspecting the distant end of a Beverage aerial—a wire slung up on telegraph poles and running out a quarter of a mile or so from the Tatsfield building.

"And now for the international wavelength checking. Off we went on a tour of inspection.

The central feature of the heated room is the multi-vibrator, which is the heart, as it were, of the wavemeter testing.

This is a tuning-fork control oscillator mounted on a substantial angle-iron stand at one end of the room. The wavemeters are mounted on a reinforced concrete platform, which prevents any vibration. I have seen a Brussels wavemeter before, but never an outfit so complicated.

Plenty of Light on the Dials

On the concrete bridge are mounted four ebonite panels at about head height, while underneath the bridge are tucked a desk and typewriter so that rapid records

can be made. A shop window type of horizontal electric light, nearly 5 feet long, runs in front of the wavemeter, so that there is plenty of light on the vernier dials.

"Why are there four of them?"

"They are four oscillators," it was explained, "and the batch of them covers a waveband of 175 metres to 600 metres."

On another concrete slab are two more wavemeters. These are of the rather older type Sullivan arrangement.

"One of these is for long waves—150 to 3,000 metres. The other tunes from 100 metres down to about 10 metres."

"Where are the receivers on which you pick up the signals to check on the wavemeters?"

"In this rack. There are two, you see, one for medium and one for long wavelengths. We can switch the output on to loudspeakers to give us an idea when stations are tuned-in, but, as a matter of fact, the performance of these sets is particularly good at low frequencies, so that we find it easy to judge the zero beat note between the wavemeter and the received signal.

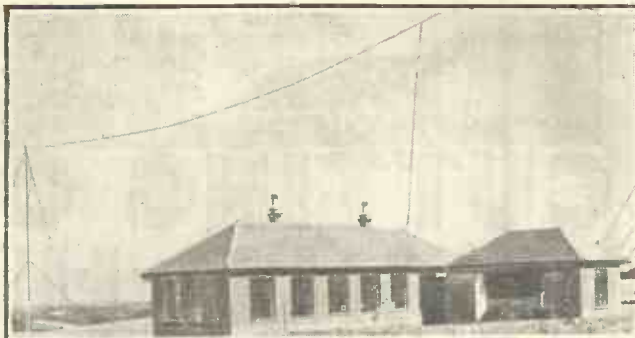
European Ether Tour

"These are not the sets we normally use for relaying or for general listening. The main receivers are in the instrument-room."

Running about 11 feet along one side of the instrument-room is a large rack dividing into six bays. These are filled with superhet receivers for all wavelengths, and a common low-frequency panel with a filter, corrector, and calibrated volume indicator.

In another rack are "straight" sets on which the listeners can make a comprehensive European ether tour. The end bay carries two direction-finding units, and, of course, it is on these that interference hunting is done.

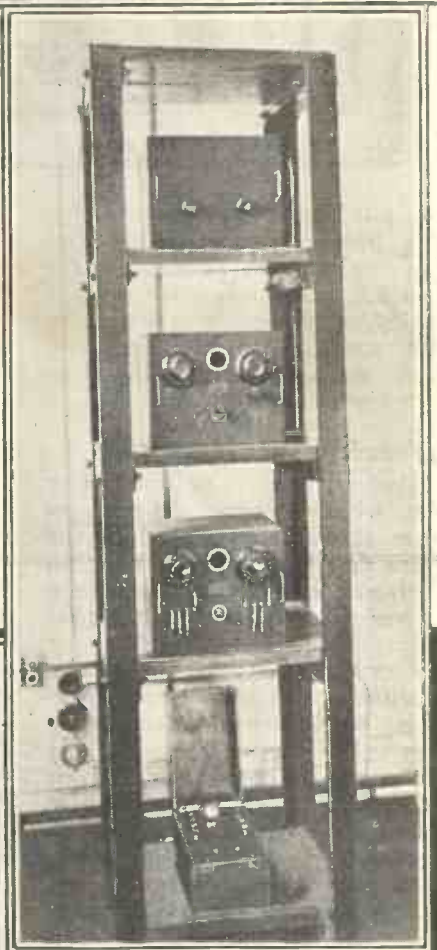
(Continued on page 289)



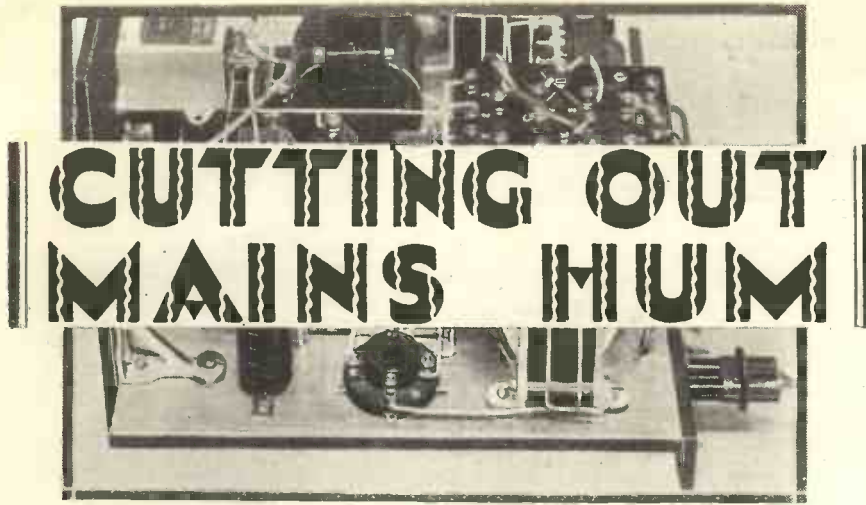
A good idea of the appearance of the buildings at Tatsfield can be gathered from the top illustration.

The tall stand to the right is the "multivibrator," which is really the heart of the checking apparatus.

The sturdy framework of the multivibrator and the concrete platform on which it stands are arranged to minimise any risk of unwanted vibration interfering with the results obtained.



A corner of the listening room where the main wavemeters are housed. Four Sullivan type meters for different ranges are visible ranged along the shelf, and to the left is the Brussels wavemeter. This is a sub-standard of one kept at the international wavelength measuring station at Brussels.



ALTHOUGH the performance of a receiver using indirectly-heated valves and obtaining its power from A.C. mains is far superior to a battery set, the man who is troubled with considerable hum naturally thinks that everything is bound to have some drawback.

Insufficient Smoothing

However, there is no reason why hum, with a soundly designed receiver, should be audible, unless one listens close to the speaker when no programme is being received. In a receiver constructed from a good design trouble is often caused by changes in the layout of components, substitution of smoothing chokes having too low an inductance when carrying the particular current, and also by the use of unsuitable valves.

Generally speaking, hum is usually due to one of the following causes: insufficient smoothing of H.T. supply, interaction between iron-cored apparatus (such as L.F. chokes, L.F. and mains transformers), long grid leads, or these being run too close to wires carrying A.C., and L.F. instability due to inadequate decoupling.

Adding Capacity

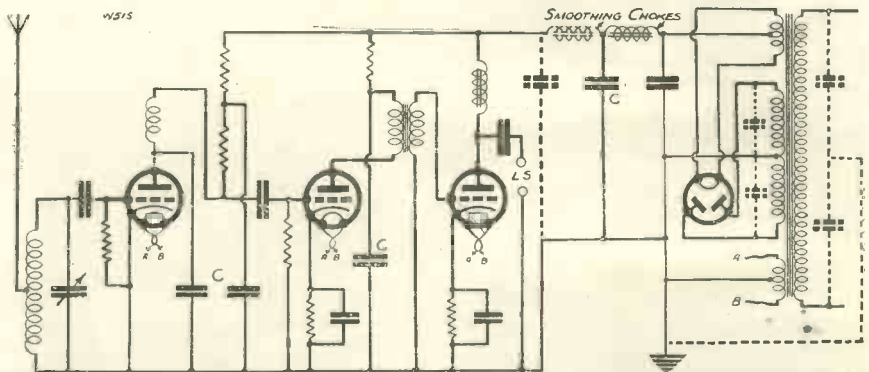
Insufficient H.T. smoothing is due either to the choke or chokes having too low an inductance or to the fixed condensers having too low a capacity. The fixed condenser connected between the centre taps of the filament and anode windings on the mains transformer which feed the rectifying valve, or the two "bridge" condensers usually used with a metal rectifier, control the output of the rectifying system to a considerable extent, and therefore should be of the values recommended by the manufacturers or the designer of the set.

A really practical article containing many valuable hints on methods of circumventing obstinate interference.
By C. ROBINSON.

The smoothing may be improved by increasing the capacity of the condenser connected between H.T. negative and the end of the choke connected to the various amplifying valves' anode circuits; for example, a 6- or 8-mfd. condenser used instead of 4-mfd.

If this does not remedy the trouble, and if it is probable that the inductance of the smoothing choke is insufficient, an extra choke of low D.C. resistance may be connected in series with the original choke.

WHY NOT TRY THESE SUGGESTIONS?



The five dotted condensers and also the dotted choke are those referred to in the article as likely to be of assistance in various obstinate cases.

A 4-mfd. condenser is then connected from the junction of the two chokes to H.T. negative. There are then two chokes in series with three fixed condensers, one from each outer end of the two chokes and one from the mid-point to H.T. negative.

Interaction between iron-cored components can usually be remedied by

altering their relative positions. For example, the L.F. transformer may be turned so that its core is at right angles to its original position. If this reduces hum the transformer should be fixed in its new position.

Long grid leads, particularly in the detector stage, frequently cause trouble, and the obvious remedy is to arrange matters so that these leads are as short as possible.

If the decoupling of the various stages is not sufficiently effective, slight instability may be caused and aggravate hum.

It is not generally desirable to increase the value of the decoupling resistances. An equal effect, however, may be obtained by using a larger decoupling condenser. For example, a 10,000-ohm resistance and a 4-mfd. condenser will decouple as effectively as a 20,000-ohm resistance and a 2-mfd. condenser.

"Modulated" Hum

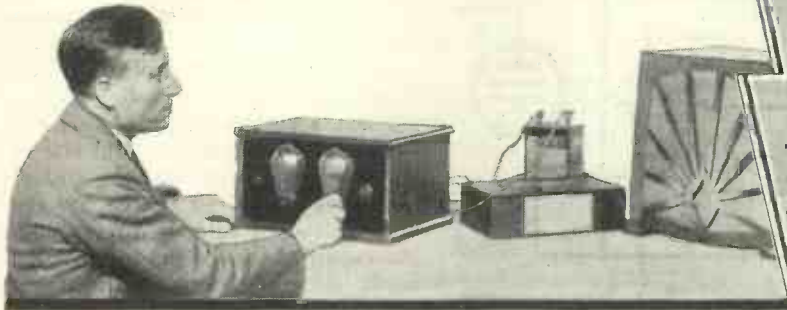
There is one other form of hum which is commonly known as "modulated" hum, and this is heard only when a station is tuned-in, the receiver being silent when tuned to a wavelength on which there is no transmission.

If a valve rectifier is used to supply H.T., this trouble may be due to high-frequency oscillations generated by the valve and, if this be the case, can be remedied by connecting a high-voltage fixed condenser of about .1-mfd. capacity from each rectifying valve anode to the centre tapping of

the H.T. secondary of the mains transformer.

In some cases modulated hum may also be remedied by connecting two high-voltage condensers of .001-mfd. to .1-mfd. capacity in series across the mains input terminals of the mains transformer, the junction of the two condensers being earthed.

VOLUME CONTROL MEANS And METHODS



A Comprehensive Review.

By G. H. WATSON.

THE most suitable volume control depends, naturally, on the type of receiver in question, and for this purpose receivers can be roughly divided into three classes. Firstly, there is the type without high-frequency amplification and consisting of a detector followed by two low-frequency stages.

Two Main Types

Secondly, we have the class which embraces the majority of modern receivers, those incorporating one or more screened-grid high-frequency valves. Into this class falls the popular S.G., detector, pentode circuit and the combinations of two S.G., detector and pentode, and S.G., detector and two low-frequency stages. In addition, by reason of its circuit characteristics, the superheterodyne can conveniently be classed with the screened-grid receiver.

Finally, there is the radiogramophone to be considered.

There are several forms of volume control, and these can be divided into two types, pre-detector controls, i.e., those which reduce the volume in the initial stages, and those which are included in the low-frequency side of a receiver.

Prevention of Overloading

The pre-detector type of control conveniently performs two functions, its primary one of reduction of volume and, one of equal importance, the prevention of overloading of the detector valve by strong signals which would otherwise be imposed on it by one or more preceding high-frequency stages.

Power-grid detection assists in this direction in so far as it increases the ability of the valve to handle larger inputs, but distortion due to over-

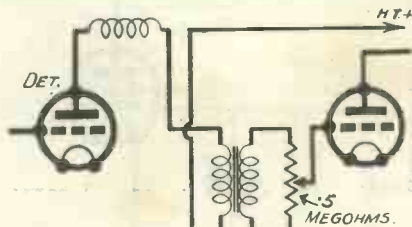


FIG. 1. The usual connections across a transformer.

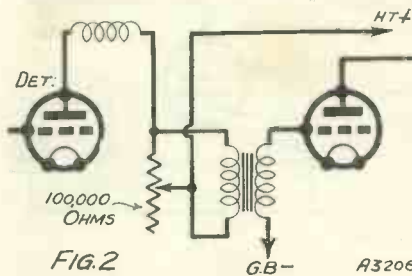


FIG. 2. Control on the primary winding.

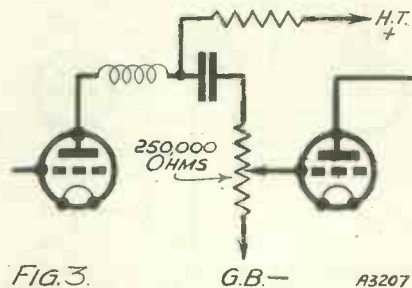


FIG. 3. For a resistance-capacity coupled stage.

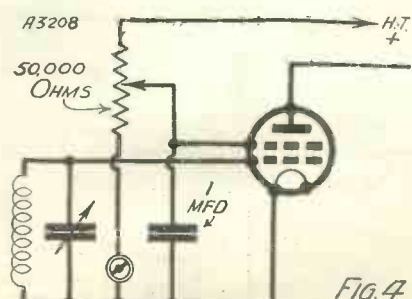


FIG. 4. Volume can be controlled by adjusting voltage on the screening grid.

loading can occur, even with this arrangement, particularly in proximity to a powerful transmitter.

Considering the first type of receiver, that in which the first valve is the detector, it will be understood that as the signals imposed on this valve are only those generated in the one tuning circuit and have not been amplified, overloading of the detector in such a receiver rarely takes place. Therefore, it is usual to incorporate the volume control in the low-frequency side of the receiver.

Transformer Coupling

It is necessary to place the volume control in a receiver having two low-frequency stages so that it controls the input to the first L.F. valve, otherwise overloading here would be amplified by the output valve.

If the method of coupling to the first L.F. valve is by means of a transformer, either parallel-fed or with the primary directly in the anode circuit of the detector, two methods of control are available, the most popular of which is shown in Fig. 1. This consists of a high-resistance potentiometer connected across the secondary of the transformer, the grid of the associated valve being connected to the moving arm or centre contact. A component having a resistance of .5 megohm will give an even variation of volume.

Another Method

The second method takes the form of a variable resistance of 100,000 ohms across the primary of the transformer, the existing connections remaining unaltered. This is illustrated in Fig. 2.

In cases where resistance capacity or choke capacity coupling is employed, the resistance connected

Many Listeners Prefer Two Volume Controls

between the grid of the valve and G.B.— should be replaced by a potentiometer of 250,000 ohms, connected as in Fig. 3.

With the recent rapid advances in valve and coil design the efficiency of modern screened-grid stages is very high, and even in circuits using only one of these valves the voltage applied to the grid of the detector is sufficiently large to cause overloading on many of the more powerful transmissions.

For this reason it can be seen that a volume control, if, as is most likely, only one is to be used, should be of the pre-detector type.

Varying Screen Voltage

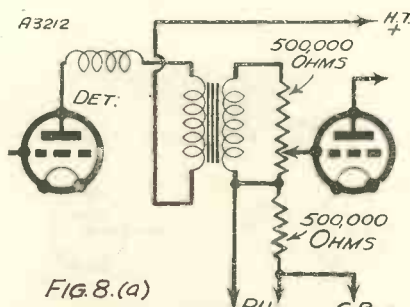
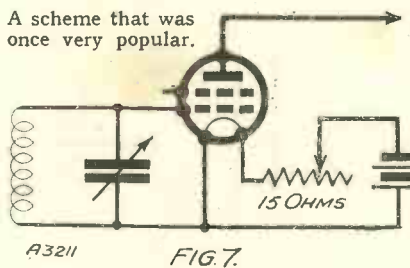
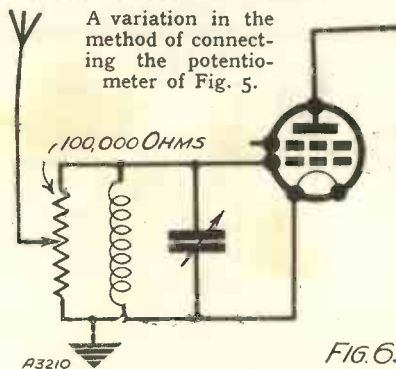
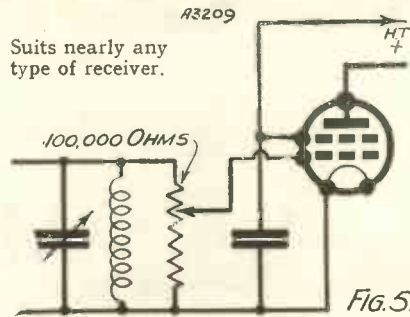
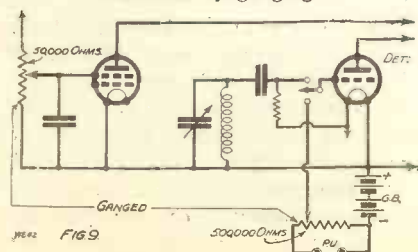
The most efficient and widely-used control consists of a potentiometer with a resistance of 25,000 or 50,000 ohms, connected between H.T. positive and common negative, the screening-grid terminal on the valve holder (the one which corresponds to the plate in other valves) being connected to the moving contact. The necessary by-pass condenser being left connected between the screening grid and common negative. This is shown in Fig. 4. When the circuit employs two screened-grid valves as H.F. amplifiers, the potentiometer should be fitted to the first.

A point to be considered in connection with this control is that a small current is wasted through the resistance. Actually, it is quite small, only 1 or 2 milliamperes, which is negligible in a mains receiver, and is only a very small percentage increase in the case of battery receivers.

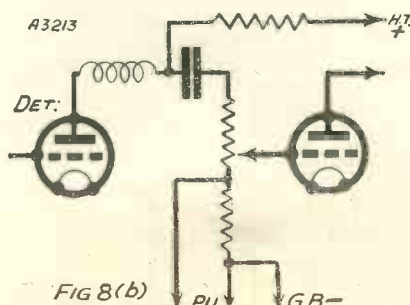
In the latter case, however, it is necessary to fit a double-pole on-off switch instead of the usual single-pole type, which will disconnect both L.T. and H.T. when the set is not in use, thus preventing waste of current.

GANGING TOGETHER

When separate controls are used for radio and pick-up, a saving in knobs can be obtained by ganging.



By means of a centre-tapped potentiometer a fading effect from radio to pick-up can be obtained.



The fade effect as applied to an R.C. stage.

For this reason it is advisable to choose the higher resistance value of 50,000 ohms in a battery receiver to cut this current down to a minimum.

Another form of control sometimes adopted is shown in Fig. 5. In this instance a potentiometer of 100,000 ohms is wired across the grid coil of the first S.G. valve, and the grid of the valve connected to the moving arm instead of directly to the coil. Movement of the contact towards the earth end of the resistance causes a reduction of volume.

Incidentally, this is a method which can be employed with nearly any type of receiver. Another form of this arrangement is shown in Fig. 6. Here the resistance is wired across the aerial coil and the aerial connection taken to the moving contact.

For Superhets.

A fourth method of variation of volume is the inclusion of a variable rheostat in the filament circuit of the first screened-grid valve. The connections are shown in Fig. 7, and this provides quite a smooth control.

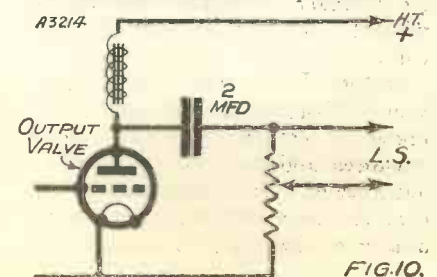
In addition to the above, all the forms of control in the low-frequency side are equally applicable to S.G. receivers, and many listeners prefer to adopt the method of having a pre-detector control as well as one of those mentioned above, Figs. 1, 2, 3, which are, of course, equally suitable for inclusion irrespective of the number of valves on the L.F. side or of the type of output valve.

As regards superheterodyne receivers, the prevailing practice is to employ a screened-grid valve as the intermediate frequency amplifier, and it is in this stage that the volume control is usually included. It most conveniently takes the form of the S.G. potentiometer described above, Fig. 4.

(Continued on page 292)

AT THE OUTPUT END

A simple form of control that can be added to sets with an output filter.





By K. D. ROGERS.

RADIO advance is one of the most fascinating things to follow, as it is inevitably constant and always interesting. There are always new developments to consider, fresh circuit twists to try, and different components to test. So radio has seldom a dull moment in its existence, seldom any lengthy period without some claim to special space in the news.

Logical Development

These bright spots in the radio firmament are not necessarily meteoric in their character; they are more often the result of steady research and logical development, but each adds its quota to the general collection that goes to make radio science.

Such were the L.F. transformer, the S.G. valve, the pentode, the variable-mu S.G., and so on. Since these has come the variable tone-control transformer, an advance over the standard model that places us a step farther on the road to realism in reproduction.

Unique Characteristics

The variable-mu valve is a recent arrival and has yet to make its name fully in the ranks of set constructors; but it is a live force and is undoubtedly an important improvement on the ordinary screened-grid valve.

In the "S.P." Three (an abbreviation for "Stop-Press" Three) we have taken a collection of the latest advances and incorporated them in one receiver. The result, as you may imagine, is a set that has unique characteristics, and is capable of

A Receiver
Containing Many
SUPER POINTS
Variable-Mu Screened-
Grid Valve
Better Volume
Controlling
Full-Range Tone
Control
Powerful Output
For Mains H.T.
For Battery H.T.
using if desired
Quiescent Push-Pull

that of a push-pull amplifier of the anode-bend or quiescent variety.

This is of particular interest to battery users, and the set has been so arranged that it can be built in two forms, or can be altered from the first to the second form so that ordinary pentode output or the push-pull variety can be obtained.

Power Considerations

The main idea is this. The set can be used with what may be termed a battery or a mains pentode in the first place, or in other words a pentode that can be reasonably run from a battery H.T. supply, or one that really needs a mains unit for its anode power supply. In the first case the pentode will provide a maximum power of some 500 milliwatts, while the larger type will give about twice that power.

But with ordinary circuits and H.T. supply power means anode wattage dissipation, and the smaller pentode takes much less current from the H.T. battery than does the larger. So we have listed the output valves in two columns; those that can be used with battery and those that need mains H.T.

For Volume Enthusiasts

This gives two choices of set, with results that are similar from the point of view of station getting, but with greater volume from the local within the reach of the constructor that can use a mains unit.

A third variety is possible, however, and that we describe at the end of the set description. It is the use of two pentode valves in push-pull, arranged in such a way that they are

providing results very much out of the ordinary.

In the first place we have a variable-mu screened-grid valve, which allows not only better control of volume to be carried out, but also gives somewhat greater amplification than the normal S.G. owing to the ease with which a suitable "load" for the anode circuit can be formed.

Pentode Advantages

Following this we have an ordinary detector circuit fed into a tone-control transformer-coupling to the last valve. This is a pentode, a fairly recent innovation, but in one version of this receiver we make use of the pentode in a new way—

Double Ganging Ensures Simple Operation

biased at their bottom bend points and so take very little anode current. As a matter of fact they consume only a few milliamps., and the whole set can be operated with an ordinary dry battery at quite a low anode consumption. This increases as the reception becomes louder, but the drain on the H.T. battery is proportional to the loudness of the reproduction, and in addition the total

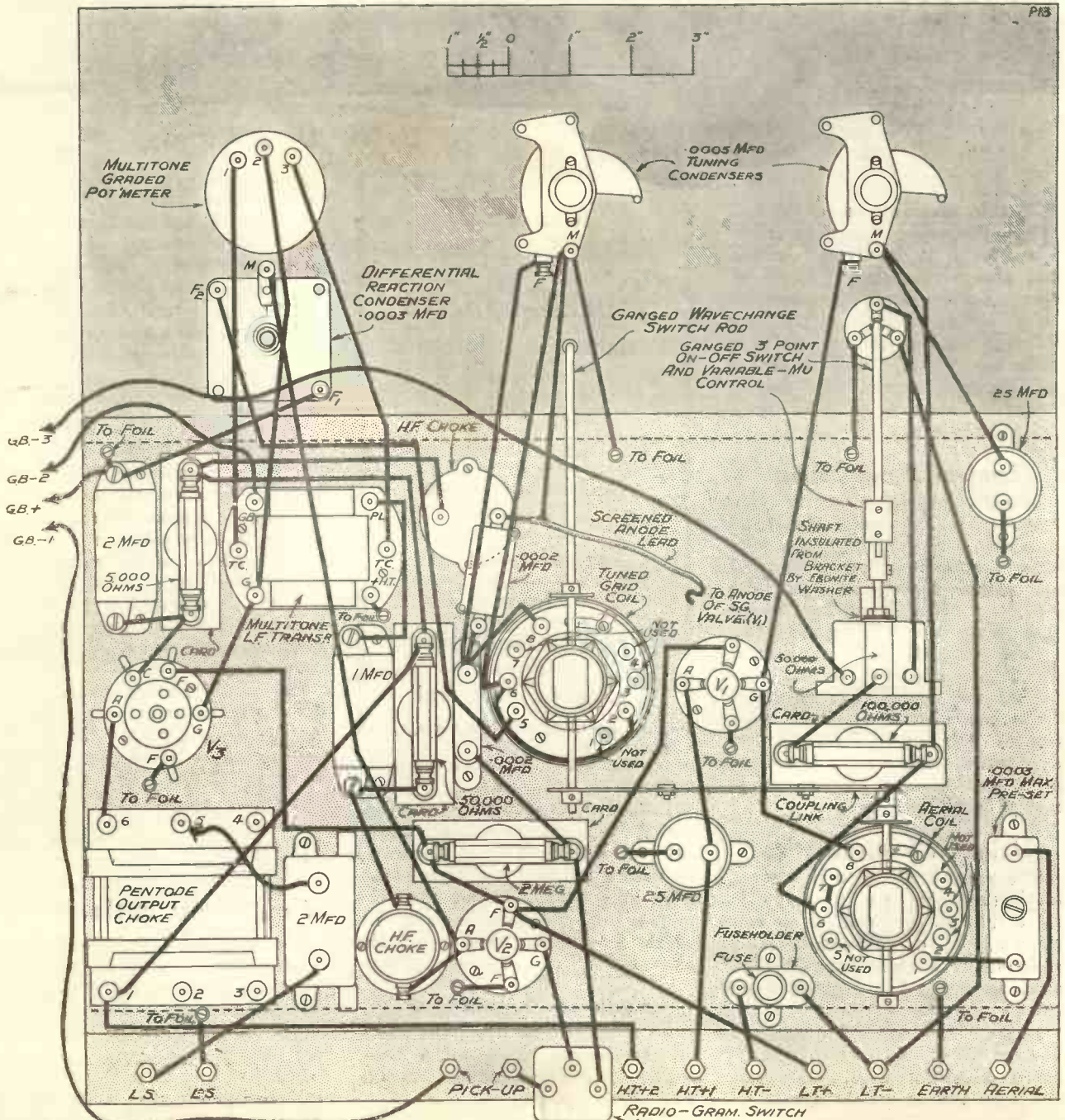
output of the set is nearly twice as powerful as with one pentode.

First of its Type

Thus, we pay only for what we get in the way of sound, with the exception of the small steady current that is present when the set is on. This small current is negligible when compared with the amount that is taken by the ordinary "conventional" battery-

operated receiver, for it is no more than half a dozen milliamps. or so.

This method of push-pull (sometimes called push-push) is particularly interesting in that it is a revision of a method that was patented some years ago, but never extensively used. It is, therefore, quite new, and as the first variable-mu battery quiescent push-pull receiver, the "S.P." Three is of unusual interest.



Note the flexible lead which goes to the output choke from a 2-mfd. fixed condenser. It permits output matching to be effectively carried out by giving a choice of different choke tapings.



The CIRCUIT and COMPONENTS

Outstanding points about the design which will enable the builder to appreciate its fine features, and details of the components used in putting them into practice.

WE have told a little about the main features of the "S.P." Three, but the circuit demands closer attention if we are to see exactly what happens and how the results are obtained.

In the first place, then, the aerial is fed into the set through a preset condenser which is invaluable in providing a control of selectivity, allowing the set to be adjusted to suit any kind of local conditions. From this the aerial input goes to a screened coil which has separate primary and secondary windings. This is important if break-through of the medium-wave local station is to be avoided when the set is tuned to the long waves.

Control of Volume

The secondary of this coil is tuned by a .0005-mfd. variable condenser, and the energy is fed on to the grid of the variable-mu screened-grid valve. This valve is controlled by means of a 50,000 ohm potentiometer which is connected across the grid-bias battery.

This allows the potential on the grid to be varied from zero to about 16 volts, thus varying the mutual

conductance of the valve and providing a steady control of volume. This at once prevents detector and output valve overloading.

Radio or Gramophone

It is important to note the 100,000-ohm fixed resistance in series with the slider of the potentiometer. This is a device which in conjunction with the .25-mfd. condenser to earth decouples the potentiometer and thus prevents the H.F. impulses in grid circuit of the valve from getting into the potentiometer and thus into the grid-bias battery. This is especially important if the set is used with a mains unit instead of an H.T. battery, for it has been found

that instability can be caused in the latter case unless the decoupling scheme is employed.

From the S.G. valve we go through an ordinary shunt-fed tuned-anode circuit (sometimes referred to as a tuned-grid circuit) to the detector, which is switched in the grid circuit to provide pick-up input if desired. Thus the set can be used equally well on radio or gramophone.

An Important Feature

The detector is fed through a shunt-fed circuit to be the tone-control transformer, which is a most important part of the circuit. It allows a very wide choice of output characteristic, and enables the owner to suit the set

SUITABLE ACCESSORIES FOR THE "S.P." THREE

LOUDSPEAKER

Marconiphone, Celestion, B.T.H., Blue Spot, G.E.C., R. & A., Igranic, Clarke's Atlas, Baker's Selhurst, Lanchester, Ferranti, H.M.V., W.B., Ormond.

L.T. BATTERY

Exide, G.E.C., Ediswan, Oldham, Block, Lissen, Pertrix.

H.T. BATTERY

Pertrix, Ever Ready, Ediswan, Marconiphone, Drydex, Magnet, Lissen, Oldham, Siemens (120 to 150 volts super capacity).

G.B. BATTERY

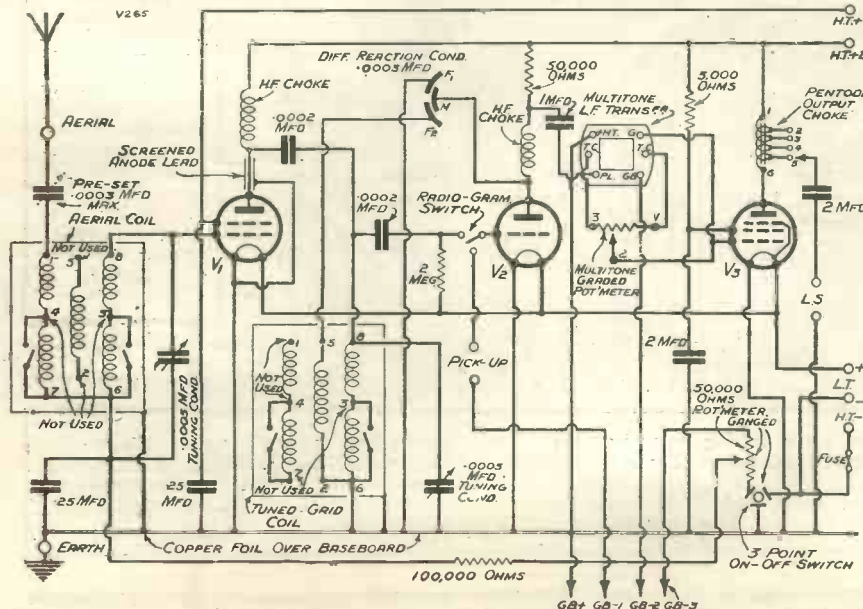
16 volts, Ever Ready, or see above.

AERIAL AND EARTH EQUIPMENT

Electron "Superial," Goltone "Akrite," Graham Farish "Filt" earthing device.

MAINS UNIT

This should have two positive tapings with outputs to suit valves chosen (Ekco, Clarke's Atlas, Heayberd, Ferranti, Regentone, R.L., Tunewell). Also see special unit elsewhere in this issue of MODERN WIRELESS.



There are many points of great interest in the arrangement of the circuit, which are dealt with on this page, and the diagram will enable them to be followed point by point.

to any particular loudspeaker he is using, and also to vary his tone in accordance with his particular requirements of the moment.

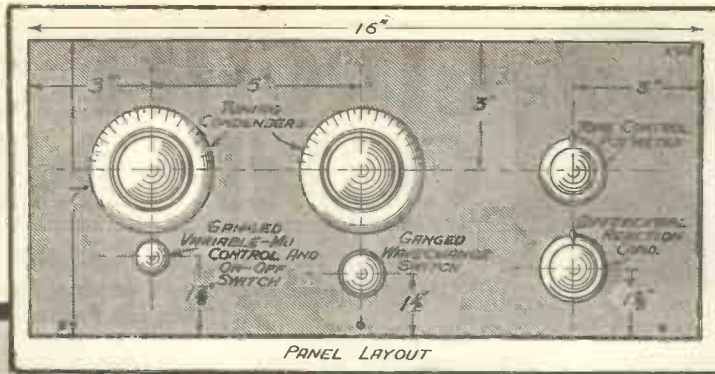
In cases where there is heterodyne interference this is particularly useful, and decreasing the amount of high-note reproduction has often assisted greatly in minimising fading on distant stations, as well as reducing the interference with which many stations' programmes are spattered nowadays.

Versatile Output Circuit

From the tone-control circuit we go to the output valve, which is a pentode and, as said before, can be either of the smaller battery-operated H.T. type or a larger valve, giving a maximum output of about 1,000 milliwatts and operated from a mains unit. In addition we give a circuit of

SALIENT FEATURES

ENSURING EFFICIENCY



PANEL LAYOUT

SCREENED S.C. LEAD

To avoid any possibility of feed-back occurring, the lead from the anode of the H.F. valve is encased in armoured sleeving which is connected to earth.

THE VOLUME CONTROL

By controlling the volume by varying the bias on the variable - μ S.G. valve, overloading on local stations is avoided at the same time as strength is cut down.

ENCLOSED H.F. CHOKE

The metal can around the high-frequency choke of the screened - grid valve permits high - amplification and at the same time prevents coupling with other components.

CAREFUL DECOUPLING

The volume-control potentiometer is provided with a decoupling resistance to ensure stable operation.

FOR TONE ADJUSTMENT

By turning the knob on the panel, the transformer and its resistance enable tone to be varied so that all tastes may be suited whether they are in favour of much bass or a lot of "high stuff."

MATCHES THE OUTPUT

This is the output choke which is provided with a number of taps so that no difficulty will be experienced in arranging the set to suit your loud-speaker.

Right at the top is the diagram showing panel-drilling dimensions, and it will be seen that the layout is quite straightforward, with hardly a hint of the distance-getting properties of the component arrangement which is hidden behind the panel. It looks an easy set to handle, and it proves to be easier than it looks! The variable- μ endows it with perfect suitability for local-station and radiogram work, and at the same time enables it to embody amazing distance-getting amplification.

A Set for the Battery or Mains User

quiescent push-pull, using two pentodes which enables, with battery H.T., a power of about 2,000 milliwatts to be obtained. This is discussed later at greater length.

A Point to Watch

No impedance equaliser is shown across the pentode output choke, as it is felt that this can easily be added if desired by the constructor. There is one point concerning this, however, which must be borne in mind, and that is, if the equaliser is omitted, care must be taken that the loudspeaker is never detached from the set while the latter is in operation. As a means of

Colvern if desired, but the latter have different terminal markings, and the wiring would need slight alteration if this make of coil were employed.

A screened H.F. choke is used, and this is an essential part of the circuit. It should not be substituted by another type of component.

Switching the Set

The potentiometer must be of the wire-wound variety, for it has to carry a small, steady current, and it is absolutely essential for a three-point switch to be used for switching the set on and off. In the case of the "S.P." Three we have chosen a potentiometer

higher decoupling resistance is used, so that the voltage on this valve is broken down to a reasonable figure, so that here again the resistance carries out a dual rôle.

In choosing the output choke it must be borne in mind that (especially if you use a large pentode) the choke has to carry quite a large current, and a small pentode choke will not be suitable owing to saturation of the core.

Not So Critical

Thus there are not many alternative makes, and the reader is advised to keep to those specified, unless he is

ALL ABOUT THE PARTS FOR THE "S.P." THREE.

PANEL

16 × 7 in. (Permeol, Becol, Peto-Scott, Ready Radio, Direct Radio, Goltone, Lissen, Wearite).

BASEBOARD AND CABINET

16 × 10 in., with cabinet to take 16 × 7 in. panel (Camco, Peto-Scott, Osborn, Gilbert, Direct Radio).

VARIABLE CONDENSERS

- 2 .0005-mfd. slow-motion (Polar No. 2 S.M. or Ideal, Ormond, Utility).
- 1 .0003-.00035-mfd. differential reaction (Graham Farish, J.B., Ormond, Keystone, Polar, Telsen, Lotus, Ready Radio).
- 1 .0003-mfd. preset (Sovereign, Goltone, Telsen, Formo, Ready Radio, Colvern, Ormond, Polar).

FIXED CONDENSERS

- 1 2-mfd. (T.C.C. type 50, Dubilier, Telsen, Lissen, Igranic, Ferranti, Formo).
- 1 2-mfd. (Igranic, or see above).
- *1 1-mfd. (Igranic, or see above).
- 2 25-mfd. (Dubilier type 9200, or see above).
- 1 .0002-mfd. tag type (Dubilier type 670, Igranic, Telsen, T.C.C., Goltone).
- 1 .0002-mfd. (T.C.C. type 34, Goltone "Midget," Lissen, Telsen, Dubilier, Ferranti, Watmel, Sovereign).

VARIABLE RESISTANCES AND SWITCHES

- 1 Combined 50,000-ohm and 3-point push-pull switch (Wearite type G23).

- 1 Radiogram rotary switch (Tunewell, Ready Radio, Bulgin).

FIXED RESISTANCES

- 1 100,000-ohm and horizontal holder, if required (Graham Farish "Ohmite," Ferranti, Colvern, Watmel, Sovereign, Wearite, Tunewell).
- 1 50,000-ohm and horizontal holder, if required (Graham Farish "Ohmite," or see above).
- *1 5,000-ohm and holder (Graham Farish "Ohmite," or see above).
- 1 2-meg. leak and holder (Graham Farish "Ohmite," Ferranti, Dubilier, Lissen, Telsen, Ready Radio, Bulgin, Tunewell, Goltone).

COILS

- 2 Matched screened coils (Telsen 287 with L coil-switch assembly type W.217).

H.F. CHOKES

- 1 Screened (Bulgin H.F.10, Wearite H.F.P.)
- 1 Reaction (R.I. Quad Astatic, Sektur, Graham Farish "Snap," Ready Radio, Lotus, Varley, Lissen, Wearite, Sovereign, Tunewell, Watmel, Goltone, British General, Bulgin, Lewcos, Telsen, Keystone).

VALVE HOLDERS

- 2 Four-pin (Lissen, LN5069, Lotus, Telsen, Igranic, W.B., Tunewell, Clix, Benjamin, Bulgin, Goltone, Peto-Scott, Ready Radio).

- 1 Five-pin (Lissen LN593, Telsen, W.B., Lotus, Bulgin, Benjamin, Wearite, Goltone).

L.F. CHOKE

- *1 Pentode output (Tunewell, R.I. "Hypercore").

L.F. TRANSFORMER

- *1 "Multitone," ratio 1 : 4.
- 1 Special tone-control potentiometer.

MISCELLANEOUS

- 1 Fuse holder (Bulgin type F.5, Telsen, Belling-Lee, Ready Radio, Goltone).
- 11 Indicating terminals (Belling-Lee type R, Bulgin, Clix, Eelex, Igranic, Goltone).
- 7 Wander-plugs (Clix, Belling-Lee, Bulgin, Igranic, Eelex).
- 2 Accumulator connecting tags (Eelex, or see above).
- 5 Yds. of insulating sleeving and 8 yds. of 18-gauge tinned copper wire (Goltone, Wearite).
- 1 Terminal Strip 16 × 1½ ins.
- 1 100-milliamp. fuse (Bulgin, Belling-Lee, etc.).
- 1 Piece of .0042 copper foil, 16 × 10 in.
- 6-in. length screened single-braided sleeving (Goltone).

NOTE.—The components marked with an asterisk are omitted when quiescent push-pull output is employed.

reducing the high-note reproduction the equaliser is not important, as the tone control can be varied to give the desired proportion of high to low notes in the reproduction.

The components required for the "S.P." Three are quite standard, but they need to be chosen with care; it is not wise to try to cut expense by getting the "next best thing." The suitable alternative parts are shown in the list, and these should be adhered to.

Essential Components

Only one component can be specified in the case of the Multitone transformer in the "straight" model of the set, and naturally there is no alternative here.

The Telsen coils can be changed for

meter which has a three-point switch incorporated. This does away with the need for a separate control on the panel, and makes a very handy arrangement.

Only Two H.T. Taps

Note, too, that the pentode screen grid is decoupled by a 5,000-ohm resistance and a 2-mfd. condenser. This is a very advisable step, and as a matter of fact the resistance is required to break down the voltage applied to the screen grid, and thus obviates the need for a separate H.T. tap for the screen grid. Thus in the "S.P." Three we can have only two H.T. taps, one for the screen of the S.G. valve and the other to feed the rest of the set.

In the case of the detector a rather

very sure that the choke he wants to use is suitable.

The rest of the components are of the usual type, and are not so critical as those we have mentioned here.

It will be noticed that the list of components on this page includes several items that are marked with asterisks. These are the parts that will have to be changed if the quiescent push-pull model of the "S.P." Three is made.

For instance, if you are building the latter model you will not want the ordinary Multitone transformer, as listed above, but will require the "Puco" 1 : 8-ratio model instead. Again, the pentode output choke has to be substituted by one with a centre-tap arrangement so that it can be used with two valves in push-pull.

CONSTRUCTIONAL DETAILS

THE actual construction of the "S.P." Three is very simple, there being no tricky jobs to do, either in the mounting of the components or in the wiring.

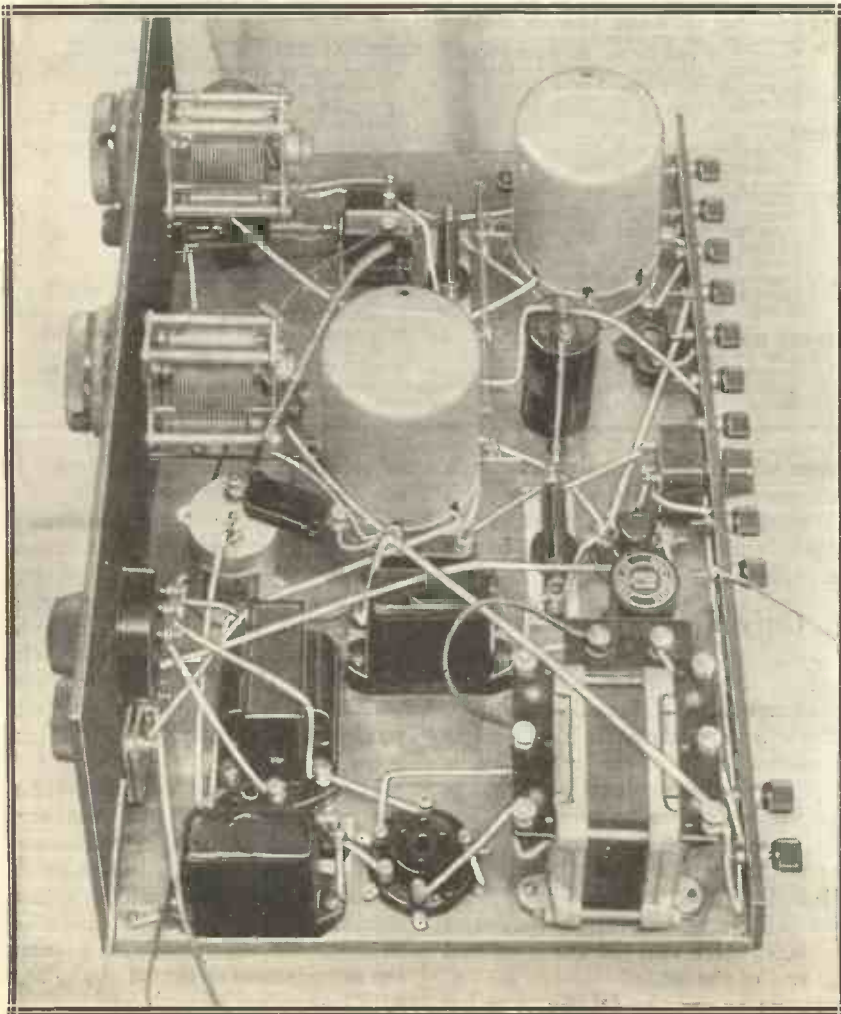
It will be noticed from the photographs and the diagrams that the two tuning coils are not placed in line as is usual in set designs. The reason is that room has to be left for the

Although capable of meeting a large variety of requirements where local, distant or pick-up work is concerned, the "S.P." Three is specially designed to be simple to construct.

gang volume control and on-off switch which projects into the baseboard space a matter of some inches, and is mounted on a metal bracket.

This makes the set look somewhat unconventional about the H.F. end, but actually it is quite conventional, and the two coils are linked together by the Telsen (or Colvern) link in the usual way.

CAREFUL SCREENING FOR EFFICIENCY



The baseboard is covered with foil, which gives excellent opportunities for earthing points, though it must be stressed that only those points that are shown going to foil in the diagrams and photographs must be taken there. There are some points that look as if they could just as well go to foil (such as earth ends of coils and condensers) which are not advisable to take so to earth. In respect of this foil it is best to place pieces of paper under valve holders

VALVES FOR THE		
	Make.	H.F. Stage.
Mazda	..	S.215V.M.
Mullard	..	P.M.12V.
Cosor	..	220V.S.G.
Marconi	..	V.S.2
Osram	..	V.S.2
Tungsram	..	
Lissen	..	S.G.2V.
Eta	..	
Six Sixty	..	S.S.215V.S.G.
Micromesh	..	

and resistance holders to obviate short circuits, while on no account should the ebonite bush on the volume control be omitted.

Care has always to be exercised when dealing with metal-covered baseboards to see that the foil is not used for H.F. circuit links and only for direct earthing of points that are not in the H.F. tuned circuits. If this precaution is neglected there is a serious possibility of causing instability, due to the fact that common earth connections are used.

Thorough Screening

The position of the screened H.F. choke is unusual, but is nevertheless important. It prevents interaction between the two tuned circuits and their connecting wires, and must be placed where shown if stability is to be assured. Should it be placed between the two variable condensers, as would seem more convenient, it is more than likely that separate screening will have to be adopted to prevent the S.G. valve from tending to spill over on certain parts of the tuning scale.

A screened lead from the anode of the S.G. valve is used to complete the screening precautions. This lead has its covering earthed by a short wire connected to the moving-vanes terminal of the second variable condenser.

Not only is the baseboard covered with foil, but the coils and H.F. choke for the S.G. valve are contained in cans.

THE operation of the "S.P." Three is not difficult, the tuning dials keep closely in step throughout the range of some 190 to 550 metres and 800 to 2,000 metres that the receiver covers, and the volume control gives an easy and progressive control of the output.

Reaction is controlled in the usual way by the differential reaction condenser on the right of the panel, while above it is the potentiometer which varies the tone of the repro-

PICKING - UP STATIONS

"S.P." THREE

D.t.	Output.	Output (Mains)
H.L.2	Pen.220	Pen.220A.
P.M.1H.L.	P.M.22A.	P.M.22
210H.L.	220H.P.T.	220P.T.
H.L.2	P.T.2	P.T.2
H.L.2	P.T.2	P.T.2
H.210	P.P.230	P.P.230
H.L.2	P.T.225	P.T.240
BY.1815		
210H.L.	S.S.220Pen.	S.S.230P.P.
H.L.B.1	Pen.B1	Pen.B1

vigorous input reduction by this means without need for reaction to make up for it except in the case of distant stations.

Ease of operation makes the bringing in of many stations a matter which even those with no experience of set handling can accomplish on the "S.P." Three.

by this action can be made up by the tone control.

The tone control is a very useful device, for it enables the exact

balance that is required to be obtained and, as remarked before, is very useful in cases of fading and bad heterodyne interference from foreign broadcasters.

With gramophone reproduction it is also valuable in cutting out scratch.

duction, giving a wide range of tonal quality.

On the terminal strip is the change-over switch which enables radio or record reproduction to be obtained, and this switch should be in the left-hand position when the set is used for radio reception.

Dealing With Interference

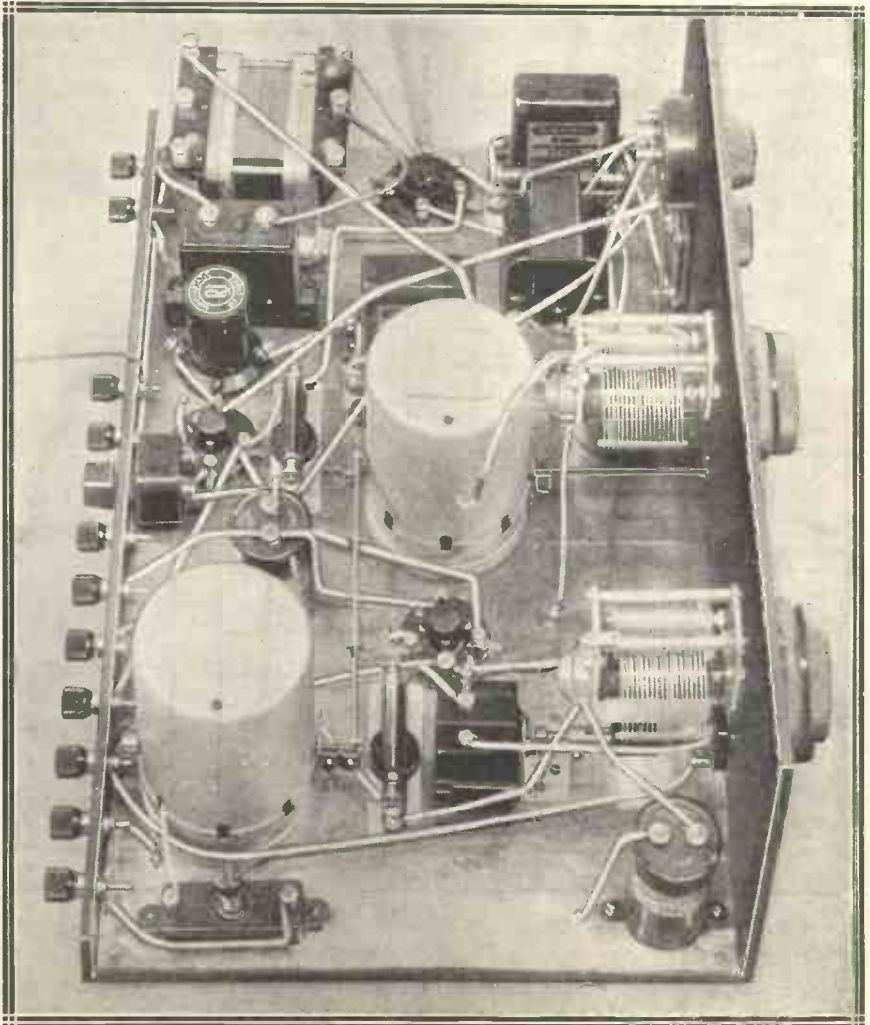
To switch the set on, the on-off switch knob, which also forms the volume control, must be pulled out, and then sensitivity varied by turning the knob to the right or left, the former being the direction for increase.

The bias battery chosen should be of 16 volts or so, the whole of it being used for the S.G. valve control, and the requisite voltage applied for the pentode valve in accordance with the makers' recommendations for the H.T. voltage applied.

The H.T. voltages should be 80 for H.T.1, and the maximum of the battery or mains unit for H.T.2. On connecting up the set the preset condenser should be screwed right up and the first test carried out with this adjustment.

