

the year
S.G.'s IN SUPER-HETS (See Inside)

MODERN 1/- WIRELESS

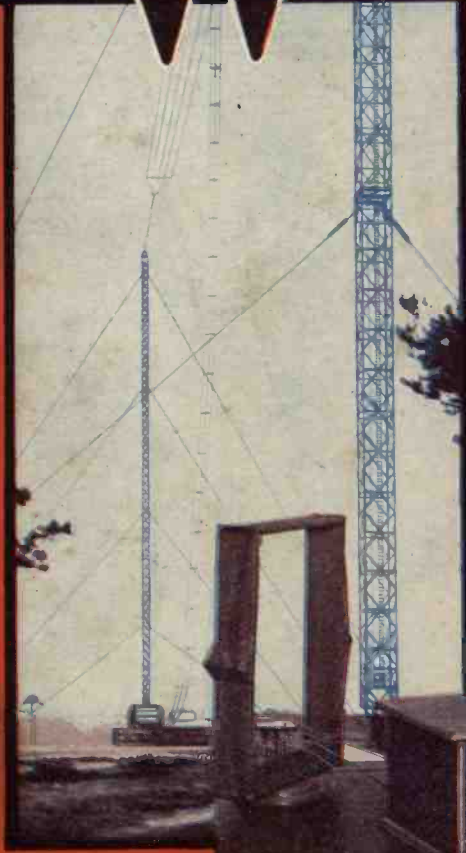
Vol. XVI. N°56

AUGUST 1931

MORE ABOUT THE "SIMPLICITY" SUPER

IN THIS ISSUE

ALSO
THE
"LOCK-TUNE"
FOUR



THE "NEW D.C." THREE
A fine loud-speaker set that embodies several original features and gives exceptional results.

THE WORLD'S PROGRAMMES
How, when and where to hear those foreigners—a special, lavishly illustrated supplement for the long-distance listener.

SELECTIVITY . . .

Varley

"Modern Wireless" chooses

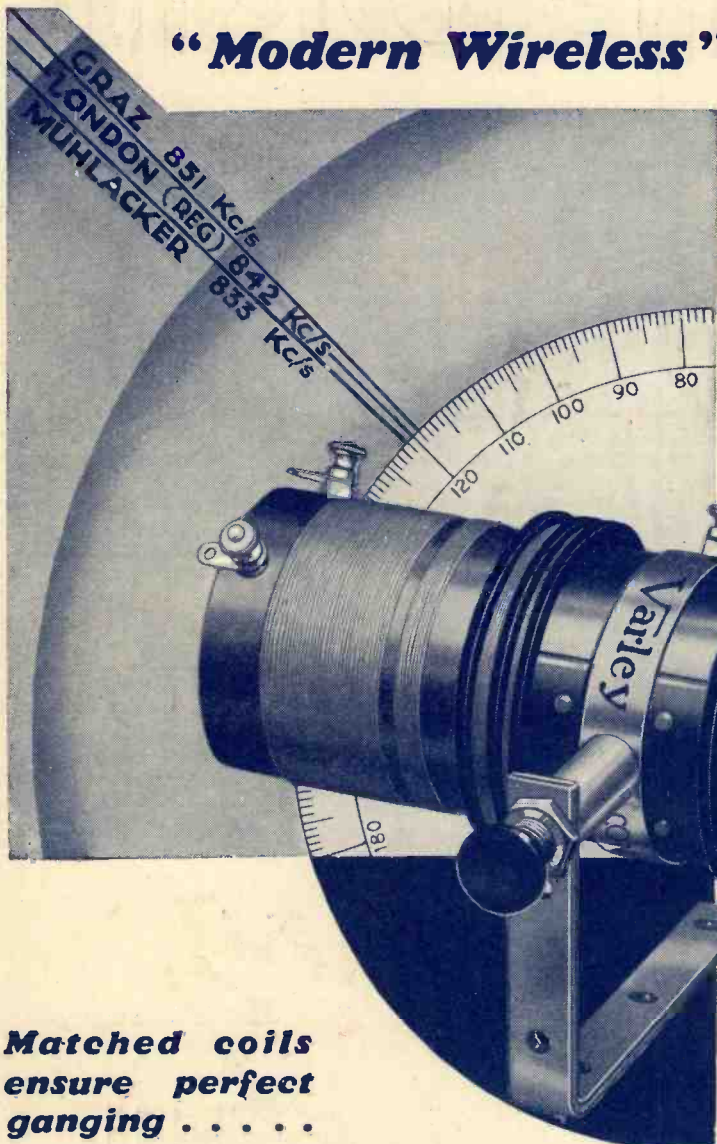
for the "LOCK-TUNE" FOUR described in this issue

THE VARLEY CONSTANT SQUARE PEAK BAND-PASS COIL

The ideal pre-selective device for any set. Enables programmes—now swamped by powerful transmissions—to be heard and enjoyed. Actually improves quality of reproduction. Abolishes all interference by medium waves on long waves. Needs no screening. This new Coil combines a *negative* inductance and capacity coupling, so giving a constant square-topped peak and separation of substantially 9 kilocycles over the whole of both wave-bands.