It may be found that the selectivity is sufficient with this, but if you live near a station you will probably have to unscrew the condenser somewhat to provide better station separation. The sensitivity of the set is ample to allow of quite

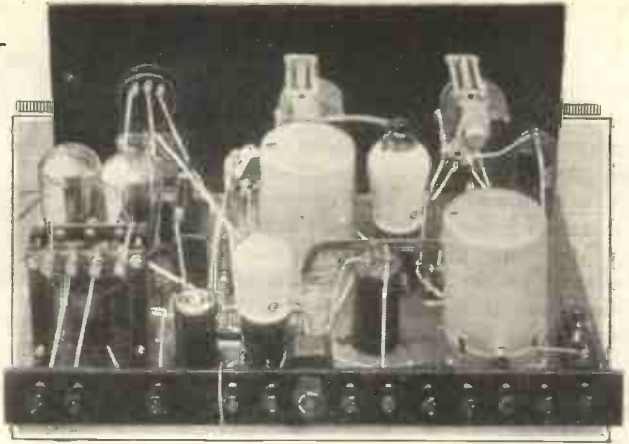
THE WAVECHANGE SWITCHES ARE GANGED



In spite of their staggered positions, the two dual-range coils are controlled by one knob, and the metal coupling is clearly seen in this view.

Push-Pulling the "S.P." THREE

The set lends itself magnificently to the new quiescent push-pull system, and here are complete details for those to whom this latest method makes an irresistible appeal.



THE "S.P." Three has been fully described as an ordinary straight receiver with either mains or battery H.T. and large or small pentode to suit. Now we come to the use in this set of the latest development in battery-set output systems—quiescent push-pull.

For the battery man who wants as much power output as he can get with as low an H.T. power consumption as possible, this is ideal, provided he does not mind paying a little more for the components than he would with the straight type of set.

Roughly speaking, it will cost him about 40s. more, including the extra valve, for it uses two valves instead of one. But the steady anode current

of the "S.P." Three on local station reception (it goes up for distant stations when the variable-mu valve is operating in a more sensitive condition) is only 5 or 6 milliamps. at 150 volts, when using quiescent push-pull, against somewhere round about 14 or so at the same voltage with the small pentode, or 25 with the large types.

Twice the Volume

Naturally, you take more from your H.T. battery when listening to powerful stations, for the anode current in Q.P.P. is proportional to the strength of the reception. When no music or speech is being broadcast (even though the station is on) you have

only the 5 to 6 milliamps. drain. When the programme commences the average current consumption goes up, and the amount it increases depends on how loud you have your reproduction.

But the current never reaches the high value that is used as the steady (on all the time, whether there is any broadcasting or not, as long as the set is on) current demanded by one pentode of the same type instead of the two push-pulled valves.

Thus one P.T.2 valve used in the normal way would take more current than the two P.T.2 valves used in quiescent push-pull, and it would give only about half the maximum output power.

It is impossible in the short space at our disposal to go as deeply into the whys and wherefores of quiescent push-pull as we should like, but those who want to know more about it will find a brief technical review of the system under the title of "Volume Without Watts" in last month's MODERN WIRELESS.

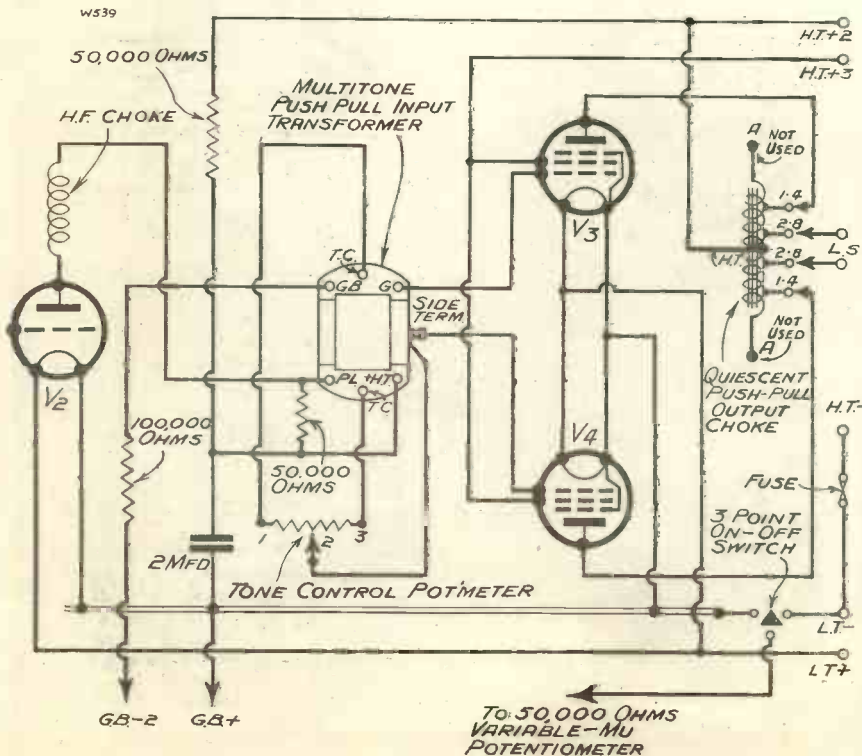
Saving H.T. Current

The fact remains, however, that the scheme is really very economical and saves about 50 per cent of the H.T. drain that would be required to operate only one valve of the same type, and it gives in addition twice the output power that the one valve would supply.

It must not be forgotten that the percentage saving depends largely on what the set is asked to do. If you listen mostly to the local station with full volume you will not save so much as if you listened to foreigners, for while you are searching for programmes and listening to more or less weak transmission you are taking comparatively little out of your H.T. battery.

The same holds good when records are being played, for while the

PENTODES ARE USED FOR THE OUTPUT



This diagram shows the connections for those who wish to use push-pull output.

Power With Economy from H.T. Batteries

records are being changed and new needles being placed in the pick-ups, the current drain is very small—a state of affairs that does not exist in the case of the straight output. In this the full current would be used even while the records are being changed—a matter of some 25 per cent of the time the set is used for record reproduction.

To change the "S.P." Three to a quiescent push-pull set is an easy task, as will be seen from the additional diagrams and photographs. The Multitone transformer has to be changed to the "Puco" type instead of the standard model, while the output choke has to be different. In the set we have used the R.I. quiescent output choke, but the list shows alternatives if desired.

The Output Connections

Another valve holder is employed and a second pentode is required. These are wired up as shown in the diagrams.

In the main list of components we have marked certain items with asterisks; these are the parts that will not be required if the set is to be built in its quiescent form, the parts shown in the auxiliary list being used instead.

There is one point that must be brought up here concerning the output choke. If you have no loudspeaker at the moment and are considering getting a moving coil, it is worth bearing in mind that some makers (notably Celestion) have models with special quiescent input transformers. These are specially designed for sets of this description and, if used, obviate the need for the output choke.

In the event of one of these transformer-speaker combinations being used, the anode leads from the pentodes would be taken to the loudspeaker terminals direct and the centre tap of that to the H.T. positive.

Avoiding Strain

If you use your ordinary speaker you must use the output choke as shown, the low ratio on the speaker transformer being used, not the pentode ratio if this is provided.

You will notice that the Multitone has a 50,000-ohm resistance connected across its primary. This is used in case the anode circuit of the detector valve is broken at any time

while the set is in use, for such an occurrence throws a great strain on the pentodes due to a large grid voltage that is suddenly applied to them.

THE ADDITIONAL PARTS

- 1 Quiescent tapped output choke (R.I., Sound Sales, Multitone).
- 1 Multitone quiescent input transformer.
- 1 50,000-ohm resistance with terminals or wire ends (Graham Farish "Ohmite," Dubiller, Lissen).
- 1 5-pin valve holder (Lissen, etc.).
- 1 100,000-ohm resistance with terminals or wire ends (Graham Farish "Ohmite," etc.).
- 1 2-mfd. condenser (Igranic, Telsen, Dubiller, T.C.C., Sovereign, Lissen).
- 1 Pentode valve to match that listed in the previous list.

Once more the remarks concerning the impedance equaliser across the output choke apply, for this is not needed as a tone control when the Multitone is used; though if you consider that it is likely that the loudspeaker will be disconnected while the set is in operation, it is a valuable safeguard to use the equaliser to prevent damage to the pentodes.

With quiescent push-pull the valves must be biased to their anode-bend points at the bottom of the curve, and an additional H.T. tap is taken to the battery from H.T.3 terminal which is connected to the "cathode" terminal of the five-pin valve holders.

You will have noticed that the 5,000-ohm resistance and decoupling condenser have now disappeared.

In theory the pentodes should be matched, but this is not very necessary in practice as long as they are not far out. Usually it is sufficient to plug the H.T.2 into the full H.T. of the battery and to take H.T.3 to a tap about six volts less. Then apply as much negative bias as you can without upsetting the quality of reproduction. This will be about 16½ volts in the case of the Pen.220A at 150 volts H.T., and about 12 volts bias at 120.

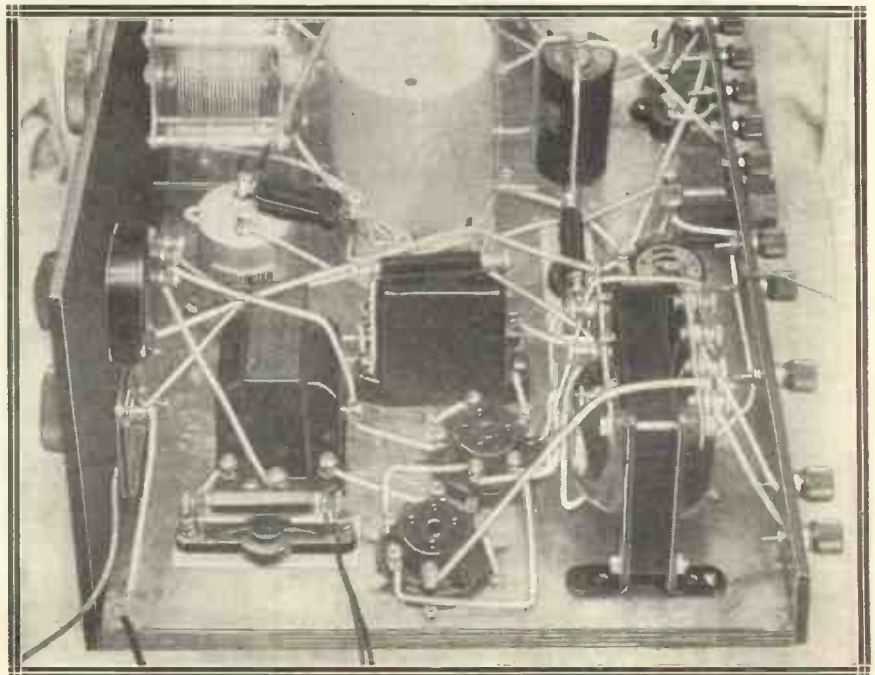
Ensuring Accuracy

If you want to be more accurate you should place a millimeter in the lead between H.T.2 and the centre tap of the output choke. Then bias the valves to the approximate figure and alter the screen volts *separately* with first one valve and then the other removed (you will need an H.T.4 terminal for the additional screen volt tap) until you get the same anode current for each valve.

Remove the meter before using the set, for the presence of the meter may cause slight L.F. instability and therefore distortion.

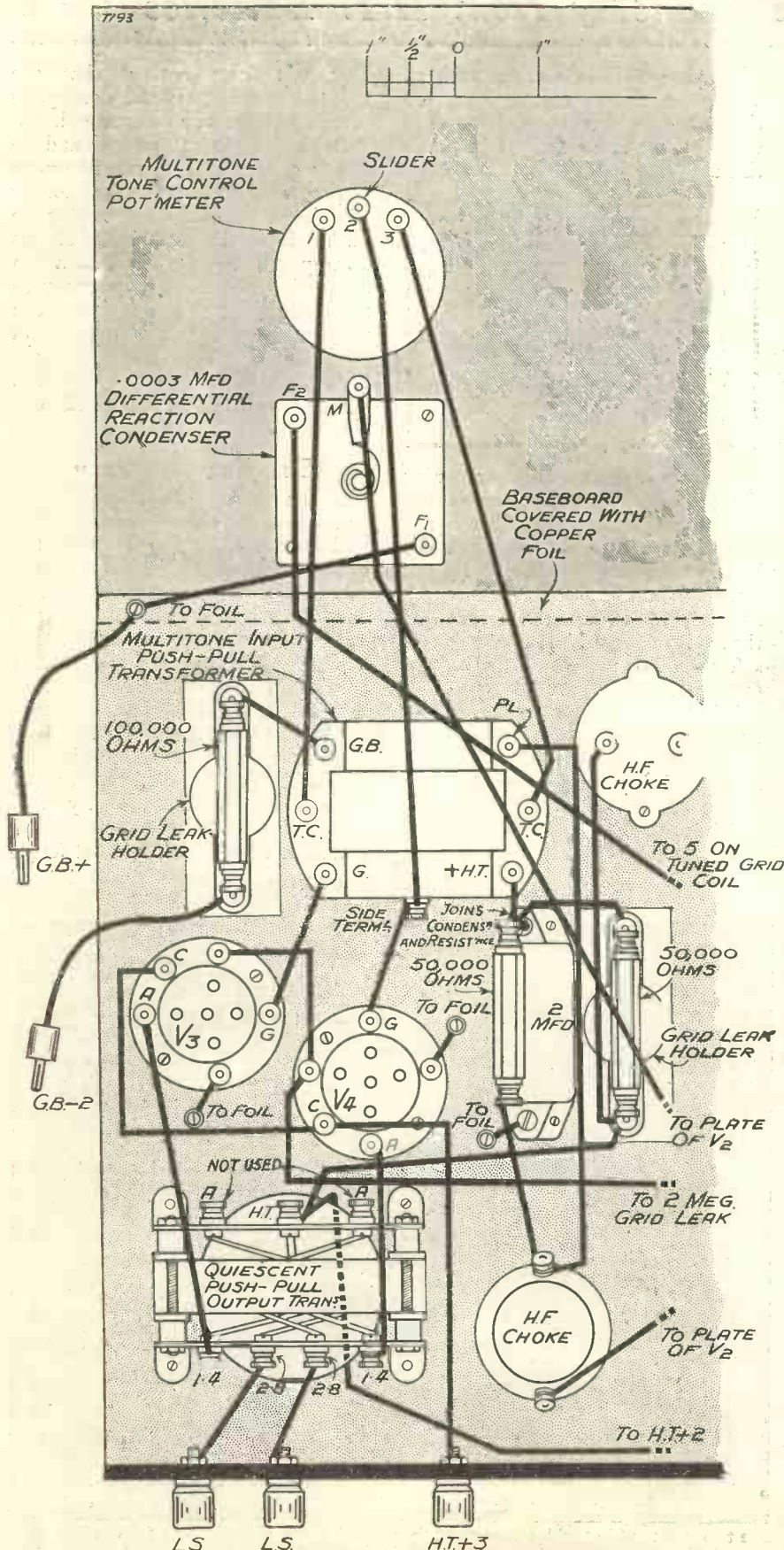
With the set in action do not forget

DETAILS OF THE LOW-FREQUENCY END



The two valve holders which take the quiescent push-pull valves can be seen in the foreground with the special output choke to their right. On their left is the Multitone input transformer.

HOW TO WIRE THE "S.P." FOR "Q.P.P."



This diagram shows the wiring for those who wish to use push-pull output.

that as the H.T. battery runs down through use the grid bias will have to be reduced, and also you must be sure that the bias battery does not drop voltage without your noticing it, for if it does, and the H.T. remains at maximum, you will gradually be coming up off the bend of the valves' characteristics and will be taking more anode current than they should.

The use of quiescent push-pull will have no effect on the operation of the set, but it will provide a means of obtaining more output power at less H.T. consumption—a by no means inconsiderable advantage.

A Precautionary Measure

Finally, a word or two might be said about the showing in the wiring diagram and the photographs of the pieces of card that are placed under the resistance holders. Other pieces of card are situated beneath the valve holders, but these do not show, though they are just as advisable.

The reason is not that we mistrust the various components concerned, but that we mistrust the copper foil after it has been mounted. The valve holders may be perfectly clear of the foil, but there is a danger that the valve pins, when pushed right home by a more than vigorous hand, will protrude sufficiently far to make contact with the metal underneath.

Buckled Foil

This would be disastrous to the valves in certain cases, and also possibly just as disastrous to the H.T. or L.T. batteries, to say nothing of the grid bias.

In the cases of the resistance holders, the screw heads under the components are usually sufficiently sunk to prevent them touching the foil (though we have known cases where they have not been far enough sunk); but we have experienced many instances of the foil being a little buckled, or the screws being inadvertently placed above old wood screw holes through the foil, when the metal has ridged up above the flat portions and has touched the screw heads just mentioned.

Making Doubly Sure

Again the results can be very disconcerting, to say the least, and it is with the idea of preventing any possibility of this type of occurrence that we have placed the card under certain components. Do not take it that we are in any way criticising the manufacturers; we are merely making assurance doubly sure.



SPICK AND SPAN

As the hands of the clock on Broadcasting House point to 9 a.m. the little army of cleaners leaves the building. Very soon the staff will be arriving and they will find all the offices swept and cleaned for a new day's work.

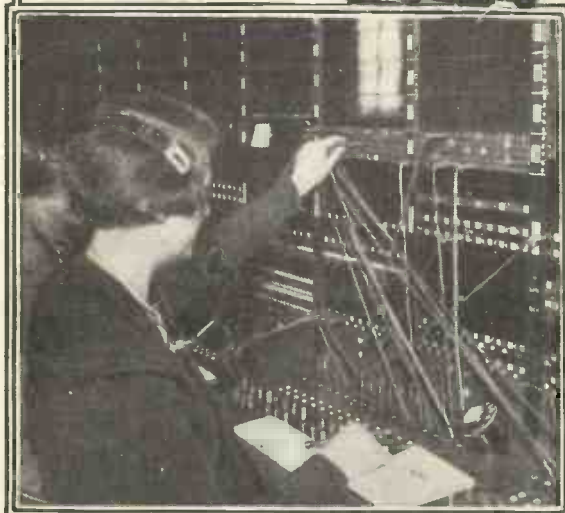
PREPARING for the PROGRAMMES



"YOUR NAME, PLEASE?"

Almost as soon as the doors are opened the first stream of callers arrives at the inquiry desk in the main hall. Artists for rehearsals and auditions, messengers, newspaper men — all are dealt with in turn, and this goes on until late in the afternoon of every day.

IN THESE FOUR PAGES WE OFFER A GLIMPSE, IN PICTURES, OF THE ROUTINE WORK WHICH GOES ON EVERY DAY AT BROADCASTING HOUSE.



OFFICE WORK

The telephones, with their hundreds of private extensions, never stop ringing all day; in the correspondence room an automatic letter opener (seen in the circle) deals with the mass of correspondence which arrives every day; and, finally, because this is Broadcasting House, the routine work must include a complete check on all apparatus, such as the dramatic control panel which is being overhauled by the engineer on the right.





PROGRAMMES ARE READY

At 10.15 the morning service ushers in another day's broadcasting and soon the studio doors will be swinging backwards and forwards with monotonous regularity as the artistes pass through for the morning talks, or for auditions. Rehearsals begin about this time, too.



"WHAT'S ON?"

The programmes are arranged—with a few exceptions—weeks beforehand, and every morning the details for the day are posted up on the two large boards in the entrance hall. Times, studios and the names of those taking part in the programmes are all posted so that there can be no excuse for mistakes!

A FRESH AIR FIEND!

Down in the sub-basement, besides studios and dressing-rooms, are to be found the machines for controlling the temperature and for washing and conditioning the air. Above is one of the engineers after finishing his job of cleaning the air-conditioning plant.



TALKING IT OVER

Jack Hulbert takes advantage of a brief interval in the rehearsal of a new show to talk over a difficult point with members of his cast in one of the rest rooms.



THREE FLOORS DEEP

All over Broadcasting House engineers and other experts are testing apparatus and busying themselves with the multitude of maintenance jobs. Here, three floors below ground level, an engineer is seen taking a check reading on a meter in the main power intake switch room.



THE PRODUCER'S VERDICT

Jack Hulbert is always determined to have things just as he wants them in the shows he produces, and he continually interrupts rehearsals until things are "just so." But during the intervals he and the principals talk things over peacefully, as you see in the picture on the left, where Jack is seen standing.



ACTORS' PARADISE

On the right is a portion of the B.B.C.'s most extensive playlibrary, where every play is carefully checked, filed and worded. Past successes and future productions are all to be found in the large numbered files which line the walls.



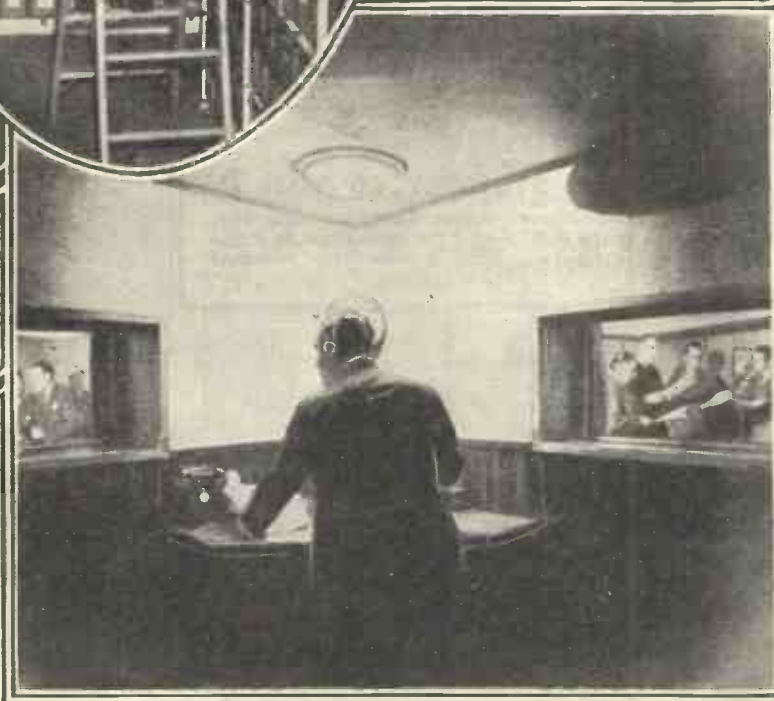
THE TOP FLOOR

Up on the eighth floor where sunlight may stream through the windows (a rare occurrence in the tower, for most of the rooms never see daylight)—an engineer regularly tests the control panel by which studios and outside broadcasts are linked to the transmitters.



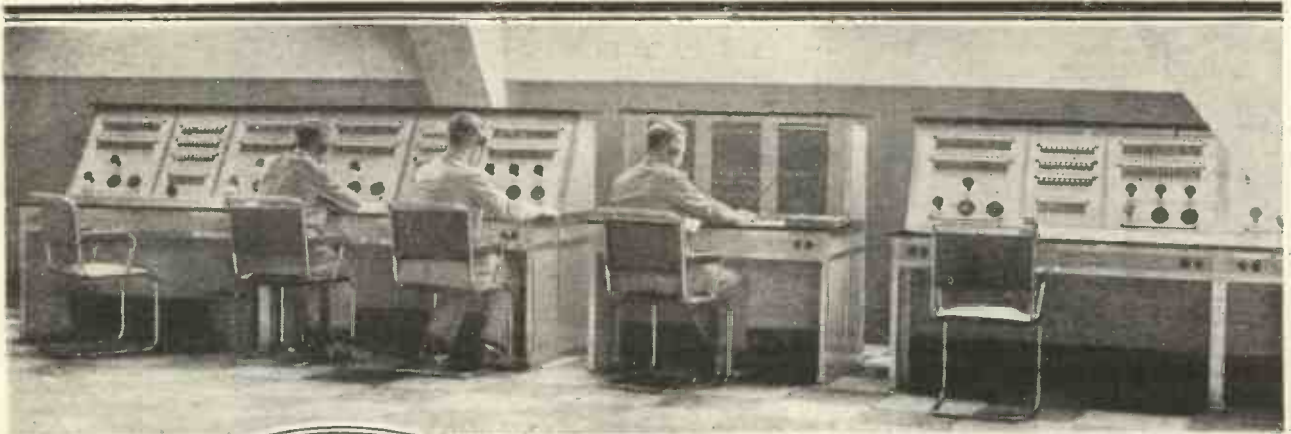
EVERYTHING O.K.

Every programme has to be checked not only by the programme arrangers and the producers, but also by the control department as regards its broadcasting quality before it can be passed on to the engineers controlling the transmissions. Above, a control engineer is reporting on a rehearsal.



BALANCE AND CONTROL

Two studios—6A and 6B—may be watched from this listening room through the soundproof observation windows. A "balance and control" official is seen above listening to a radio play rehearsal through headphones



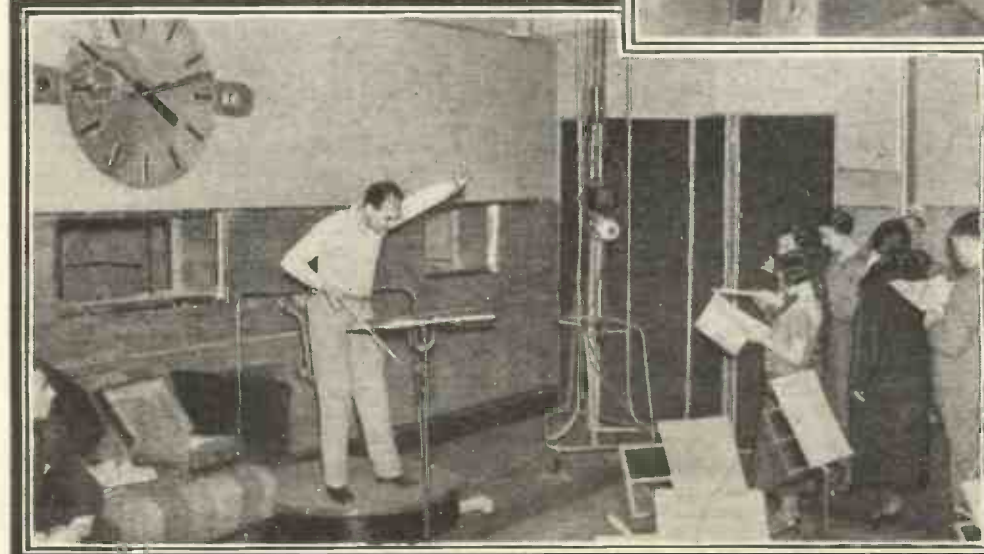
CHECKING UP ON REHEARSALS

Rehearsal time provides no rest for the engineers at the top of the tower, for rehearsals have to be watched and balanced as carefully as "the real thing." But occasionally the artistes can snatch a few minutes off—and then, as you see on the left, there is a rush for coffee and biscuits in the B.B.C.'s own restaurant.



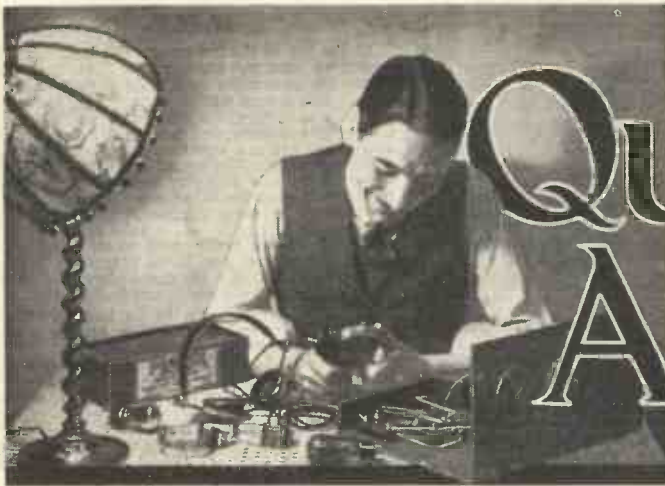
RUNNING STRICTLY TO TIME

The importance of correct timing of programmes is never overlooked by the B.B.C.—and the large clock, in studio 8A (below) helps in judging a miscellany rehearsal during the afternoon.



"MAKE IT SNAPPY"

In studio 6A, Ernest Longstaffe, in shirt-sleeves, encourages his company to greater heights during a rehearsal of a new show. In this case, Leonard Henry, Wynne Ajello, Foster Richardson and Philip Wade are among the principals; while, near the camera, you can see the Revue Chorus and members of the Theatre Orchestra, some of the most hard-worked men and women in Broadcasting House.



QUESTIONS ANSWERED

Body-Capacity Effects

C.N. (Clapton).—“My two-valve short-wave receiver gives very good reception but has one drawback. If I use a loudspeaker, as I do at times when the volume is sufficient, there is no trouble from hand-capacity effects. When, however, I substitute headphones for the loud speaker, I find that body-capacity effects are very marked.

“Is there any remedy, because I am unable to keep the weaker transmissions properly tuned in, the slightest movement causing the station to disappear?”

Body-capacity effects which occur when headphones are used can frequently be eliminated by isolating the 'phones from any H.F. currents flowing in the H.T. + lead.

Connecting a .001-mfd fixed condenser between the H.T. + side of the reaction H.F. choke and L.T. — keeps any stray H.F. currents out of the detector H.T. + lead.

The headphones can be isolated by joining a short-wave H.F. choke in series with each 'phone lead. You can construct suitable chokes by windings of about 100 turns of No. 36 D.S.C. on a piece of ebonite tube $\frac{3}{4}$ in. in diameter.

In connection with short-wave receivers it is desirable to join the moving vanes of the reaction condenser to the earthed side of the set, and an earthed metal shield behind the panel, or alternatively a metal panel, is a great help.

Testing Condensers

H. H. N. (Paignton).—“Can you tell me of a simple method of testing fixed condensers? These components always seem to me to be difficult to check up in the absence of proper testing equipment.”

Yes, condensers are not easy for

the average constructor to test. In the case of the larger capacities, such as those used for decoupling and smoothing, the terminals can be joined to a source of high-tension supply—an H.T. battery, for instance—for a minute or two.

The source of supply can then be removed and the condenser left for about half an hour. At the end of this period, a healthy spark should take place when the two condenser terminals are shorted.

TECHNICAL QUERIES DEPARTMENT

Are You in Trouble With Your Set?

The MODERN WIRELESS Technical Queries Department is in a position to give an unrivalled service. The aim of the department is to furnish really helpful advice in connection with any radio problem, theoretical or practical.

Full details, including the revised scale of charges, can be obtained direct from the Technical Queries Department, MODERN WIRELESS, Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you to ask your questions so that we can deal with them expeditiously and with the minimum of delay. Having this form you will know exactly what information we require to have before us in order to solve your problem.

London Readers, Please Note: Inquiries should not be made in person at Fleetway House or Tallis House.

It is, of course, advisable to connect a fuse in series with the high-tension supply when this test is carried out in case the condenser has an internal “short.”

A method that may be adopted by those who have a voltmeter handy is to join the condenser and voltmeter in series across the H.T. supply, so that if the condenser were not in circuit the meter would be connected across the H.T., as if to measure the voltage.

Upon completing the circuit the

needle of the voltmeter will show a momentary deflection. This indicates that the condenser is not leaky.

If a leak exists between the plates the voltmeter needle will move across the scale to a steady reading.

Parallel-Feeding

P. L. T. (Welling).—“I notice that some L.F. transformers are designed for parallel-feeding, while others can be connected in the anode circuit of the valve. Those which are intended for parallel-feeding are, I believe, usually of small physical dimensions. Cannot this method of coupling be applied to all transformers?”

Transformers which lend themselves to the parallel-feed system are normally those with nickel alloy cores. These cores have a very high permeability, i.e. they offer a ready path to magnetic lines of force, and it is possible to obtain a remarkably high inductance with quite a small sized transformer.

These instruments, however, have a dislike for steady anode currents, and the inductance decreases rapidly when an increasing current is passed through the primary winding.

With some of these transformers two or three milliamps. are sufficient to change a good response curve to a bad one. The remedy is to deflect the steady current from the primary winding by inserting a resistance-condenser “feed” in the circuit.

The steady current flows through the resistance to the anode of the valve. The condenser acts as a barrier to the steady currents, but allows the L.F. impulses to pass into the transformer.

Although any transformer can be parallel-fed, there is little or no advantage in doing so with transformers designed to carry the normal working current of the valve without appreciable loss of inductance.



A brief selection of the latest gramophone records.

BROADCAST RECORDS

THE latest advance in record making, the Broadcast "Four-Tune" discs, have met with enormous response from the trade and public alike. There is no doubt that they are excellent value, and they offer really modern numbers.

This month the "Four-Tune" discs (there are two of them, 503 and 504) give Just a Little Home for the Old Folks; Puss, Puss, Puss; When Sally Left the Alley, and Venetian Lady, in the former case played by The Blue Mountaineers and The Rhythm Rascals. The second disc contains Fit as a Fiddle; Taboo, Taboo; Balloons, and Roll Along, Kentucky Moon. All have vocal choruses, and each disc provides about ten minutes of music.

The New International Broadcasts are also a novelty that is worth special note. These 1s. 6d. discs contain foreign recordings, or rather records of foreign artistes, and are particularly good.

This month, for instance, we have Gretl Vernon, the Viennese Nightingale, singing The Bird in the Forest and Love, You Earthly Paradise (B116); while the Hanover Military Band is concerned with The Anvil Polka and The Jolly Copper Smith on B115.

Liszt's famous Hungarian Rhapsody No. 2 is again recorded, this time on the International records by The State Opera Orchestra of Berlin (B117); while many will find the McDonald Quartet (an American combination) of particular interest on B114, whereon they give Gipsy Love Song and Roll On, Blue Moon.

Now let us go on to the "ordinary" twelves, where we find such artistes as Payne and Hilliard doing The Commercial Traveller (3281) and The Pennwhistle Operatic Society engaged in Faust Gone Barmy—or Crazy Night at the Opera. This is a musical burlesque that will raise many a laugh, though it may not be appreciated by true opera lovers, who will not like to hear their favourites travestied. So to them I say, don't get this disc, while to others it will be a source of great delight. (3282.)

The Commodore Grand Orchestra is one of the most popular outside broadcasts; why, I cannot imagine, for it does not appeal to me. However, that may be my fault, the fact remains that they have made a very good recording of Kettelbey's In a Monastery Garden and In a Persian Market on 3284.

We have had a lot of Sweethearts of Yesterday from Henry Hall and other sources, and here's another—a record of Reginald New on the cinema organ. It is good as such things go, but I must say I am heartily sick of this particular conglomeration of old favourites. Aren't you? (3285.)

The Six Hits from a hit film ("The Big Broadcast") will be a popular record. It is played by Ned Fox's Film Fans, and is a very good recording. (939.)

COLUMBIA

A mixed grill is set before us by Columbia's this month, ranging from Moody and Sankey Hymns to the Carnival of 1932 Stars. Let us take the latter disc first. It is a selection record of hits with various well-known stars singing or playing them, and the whole is welded together by Debroy Somers Band.

Included in the record are Flanagan and Allen, The Carlyle Cousins, Peggy Wood, Sandler, and Dan Donovan, Somers' popular vocalist, who sings two numbers. This review will go well, and it deserves to. (DX432.)

Jetsam's heavy voice conceals a light heart, and he has just made another comedy record that should go well. It is a pity he will sing flat when he gets down on that bottom note of his (or is it the one next to the bottom?), and in My Grandfather's Clock and Lucy Long he has a

good time down below, assisted in his vocal humour by a bassoon.

Malcolm McEachern, to give him his right name, is never more happy than when he is exercising those low notes of his, and here, with that most ridiculous of instruments (played as a solo), he has a real good time. I prefer the latter to the former number, and, as a matter of fact, the bringing in of several instruments of the orchestra makes it a particularly useful disc for quality test work. You should certainly hear it. (DB1017).

The organ at the Regal Cinema, London, is said to be the finest in the country (or was so, some little time ago), and the discs that it makes are always to be relied upon to be full-blooded and realistic. This month we have Classical Fragments, and Sidney Torch makes full use of the powers of his fine instrument. It is worth hearing. (DX434.)

CICELY SINGS!



Cicely Courtneidge busy before the H.M.V. microphone at the Abbey Road studios. She is recording her famous "Laughing Gas" sketch.

I like Will Fyfe, and his "I belong to Glasgow" will always be one of my favourites. So I was particularly glad to meet him again this month, still as good as ever, discussing farmyard philosophy in It Isn't the Hen (that cackles most that lays the bonniest egg). (DX437.)

If you are highbrow—and I use the term in all reverence—you will be interested in the Chauve Souris records, of which there are two made by the world-famous company under M. Balleff. One disc contains some of the best-known successes, "Round the Hay Wain," "Dark Eyes," and so on, while the other concerns two later numbers, "The Knife-Grinder's Daughter" and the duet from Tschalkovsky's "Pique Dame."

Anona Winn has long been a popular broadcast artiste, and listeners will be glad that she has now recorded on a disc under the Columbia flag. Her first record contains two theme songs from a new film, "The Little Damsel," namely, What More Can I Ask? and Brighter Than the Sun, which are sung by Anona on DB1036. I think you will like this disc.

H.M.V.

At the top of the list among the H.M.V.'s this month we must put the record of H.M. The King giving his memorable speech on Christmas Day, 1932. This record will be one of those that will go down in history, for the speech was not only that of His Majesty, but inaugurated the Empire short-wave link in a way that no ordinary opening ceremony could. The record has been heard and approved by His Majesty, and the proceeds of its sale will go to the Wireless for the Blind Fund. The record is most lifelike in its intonation. (R.B.S.4359.)

If you want a really good violin record you should get hold of Ave Maria played by Yehudi Menuhin on DB1788. His chord playing is always dead in tune, and the whole disc is delightful.

Marek Weber is again to be had on C2514, playing Czardas and The Czarina, and on a ten-incher playing two Strauss' waltzes. As a matter of fact, it will be interesting to hear which goes the better, this disc of Weber or the Strauss' Love Songs played by the Vienna Philharmonic Orchestra on C2339.

An operatic record of appeal is the famous La Donna è Mobile, sung by John Turner, together with When a Charmer Would Win Me on the other side.

Paul Robeson has been a favourite ever since he "appeared" on H.M.V. He has just recorded two more items on B4336, namely, Mary Had a Baby and All God's Chillun Got Wings.

Gracie Fields has recently pressed her 4,000,000th record, and since then, of course, her discs have carried on steadily selling. Her latest is B4302, In Old Siberia and Balloons, two very different types which give an excellent idea of the powers of expression that are possessed by this wonderful artiste.

Jack and Claude Hulbert carry on their light entertainment with Loving You, a piece of foolery that may be remembered by listeners as one of their best broadcast items.

I wonder how long that veteran of recorders, Peter Dawson, will continue to charm his hearers—he is still hard at it, and has just produced an old favourite in The Arrow and the Song, accompanied on the other side by Will o' the Wisp.

Film fans will be glad of Gloria Swanson's second H.M.V. recording, Ich Liebe Dich, My Dear; and from her new film, "Perfect Understanding," she sings I Love You So Much That I Hate You.

Do you want a lively xylophone disc? One that will find out any weak points you may have in your radiogramophone? Get Jack Simpson's On the Track and Clock and the Dresden Chins Figures. This latter is the better side of the two, and it is a real goer. (B4351.)

Finally, we must mention Ray Noble and His Orchestra playing A Little Street Where Old Friends Meet and Just an Echo in the Valley on B6305, and also Lying in the Hay, the popular French dance hit, with which he couples Wanderer. Two more of his compositions, this time from the film, "The Little Damsel," are being recorded by him. They are What More Can I Ask and Brighter Than the Sun.

Finally you must hear B6303 if you are a hot rhythm enthusiast. Tapping the Time Away Stomp by the Washboard Serenaders is great.

REGAL-ZONOPHONE

The first releases of this new combination were made in January, and went off with a good kick. Here we have some of the second set which I want to bring to your notice. Especially good did I find Black Laughter by the Cole Brothers, which proved to be a nigger back-chat disc of refreshing novelty. The tired laughs that these two new comedians emit on the record are irresistible. This record will raise many a chuckle. The second side is not so good (Take Me Away From the River).

The best of the dance numbers in my batch of records was that by Ambrose, Try a Little Tenderness and I'll Never Have to Dream Again, recorded on MR801. The former number is sung on MR794 by "The Velvet Voice," a gentleman with a pleasing tone that will be very popular. On the other side he has recorded Till To-morrow.

Bud and Joe Billings are to be heard on MR780 singing Folly Wolly Doodle and The Hum Song, two ditties that have been arranged by Carson Robison, the Hill-billy specialist.

I suppose some people like yodelling; I cannot stand it as expressed by Harry Torroni on MR779. He has chosen two of his own songs and accompanies himself on his guitar. The result of Mexican Yodel and My Swiss Miss Yodel on me is one of pity. There are many things that may be clever that we do not see the necessity for, and this is one of them.

Space forbids me saying any more about the Regal Zonos this month; they form a mixed bag; and I advise readers to have a look through the lists for themselves. They will find many attractive titles, and a visit to their local record shop will enable them to pick out those they prefer.



In EASY-TO-MAKE A.C. MAINS UNIT

One might easily imagine that this unit was specially conceived with the idea of showing just how simple a mains H.T. unit can be. But its efficiency in no way suffers for its straightforwardness, and the unit is particularly suitable for the "S.P." Three.

Described by A. S. CLARK.

THE days when deep mystery surrounded all-mains radio apparatus are gone for ever. No longer are mains units fearsome complications of components that only

YOU'LL NEED THESE

- CABINET**
(See text.)
- PANEL**
7 × 5 in. (Peto-Scott, Permcot, Becol, Direct Radio, Wearite, Goltone).
- BASEBOARD**
7 × 12 in.
- CONDENSERS**
2 4-mfd. (T.C.C. type 61, Dubilier type B.B.)
1 2-mfd. (Dubilier type B.C. or L.S.B., Igranic, Telsen, T.C.C.)
2 8-mfd. dry electrolytic (Helleesen, peak voltage 500).
- RECTIFIER**
1 (Westinghouse H.T.—6.)
- MAINS TRANSFORMER**
1 (Wearite type T.7.)
- SMOOTHING CHOKE**
1 (Ferranti B.1.)
- RESISTANCES**
1 25,000-ohms, with holder if required (Graham Farish "Ohmite," Ferranti, Colvern, Wearite, Watmel, Sovereign).
1 30,000-ohms, with holder if required (Graham Farish "Ohmite," or as above).
1 1,000-ohms, with vertical holder (Graham Farish Power "Ohmite").
- MAINS PLUG**
1 (Goltone type LS/31 and MC/9, Bulgin, Belling-Lee).
- MISCELLANEOUS**
3 "Safety-shrouded" plugs and sockets (Belling-Lee type 1015, H.T.—, H.T.1, and H.T.2).
1 Fuse holder and 150-milliamp. fuse (Belling-Lee short type and 1053, Bulgin, Telsen, Goltone).
2 yds. insulating sleeving and 3 yds. 18-gauge tinned copper wire, screws, etc.
Metal for box. (See text.)

unit can be constructed is well illustrated by the design which I am going to describe. As a matter of fact, one might easily imagine that this unit was specially conceived with the idea of showing just how simple a mains H.T. unit can be—and irrespective of effectiveness or efficiency at that!

Actually, nothing of the sort is the case, that is, so far as efficiency is concerned. Its ease of construction is every bit as real as it appears, and at the same time it is perfectly safe for anyone to use.

Ample Output

This safety is provided by the metal cover that protects all the components and makes it impossible to touch anyone while the mains are "on." The mains are connected up by means of a connector which has to pass right through the metal cover, so that the connection must be removed before the cover can be displaced.

Insulated plugs and sockets at the opposite end to the mains input take care of the output. There is one negative and two positives.

The lower voltage tap of the two is provided via a potential divider and is intended for the screening grid of an S.G. valve. The other tapping

which gives the maximum output of around 150 volts at 30 milliamps. serves for the other valves in the receiver and also for the anode of the S.G. valve.

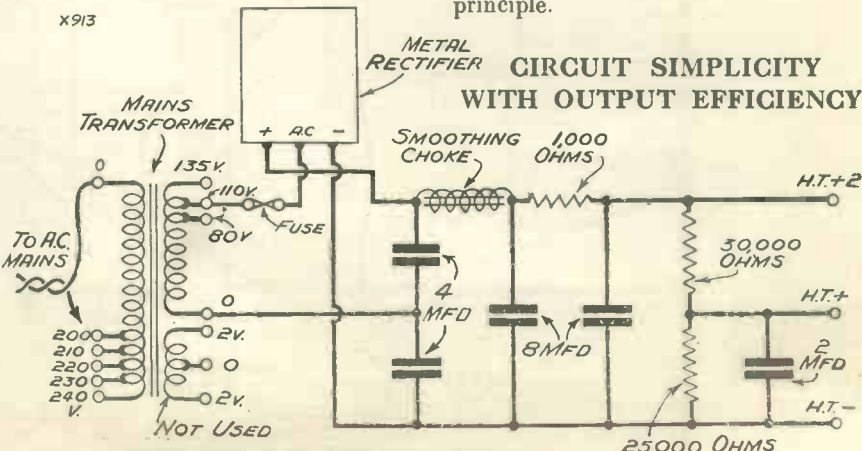
Dealing with the Detector

Most detector valves are decoupled with a resistance these days, so that the voltage supplied to them can easily be dropped to a suitable extent by giving this decoupling resistance a suitable value. The unit is particularly suitable for the "S.P." Three type of receiver, described in other pages of this number of MODERN WIRELESS.

As a matter of fact, it was designed largely with the idea of supplying the high-tension necessary for the "S.P." Three when built with the single valve output arrangement. Those building up the "S.P." Three who have mains available but have not already a mains unit cannot do better than construct this one.

Voltage Doubling

Returning to the circuit details, readers will see that a metal rectifier is employed, so that the unit is to all intents and purposes everlasting. This rectifier is of the full-wave type and is arranged on the voltage doubling principle.

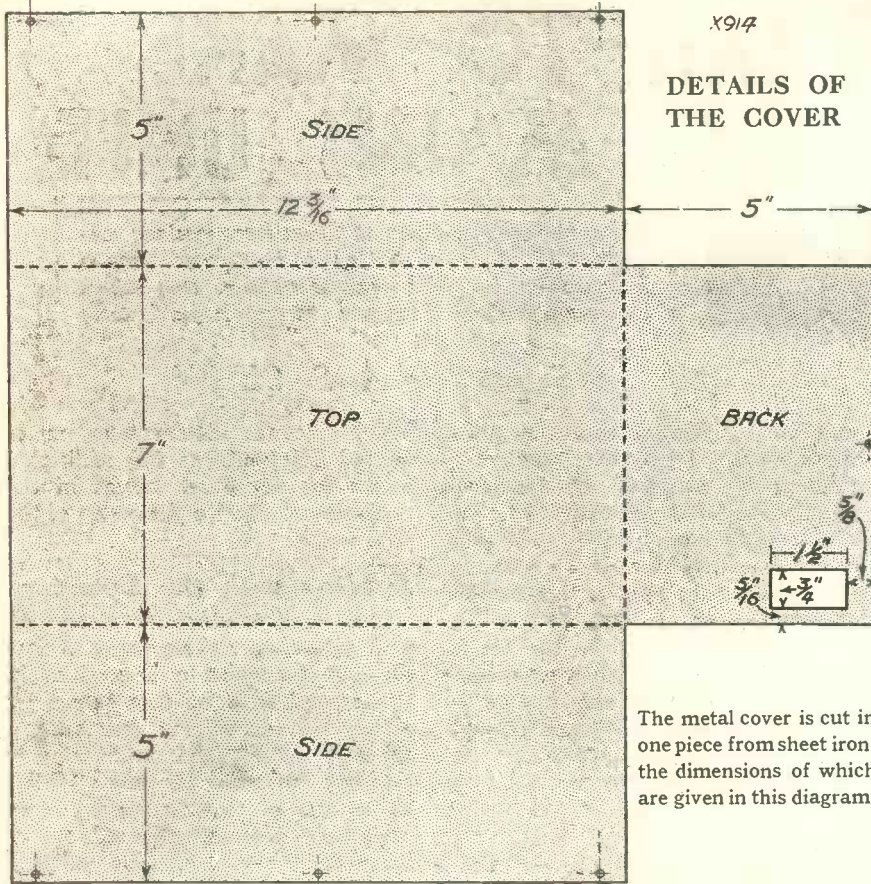


A dry rectifier, working on the voltage-doubling principle, is employed, and two positive output tappings are provided, one being potentiometer-fed for screening grids.

the expert dare handle for fear of receiving a shock.

Gone, too, is what we might term the romance of all-mains working, and the superiority which was the acceded right of all possessors of a set that worked from the mains. But who is there who will mourn the passing of these days, since their departure has brought the building of a mains unit well within the scope of the ordinary constructor?

The simplicity with which a mains



The metal cover is cut in one piece from sheet iron, the dimensions of which are given in this diagram.

the lower condenser in the circuit diagram and negative for the upper condenser, hence the series effect.

The smoothing arrangements consist of an L.F. choke and a fixed resistance shunted by two 8-mfd. fixed condensers. The resistance also serves to drop the voltage to a suitable value for working.

Preparing the Cover

Its value can be varied if necessary, a greater resistance being employed when drawing small currents from the unit. The higher resistance will then keep the output voltage from rising too high.

The biggest job of all in the construction, and that not so very big, is the preparation of the metal cover. It is cut from tinned iron sheet, but does not need to be very thick.

A diagram of the dimensions to which it has to be shaped is given, and those who fear their capabilities as amateur tinsmiths could get the cover made up for a very small sum. The cutting of the slot for the mains connector is best done with a chisel and a tendency made to keep it on the high side if anything. Then, if it is not quite in the right place, it is a simple matter to raise the plug on the baseboard to come level with the hole.

Simple Procedure

The two edges where the sides and the back come together are joined with solder, a simple enough procedure if you give yourself time for the job and use a largish and hot iron. Seven holes are pierced where shown in the cover so that it may be screwed to the baseboard of the unit.

For those who are not familiar with this scheme, it should be explained that alternate pulses are used to charge up separate condensers, these condensers being connected in series in such a way that the charges in them are joined in series, hence the voltage doubling effect.

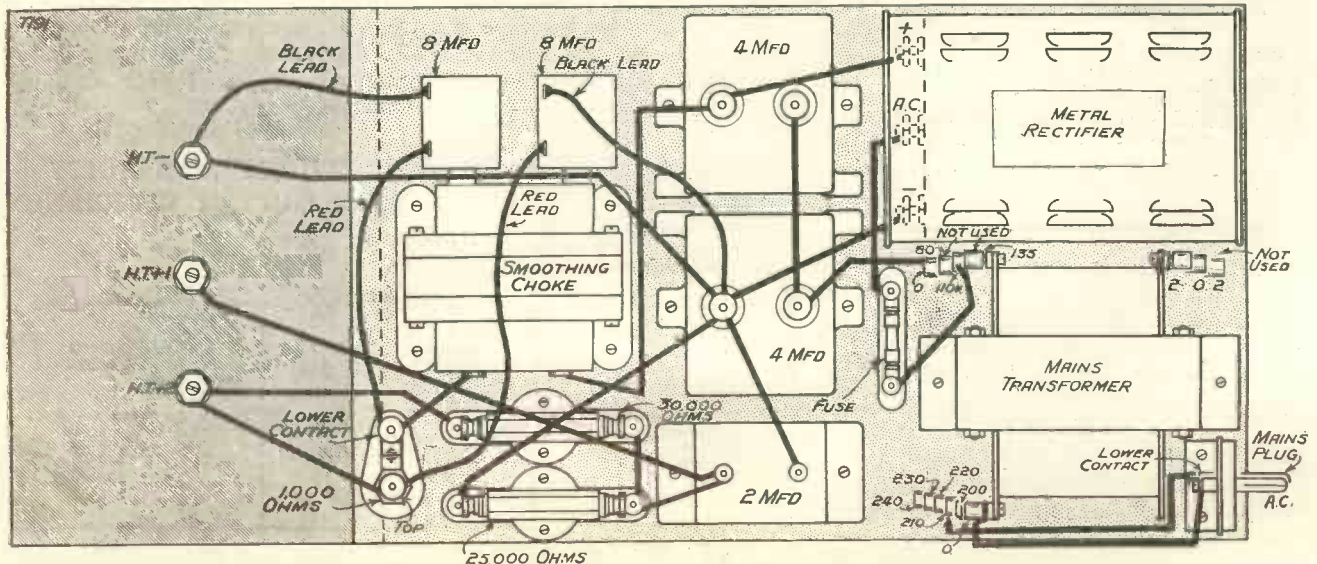
One terminal of one of the condensers in series goes to the - terminal on the rectifier, and the positive

terminal goes to one terminal of the other series condenser. These two terminals on the condensers form the positive and negative outputs.

The Series Effect

The other two terminals of these series condensers are joined together and go to the "O" terminal of the H.T. winding on the transformer. This terminal serves as positive for

FOLLOW THIS SCHEME WHEN FIXING COMPONENTS AND WIRING



Little need be said about the construction as it is very simple, but you should note that the 8-mfd. fixed condensers have one black and one red lead each. See that you join these up exactly as shown in the above diagram.

Plug in to an H.T. Supply that Lasts for Ever

It would be almost an insult to tell you anything about the drilling of the panel with its three holes for pins and sockets and three for screws. And the necessary dimensions are given in a separate diagram.

Likewise, the screwing of the components to the baseboard is almost too simple for words. Just follow the positions shown in the layout diagram.

The two dry-electrolytic type 8-mfd. fixed condensers are not screwed down in any way, but just rest end up on the baseboard. Their connections will keep them approximately in position.

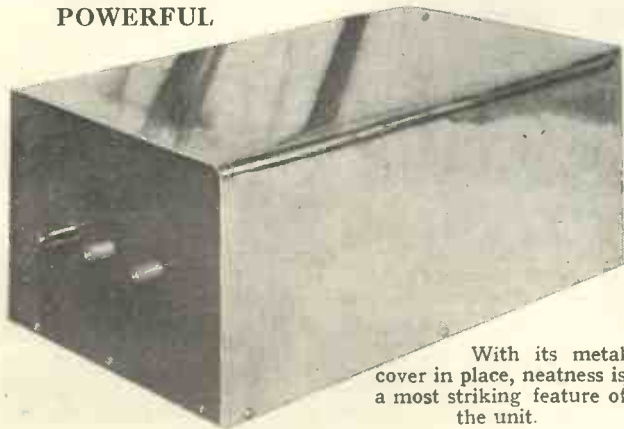
Preventing Break-down

This is a good point to intersperse the warning to use high-test-voltage condensers for the 4 and 8 mfd. A break-down in these condensers would be likely to lead to complicated troubles.

The wiring you will find easy enough, but note that there are three terminals on the transformer not used and marked 2-0-2. These are for supplying the heaters of A.C. valves, and could be used for this purpose by those who are constructing a simple all-mains receiver. Their output is 4 amps., and they would serve to supply three or four valves.

There are four other terminals

PLAIN BUT POWERFUL.



With its metal cover in place, neatness is a most striking feature of the unit.

that are not connected up on this transformer, but they form the taps for varying voltage mains around 200 volts. If your mains voltage is in the neighbourhood of 100 volts, you will need a transformer with a different primary winding and should mention the fact when ordering.

And that, I think, brings us to the connecting of the unit to the set and to the mains. The former is simpli-

city itself, the uses of the two tap-pings having already been explained.

For the latter you will need a length of twin flex long enough to reach from wherever you are going to keep the unit to a suitable wall-plug or electric light point. On one end of this flex lead you wire the connection that fits through the cover of the unit, and on the other a suitable plug or adaptor in the case of a light point being utilised.

No switch is provided on the unit, because all the necessary switching can very well be carried out by the ordinary switch on the wall which controls the plug or light point. In the case of a wall socket which is not provided with a switch, quite a frequent state of affairs where old electric-light installations are concerned, the plug may be removed from its socket instead.

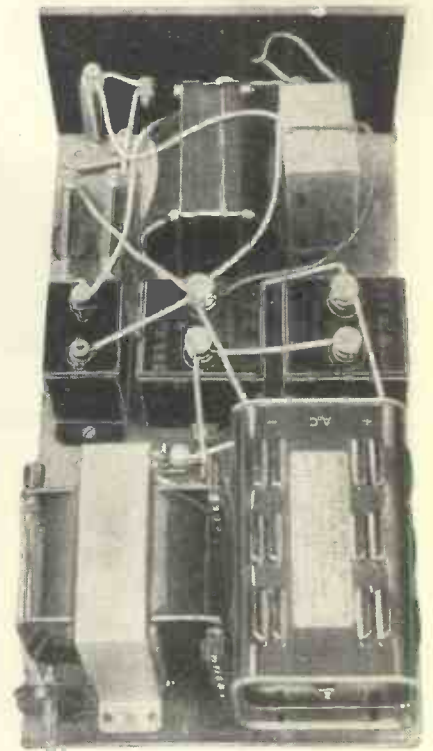
Avoiding all Risk

There is a particular sequence which should be adopted when a mains H.T. unit is employed, for switching on and off. The object of this sequence is to prevent sudden rises in voltage producing harmful effects in the components of the unit, especially does this apply to the fixed condensers.

It is a point which is very often entirely ignored, as a rule it must be admitted, without any harm resulting. But those who do ignore it are most certainly running a risk of trouble—a risk which is not worth while since it can be avoided simply by operating the two switches (that on the set, and the mains switch) in the correct order.

The idea is to prevent sudden rises in voltage from harming components, by stopping the voltage from suddenly rising. The time when this occurs is when a load is quickly removed from the unit, such as when the filaments of the valves are turned off while the unit is still joined up to the mains.

This state of affairs is easily avoided by switching off at the mains before switching off at the set, a sequence which is just as convenient



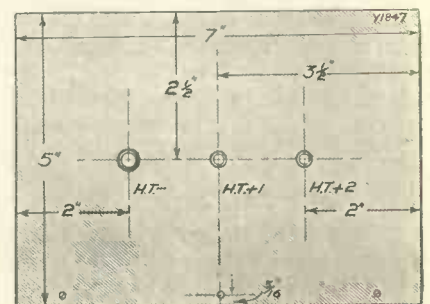
In the top right-hand corner of this photo can be seen the two 8-mfd. electrolytic condensers. These are of the dry type, so have to be connected a certain way round.

as the other way round, which may lead to damaged condensers. Similarly, it is just as well, although certainly not so important, to switch the set on before applying the mains voltage to the unit.

Voltage Rise Impossible

The effect of proceeding in the method outlined is to ensure that there is always a load on the condensers of the unit—that is to say, they are always supplying a certain amount of H.T. current. In this way it is impossible for the voltage across them to rise too much.

JUST SIX HOLES



PANEL LAYOUT

The drilling of the panel is not a big job! It can be done in a few minutes.

as near to perfection as any set we have yet tested. The amazing ease with which station after station—literally dozens and dozens of them—can be tuned-in on this set is nothing short of a revelation, and those stations which are more or less immune from serious heterodyne interference (fortunately, the majority) might easily be mistaken for the local!

Well-Merited Eulogy

These are but a few of our impressions of this creditable Ekco instrument, and we need hardly add that we are not easily moved. Yet eulogistic comment in this case is certainly well merited. It's a fine set.

The superheterodyne circuit is built up around a total of five valves, which are arranged in the sequence of S.G. first detector, separate oscillator, one S.G. intermediate, second detector, and pentode output. The instrument, the full title of which is the Ekco "S.H.25" Superheterodyne Console Receiver, is available for A.C. and D.C. mains operation. Incidentally, the model that was the subject of our tests was the standard A.C. version for mains voltages of from 200 to 250.

Complete with its moving-coil loud-speaker and all the mains equipment, the set is built into an attractive bakelite case which, for what it contains, is remarkably compact. That is one of the obvious results of very careful designing.

Last Word in Simplicity

The controls are the last word in simplicity, and are all conveniently grouped at the front. To make matters even more simple for the uninitiated user, the stations are all named on the scales which surround the loudspeaker fret, and it is worthy of mention that the dial settings are accurate.

To do away with a "knobby" appearance, concentric mounting has been employed for the four principle controls. On the left, the larger of the two knobs is the station selector,

(Continued on page 292)



"M.W." TESTS

**THE "EKCO"
"S.H.25"
SUPER-
HETERODYNE**

A review of one of the most interesting products from the great Southend factory of E. K. Cole, Ltd.

ASK almost anybody with the simplest three-valver what sort of results he gets, and ten chances to one he will tell you that he is able to receive dozens of distant stations. Moreover, to an extent, his answer will probably be quite correct.

Yet if the same question is addressed to the owner of the most elaborate set available, his reply will probably be very much the same. And, if both are correct, why bother to go in for an elaborate set?

Foreign "Locals"

The fact of the matter is that the claim to be able to receive a great number of distant stations is a very loose term. The "great number of stations" may consist of thin and distant monosyllables in a foreign tongue at irregular intervals all round the dial; or, again, they may be up to the standard of what might be termed foreign "locals"—in other words, genuine alternative programmes free from interference, fading, and like troubles.

We raise the point because in giving our opinions of the Ekco "S.H.25" Superhet it is inevitable that we should refer to "a great number of distant stations." Not stations that are obviously distant before you hear the announcement, but programmes that might for all the world be emanating from your own local transmitter. And that is the essential distinction.

Near to Perfection

If you want *real* programme value from any one of a hundred different stations, if you want to hear the programmes of other countries as programmes and not as unintelligible cacophony, then, frankly, you need

not look farther than this fine Ekco set.

Definitely it does not receive every station in Europe on a par with the local. No set, however elaborate it may be, will do that.

To be comparable with the local, it is essential for a distant station to be appreciably free from interference, and until such times as every station in Europe adheres rigidly to its

AN EFFICIENT LAYOUT



Note how the valves are easily accessible and how complete screening is given to the various stages to ensure stability.

allotted wavelength, an "all-Europe" set will be an impossibility.

But so far as set manufacture is concerned, the Ekco "S.H.25" is

TABULATED DATA FOR THE TECHNICALLY-MINDED READER

GENERAL SPECIFICATION :—Five-valve "all-electric" superheterodyne console receiver for A.C. and D.C. mains, incorporating built-in moving-coil speaker.
CIRCUIT DETAILS :—S.G. first detector, separate oscillator, S.G. intermediate, second detector and pentode output.
CONTROL ARRANGEMENTS :—Main tuning and wavechange switch knobs are mounted concentrically on the left. Larger of right-hand concentric controls is volume regulator, and smaller one is local-distant switch. Small

central switch is a tone-control device. Mains "on-off" switch is located on side of bakelite case.
SPECIAL FEATURES :—(1) Remarkable selectivity combined with amazing sensitiveness; (2) Ease of operation; (3) "Named" station markings; (4) Provision for pick-up and external speaker.
PRICE :—£25 4s.
MAKERS :—E. K. COLE, LTD., EKCO WORKS, SOUTHEND-ON-SEA, ESSEX.

LA MARSEILLAISE
 Written and composed by Claude Joseph Rouget de Lisle 1792.
 Con anima
 Arr. for male voices by

The WORLD'S PROGRAMMES

HOW WHEN AND WHERE TO HEAR THOSE FOREIGNERS—

GOD SAVE THE KING
 Attributed to Henry Carey 1745
 Moderato
 Long live our noble King
 Long live our noble King
 God save the King
 God save the King

Austrian Hymn
 (Joseph Haydn)
 1772-1792
 Andante (♩ = 100)

The Belgian National Song
 The son of France
 The son of France

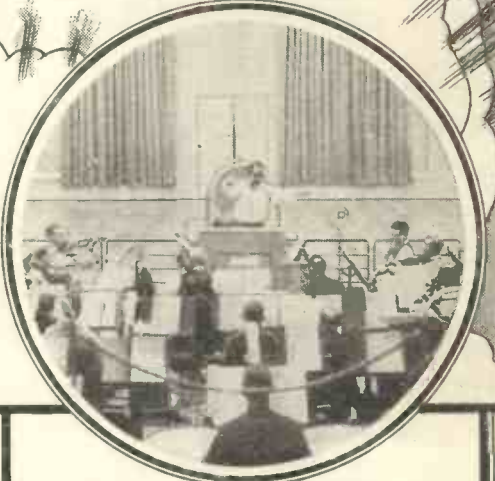
The Polish Hymn
 Allegretto (♩ = 120)

THE STAR-SPANGLED BANNER
 National Song of the United States
 With spirit
 Arr. by J. B. L.

SÖNNER AF NORGE
 Den Norske Statslaug
 Norge Statens
 Allegro con spirito

THE MAPLE LEAF FOR EVER
 Words and Music

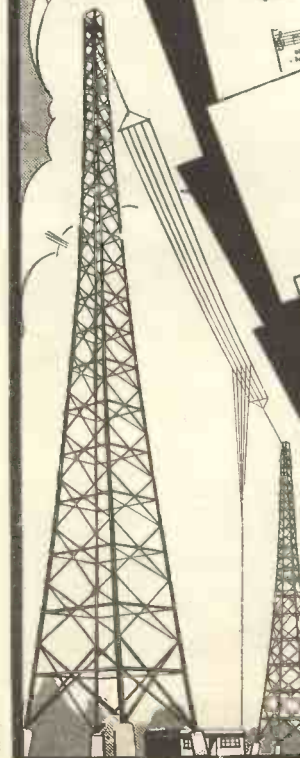
Dutch National Hymn
 Maestoso (♩ = 100)



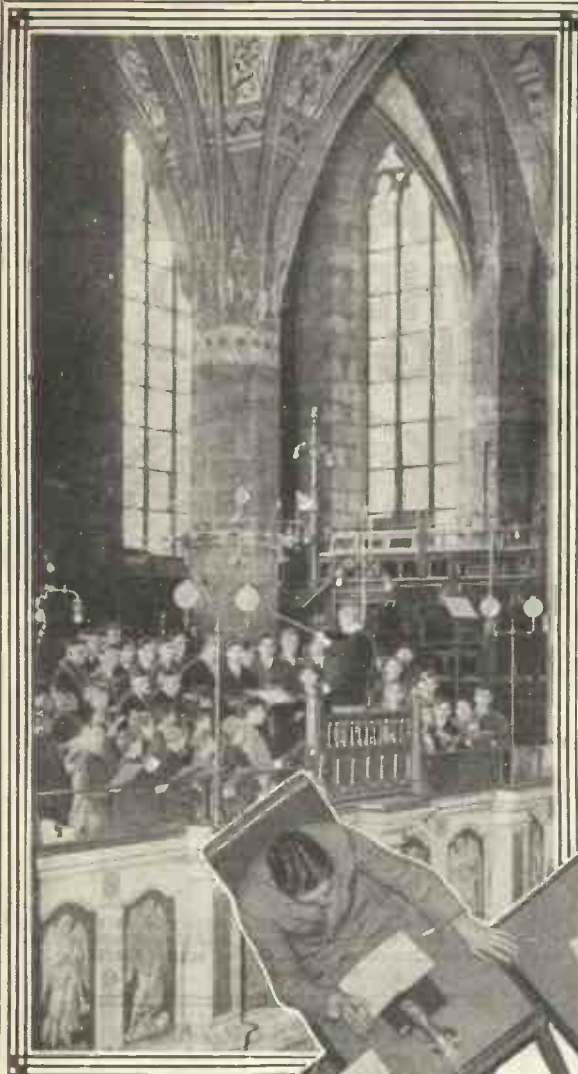
WITH WALLS THAT MOVE to adapt acoustics at will, the Hamburg studio of NORAG has now become famous as an example of modern broadcasting technique.

CONTENTS OF THIS SPECIAL SUPPLEMENT

- Radio's Part in Religion.
- Long-Wave Listening.
- Geneva on the Air.
- Distinguishing Whistles.
- On the Medium Waves.
- The Announcers of Hungary.
- At Strasbourg.
- The Favourite Uncle of Vienna.
- Children of Austria.
- Overseas Items.
- Other People's Programmes.
- Long Distance Receivers.
- World-Wide Jottings.
- Programmes that Pleased.
- The Month in Europe.
- "Nightingale Lane" in Berlin.
- "Ecoutez!"
- Distant Stations and How to Hear Them.
- The Regionals of Japan.



RADIO'S PART IN RELIGION



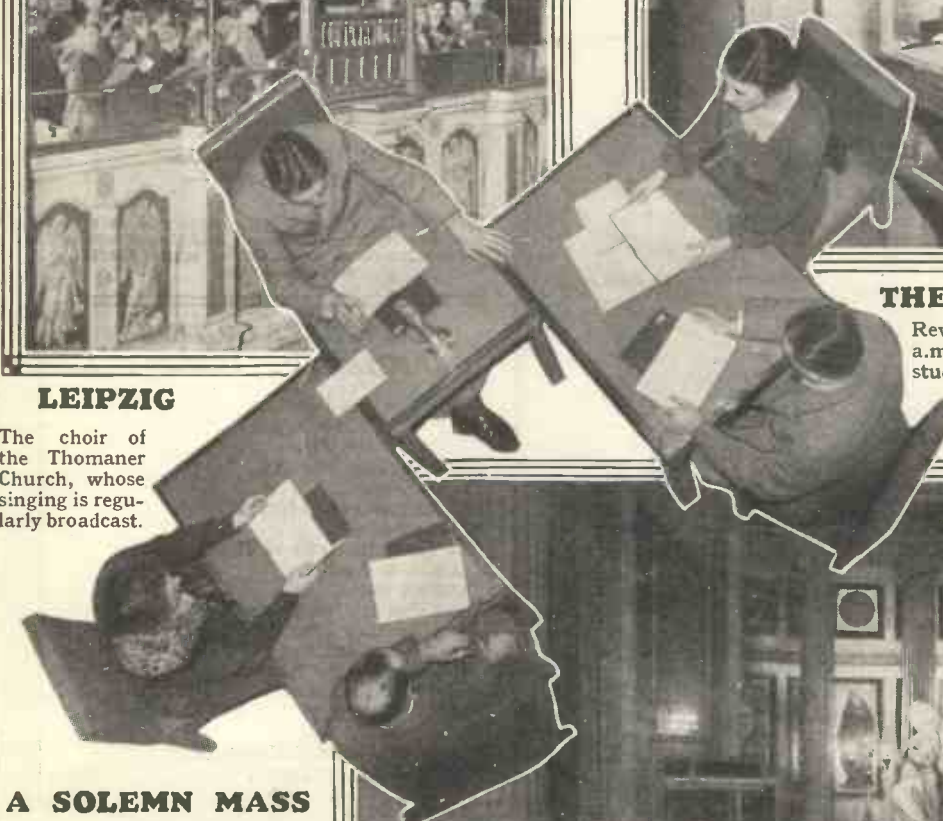
LEIPZIG

The choir of the Thomaner Church, whose singing is regularly broadcast.



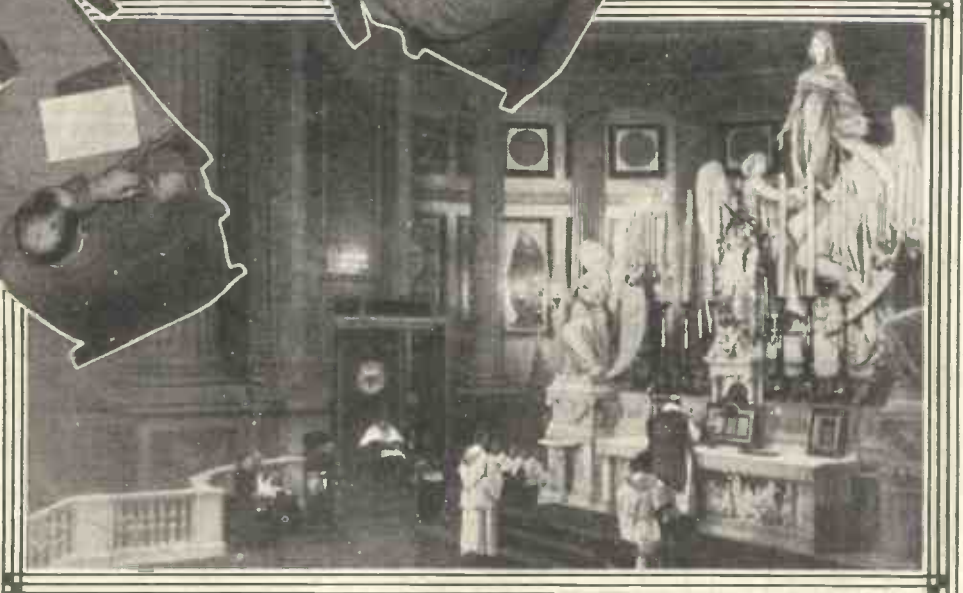
THE MORNING SERVICE

Rev. Hugh Johnston conducts the 10.15 a.m. service from the new religious studio in Broadcasting House. The Wireless Singers who are seen to the left form an integral part of this service



A SOLEMN MASS

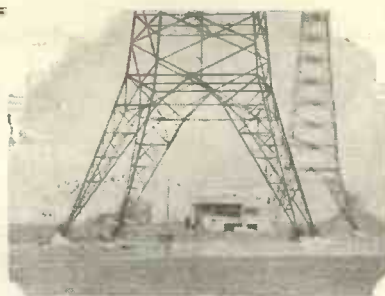
Each year, in the Madeleine Church at Paris, a mass is sung for the prosperity of the radio industry. This year Cardinal Verdier, Archbishop of Paris, with several members of the high clergy, attended the mass which our photograph shows in progress.



PRAYERS FOR THE PROSPERITY OF FRENCH RADIO

We might easily dispense with long-wave programmes during the dark winter months.

LONG —



But as Spring approaches we turn with relief to higher waves for really reliable service.

— WAVE

MARCH is the month when daylight fast encroaches on the evening hours, and as a consequence the medium-wave stations are now apt to lose much of their interest until later in the evenings. But not so the long-wavers, for daylight or darkness is a much less important matter on wavelengths above 1,000 metres.

In the middle of the winter, when it is pitch dark at 5 p.m., we might easily do without the long-wave programmes altogether, but as soon as Spring blankets the medium-wavers, during daylight we must turn to the superior carrying power of the long-wave band programmes for our reliable foreign programme alternatives.

Amazingly Good Stations

And we shall find plenty! Between Moscow's programme at the bottom of the long-wave dial and Huizen, near the top, there is a group of amazingly good stations not equalled for radiation efficiency anywhere else in the world.

The fact that various improvements are now being undertaken on long-wave transmitters lends special interest to that waveband. The coming of Luxembourg, the start on the rejuvenation of Kalundborg, and the news that eventually our own Daventry 5 X X is to blossom out into a super station, have all been recorded. But there is one other factor worth bearing in mind.

A Limit to the Power

It is this. After the recent international wavelength conference at Madrid it was stated that it is probable that in future no medium-wave station would be allowed a power to exceed 100 kw.; but on long waves, on the other hand, up to 150 kw. might be employed. And thus in spite of their restricted number (there are only about 24 in all), the long-wavers will be the future giants of the ether.

LISTENING

Of the chief programme-providers little can be said this month except to praise them for reliability.

Königs Wusterhausen has staged a somewhat unexpectedly strong come-back to my aerial, and is now generally well worth tuning for, although only a few months back I found him too weak to worry about.

Most Interesting Transmissions

At the moment the most interesting stations are Warsaw and Moscow. The former is so good that his 11 a.m. bugle-call on a recent Sunday sounded almost as clear and life-like as a local station.

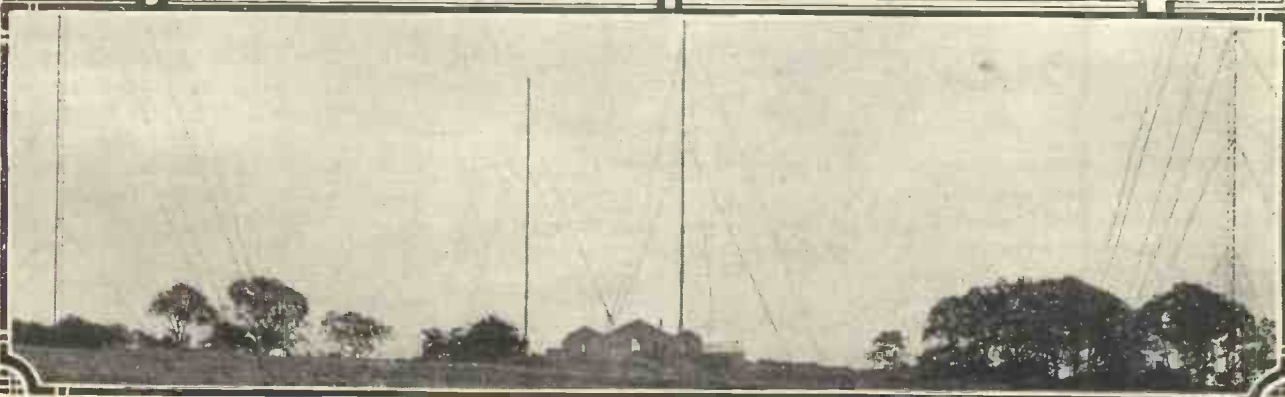
In fact, with the sun shining brightly in London, it was almost uncanny to hear that poignant ceremony—the hollow footsteps, and the bugle-call which is interrupted in the middle, to remind the citizens of Cracow of the sentry there in ancient times who died as he sounded the alarm. Warsaw at 11 a.m. is a station to make a note of.

Very Easy to Pick Out

Moscow is interesting because of his penetrating power on some nights. He is remarkably good, and very easy to pick out now, for some reason. On one occasion, after a long Sunday-night political broadcast, he announced that he was using the Komintern wave.

At the time of writing no further news has been received regarding a reported permanent closing down of Eiffel Tower as a broadcaster. We should miss this fine station, but there is a talk of employing it solely for official purposes, instead of allowing some sponsored programmes, as at present.

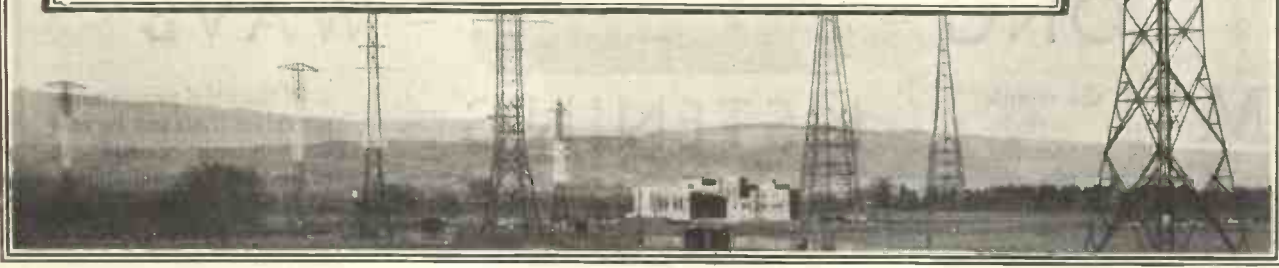
Curiously enough, both this station and Warsaw are coming over unusually well, and yet the interference between them, due to their closely-adjacent wavelengths, seems less noticeable than it did a few weeks ago.



GENEVA ON THE AIR

The history of the League of Nations broadcaster.

By CONSTANCE DREXEL



WHAT kind of a programme would you like to have from the League of Nations' new wireless station—RADIO-NATIONS—at Geneva, Switzerland? The League of Nations authorities would be happy to know what its world-wide audience would prefer.

Though intended mainly for listeners overseas, the Sunday evening broadcasts may be picked up in Europe on present short-wave lengths 40.3 and 38.74 metres.

The First Speaker

It was on the last Sunday in September—the day before the opening of its 13th Annual Assembly—that the League inaugurated these programmes which, it is hoped, will be another link in the chain welding nations closer together. It was but fitting that Sir Eric Drummond, Secretary-General of the League, should be the first speaker. He was introduced by Vernon Bartlett, of the British Broadcasting Corporation. If you listened the first quarter of an hour, you heard Sir Eric in English; then you heard a fifteen minutes in French, then in Spanish. A trained diplomat, Sir Eric was to have spoken in the three languages himself, but an incipient sore throat caused his physician to forbid the strain of talking three-quarters of an hour at a stretch. So French and Spanish members of the League Secretariat did it for him.

The following Sunday came Eamon de Valera because he was President-

in-office of the League Council; the third Sunday, the voice from Geneva was that of His Excellency Nicholas Politis, of Greece, President-in-office of the Assembly and for many years a prominent figure in League conferences. The former spoke in English and was translated into French and Spanish; the latter in French,

"We can hardly estimate the change that may be made in international relations if people in various parts of the world become accustomed not only to the thoughts but even to the actual voices of the statesmen of other countries."

SIR ERIC DRUMMOND,
Secretary-General to the League of Nations.

translated into English and Spanish. English always comes the first quarter of an hour, even if the original speaker does not use that language.

Next, a series of interviews was inaugurated. Arthur Henderson,

York Times," for the reason that he was President of the International Association of Journalists Accredited to the League of Nations.

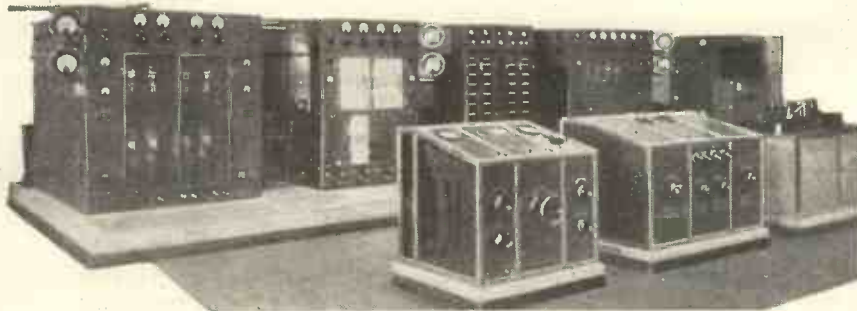
Broadcast Interviews

It is proposed to carry on this question and answer kind of a programme for some time to come. Interviewers will be selected from among the three hundred newspaper correspondents from all parts of the world, "covering" the League of Nations. One Sunday you may hear the correspondent from Buenos Aires, another Sunday from Tokio, and another from Berlin. It is probable that they will speak in their own language and be translated into French and English, the two official languages of the League. Their questions will be answered by leading statesmen in Geneva or by officials of the League.

Talks from Statesmen

Or would you radio listeners prefer straight talks from statesmen of many nations as they come to Geneva meetings, or would you like still better to hear the same person—a trained broadcaster—giving you an impartial résumé of the League's activities from week to week, or from day to day, as world interest in the League of Nations may develop?

Of course, in between, you will hear speeches at important meetings in Geneva. This was attempted for the first time at a committee meeting on November 4th, 1932, when M. Paul-Boncour presented the new French



"PRANGINS CALLING"

A view of the short-wave transmitting control points of the Marconi short-wave installation built for the League of Nations at Geneva.

President of the Disarmament Conference, was interviewed by the Geneva Correspondent of the "New

Six Aerials That Span the World

disarmament plan to the Bureau of the Disarmament Conference sitting at Geneva. The French Government asked for this, and so a microphone was installed at the speaker's stand and M. Boncour's hour-long speech went to a French post, to be relayed throughout France. Thus the French people were able to hear what their Minister of War was actually saying for them in Geneva.

Recorded Broadcasts

The same can be done for Premier MacDonald or Sir John Simon, should the British government know in advance and ask that their addresses at Geneva be broadcast to England, or, for that matter, throughout the British Empire. For Radio-Nations' six aerials are able to reach around the world, if desired. In that case, however, morning or afternoon in Geneva would mean the middle of the night in some parts of the Empire. But Science, though unable to change the course of the sun, has overcome even this difficulty. A new tone-film has been invented which can record the speech, or the concert, as the case may be; or a disk can be made, and these can be run off and broadcast at any time that may suit any part of the world. This method will be applied at Daventry when that powerful wireless station shall link the Empire closer together by recording important events in England to broadcast them to Canada, Australia and South Africa. Isolation is a nightmare of the past.

A Palace at Bagdad

Broadcasting to Bagdad is one example of the use to which this marvel of 20th-century science can be put. The admission of Iraq into the League of Nations at a session of the Assembly on October 3rd, 1932, was radioed from Geneva to that ancient land in the East. Such a modern achievement, if one is to believe the credo of certain Arabs, is but a reversion to their own lost civilisation. The

rubbing of Aladdin's lamp, travelling through the air on the magic carpet, and other apparent miracles of the Arabian Nights are but folk-lore images of electricity and the aeroplane which were among the scientific developments of the Arabian civilisation.

THE CONTROLLER OF RADIO-NATIONS



Giovanni Gallorati, in charge of the League of Nations information Department, is in sole charge of the broadcasting station.

Be that as it may, King Feisal, in his palace at Bagdad, was able to listen-in on the ceremony of the examination of Iraq's credentials and of her admission as a member of the League. He heard his Prime Minister, Noury Pasha el-Said, whom we could see as well as hear, in the picturesque white and gold head-dress of his

country, mount the tribune and speak in perfect English. He could hear the addresses of welcome from foreign ministers and other delegates of Great Britain, Turkey, France, Greece, Italy, Germany, India, Persia, Japan and Poland. Iraq is not only the first representative of the ancient Arab race to enter the League, but the first state which has been developed and freed under the mandatory system.

Statesmen on the Air

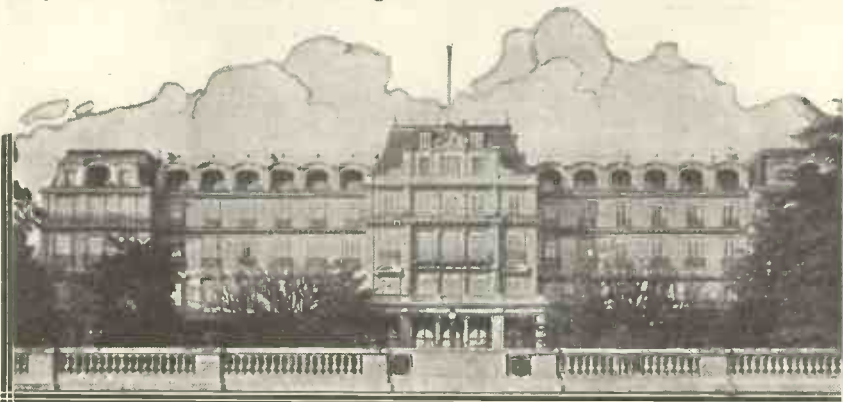
Nor was this the first time that Assembly speeches have gone on the air from Geneva. Before the completion of Radio-Nations, they were relayed over telephone wires to broadcasting stations in European countries which had asked for them, and in several instances, to the United States, through Rugby, in England. These arrangements were undertaken by the International Broadcasting Union which has its headquarters in Geneva in charge of A. R. Burrows, first director of the British Broadcasting Corporation. Briand, Stresseman, Brüning and MacDonald were popular features on the air, and their speeches always in demand.

Time Difficulties

Mr. Henderson's opening speech at the Disarmament Conference, on February 2nd, was broadcast to America, as was Mr. Yen's speech to the Special Assembly called to consider the Sino-Japanese conflict. Both meetings were postponed to late afternoon for the benefit of radio audiences over there. Even so, it was morning across the Atlantic, and thus the hour of minimum audience. In order to reach a "maximum"

audience over there—that is, in the evening, speakers are obliged to go before the microphone at Geneva in the middle of the night. This is anything but convenient.

However, the real reason for the existence of this new wireless station is that the League shall be able to communi-



THE MOUTHPIECE OF THE WORLD

From a microphone in this building—once an hotel, now the headquarters of the League of Nations secretariat in Geneva—come the voices of the world's diplomats and statesmen.

International Disputes Settled by Radio

cate with governments in all parts of the world, and governments with the League, with the least possible delay. In times of crisis, the League is in absolute control of the station and its business takes precedence over all else.

News from the East

Fortunately, Radio-Nations was functioning for wireless messages during the crisis in Shanghai in February. A direct channel was created between Geneva and the Far East, enabling the maintenance of the League Secretariat and the Japanese and Chinese Governments, as well as with the Committees of Investigation at Shanghai and in Manchuria. By this means, it was possible to convey reports from the Commission at Shanghai to the League Secretariat very rapidly, thereby affording an opportunity for proving, within the first weeks of the League station's existence, that the new plant is capable of fulfilling its principal task—that of providing prompt and independent communications between the League and Member-States engaged in a conflict, even if communication between those States has stopped. The Lytton report was not radioed through to Geneva because in this case the Commission itself wished it brought by personal messenger.

Reports Wanted

In the case of the dispute between Paraguay and Bolivia over the Chaco territory, though both countries are members of the League, a Commission of Neutrals in Washington took the matter in hand and the crisis was not dropped on the doorstep of Geneva. Radio-Nations, however, stands ready to function in case of an SOS from that or any quarter of the globe.

The completion of this station is part of a dream come true. For

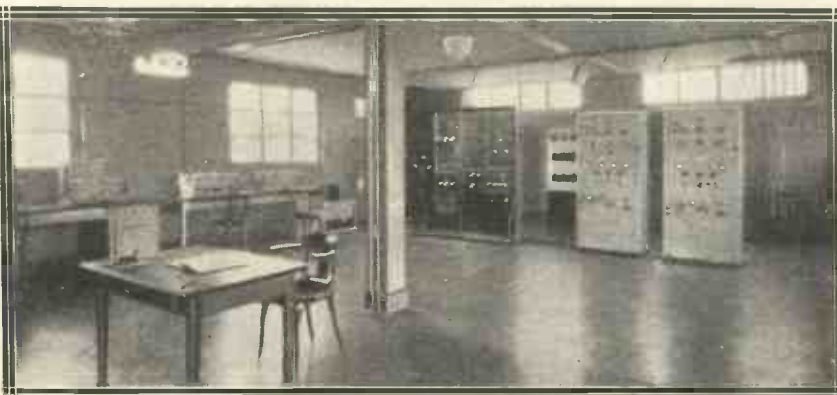
in the plans for a League of Nations born in 1918 as a result of the war a powerful wireless station at Geneva, reaching to all parts of the world, was a necessary factor. Then, only speedy wireless telegraphy was thought of. Broadcasting is a later development. Who knows what is still reserved for mankind when Science is used so constructively? The new League programme over Radio-Nations now takes its place in adding its contribution to human knowledge and human understanding.



NO FEAR OF BREAKDOWN

The reserve transmitter power plant, always ready to start work at a moment's notice, obviates any risk of mechanical failure in the transmissions.

If you receive broadcasts from Radio-Nations on Sunday evenings at 10 p.m. (G.M.T.), on wavelengths 40.3 and 38.47, or if, after reading this article, you have any suggestions to make as to the kind of programme preferred please write to MODERN



WORLD-WIDE RECEPTION

Although one might easily imagine this to be a transmitting hall in some new broadcasting station, it is actually the reception point for the League of Nations where transmissions can be gathered in from almost all over the world.

WIRELESS, and your letters will be forwarded to the League of Nations authorities at Geneva.

DISTINGUISHING WHISTLES

The "howls" which sometimes accompany reception are not always an indication of an oscillating receiver

Most people know the difference between a heterodyne whistle and the one produced by oscillation in a "straight" receiving set. If your set is oscillating the whistle goes up or down in pitch as the tuning knobs are moved; a heterodyne whistle, though, maintains its pitch but becomes louder or fainter.

Another kind of whistle which puzzles a good many people is that which occurs sometimes in superheterodynes. There may be one or two stations which are accompanied, when you tune them in, by the "oscillation" type of whistle—the one whose pitch, rises and falls.

Those who have not much experience of superhets are apt to jump to the conclusion that some valve that ought not to be oscillating is doing so. This is not the case.

The Local to Blame

What is happening is that some powerful station—generally the local—is forcing its way through on its second channel and that this second channel happens to coincide with the first channel of the station that you want to receive. The set is not

radiating and will not cause interference in such circumstances, and there is no harm in tuning to the silent point if you can obtain reasonable quality by so doing.

If second-channel interference is bad it can usually be minimised, if not altogether eliminated, by fitting band-pass tuning.

R. W. H.



"Breakfast-time" listening may not attract those listeners who have not tried it! But if you follow the advice in the notes below, you will probably be quick to join the band of early morning enthusiasts.



ON THE MEDIUM WAVES

FOR those who have not yet tried it there is a lot of new interest to be got from breakfast-time radio. It sounds a queer time to listen in, but a good set will soon prove that a great many foreign programmes are going out from 7 a.m. onwards, so presumably Europe keeps one ear cocked on its radio at that hour.

What makes it specially interesting is not the fact of the programmes being transmitted, but their quite considerable strength even in the broad daylight of 8.15 a.m. or so. Some days are much better than others, of course, but on a good morning about a dozen may be secured by a zealous searcher.

Some of these are quite low-powered stations, of the type not heard at all well in the evenings, when "smothered" by their powerful neighbours. So it may easily happen that by listening around the breakfast hour you may bag a station not previously heard at all.

As an instance of the kind of freakish results obtainable, it may be worth mentioning that on two following mornings recently a cursory tune-round showed on the one morning only two stations worth hearing; and on the next morning—a very similar day, too—no less than nine of them, all quite clear and interesting.

As a matter of interest the two "regulars" heard on the first occasion were Hilversum (296.1 metres), and Nürnberg. The latter is on 239 metres, and although he only uses 2 kw. he seems a regular breakfast-time visitor.

His programmes are from Munich (pronounced "Munchehen"), and the blast of a siren is used for an interval signal.

Other daylight visitors of special interest are Lille

and Trieste. Lille is supposed to be using a mere 1.3 kw., but certainly he has never been so well heard at night as he was recently about 8 a.m.

Trieste is one of the best and most regular of the morning broadcasters, but what makes him so noteworthy is the big distance covered—the daylight reception of a 10 kw. station more than 750 miles away is quite a feat. Turin is another morning Italian who is worth searching for.

As regards results in regular hours there seems to be little to record except "all's well." The transatlantic route seems to be wearing thin, for the number of reports has sadly diminished as compared with those of a few weeks ago. But the surprising vigour of the American stations that have been getting over, especially just above the 230-metre mark, seems to indicate that we may hear them occasionally for some weeks, at least. Perhaps at intervals right through the summer.

According to advice from Vienna the new Bisamberg station may be testing at the end of March, although April is the likelier date. It will be specially interesting to see if this high-powered new-comer can create as good an English audience as the present Vienna station did when it first came into prominence some years ago.

Bisamberg's giant was undreamt of then, but Britain was delighted to find it could get waltzes at good strength direct from Vienna, whilst there was gratification out there at the stir in Britain which the Viennese programmes had caused.





"MODERN WIRELESS" introduces

THE ANNOUNCERS OF HUNGARY

What are they really like, these men and women, who to us are just voices—albeit "golden voices"—from the air? Let us introduce them to you, from Lydia de Beöthy (whom you see here) to Eduard von Scherz, Europe's oldest announcer.

OTHER people are content to listen to a station, but I never was built that way. A station once heard has to be seen as well.

Visiting stations means making friends, and having met so many people the ordinary listeners only hear, I would like to introduce some of them to you. Budapest, for instance.

Announcer in 1907!

Budapest owns the world's oldest radio announcer. Meet my friend Mr. Eduard von Scherz, announcer at Budapest since 1907!

Budapest has had a wired system of broadcasting since 1897, and it was on this system that Mr. von Scherz first started announcing, after losing all his money on his honeymoon to Monte Carlo. Later Von Scherz became a lecturer and then announcer.

He had the thrill of his life in 1914 when a good friend of his wired him the news of the assassination of the Austrian Crown Prince in Sarajevo. He immediately broadcast the terrible news—and within a few minutes the police came and took him to the Ministry; because as yet nobody had the news and the Telefon Hirmondo had been an hour ahead of all other sources of information.

Dozing in the Studio

It was Scherz's worst hour in all his life, he told me. Prison if the news was wrong, medals if it was right. And it was right.

After the War, Scherz returned to his post with the Telefon Hirmondo, but he gave up announcing and worked in the book-keeping department.

After the opening of the wireless broadcasting service he was again called upon to act as announcer, as

his knowledge of French and his clear articulation made him the ideal announcer.

Letters from England

Over twenty years of announcing makes one tired, and Uncle Scherz acquired a very bad habit of dozing in the studio during the items.

So he recently returned to office work, and three cheery young ladies have taken his place.

They are Lydia de Beöthy, Elisabeth Gecsö and Lili Filotas. Miss de Beöthy told me the other day that she had been inundated with letters from England and Scotland, and she said that we British listeners seemed to appreciate her Hungarian, German and French announcements as much as her Hungarian listeners.

Elisabeth Gecsö was born in Budapest and spent her school years in Hungary and Switzerland. She, like Miss de Beöthy, is an able linguist. She speaks German, French and English fluently besides her native Hungarian.

Likes Her Audience

Mrs. Gecsö started announcing three years ago, and she tells me she has come to like her huge audience. The studio is just her second home, and next to her ambition to satisfy her listening audience, her one ambition is to see her boy grow up into a real gentleman; this wish, she says, is common to all mothers.

And the third jolly young lady of Budapest is a mystery. I have not had the pleasure of meeting her yet. She is very young, and is called Miss Lili Filotas. More I do not know.

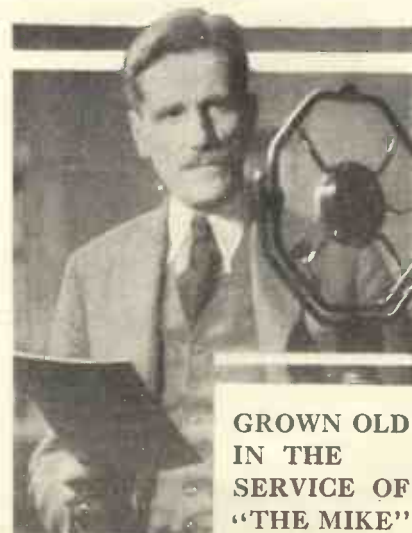
You can rest assured that she will be the first person I will go to see the next time I am in Budapest.

Budapest was one of the first European stations to use a musical box as an interval signal. I have a much-used notebook and on one of its pages Tibor Polgar, the well-known young Hungarian composer himself, penned the melody of the Budapest interval signal.

Additional Accommodation

Budapest's studios are at present being further enlarged by the addition of a block of studios and offices. This, together with the building of the new 120 kw. transmitter on the island Csepel in the Danube just below Budapest, as well as the opening of four relay stations, were due to the initiative of Dr. Szöts, the sad news of whose death reached us some time ago.

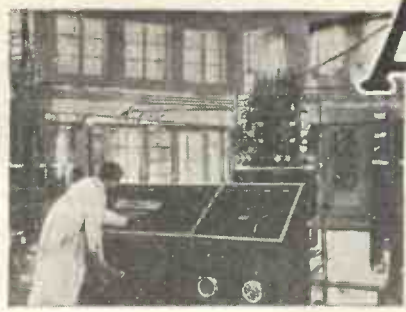
Dr. Szöts had been ailing for the past two or three years, but in spite of that he was always up and about, and represented Hungary at all the international radio meetings. A.A.G.



GROWN OLD IN THE SERVICE OF "THE MIKE"

Eduard von Scherz, now on the "retired list," who has served Budapest long and faithfully in many capacities.

At STRASBOURG



Getting to know about those stations which are famous in other countries is an interesting business. This time we suggest you come with us to Strasbourg and pay a visit to a station which is a giant voice in its own country, and whose programmes are regularly heard in Britain.

I VERY nearly had the opportunity of visiting Strasbourg when the present station was first testing, but business prevented me at the last moment. A few weeks ago, though, I was able to make a comparatively short train journey and repair the omission.

The section of the P T T enterprise running the station has ample funds. It is really a very fine place.

An S.F.R. representative conducted me round. He told me that as the Radiophonie people did not want to spoil the appearance of the station site, the park trees were not cut down, but two very high pillar masts were put up.

I do not know the exact height of these, but although the main part of the masts is of the ordinary lattice construction, extension pieces of brazed steel have been put on the top to increase the height.

Experimental Aerial

There is a large T aerial, with six or seven wires forming a "cage" for each arm of the T. The top two parts of the aerial are very short, and the engineer with me said that it is the huge down-lead which gives the most radiation.

This aerial system was an experiment, because owing to the low-lying country round about the engineers could not make the usual polar-diagram field strength tests with any degree of accuracy, and they have had to rely on letters from listeners.

The down-lead comes straight to the top of the domed roof, and the main transmitting gear is in the circular hall below this, taking up the main part of the building.

Unusual Valve Arrangement

This big and very unusual transmitter hall gives the station an uncanny effect, and it struck me when I first entered it as being robot-like.

One walks straight into this double-height circular room. Right in the centre is a curious structure holding the water-cooled valves.

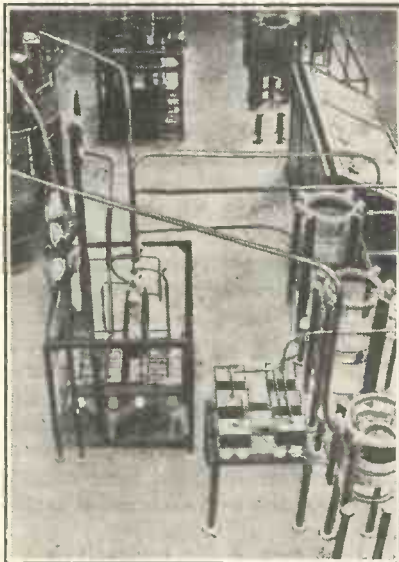
This is just like the new tower at the new Radio Paris. It stands some ten or twelve feet high, and the eight water-cooled valves are held on tall porcelain arms at the top of it. The massive metal circular base of this valve tower carries the controls and the water-pump relays.

The cooling water is pumped up through tubes running underneath the floor, and long copper tubes, carrying the high-frequency current, radiate out from the top of the valve tower. It is a striking structure and certainly has the merit of keeping all the high-voltage parts together.

Short Connections

Coupling condensers for these high-voltage valves are out in the centre of the metal tower, so that there are short leads of stranded cable running to them from the grid and anode connectors of the valve "bottles."

As I came into the control-room the main desk carrying the rectifier



FIXING ITS WAVELENGTH

This novel view of the aerial tuning circuit at Strasbourg shows the interesting layout, which is not so haphazard as it looks here.

The transmitter is housed in a large building with a domed roof, converted from a kind of conservatoire and standing in the middle of a private park-land.

One of the Best

It is built by the S.F.R. engineers, who have done the technical work at the new Radio Paris station, and from the point of view of size, neatness and electrical artistry, it is one of the best Continental stations.



AN IMPORTANT ITEM

It is hard to recognise those foreigners as it is, but without their interval signals—made in the case of Strasbourg with this apparatus—station finding would be still more of a guessing game!

voltage regulators faced me. Right in front are iron railings surmounted by glass screens. These prevent visitors from touching any of the high-voltage parts!

It is a wise precaution, because immediately behind the glass screens are the six air-insulated tuning coils and the H.F. tuning condensers. These are not mounted in racks as in B.B.C. apparatus, but are stood on insulated pillars in the floor. Curved copper piping is used for wiring up.

The engineer on duty does not have to go behind the glass screens in order to carry out the main adjustments. Tuning is done with variable

rotor coils, and not with variable condensers.

These rotors have long shafts brought out to French car-type steering wheels with five spokes (Renault type, I think). The effect of any adjustment of these can be seen on the H.F. ammeters supported on short poles, just behind the glass screen.

Window-Pane Lead-In

Glass doors from this circular control room lead out to the main entrance and to passages running right and left to the station staff living quarters and the testing room.

The big glass windows around the top of the hall suggest vastness. The aerial lead is taken through a silica guide in one of the panes.

As we left, the S.F.R. man said that the crystal control at Strasbourg is not heat-regulated, but it is remarkably accurate. Strasbourg sticks closely to its 869 kilocycles, and the last report from the Technical Committee of the U.I.R., giving a frequency curve measured at Brussels, shows that the average error is only 0.1. Compared with its nearest frequency neighbour, Barcelona, which is not controlled, Strasbourg is a gem!

A FAVOURITE UNCLE OF VIENNA

More popular with old and young alike than any other broadcaster is Herr Grisse mann, of the Austrian Children's Hour.

I do not know who, in the hazy yesterdays of broadcasting, first had the idea of creating Uncles (both plain and deliciously wicked) to sponsor that best-loved portion of the day's programme, the Children's Hour.

Whence came the Uncle (not forgetting the Aunt) idea is a matter for the mere fact-mongers. Fortunately the idea did come to someone, was tried, and was found overwhelmingly successful.

A Novel Suggestion

It would be tedious to repeat how necessary a part of our lives these Children's Hours have become in England. Instead, let us take a peep at Austria, where a certain Herr Oscar Grisse mann is making himself felt as an avuncular power in the land.

Several years ago this Herr Grisse mann approached the dignitaries of the Austrian Radio Company with the request that he might be allowed to broadcast talks to children on modelling.

This suggestion was regarded as unsuitable. How could one, however clever, possibly teach an art through the medium of invisibility?

So convincing were Herr Grisse mann's arguments in favour of broadcast modelling that it was at last decided to give him a chance. He was right and the official doubters were wrong. Modelling for children,

as taught by this new Uncle, caught on; it even mastered the Austrian Children's Hour.

Nowadays, when the clock points to a certain hour in any Austrian home, you will hear a sharp cry of excitement—"Quick, the Bastel Uncle is here!"

Out come the modelling tools and clay as the young people gather round the loudspeaker to hear what thrilling new thing they are to make to-day.

The art that Herr Grisse mann teaches to the devotees of the Austrian Children's Hour is known as



"WE DON'T WANT TO GO TO BED!"

The story is over, the fun finished, and six more happy children bewail the end of their broadcast hour and the nearness of bedtime.

"bastelling," which means model-making from the most fantastic miscellany of handy materials—in fact, anything that will bear carving or cutting, from a potato to a match-box.

The children have learnt to save an incredible array of oddments that may come in useful at some time or other for bastelling.

In the Austrian equivalent of the "Radio Times" is published a short note telling the children what materials to get together in readiness for the following week's bastelling lessons.

Secrets of Success

But one of the big secrets of this Uncle's success is his secrecy over what the finished model will turn out to be; he leaves it to his craftsmen-listeners to guess as their little fingers follow his fascinating instructions. Presently they realise that they are fashioning a little cardboard cottage or an aeroplane.

Prizes are awarded from week to week for the best sketches of models made.

Last year a big competition was organised and thousands of the actual models were judged by the Bastel-onkel, as he is called.

As for the old folk, who are enthusiastic followers of the Children's Hour, they too enjoy the model-making along with their grandchildren, as is shown by the hundreds of letters received by the broadcast-ing authorities.

Many homes believe in a Bastel Realm, that is a legendary country in which the toy models of castles, aerodromes, hotels and villages all play their parts; and what matter that the hotel is really only so many matchboxes, and the tiny boat drifting down the glass river merely a bottle cork?

CHILDREN OF AUSTRIA

Studying Parliament with a Portable Microphone

SINCE the beginning of broadcasting, children have had a big part in the arrangements of programme directors on the Continent. The broadcasting authorities of Austria have not been behindhand in this matter, and recently the Minister of Education has lent his aid to the Director of the Vienna Broadcasting Company in the formation of a series of microphone tours, intended for children all over Austria, in which nine children—representing the nine provinces—take a personal part.

Sometimes artistes give talks, sometimes the microphone and its attendant children are taken to the actual spot where some important event is taking place and the Children's Hour is given from there.

Below you will see a selection of pictures taken during a tour of Parliament which was undertaken with the aid of a portable microphone.

Dr. Scharf led the tour, and as the nine children were taken round the buildings, every stage in "How the Laws are Made" was explained and questions answered.

By means of a movable transmitter, the proceedings were conveyed to the Vienna broadcasting station and from there relayed to the whole country.

The idea of allowing children to take a part

in their own programmes has met with the greatest success, not only in Austria but in all the European countries which practice the idea. In many cases the complete programme is provided by children's orchestras or child singers, and in every case the presence of children who will ask actual, first-hand questions lends a charming personal touch to the programmes

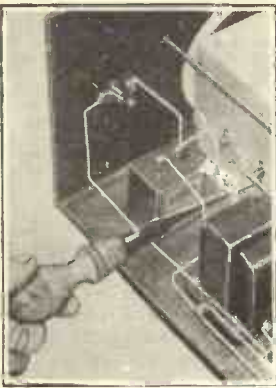
which is sadly lacking in countries where "grown-ups" try to provide entertainment for children.

In any case, the Austrian idea, which has been undertaken chiefly as a means of increasing the range of radio education, has introduced a new interest into radio lessons and has been enthusiastically greeted by the children themselves.



PERAMBULATING TRANSMITTER

The two pictures at the bottom of this page show the announcer and a member of the children's radio circle setting out in the short-wave transmitting van which links the "tour" with the studios.



OVERSEAS ITEMS from Tessin to Belgrade



The long-distance listener must keep up to date with station changes. That's why these paragraphs from all over the world are published monthly on these pages.

TESSIN, SWITZERLAND. The new Regional station on Monte Cenere will have two masts, each 250 feet in height. The design of the station will permit even frequency response between 30 and 10,000 cycles.

CAMPHIN-EN-CAREMBAULT, FRANCE. Engineers have commenced operations in this neighbourhood in connection with the new Lille station.

NAPLES, ITALY. This station sends out a five-minute time-signal of spaced dots from 7.15 p.m. to 7.20 p.m.

KAUNAS, LITHUANIA. The usual hours of Europe's longest-wave station (Kaunas is on 1,935 metres) are 12.00-12.15 and 17.00-21.30 on weekdays. Sundays 09.00-11.30 and 16.00-23.30.

NANKING, CHINA. The recently-opened Nanking station was erected by the German Telefunken Co.

MUNICH, GERMANY. Bad luck marked the official opening of the Munich high-power station, a power-supply failure occurring during the inaugural speeches and thereby spoiling the effect.

LEIPZIG, GERMANY. Munich was not the only unlucky station in Germany on opening-day, as when the Leipzig high-power station took the air its ceremonial bow was spoiled by a technical hitch in the control-room.

ROME, ITALY. The letters F C in Morse (---) which can sometimes be heard from Rome are used in conjunction with the time-signal sent from that station and Naples.

KALUNDBORG, DENMARK. When the new Kalundborg station takes the air this Spring, it will be eagerly listened for in this country, as the present station has achieved a great reputation on comparatively low power, while the new transmitter is of British manufacture.

MADONA, LATVIA. The new 10-kilowatt station which recently took the air on about 500 metres is actually situated at the village of Aiviekste, but is generally known as "Madona."

POSTE PARISIEN, FRANCE. Listeners for the much-advertised special Mass for Cinema and Radio which was to be sent out from Poste Parisien a few weeks ago, were disappointed, a hitch occurring to prevent the broadcast.

BRUSSELS, BELGIUM. Great success has attended the recent drive against "pirates," the total number of licences having been nearly doubled since the drive began.

to improvements at Kalundborg, Denmark is to have a new station at Copenhagen. It is expected that the wavelength will remain unaltered—281 metres.

LUGANO, SWITZERLAND. The new Italian-speaking Swiss station to be erected at Mt. Cenere, Tessin, Switzerland, will have its chief studio at Lugano.

PECZ, HUNGARY. This is the name of one of the new Hungarian relay stations now being placed in commission.

MANCHESTER. The Air Ministry is to erect a station at Barton Moss in connection with Manchester's Air Port.

YOUR FRIEND ABROAD

Why not send him "Modern Wireless" every month to keep him in touch with all the latest radio news and developments? Post his name and address with 17s. to the Subscription Department, Amalgamated Press Ltd., The Fleetway House, Farringdon Street, E.C.4, and "M.W." will be sent every month for a year.

Communication with aircraft, telegraph, telephone and meteorological services will all be carried out, the wavelengths to be used being chosen from the band between 700 and 1,550 metres.

April is the date tentatively mentioned for the station to commence transmission.

MT. CENERE, SWITZERLAND. The new Tessin station is expected to be ready about May.

SHANGHAI, CHINA. The European broadcasting audience is experiencing difficulty in hearing their programmes owing to the increase of Chinese programmes.

VIENNA, AUSTRIA. The broadcasting authority will probably have to put aside about one-third of its income for the benefit of "State" music, theatres, etc., which have subsidies from municipal or Government sources.

BISAMBERG, AUSTRIA. The new Vienna station to be opened this year at Bisamberg is to cost about £100,000.

COPENHAGEN, DENMARK. In addition

POSTE PARISIEN, PARIS. A recent competition to decide the best interval signal for Poste Parisien resulted in the vote being cast for a coaching horn.

MAGYAROVAR, HUNGARY. This new Hungarian relay station has been unlucky with heterodyne interference, and has recently been shifting off its allotted wavelength (210 metres) in the attempt to give its audience a clear programme

RADIO PARIS, FRANCE. Important changes will occur in April, or soon after, if the French plans for ceding Radio Paris to the Government mature as originally projected.

BELGRADE. This station, on 431 metres, is amongst those from which freakish daylight reception is sometimes possible in this country.





OTHER PEOPLE'S PROGRAMMES

No. 4—HOLLAND

To the Hague, in Holland, belongs the credit of having been the scene of the very first broadcasts in Europe, and although the broadcasts on this occasion were sponsored by a British newspaper, it was a Dutch engineer—by name Idzerda—to whom the praise must be given.

SEVERELY HANDICAPPED

Such a record in the world of radio must needs take a great deal of living up to, and the earlier days of broadcasting in Holland were severely handicapped by that universal bugbear—a lack of adequate funds.

In 1922 there were several stations with very little power run by the manufacturers of radio receivers and components. They were obliged to run the stations as a means of selling their goods.

But when broadcasting began in the other countries of Europe, Dutch listeners found it greatly to be preferred to the offerings of their own country, and the support for Dutch broadcasting, never very large, dropped down almost to zero.

VOLUNTARY HELP

The most ardent optimist could hardly call that a satisfactory setting for Dutch broadcasting. Nevertheless, Holland contained some enthusiasts who were keen enough on the affairs of their country and who had sufficient foresight to see better days in the future, and these amateurs rallied to the support of the only station—"Nederlandsche Seintoe-stellen Fabriek"—which had been able to survive the slump.

Listeners were asked to subscribe whatever they thought the programmes were worth towards the

upkeep of the transmitter, and it speaks much for the quality of the programmes that, under these most stringent conditions, enough money was forthcoming to save, for the future, the broadcasting of Holland.

Some time before the B.B.C. started in this country, the first European broadcasts took place in Holland. Since then the Dutch enthusiasts have forged ahead, overcoming many and varied troubles, until to-day they enjoy a fine broadcasting service supported entirely by the voluntary contributions of listeners.

It is one thing to be compelled by law to buy a 10s. licence, but it is quite another matter to provide the 10s. out of gratitude for the fare

casting holds in the countries of Europe.

Hilversum and Huizen, of course, are the first names which spring to your mind when the question of Dutch broadcasting springs up. As a matter of fact these two stations get talked about a great deal more than many others because of their apparently "double-Dutch" habit of changing wavelengths and call-signs on the slightest provocation.

A SIMPLE CHANGE

Actually this change, which seems to confuse so many British listeners, is childishly simple, provided one knows the constitution of Dutch radio, a constitution which is probably unique in the broadcasting circles of the world.

The director of AVRO (Algemeene Vereeniging Radio Omroep), which is the only independent broadcasting concern in Holland, told me the interesting history of the two stations a week or two ago.

PARTY BROADCASTS

Very soon after the Hilversum station opened as a non-party and non-propaganda concern, the Protestant, Roman Catholic and Socialist parties approached the directors and asked to have the station placed at their disposal for one day a week.

Although this was done, the three parties soon wanted more space on the air, and finally the two religious bodies prevailed upon the Dutch Minister in charge of broadcasting—he is comparable, I believe, to our Postmaster-General—to let them build a station of their own, to be known as Huizen.

As a result AVRO and the Socialists shared the old station at



THE HILVERSUM STUDIO, with its warm drapings, shaded lights and open fireplace, presents a comfort and homeliness to artistes which ultra-modern studios—no matter how efficient—can never provide.

which your local broadcasting station provides.

When you consider that even today Holland has no licence scheme, but still depends upon the voluntary contributions of listeners, then you get a very good idea of the position which Dutch broad-

Listeners Who Buy No Licences!

Hilversum, and the Protestant-Catholic combination went to Huizen.

But it was not until three years ago that a law was passed regularising the broadcasting position. By



W. VOGT, the Director of the A V R O company which shares the Hilversum programmes with V A R A, the Socialist broadcasting company—each taking three and a half days.

this law of 1930, the Protestants and Catholics were to have exactly three and a half days each on one station, and the Socialists and A V R O three and a half days on the other. And because all parties concerned preferred the long-wave station at Huizen, it was further provided that the studios should exchange transmitters every three months.

Very Fair Scheme

And what could be fairer than that?

So, although the wavelengths are exchanged every three months, the organisations remain the same, the studios do not change and the calls are not altered. Therefore, while "Hilversum" is using the long-wave transmitter, "Huizen" has the medium wave, and vice versa.

After which explanation from the director of A V R O, none of you will ever have a good excuse for feeling confusion over this Hilversum-Huizen business!

And now what of the programmes? You will not be surprised to hear that

the two religious bodies make use of their station, if not for actual propaganda in so many words, at least for providing education and music of a kind which will bring up listeners "in the way they should go."

Organ Recitals

Actually some of the Huizen concerts provide very fine music, and the organ recitals which have a very frequent place in the programmes are world-famous. Also, as a concession to all tastes, light music is given its place at Huizen, and opera is often relayed.

It is interesting to see how the utmost impartiality invades the programmes, so that Protestants and Catholics share Sunday, and have exactly the same number of hours during the rest of the week!

Each organisation is supported by its own listeners, as has been the Dutch custom since the early days.

Interesting as the Huizen programmes are as an example of what a certain form of "sponsored programme" can achieve, one can more easily take Hilversum as an example of Dutch broadcasting.

Outside Broadcasts

Although the Workers' Broadcasting Society has half the week on this station, the A V R O programmes dominate the week. A V R O, under the able direction of W. Vogt, has always been entirely independent of all parties, and its programmes, being of general interest, are more similar to those of European countries.

A short morning service is included, and attention is given during the day to Children's Hour, talks and entertainment for young people, courses in dressmaking, English lessons, and the like.

Outside broadcasts are also undertaken quite freely, and the correspondence from readers shows that by far the most popular item in the O.B. range is the running commentary on the football match. Listeners seem to be the same all the world over!

News Bulletins

The news bulletins are supplied as in England by a news agency, in this case the Presbureau Vaz Dias.

The chief announcers of various countries have been appointed in all

sorts of odd ways, and have come to radio from all kinds of other jobs.

But Mr. Guus Weitzel, the 28-year-old announcer for A V R O, is probably original in that he started as a very enthusiastic amateur and a subscriber to A V R O's programmes, and graduated from that position to the post of chief announcer five years ago. So there is probably not much that Mr. Weitzel does not know about radio by now!

A Triple Programme

Several programme "stunts" have been undertaken in recent months by A V R O. Probably the most interesting both artistically and technically was a "triple" bill from three different places.

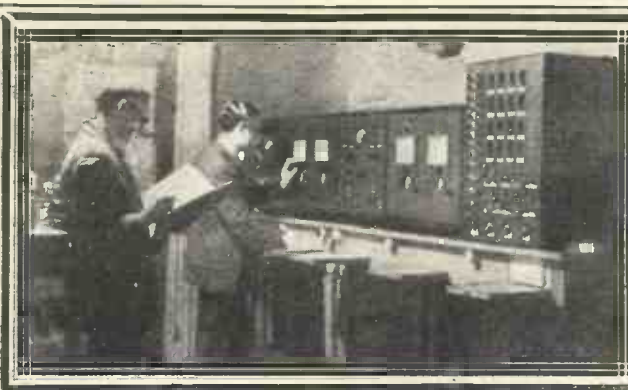
The studio orchestra played at Hilversum; there was an organ in Rotterdam; a choir sang from the Hague. And with no technical assistance other than land lines between the towns, headphones for the organist and choirmaster, and a big loud-speaker system in the main studio at Hilversum, the combined musicians



NICO TREEP, the man responsible for creating and sustaining the popularity of the Hilversum studio orchestra.

performed a couple of Strauss' waltzes with perfect success.

So when you listen to Huizen, or Hilversum, you will have to admit that Holland provides great variety in the matter of radio fare.



LONG DISTANCE RECEIVERS

A discussion on circuit types and their advantages for the distant-station enthusiast.

IN these days when reception of foreigners is so easy that no one "thinks anything of it," and when there hardly exists a two-valver that will not give its quota of continentals on the speaker, it may seem a little like hair-splitting to draw a line to divide "long-distance receivers" from others. But it must be remembered that the reason why simple sets can bring in distant programmes well, is mainly because of the tremendous strength of those stations and not so much because of the distance-getting properties of the receiver itself.

Difference in Design

Don't misunderstand me. I do not mean to infer that simple sets are not sensitive, they are—most amazingly so. But a receiver that is designed to bring in weak transmissions from a long way off, and be selective enough to separate all the distant weak stations which it picks up, will vary greatly in its make-up from sets produced simply for general-purpose use.

Suppose for a moment you had not a receiver of any sort (a state of affairs which may even be true), and had been reading "The World's Programmes" section each month until you felt you simply must go in for distant reception for the sake of its thrills and entertainment—what sort of a set would you choose.

No "Best" Set

This immediately conjures up in your mind thoughts of superhets, receivers with two high-frequency stages, skeleton type short-wavers, powerful amplifiers, rows of knobs, and so on. On second thoughts, no doubt, you begin to wonder whether something simple might not be more effective because of the greater ease with which the adjustments could be carried out.

So you turn to ruminating over simple twos, sets without H.F., single-

knob receivers, ganging, and such-like. In the end you would either give it up and make a crystal set, or decide that it depended on the conditions peculiar to your own case and first of all arrive at your exact requirements.

Nothing can be more true than that there is no "best" set for distant reception. Such things as the skill of the operator, the distance of the nearest powerful broadcaster, the local screening and the volume required from the loudspeaker, all count.

First of all, let's consider what are the necessary features of a set that is to pull in the foreigners with ease. To start off with there is selectivity.

Selectivity Problems

There are many ways of obtaining selectivity, but however you get it, there is no doubt that it must be to a fairly high degree, and you want it

A NORTHERN VOICE



This lonely building, against a winter's sky, represents Sweden's most northerly station at Kiruna, in Lapland.

whether you are near a "local" station or not. If you are near a local station you need selectivity to cut it out; if you are not, then you still need selectivity to separate distant stations.

Of course, it depends *how* near you are to the local, but as a rule the degree of selectivity need not be quite so great to separate distant transmissions as to cut out a near-by one. The only deviation from the above is in the case of short-wave receivers.

Number of Controls

Here, the local does not really come into the question, nor is any difficulty experienced as a general rule in separating stations. Not, as is so often assumed, because selectivity is any greater on short-waves—it isn't; but simply because stations are separated as a rule by a greater number of kilocycles than on the broadcast waves. This is possible because of the large number of channels available on short-waves.

The question of how to obtain our selectivity is largely bound up in the next consideration, which concerns the number of controls. Perhaps it should be number of tuning controls, because switches and volume controls which are operated independently do not complicate the tuning of a set. With them it is simply a matter of remembering what they are all for.

Simultaneous Tuning

But tuning controls—and in these reaction may be included—have to be operated more or less simultaneously, and with three tuning controls it is no help even to be ambidextrous. The only useful trait would be to learn to use one's feet!

Once again, I would add, don't misunderstand me. It is quite possible to tune a set with three or more

The Best Circuits for Ganging

tuned circuits, but searching on it can never be exactly a rapid procedure. After all, three separately operated condensers can be a little bit too much of a good thing.

But leaving out short-wave sets and superhets, three tuned circuits are usually necessary for superselectivity such as is wanted when local conditions of jamming are bad. Their use can be greatly simplified by ganging, and here again there is a choice.

Independently Controlled

All three may be ganged; or, alternatively, we may gang two and have a separate control for the third one. There is also the choice of which two circuits shall be ganged, but, personally, I feel that, under these circumstances, the one controlled independently should be the circuit to which reaction is applied.

Then, if this is the case, when reaction is pushed fairly hard, it is easy to compensate for any slight alteration of tuning made desirable without upsetting the tuning of the other circuits. The fact that tuning is always sharper when reaction is applied to a circuit confirms this reasoning, because a sharply tuned circuit will have more effect when a trifle off tune than a flatly tuned one.

Two Stages

Another variation concerns the method of providing the three circuits, namely, whether we are to use one or two stages of H.F. amplification. And here, to divert for a moment, we have an item over which we can be very definite—the desirability of H.F. valves.

Where expense does not prohibit it, an S.G. stage should always find a place in the design of a long-distance receiver. When only one is used, and it is desirable to have three tuned stages, band-pass or double-tuned circuits have to be resorted to.

With two H.F. stages this is not usually necessary. Single ganging

of all tuning condensers is not to be advised for distant listening except where it is agreed to limit the range a bit for the sake of simplicity.

Tone Balance

To make a single tuning knob which is every bit as effective, over the whole medium and long broadcast bands, as separate tuning is at present an impossibility. Some commercial receivers, however, by the use of specially matched components, obtain a very high degree of efficiency in this connection.

Superhet receivers have much to commend them from the simplicity point of view, but it is more important for this type of set to be just right than with the more

a new invention appearing in a set for the first time in a sister journal, is a big step in this direction.

With detector and low-frequency receivers, it is always advisable to use two L.F. stages, otherwise there will be such a small margin, if any, of power and the set will always be "all out." The difficulty with this type of set is obtaining the necessary selectivity without sacrificing to too great an extent the output volume.

Popular Arrangement

The two L.F. stages may be a combination of resistance-capacity coupling, or be two transformer-coupled ones. The latter gives a greater amplification, but the former is, for all that, a very popular arrangement.

Short-wave sets are ideal for covering the greatest distance—distances up to the limit of the earth—but, nevertheless, it is surprising what huge distances can be covered on medium waves. South American stations can be heard in England, and European stations in New Zealand.

Ether Conditions

This proves what a big effect conditions, either permanent local restrictions or varying ether conditions, have on long-distance reception. It also emphasises that a receiver must be chosen with due regard to what is wanted in the way of results.

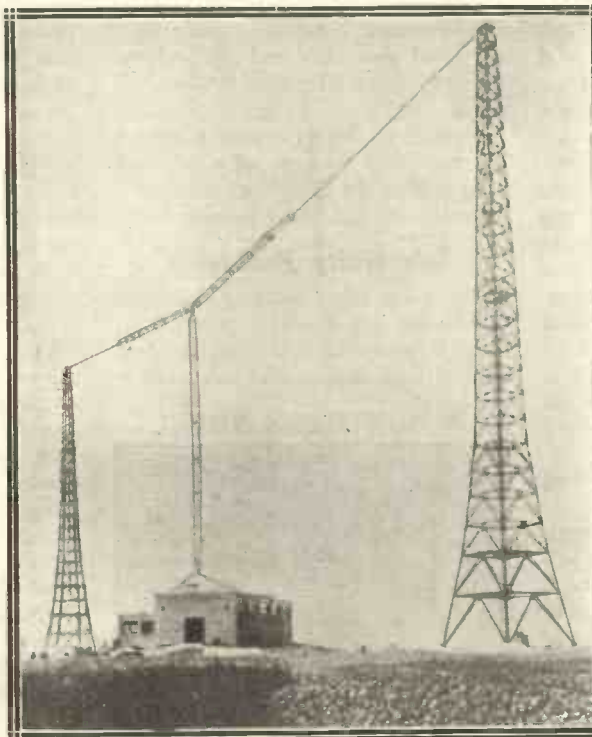
But don't think that because a set is designed for distance-getting, it doesn't want to be in trim to do this. It does.

That, as a matter of fact, is why some people with simple sets seem to get just as many foreign stations as others with powerful "distance" receivers—an effect which is often emphasised because there is less to go wrong in the simple set.

So pay attention to seeing that your batteries and valves are up to scratch and that the ganging (if employed) is properly adjusted.

A. S. C.

ACROSS A CONTINENT



From this giant aerial, right across Europe to your own fireside, come the programmes of the 11-kw. Moravska-Ostrava, 820 miles of travel on 263 metres. Listen for him to-night.

usual kind. They are somewhat temperamental, and tend to suffer from noisy background, as a rule.

Their use largely depends upon the importance attached by the listener to quality of reproduction of his foreigners. Personally, I feel that this should receive much more attention than many concede to it, and automatic tone balance,



WORLD-WIDE JOTTINGS

News of the world's broadcasters gathered by radio, telegraph, rail and air from every corner of the globe and presented for your greater enjoyment of long-distance listening.

BROADCASTING HOUSE, LONDON.

The power radiated from the aerial on Broadcasting House in the ultra short-wave experiments, being conducted by the B.B.C. engineers, is about 25 kw. The masts are 35 ft. high, and the tops are 140 ft. above street level.

BRUCK, AUSTRIA.

This is the name of one of the projected Vienna relays, others being planned for Feldkirsch, Loeben, Steyer, Villach and Wels.

STRASNICE, CZECHOSLOVAKIA.

The Prague programmes are to be relayed by the remodelled Strasnice station on 250 metres, at least for a time. It is possible that later on alternative programme service will be put into operation.

COLOGNE, GERMANY.

Like Königsberg, Cologne has fallen for the prevailing fashion of providing a Broadcasting House in which the city's radio can be efficiently centred.

VIGENTINO, ITALY.

The old Milan station at Vigentino has been used to provide an alternative programme ("Roma-Napoli") for Milan listeners, and it is probable that it will do so regularly on 452.3 metres.

OSLO, NORWAY.

Private control of broadcasting in Norway is to go, and from July 1st onwards it is expected that a State service, somewhat analogous to the B.B.C., will come into force.

SASKATCHEWAN, CANADA.

The Dominion Bureau of Statistics recently issued figures showing increased licence-holding in all Canadian provinces except Saskatchewan.

RADIO LUXEMBOURG.

Apparently this station is now using much higher power for its daylight tests on about 1,200 metres.

EINDHOVEN, HOLLAND.

This world-famous short-waver has resumed transmission, experimentally, on about 31.5 metres.

RADIO AGEN, FRANCE. This station, which was destroyed by the disastrous floods of 1930, has now recommenced operations on about 453 metres. In addition to the evening session—7.30 to 8.30 p.m., or later—there is usually a programme from 12.30 to 1 p.m.

ROCKY POINT, U.S.A. No less than 18 different wavelengths are in regular use by the group of transmitters at the Rocky Point short-wave station.

BARI, ITALY. The Bari station, now working on 269.8 metres, is using 20 kw., as compared with the 7 kw. used by Turin on 273.7 metres. Owing to their neighbouring wavelengths it is easy to mistake one of these stations for the other.

PLYMOUTH, DEVON. The B.B.C. experiments at Plymouth involved the use of two widely separated wavelengths—288.5 metres and 218.5 metres.

MAGYAROVAR, HUNGARY. The wavelength-wandering troubles which made this station unpopular around 210 metres have now been overcome by the installation of improved apparatus.

KÖNIGS WUSTERHAUSEN, GERMANY.

If the long-wave programmes on 1,635 metres are interfered with it may be

useful to remember that this programme is generally duplicated by D J A on 31.38 metres.

LAKIHEGY, HUNGARY. This village is the actual site of the Budapest No. 1 transmitter, that works on 550 metres.

LAHTI, FINLAND. As two languages are in common use in Finland, this station gives two news bulletins, and repeats the Finnish announcements in the Swedish language.

REYKJAVIK, ICELAND. This station has one of the smallest regular audiences in the world for a high-powered station, its licensed listeners numbering just over 5,000.

BERLIN, GERMANY. The largest broadcasting studio in Europe is soon to be completed in Berlin's "Funkhaus."

POSTE PARISIEN, PARIS. The lady who proved a popular "announceress" at Poste Parisien has now been appointed to the Algiers station.

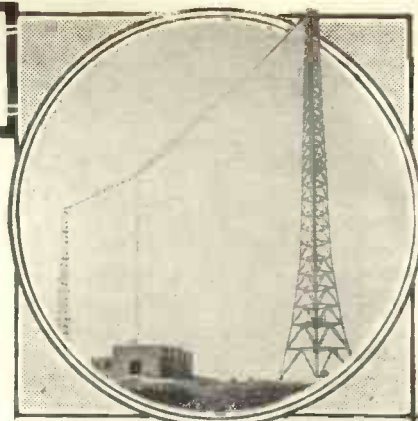
ALMELO, HOLLAND. The authorities have been greatly bothered by an unauthorised broadcasting station in the neighbourhood of Almelo. It sometimes broadcasts encouraging messages to the police engaged in trying to locate it!



One half of the world does not know what the other half is doing
—but it's worth while knowing what programmes Europe is "putting
over."

PROGRAMMES THAT PLEASED

A month of broadcasting fare in Europe.



Austria

THE popularity of Jack Payne and his Band has greatly increased since his last European tour, and Viennese listeners, unable to hear this famous dance band in person, arranged a special gramophone concert of his recordings. This concert was extraordinarily well arranged and put over, and many listeners must have thought that Jack himself was in the studio.

The ski-championships at Innsbrück have also formed material for a whole week of running commentaries which have been quite thrilling and most tantalising to those who hoped for a longer continuation of the frost in Britain!

Czechoslovakia

There have been no outstanding programmes from any of the Czech stations recently, but Scottish listeners will probably have revelled in a recital of bagpipe music from Brno. The recital lasted for over half an hour, and the player was certainly familiar with his instrument!

France

French stations have been responsible for several excellent programmes, not the least enjoyable of which was a relay from the famous "Folies Bergères," which Radio Paris put over very vividly.

Strasbourg rushed listeners away from a performance of "Carmen" in the Marseilles Opera House (a very good performance, too) to hear dance music from the Pastrycooks Ball, which was closed down at 10.30 p.m.!

Radio Paris was also responsible for a new idea when it took listeners on a radio "tour" of France, Italy Switzerland and Austria; while Eiffel Tower came to England for inspiration when it produced "A Midsummer-Night's Dream," described as a "fairy play by William Shakespeare."

Germany

German programmes have been showing a very strong pro-American tendency recently. Besides several talks on America and its customs, there have been concerts devoted entirely to American music, as well as a relay from the U.S.A. from a well-known German speaker on

"What they are talking about in America."

Breslau billed a talk on the American Army which, if reports are to be believed, caused a great amount of interest.

Heilsberg brought England into it as well with a programme of English and American music which included Sullivan, Eric Coates, Delius and George Gershwin. Including as it did "Rhapsody in Blue" and "The Three Bears" this was a programme well worth hearing.

Germany is also keeping up its high reputation for radio drama.

Two interesting items on the talks side were a discussion of Bernard Shaw's new play, "Too True to be Good" on the occasion of its first performance in Frankfurt, and a talk by a German author on his latest book—a new method of literary review.

Holland

Hilversum was fortunate in getting Billy Mayerl, the syncopated pianist, to go out from England to play in a recent concert. He was a great success.

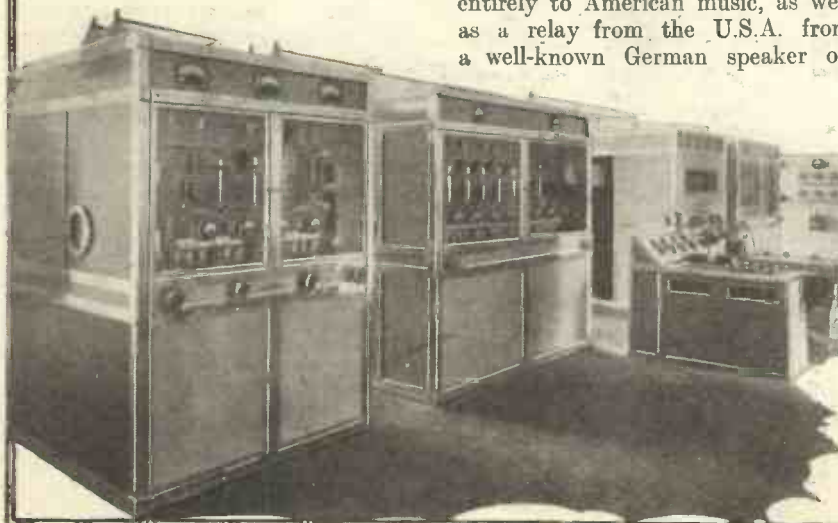
An English playwright—Oscar Wilde—was also in the news at Hilversum when "The Ideal Husband" was given a broadcast performance.

Italy

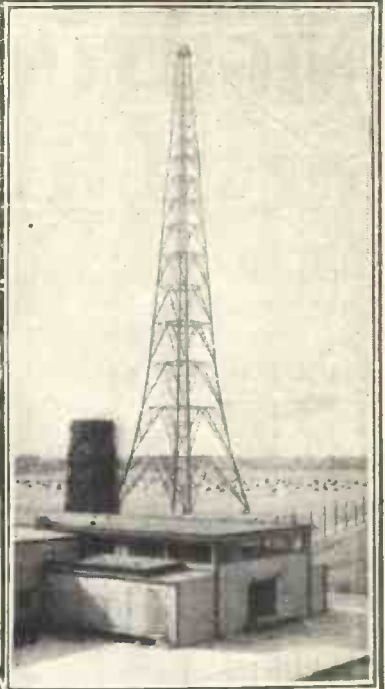
On the musical side, an unusual event at Rome was the production of Jones' light opera, "The Geisha," which gave Italian listeners a very good idea of English comic opera writing.

The outstanding play was "Rosalind," a one-act play by Sir James Barrie.

England has certainly been "starred" abroad this month in every way.

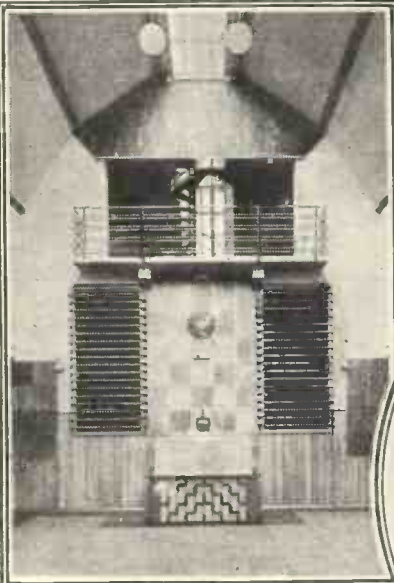


THE MONTH IN EUROPE



POSTE PARISIEN, France

In addition to the usual sponsored concerts from this station—including Test Match relays—notable programmes have seen the introduction of a humorous news bulletin lasting for half an hour and conducted by Lucien de Gerlor and a concert of music written entirely by women.

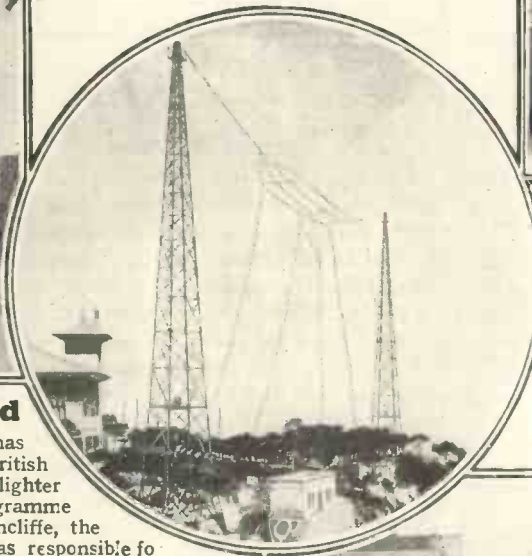


LEIPZIG, Germany

An interesting innovation at this popular German transmitter has been a new series of lunch-time talks giving advice to unemployed.

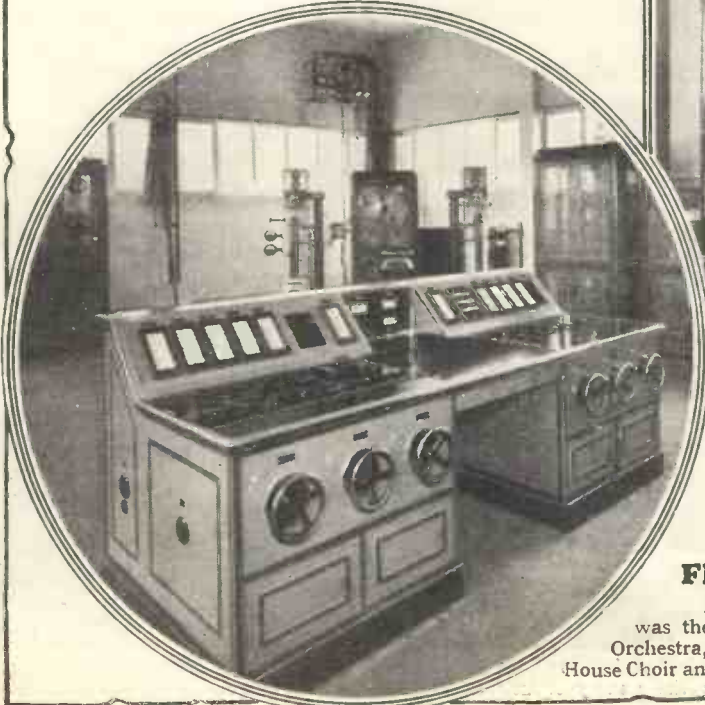
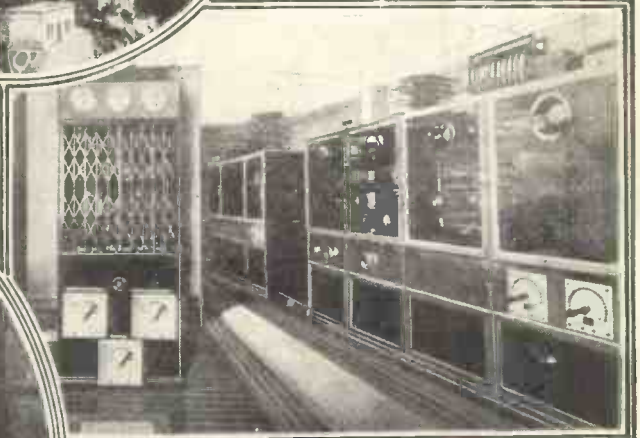
BARCELONA, Spain

Barcelona has also adopted the idea of a humorous review of the week's news—but this station has gone one better by having the review in verse!



HILVERSUM, Holland

This popular Dutch broadcaster has always had a partiality for music by British composers, particularly music of the lighter variety. Recently, the musical programme included several items by Charles Ancliffe, the popular English composer who was responsible for writing the waltz "Nights of Gladness" some years ago.



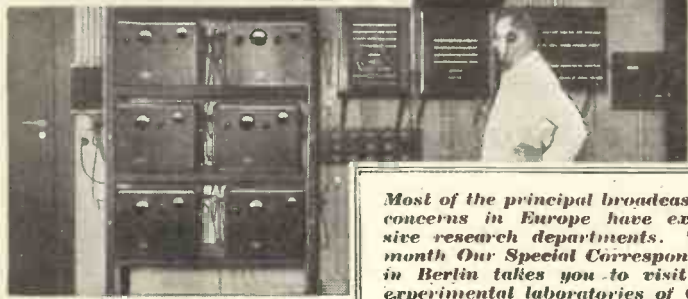
RADIO TOULOUSE, France

Opera, either in full or in the form of selections, has been the feature of the month at Toulouse. A complete version of "Faust" was relayed from the local opera house and was enlivened in the intervals by the latest horse-racing results and other news. Melodies from the latest sound films have also been introduced recently as a special feature of the programmes.

FRANKFURT-AM-MAIN, Germany

A special feature of the musical programmes at Frankfurt was the big Lehar concert at the Opera House. The Station Orchestra, the Egon Kaiser Dance Band, the Studio Choir, the Opera House Choir and soloists all-joined to make this a most successful relay.

NIGHTINGALE LANE in BERLIN



Most of the principal broadcasting concerns in Europe have extensive research departments. This month Our Special Correspondent in Berlin takes you to visit the experimental laboratories of German Broadcasting.

THE B.B.C. is not alone in having a first-class research department in Nightingale Lane, Clapham.

The French C.F.R. engineers have their research section just outside Paris, and the German R.R.G. engineers have a truly wonderful broadcasting research "lab." in a suburb of Berlin (Charlottenberg) which is now becoming world-famous on account of the huge Broadcasting House put up there for the trio of German programme organisations.

"Bottling" Programmes

In this research laboratory a vast amount of testing work is done, some secret and some for other radio laboratories, on behalf of all the programme companies who broadcast from the Charlottenberg building.

In the Charlottenberg laboratory they are working on new microphones, on echo controls, on amplifiers for outside broadcast work, on seven-metre receivers, and also on special gramophone recording schemes for "bottling" programmes.

There is one long studio fitted up with a removable roof and with curtains on steel runners all round the walls. This studio has its own silence cabinet, and in the annexe the engineers have fitted up an amplifier rack for the microphones and echo variation equipment tested out in the main studio.

Testing Microphones

This studio is the home of a practically unceasing wailing noise! The microphones and reverberation factors have to be checked up with howling-tone records and oscillators. Every "mike" is put through its paces by having to pick up the noise

of an oscillator which is slowly tuned from 35 cycles a second up to 7,000.

Two Speakers Used

Two speakers are used on the baffle board to cover the oscillator range, and the output from the microphones is registered on a valve voltmeter.

The loose slats of the studio roof are used for echo testing. Moving-coil speakers and directional microphones project and receive the sound waves respectively.

The gramophone research section at the Berlin Broadcasting House is one of the most interesting in Europe.

Three electrically-driven turntables are fitted up with most ingenious gadgets for the examination of gramophone "waxes" during manu-

facture. The turntables are driven by electric motors, specially synchronised, in place of the gravity motors which most commercial record firms in England use to drive the master turntable.

Vacuum-Cleaned Records

The turntables in the Berlin laboratory are fitted with stroboscopic drums and with powerful-pneumatic suction tubes, to take away all the dust which is formed while the records are being made.

Non-standard high-quality long-playing records can be made of "bottled" programmes for subsequent rebroadcasting. The R.R.G. engineers realise what a big part records will play in broadcasting of the future. They don't intend to have to rely upon commercial record companies.

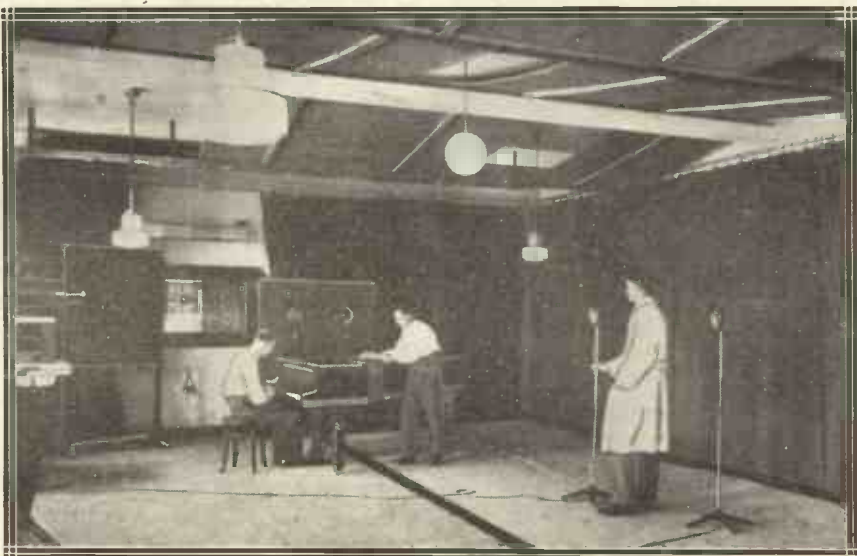
While the B.B.C. is making use of the steel tape recording system which came from Germany, the German engineers are experimenting with a typically British wax-recording scheme!

Work on Seven Metres

At the last German radio show there was a demonstration of ultra short-wave gear which showed how far the Berlin engineers had advanced.

The R.R.G. engineers have been carrying out continuous ultra short-wave tests. Actually, they have not had any better results than we have obtained in this country, but they have more actual experience of working on seven metres and below.

THE STUDIO THAT NEVER BROADCASTS



The German State Broadcasting Company keeps a specially designed studio in permanent use for testing the quality of microphones and making experiments with echo and reverberation.



"ECOUTEZ!"

FRENCH PHRASES YOU CAN LEARN WITHOUT TROUBLE

An easy and pleasant method of "learning while you listen" is here detailed for you by
A SPECIAL CORRESPONDENT

I HAVE already outlined in these columns how I used wireless to perfect my knowledge of the French language. Before broadcasting began I had always experienced difficulty in following spoken French. This difficulty, I am sure, is shared by thousands of Englishmen, for no other reason than that their ears have never been adequately trained for the job.

How to Begin

Although many people can read a French newspaper or novel with comparative ease, there is little doubt that, were extracts from either of these broadcast from Radio Paris, these same people would be none the wiser after the event. And all because their ears, through lack of training, were incapable of functioning with anything like the speed necessary à saisir le sens.

Now, Radio Paris and other French stations provide opportunities daily for the foreigner anxious to master the difficulties of the spoken word. How to begin is the question. And the answer: "Start with the announcers." They use a vocabulary which, like that of their English colleagues, varies but little from day to day.

Better still, start with a gramophone recital. *Disques* or *Musique enregistrée* are a popular feature of French broadcast fare, especially on Sundays.

Listen to Records

Further, they bring the French announcer very much into action; hence the marvellous opportunities for the student of French.

You will find below a selection of the French announcer's remarks that can be heard any time a gramophone recital is in progress. Read these

(learn them by heart, if you can), listen for them next Sunday afternoon, and henceforth you will not have to listen for them—they will thrust themselves on you almost in spite of yourself.

"Allo! Allo! Ici Radio Paris! Le 118e concert organisé par — Records va commencer."

(The 118th concert organised by — Records is going to begin.)



"LE PROGRAMME COMMENCE"

Preparations by a famous Continental orchestra for a Sunday afternoon broadcast.

"Le programme commence aujourd'hui avec un valse de Chopin, enregistré sur disque —, numéro 1234."

(The programme begins to-day with a Chopin valse, recorded on — record, No. 1234.)

After the Record

Then, after the record, the announcer will say:

"Vous avez entendu un valse de Chopin. Ecoutez maintenant une chanson sentimentale de Carl Brisson, enregistré sur disque —, numéro 2341."

(You have heard a Chopin valse. Listen now to a sentimental song by Carl Brisson, recorded on — record, No. 2341.)

Then: "Après le disque que vous venez d'entendre le programme continue avec un foxtrot, 'Coupable,' enregistré par Jack Hylton et ses boys (or, et son orchestre), sur disque —, numéro 3456."

(After the record that you have just heard, the programme continues with a foxtrot, "Guilty," recorded by Jack Hylton and his boys (or, and his orchestra), on — record, No. 3456.)

For a Change

Or, by way of a change, you may hear:

"Le disque que vous venez d'entendre, qui a pour titre 'Les Trois Arbres,' est interprété par Albert Whelan, et enregistré sur disque —, numéro 4567. Ecoutez maintenant —."

(The record that you have just heard, which has its title "The Three Trees," is a song by Albert Whelan, and recorded on — record, No. 4567. Now listen to —.)

Again, after the record:

"La chanson que vous venez d'entendre est enregistrée sur disque —, numéro 3675. Voici maintenant —."



"LE CHANT DES CHANTS"

A well-known group of wireless singers before the microphone.

(The song that you have just heard is recorded on — record, No. 3675. And now follows —.)

Combining Work with Pleasure

Among a variety of announcements, note the following :

"Le disque précédent est —."
 (The previous record was —.)
 "Écoutez maintenant —."
 (Hear now —.)

* * *

"Et voici maintenant le quintette fameux du troisième acte des *Maîtres-Chanteurs de Richard Wagner*, enregistré sur disque," etc. "Écoutez bien un pot-pourri de negro spirituals interprété par Paul Robeson, sur disque," etc.

(Here is now the famous Quintet from the Third Act of the *Master-singers* by Richard Wagner, recorded on, etc. I'm going to put on a medley of negro spirituals sung by Paul Robeson, on record, etc.)

"Écoutez 'La Corde Perdue,' chantée par G. avec accompagnement d'orchestre sous la direction de Mons. S., enregistré sur disque," etc. "Voici maintenant un foxtrot intitulé 'Ma Chanson,' enregistré sur disque," etc.

(Hear now "The Lost Chord," sung by G. with orchestral accompaniment under the direction of Mons. S., recorded, etc. Here is now a foxtrot entitled "My Song," recorded, etc.)

* * *

"Écoutez maintenant 'Le Chant des Chants,' interprété par le fameux violoniste, R.C., sur disque," etc.

(Listen now to "The Song of Songs," played by the famous violinist, R.C., on record, etc.)

"Le morceau que vous venez d'entendre est enregistré sur disque," etc. (The piece you have just heard is recorded, etc.)

"Nous vous rappelons que les morceaux que vous venez d'entendre sont enregistrés sur disque," etc. "Voici maintenant deux chansons par

le grand artiste anglais, Mr. X, enregistré sur disque," etc. "Le disque que vous venez d'entendre porte le numéro 3456."

(We remind you that the pieces you have just heard are recorded on, etc. Here are now two songs by the great English artiste, Mr. X, recorded, etc. The record that you have just heard bears the number 3456.)

* * *

"Veuillez écouter maintenant —. Notre concert continue avec 'Siegfried Idylle,' interprétée par l'orchestre C, sous la direction de M. Gabriel D, enregistré sur disque," etc. "Vous allez entendre les deux côtés d'un disque intitulé 'Musical Gems,' enregistré par —."

(Our concert continues with "Sieg-

'Un Son d'Amour,' 'Près de moi,' et 'Sous le Pont.'"

(We have here in the studio Monsieur Roger D, who is going to sing three little songs, entitled —, etc.)

* * *

And, finally, the concluding record produces the following remarks, either before or after the playing :

"Écoutez pour terminer ce concert 'La Marche Militaire,' enregistré sur disque," etc. "Ce morceau termine le concert exceptionnel organisé par —"

(To terminate this concert, listen to "The Military March," recorded on record, etc. This piece ends the exceptional concert organised by —.)

* * *

"Le concert organisé par la compagnie — est terminé. Le disque que vous venez d'entendre termine le concert, le 118e de la série qui vous est offerte chaque dimanche."

(The concert organised by the — Company is now over. The record which you have just heard terminates the concert, the 118th of the series, which are offered you every Sunday.)

* * *

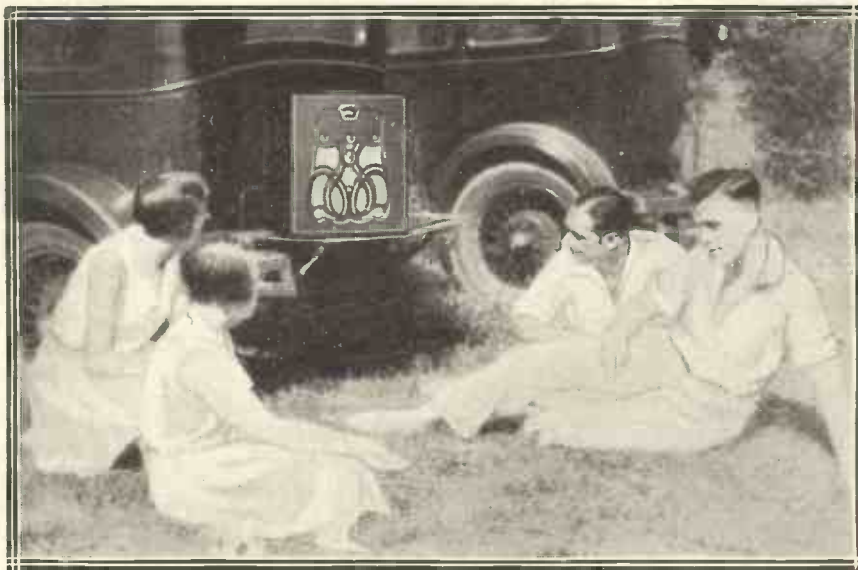
"Nous fixons rendez-vous dimanche prochaine à 2 heures (or à la même

heure). Nous vous prions de bien vouloir adresser toute correspondance au sujet de ce concert à la Maison D," etc.

(We make an appointment for next Sunday at 2 o'clock (or, at the same hour). We beg you to address all correspondence regarding this concert to D house, etc.)

* * *

If you study carefully gramophone recitals from Paris, Fécamp or Toulouse you will have an added charm, because you will be combining useful work with pleasure.



"ICI RADIO PARIS"

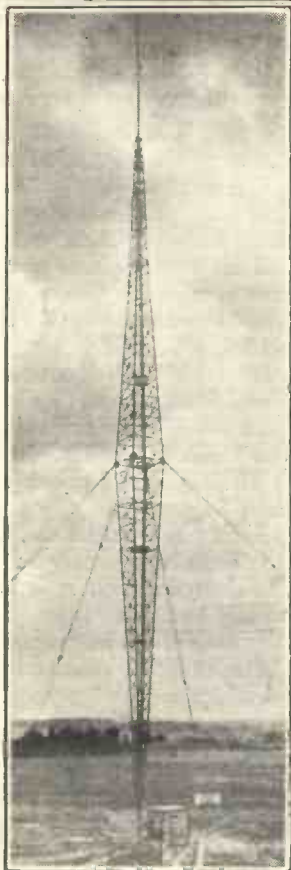
The warm days are not so far away now and a portable receiver gives an opportunity of listening to French announcers on those Sunday afternoons when there is nothing to do but sit lazily in the sun !

fried Idyll," played by the C. orchestra, under the direction of Monsieur Gabriel D, recorded on record, etc. You are going to hear the two sides of a — record entitled "Musical Gems," played by —.)

* * *

If an artiste should be going to sing from the studio during one of these recitals, he is likely to be introduced thus :

"Nous avons ici dans le studio M. Roger D., qui est venu se faire entendre en trois petites chansons intitulées



RECEIVING AMERICA

THERE are still many who have not realised how easy it is this season to receive United States and certain South American stations working on the medium waveband. On favourable nights—and for some time now most nights have been favourable—a reasonably efficient three-valver often brings in several of them with volume equal to that obtainable from European stations such as Strasbourg or Rome. There is no need to sit up most of the night; American stations are generally receivable as soon as those on the Continent close down and make way for them. I have logged several at 11 p.m., or even a little earlier.

It is of no use to go in search of American stations if conditions are unfavourable. The best way of discovering whether it is or is not a good night is to try at your normal bedtime for some of the more distant European stations with wavelengths below 300 metres. If atmospheric conditions are troublesome, if fading is violent, or if the test stations are coming through feebly, then you can spend your time more profitably in bed than at the controls of the receiving set. But should you find that the

DISTANT STATIONS— AND HOW TO HEAR THEM

European stations are heard strongly, clearly and steadily, and with no accompaniment of crackles and bangs, then you can feel pretty sure that you will hear American stations from midnight onwards.

WHAT TO TRY FOR

A FEW transatlantic stations may be found by mere haphazard searching over the medium waveband, but this process wastes a great deal of time, for there are certain broadish belts of wavelength which are not worth bothering about, since they contain no station that is ever heard over here. You will undoubtedly make a far better bag and be able to identify your stations much more easily if you search with definite objectives in view.

Supposing that your set will tune right down to 200 metres, search carefully between that wavelength and 205.4 metres. There are no less than seven possible stations here. These are W C K Y (5 kw., 201.2 m.), K F J K (5 kw., 202.6 m.), W K B W (5 kw., 203.6 m.), K G A and W L A C (both 5 kw., 204.0 m.), K S T P and W J S V (both 10 kw., 205.4 m.).

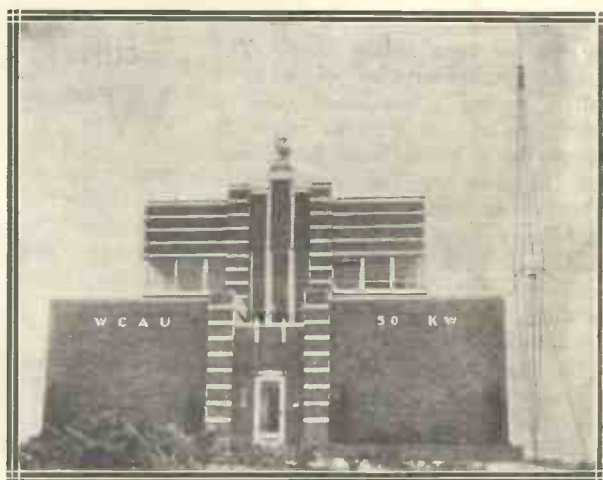
From 205.4 m. you can jump straight to 230.6 m., for there is nothing worth troubling about in between them. In terms of European stations' settings this means that you can go from rather below Budapest No. 2, or Newcastle, to a little above Fécamp. On 230.6 m. is an amazing station, W I O D. Though

its power is only 1 kw., it is amongst those most frequently and most strongly heard in this country. Here is a list of frequently heard stations on higher wavelengths. W C A U (50 kw., 256.3 m.), W H A M (25 kw., 260.7 m.), W J J D (50 kw., 265.3 m.), W P G (5 kw., 272.6 m.), W T A M (5 kw., 280.2 m.), W T I C (50 kw., 282.8 m.), W B Z (25 kw., 302.8 m.), K D K A (50 kw., 305.9 m.), W E N R (50 kw., 344.6 m.), W A B C (50 kw., 348.6 m.), W G Y (50 kw., 379.5 m.), W J Z (30 kw., 394.5 m.), W L W (50 kw., 428.3 m.), W E A F (50 kw., 454.3 m.).
R. W. H.

SHORT-WAVE NOTES

AT the time of writing these notes conditions are still of such a kind that reception is far better above 30 metres than below. Those who are lucky enough to have an occasional afternoon off will always find something of interest on 25 or 19 metres, but in the evenings everything below 30 is very dull.

Quite the best stations for the DX man are W 8 X K on 48.86



A FREQUENTLY-HEARD STATION

"You will undoubtedly make a far better bag if you search with definite objectives in view." W C A U, for instance, the 50 kw. Pennsylvania transmitter, can often be heard in this country on 256.3 metres.

NOTES FOR THE "DX" MAN

metres, W 8 X A L on 49.5 metres, Y V I B C (Venezuela) on about 49.1 metres and, when conditions are so inclined, Sydney on 31.28.

It is quite possible, over the space of three or four nights, to log upwards of twenty really distant stations on the 30-metre and 49-metre bands, but it needs patience.

Fading is not so bad as to be troublesome, but it is important in another respect. One may hear a very faint carrier-wave and pass it over as "not worth while," and in five minutes that carrier-wave may have "faded in" until it is a really lusty and enjoyable transmission.

"Spring" conditions are not yet in force, but there should be a change by the time these notes

from the seasons of the year, but it is the latter that fixes the best times for the reception of any given station, except in freakish cases.

The last outstandingly good period of good DX conditions was in February-March, 1932, so that we may reasonably expect another very good patch in May and June this year.

As a matter of fact, the lowest "trough" of all is now behind us, and there is every reason for looking forward to a steady, if slow, improvement.

Each successive fifteen-monthly peak will rise, so to speak, to a greater height than the one before it. In between these peaks conditions may be good, bad or indifferent; there is no knowing. W. L. S.

Sure enough, I did so. It was W C A U, of Philadelphia, Pennsylvania, U.S.A.!

The best way of eliminating the interference with reception caused by heterodyne whistles is to use an inexpensive component known as a whistle filter, which can be fitted into most receiving sets.

These are made with "cut-offs" ranging from 3,500 to 5,000 cycles a second, and some types are adjustable. The effect of the filter is to eliminate all frequencies above this cut-off limit.

As a general rule a cut-off of 4,500 to 5,000 is quite satisfactory in removing heterodynes, and it is surprising to find how small is its effect upon the quality of music. It is apt, though, to make speech sound a little "woomphy."

A good tip is to arrange a switch to throw the filter into or out of action at will. When you are listening to an unheterodyned station it can then be cut out, but as soon as you turn to one which has an accompanying whistle it can be brought into use.

A QUESTION OF AERIALS

QUITE a number of people have complained to me bitterly that, though their superheterodyne receiving sets are splendid for the reception of European stations, they do not shine when it comes to bringing in Americans.

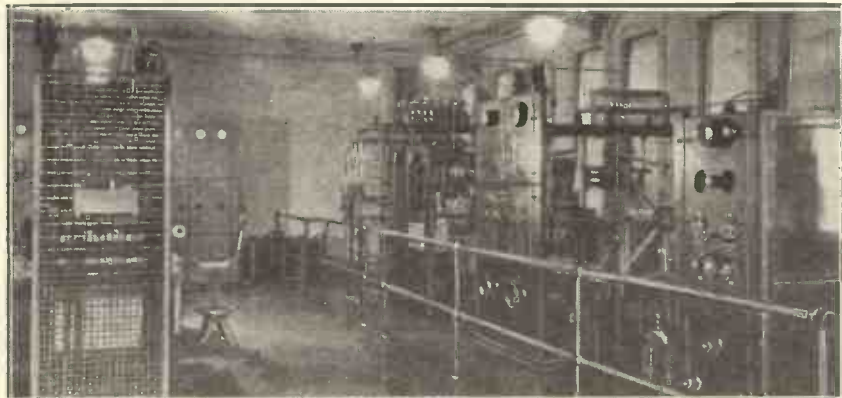
There is nothing perhaps more galling than to find your next-door neighbour is hearing numerous American stations with a three-valve straight set whilst your five- or six- or seven-valve superhet refuses to bring them in. In every case where these sad stories have come my way I have found that there were two important factors at work.

The first was that the superhet was being used with an indoor aerial; the second that it had no high-frequency stage.

It must be remembered that the field strength of American stations is often very small indeed. With an indoor aerial the grid swings reaching the detector with no preceding high-frequency stage may be too small to "pull the string" and make the valve function properly.

An outdoor aerial or a more efficient one of the indoor variety usually serves to enable this kind of superhet to do itself justice. R. W. H.

HEARD THIS ONE?



Reception of medium-wave American programmes has been dead easy for the past few weeks. A station you can try for is K O A, Denver, Colorado, which radiates its 50 kw. on 361.2 metres.

appear, or even before then. The general characteristics of what I call "Spring" conditions are a "hanging-on" of stations below 25 metres to a much later hour, and the appearance at respectable strength of some of the stations that have been weak or even inaudible through the winter.

Stations that are normally strong in winter do not change much with the arrival of Spring.

By the end of March it will probably be noticed that W 2 X A D, and the other 19-metre stations, remain strong until 10 or even 11 p.m. At the moment they are almost negligible by 8 p.m.

The eleven-year cycle, together with its "ninth harmonic," the fifteen-monthly cycle, governs general reception conditions, quite apart

CUTTING OUT WHISTLES

WITH so many high-powered stations working upon the broadcast band, and a frequency separation that in most cases is not more than 9 kilocycles (and not infrequently it is a good deal less!), heterodyne whistles are the bane of the long-distance enthusiast nowadays. It is surprising, too, to find how stations separated from one another by enormous distances can cause mutual interference.

A few nights before these notes were written Hörby was observed to be badly heterodyned. As the lists show no European station that should cause such trouble, this was rather interesting, and I waited until Hörby had closed down to try and spot the offender.

I DARE say you have never realised how other countries are following the B.B.C.'s regional scheme, which Captain Eckersley originated.

My experience out here in Osaka, Tokyo, and other places in Japan, is that knowledgeable Japanese listeners have studied every detail of B.B.C. history. In spite of the American influence, Japanese enthusiasts know more about the B.B.C. than the American Federal Radio Commission!

Crystal Sets

This I was made to realise forcibly when, at Formosa, I came in contact with a Japanese broadcasting official who had been to England, who had erected the British-built broadcaster at Tokyo, and who knew the B.B.C. station idea inside and out.

The Formosa station, which he was kind enough to arrange for me to visit, is one of the links in the regional station chain which Japan has copied—and is still copying—from us.

The station at Formosa is one of the biggest in Japan, and although it is one of the few which is not British-built (as a matter of interest famous German engineers were responsible for all the technical gear), it is extremely popular with listeners.

You must bear in mind that out of the 100,000 or so listeners in Japan, very many are crystal users. The modulation at many of the stations is arranged to be deep, so that crystal-set owners in poor districts will get good reception, although the more wealthy owners of valve sets may find the quality poor because of the heavy modulation ratio.

Formosa is not compelled to modulate quite so deeply, as a large proportion of its local listeners are valve users, and the modulation, quality and polar diagram have been altered to suit them. This much was explained to me, in excellent English, by the Japanese official.

Acoustic Treatment

The Formosa station, I found, is in a big white building in grounds of its own, with a luxurious drive up from the main road.

A flag flying at the top bears the station call letters. Near the entrance is the main studio. The decoration has been done by the German builders, and so the curtaining and sound-damping arrangements make the main room bear a strong resemblance to the Berlin stations.

The ceiling is not draped, but the acoustics of the room can be varied by moving the wall curtains, which are on runners. This is seldom done though, as the native orchestras which most frequently appear before the "mike" are not over particular in the matter of sound technique.

Most of the day's programme, even talks, is given in this studio. There is no special microphone for



The British regional scheme of broadcasting has secured, by its success, a host of imitators in other countries. Japan is one of the most recent in this matter, and Our Special Correspondent to-day takes you on a tour of Formosa, one of the biggest links in the regional scheme.

speakers. The studio "mike" on its stand is drawn over to the announcer's table. A big grand piano is part of the studio furnishing, while a small reed organ, not often used, is in one corner.

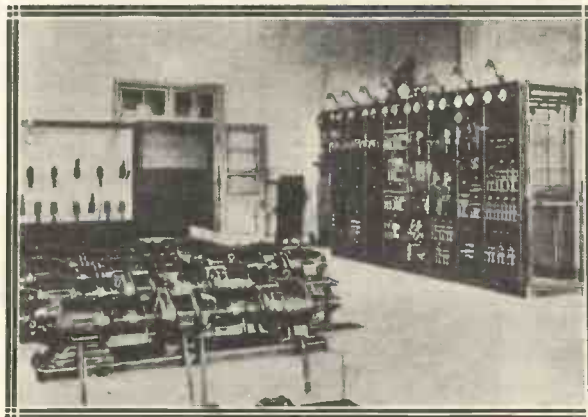
The curtaining is drawn away at one part, so that a window out into the station grounds can be opened for ventilation.

At the other side, part of the sound-damping curtain is drawn away so that the control engineer can peep through from his amplifier control panels. They use carbon

microphones in the studio, but test transmissions are sometimes given with a condenser mike.

The transmitter is an immense affair. Two tall pillar steel masts support the aerial, and there is a low-capacity earth. The radio section of the transmitters appears bigger than it actually is, because parts are not grouped on panels, Formosa is built on the familiar German fashion.

Part of the main hall is roped off with the sort of heavy cord they have to divide the seating sections



CURRENT SUPPLY

All the valves in the later stages of the Formosa transmitter are fed from these six banks of rotary converters. The earlier stages draw their current from independent batteries.



UNDER GERMAN INFLUENCE

The decoration and acoustic arrangements of Formosa's studio (seen above) were carried out by German builders, with a result that the appearance bears a strong resemblance to some of the work in Berlin's Rundfunkhaus. The two steel masts on the left carry the single wire aerial.

in cinemas. On one side is the control gear, and on the other the high-voltage radio parts. This, of course, is a safety measure.

The control desk is a big metal contraption with a raised panel at one end, carrying a number of meters which the man in charge must watch all the time Formosa is transmitting.

Special Meters

These are voltage meters and have no bearing on the high-frequency performance. The operation of the H.F. side is gauged from the special meters which stand each on a separate pillar on the other side of the roped-off section.

From his control desk the engineer can, without reaching across to the high-voltage side, vary the tuning and the aerial coupling to the power stage.

The high-frequency current in each oscillator anode circuit and the rate of cooling water flow—both important matters to a man running a big transmitter—can be seen from the meters in their appropriate section.

High Voltage

It would be sheer folly for a non-technical man to walk between the groups of parts on the dangerous side of the roped barrier. Unlike our British transmitters, there are no safety measures!

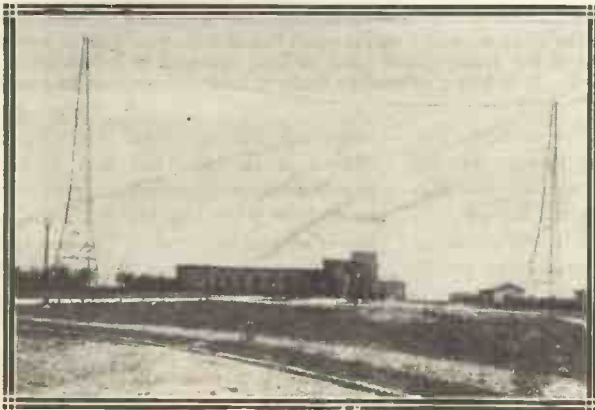
The coils—wound with bare copper tubing—and the condensers across high-voltage points, stand exposed and are connected by further lengths of tubing. To brush against some of them would mean electrocution!

The water-cooled valves (there are, I think, ten of them in the output stage) are on a metal rack, and the cooling water comes up along pipes in a metal channel in the floor of the transmitter hall.

Complicated Appearance

I must confess, to an onlooker the outfit looks very complicated; actually, it is not so. The control desk had relay switches and flashing lights which show when each circuit is properly closed and when the generators are running at full power. The desk is connected by conduits through to the power room.

In here are six concrete slabs on which are the rotary converters feeding most of the valves, except those in the early stages, which are supplied independently by batteries. One man is on duty all the time in the machine room and he stands at a panel watching the needles of the output meters.



GETTING THE BEST FROM YOUR "EMPIRE SUPER"

Some practical hints on operation and adjustment.

By W. L. S.

SINCE I wrote the full description of the "Empire Super" for last month's MODERN WIRELESS, I have had the set on my bench, and in constant use. Conditions, unfortunately, have not been very good, but I have been able to form a good opinion of what it will do, and have come across a few points worthy of further mention.

It strikes me, more than ever, as a set that will amply repay its owner for a little experimental work in the initial stages. By this I don't mean that there are any "snags" to overcome, but that it is possible to think that it is working well when it might do even better.

No Rules to Observe

The first point lies in the correct adjustment of the two intermediate-frequency transformers. This should be done with the utmost care on the weakest telephony station you can possibly find.

It should not be performed with a metal screwdriver. The most suitable implement I found for the job was the homely wooden skewer with a sharp point! There are no rules for this job. One simply slides the adjusting levers gently round until the best strength is obtained from the station the set is tuned to. Do not overlook the fact that a minute amount of re-tuning on the main tuning control may be necessary after altering the I.F. transformer settings.

Coupling Adjustment

The transformers are also adjustable for coupling, which is done simply by removing the screens, turning the top coil slightly on the splined spindle, and sliding it up or down as required. I have found all along that the half-way position is satisfactory for all normal work.

Whatever adjustment one makes to the coupling necessitates re-tuning on the levers down below, and one generally gets back by a devious route to the position from which one started.

The next adjustment worth mentioning is that of the coupling conden-

ser from the first valve to the detector. If this is too tight it will upset all semblance of "ganging" between the two tuning controls; if too loose, it will make the detector rather liable to howl when the reaction condenser is quite near the "all out" position.

Results that Count

One wants just enough damping introduced into the detector-grip circuit to enable smooth oscillation to be maintained through the whole tuning range, and the same position seems to give just the right degree of coupling from the preceding valve.

battery voltages. The former generally looks after itself; once a suitable setting is found, it may be forgotten. The latter may require a few words.

Best Voltages

No advantage is gained on the original model of the "Empire Super" by using anything much above 135 volts for H.T. 120 is the figure usually used, and under these conditions, with the appropriate settings for grid bias, the total H.T. consumption is not more than about 12 milliamps. The I.F. valve and the second detector both seem to like $1\frac{1}{2}$ volts negative, and a "two-way" wander plug has been provided so that this may be conveniently used. For strong stations the second detector does not object to 3 volts, but I have noticed a slight loss in strength on the weaker stuff by keeping to 3 instead of $1\frac{1}{2}$.

It was intended to give a list of stations heard, with their dial readings, but as, during the month, I have logged practically everything on the

PREPARING FOR AN UNDERSEAS BROADCAST



If you heard the underseas relay on short waves from the U.S.A., you will be specially interested in this picture of the Bathysphere used on that occasion to broadcast a description of the ocean bed. It is being painted to make it as inconspicuous as possible.

Here, again, it is the results that count rather than the rules. Do all these adjustments on a weakish station. I did them myself on W I X A Z fairly early in the evening, before he began to come over really well.

There is really nothing else in the set that is adjustable, with the exception of the aerial coupling condenser and the externals, such as

map, there is no point in doing this. Suffice it to say that the 49-metre group come at the bottom end of the condenser with the biggest coils, and again at the top end of the condenser with the "medium" coils. The 31-metre group obligingly do the same, being found at the bottom of the scale with the "medium" coils and the top end with the smallest

(Continued on page 291)



AN A.C. "DIODION"

SOME few months ago we published in MODERN WIRELESS details of three sets employing H.T.-less rectifiers, or detectors: diodes. All diodes are not H.T.-less, but the particularly sensitive form of two-electrode rectifier that we used was based on what is sometimes referred to as a "Kirkefier," because the circuit was originally evolved by Mr. Kirke, of the B.B.C.

The sets referred to include the "Diodion," a battery four; the D.C. "Diodion," a four-valver for use on D.C. mains; and the "Diodion Super," a seven-valve battery superheterodyne, which was described in our December, 1932, number.

A "He-Man's" Job

Requests for details of an A.C. "Diodion" have repeatedly reached us, and we should have supplied this want earlier but for the fact that we wanted to lift the set out of the usual rut of A.C. receivers, three or four valves with quite usual types of performances, and to provide readers with something somewhat out of the ordinary.

It seemed to our Research Department, on which falls the task of supplying most of our set designs, that it would be doing those readers who wanted an A.C. "Diodion" a better turn if it made a real "he-man's" job of the set.

Thus it is that we have produced a set that may not appeal to the

Such has been the success of the other "Diodion" receivers described in "Modern Wireless," that we have had many requests for an A.C. version. So this month we give the necessary details for enthusiastic constructors who wish to tackle this elaborate design.

majority from a constructional point of view (though they will probably like to read about it), but that will be the delight of many an enthusiastic set builder who enjoys constructing the "giants" of the radio world.

Not that the A.C. "Diodion" shown here (we may do a simpler, smaller one later if you want us to) is really a giant. It has six valves and employs 400 volts H.T., but it is a perfectly straightforward constructional job.

Moreover, so straightforward do we feel it to be to those readers who are versed in large set building that we do not propose to take up space

by the publication of a full wiring diagram. A set of a size such as this, with 400 volts on the anode of the last valve, and some 500 supplied by the mains unit, is not the most suitable for a beginner to attempt; but it is within the scope of an enormous number of constructors, and the photographs and diagrams provided should enable them to go ahead should they so desire.

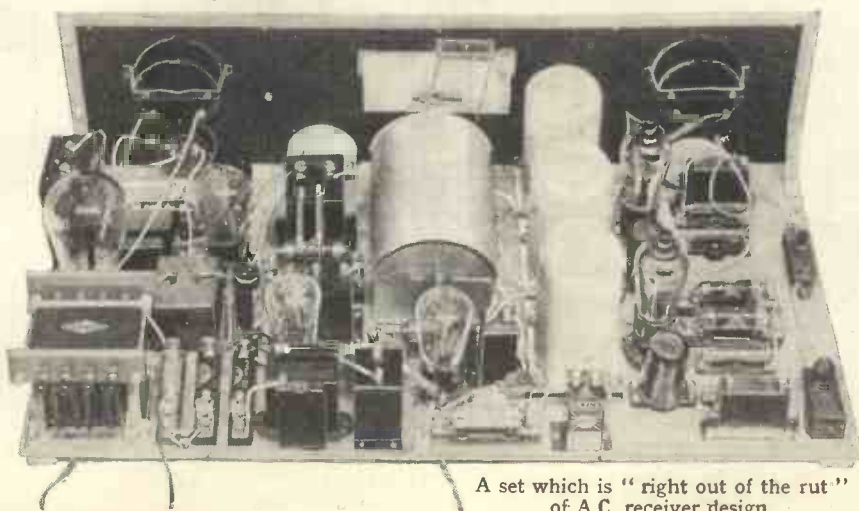
Separate Mains Unit

The set is separate from the mains unit. This keeps it reasonably compact, despite its six valves, and also simplifies construction.

It is designed primarily as a radiogram set, and the size of panel will fit many of the wider types of radiogram cabinets. The panel can easily be modified if desired, of course. As an ordinary set it can be housed quite well in an "American type" of cabinet, with the mains unit boxed up somewhere near (say, below the set). Actually the set is at present housed in one of Pickett's radiogram cabinets, with the motor above and the speaker and mains packed below.

All the wiring, with the exception of some of the H.T. feed wires and the L.T. wiring, is carried out above the foil-covered baseboard, on which all the components (save those on the panel) are mounted. There are no under baseboard layouts to do, but to give clearance for the under-baseboard leads the base-

QUITE OUT OF THE ORDINARY



A set which is "right out of the rut" of A.C. receiver design.

board is raised up $\frac{1}{4}$ of an inch. The arrangement of components is systematic, so that short grid and anode leads are obtained, while cathode returns, decoupling condensers, earthed ends of tuning circuits, and so on, are connected to the foil. Thus, as you can see in the photographs, there is a remarkable scarcity of wiring.

The circuit is quite straightforward in its features, as can be seen from the diagram. The first two valves are variable- μ S.G.'s, coupled together by H.F. transformers and followed by a diode rectifier. This is followed by two L.F. stages and an output stage, making six valves in all.

Ganged tuning is employed, making the set a simple dial control receiver, the other knobs on the panel being concerned, left to right, with volume, wavechange, radiogram fader, and tone control.

The meters show the anode current (and therefore the effect of tuning and strength of H.F. reception) of the L.F. valve following the diode, in the case of the left-hand meter, and the output current in the case of the right-hand meter.

It must be remembered that the first L.F. valve is partly biased by the incoming carrier wave and therefore the exact tuning point can be watched by the movement of the left-hand (0-5) milliammeter.

Diode Details

And now for a few remarks about the smaller points in the circuit. It has been seen that in the main the

Originally the set was built with an H.F. choke in that position, and it worked excellently except for one thing. Although the set was free from A.C. hum when gramophone was used, the switching over to radio immediately introduced an annoying hum.

Striking a Balance

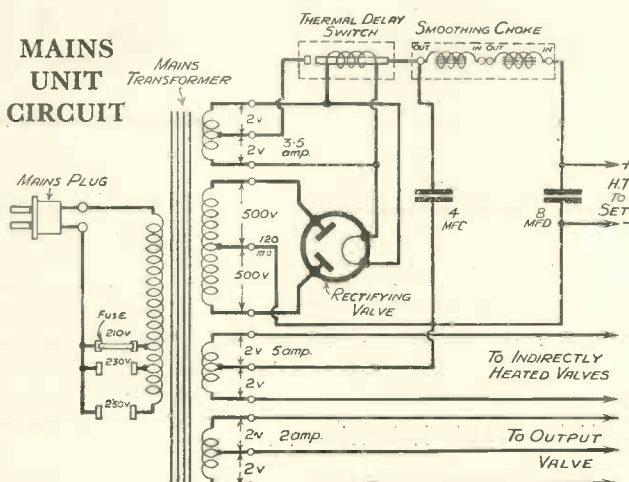
This was finally traced down to A.C. pick-up by the diode choke. Screening was tried, but naturally nothing short of thick iron would prevent A.C. from being induced into that winding, and so it was discarded in favour of a resistance.

Here we were up against a double problem. The resistance had to be as large as possible to make it a good H.F. stopper and as low as possible so as not to reduce the L.F. feed to the grid of the next valve any more than could be helped.

The resistance forms with the other resistance of .5 meg. a potentiometer tap for the grid of the L.F. valve across the "anode"—earth L.F. feed from the diode, and the higher the resistance of the resistance H.F. stopper compared with the .5 megohm the less the potential developed across the grid and cathode of the L.F. valve.

Negligible L.F. Loss

Eventually a value suitable as an H.F. stopper was found, having a high enough resistance to make the loss of voltage due to potentiometer effect (as compared with the voltage provided by a proper H.F. choke) quite unappreciable aurally, and this was

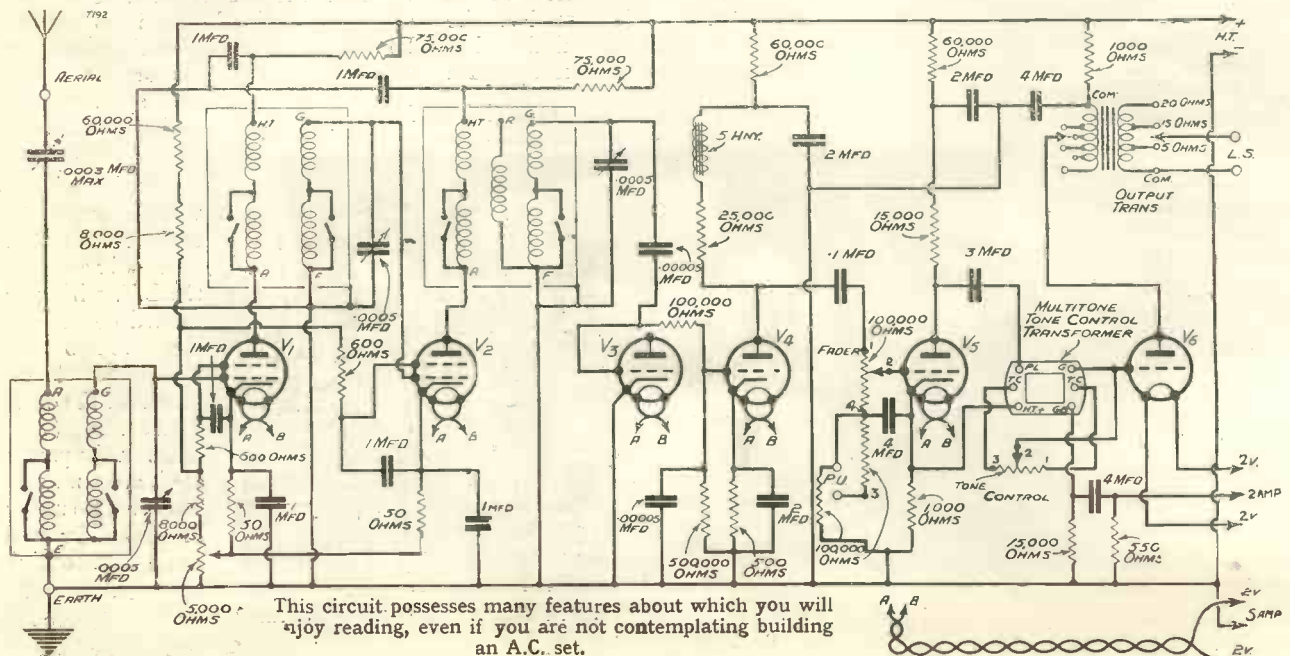


Full-wave rectification is employed, and separate filament supplies are provided for the output valve and the other stages.

circuit is straightforward. There are points worth noting, however, that are vital to the successful operation of the receiver.

The first of these is the fact that the diode has no H.F. choke between its anode (grid of valve) and the grid of the L.F. stage, a resistance being used instead. There is a very good reason for this.

Two S.G. Valves—Diode Detection—Tone Correction



This circuit possesses many features about which you will enjoy reading, even if you are not contemplating building an A.C. set.

Straight-Line Response from 50 to 4,000

included in the set with excellent results.

Primarily the receiver was not designed for multi-station getting; it was intended as a quality set for the main British and Continental broadcasts, and in use is practically confined to the reception of the London, Midland, and Northern programmes, with a little of Radio Paris on Sundays. Actually the set will get many more than these.

PARTS FOR POWER-PACK

- 1 Power transformer 500-0-500 volts (Sound Sales). See text.
- 1 Smoothing choke (Parmeko F.40/120).
- 1 4-mfd. condenser, 800 volts working (Dubilier L.C.G., T.C.C.).
- 1 8-mfd. condenser, 800-volts working (Dubilier L.S.C., T.C.C.).
- 1 Four-pin valve holder (W.B.).
- 1 Thermal delay switch (Varley, Bulgin type A.).
- 1 Mains input plug and socket (Bulgin, Belling-Lee, Goltone, etc.).
- 1 Rectifier valve (Marconi or Osram U.14, Mullard D.W.4, Cossor 460B.U., Mazda U.U.120/500).

There is no reaction, so that what you get in the way of stations you get; there is no coaxing to be done; the set either receives them or leaves them alone—ideal, in spite of its scientific appearance, as a family receiver.

Following the diode is the L.F. valve we have been talking about, and in the anode circuit of that valve is a 5-henry choke in series with the ordinary resistance used for resistance-capacity coupling.

Boosting High Notes

Every stage is decoupled by resistance and condenser, but the addition of the 5-henry choke is to provide a rising characteristic to the voltage amplification curve of the stage, thereby enhancing the reproduction of high notes and making up for any loss due to the three tuned circuits of the H.F. section, which are not of the band-pass variety. In the photographs the 2-mfd. condenser across the bias resistance for the 1st L.F. valve is not shown. It was put in later, the 5 leak being moved slightly to make room.

Next we come, via a .1-mfd. condenser, to the grid of the intermediate L.F. valve—a 164-v. type. This is shunt-transformer-coupled to the out-

put stage via a Multitone tone control transformer of 3.5:1 ratio. The coupling condenser feeding the impulses to the transformer has been carefully chosen so that the bass peaks at a convenient frequency, between 75 and 100 cycles—a point at which many speakers begin to fall badly and one which in effect gives excellent results.

Incidentally, it may be stated that on the frequency tests radiated by the B.B.C. the "Diodion" gave to all intents and purposes straight-line reproduction from 50-4,000 cycles, and only a slight fall from 4,000-6,000. This with the Multitone set at "normal" or mid-way. Correction in balance for either end can be applied as desired by means of the Multitone control.

Below 50 cycles the fall off was fairly rapid, but above 6,000 cycles there is a large residue going up well above 8,000. This is as high as anyone needs to go for it takes you well in the "heterodyne area," though it is very valuable when no interference is encountered. Of course, here again the Multitone control comes to the rescue as a heterodyne reducer if desired.

Dual Speaker

As photographed, the set is shown with a special Parmeko output transformer matched for the type of output

valve used (D.O.24, P.P.5/400, P.X.25), and for 8-, 15-, or 20-ohm moving-coil speakers. It was used for some time with a Ferranti M.1 speaker with excellent results, and is now being tried with the new Celestion double-speaker, which promises to be exceptionally good, especially at the top end of the scale.

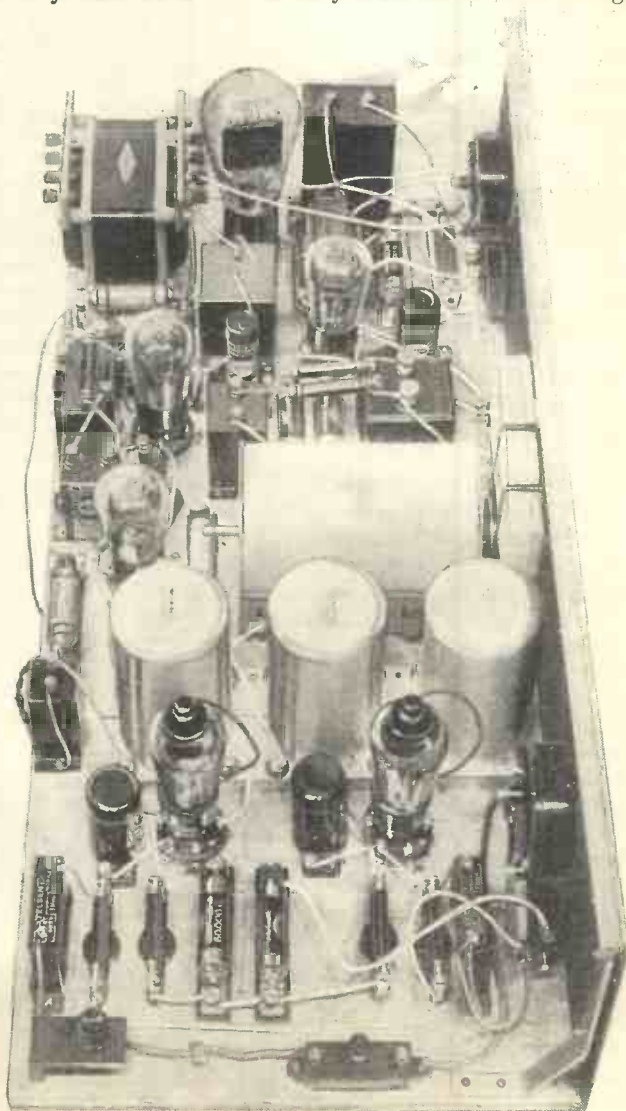
Output Circuit Requirements

The use of a good, big output transformer is essential, for the variation of anode current at low frequencies is surprisingly large, even when the set is only "half-out," and unless the transformer inductance remains reasonably constant over these changes (remember, it is carrying 63 milliamps. of steady anode current), the reproduction of the bass notes will be seriously impaired.

Should you not desire to use a large

THE LAYOUT

In spite of the comprehensive nature of the design and the number of components on the baseboard, the layout has been so arranged that there are very few long leads, most being remarkably short.



output transformer, a large filter choke system should be employed (just about as costly, by the way), and in addition you will need a transformer for the loudspeaker.

There are one or two points to remember during the actual construction of the set. The baseboard is covered with foil so that as a precaution all such components as "Ohmite" holders, valve holders, and Colvern resistance strips are mounted on cardboard strips to prevent in the first two cases any chance of screw bolts or valve pins touching the foil, and in the latter shorting to foil due to sagging should by any chance the resistance get too hot.

Insulation Reminders

In fairness to these strip resistances, however, we must say we have never had a case of sagging other than that caused by overheating due to over-running.

Remember, too, that systoflex is not a high-voltage insulator, and all systoflex leads should be kept out of contact with other leads carrying different potentials, and with earth points such as foil, condenser cases, and so on.

Especially is it important, too, to cut back the foil where the L.T. wiring comes through to the valve holders, and where the H.T. feed wires come through to the various points. These latter start from the decoupling and breakdown resistance in the anode circuit of the output valve and run under baseboard radially to the various resistances in the anode circuits of the various valves.

Simple Mains Unit

In order to get the panel layout symmetrical, the fader volume control for pick-up and radio (L.F. side) is sunk through the baseboard a little.

Don't forget that one L.T. wiring scheme has to carry 5 amps. (the last valve being fed separately), and so it is best to take a thick pair of wires to some sort of junction under the baseboard branching out from that point to the five valve holders concerned. Thus the minor feeds can be of thinner and more convenient wire as they carry but 1 amp. each.

The mains unit is very simple, being a plain full-wave rectifier for 120 milliamps. and 500-0-500-volt transformer. This latter is a special transformer providing, in addition to the 500-0-500 at 120 milliamps., 2-0-2 (5 amps.) and 2-0-2 (3.5 amps.), with 2-0-2 (2 amps.) for the output valve. The 3.5-amp.

winding is required for the rectifier valve, which has in its H.T. circuit a thermal delay switch. This is essential if high-voltage peaks are to be prevented. A really good choke is used for smoothing and high-voltage condensers.

Talking about condensers, it is important that the grid condensers on the L.F. side of the set should be either mica (and very expensive) or of exceptionally high leakage resistance. Those we have chosen fill the bill admirably.

ABOUT THE VALVES

VARIABLE-MU

Marconi or Osram V.M.S.4.

DIODE

Mazda A.C./H.L., Mullard 354V.,
Cossor 41M.H.L., Marconi and
Osram M.H.4, Eta D.W.4011,
etc.

1st L.F.

Mazda A.C./H.L., Mullard 354V., etc.

2nd L.F.

Mullard 164V.

OUTPUT

Mullard D.O.24, or with necessary
bias resistance value alteration,
Marconi or Osram P.X.25, Mazda
P.P.5/400.

There is only one H.T.+ connection to the set—that to the anode resistance of the output valve, while the other mains unit points are taken as follows: H.T.— to any earth point (that is, to some point connected to foil), 5-amp. heaters to the first five valves with the centre point of this winding to H.T.—. The 2-amp. winding goes to the output valve only, but this being directly heated, and not indirectly like the others, requires careful connection regarding the L.T. centre point connection or you will get the bias resistance wrongly connected. In the case of this valve the centre point goes to that terminal of the 4-mfd. grid-decoupling con-

The top or "outer" heater terminals on the left (near the bolt that secures the terminal board) are connected to the heaters supplying the first five valves, the bottom terminal being the centre tap of the heater winding.

denser that is joined to the bias resistance, and not the terminal that is joined to the L.F. transformer.

Screened wire is used for the connection to the compression condenser from the aerial terminal, and from the condenser to the aerial coil, and screened wire also connects the 0-5 milliammeter in series in the anode-feed circuit of the first L.F. valve, the wiring being taken under the baseboard and the screening and the case of the meter being earthed.

Pick-up Connections

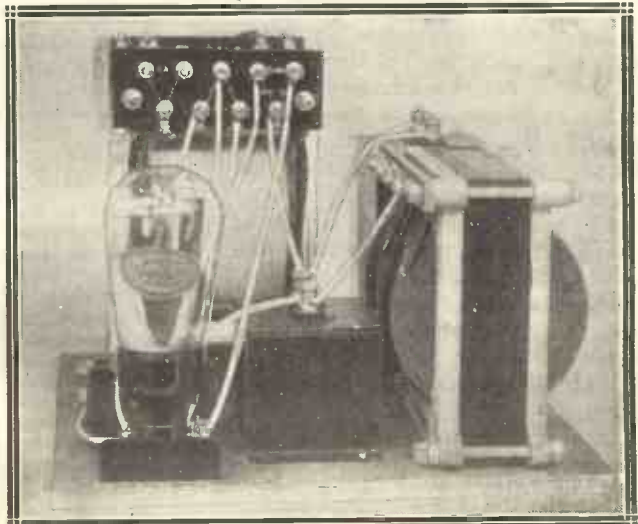
The ganging of the set is quite normal and the operation quite simple. The pick-up is connected between one outside terminal of the fader control and the isolated terminal on it, to which latter the top end of the decoupling grid leak and the 4-mfd. condenser are also connected.

The earth lead is connected to any convenient earthed point on the set. Remember that the resistance values given are such as are necessary with the valves specified. If these are altered the resistances affected must also be changed, but it is advisable to keep to the valves specified, especially in the case of the variable-mu and second L.F. valves.

On switching on, remember that the Varley thermal delay switch takes one minute to come into operation, and when you switch off for adjustments do not switch on again for a full half-minute—the time taken for the switch to return to the off position.

Satisfactory Output

Such are the brief details of the set. It has a 5-watt undistorted output, and is amply large enough for all household purposes, with plenty of margin to obviate overloading.



A Quality Receiver of Ambitious Type

If further details are required we shall be pleased to supply them as far as is possible to those contemplating building the set, if they will write to the Chief of Research, MODERN WIRELESS.

This set is primarily a quality receiver of somewhat ambitious type, and was built more as an experimental receiver than with the idea of giving published details. We shall, however, be pleased to hear from readers who are interested and to give them all the help we can.

There is one point that readers may like to try for themselves, and that is the alteration of the return of the Multitone transformer primary from cathode of V_5 to the earth. There is no golden rule about such returns, though they are supposed to be made direct to cathode where possible.

Trial Connection

It may be found, however, that the 1,000-ohm resistance in the cathode lead will upset matters, as cases have come to our notice where such a resistance (although the grid circuit is decoupled) being un-shunted has caused splitting of high notes when direct return to cathode of the A.C. anode component has been made.

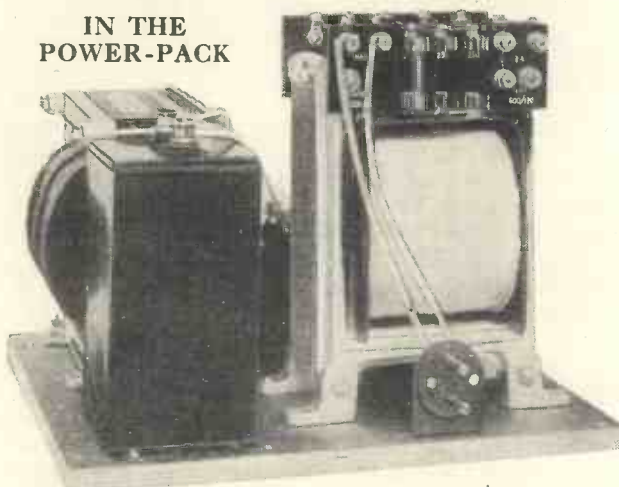
In such an event it will be as well to try the Multitone return to earth, leaving the rest of the circuit as

shown; but this trial will only be necessary in the event of any such splitting being noticed.

Avoiding Elaboration

In the case of this set no such trouble was noticed, but, as said before, it has been experienced using other receivers, with other components, and we thought it advisable to put the

IN THE POWER-PACK



By changing the position of the fuse, the right tap for the mains voltage to be used is connected up.

wrinkle before readers in case they do experience the trouble.

It may have been remarked during the reading of this article that the mains power-pack looks only half finished. In certain respects that is so, because the leads from the heater circuits of the set and the corresponding centre taps, as well as the H.T. positive and negative connections, are

taken from the unused terminals of the mains transformer in the first cases, and from the two terminals of the smoothing condenser in the case of the H.T. In a set of this description that is made for the particular purpose of insertion in a radiogram cabinet there is no need for elaborate terminal strips—the set is to be packed away neatly, and perfect safety of operation is assured by the inaccessibility of the dangerous parts while the set is in situ.

Rigid Panel

Finally, a brief remark for those who do as we did and use a plywood (oak- or walnut-faced) panel. These are very prone to warp, and in addition to the panel brackets we used a piece of stout angle brass at the top and bottom of the panel. This keeps it pulled straight and makes everything beautifully rigid.

There is ample room at the bottom, for the baseboard is mounted on two fillets of wood, leaving the space between clear for the brass angle strip. At the top, of course, the whole length is clear, and the brass can be seen clearly in the photographs.

Some constructors may like to try employing an H.F. choke in place of the 100,000-ohm resistance associated with the diode. If this can be done without hum it is permissible. The increased sensitivity will then necessitate more drastic volume controlling.

THE COMPONENTS THAT WERE USED AND THEIR VALUES

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> 1 Panel, 26 × 8 in. 1 Baseboard, 26 × 12 in., and copper foil for same. 1 Three-gang coil unit assembly (Wearite W.L.2C.). 1 Three-gang .0005-mfd. screened condenser (Utility). 1 Straight-line tuning scale for above (Utility). 1 0-5-m/a. flush-mounting meter (Ferranti, Weston). 1 0-100-m/a. flush-mounting meter (Ferranti, Weston). 1 .0003-mfd. max. compression condenser (Formo, Ready Radio, Goltone, Polar, Sovereign, Telsen). 6 5-pin valve holders (or five 5-pin and one 4-pin) (W.B., Telsen, Benjamin). 10 Wire-wound resistance holders (Ferranti). 1 1,000-ohm wire-wound clip-in type resistance (Ferranti). 1 8,000-ohm wire-wound clip-in type resistance (Ferranti). 3 60,000-ohm wire-wound clip-in type resistances (Ferranti). 2 75,000-ohm wire-wound clip-in type resistances (Ferranti). 1 25,000-ohm wire-wound clip-in type resistance (Ferranti). | <ul style="list-style-type: none"> 2 15,000-ohm wire-wound clip-in type resistances (Ferranti). 4 Horizontal "Ohmite" holders (Graham Farish). 1 Vertical "Ohmite" holder (Graham Farish). 2 50-ohm "Ohmite" resistances (Graham Farish). 2 600-ohm "Ohmite" resistances (Graham Farish). 1 100,000-ohm "Ohmite" resistance (Graham Farish). 1 500-ohm "Ohmite" resistance (Graham Farish). 1 1,000-ohm "Ohmite" resistance (Graham Farish). 1 500,000-ohm "Ohmite" resistance (Graham Farish). 1 8,000-ohm "Ohmite" resistance (Graham Farish). 1 300-ohm strip resistance (Colvern). 1 250-ohm strip resistance (Colvern). <p>(These are standard values connected in series to make 550 ohms, but special resistance of that value could be wound instead if desired.)</p> <ul style="list-style-type: none"> 1 100,000-ohm resistance (Dubilier 1-watt type, etc.). | <ul style="list-style-type: none"> 1 4-mfd. condenser, 400 working (T.C.C., Dubilier, Formo). 2 1-mfd. condensers (Telsen, Formo, T.C.C., Dubilier). 2 1-mfd. condensers (Formo "mains" type, Dubilier, T.C.C. 400 working). 3 2-mfd. condensers (Formo "mains" type, Dubilier, T.C.C. 400 working). 1 4-mfd. condenser, 400 working (Dubilier type L.E.C., T.C.C.). 1 4-mfd. condenser (Dubilier L.S.A.). 1 .1-mfd. condenser (Formo "mains" type or mica type T.C.C., Dubilier). 2 1-mfd. condensers (Formo cylindrical type, etc.). 2 .00005-mfd. condensers (Dubilier, T.C.C.). 1 .3-mfd. condenser (Formo "mains" type). 1 5-henry L.F. choke (R.I. special choke). 1 Output transformer (Parneko DUOT.1). 1 5,000-ohm wire-wound potentiometer (Varley). 1 Multitone transformer 3:5:1. 1 Multitone graded potentiometer. 1 Fader control, 100,000 ohms per section (Magnum "Dissolver"). 1 Aerial terminal and terminal block (Belling-Lee, etc.). <p>Wire, sleeving, panel brackets, screws, flex, etc.</p> |
|--|--|--|



ROUND *the* TURNTABLE

*A new dance band for recording—Ray Noble takes another step—
The lighter side of record making.*

By "TONE ARM."

HERE is some news that will interest many of my readers who are followers of the various dance bands and their records.

Ray Noble, who has recently come right to the fore on H.M.V. and who is only just in his thirties, after writing four of the biggest song hits of recent years, has just completed arrangements for the formation of a new British dance band which will be unique in many respects.

Seven years ago, after studying at the Royal College of Music, Ray Noble horrified his relations by winning a dance music orchestration competition organised by a music magazine. This success led to an appointment as orchestrator on the staff of a music publisher.

With Jack Payne

He accompanied Jack Payne to the B.B.C. in 1928 and produced the first special orchestrations for that band to be broadcast. (This association has recently been renewed in Jack Payne's successful talkie, "Say it with Music," for which Ray Noble wrote the musical numbers.) A year later he left to become light music director for a well-known gramophone company.

One evening, returning home in a bus from his office, he heard a girl say to her boy-friend, "Good-night, Sweetheart," and Ray at once thought what a wonderful title it would make for a song. *In two days the words and music were complete.* Some moving, wasn't it?

Universal Appeal

It became the biggest hit England and America had known for years. Millions of gramophone records of this haunting melody brought its

composer large royalties. "I Found You," "By the Fireside," and "Love is the Sweetest Thing," confirmed the fact that England had at last a dance music composer who could rival the Americans at their own game.

Ray Noble's band is to be capable of performing all types of light music, and he hopes to be able to cultivate a flexibility of style that will appeal to any kind of listener. The orchestra will be heard on "His Master's Voice"

RECORD BROADCASTER OF THE MIDLANDS



Robert Tredinnick, who frequently broadcasts record recitals from the Midland Regional, listening to new discs on his H.M.V. Transportable Radiogram.

records, and will be featured as the country's premier recording band.

When he was asked whether he proposed to give any public or broadcast performances, Ray Noble said that negotiations were at present in hand, but no definite arrangements had yet been fixed. But I for one hope we shall hear him in the flesh some day.

In a quarter of a century of recording there are bound to be bright as

well as dark spots, and a whole host of interesting experiences. This is proved by the story of Mr. Arthur Clarke, who has just been presented with a silver salver by the Directors of the Gramophone Co. in recognition of his 25 years' service with H.M.V.

Mr. Clarke joined H.M.V. when it was called the Gramophone and Typewriter Co. in 1907. Later it was to grow into the vast concern we all know to-day.

Recording Memories

Here are some of the most interesting anecdotes told by Mr. Clarke, who has a host of such yarns. In the early days sometimes the artistes were very zealous in trying to get unusual effects on the records. When a Guards band was recording, a young lieutenant who was conducting them thought that he would produce a novel effect by firing his revolver down the horn that was used then for recording.

He did so, and though he used a blank cartridge he blew the best recording diaphragm then possessed by H.M.V. to bits.

In 1913 a short man arrived to make a record. He was the late Lord Roberts, who had come to make a speech on National Defence, but

before he could speak a box had to be found for him to stand on so that he could reach the recording trumpet.

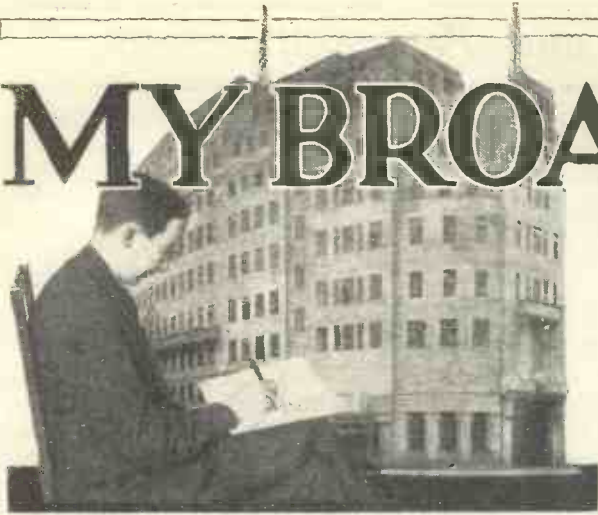
Mr. Clarke says that it was in his trips abroad to carry out recording that he had his most interesting experiences, and I will let him tell you in his own words how he fared in the East.

"In Egypt the artistes would only record at night, as they considered the spirits were more propitious after the sun had

fallen. They always used to bring their prayer mats with them and offer up a prayer for a successful recording before they commenced work."

The lighter side of recording would make a most interesting book, and I sincerely hope that someone who has been in the game from the start will put pen to paper one day and let the world read about the many unrehearsed incidents that have startled the recording engineers.

MY BROADCASTING DIARY



Where are the Radio Playwrights ?

THERE is undoubtedly a dearth of writers who are prepared to write specially for the microphone. Some years ago, when Captain Reginald Berkeley wrote the "White Chateau" specially for radio production, it was hoped that there would be encouraged a new school of radio dramatists. In the interval, however, there has not been much development on original lines.

The difficulty, of course, is that the B.B.C. has not seen its way clear to encourage new writers by special commission. Until this is done, there will be no hope of a real school of radio dramatists as envisaged by Val Gielgud, the Productions Director at Broadcasting House.

Sir John's Greatest Test

Sir John Reith's greatest test in the defence and protection of the B.B.C. will be in 1935, when there will be another Parliamentary Committee of Inquiry on lines similar to those which governed Lord Crawford's Committee of 1925.

On the whole, I think the B.B.C. will have a good case, and therefore will be well advised not to resist a full public inquiry in 1935. There will be just this difference, however, that the ten years that will have elapsed since Lord Crawford's Committee will have witnessed a remarkable extension, not only of interest in but also of understanding of the problems of broadcasting.

Ghostly Manifestations

Is there something in the rumours about ghostly manifestations at Broadcasting House? At least one announcer working on the Empire programme (Canadian Zone) in the early hours of the morning is said to have been surprised, if not astonished, by apparitions and strange manifestations.

Accommodating Temperament

In the past the B.B.C. has been fairly fortunate and well advised in its attitude of accommodation to difficult temperaments. For instance, it was extremely wise to arrange for a special department of dramatic research in which such people as Messrs. Lance Skieveking, King Bull, and Harding would have a chance to spread themselves with immunity from red tape.

The result has been some of the best programmes since the B.B.C. started. I do hope that the principle will be accepted as permanent.

Our own Broadcasting Correspondent keeps a critical eye on the affairs of the B.B.C., and each month, for the benefit of listeners, comments frankly and impartially on the policies and personalities controlling British broadcasting.

The Budget and the B.B.C.

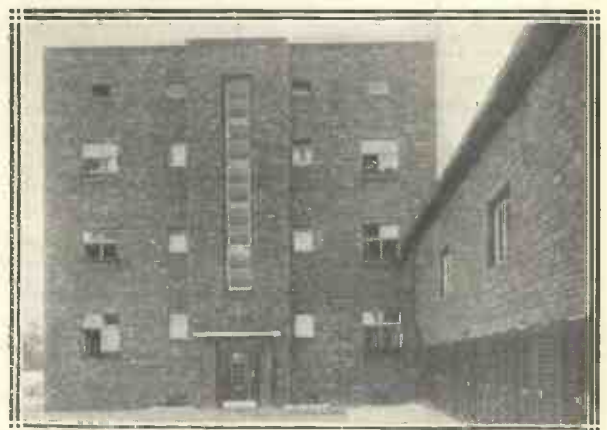
The possibility of a deficit in the Budget has induced various members of Parliament to consider the finances of the B.B.C. with a view to recommending a further Treasury raid. Of course, very few members have any idea of the extent to which licence revenue is already raided.

To the ordinary member of Parliament the problem of B.B.C. finance is simply the matter of multiplying ten shillings by five millions; which yields the not unsubstantial total of two and a half million pounds. There is astonishingly little general realisation that the B.B.C., in addition to the ten per cent paid to the Post Office for collection, enforcement and recording, manages to give a clear million pounds a year to the Treasury.

The Welsh Children's Message

This year, for the first time, the Peace Message from the Children of Wales to the Children of all the rest of the

BRESLAU'S HIGH-POWER STATION



This uncompromisingly plain exterior houses the transmitting plant of Germany's most powerful medium-wave station, Breslau, which works on 325 metres, immediately below the Poste Parisien programme.

World will be broadcast nationally and relayed in other countries. Hitherto the B.B.C. has been very reluctant to give the sponsors of this message the facilities they desired. Now, however, the attitude of the B.B.C. has changed and Wales will be happier as a result.

News of Programmes and Personalities

Sunday Programmes

There has been a lot of talk about the extension and enrichment of the programmes of the B.B.C. on Sunday. Naturally, there is a tendency on the part of advertisers to encourage this sponsored broadcasting from the Continent. My own view is that this sort of thing will not survive, whatever the B.B.C. does about it.

"A GOOD MIXER"



The engineer in charge of one of the big broadcasts going out on the National Broadcasting Co.'s chain from Chicago. Note his portable telephone, and the "lash-up" aspect of the apparatus temporarily for the broadcast.

Birthdays in the Children's Hour

Birthdays in the Children's Hour are doomed. There will be notice, of course, and I do not expect that the birthdays will be eliminated before the end of this year. Nevertheless, they are for the "plank," since Mr. Kettelwell has made up his mind that they are really redundant to his scheme of things.

Regional Orchestras

The movement for the restoration of Regional Orchestras has been encouraged by the inflexible attitude of the B.B.C., but there is more in it than this. A B.B.C. official has definitely promised a local studio to Nottingham, partly to enable auditions to be conducted locally.

It is all very well for the B.B.C. to argue that the really big works are better performed in a technical sense by the Central Symphony Orchestra under Adrian Boult. My own view as a layman is that there would be little difficulty in settling the matter if the principals concerned on both sides agreed to meet.

Censorship Abroad

By arrangement amongst most of the broadcasters of the world, there has been evolved what is now known as the "telephone box" system of interchange. By this is meant simply that if the Columbia System of America or the National Broadcasting Company desire to share something special in British programmes, an intimation to this effect would be duly conveyed. And it is generally understood that there will be no censorship locally.

The Germans, however, are insisting on censorship, and this may lead to the abandonment of European interchange.

The Empire Programmes

The time has arrived when it is imperative to develop and improve the B.B.C. transmissions on short-waves to the Empire Overseas. The technical side seems to be settling down; but the programme side remains the subject of intense controversy. Well, we shall see what we shall see.

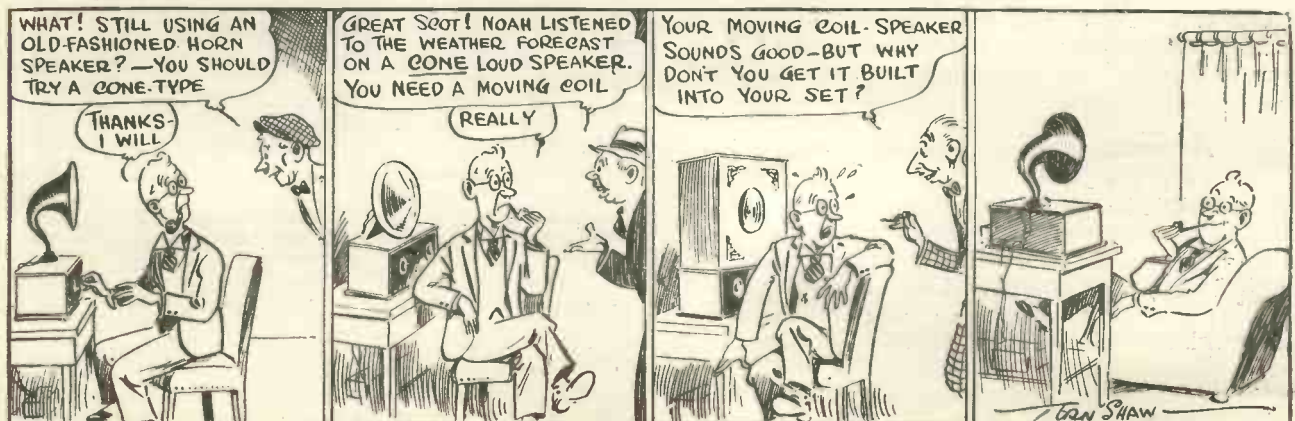
Moral Regulations

Certain staff changes in the past few years have made it necessary for the B.B.C. to define its attitude on the subject of the morals of its staff. A curious situation has arisen.

It has been laid down, although not promulgated or officially admitted, that any member of the staff technically in the wrong in a divorce action must retire from the B.B.C.

Where the difficulty arises is in connection with the considerable number of those members of the staff who have been involved in divorce proceedings without being technically in the wrong. I am sure the situation needs clearing up by the Governors.

While it is admitted that public servants should not give cause for scandal, it seems to me that in the long run, more harm than good can flow from inquisitorial methods on irrelevant subjects.



HOW TO OBTAIN BETTER RADIO

Whether you build your sets or buy them ready-made, you'll always find some query cropping up regarding maintenance, installation or modification. This special monthly feature solves all such problems for you in an attractive and entertaining manner.



REVIVING H.T. BATTERIES

WE have had considerable correspondence of late concerning the subject of reviving dry H.T. batteries. Before the effectiveness or otherwise of any particular method is discussed, it may be as well if we ask ourselves why H.T. batteries run down.

The answer is simple. The chemical action is such that the zinc in the cells is eaten away. (In certain uncommon cases the paste in the cells dries up first and thus causes a cessation of activity.)

Flicker of Life

Usually a worth-while revival is therefore only possible if new zinc is introduced, and that is an operation which would be hardly worth while.

In a few instances a flicker of renewed life can be obtained if holes are pierced in the tops of all the cells and a strong solution of sal-ammoniac and water is poured over them.

But at best it is likely to be only a mere flicker, and would be barely worth the trouble.

No, we regret to say that dry H.T. batteries must definitely be included in the "consumable" class, and that the claims of all the so-called "revivers" which are advertised from time to time should be regarded with distinct suspicion.

MIXING YOUR H.T.

IT is possible to run the one set with several different supplies of H.T. at the same time. This fact is one which should be thoroughly understood by all listeners, for it enables all kinds of extemporary arrangements to be made if necessary.

Curiously enough, it would appear that many listeners consider it diffi-

cult, if not actually dangerous, to employ two H.T. batteries, or an H.T. battery, to boost up the output of a mains unit.

We say curiously, because all whose acquaintance of radio goes back a decade or so know that in the early days the problem was to run more than one valve from a single source of H.T. supply.

At first each valve in a three-valve set, for example, had to have its own independent H.T. supply, and you may encounter old diagrams showing this.

Of course, H.T., especially if derived from the mains, needs to be

the H.T. plus terminals in the set to a plus socket of the H.T. battery, and the minus socket of this to the H.T. minus terminal of the set. (See our illustration of the arrangement.)

You will naturally choose that H.T. plus terminal which feeds a suitable valve or valves. You will have to bear in mind the voltage required and current taken by the various valves, and arrange the battery and unit in accordance with their individual output potentialities.

It is better to use the battery for H.F. and/or detector valves, especially if there is any "hum," because this will be less pronounced if the mains

battery must be capable of supplying the current demanded by that valve. With a big super-power valve it may even be desirous to consider the advisability of employing a group of H.T. accumulator cells.

The connection is simple. Join the negative of the H.T. battery to the positive output of the mains unit in question and the positive of the battery to the H.T. plus terminal of the set. That is all.

MATCHING SPEAKERS

WHEN a loudspeaker is joined direct to a set, as in the first diagram of the trio in this column, it is doubtful whether the essential values will be such that the best results obtain.

Anyway, it will be a lucky accident if this is the case.

There is one vital thing which must be borne in mind. And that is that there is no definite relation between the condition for greater power output and for the greatest undistorted power output of any particular valve.

That obviously needs a little further explanation. First of all, there are two factors which must be considered. These are the impedance of the valve and the impedance of the loudspeaker.

The greatest output is achieved where these are equal. If the output valve of a set has an impedance of 3,500 ohms, then to get the greatest power out of it a loudspeaker of 3,500 ohms impedance would have to be joined to it.

No Definite Law

But—and this is a big "but"—that is *not* the condition for the greatest undistorted output.

For this the impedance of the loudspeaker must generally be between two and three times that of the valve.

No definite law applies, unfortunately. It is found that the relation differs with almost every valve.

FOUR PRACTICAL POINTERS

handled carefully, for apart from shocks, it is all too easy to burn out valves if wrong connections are made.

But, given reasonable care, it may amaze many that quite a number of mixing arrangements are possible.

Let us now leave generalities and see what can be done in particular instances. Supposing we have a large set and a small mains unit which is incapable of supplying all the H.T. current needed.

unit feeds the L.F. end of the set. That is, in most cases.

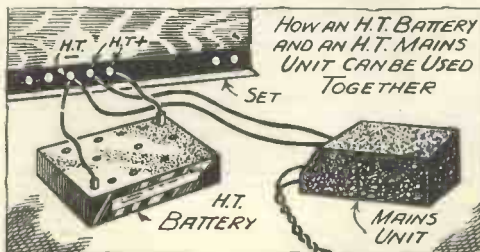
Where hum or instability, or both, is troublesome to remove, it is often very advantageous indeed to use a battery to supply the detector valve. This is applicable even when the unit is capable of supplying the desired current.

But the most useful of all mixed H.T. schemes is when it is required to boost up the available H.T. voltage.

Perhaps they are D.C. mains of 110 volts and a round 150 is desirable for an output valve.

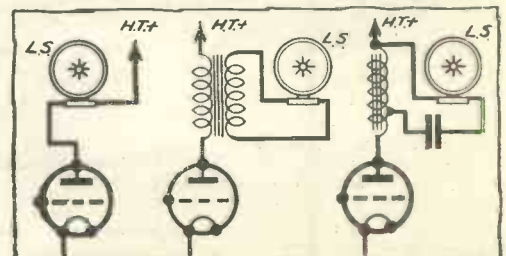
The listener in such circumstances need have no hesitation in connecting an H.T. battery in series with that particular mains unit output feeding the output valve. But, of course, the

TWO TYPES OF SUPPLY



The mains unit could be used for the maximum tap, and the battery for detector alone.

THREE KINDS OF COUPLING

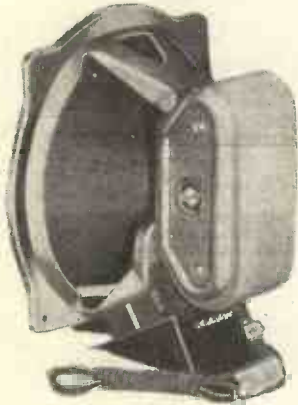


Showing how a loudspeaker can be direct-, transformer- or choke-coupled to the set.

Are You Changing Over To A.C.?

Let us give a few examples. With a Cosmor 215P., which has an impedance of 4,000 ohms, a speaker impedance of 9,000 ohms is required. On the other hand, that big Mul-lard D.O.25, whose impedance is 800 ohms, needs an anode circuit

PERMANENTLY FITTED



Many modern speakers have matching transformers permanently fitted to them.

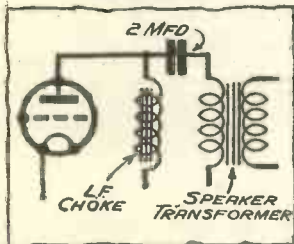
impedance of 4,000 ohms, which is five times as much.

Then the Marconi and Osram I.P.2, with 3,900 ohms, requires less than twice, i.e., 7,100 ohms.

It is indeed unfortunate that there is no general rule. But there is not, and so each output valve must be dealt with individually. Of course, the makers supply the details. They generally style the ideal loudspeaker impedance "Optimum Load."

In many sets these days there is either an output choke or transformer, the duty of which is to bring about the ideal load conditions. The majority of modern moving-coil loudspeakers embody transformers

CHOKE AND TRANSFORMER



A choke-condenser output feeding into a speaker transformer.

for the purpose. If such a loudspeaker is used, it is unnecessary to have one in the set as well.

Our other two small diagrams show theoretically how a transformer and a choke are connected in the output of a receiver.

The actions of both are similar. The object of the component is to provide a ratio which will establish the correct operating condition. But remember that this ratio varies as with both the valve and the loudspeaker.

Alternative Ratios

Actually, all but the technical purist will be fully satisfied by an approximation. A difference of an effective point or two between an impedance ratio of 1 to 2 and 1 to 3, for instance, is not likely to cause so much trouble that it would be actually noticeable by the average listener.

Therefore, it is possible to design transformers with two or three alternative ratios which will satisfy all normal requirements. And this is what is done. You find them, as we have indicated, on loudspeakers. Usually, a couple of ratios are provided for ordinary power valves and one for a pentode.

By the way, pentodes demand particular care in output matching. If they are not dealt with properly they are liable to give very disappointing results.

Special chokes are made for pentodes, and these, too, ensure that the correct conditions are observed.

CHANGING OVER TO A.C.

THERE have been many grumbles to the effect that local authorities have changed over to A.C. from D.C., and have failed to make good the losses entailed by listeners in adjusting their wireless apparatus to the alteration.

We cannot help thinking that it is often the listener's own fault that he is occasioned loss. We venture to think that it is seldom that listeners take the proper steps in the first place.

How many, for example, notify their supply companies when they first install wireless gear? Yet this should always be done in fairness to the authorities and for the consumer's own benefit.

If the supply authorities are written to in the first instance and full details volunteered concerning the proposed installation, they are given the opportunity to advance their views on the matter.

And if and when they have given an O.K., the listener's responsibility has ended. He has the assurance that his apparatus is approved by experts; that at least it can be assumed to be safe to install and use.

Their Responsibility

Then when the time comes that a change from D.C. to A.C. is to be made, it can reasonably be advanced that it is the responsibility of the supply authorities to make good any financial loss incurred by the listener.

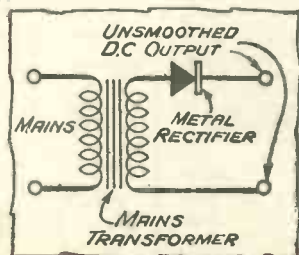
They have said that certain apparatus is suitable for their supply. If they change the supply at some subsequent date, then it is just that they should provide cover for their consumer.

If, however, the listener did not take initial steps on the lines of the above, and the local supply authorities deny liability (and this has happened), then he must either scrap all his present gear and purchase an entirely new outfit, or attempt to modify it for A.C.

It is frequently not difficult or particularly expensive to adapt D.C. mains units for A.C. working, especially if it is a home-made instrument.

The only real difference between a D.C. and an A.C. H.T. unit is that the

FOR D.C. UNITS



A simple rectifier unit will render some D.C. apparatus useful on A.C. mains.

latter has a rectifier and the former has not.

A simple rectifier unit can be made

VERY ECONOMICAL



Even a large A.C. mains unit such as this costs little to run.

up, and it is better to use a metal rectifier for such a purpose, for this will need no filament current, as does a valve rectifier, and so a simpler type of mains transformer can be used.

We are not in favour of drastic modifications unless the listener is well versed in radio theory and practice. For instance, we do not commend the inexperienced to attempt to alter a D.C. set into one capable of working from A.C. mains.

Perhaps the best scheme of all is completely to dismantle the outfit and use as many of its component parts as possible for the construction of a new design.

However, going from D.C. to A.C. is a move in the right direction. There is much greater scope with A.C., and also it is vastly more economical.

THE NEW PUSH-PUSH

OUR postbag this month contains scores of letters from readers who want our opinion of quiescent push-pull. It is very pleasing that, working anonymously as we do, we, the compilers of "Better Radio," should be regarded by large numbers of radio enthusiasts as the leading critics of current technique and design.

Perhaps that is because we have expressed very definite personal opinions on certain subjects, and thus have proved that we are not prepared to accept without personal practical test and proof many things which others may care readily to regard as above suspicion.

In respect of quiescent push-pull we again venture to express opinions which, perhaps, might be in part at variance with those of many of our contemporaries.

We have now had some considerable experience of Q.P.P. and must say right away that we consider it a most attractive proposition.

It not only works, but it works exceptionally well.

We believe that many set manufacturers will adopt the system for their battery sets. (Some may have done so before these words appear in print.)

We are also of the opinion that it will prove popular with home constructors, but—and this is where we will probably differ from many experts—we do not predict anything in the nature of a

"riot" so far as the home constructor is concerned.

Q.P.P. will not, we think, be of great interest to the tens of thousands of home constructors in what we may term the "Det., 2 L.F." and "S.G., det., L.F." class. And that is, of course, where the bulk of the home constructor trade lies.

But for the battery set man who now ventures above about 10 milliamperes of H.T. in an attempt to develop unit watts of power, Q.P.P. is a boon indeed. It costs thirty shillings or so over and above the cost of an ordinary circuit in initial expense. It is worth it. There would indeed be a "riot" if Q.P.P. were possible at no extra expense!

We do not propose to discuss the system in detail, for this has already been most ably done in "M.W."

COMPENSATING TRANSFORMERS

ANOTHER new development of considerable importance and interest is the production by several manufacturers of compensating L.F. transformers. In regard to these, we venture to suggest that if these new components do not receive an extremely warm welcome it will be a very great pity indeed.

For years we have carried the burden of the "straight-line" fetish. So intense has this been that no one has dared to depart from the over-beaten track in any particular.

The reason, we think, was the independent production by numerous firms of the individual items of a radio set. To guard against fortuitous coincidence, it was and still is the aim of independent radio industrial units to produce set parts of standard and fixed efficiencies—regardless of the limitations imposed by a radio reception outfit as a whole.

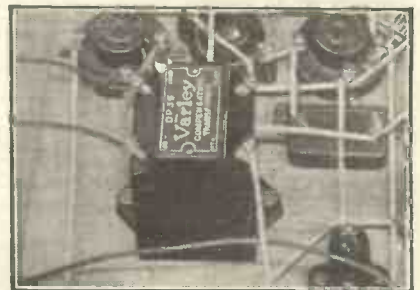
Possibly it was an essentially sound procedure, but while its safety-first tenets were adhered to, progress was to some extent stifled.

To cut generalisations, it can be stated categorically that it seldom, if ever, happens that a "straight-line" is the best characteristic for an L.F. transformer, taking into account the over-all response of the average set.

Especially is this the case in the popular "three," where reaction is resorted to for all but the local station, where peak tuning is affected and where the loudspeaker is more likely to have a semi-circular curve than a dip at one end, let alone a straight line.

Peak tuning cuts off the higher frequencies, and so does reaction. The average loudspeaker may be deficient in bass, but that is where reaction can actually help, for reaction emphasises the bass.

NO ADJUSTMENTS NEEDED



One of the new compensating transformers.

But what about those poor high notes?

This is where the compensating transformer comes in. It is peaked at the higher frequencies and can thus

Some Intriguing and Useful Devices Described

restore losses at that end of the audio spectrum.

There must be at least two million sets in use which would be vastly improved were they to have compensating L.F. transformers instead of ordinary ones.

The new component has been introduced in a way which suggests the manufacturers anticipate that listeners will at once appreciate its advantages. It is being retailed at the price of an ordinary transformer, and that means it is already in mass production in anticipation of mass demand.

For the sake of any future new device of an equally valuable nature, we trust that the radio industry will not be disappointed and that there will be an immediate rush to buy the device.

We have tried compensating L.F. transformers in a round half-dozen sets, and in all cases their presence was at once noticeable. The improvement in results really was very great indeed; anyone would have heard it right away.

nature of the material which keeps them apart.

In the electrolytic condenser, the one plate comprises aluminium foil and the other a chemical solution to which external contact is made by the containing metal can.

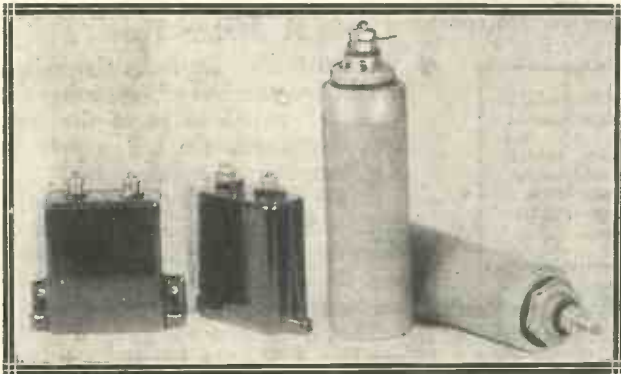
Normally the chemical solution will also be in contact with the foil, but as soon as an electrical current is passed through the component, an electrolytic action is set up, there is polarisation, and a thin film of gas is formed between the solution and the aluminium foil.

We now have a condenser, and one of comparatively very high capacity for its size, because of the extreme thinness of the dielectric, the film of gas.

Same Polarity

It will at once be obvious that the electrolytic condenser is no complete alternative to the ordinary type. In the first place, it is necessary that it should be subjected to electrical pressure all the time. However, this condition can be observed when it is

A STRIKING COMPARISON



The electrolytic condensers (on right) each have a capacity of 2,000 microfarads. Compare their sizes with those of the 2-mfd. "paper" condensers shown.

ELECTROLYTIC CONDENSERS

YET another innovation upon which we feel we have to comment, is the manufacture in this country for the first time of dry electrolytic condensers. But we must say right away that from a purely technical point of view opinions are sharply divided as to whether or not this type is equal to the wet type.

From a more practical viewpoint there is no room for argument. The dry electrolytic condenser can be made in square cardboard containers instead of as those rather awkwardly shaped wet types, which, as you will know, are invariably built into round cans.

Side Mounting

Further, the dry ones can be mounted on their sides, and constructors will at once appreciate the advantages of an oblong component, which can be mounted in any position, over a tubular one which must be kept upright.

Electrolytic condensers are extremely fascinating devices. Their construction is quite simple. We will first of all describe the wet variety.

Every condenser must have two plates of conductive material (or two sets of plates) separated by an insulating material. This last is known as the dielectric. The capacity of a condenser depends upon three things: the area of the plates, the distance separating them, and the

applied for smoothing in practically all mains units and sets.

But it is very essential that the current be of strictly the same polarity all the time. There must be no reverse, or irreparable damage may be caused to the component.

Clearly, then, electrolytic condensers are of no value to us in purely A.C. circuits.

On the other hand, it is not correct to assume that they cannot handle A.C. currents. If that were so, then they would be useless in smoothing circuits, for a certain amount of A.C. is often inevitable in these.

It is a question of proportions. There must be a certain polarising current always flowing through the component in the one direction, and there can be a degree of A.C. which will not affect the operation of the device.

In the so-called "dry" electrolytic condenser, a paste is used instead of a fluid. The paste is approximately of the consistency of the paste used as an electrolyte in "dry" batteries. It is debatable whether either article is in fact completely entitled to the description given it!

However, it cannot be gainsaid that for all practical intents and purposes the component is "dry."

"LOGARITHMIC" RESISTANCES

IT has only lately been realised that an ordinary variable resistance or potentiometer makes a poor volume control. Rotation of its

knob is followed by equal variations of resistance.

And usually that means equal variations in amplification. But that is not what we want. We require equal variations in volume to follow adjustments of the volume control. In fact, we want a "volume control" in the literal rendering of the words, and not an "amplification control."

Volume Control

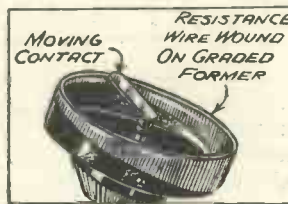
The writer believes he was the first one to point this out. And that is now a matter of five or six years ago!

However, after all the broad issues of progress were perfected and revolutionary invention appeared to become a thing of the past, attention was turned to detail. And one of the details to be dealt with was the volume control.

There are now quite half a dozen different makes of "graded" or "logarithmic" potentiometers and volume controls available.

In these, equal movements of the control are not followed by equal differences of resistance. There is gradation so that the resistance change follows a "log" law. The result is that the volume adjustment is spread out. Instead of there being little or no change until somewhere near the end of the adjustment is reached, when a sudden and most marked change occurs, a smooth and equal variation of "loudness" is given "from a whisper to a shout." At half way there is half volume, at a quarter way, quarter volume, and so on.

HOW THEY WORK



Showing how the former of a "log" resistance is arranged.

BOX BAFFLES

THE fact that the B.B.C. employs a certain construction of loudspeaker does not appear yet to have occasioned a rush on the part of listeners to emulate this practice of high authority.

That is, speaking in terms of millions of loudspeakers.

We wonder why this is?

There is no doubt at all that the evil which the B.B.C. set out to destroy in their patent loudspeaker construction is a very widespread evil.

We refer to "box resonance." This is the tendency for all enclosed spaces to act like an empty bathroom when you sing in it!

A loudspeaker diaphragm emits sound waves from its back as well as its front. And if its back projects into a closed cabinet, it will be obvious that unless special steps are taken there is going to be serious resonance.

All the first-class loudspeaker manufacturers design their loudspeaker cabinets so that there shall be a minimum of resonance, for this evinces itself as a horrible booming and general muzziness which badly upsets the overall response of the instrument.

The B.B.C.'s method is to introduce special sound-absorbing material into the cabinet. This material is some-

thing like unbleached cotton-wool in appearance, and it is most effective.

They have licensed a firm to exploit their patent, and as they do not seem to give it microphone publicity there would appear to be no valid objections that can be raised against the practice. But we cannot help wondering if one day the noble Corporation will follow the same procedure with receiving circuits, in which case no doubt there would be rather more comment occasioned!

ABSORBING BOOM



A special sound-absorbing material is built into the cabinet.

SIMPLIFYING TUNING

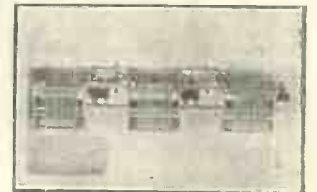
IT may seem curious that no mention has yet been made in "Better Radio" of that ingenious and highly useful component, the extender. But we have not been ignorant of its existence.

As it happens, there have been several articles in other sections of MODERN WIRELESS about the extender during the past two or three months. But as we appear to have a "novelty" issue of "Better Radio" we are bound to say something concerning it even at the risk of some degree of repetition.

Some may consider that the extender has run its course. We do not think so. In our opinion its popularity will extend during the coming year.

Obviously, constructors have not been unconscious of its advantages, for we are given to understand that many tens of thousands have been sold in this country.

AUTOMATIC SWITCHING



A three-gang extender.

A further stimulus will be given to it during the next few months by the fact that Germany has taken it up.

We ourselves have used extenders on our home sets for a long time, and would find it difficult if not impossible to go back to separate wave-changing and the confusion of one set of dial readings serving two wavebands.

The attractions and advantages of the extender are great, and in two- and three-gang applications it constitutes a definite technical advance.

TROUBLE TRACKING



WHY does my H.T. battery run down so quickly?"

This is a common complaint. If only the H.T. battery could supply current indefinitely!

The trouble is that so many listeners never realise the limitations of the dry cell.

Work a battery of this type at its economical rate—I am speaking of current output in milliamperes—and it will give excellent service.

But overwork it and its life will be a short one.

The modern power valve and, to some extent, the S.G. valve have made the task of the battery manufacturer difficult.

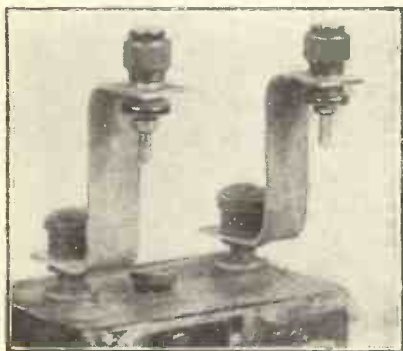
The Maker's Warning

He has to supply batteries to the public, not knowing how many valves are going to be worked from them.

More often than not the number of milliamperes taken from the small cells is in excess of the battery's rated output. The maker is frequently blamed in spite of his warnings about output and so on.

The fact of the matter is that those listeners who complain so bitterly about the short lives of their H.T. batteries are usually the ones who purchase a unit comprising the smallest sized cells and then expect it to supply anode current to a super-

A TIP WORTH TRYING



Here is a practical tip for those who get trouble from corroded accumulator terminals. The two extension strips are cut from sheet lead, and once they are secured into position the accumulator terminals can be plentifully smeared with vaseline and left.

power valve taking umpteen milliamperes.

I have stressed the point before, and I do so again. If you have a super-power valve, or if your set requires more than 8-10 milliamperes, buy the biggest battery you can afford.

Measure the Current

It will pay you in the long run because the large cells are designed to withstand comparatively heavy loads.

Alternatively, get somebody to measure the total anode current con-

Every month the Chief of the "M.W." Query Department discusses some of the common difficulties which can often be so troublesome. This time he deals with a much abused accessory, the H.T. battery.

sumption of your receiver if you don't happen to possess a milliammeter yourself.

Then ask the battery makers for their guidance, and follow their advice.

On the other hand, batteries do not always run down quickly because the valves require too heavy a current. A defective component may cause the trouble.

A leaky by-passing condenser is one possibility. Take for instance the condenser that is joined from the screening-grid of an S.G. valve to L.T.— or the "earthed" screen.

Since H.T.+ is connected to the screening-grid, any leak across the condenser (between the plates, owing to a faulty dielectric) will result in a permanent drain on the H.T. battery. No battery made can be expected to stand up to this sort of thing for long.

Permanent Leak

Other possibilities are leaky L.F. decoupling condensers, although fortunately the drain will not be very high since the decoupling resistance limits the discharge.

But the point to bear in mind is that even if the leak is a fraction of a milliamperes, it exists day and night and not only when the set is switched on.

This is one reason why good insulation is so important and why it pays to check up the current consumption with a milliammeter.

A Meter Test

When testing for leaks the valves should be switched off, assuming the "on-off" switch to be of the type that disconnects the L.T. supply to the filaments and nothing else.

If the "on-off" switch breaks the H.T. circuit as well—and some of them do—the switch can be left "on" and the valves withdrawn from their holders.

Then if the meter is inserted in the common H.T.— lead or in series with each H.T.+ connection, a leak between H.T.+ and H.T.— will be shown up by a deflection of the needle.

A reader asks me whether a set will continue to work if one of the L.F. transformer windings is broken.

Now this is not an easy question to deal with.

Transformer Troubles

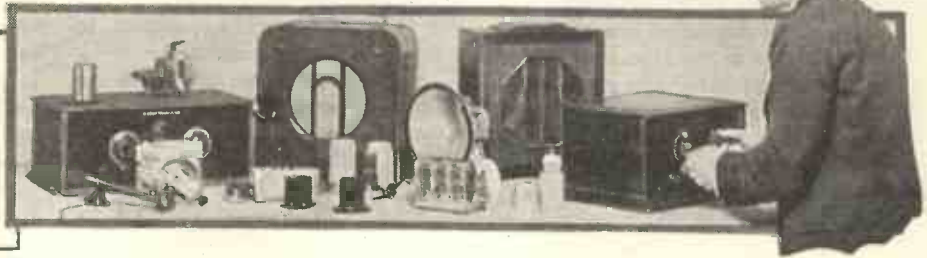
If the primary winding has a definite break no anode current will flow through it to the anode of the valve, and the set will not work.

But in the case of a disconnection in the secondary winding, at a point along the winding, I have known a set to continue to function, although not at full volume.

How often do transformers give trouble due to faulty windings? Very infrequently these days! It is true that theoretically the windings of such fine gauge wire are liable to develop breaks through mechanical movement of the turns, but the latest methods of winding and the careful testing these instruments receive places them among the most reliable of the various components used in a radio receiver.

AT YOUR SERVICE

by
**OUR TRADE
COMMISSIONER**



A New Radio Fashion

I HEAR that a unique fashion has been inaugurated by many of the gramophone dealers' girl assistants in all parts of the country. It seems that every time H.M.V. deliver a new radiogram the female staff of the recipient firm scrambles for the flannelette coverings which protect the cabinets.

This material is used for making pyjamas, overalls or other feminine garments, and the contest for the material has become so intense in some parts that the proprietors of some shops have made a rule that the person who sells the radiogram shall be entitled to the covering material.

One girl has made a pair of pyjamas from the covering of an 80-guinea radiogram, while another used the material from a table model for a pair of hiking shorts.

On Top of the World

From Mullards comes the news that in their latest effort to conquer Mount Everest, the British expedition which is shortly leaving this country is relying very largely on radio to enable the advance exploring party to keep in touch with the base camp.

Several camps will be established, all equipped with radio, and at the base camp will be a powerful commercial-type transmitter. At No. 3 camp, some 21,000 feet up, will be a portable equipment which will be a redesigned ex-W.D. trench set rebuilt to operate on 60 and 120 metres on C.W. Mullards are supplying two P.M.4 valves for it, the maximum input being some 15 watts. The H.T. is supplied by a hand generator, while L.T. will be taken from Siemens' inert cells.

The whole installation is extremely compact and light, and can be carried by one man. The transmitter is fitted with folding legs, and measures, when closed, only 9 in. by 9 in. by 11 in., while the accessories, six spare Mullard valves and spare low-tension

Some trade news and views that are of interest to readers, whether or not they are connected with the radio industry. Members of the trade are invited to send items of interest or photographs, to be included under this heading.

cells are contained in two oiled teak cases lined with felt to withstand mechanical shock and low temperatures.

It will be the duty of this equipment to maintain touch with the base

camp, which is situated some ten miles away. A still more advanced camp, No. 4, is connected to camp No. 3 by land lines, and messages sent from this station will be relayed by radio to the base. It is from this most advanced camp that the final effort to reach the summit will be made, and beyond this point no permanent means of communication is deemed feasible.

Sovereign Mains Unit

The latest addition to the list of Messrs. Sovereign's products is a mains unit for use on D.C. mains. It is capable of providing 25 milliamps. at 120 volts, or 15 milliamps. at 150 volts, and is priced at 32s. 6d.

BROADCASTING NEW YORK OPERA



The National Broadcasting Co.'s box in the Metropolitan Opera House in New York, whence operas are broadcast throughout the continent. The window at the back is that of the commentator's room.

Q.P.P. Receiver

The trade has leapt enthusiastically at the "new" quiescent push-pull method of output valve coupling, and sets are rapidly being put on the market using this system. One of the first to arrive was the Aerodyne Hawk, made by Messrs. Hustler, Simpson and Webb, Ltd., of Walthamstow, which gives an output of well over 1,000 milliwatts. It is not my province to criticise the set from a technical point of view, but if you want plenty of volume with lower H.T. consumption than the normal type of battery set can give you, you should certainly cast your eye in the direction of Walthamstow

Four Million Gramophone Records of One Star

The Component Show

The trade component show held last month was a great success and full of interesting developments, some 70 firms packing into the hall. Many showed Q.P.P. parts, while a number of new transformers made their first (or nearly first) appearance during the three days on which the show was held.

Colvern had some of the new Ferrocart coils on view, while the universal model of the Garrard record-changer created much attention.

A Novel Celebration

Our inimitable comedienne, Gracie Fields, has personally pressed her four-millionth H.M.V. gramophone record, afterwards celebrating the event in true Gracie style, assisted by others, including the Press, at the Trocadero. It is a great achievement to be able to say that 4,000,000 of those wonderful black discs, containing Gracie's voice, have gone out into the world, and the occasion was novel from the start when the invitation to lunch with Gracie was sent out in

unusual nature. Records and Lancashire were obviously uppermost in the minds of the organisers.

The tops of the round tables themselves were in the form of records, the centre being taken up with a large facsimile of the label of one side of the four-millionth record. The table tops were even grooved to scale to represent the faces of discs.

Musical Menu

Before each guest's place was another special H.M.V. gramophone record, on one side of which was pressed "Play, Fiddle, Play," which is one side of the four-millionth record, and on the other a song entitled "A Musical Menu." This was played to the guests before the luncheon commenced, and consisted of a song composed specially for the occasion, sung by Miss Fields, in which all the courses of the Lancashire meal were introduced.

Broth, fish and chips, hot-pot, apple pudding, tea and ale provided an authentic Lancashire lunch, and the waitresses wore clogs and shawls which had been sent specially from Lancashire.

Among the guests of "His Master's Voice" were Gracie Fields' mother; her husband (Archie Pitt); Councillor Dutton, the Mayor of Rochdale (where Miss Fields was born); Mr. White, her schoolmaster; Mr. Robert Brierley, her clog-maker and Mrs. Bertha Schofield, an old friend of the family who keeps an off-licence in Rochdale.

Unusual Replies!

Every department of The Gramophone Company which has been involved in the production of the millions of Gracie Fields' records was represented, including the recorders, the men that press the records, and even the packers. The chairman was Mr. Richard Haigh, English Manager of "His Master's Voice."

Representatives were also present of every entertainment venture which benefited by the artistry of Miss Fields, including Mr. Bert Aza, Messrs. Brown and Sharman, of the B.B.C., Mr. Basil Dean, who has produced her two films, and Mr. Sol Newman, Managing Director of Radio Pictures, who had distributed her films.

It is interesting to note that many of the guests who received recorded invitations sent their replies by

unusual methods. These included a block of type in which the words were cast from a linotype machine, a reply in Morse code from the editor of a well-known radio paper, and a recording on sound film from the managing director of Radio Pictures.

CLEAN DESIGN



The back of the latest chassis Ferranti electric clock shows wonderfully clean design.

For D.C. Mains

I am asked to announce that the H.M.V. "Superhet Lowboy" Seven is shortly to be available for D.C. mains operation. The voltage range of the new models will be 200 to 250 and the set will be similar in size and appearance to the A.C. type.

The circuit has, of course, been slightly modified, and has different valves from those used for A.C. The set remains a seven-valver although the rectifier is no longer needed, for the P.X.4 in the output stage has been replaced by two D.P.T.'s in parallel. The price is 32 guineas.

Q.P.P. Speakers

This month I am bound to have several references to quiescent push-pull, for not only have the transformer, the valve, and the set manufacturers gone almost "gaga" over it, but the speaker manufacturers have also had to sit up and take notice, providing special speakers, or speaker transformers, for the "new" system.

Among the foremost here are Celestion and Epoch, both of whom have been busy with speakers fitted with special Q.P.P. input transformers. This is as it should be, for it is much better to couple the valves straight into the speaker transformer than to have to employ an intermediate transformer or choke link.

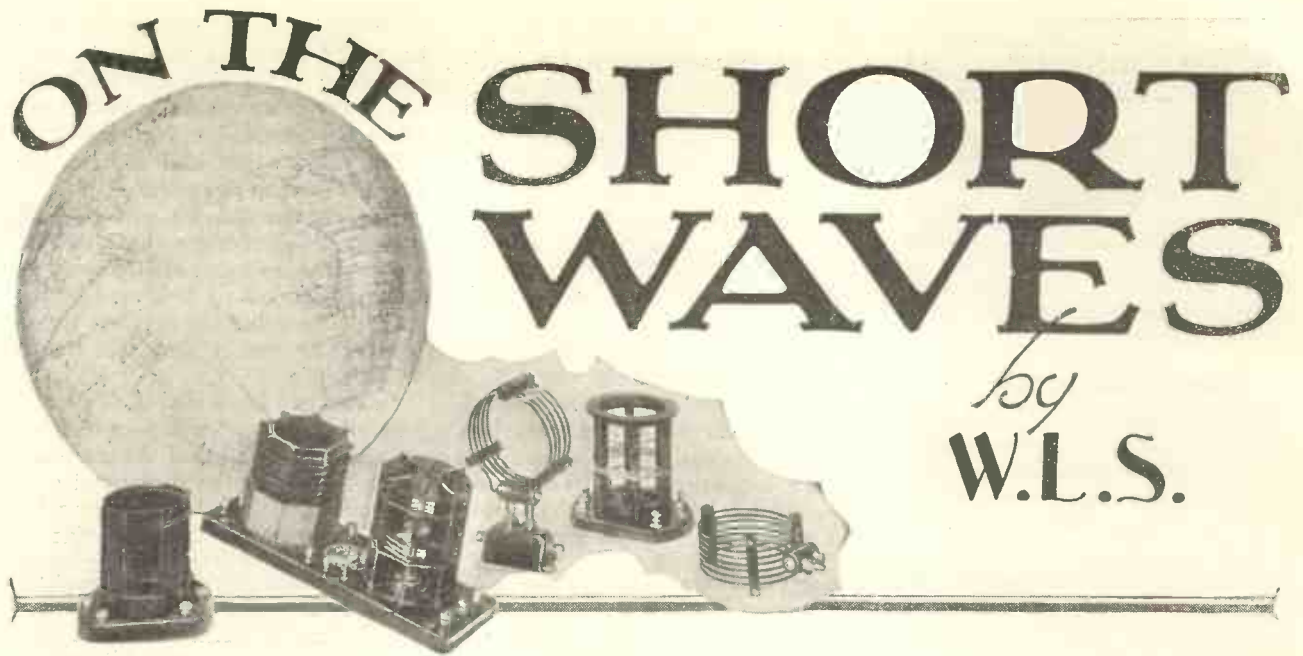
BROADCASTING BOW BELLS



The Vicar of Yardley Wood playing an H.M.V. record on his 50-watt amplifier, which he constructed for the vestry of his church. The amplifier is used to broadcast from the steeple of the church records of the famous Bow bells, the steeple being too small to accommodate a real peal.

record form, with her own cheery welcome on board. I need hardly add, in the much-hackneyed phrase of the society journalist of some years ago, "a good time was had by all."

The lunch itself was of a very



by
W.L.S.

WE are just about to enter into the period of the year that is usually the most interesting of all for short-wave people. March, April and May almost invariably show promise of good things (even if the good things themselves don't materialise).

February has seen the conducting, on the four week-ends, of the British Empire Radio Union tests, which proved, last year, that the "hams" were not dependent upon good conditions to make their presences felt in all the corners of the earth.

Eleven-Year Cycle

March will see the running of an interesting test, more of the "Traffic" type, by the A.R.R.L.—the American equivalent of the R.S.G.B. These tests have a stimulating effect upon "hams" who, like myself, have remained more or less dormant through the winter, and suddenly turns them into red-hot "fans" once more. ("Boy, bring me a flask of hot coffee and some sandwiches, for I would fain stay up all night.")

If we accept our old friend the Eleven-Year Sunspot Cycle (whose existence is proved up to the hilt) as having an equivalent effect upon radio conditions, it would be a very interesting business to find the "optimum" wavelength year by year. If we only had the eleven-year cycle to consider, naturally short-wave conditions would simply have been going steadily down

According to our popular contributor we are now entering the most interesting period of the year for short-wave reception. His review of the month's happenings is rendered particularly interesting by a summary of factors which govern "conditions"—that all-embracing term!—and he also gives some suggestions for obtaining a clean background by the use of R.C. coupling and a pentode.

since 1927, and about now the short waves would have ceased to have the slightest interest or to be the slightest use to anybody.

Luckily for all of us, there are more frequent sunspot-cycles which may be said to be "super-imposed" on the

every fifteen months and, sometimes, every seven and a half months.

The general effect, looking back over the five and a half years through which we have come, is certainly that of a number of periods of outstandingly good conditions, roughly fifteen months apart, each one being just a little poorer at "maximum" than the one before it.

Above 100 Metres

The entire curve looks like a section of the Himalayas, but if you join up the adjacent peaks and forget about the hollows between them you will see a fairish picture of our friend the eleven-year cycle.

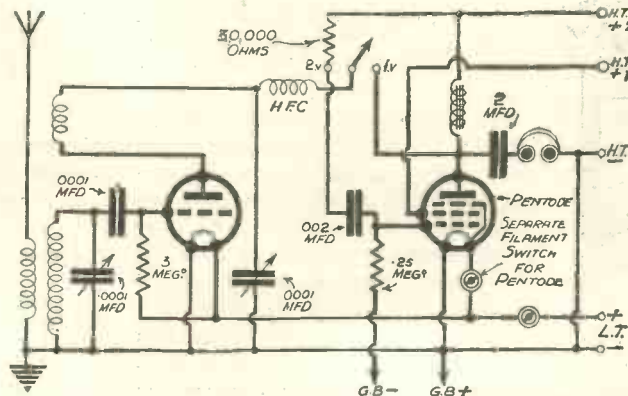
In all this I am referring chiefly to conditions below 50 metres.

The waves which have been less affected than any others by the changing conditions are probably those between 70 and 100 metres. Above 100 metres we see almost the inverse (or is it obverse?) effects to those we are concerned with lower down.

When, for example, has the reception of North American broadcasting on the 300-metre waves been as good as it has been this winter? As our short-wave conditions have gradually depreciated, the medium-wave stations from afar off

have been improving almost weekly.

Now that we are just about at the spot at which the tide should turn, we may expect to see a gradual fading-out of all this fabulous DX that we hear



HAVE YOU TRIED THIS ARRANGEMENT?

It is a detector resistance-capacity coupled to a pentode, and W.L.S. says it gives excellent results and freedom from background.

eleven-year monster, and are regarded in some quarters as being the ninth and eighteenth harmonics thereof. These take the effect of recurring periods of moderately good conditions



of on 300 metres, while our own beloved stations begin to look more like their old selves.

An Investigation

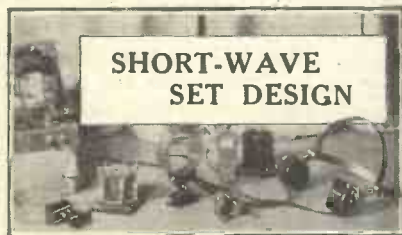
When I mentioned the "optimum" wavelength earlier on in this article I had in mind the fact that at any given point during the past five and a half years there must have been some particular wavelength on which signals were more consistent and more strongly received than on any other. I am going to have a shot at spotting this, first of all from my own logs, and then from the graphs that I have by me of the sunspot cycle.

Nothing startling has taken place in the short-wave broadcasting world since the successful inauguration of our Empire station. Reports have been pouring in ever since, and everyone seems vastly pleased with it.

New Arrivals

The most enthusiastic letters I have received are all from South Africa, where they appear to be having no end of a fine time with him!

Two new arrivals, however, have been Y V I B C (Caracas, Venezuela) and W I X A L (Boston, Mass), both in the region of 49 metres. Everyone with a short-waver seems to have heard them soon after they started up, so that there is no point in elaborating the news now.



The all-important matter of short-wave receiver design is claiming more and more attention among the commercial people nowadays. Of course, they have, in a way, an easier problem to solve than that of the amateur transmitter, or even the broadcast listener. The commercial concerns generally wish to build a receiver that is guaranteed to give 100 per cent reception of one particular station, day and night, summer and winter.

That being the case, they can use the most elaborate schemes for signal-frequency amplification, together with band-pass circuits and special "mush" filters. The ordinary amateur has no use for them, because he doesn't want what almost amounts to a "fixed-tuning" receiver.

Signs of Progress?

He wants to swish about with joyous abandon from 19 metres to 49 metres, picking up whatever little tit-bits he can find on the way.

"One hundred per cent reception," to be candid, doesn't interest him much. If he can receive a man well enough to identify him, he is satisfied; if he gets him well enough to listen to one or two items of the programme, he is delighted. If I may be pardoned, I would say, "Man wants but little here below."

All this is very nice and straightforward, but what signs of progress are we making from the point of view of the amateur and his receiver? Very, very little, I am afraid. He is still hopelessly at the mercy of the eternal "conditions," very real to him, but looked on by non-short-wave people as figments of the imagination, invented on the spot to excuse a rotten performance by a rotten receiver.

Where to Improve

After several hours of argument, followed by a good long think, I came to the conclusion, a few days ago, that the improvement has got to be with the transmitter, and that the receiver, as such, is all right. A friend started trying to get me to think on these lines, and he had a fairly tough time of it, but he did convince me in the end. (Although, bless him, he doesn't know it until he reads these words!)

I think that when one examines the log of a typical amateur short-wave transmitting station, and sees what is possible with 50 or 100 watts, one is compelled to marvel at the poor performances put up by some of the short-wave broadcasters using 50 kilowatts.

I know a "ham" myself that can work with the U.S.A. whenever there is a single American station coming over (however weakly) with an input of 30 watts. More often than not he can put understandable telephony across, even during poor conditions.

Simplicity Scores

Surely it is the absolute simplicity of some of these comparatively low-powered stations that accounts for

their efficiency. The same thing has happened time and time again with receivers; those that are neat and use short-wiring generally work well, while the glorified mouse-traps just make nasty noises and shorten the tempers of their operators.

If some enterprising person could design a short-wave broadcasting station with an input of 50 kilowatts, using as simple a rig as is used by the more successful of the amateur transmitters, he would show the world something.

Of course, I know that the "pro's" and "super-pro's" will pour derision on me, because a lot of them are too much tied up in the theoretical considerations. If they think a thing can't work, they won't take the risk of trying it.

ON "THE ELETTRA"



The Marchesa Marconi, who frequently accompanies her famous husband on his experimental yacht, "The Elettra," which is well known to short-wave listeners for its interesting broadcasts.

There are people like them among the ranks of the amateur transmitters—they generally have an outfit that looks like the Empire station or one of the Rugby short-wavers, and gets nowhere!

A Worthy Example

All this must not be interpreted to mean that I think the commercial designers, as a whole, don't know their job. Far from it! But I do say, most definitely, that 30 or 40 per cent of them don't, and that there are more inefficient and generally poorly-conceived short-wave transmitters about the place than one generally thinks.

The Empire station is a worthy example of what can be done by



Graham Farish says:—
“MY NEW OHMITES are
sweeping all before them...”

Because they can be specified by the experts with such confidence. They do not break down, and not being wire wound cannot give “rise” to unwanted noises or hum. For the A.C. “Diodion” and the “S.P.” Three the designers were most emphatic that my NEW OHMITES should be chosen above all other resistances to occupy such critical points.



SAFE MAXIMUM CURRENT CARRYING CAPACITY OF “OHMITES”

100° F. Temperature rise.

Ohms	Milliamps	Ohms	Milliamps
100,000	3.5	10,000	12
80,000	4.24	5,000	20.25
60,000	5	4,000	24
50,000	5.5	3,000	29
40,000	6	2,000	35
30,000	6.75	1,000	40
20,000	8	Other values pro rata.	

Heavy Duty type approximately double the above ratings. Price 2/3

The popular and efficient resistances for all general purposes. All values 50 ohms to 5 megohms. Each

1'6

A very carefully constructed instrument, compact in size and efficient in design, with accurately gauged bakelite dielectrics and solid brass pigtail connection to moving vanes. Made in all capacities up to .0005 mfd. in tuning, straight line capacity and differential types. Used by many leading manufacturers and specified in sets by famous designers. One hole fixing; supplied complete with terminals. Each

2'.



GRAHAM FARISH
COMPONENTS

MASONS HILL, BROMLEY, KENT.

EXPORT OFFICE: 11/12, FENCHURCH STREET, E.C.3.



SHORT-WAVE SET DESIGN

—continued

people who know the theory from A to Z, but are also real experts on the practical side. Certain other broadcasting stations throughout the Empire are also admirable in every way. But if you look through a list of short-wave stations and mark off some of those high-powered people who are heard unreliably or not at all, you will be surprised at the number of ticks you find on the list when you've finished.

A Good Circuit

When conditions (we're back on that subject again) do start to improve, some of these poorer stations will be shown up badly.

Now for a few more practical notes about receivers. Those who favour

the two-valver might very well try what I have been doing of late.

Instead of using a detector, transformer-coupled to a power valve or even another "H.L." type, just try the experiment of using a detector resistance-coupled to a pentode. The extra mag. obtainable from the pentode amply compensates for the absence of the transformer step-up, and I am prepared to swear that the background level is much quieter.

I have practically convinced myself that most of our background trouble in the past has come from the L.F. transformer. Some of the new types are greatly improving things, but they still seem to leave something to be desired.

Valve Switching

Last month I was using an "H.L." valve as detector, resistance-coupled to another "H.L." Now I have replaced the second "H.L." by a pentode, and am getting all the volume one could possibly want, even on the weaker telephony stations, without that awful nerve-racking accompaniment of "SSssssZZZZssH." The latter word is copyright, and entirely self-explanatory!



IN NEW YORK

Lady Astor facing the microphones in New York for the benefit of a women's and children's charity in which she is interested.

When one wants weak C.W. signals I find that one valve is still preferable to two, and I have accordingly arranged a switch to cut the pentode out of action. The circuit diagram is shown in Fig. 1.

For an all-purpose receiver I honestly find this arrangement very hard to beat.

How many blind people are able to make their own sets? The question is raised by the remarkable achievement of Mr. John Archibald Godwin, of Greencourt, Weymouth, Dorset, in building a seven-valve superheterodyne set of modern design in spite of the handicap of total blindness.

Mr. Godwin, who lost his sight during the Great War, adopted home

SEVEN-VALVE SUPER
THAT WAS
BUILT BY A
BLIND MAN

construction as a hobby in 1925, and his "superhet" is only one of a dozen sets which he has built. It is a very fine instrument, with perfect tone and extraordinary range and power.

Memorised Circuit

In building the set, Mr. Godwin relied entirely upon the sound knowledge he had acquired during the past seven years of radio technicalities and upon an exquisite sense of touch. His usual procedure is to enlist the services of an amateur constructor who can read a theoretical diagram, and, having committed the details to memory, he requires no further assistance.

For obvious reasons, Mr. Godwin cannot use a soldering iron, and all the connections in his set are screwed down. The wiring is kept short, in accordance with modern practice, but on close inspection, one or two peculiar features may be noted.

Dials Marked in Braille

The tuning dials have large pointers, moving around discs which are

embossed with numerals in Braille. Battery connections are identified by means of beads threaded on the leads.

Passion for Experimenting

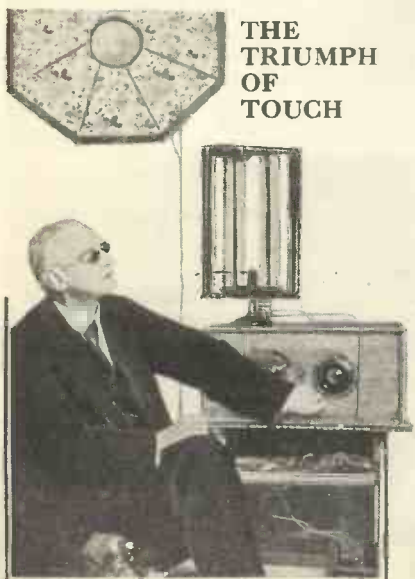
Mr. Godwin built the D.C. eliminator with which he draws high-tension from the mains, the cabinet, the table on which the set stands, and the loudspeaker, incorporating a moving-coil unit of the latest type. He has the home constructor's passion for experimenting, too.

When the MODERN WIRELESS representative called upon him, he explained, with a quiet chuckle, that he had just changed one of the condensers, making it necessary for him to calibrate the set all over again. The outlook of this remarkable man is supremely cheerful.

A Friendly Message

One can sense that, while he lives in an unseeing world, he has nevertheless captured from it something which many others who walk in the light have perhaps missed.

He expressed to us the hope that the success of his radio experiences might inspire some of his friends in the brave army of the blind to adopt set-building as a hobby, thus enabling them to derive additional benefit from the wireless.



THE TRIUMPH OF TOUCH

Mr. Godwin, of Weymouth, who built this superhet and its "eliminator," though he lost his sight during the Great War.



Don't Shoot the Pianist!

THE B.B.C., like the unfortunate pianist in the American saloon, is a conspicuous target for the bullets of a disgruntled populace. But it is doing its best.

Look at that Lady Oxford—Air Commodore Charlton debate. The B.B.C. develops a completely new technique for debates, fades in the contestants after they are well worked up and fades 'em out again before they have had time to get dull, and what do you listeners do? You write in your hundreds and complain because this debate was switched off to make room for dance music, or suggest that the engineer was afraid that both the speakers were losing their tempers and cut them out!

I blush for you all. No wonder B.B.C. officials die young or retire to the country and keep bees.

New Stars in the Sky

Somebody at Broadcasting House has been keeping eyes and ears open recently. As a result of last month's programmes several new stars are shining in the radio firmament.

Reginald Briggs, the page-boy whom you see on this page, was the most spectacular discovery, and is probably doomed to go through the rest of his life attached to the sobriquet, "The whistling page-boy." Such are the penalties of fame.

Listeners are probably more interested, however, in the discovery that one Guy Daebnitz can write most tuneful radio revues. With Mark Lubbock as the B.B.C.'s ewe lamb in this department, the advent of a new composer with a style all his own is an event worth celebrating. I hope that "Ring o' Roses" will merely be the prelude to much more

in the same vein. Who cares for the story? It's the tunes that count.

Not as Bad as That

Despite several announcements in all kinds of papers that Miss Dulcima Glasby had left the B.B.C., this talented author and play adaptor is still at Broadcasting House. You probably heard her adaptation of "Hassan" a few weeks ago, the feature of the month's dramatic productions.

Miss Glasby tells me, however, that she will cease to be official play adaptor to the B.B.C. this month as she wants to devote her time to the writing of original plays. There is a



THE WHISTLING PAGE

Reginald Briggs, the 14-year-old page-boy at the Piccadilly Hotel, has followed his success as a whistler with Henry Hall's dance orchestra by securing both gramophone and film contracts. Good luck, Reggie!

possibility, however, that Miss Glasby will continue with her most successful radio adaptations as a part-time job—a hobby which she will be able to share with her delight in collecting horse brasses.

An Inopportune Protest

Mr. Sydney Moseley, radio critic and television enthusiast, chose the wrong moment for a letter to "The Times" protesting that the B.B.C. was neglecting its duty to the public by insisting upon remaining "silent" for a great part of Saturdays.

Actually, of course, you will all have noticed that Saturday afternoons have recently been so packed with bright musical fare that it is difficult to know how to listen.

A continuous non-stop programme from twelve noon to twelve midnight doesn't leave very many waking hours during which the B.B.C. can insist upon being "silent." Fortunately it will need more than Mr. Moseley's opinions of the programmes to make out a case for those who are now urging that Parliament should be responsible for all broadcasting fare.

This Vaudeville Business

Vaudeville programmes continue to be as like the curate's egg as they have been for years past. Some of them are very good—others hardly bear thinking about.

There seems to be a tendency to overwork certain popular artistes to death. Miss Floy Penrhyn, for instance, who is quite a recent radio find, seems to appear in almost every programme. Fortunately Miss Penrhyn has realised that it is necessary for a radio artiste to present a new programme every time, and so far each of her offerings has been better than the last (that Test Match visit was a piece of real genius).

But this happy state of affairs can't last for ever, and I shall never forgive the B.B.C. if they ruin Miss Penrhyn's genius by flogging her material to death.

A Vaudeville Programme Suggestion

Here's a Suggestion—

Meanwhile, if the vaudeville director is trying to think of new ideas for original programmes, I would point out that we have not yet had a variety bill consisting entirely of "double acts."

Such a programme—which might be called "In Double Harness" or "Three's a Crowd"—could feature Flotsam and Jetsam, the Weston Brothers, Mabel Constanduros and Michael Hogan, Claude Hulbert and Enid Trevor, Alexander and Mose and, to round off the programme, Doris Arnold and Harry Pepper.

A really well-balanced bill could be made from these dozen names.

—And an Appeal!

Here's a chance for readers of MODERN WIRELESS to do a good turn to a radio enthusiast in the Atlas Mountains.

This listener, a Berber chieftain, has installed a receiver and now finds himself in trouble.

Let's Hear Them Again

I should think that light orchestras, quintets and the like must have a pretty big job to make a name for themselves nowadays. Gershom Parkington, Victor Olof, Leslie Bridgewater and Reginald King are names that want a deal of outshining.

Fred Hartley and his orchestra, however, have made a cosy nest for themselves as a result of their programme of dance music of the last fifty years broadcast last month.

Not only was this a jolly affair musically, but Harman Grisewood who was responsible for compering the show proved himself a serious rival to John Watt.

John Johnson and his orchestra, despite some odd preliminary publicity from a certain newspaper critic, proved themselves to be masters of harmony and rhythm.

These are two orchestras that

"Radio Times," who is soon changing his name permanently to Holt Marvel, is to be given an important post on the programme organisation staff. You didn't know that Holt ("Hansom Cab") Marvel and the fellow who writes those bright articles on the first page of your "Radio Times" every week were one and the same, did you?

—that our short-wave expert, W. L. S., who is a first-class organist in the intervals of listening to the other ends of the world, has been playing with, if not on, the new British organ which is going into Broadcasting House very shortly.

—that the fireman who, as he stood in all the glory of his uniform in the entrance of Broadcasting House, was greeted by a delightful old lady as "dear Mr. O'Donnell" still hurries furtively past the door of the Military band studio on his daily rounds.

—that "Mrs. Feather" has just been visited by burglars for the third time in as many months. It appears that the unwelcome visitors have been searching for some document or other.

In the Programmes

JEANNE DE CASALIS

Jeanne de Casalis, known to millions of listeners simply as "Mrs. Feather," was born in Africa of French parents. Actually she is just about as English as she could be; well, don't her broadcasts prove it? To say nothing of the fact that she is the wife of Colin Clive, of "Journey's End" fame.

"Mrs. Feather" has been on the air now for about eighteen months. Miss de Casalis never broadcasts any other "turn" and insists on writing all her own material.

"I get all my ideas and situations from real life," she told me, "and base my monologues on my friends—and on myself." So, when you next hear Mrs. Feather ordering kidneys from the butcher,



you will know that Miss de Casalis behaves in the same way at home!

Anyhow, there's nothing she likes better than broadcasting her. Mrs. Feather episodes.

For hobbies, Miss de Casalis plays golf and indulges in clay modelling. She is also very good at cooking—especially soups!

She has a delightful little cottage in Kent—wild horses won't make me tell you where it is—and when in the country she leads a real, old-fashioned "simple life."

Miss de Casalis confessed that she has already written one play which was not a great success, so she is writing another now.

"And another thing," Mrs. Feather called to me as I said good-bye, "I can't sew!"

His plea—published in the correspondence columns of "The Times"—is for information about "one of those small and inexpensive machines, to be affixed to the loudspeaker, which interpret into Arabic all air communications that are received from abroad in foreign languages."

Many of us would like an adaptation of the same machine for the purpose of translating into plain English some of the talks which are put out from our own stations—so, budding inventors, get busy!

we should certainly like to hear again.

They Tell Me—

—that the Gaumont-British sound engineers have turned the Kit-Cat Restaurant in London from the B.B.C.'s outside broadcast nightmare into a suitable home for Roy Fox. The B.B.C. hopes that new buildings will be designed with a view to broadcasting acoustics!

—that Eric Maschwitz, Editor of the

I trust the possibility of a jealous rival looking for broadcasting material has not escaped this most talented vaudeville artiste.

Our Thanks Are Due

Our congratulations this month go to Fred Hartley for his "Fifty Years of Tunes" programme; and to Guy Daebnitz for the music of that very cheerful show "Ring o' Roses."

PATRICK CAMPBELL.

B.I.

ENAMELLED WIRES

8 SPECIAL FEATURES

1. High dielectric strength and free from pinholes.
2. It is tough and will withstand severe handling.
3. Enamel is highly elastic and will not readily fracture.
4. Will resist temperatures which would char any fibrous insulation other than asbestos.
5. Under ordinary conditions, retains all its qualities year after year.
6. The enamel is non-hygroscopic, thus avoiding short circuits where damp occurs.
7. The gauge of the wire, both under and over the enamel, is accurately constant, making it ideal for coil winding.
8. Entirely British made.



The B.I. have been manufacturing enamelled wire since it first came into use, and long experience, constant research and the use of the finest machinery available have led to the production of B.I. enamelled wires of a consistently high standard of quality. For all fine windings where economy of space is essential, there is nothing to compare with the perfect insulation of B.I. Enamelled Wires, which are made in all usual sizes down to 0.002-in. diameter. Write for full particulars.

BRITISH INSULATED CABLES LTD.

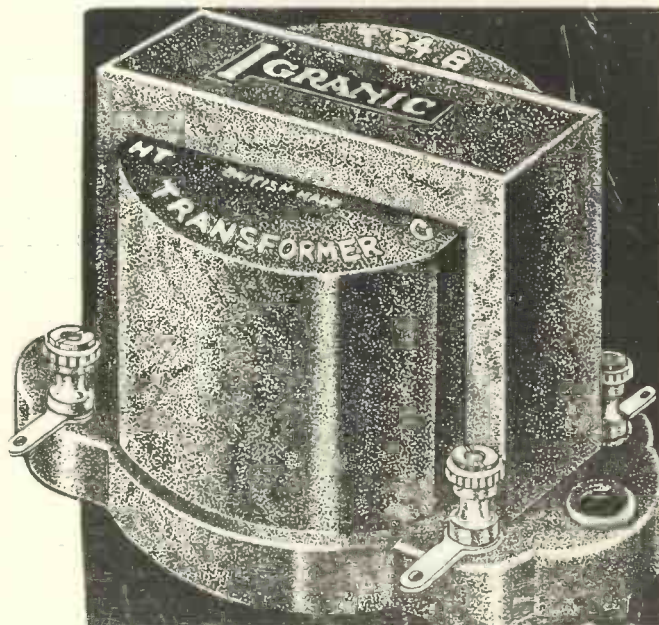
CABLEMAKERS AND ELECTRICAL ENGINEERS

PRESCOT—LANCS

Telephone No. : Prescott 6571.

London Office : **Surrey House, Embankment, W.C.2**

Telephone Nos. : Temple Bar 4793, 4, 5 & 6.



"My Igranich transformer was made in December, 1924 . . . has been in constant service ever since . . . outlived all other components purchased at the same time. This performance reflects great credit on your transformer . . . wonderful service."—J. D., Glasgow. Extract from letter.

T24B TRANSFORMER

Igranich, with their long experience of wireless construction, have perfected a general purpose transformer at a reasonable price — you can be certain that it is the best of its kind. The Igranich T24B Transformer reproduces over the whole scale of musical frequencies.

Ratios 3 — 1 and 5 — 1. Price 5/6.

Write to-day for fully illustrated Catalogue No. J.1242 of complete new range of Igranich Quality Components.

Igranich Electric Co. Ltd.,

149, Queen Victoria Street, London, E.C.4.

IGRANIC COMPONENTS WILL BE THE MAKING OF YOUR SET

REFRIGERATED RADIO

At very low temperatures the resistance of wire almost vanishes, an effect which leads to most interesting results. When a current is induced in the wire it tends to "go on for ever." These effects are described

By J. F. CORRIGAN.

ABSOLUTE zero, as no doubt you will remember, is that degree of coldness at which a material body possesses no heat at all. You can (theoretically) heat a thing to any degree of temperature, but you cannot cool it down below absolute zero, because, as I have said, at that point it possesses no heat at all; and, obviously, you cannot take away heat from a thing when no heat remains to be taken away from it.

Absolute Zero

Let me say here, of course, that absolute zero has never yet been completely attained. By calculation, it may be shown that when you have cooled a body down to a temperature of 273 degrees below the freezing point of water you have reached a point at which no further heat remains in the body. That point is called absolute zero. On the Centigrade scale it is referred to as -273°C .

Now, although absolute zero has never yet been attained, a temperature of -271°C ., or perhaps slightly less, has definitely been attained on several occasions, and it is at this extremely low temperature, when a body has given up practically all its heat, that strange effects have been found to take place.

The effect of this intense cold, which is really of paramount interest to all electrical and radio theorists, is this:

At or near absolute zero, an electrical circuit shows *no loss at all*. Its resistance practically completely vanishes! A current started in such a refrigerated circuit tends to conserve itself and, like Tennyson's little brook, to "go on for ever."

Solid Gases

Professor Kamerlingh Onnes, of the University of Leyden, in Holland, is the scientist who has done the most work on the attainment of this rather mysterious absolute zero.

Professor Onnes obtained these extremely low degrees of cold by methods involving the rapid evaporation of liquid hydrogen and liquid helium, during which processes these liquefied gases become frozen solid,

and, in freezing, abstract all but the very last traces of heat from any object which they surround.

At temperatures below -270°C .—that is, within 3 degrees of absolute zero—Onnes found that astonishing effects take place in simple electrical circuits.

A narrow glass tube containing a thread of highly-purified mercury, and shaped to form a complete ring-like circuit, when cooled to below -270°C ., completely lost all its electrical resistance! Or, at any rate, the electrical resistance of the circuit dropped to less than one five-billionth of its resistance at room temperature.

EFFECTS OF COLD



Very low temperatures have peculiar effects on all sorts of things. Sweet peas, for instance, become very hard and brittle.

A magnet which had previously been placed within the metallic ring was suddenly withdrawn, thus setting up an induction current in the mercury ring forming the closed circuit. This current could be detected flowing round and round the refrigerated mercury ring hours after it had been induced.

Persistency

In another experiment a coil containing 1,000 turns of lead wire allowed a current of 50 amperes to flow round it for more than an hour without giving rise to a loss in current strength of more than 1 per cent after the elapsion of that time.

Other metals were experimented with. Three of them—tin, lead and thallium—in addition to mercury, all showed an almost complete loss of resistance in the neighbourhood of absolute zero, whilst other metals—gold, platinum, copper, iron, cadmium, to mention some of them—although they showed an enormous drop in resistance at this extremely low temperature, did not quite completely lose their electrical resistance in the way in which the former metals did.

Resistance Annihilated

Electrical resistance has seemed to be almost as inseparable an attribute of matter as its weight or its property of inertia. Here, however, we see electrical resistance being completely annihilated.

So what, I wonder, would be the effect of cooling down a radio set to the neighbourhood of absolute zero? Obviously, of course, the valve would cease to function, the emission of electrons from the surface of the filament being essentially a heat effect.

But conceivably one could so arrange matters that the valves of a receiver remained at ordinary temperatures whilst the rest of the apparatus was plunged into the depths of cold.

Frozen Circuits

In these practically heatless regions of the thermometric scale, would the condensers cease to "condense"? Would transformers give rise to miracles of transformation? Would coils and closed circuits, having their resistances almost completely lopped away by the intense cold, tend to conserve almost indefinitely the currents which flowed in them?

I am inclined to think that refrigerated radio, under these conditions, would be rather impossible. In the years to come such developments in the radio world may possibly be startling, but for the present radio at normal temperatures is enough to satisfy most folk.

Flowers can be broken into small pieces like glass after immersion in the temperature of liquid air





On the TEST BENCH

Our comments regarding some interesting new components.

From Messrs. Ward and Goldstone

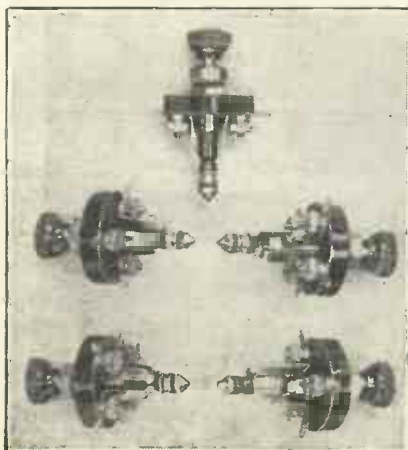
A NEW series of "Goltone" push-pull switches has recently been placed on the market. There are five types covering all the usual requirements.

They are particularly well-designed components and, although their actions are definitely easy, their contacts are much superior to those commonly associated with this class of switch.

Contact tests carried out with the two-point type have shown that it requires a leverage of no less than 2.1 pounds to lift the contacts from the centre contact ring.

In the case of the single-pole double-throw "Goltone" switch a leverage of 2.75 lbs. is required for the medium-sized spring, and 5.2 lbs. for the smallest one.

A most excellent feature of all "GOLTONE" PUSH-PULL SWITCHES



The five types described.

these "Goltone" switches is that they can easily be fixed on any thickness of panel from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. This is made possible by the provision of two lock nuts and two fibre washers.

The one nut and both washers can be removed without in any way interfering with the operating or firmness of mounting of the switches.

A further good point is that all the screws are well recessed to avoid short circuits on metal panels.

It will be seen from all this that Messrs. Ward and Goldstone have designed their switches with considerable foresight and skill.

Loudspeaker Development

The new W.B. loudspeakers known as the Mansfield Models incorporate a new and patented magnetic system of an ingenious and very effective nature. The pole pieces, instead of being composed of soft iron as normally, are fashioned from a highly efficient cobalt steel possessing magnetic qualities of a most superior nature.

The back piece, which forms the remainder of the magnetic circuit, is not cobalt but is an alloy having a high degree of magnetic "conductance." So this can be bolted to without affecting the efficiency of the magnetic system.

By virtue of this special Mansfield system, the W.B. loudspeakers achieve excellent sensitivity without the necessity of an over-critical closeness of gap.

Indeed, they are very robust instruments which are not likely to develop faults such as are met with in some moving coils, unless very roughly handled indeed.

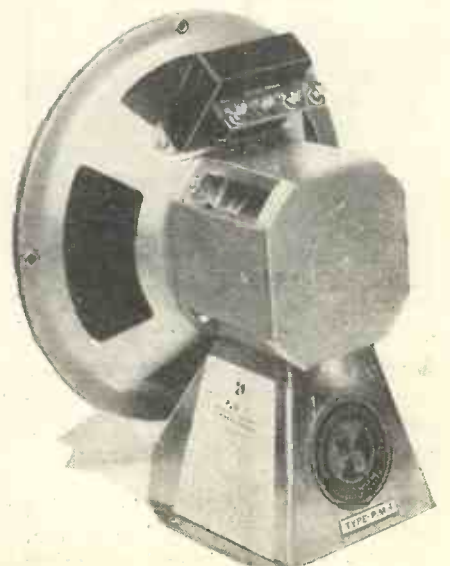
They are particularly good on the upper register where the response is crisp, clean and free from noticeable peaks. But there is also a first-class rendition of the bass.

For Short Waves

There are few margins to play with in short-wave reception, and losses which are barely appreciable on the medium waves or on long waves may assume very serious proportions indeed.

The first essential in a successful short-wave receiver is that the components should be above reproach. One of the most important items is the H.F. choke. Unless it is of first-class design and construction, a good reaction control will be impossible.

A W.B. PERMANENT-MAGNET MODEL



This loudspeaker unit employs a patented magnetic system.

Components of the Month Reviewed

And in S.G. stages there can be no amplification at all if the H.F. choke employed is not efficient.

Among the H.F. chokes for short waves which are definitely up to the required high standard demanded for this exacting work, is the Dubilier. It is one of a range of H.F. chokes made by this famous firm.

It is of the completely enclosed type, and is a very compact and neat component. We have used it in various short-wave outfits, and in all cases it has proved highly satisfactory.

We can recommend it to all constructors.

T.C.C. Subdivided Condensers

The Telegraph Condenser Co. is now making a useful range of subdivided condenser blocks which should prove of particular interest to constructors of mains sets and units.

There are no less than six of them. 87A/02 has a total capacity of .02 mfd. and comprises two .01-mfd. sections with a common negative soldering tag. It is tested at 1,000 volts D.C., and is designed to withstand a working voltage of 440 volts D.C. and 300 volts A.C.

THE DUBILIER H.F. CHOKE



A compact and efficient H.F. choke for short waves.

125A has two .1-mfd. effective sections, although there are actually four .2-mfd. series units, so that a working voltage of 500 volts raw A.C. can be achieved.

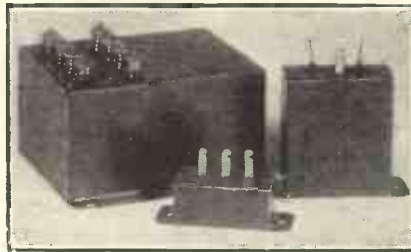
A third particularly interesting model is R.M.12, which has a total capacity of 12 mfd. and comprises two 4- and two 2-mfd. sections all having a common negative terminal.

This model is tested at 500 volts D.C. for a working voltage of 250 volts D.C.

S.B.1 has two 2-mfd. sections, and one of 4-mfd. The latter is tested at 750 volts D.C., and the 2-mfd. sections at 500 volts D.C.

The advantages of employing "blocks" instead of separate condensers will be obvious. They are

USEFUL UNITS



Three of the T.C.C. condenser "blocks."

compact, inexpensive, and centralise and reduce wiring.

The T.C.C. examples are excellent representatives of this type of attractive component, a type which has hitherto been confined mainly to manufacturers, and we feel sure constructors will be grateful for the opportunity afforded them to enjoy their use.

A New R.I. Component

One of the most noticeable features of the progress of radio during the past few years has been the steady improvement in L.F. transformers.

This has been made possible largely by the development of special iron alloys for cores, the main object being to achieve high permeabilities.

Almost spectacular effects have been attained by the introduction of nickel, but cores made of nickel alloys have not hitherto proved invariably and entirely successful.

The drawback has been that "nickel" transformers could not carry appreciable D.C. in their primaries and still retain their characteristics.

Now, however, efficient nickel-iron transformers in which this limitation does not apply are being rendered possible by new alloys.

The R.I. "Di-Feed" is, however, the first L.F. transformer we have seen in which the compactness of the smallest "parallel-feed" transformer has been obtained while preserving good current-carrying capabilities.

The "Di-Feed" employs a core of what is known as "K. Metal," a very modern nickel-iron alloy. It can be connected directly into circuit and is able to withstand three and four milliamperes without the slightest loss of efficiency.

It is an excellent little transformer and is inexpensive. Constructors will no doubt give it the hearty reception it deserves.

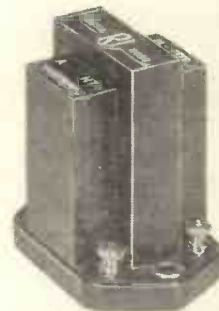
Fine Mains Transformers

Those enterprising manufacturers of first-class value-for-money mains apparatus, Messrs. Heayberd, continue

"K. METAL"

to add to their fine and comprehensive range.

Their latest products are those very useful mains transformers. There is Model W.31, for use with Westinghouse Metal Rectifier H.T.8.



The R.I. "Di-Feed" L.F. Transformer.

It has 0-175 and 0-200 volts

180 milliamperes, and 2 + 2 volts 5 amperes, and 2 + 2 volts 1 ampere secondary tapplings. The retail price is 30s.

Model W.35 is designed for use with the H.T.11 Westinghouse Metal Rectifier and provides for 300 volts at 550 milliamperes, with 2 + 2 volts 5 amperes, and 2 + 2 volts 2 ampere L.T. outputs. This one lists at 65s.

HEAYBERD MAINS TRANSFORMERS



Models W.35, 803 and W.31 Heayberd transformers.

Some Interesting New Radio Productions

Model 803 is for valve rectification and A.C. valves, its outputs being 250 + 250 volts 75 milliamperes, 2 + 2 volts 1 ampere, and 2 + 2 volts 5 amperes. The retail price is 32s. 6d.

All three transformers are beautifully built pieces of apparatus and fully deserve their maker's slogan of "Safe and Sound."

We have used them in sets with conspicuous success and can fully recommend them to our readers.

Slektun H.F. Choke

We have recently had an opportunity of testing a Slektun H.F. choke on the special apparatus which we have developed for such purposes.

It is a component of sound and straight-forward design. The winding is carried on a sectioned former and, in this way, the self-capacity is reduced to negligible proportions.

We found that there was full effectiveness over a range of 25 to 2,600 metres, which is rather more than is claimed by the makers.

Conservatism in specification is a commendable fiction of the methods of Messrs. Slektun, it would seem.

The Slektun choke is a well-made component, efficient in operation and neat and robust in construction.

An Efficient Loudspeaker

The average orchestra covers useful musical frequencies of some 32 to 8,000 cycles, and by "useful" is meant frequencies that really count in the make-up of the total effect.

True, higher notes (harmonics) than the 8,000 are present, but we do not appreciate them at their true worth.

Where broadcasting is concerned we frequently cannot make use of anything above 6,000 cycles owing to the heterodyne interference that so often upsets our reproduction. But even if we can usefully employ 32 to 6,000 cycles, with an occasional 8,000 when heterodynes are not present, and we are listening to the local station, it is a wide range for one speaker to handle, isn't it?

Celestion Ltd., who have long been noted for their excellent loudspeakers, have decided that for the absolute apex of successful reproduction it is better to use two speakers than one; but not necessarily to use similar types of speaker with a common input transformer.

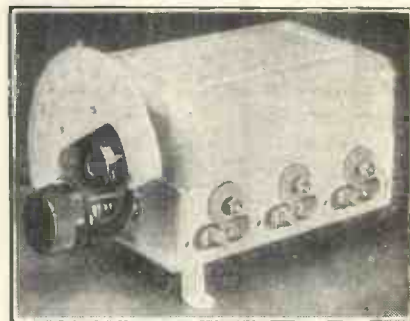
This firm prefers to use two dissimilar units, one to cover the lower and middle register and the other to deal solely with the higher notes. Naturally the response curves of the speakers overlap, and two input transformers are supplied, with adjustable taps to suit different output valves, and also in the case of the smaller (high note) unit to enable different degrees of high-note response to be obtained.

The maximum load the speakers will carry is some 8 or 9 watts, so that sudden highly peaking transients can be dealt with without overloading the speakers, and on test the effect is exceptionally good. From 50 cycles to 6,000 the response is tolerably straight, while the small speaker allows 8,000 and higher to be well reproduced. As it is impossible to get

good reproduction below 50 cycles without huge thick baffles, it does not matter that the "Reetone" (as the new speaker is called) begins to fall off somewhat below that figure.

The "Reetone" is made on one iron casting, forming a very neat and convenient unit and necessitating a somewhat pear-shaped hole in the baffle instead of two separate ones. The price is £6, and the transformers supplied take 40-50 milliamps. without danger of low-note distortion due to greatly varying inductance. Above 50 milliamps. shunt-feeding should be used.

A LOTUS GANG



The component is sold complete with disc drive.

A Three-Gang Condenser

We have recently examined and tested one of the new Lotus 3-gang condensers. The Lotus 3-gang is supplied with a disc drive which is both of good appearance and smooth and positive in action.

There is also a well-placed scale light.

The trimmers are accessibly placed and are generous in their adjustments.

The condenser is solidly built and its sections match with a precision which, in our opinion, is above the average.

This is, of course, a quality which can only be obtained by the most careful design and manufacture.

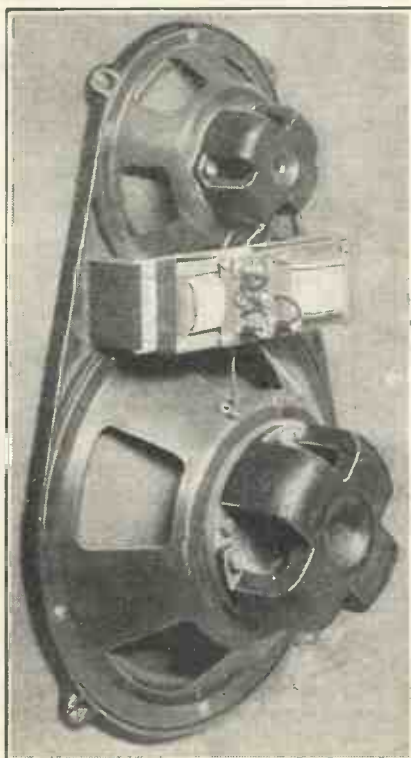
But it is not likely to be maintained for long when the component is in use, unless there is great rigidity in assembly.

The ordinary nut and bolt and pressure methods adopted for ordinary condensers, fail in gangs.

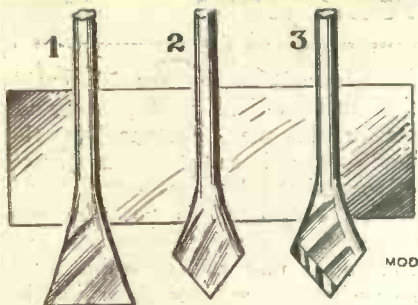
In this "Lotus" gang condenser, however, it is plainly apparent that special steps have been taken to ensure the necessary rigidity of construction.

Altogether the Lotus 3-gang is a fine component deserving of a place in any set.

THE NEW CELESTION LOUDSPEAKER



The Celestion "Reetone" loudspeaker comprises two complete units of scientifically differing characteristics.



MAKING A DRILL

CERTAIN makes of screened coils are arranged in such a manner that the leads to the various terminals can either be brought out through slots in the side of the metal cover, or they may be taken through the baseboard or chassis, providing that suitable holes are made.

After the coil has been mounted it is usually found that with a normal length of drill and brace the drill cannot be used because of its limited length. It is suggested, therefore, that a special drill for this purpose is made from a steel knitting needle or a length of silver-steel rod. The size of the hole to be drilled and the diameter of the hole through the base of the coil will naturally decide the size of the needle or rod.

The end of the needle must be heated until this is bright red, and then beaten with a hammer to the shape shown in Fig. 1.

After it has been allowed to cool it will be reasonably soft, and with a

On the left you see the various stages in the fashioning of a coil-former drill from a knitting needle, and to the right one way of dealing with a peaking pick-up

fine file you can shape the end as shown in Fig. 2. It must then be re-filed so as to obtain the cutting edges, as shown in Fig. 3.

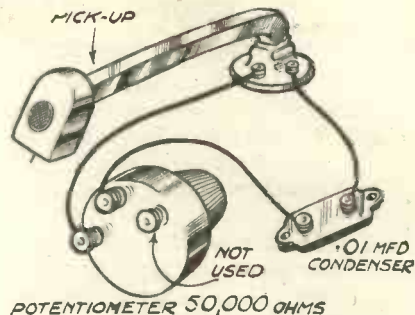
All that remains is to harden the drill by re-heating to a dull redness and then quickly immersing in oil or water.

Quick Change-Over

A use to which I have put some old plug-in coil holders in my possession, is that indicated in the sketch.

In all, three plugs are used, one attached to the accumulator flex, one on the receiver instead of the normal L.T. terminals, and one on a D.C. mains accumulator charger.

The advantage, of course, lies in the fact that the accumulator plug can immediately be withdrawn from that on the receiver and inserted in the one



FOR TONE CONTROL

mfd. capacity. Probably a 50,000-ohm potentiometer will do very well in this connection, the slider and one terminal being used. If a resistance only is used, it will have to be between 15,000 and 30,000 ohms in most cases.

Lowering the resistance in each case results in increased high note reduction.

Accumulator Carrier

It is a common occurrence with listeners who use accumulators to mislay the carriers when conveying them to and from the charging station.

Yet, with a little care, it is no difficult matter to construct a suitable box which serves both as a carrier and a safeguard when the cell is "standing."

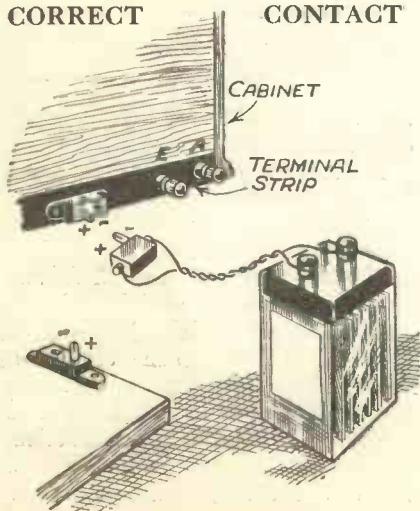
The accompanying diagram illustrates

how this is made, and it can be finished off very neatly by counter-sinking the screws, rounding the edges and applying a coat of stain.

YOU'LL FIND THESE HELP

The tips on this page cover little troubles which are continually cropping up in set construction and use, and the suggestions indicate simple ways of getting over quite a lot of bother.

CORRECT CONTACT



on the mains unit, or vice versa, without any leads having to be disconnected, or any thought given to the correct connections of the mains to the accumulator.

Peaking Pick-Ups

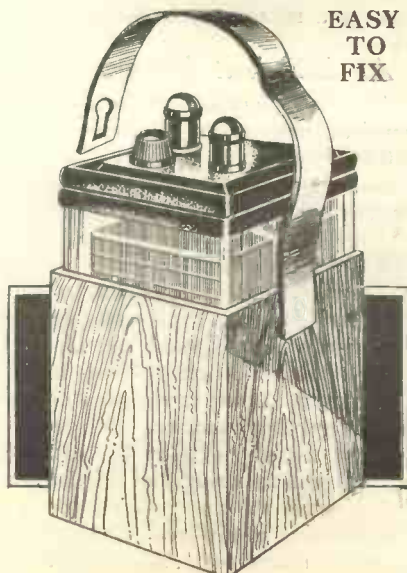
In some cases it is found that a pick-up gives too much prominence to the high notes, often making these very much too shrill.

This can be remedied in many ways; by using a tone-control transformer between the pick-up and the set, or by introducing some high-note lossing scheme across the pick-up.

This latter can take the form of a resistance across the pick-up, or, better still, a variable resistance in series with a fixed condenser of about .01-

Those who charge their accumulators at home will be interested in the left-hand sketch, while those who don't should consider the idea of the right-hand one.

EASY TO FIX



FOR THE
"EMPIRE SUPER"
 USE
PREH POTENTIOMETERS

50,000 ohms. Retail price 5/9

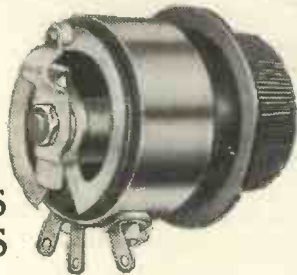
The new range of variable resistances has been designed to meet the demand for a component with a particularly silent and smooth movement.

The curve of the potentiometer is arranged "straight line," which gives a straight-line ratio between angular movement and resistance variation.

The resistances can be supplied with "straight line" or logarithmic curves according to requirements.

These components are also supplied with a combined switch, making an extremely neat and robust unit. The switch has a quick make-and-break movement and will handle 1 1/2 amperes at 250 volts without arcing.

Preh

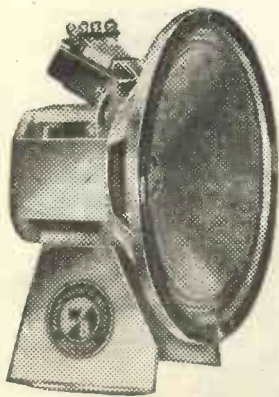


POTENTIOMETERS
 AND RHEOSTATS

Prices for your special requirements on application.

PREH MANUFACTURING CO. LTD.,
 Broadwater Road, Welwyn Garden City,
 MANUFACTURERS AND WHOLESALE ONLY SUPPLIED.
 Sole Sales Organisation: Harwell Ltd., The Sessions House, Clerkenwell Green, E.C.1.
 Phone: Clerkenwell 6905-6.

Why it is **SPECIFIED** for
 the leading 1933
Constructor Sets



Because the "MANSFIELD" MOVING-COIL SPEAKER'S magnetic system is a marvellous advance—it gives GREATER power from a SMALLER magnet. It makes possible in a moderate-

priced speaker a performance at least equal to very expensive instruments. Further, the "Mansfield" magnet is truly permanent, it cannot lose its magnetism. Write for 1933 folder, then hear it at your dealers; you will be AMAZED.

"Mansfield," P.M.4, complete with tapped transformer, 42/-

Handsome cabinet in oak to suit, 25/-
 Whiteley Electrical Radio Co., Ltd.,
 Dept. K, Radio Works, Mansfield, Notts.
 Irish Free State Distributors: Kelly & Shiel, Ltd.,
 47, Fleet Street, Dublin.



Abolish batteries
RUN YOUR SET
FROM THE MAINS
FOR LESS THAN
ONE SHILLING
A YEAR



WHY spend 50 shillings a year on quickly exhausted batteries? An "ATLAS" Unit will run your receiver from the electric light for less than 1/- a year!

"ATLAS" Units, the experts' choice, are as simple to fit as a battery, need no alterations to set or valves and last for ever. Ask your dealer for a demonstration to-day and insist on "ATLAS," the units which won the Olympia Ballots against all competitors. No other can give the same reserve of silent, steady power. Models for every set from 39/6. Guaranteed 12 months. Westinghouse Rectifiers.

CLARKE'S
"ATLAS" MAINS
UNITS

Messrs. H. Clarke & Co. (M/cr.) Ltd.,
 George Street, Patricroft, Manchester.
 Please send me folder describing the complete range of "ATLAS" Mains Units and Components.

Name.....
 (in capitals)
 Address.....

34/13

POST
NOW

H. CLARKE & CO. (M/CR) LTD., PATRICROFT, MANCHESTER.
 London: Bush House, W.C.2 Glasgow: G.E.S. Co. Ltd., 38, Oswald St. 13

A RADIO DIVINING ROD



By T. B. FRANKLIN, B.A., and V. J. VICKERS.

An interesting and ingenious instrument is here described, by means of which it is possible to trace by "radio" the path followed by a metal pipe or other large buried metal object.

It is sometimes necessary to determine the position of a metal pipe, power cable, or other metallic object buried in the earth, without digging here, there and everywhere on the off-chance of hitting upon it. Many of us know, too, how much time can be spent in Spring, hunting for the angle irons at the corners of a tennis court, or for hydrant covers lost under a winter's growth of grass.

Changes of Capacity

An exceedingly simple apparatus which is quite effective for these purposes can be made for a few shillings; it depends for its success on the extreme susceptibility of an oscillating wireless valve to very slight changes of capacity in its grid circuit.

A simple valve oscillator has the grid coil B coupled to an auxiliary coil A, which is tuned by a .0001-mfd. condenser E, as shown in the diagram. One side of this condenser E is connected to a metal plate fixed at the bottom of the box containing the instrument, so that this metal plate and the soil form a condenser of a capacity which varies according to whether the soil contains any metal object or not.

The semi-variable condenser D is so adjusted that the two circuits resonate when condenser E is about the middle of its scale with the box on ground containing no metal.

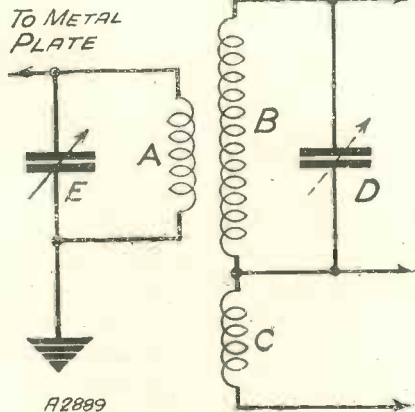
Sudden Jump

A sensitive milliammeter in the anode circuit of the valve indicates when the valve is oscillating, the difference in anode current when the valve is oscillating or not being in the region of 1 milliamperes. In general, a valve goes into or out of oscillation suddenly,

and the anode current shows a corresponding jump to a lower or higher value.

When the box is on normal ground these jumps on the milliammeter correspond to certain fixed readings on condenser E.

If now the box be moved about over ground known to contain pipes, cables, etc., the effective capacity of E will



EXCEEDINGLY SIMPLE

This is the apparatus described and it can be constructed at the cost of only a few shillings. As the circuit above shows, it is based on the principle of an oscillating valve subjected to very slight capacity-changes across the grid-filament circuit.

be increased every time the box is over any hidden metal object, for the increased earth plate capacity is then added to condenser E. Hence lower readings on dial of E will now be obtained corresponding to the kicks on the milliammeter as the valve goes into or out of oscillation.

Single Control

By suitable adjustments, readings of 10°-15° less on condenser E will be found when the box is over a buried hydrant cover or 3-in. iron water-pipe compared to readings over normal ground.

The photographs give a good idea of the simplicity of the instrument—the dial of condenser E is the only control. It measures 14 in. by 10 in. by 10 in., and with valve, batteries, and complete apparatus weighs about 10 lb.

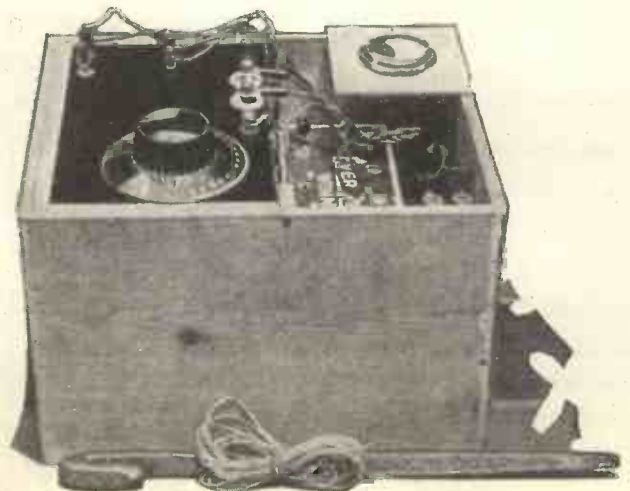
For the sake of example, let us suppose it is desired to trace the path of a pipe from a tap at one's garage.

By taking a series of readings with the box on arcs of circle of increasing size round the tap, and noting the readings on condenser E corresponding to either the upward or downward kick on milliammeter—whichever is most pronounced—a network of values will be obtained showing clearly the path of pipe by the line of readings which are below normal.

Located in Half an Hour

Work can be carried out very quickly as there are no complicated controls to manipulate. Recently we located a buried water-supply tank and pipe line within half an hour of the approximate location being given to us.

It is impossible to give any definite figures about the sensitiveness of the instrument, but with suitable adjustments it will find a piece of metal about the size of a five-shilling piece buried a couple of inches deep.





IN PASSING

Various Jottings on Radio Themes

STIMULATED and piqued by the success of the Post Office's pirate-hunting vans, the police have been very busy with wireless lately, and have planned to fit every policeman with a little receiver to be worn either in the helmet or beneath the lapel, or possibly combined with the truncheon.

*Every member of the Force
Has a watch and chain, of course.*

So runs the old jingle, to which we must now add :

*Somewhere beneath that coat of blue
He hides an "S.G. Sherlock" Two!*

Bond of Union

But let the authorities pause to consider that a common interest in radio is bound to forge a bond of union between the policeman and the public, so that in some struggle with a law-breaker the policeman may hiss, "Ow, if I could only get your foot off my ear so that I could reach my little 'All-Wave Crippen' Two!" When Sikes would at once unclinch in order to enjoy a quiet half-hour of Debussy.

Again, there is the risk that inspectors will develop apoplexy through coming upon constables and pinchers of portables sitting happily together on doorsteps, swapping ideas about grid-leak values.

Radio and Cows

Of course, this tendency to fraternisation may eventually make for greater righteousness amongst members of the so-called criminal class and put the bobbies out of work, so that there will arise a "Back to the Whistle" movement and a "Devolution and Dot-the-blighter-one" school

of thought at New Scotland Yard. Another example of the base utilitarianism of man is the growing radio conspiracy against the lower creation, particularly cows, poultry, etc. The labours and triumphs of Hertz, Maxwell, Lodge, Marconi, Fleming and the B.B.C. have come to this, that our cows are being forced to become "listeners" so that they may produce more milk per manger, whilst the hens

Police Pocket Radio—Aiding the Farmer to Produce—A School of Variety—War in our Town.

are bedevilled with loudspeakers in the lofts and Rimsky-Korsakov in the runs; they are fooled with artificial daylight, and positively thrilled by ultra-violet into laying ultra eggs.

No good can come of these nervous, rhythm-conscious eggs.

It is merely a question of time before someone pretends to have discovered that the loudspeaker in the hot-house gives the grapes less pips, thereby proportionately increasing the

TENDENCY TO FRATERNISE



"Swapping ideas about grid-leak values."

"booze content" of the fruit. Then we shall go mad and every kind of fruit from carrots to crab-apples, and all the vegetables from nasturtium seeds to nuts will be grown in hot music. And so we shall come to "Best Foxtrot-fed Filberts," or

"Choice Waltz-grown Williams"—Strauss' Special.

A different sort of cultivation appears likely to be required by the B.B.C. if the war between them and the music-hall authorities continues, and the B.B.C. is prevented from drawing at will on the ranks of the "variety stars." It's a great pity that the B.B.C. so frequently finds itself obliged to mix up with these blood sports to the detriment of its programmes.

Foundations of Music

In passing, let us note that the supply of "Foundations of Music" has never failed once; but that it is because the B.B.C. placed a firm order in 1924 for 2,000 tons of foundations per annum at two-and-eleven-three a foundation, for twenty-five years.

In order to supply the deficiency of joke-blokes the B.B.C. will probably go into the star business itself, drawing its raw material from its Talks Department. (*Greybeard Gus will now pul over his screaming monologue entitled, "The Coleoptera of Little Twittering: with Notes on Lord Marshmallow's pseudo odontoid processes."*)

I am seriously thinking of starting a preparatory school for would-be members of the B.B.C.'s Variety Academy: so when you see my advertisements you will know that the problem of what to do with young Clarence is solved.

Publicity Matter

Extract from some of my publicity matter: "You want to make big money! Take my Course and knock George Robey for a back number! You want the Best Jokes! I have them.

"I keep my own ma-in-law on the premises! She cannot be beaten! Special Giggling Classes under the supervision of Leo. Hy. Learn to stutter and stumble from Stainless Steve! How would you like to star as

Ready with Parts for the "Pole-to-Pole" Five

'The Girl with a Creak in her Boots'? What do you know of Rabelais? Well—forget it!"

Radio Romance

In passing, yet once more—I saw in the papers the other day that one of the announcers is going to marry a lady who is described as an Art Student at Broadcasting House. Surely, we have here a hint of an hitherto undisclosed B.B.C. activity.

One would like to know what form of Art the lady studies. I hope that it is not sculpture, for with all that near-Epstein carving of Mr. Eric Gill, Broadcasting House will engender a school which will be known as the Gargoylist!

The development of the radio trade in our townlet is, I think, now complete, it having reached that fierce, cut-throat stage beyond which it can scarcely progress without one or more of the combatants retiring from the party to lick their wounds. Here is the history of our radio war.

"Few Dozen Terminals"

About 1923 an enterprising youngster rented a six by four lock-up shop, and placed in its window several condensers (overcoatless), one receiver of the period, a number of valve cartons, a few dozen terminals (assorted), and a whale of a lot of cardboard publicity, all made to stand up, supplied by manufacturers.

Inside there were a counter as big as a pastry board, a shelf holding

GREYBEARD GUS



"In order to supply the deficiency of joke-blokes . . ."

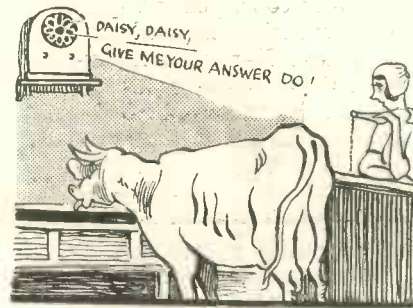
the rest of the stock, and a sort of trapdoor through which our pioneer used to appear with a whizz-bang when the shop-bell clanged. This young Mephistopheles deserved to make a pile—if there are piles in radio!

But a year later another little

place was opened at the other end of the burgh; it called itself an Emporium, and had two windows and a swinging sign. Mephistopheles, in a panic, at once sported a sign bearing the strange device, "Radio Service." I don't believe that he ever lost any trade to Two Windows, but it gave him a fright and made him more Sales Conscious than ever. Anyhow, it was the beginning of our war.

Then Two Windows shot off a "dud." He advertised his battery-

TO GET MORE MILK



"Cows are being forced to become 'listeners.'"

charging service in the local gossip sheet, whereupon the motor shop opposite saw and seized the idea, bagging practically the entire charging business.

At this stage I casually suggested a merger, an idea which both Mephisto and Two Windows snatched so eagerly in each other's presence that each thought the other was bankrupt! Had I not been negotiating Big, Solemn Business, I could have shrieked with laughter at those charming innocents.

The Merger Launched

I got them to lay their assets and liabilities "on the table," and drew up my scheme. I had two large bridges to jump: *one*, Mephisto's objection to the inclusion in the pool of Two Windows' patent swinging sign—he said that it represented 50 per cent of T.W.'s assets; *two*, there was some heat evolved when it was found that each party desired the other party's shop to be the branch.

Eventually the Merger was launched, and in twelve months Mephisto adventured on matrimony and T.W. was delivering charged batteries in a cycle delivery truck propelled by a boy formerly in the service of the wicked garage.

Somewhere about 1926, when radio was so popular that no druggist's was complete without a wireless department, a bad, bold fellow who had a large electrical fittings business in the main street went off with a loud report and devoted a half of his large window space to radio goods in lavish profusion. The Merger perspired and called me into conference.

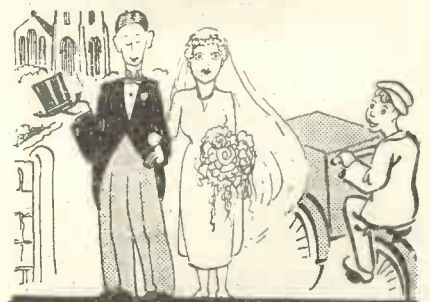
Component Trade

"Don't be scared of mere area," I advised. "Look at the bloke's cards! 'Choice.' 'Marvellous Value'! Pooh! he's only fit to sell fancy goods. Get right to the root of this business and plump for the component trade. Follow the radio papers like bloodhounds."

Accordingly the Merger plunged heavily into the "Kit" racket, and learned how to be ready with all the parts required for the "Pole-to-Pole" Five almost before the journal which featured it had issued the blueprint. They sold out at a fine profit in 1929, and now run a chicken farm because Mephisto's youngest needs country air.

At present the war rages between the Electrical Fittings man, the old Merger (which is now developing Kodakery and mangles as side lines) and another man who opened as radio pure and simple, and then hit back at Electrical Fittings by stocking bulbs and lampshades.

ADVENTURED ON MATRIMONY



"'T.W.' was delivering charged batteries in a cycle delivery truck."

Electrical Fittings has now opened a branch a few doors away from the latest interloper, and over all hangs the menace of a mighty Motor Dealer who is said to have cornered the radio business in the nearest townlet.

I think that the time is ripe for me to form another merger.

COLVERN COILS

for
S.T. RECEIVERS

Make no Mistake—

COLVERN

S.T.400 COILS

for the

A.C. S.T.400

Send for Radio List No. 10.



COLVERN LTD., MAWNEYS ROAD, ROMFORD, ESSEX

LONDON WHOLESALE DEPOT, 150, King's Cross Road, W.C.1.

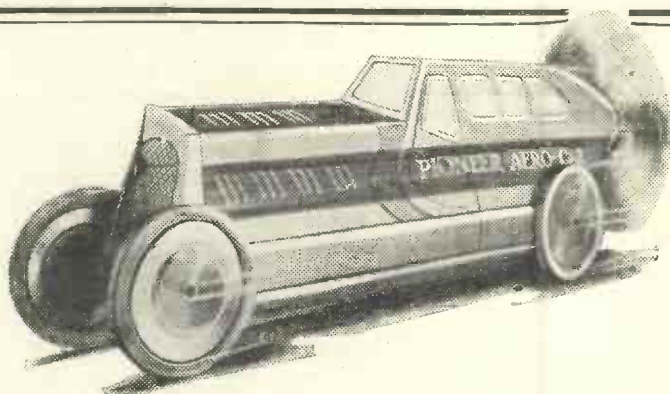
FREE!

with the March CHUMS

THIS SPLENDID
WORKING MODEL

"PIONEER"

AERO-CAR



The complete model of a splendid PIONEER AERO-CAR, including the mechanism, is given away with every copy of the March CHUMS. All you have to do is to assemble it, and then see how it goes!

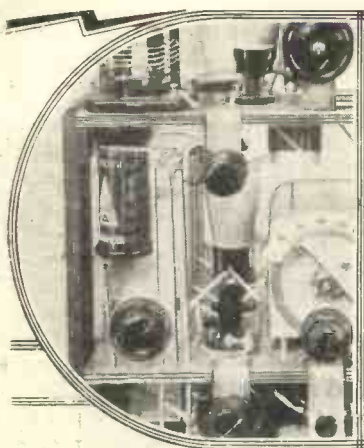
The better job you make of the assembling, the speedier model you will have, so that you can stage exciting races with your friends.

Don't miss this really wonderful gift for anything. Get your copy of CHUMS now—it's simply packed with thrilling yarns and fascinating articles.

MARCH Issue Now on Sale

1/-

CHUMS



Those H.F. CHOKES

By Marcus G. Scroggie

Is there any explanation of the amazing variety of shapes and sizes—and prices—of the articles offered for sale under the one name of H.F. choke? Apart from vague claims for “perfect efficiency on all wavelengths,” those responsible for them do not usually proffer any very lucid arguments in favour of the somewhat fantastic forms of construction sometimes adopted by them.

Distinguishing Types

As a matter of fact, it is not altogether surprising, for this neglected little component conceals an astonishingly complex problem in design, which could not be dealt with on the space afforded by a carton or even on an instruction slip, if any. It cannot even be dealt with in its deeper aspects here. But the discussion that follows is hopefully intended to provide some guidance in the practical job of selecting a choke for the purpose in view.

Before going any farther it would be as well to be quite clear as to what purposes may be in view. Perhaps the only distinction commonly made is that between general purpose chokes and “short-wave” chokes. It may be said quite definitely here and now that a choke which is really satisfactory on medium and long waves is almost certain to be so on short waves, down to 15 metres at any rate; the reverse is not true, however.

Separating L.F. and H.F.

But that distinction is not really the most important one. An H.F. choke serves several quite different purposes, and these do not all demand an equally high standard of performance.

Take first of all the choke that is commonly connected in the anode circuit of a detector. There are two objects in using a choke in this position. Firstly, it helps to sort out the

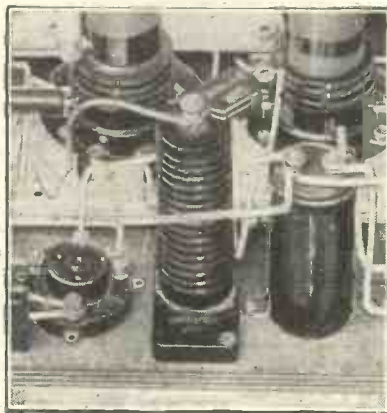
mixture of H.F. and L.F. currents issuing from the detector valve, and to pass the L.F. freely, but to obstruct the H.F. and keep it from straying into the L.F. circuits.

It is not very much use choking back anything—H.F. currents or exuberant children—without providing a lawful alternative, and in the

The H.F. chokes you use in your set may be called upon to serve several different purposes, and these do not all demand an equally high standard of performance. Are you using your chokes to the best advantage?

case of the H.F. currents this usually takes the form either of a fixed condenser to earth or to some equivalent point, where they are simply disposed of, or a variable condenser leading to a reaction coil, where they are harnessed for useful purposes.

IT LOOKS SIMPLE BUT—



The H.F. choke, an oft-neglected component, represents an astonishingly complex problem in design.

If the set is a very elaborate one, with high amplification, a detector choke is very desirable if one wishes

to avoid unpleasant groans, howls and squeals. And short-wave receivers usually need a reliable type of choke for ensuring effective reaction.

But in simple sets and for purely reaction purposes on medium and long waves the choke may be omitted altogether without much loss, and the coupling transformer or resistor relied upon to do all that is necessary. At the most the requirements are not very exacting, except perhaps on short waves, where “dead spots” in reaction may be experienced.

Aperiodic Coupling

Curiously enough, such effects are confined mainly to chokes specially “designed” for short waves.

But, generally speaking, an extraordinarily bad choke will do quite well in the detector anode circuit, which is fortunate for the sales of such articles.

Another purpose is as an H.F. amplifier coupling of the wrongly so-called aperiodic type. “Aperiodic” means unresponsive to signals of any particular frequency. No choke ever produced has failed to have a pronounced response to a resonant frequency. Leaving aside questions of nomenclature, the feature of such a coupling is that no attempt is made to bring its response in line with the wavelength of the particular station which it is desired to hear. Its selectivity therefore is in practice negligible, and for that reason it has become almost obsolete, though it was universal in portable sets a few years ago.

An Inefficient Method

But just in case readers may consider adopting this type of amplification, it may be said that the efficiency of the method is so low that unless a fairly good choke is used the results are a loss. Except with S.G. valves, any resonance or sub-resonance of the choke is likely to cause uncontrollable

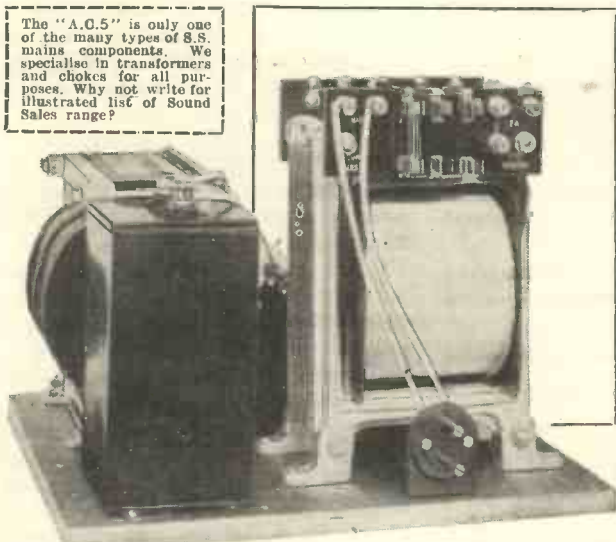
SOUND SALES

Specified by the Experts
for the "A.C. DIODION 5"

Only super-quality components are suitable for a quality receiver. Hence the specification of SOUND SALES "A.C.5" TYPE MAINS TRANSFORMER. Guaranteed to designer's specification. Price

55/-

The "A.C.5" is only one of the many types of S.S. mains components. We specialise in transformers and chokes for all purposes. Why not write for illustrated list of Sound Sales range?



SOUND SALES LTD., Tremlett Grove, Highgate, London, N.19.



THIS WEARITE HETERODYNE WHISTLE FILTER means **MUSH-FREE PROGRAMMES**

THE more sensitive the receiver the more prone to Heterodyne Whistle interference. With a host of really good programmes always available there is, however, no need for reception to be marred this way. This Wearite unit permits only the programmes to reach the speaker and provides a perfect barrier to Heterodyne Whistle. Made in two types—"A" cutting off at 3,500 cycles, and "B" at 5,000 cycles. Will fit any set. Write for special leaflet. Price, both types, **10/6**

HAVE YOU GOT YOUR COPY OF THE WEARITE BOOK NO. 0.1?

Whatever set you may contemplate building, be sure to have this book by you. It contains full details of chokes, resistances, volume controls, mains transformers, switches, etc.

SEND NOW!

THESE WEARITE PARTS ARE SPECIFIED FOR THE "S.P.3."

1 Wearite combined 5,000 ohms resistance and 3-pt. switch Price 6/-

FOR THE "S.P.3" A.C. MAINS UNIT 1 Wearite Mains Transformer T7A (old type No. T7) Price 25/-

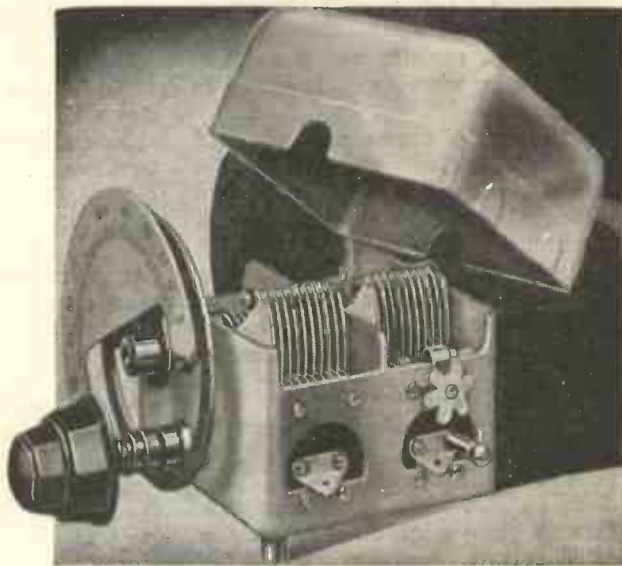
FOR THE A.C. "DIODION"

1 Wearite 3-gang coil unit W.L.2.C. Price 25/-

WEARITE COMPONENTS

WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17. Telephone: 3847/8/9.

UNITUNE



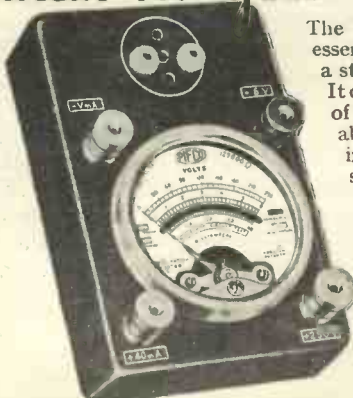
Gives extremely fine tuning, the trimmer of front section being operated from the panel by a knob concentric with the main tuning knob. Rigid one-piece chassis. Trimmer to each stage. Disc drive and bakelite escutcheon plate. Capacity '0005. 2 gang, 18/6; 3 gang, 27/-.

PRECISION INSTRUMENTS

Advertisement of Jackson Bros. (London), Ltd., 72 St. Thomas' St., London, S.E.1. Telephone 'Hop 1837.

DON'T HAVE RADIO TROUBLES

The **DOCTOR OF RADIO** will solve them for you



The PIFCO Radiometer is as essential to the radio owner as a stethoscope is to the doctor. It diagnoses instantly the cause of any trouble, however abstruse. This amazing instrument ensures a new standard of radio reception by locating trouble in all its stages. Ask to see it demonstrated at your radio dealer's or electrician's. If any difficulty, send P.O. direct to

PIFCO LTD., HIGH STREET, MANCHESTER, or 150, Charing Cross Road, London, W.C.2.

De Luxe Model Standard Model For Electric "All-in-One" Receivers, Mains Units and Battery Sets. Shown here only.

PIFCO ALL IN ONE RADIOMETER

£2:2:0 12/6

Working Wavelengths are all Below Natural Wavelengths

oscillation. Let us say no more about it.

The last common use of an H.F. choke is for what is usually known as "parallel-feed."

There is, of course, a parallel-feed system for L.F. amplification, in which the transformer is taken out of its usual position in the anode circuit and moved to the next grid; the first valve is then fed through a resistor, which is effectively in parallel with the transformer primary (though it doesn't look like it), hence the name.

Parallel-Feed

There is the disadvantage that the resistor absorbs valuable H.T. volts, but in the H.F. counterpart a choke may be used whose resistance is too low to make much difference in the H.T. voltage. And it enables all the tuned circuits to be on the earthed side, which is useful in these days of high voltage mains-driven sets, for a multiple-gang condenser is an awkward piece of work to insulate from everything, including the hands of the owner or occupier.

Although (as hinted above) the choke does not appear at first glance to be in parallel, and certainly is not in parallel as regards H.T. supply, a large condenser such as that used (we hope) across the H.T. battery

or power unit is as good as a dead short circuit to H.F. currents, and by re-drawing the circuit diagram the choke is found to be effectively in parallel with the tuned circuit.

Now if there are two things that are worse than others for the health of a tuned circuit, and hence for the range and selectivity of the receiver in which it is incorporated, they are (1) leakage across it, such as would be caused by a not-too-high resistance connected there, and (2) an indefinite amount of stray capacity, also connected in parallel.

Inductance Doesn't Count

The first reduces the sharpness of tuning, cutting down reception from the desired station, and leaving any interference just as strong as before. The second shifts the tuning and thus not only cuts down the wanted

programme but is likely to strengthen the neighbouring one. There is ample reason, therefore, for wishing to avoid either or both of these items.

Now although a choke is simply a particular form of inductance, its inductance is just the effect that usually does not count; a choke can be regarded as equivalent to a combination of resistance and capacity. That sounds rather contradictory; but it arises in this way: although a choke consists of a large number of turns of wire, and consequently possesses a large amount of inductance, it is impossible to avoid a certain amount of stray capacity also.

As the wavelength is diminished the capacity becomes relatively more

working wavelengths are all below the natural wavelength.

When a choke is used for parallel-feed purposes, therefore, it is very important that the resistance it puts in parallel with the tuned circuit should be as high as possible, and that the capacity should be as small as possible; also that the capacity that it does inevitably introduce should at least be constant, so that it can be allowed for, by reducing the "trimmer," for example.

Defining a Good Choke

A very good tuned circuit is equivalent to a resistance of 500,000 ohms or more, a poor one may be 100,000, and a very bad, inselective one possibly lower still. Clearly those who rejoice in a very good one are most hit by the connection in parallel of another resistance in the form of an H.F. choke. For we remember that the resistance equivalent to two in parallel is less than either of them separately. A choke which is equivalent to 500,000 ohms cuts down the goodness of a 500,000-ohm tuned circuit to a half, but it has little effect on a 100,000-ohm circuit, which is already poor enough.

A good choke, therefore, is one which is equivalent to a very high resistance—one megohm or more for choice, and as few micro-microfarads of capacity as possible. But

the D.C. resistance—that is, the resistance offered to the steady valve feed current, should be low—well under 1,000 ohms. The main thing, then, is to wind a coil to give enough inductance to make it resonate above the working wavelength, with the minimum of undesirable parallel effects.

It will be seen, therefore, that the design of a really satisfactory H.F. choke is not a matter to be embarked upon light-heartedly. The problem has been tackled in many ways and a large variety of types has been evolved in an attempt to produce the perfect choke.

Next month consideration will be given to some of the more successful solutions to the problem and an entirely new method of overcoming the difficulty will be described in detail.

H.F. CHOKE FACTORS

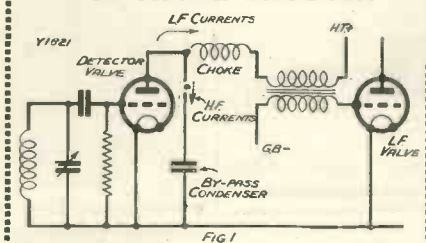


FIG 1

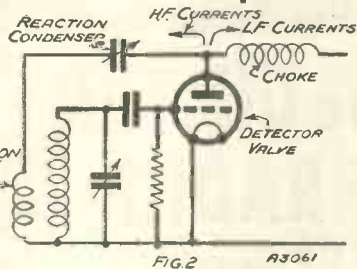


FIG 2

Fig. 1 shows how an H.F. choke separates high-frequency and low-frequency currents. While to the left, in Fig. 2, you see how the separated high-frequency currents can be used for reaction purposes. Fig. 3 is a parallel-feed circuit. By feeding the H.F. valve through a choke, the tuned coupling may be brought to earth potential. The choke, in series with the H.T. condenser, is in parallel with the tuned circuit, and increases its loss if the choke is badly designed.

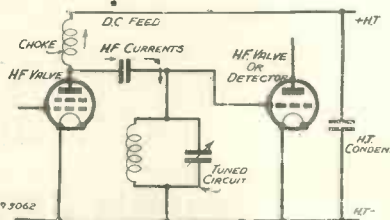


FIG 3

and more important, until at a certain wavelength (the natural or resonant wavelength) the two effects neutralise or destroy each other and the choke behaves as a very high resistance; like a grid leak, in fact. If the wavelength is still further reduced the capacity effect predominates, and the total effect is the same as that which would be given by a grid leak shunted by a small capacity.

This is the state of affairs that usually exists in practice, for the inductance is made so high that the

HINTS FOR THE HANDYMAN

Practical schemes which are well worth remembering.

THE winding of a coil should not be loose if it is to be efficient and look well, but many people seem to find it difficult to apply the requisite tension. This is more excusable in the case of lengthy windings, as the friction of the wire passing between the fingers is not only tiring but painful.

Great assistance can be obtained if a piece of systoflex be slipped over the wire before the winding is commenced. Its thickness affords a much better grip for the fingers, and although the wire slips easily through it, any degree of tension can be comfortably applied.

At the same time no damage need be done to the delicate silk or cotton covering of the wire if the systoflex be of reasonable length, say, some three or four inches.

A Good Substitute

If a piece of bakelite or vulcanite tubing cannot be found for winding a solenoid coil, quite satisfactory low-loss results can be obtained from a common cardboard tube if the tube is first wound lengthwise (as shown in the sketch) with a well spaced piece of hard string. This lifts the wire winding slightly from the former and at the same time forms a base into which it beds easily.

Plug-in coils of a neat and handy type can be made readily by utilising the bases of discarded valves. After removing the bulb and the "innards,"

SAVES YOUR FINGERS



Systoflex

The short length of systoflex prevents the wire cutting into the fingers when tension is applied to it.

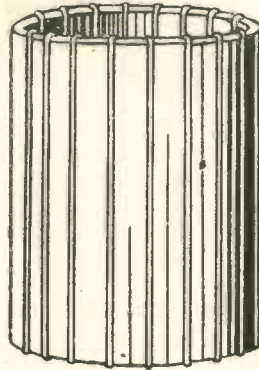


A2874

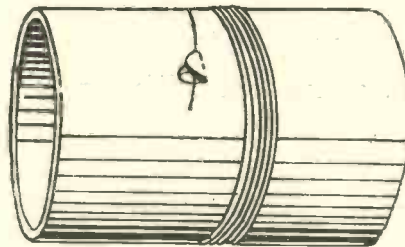
a short length of bakelite tube should be slipped over the vulcanite base and fastened with Seccotine.

The winding of such coils should be done with wire of very fine gauge, and wire off a broken-down L.F. transformer is often suitable for this purpose. This type of coil, on account

COIL-WINDING TIPS



Coil with string wound lengthwise



Lip raised by knife jabbed into Former.

A2875

of its small size, lends itself very readily to screening.

Although it is best to finish the winding of a coil by threading the wire through a couple of holes, two alternatives are mentioned which may prove useful in special conditions.

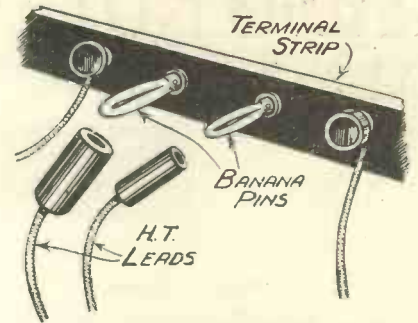
In the case of a cardboard or similar former, a penknife may be jabbed into the former and a lip raised, under which the wire may be slipped, and then the lip can be pressed down over it to hold it secure.

The other plan is to push a match stalk into a hole in the former and wrap several turns of the wire round it. Either of these plans will be found useful when dealing with a very long wiring or when using a former of such small diameter that the threading operation cannot be performed conveniently. J. U.

Preventing Misconnections

If all the terminals used to connect the various leads to a set are of exactly the same kind, mis-

FOR SAFETY FIRST



By mixing terminals and different size pins and sockets, the incorrect connection of battery leads is made an impossibility.

connections having expensive consequences are sometimes made.

To prevent this it is suggested that instead of terminals, split banana pins, preferably of different sizes, may be mounted on the terminal strip for the H.T. connections. Covered sockets are fitted to the leads from the H.T. battery, and it is then impossible to go wrong.

Earthing A.C. Mains Apparatus

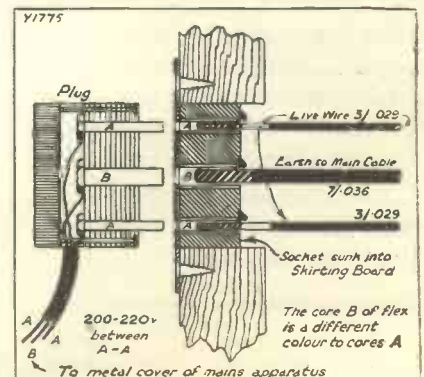
The earthing of the metal chassis, and cases of apparatus using A.C. mains, can be easily carried out by the following method.

A three-pin plug and socket should be installed, the "odd" socket of the three (the largest) being connected to the earthed case of the main switch, or sweated on the lead covering of the main cable.

Three-core flex connects the apparatus to the plug, care being taken to connect the "odd" plug to the metal of the apparatus. This is easily done by buying good three-way flex, which has the three cores all coloured differently to one another.

When the plug is inserted into the socket, the apparatus is automatically earthed, and independent of any existing radio earths, such as water pipes, buried buckets, etc. G. F.

AUTOMATIC ACTION



The centre pin of the plug is connected to earth via its socket and the special wire.

RADIO NOTES and NEWS of the MONTH

By G.B.



Programme Chiefs

MR. ERIC MASCHWITZ, who has for some years been the very successful Editor of the B.B.C.'s "Radio Times," and who is well known to listeners under the nom de plume of Holt Marvell (you will remember he wrote "Good-night, Vienna," with music by George Posford), has been given the appointment of Light Entertainment Chief.

plays; Mr. Gerald Cock on outside broadcasts; Mr. Eric Maschwitz on light entertainment, etc. Mr. Siepmann is directly responsible to the Director-General, Sir John Reith, for talks.

The Music Department

In the near future it will be found that Dr. Boulton has a much freer hand as regards music. The Music Department, by the way, is responsible for over 80 per cent of the programmes, and its elevation as a distinct branch of broadcasting has been long overdue.

Husband and Wife Radio

A very curious radio problem was presented to a North London magistrate a few days ago. A postal official

asked for a summons against a husband for installing a wireless set without a licence, and another summons against the man's wife for working the set without a licence. The official said he was unable to ascertain who was the actual owner of the set, so calculated that as both of them had worked it both were liable under the Act.

Friends, Too!

The magistrate did not agree, and said that if that was so it would mean that anyone who visited a friend and operated a wireless receiver would have to have a licence.

The official then called a detective, who alleged that the husband purchased the set and had admitted that he also worked it. The magistrate thereupon issued a summons against the husband.

Performing Rights

It is an interesting fact that licence holders will contribute something like £80,000 a year to writers and publishers of musical works which are to be broadcast. It is learned that this is the fee to be paid by the B.B.C. to the Performing Rights Society in return for the privilege

(Continued on page 288)

from MARCH 1st

BIG PRICE REDUCTIONS

Here are the NEW Prices of T.C.C. Condensers. No longer is there an excuse to buy condensers of inferior quality—of doubtful characteristics. Every T.C.C. Condenser has behind it the experience of over a quarter of a century's specialised work. True to specification—unquestioned dependability are factors that have made T.C.C. the premier amongst condensers. And now you can get them Cheaper.

MICA CONDENSERS

MFD.	Type M	S.P. Type	Type 34
.00005	-/8	—	1/3
.0001/3	-/8	2/-	1/3
.0004/5	-/9	2/-	1/3
.001/4	1/-	2/6	1/6
.005/6	1/8	3/-	2/-
.01	2/-	—	3/-

PAPER CONDENSERS—SOLDERING TAG TYPES

MFD.	Type 65	Type 84	Type 87
0.1	1/8	2/-	2/2
0.25	1/10	2/2	2/4
0.5	1/11	2/4	2/6
1	2/-	2/9	3/-
2	2/8	3/9	4/-
3	—	—	—
4	5/-	6/9	7/3
5	—	—	—
6	7/-	10/-	—
8	9/0	13/0	—
10	11/8	16/0	—

PAPER CONDENSERS—TERMINAL TYPES

MFD.	Type 50/61	Type 80/81	Type 101	Type 121
0.1	—	2/-	—	—
0.25	—	2/4	—	—
0.5	2/4	2/6	5/-	7/-
1	2/8	3/-	6/-	8/6
2	3/6	4/-	9/-	13/-
3	5/-	6/-	—	—
4	5/8	7/-	17/6	25/-
5	7/3	9/-	22/-	31/-
6	8/8	10/6	25/-	37/6
8	11/-	14/-	—	—
10	14/-	17/6	—	—

ELECTROLYTIC CONDENSERS

MFD.	Type 802 Aqueous	Type 801 Aqueous	Type 902 Dry
8	6/-	—	6/6
4	5/-	—	—
7	—	6/-	—

T.C.C.

ALL-BRITISH

CONDENSERS

THE TELEGRAPH CONDENSER Co., Ltd., WALES FARM ROAD, N. ACTON, W.3.

LEADING DESIGNERS BELIEVE TWO-WAY TONE CONTROL ESSENTIAL!

TONE CONTROL TRANSFORMERS FOR STRAIGHT CIRCUITS.

★ TOCO Various ratios. Ensures good reproduction in all working conditions .. **17/6**
 Graded controlling potentiometer .. **3/6**

TRANSFORMER FOR QUIESCENT OR OTHER PUSH-PULL CIRCUITS.

★ PUCO 1-8 Tone Control, centre-tapped input transformer .. **17/6**
 PU 1-8 Similar to PUCO 1-8, but without tone control .. **15/-**
 PUCHOKE For matching loudspeakers, giving three ratios .. **9/6**

★ Specified in the "S.P. Three" and A.C. "Diodion."

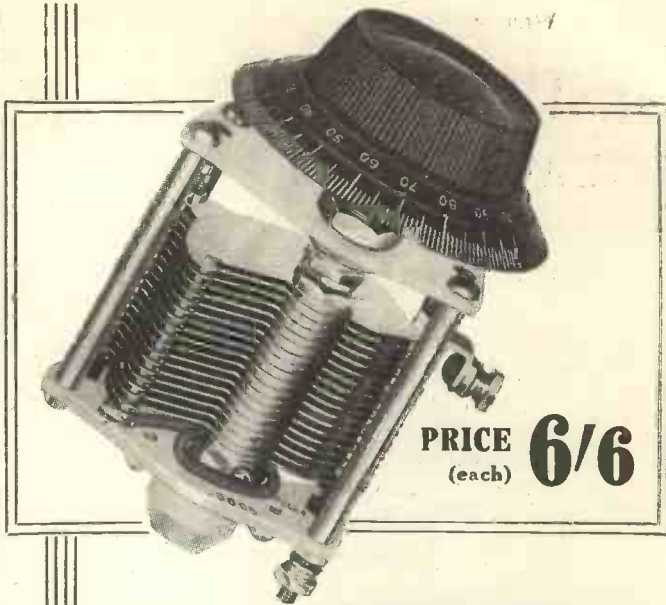
Obtainable from any good dealer. If in difficulty, write direct to us.

New fully descriptive Multitone handbook (G) sent free on application.

MULTITONE ELECTRIC CO. LTD., 95/98, White Lion Street, Islington, N.1. Telephone: North 5063.

MULTITONE

TONE CONTROL L.F. TRANSFORMER



PRICE **6/6**
(each)

TWO

POLAR

No. 2 S.M. CONDENSERS '0005

SPECIFIED

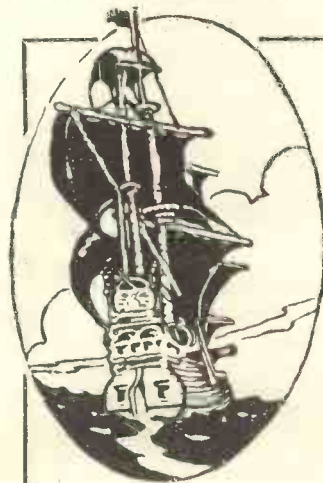
for the "S.P." Three

WINGROVE & ROGERS LTD.,
 Arundel Chambers, 188/9, Strand, W.C.2.
 Works: Old Swan, Liverpool.

♥ 2441

Also Recommended

Polar '0003 Differential Price .. 3/-
 Polar '0003 Preset Price .. 1/6



The World's Best Stories

The ARGOSY offers a splendid variety of really first-class fiction. Every story sets a standard of excellence, for the policy of this magazine is to print those stories which are indisputably great, and written by acknowledged masters of the past and present day. You will never regret it if you tell your Newsagent to deliver this excellent magazine regularly.

1/-
MONTHLY

The ARGOSY

MAGAZINE

MAGNUM SUPERHET SHORT WAVE ADAPTOR

MODEL T.S.H.

An entirely new design which utilizes the amplification of every valve in the set. Including 2 Coils and Battery cord **45/-** or Complete with valve, H.T. and L.T. batteries .. **63/-**
 Send for particulars of this and list of latest short-wave stations. Free on request.

MAGNUM FADER CONTROL

100,000 ohms per section as specified for the "Diodion 5" **7/6**

BURN-JONES & CO. LTD.
 "MAGNUM" HOUSE,
 296, BOROUGH HIGH STREET,
 LONDON, S.E.1.
 Telephone HOP 6257 & 6258.

BETTER-CAMCO Speaker Cabinets

The Camco "Melodee." Here's the cabinet that makes 'a good speaker better'! Definitely improves tone and volume of any unit housed in it. Price, Oak, **22/-**. Mahogany or Walnut, **24/-**. Including baffle board.

See it at our showrooms or send coupon for free Cameo Cabinet Catalogue giving particulars of complete range.

Carrington Mfg. Co. Ltd., Showrooms: 24 Hatter Garden, London, E.C.1. Phone: Holborn 8262. Works: S. Croydon.

Post in 4d. envelope.
 NAME.....
 ADDRESS.....
 7 M.W.



When you are requiring Mains apparatus, make sure you buy from Specialists. You can then be sure of your purchase. That is the reason for the popularity of Heayberd Mains Units, Kits, Mains Transformers and components. Constantly specified by the Technical Press and used by constructors all over the country—Heayberd products can be relied on. Write NOW for particulars



Post Coupon

for Heayberd handbook on Mains Working
I enclose 3d stamps for New Handbook of Mains Equipment. Packed with Technical Tips, Service Hints and diagrams

Mr. _____
Address _____

Mod. W.
F.C. HEAYBERD & Co.,
10 FINSBURY STREET, LONDON, E.C.2
One minute from Moorgate Stn

RADIO SUPPLIES

Send your list of Radio needs for our quotation—Kits, Parts, Sets, etc. Everything in Radio stocked. prompt delivery, 7 days' approval. Catalogue free. Taylex and standard Wet H.T. replacements stocked.
M. TAYLOR, 57 Studley Rd., Stookwell, London

FUSES and FUSE - HOLDERS

An exceptionally neat and compact Fuse-holder to take 1½-in. fuses. Heavy gauge phosphor bronze clips, soldering tags and terminals. Complete with 1-amp. fuse.



No. 1,034
Price 9d. eac
Spare Fuses all ratings and sizes 6d each

Write for complete list

BELLING-LEE FOR EVERY RADIO CONNECTION

Cambridge Arterial Road, Enfield, Mdx.

WE invite readers to support our Advertisers—care being taken to accept only announcements of reputable firms!

RADIO NOTES AND NEWS OF THE MONTH

—continued from page 286

of broadcasting any of the Society's copyright works which, in practice, include practically all published music of which there is a copyright.

The fees are collected by the Society and distributed to its various members. In the past the B.B.C. paid £60,000 a year minimum to the Society, but by a new arrangement the fee has been raised to £80,000.

The Pope's Broadcast

The new Vatican ultra short-wave wireless station has now been inaugurated, and no doubt many readers of MODERN WIRELESS heard the Pope when he broadcast at 3.30 p.m. G.M.T. on February 12th from Vatican City. The ceremony was broadcast to the world by the Vatican longer-wave station, and the Columbia network relayed the broadcast for the benefit of American listeners.

A Tragic Accident

An extraordinary story of how a boy was electrocuted during the inspection of a new wireless aerial was described at a recent Exeter inquest. With his father, the boy had climbed up on to the house rafters to examine the aerial. Father and son obtained their light for the job from a bulb attached by flex to the house lighting circuit.

It appears that the ends of the flex had been pushed too far into the bulb holder, and when the boy stepped upon a junction box or a lead-covered cable on one of the joists, he made an earth connection and received a shock of 210 volts, the effects of which caused his death.

A verdict of accidental death was returned at the inquest.

Athlone's Power

Listeners to the new Athlone station have probably noticed that the power has been gradually increased, until to-day it is probably in the neighbourhood of 80 kilowatts. Tests seem to indicate that the volume is about equal to that from Midland Regional, and that the quality has rapidly improved.

The Luxembourg Tests

As we go to press, Radio Luxembourg can still be heard testing at irregular hours—sometimes very early

in the morning and sometimes starting at 10.30 p.m. up to midnight.

On Seven Metres

For some months past now the B.B.C. has been carrying out experimental work on wavelengths round about 7 metres, but so far no official report has been made as to the results obtained by the B.B.C.'s engineering department. Research tests on 7.85 metres have also been carried out for some time past in Amsterdam, and, commenting on these researches, a writer in a German newspaper gives it as his opinion that a satisfactory service for a large town can be maintained by employing an aerial power of only one-quarter to one-half a kilowatt.

Freedom from "X's"

Quality of transmission can be made as good as the regular broadcasting service, it is claimed; while the background of reception is unusually quiet. Constant signal strength at any part may be expected because of the absence of reflected rays from the upper electrified layer. Another favourable feature is complete freedom from atmospherics.

Motor-Car Interference

It has been noted, however, that absorption effects of buildings are very marked, a variation of six to one being recorded as between the inside of a restaurant and a point across the road.

Dealing with the possibilities of interference from motor ignition systems—the chief source of interference on such short wavelengths—the writer of the article states that the range of such interference is only 20 metres or so from its source, and that it can be prevented from the introduction of high resistances—about 20,000 ohms—in the spark distributing leads.

Those Poets!

The B.B.C.'s invitation to poets to send in original work for broadcasting closed on February 28th and the two judges are now settling down to the task of reading the 2,000 or so manuscripts which have been submitted.

According to the officials who have opened the letters and placed the poems in two large sacks for judging, the most popular subject was Love. The Prince of Wales also came in for a large share of attention in some 200 of the manuscripts.

Young ladies in the suburbs, bricklayers and miners seem to be the most poetically minded.

WATCHING THE WAVE-LENGTHS
—continued from page 201

"These direction-finders are much like those you can see at Croydon or any other big aerodrome. One of the 700-foot masts outside carries an umbrella aerial from which separate leads-in run to the two direction-finding units.

"The superhets are connected by means of a buried D.F. type cable to half-wave aerials supported by two 120-foot masts. The aerials for the other receivers are supported by three masts 60 feet in height.

Broadcasts Possible!

"We have carefully tested lines running through to the Broadcasting House control-room, and in the low-frequency bay there are land-line equalisers, calibrated volume indicators, fade units (as used on outside broadcasts), and microphone apparatus, so that in an emergency it would even be possible to broadcast from here. A running commentary could be given, say, on American reception being done with one of the superhets."

"And how is the European wavelength checking done?"

"In the mornings, the multi-vibrator is switched on, allowed to warm up, and then used for testing the wavemeters at a dozen or so points over the whole waveband.

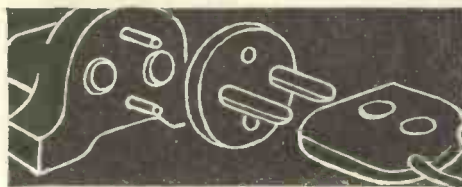
"Then, as you can see being done now, the checking receivers in those racks by the Brussels wavemeters are switched on and tuned to the chief B.B.C. stations and foreign broadcasters in order to see what conditions are like for the evening.

A Fascinating Game

"The B.B.C. listeners know what to expect, for they get regularly from Brussels the frequency measurements made with the official wavemeters there. Bad stations are 'spotted' and watched for the following month."

For something like an hour I watched the experts at work with the checking sets and receivers. It is a

AN INDISPENSABLE SAFEGUARD



THE BULGIN COMBINED TWIN FUSEHOLDER AND MAINS PLUG

constitutes a great step towards simplicity of mains-operated equipment. Not only does it economise in space by combining two essential components, but simplifies wiring and costs less. In common with all Bulgin Mains Equipment every live part is fully protected and readily accessible; and the component is up to the usual Bulgin standard of excellence.

List No. P.12. MAINS PLUG AND SOCKET,

Specified in this issue for the Price "A.C. DIODION," "POWER PACK." 3/.

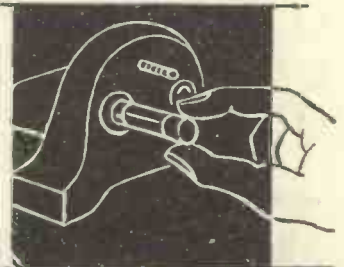
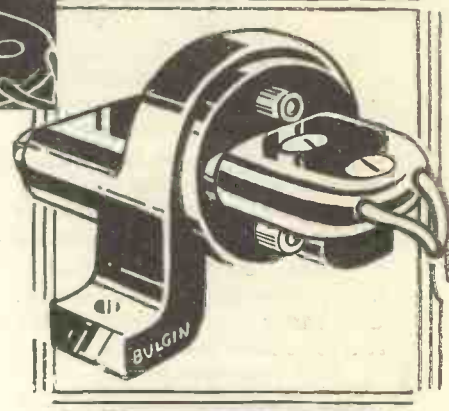
If you are building the "S.P. THREE," insist upon the BULGIN specified parts.

- | | | |
|----------|-----------------------------|-------|
| List No. | | Price |
| H.F.10. | SCREENED CHOKE | 5/6 |
| F.5. | FUSEHOLDER AND 100 M/A FUSE | 1/- |

Send for 80-page catalogue "M." Enclose 2d. Postage.

A. F. BULGIN & CO. LTD., ABBEY ROAD, BARKING, ESSEX.

Telephone - - - - GRANGEWOOD 3236 & 3267.



SPARE FUSES 6d. REGISTERED DESIGN No. 765,496.

fascinating game. It is ether-searching reduced to a fine art.

The calibrated dials of the Tatsfield sets enable the listeners to spot at once some distant European station, hiding in the middle of a bevy of heterodyne howls, which it would take the average amateur half an hour to find.

Average Error

The talk during these exacting tests is all mathematics. Really, the Tatsfield wavemeters don't only tell the listeners which station is wandering off its wavelength, but a little calculation (I didn't say simple calculation!) shows the average error over, say, a month.

They even try the "common" waves, which on the normal amateur set bring in only a pessimistic howl.

While I waited, I witnessed an interesting chase on 307 metres. This, they told me, is Zagreb's normal

wavelength, and it sticks to it faithfully. The average error over the month had been 0.5. But there was an intruder. Brussels has reported the unwelcome visitor, and the following day Tatsfield discovered that there were two intruders!

Sometimes, of course, Tatsfield finds that it is only chasing harmonics. For instance, although the average receiver may not stop them, there are two strong harmonics round about 430 metres.

It has been proved by the sensitive superhets and the Brussels wavemeters that near Stockholm, on 436 metres, and near Belgrade, on 430 metres, there are harmonics of long-wave Russian stations.

And yet, in spite of it all, the Tatsfield fellows are still as keen as mustard on radio, and will tell you strange tales of international "DX" hunting so long as you care to listen!

FOR EVERY SET — there's a **SEND NOW FOR LATEST LISTS**

PILOT AUTHOR KIT

PETO-SCOTT CO. LTD. 77, CITY RD. LONDON, E.C.1 CASH — C.O.D — or H.P.

QUIESCENT PUSH-PULL COMPONENTS

Radio's newest need Varley's latest achievement. An Input Transformer, ratio 9/1, and three different Output Transchokes for accurate matching. **Each Varley Output Transchoke is suitable for either high- or low-impedance speakers, thus avoiding the losses of an additional matching transformer and its expense.** Get all the advantages of this revolutionary push-pull system. Use Varley—the quality products at a reasonable price.

- Q P.P. INPUT TRANSFORMER** (DP36) Ratio 9/1. Price, including royalty **17/6**
- Q P.P. OUTPUT TRANSCHOKÉ** (DP37) Ratios 3/1 and 42/1. Price, including royalty **18/6**
- Q P.P. OUTPUT TRANSCHOKÉ** (DP38) Ratios 3/1 and 50/1. Price, including royalty **16/6**
- Q P.P. OUTPUT TRANSCHOKÉ** (DP39) Ratios 3/1 and 75/1. Price, including royalty **16/6**

Write for illustrated literature.

Varley

Proprs.: Oliver Pell Controls, Ltd.

Advt. of Oliver Pell Controls Ltd., 105, Kingsway W.C.2. Tel. Holborn 5305

TAYLOR WET H.T. BATTERIES.
Give long service, improved volume and tone; very economical.
Replacements for Taylex or Standard batteries at low prices; details post free; also Bargain List. Radio Kits and parts at lowest prices.
M. TAYLOR, 57, Studley Rd., Stockwell, London.

Write for Illustrated Catalogue of **RADIO-CRAMOPHONF CABINETS**
of exclusive modern design, made by craftsmen, in highly figured Oak, Walnut or Mahogany post free.
Remarkable Values
Cabinets made to order a speciality. Maker, under licence, of the
HOWE BOX BAFFLE. Recommended by the B.B.C. Full details on request.
GILBERT
Cabinet Maker,
SWINDON.



The Picture Paper with the **MOST** News—
SUNDAY GRAPHIC
and Sunday News

ALL APPLICATIONS for **ADVERTISING SPACE** in **"MODERN WIRELESS"** must be made to the Sole Advertising Agents,
JOHN H. LILE, LTD.,
4, LUDGATE CIRCUS, LONDON, E.C.4. 'Phone: City 7261.

USING THE MILLIAMMETER

Practical Notes on Procedure.
By **H. CROSS.**

ALTHOUGH valve manufacturers usually give instructions as to the correct grid-bias value to use, this value is in most cases for one particular anode voltage.

Furthermore, valve data sheets, although useful, are usually thrown away with the box, or lost soon after. So more often than not the constructor finds himself adjusting the grid bias on the hit-and-miss principle, with always the unsatisfactory feeling that the right value is never reached.

If a milliammeter is possessed, however, the correct negative grid voltage for the particular valve and particular anode voltage can be found once and for all.

Tune In Local

The instrument is connected in the plate circuit of the valve of which biasing is to be carried out, and will, of course, give a steady reading when the batteries are joined up. Tune in to the local so that a fairly hefty sound is obtained; this gives a good grid swing and assists in finding the correct bias value.

Note what happens to the milliammeter needle on increasing and on decreasing the bias. When the needle kicks upwards the valve is over-biassed. When the needle kicks downwards the valve is under-biassed. Bearing these points in mind the correct mid-value may be determined beyond question, irrespective of what resistance is in the anode circuit, or the voltage at the terminals.

A further exceedingly useful application of a milliammeter is to insert it in the anode circuit of the detector valve. Assuming this to be the more usual leaky-grid detector, it will be found, unlike the previous case, that when a signal is tuned-in the milliammeter needle will fall back, the lowest reading indicating the point at which the oscillatory circuits are exactly in tune with the received transmission.

Band-Pass Checking

If a band-pass filter is used its square-peak efficiency can be checked up. As the tuning dial is swung the range of a powerful station the milliammeter should fall from normal, reach the lowest reading and rise again. If a double-hump effect is present, a small rise will occur at the position where normally the minimum would be.

This also checks ganging, since the effect noted may be due to the two or more circuits going in and out of resonance at slightly different positions of the control dial. In either case the remedy is obvious.

Sometimes self-oscillation is experienced in a receiver, and it is difficult to know which is the errant circuit, this being particularly the case with more than one H.F. stage. A milliammeter connected in turn in the anode circuit of each valve will indicate the stage or stages giving trouble.

The reading obtained on the ammeter will increase appreciably above normal if the circuit is in oscillation. In the case of the leaky-grid detector valve, however, the current will decrease.

CONTROL OF THE B.B.C.

An interesting letter from a Scottish reader.

The Editor, MODERN WIRELESS.
Sir,—I have read with interest your Editorial in this month's issue of MODERN WIRELESS, on the subject of Parliament and Broadcasting, with special reference to the proposed control by Parliament of the B.B.C.

You quote Lord Allen of Hurtwood, when he observed that mistakes are quite inevitable under any condition. Of course they are, all sensible people recognise this as inherent in human nature, in whatever guise it may be dressed.

Effective Control

What the people of this country will not tolerate, is an autocracy like the B.B.C. under a democratic constitution. What Parliament can make, it can also control, and there is no reason why it should not bring the B.B.C. under effective control.

The Highlands have been demanding an effective broadcasting service for a long time now. Yet the B.B.C. refuse to do anything in a practical way to remedy our claim for equal justice and treatment with other parts of Great Britain. Let your readers consult this year's B.B.C. Year Book, on page 43, and there they will find how the autocratic B.B.C. have ignored the claims of the Highlands for an adequate broadcasting service.

The sooner the B.B.C. is brought under close control of Parliament the better for all parties concerned will be the result.

Yours faithfully,
ANDREW MURRAY,
Provost.
Town House, Dingwall.

YOUR "EMPIRE SUPER"
—continued from page 250

ones. The 25-metre group are in the region of 50 degrees (100-degree dials) on the smallest coils, and the 19-metre stations are between 10 and 20 degrees.

All these settings are naturally dependent upon the adjustments of the two variables previously mentioned. For a list of "stations heard," turn up any complete list of short-wave stations and cross off those that don't work nowadays, and you will have a close approximation of my list.

After all, there is not much point in building a big short-waver of this type if it doesn't get all the broadcast and high-power stations going! 40- and 20-metre amateur telephony also comes in very well, but for C.W. stations, even with the I.F. stage oscillating (this is done by loosening

NEXT MONTH

MODERN WIRELESS

will contain full details for building

A QUIESCENT PUSH-PULL RADIOGRAM

On Sale April 1st. One Shilling

off the coupling and leaving the screens off the transformers), it is not particularly good.

I make no apology for this, as it was never intended to be a "weak-C.W." receiver—a small straight circuit does the job much better.

WIRELESS IN THE NAVY

Some good news for Students

FROM H.M. Stationery Office we recently received the latest edition of the Admiralty Handbook of Wireless Telegraphy. It is on sale to the public at 7s. 6d., and at that figure it represents really amazing value, being a big well-bound volume of over a thousand pages, packed with facts and formulæ.

Intended as the standard work for all ratings trained in radio, the book is admirably clear and concise, and its presentation—i.e. use of heavy type, illustrations, etc.—leaves nothing to be desired.

It is, of course, particularly concerned not with broadcasting, but with general theory and transmission and reception as practised afloat and ashore in naval stations; but for the student it is filled with relevant matter, exceptionally well set out.

Most of the explanations are extremely helpful, though that of cumulative grid rectification, which suggests that the student first assumes the grid leak is omitted, appears to savour of tradition.

In most cases the book is a marvel of conciseness and accuracy, and it is thoroughly recommended to all students of the subject.

HOW TO MAKE AN ACCUMULATOR CARRIER

THAT spare accumulator of yours—how often have you desired a handy carrier for it, a simple and foolproof device which would not be liable to deteriorate with rough use?

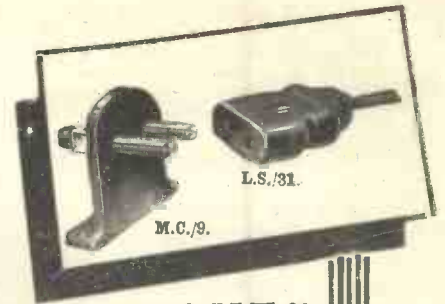
Such an article is the one which you see in the illustration. All it consists of are three strips of leather, taken in this particular instance from a long-disused camera case.

The leather strips are carefully measured round the accumulator. Then they are cut to size and sewn together by means of a strong needle and stiff thread.

After completing the accumulator carrier, give it a good rub over with a rag charged with oil or floor polish in order to nourish the leather, to keep it pliant, and to render it acid-proof. You will then have a handy little carrier for the spare accumulator, a carrier which, when not in use, can be stored anywhere, and one which will not wear out, even under the severest of working conditions.

J. F. C.

This useful accumulator carrier was made entirely of cut leather strips cut from an old camera case. When employing leather for this purpose it is as well to bear in mind that the material must be adequately protected from the effects of sulphuric acid. So don't forget to "nourish" the leather with oil or polish.



"GOLSTONE" MAINS CONNECTOR

as specified by "MODERN WIRELESS"

M.C./9. 2-Pin Plug Projector 6d. ea.
L.S./31. Flat Bakelite Connector 6d. ea.

Screened Tubing as specified.
R43/91. 2m/m bore, per yard length 9d.
R43/92. 3m/m bore, per yard length 10½d.

GOLSTONE products are obtainable from all first-class Radio Stores. Refuse substitutes — if any difficulty write direct.



HAND CRAFTSMANSHIP!

BUILT LIKE A PIANO.

Used by B.B.C., famous experts, 3,000 clientele.



FOR YOUR RADIO-GRAM.

The sort people desire to possess and keep Tasteful beauty—Piano finish—advantages also of PIANO TONE baffle chamber. The BETTER REPRODUCTION—that your Set and Speaker is really capable of—gives you a joyous sense of achievement. Sent ON APPROVAL—direct from the makers—Prices 65/- to £15 (Cash or Deferred) you may return at our expense if you wish to part with it. Photographs and lists FREE!

PICKETTS Radio Furniture (M.W.), Albion Road, Bexleyheath, Kent.

The Paper for the Boy of To-day!

Such is MODERN BOY. Its every issue is brimful of thrilling stories and articles on the very latest Invention, Adventure, Hobbies, etc. It is the paper for the youth of to-day. Buy it regularly.

MODERN BOY

Every Saturday 2d.

THE EKCO "S.H.25" SUPERHETERODYNE

—continued from page 224

or main tuning control; while the functions of the smaller one are obvious from the engravings on the facets, which are "M.W.," "L.W.," and "Gram."

Balancing these on the right are two similar knobs, the larger one of which comes into use for regulating volume; while the smaller one is employed for local-distant switching. A rough but effective method of tone control consists of a small switch which is located centrally between the two sets of knobs.

Internal Aerial

The only other control, if such it can be called, is the mains switch which is mounted on one side of the bakelite case.

Sockets at the back provide for the use of a gramophone pick-up, and, where desired, for the connection of an external speaker. For those who are not able to erect an external aerial it is worthy of mention that a simple change-over scheme at the back enables the "S.H.25" to be used in conjunction with an internal aerial, under which conditions the set works very well. But for best results, of course, an external aerial, even if it is only quite short, is to be preferred.

True to Life

As in the case of almost any of the apparatus produced by Ekco we feel that it is hardly necessary to dwell upon the question of quality of reproduction. It is abundantly obvious that it would not have been possible for Ekco's to have staged their famous "direct comparisons" show

all over the country with such outstanding success had not the reproduction of their instruments been all but indistinguishable from the real thing.

As a result of our tests we have no hesitation in saying that the Ekco "S.H.25" is a very fine set. Few sets at or anywhere near the price could equal its performance, and certainly none could beat it.

VOLUME CONTROL— MEANS AND METHODS

—continued from page 204

With the detector, two L.F. circuit the most suitable form of pick-up connection and control is undoubtedly that consisting of a fader potentiometer. This component consists of two 500,000-ohm resistances so arranged that a movement of the knob slides the moving contact from one resistance to the other without a break, and thus fades from radio to records and vice versa without any other change being necessary. This component has four terminals and several types are available. It should be connected as shown in Figs. 8a and 8b for transformer and resistance-capacity coupling respectively.

When Playing Records

In receivers using screened-grid valves on the high-frequency side, and having only one stage of low-frequency amplification, a pre-detector control fitted for operation on the radio programmes will be ineffective when playing records, and a separate control is needed.

This should take the form shown in Fig. 9, that of a 500,000-ohm potentiometer connected across the pick-up. The radio and gramophone

volume controls can, however, be conveniently ganged on one spindle, the operation of one in no way affecting the other, as the two are never in circuit at the same time.

If the receiver employs two L.F. stages, the foregoing remarks in respect of the detector, two L.F. receivers apply, while if there are already two controls operating on radio, a pre-detector type and one included in the L.F. side, the latter will be equally effective on record reproduction.

Applicable to All Types

There is one form of volume control applicable to all types of receiver employing choke capacity or transformer output, but it has the drawback that the reduction is effected at the output instead of the input end of the receiver. Also, the lower frequencies are somewhat reduced as the control is rotated, but it is a simple form of control that some may like to try. It consists of a 5,000-ohm potentiometer across the output terminals as shown in Fig. 10.

NEXT MONTH

Full details for making an up-to-date

RADIOGRAM

embodying radio's most recent innovation—

QUIESCENT PUSH-PULL

ALWAYS AHEAD

MODERN WIRELESS

Out April 1st. Price 1/-

INDEX TO ADVERTISERS

Argosy Magazine	PAGE 287
Belling & Lee, Ltd.	288
Bulgin, A. F., & Co., Ltd.	289
British Insulated Cables, Ltd.	271
Burne-Jones & Co., Ltd.	287
Carrington Manfg. Co., Ltd.	287
Clarke, H., & Co. (M/cr.), Ltd.	277
Colvern Ltd.	281
"Chums"	281
Edison-Swan Electric Co., Ltd.	Cover iv
Gilbert, J. C.	290

Graham Farish, Ltd.	PAGE 267
Gramophone Co., Ltd.	198
Heyberd, F. C., & Co., Ltd.	288
Igranic Electric Co., Ltd.	271
Jackson Bros., Ltd.	283
London Electric Wire Co. & Smiths, Ltd.	Cover ii
Multitone Electric Co., Ltd.	287
"Modern Boy"	291
Osram Valves	Cover iii
Pickett Brothers	291
Peto-Scott Co., Ltd.	289
Preh Manufacturing Co., Ltd.	277
Pifco Ltd.	283

Sound Sales, Ltd.	PAGE 283
Telegraph Condenser Co., Ltd.	286
Taylor, M.	288, 290
Varley Products	290
Westinghouse Brake & Saxby Signal Co., Ltd.	197
Wright & Weaire, Ltd.	283
Whiteley Electrical Co., Ltd.	277
Ward & Goldstone, Ltd.	291
Wingrove & Rogers, Ltd.	287

All communications concerning advertising in "Modern Wireless" must be made to John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4. Telephone: City 7261.