Supplied complete with extension rod for switch and universal mounting bracket.

List No. BP5. Price **15'.**



Matched coils ensure perfect ganging

The New VARLEY H.F. INTERVALVE COIL is also specified in the "LOCK-TUNE" FOUR. This Coil is specially designed for use with the VARLEY CONSTANT SQUARE PEAK COIL. It is completely screened and its inductance as screened is exactly matched to that of the Constant Square Peak Coil. With a good ganged condenser the tuning will keep in step over the whole long- and medium-wave range. Extension rods are supplied for mechanically coupling the switch to that of the Constant Square Peak Coil.



THE NEW H.F. INTERVALVE COIL

List No. BP6.

Price **8'6**



CONTENTS

VOL. XVI. No. 56.

MODERN WIRELESS

AUGUST, 1931

	Page		Page
Editorial	95	At Your Service	153
Planning the New Studios	98	Concerning Tuning Controls	155
All About Tone Control	99	On the Test Bench	156
The "Lock-Tune" Four	102	Letters from Listeners	158
More About the "Simplicity" Super	109	D.C. or A.C.?	159
Round the Turntable	112	Trouble Tracking	161
S.G.'s in Super-Hets	129	Mounting a Pick-Up	162
The "New D.C." Three	132	Switching Your Super-Het	162
Jottings for the Listener	140	In Passing	163
My Broadcasting Diary	141	Questions Answered	165
A Radio Reckoner	143	Contact Rectifiers	166
One Hour of Music Means Weeks of Work	146	"Mike Fright!"	168
On the Short Waves	148	An Aero Short-Waver	172
A Varley All-Electric Transportable	149	Recent Record Releases	174
Direction Finding by Radio	151	Radio Notes and News	176

SPECIAL SUPPLEMENT, "THE WORLD'S PROGRAMMES," PAGES 113-128
(See page 113 for contents of this section.)

As some of the arrangements and specialities described in this Journal may be the subject of Letters Patent the amateur and trader would be well advised to obtain permission of the patentee to use the patents before doing so.

Edited by **NORMAN EDWARDS.**

Technical Editor: **G. V. DOWDING, Associate I.E.E.**

Radio Consultant-in-Chief: **Capt. P. P. ECKERSLEY, M.I.E.E.**

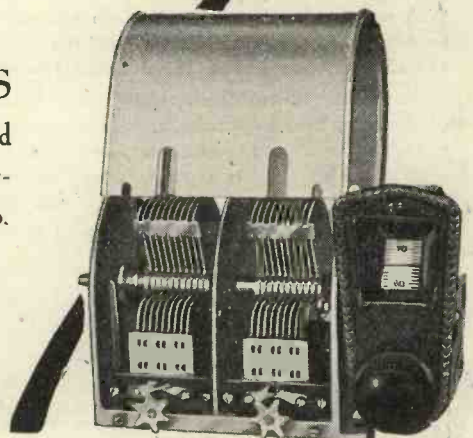
Scientific Adviser: **J. H. T. ROBERTS, D.Sc., F.Inst.P.**



Perfect Ganging

POLAR "TUB" CONDENSERS may be compared to two athletes locked together, working in close harmony and perfectly matched for the work they have to do.

Guaranteed accurate. Matched within one per cent. Rigidly built. Fully screened. Fitted with minimum trimmers.



POLAR



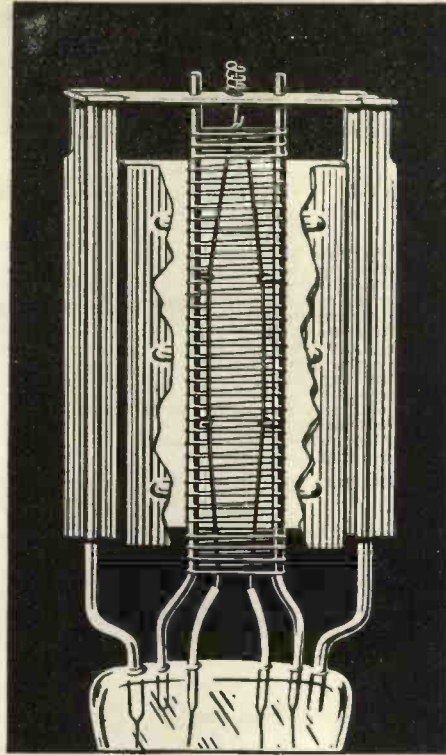
TUB CONDENSERS

POLAR "TUB" THREE, specified for the "LOCK-TUNE" FOUR.

PRICES :

- Polar "Tub" Two (less drive) 21/-
- Polar "Tub" Three " " 30/-
- Polar Drum Drive 8/6
- Polar Disc Drive 5/-

Simple facts for
Valve Users



Why

**Cossor Valves retain
their filament
emission**

THE locomotive depends for its power upon a good head of steam. When steam pressure falls the engine inevitably loses speed. In precisely the same way the efficiency of a Wireless Valve is determined by its filament emission.

With some makes of valves adequate electron emission is obtained by heating the filament to a high temperature. But this has the effect of prematurely curtailing its emission and renders the filament readily liable to fracture.

In the special filament developed by Cossor Research Engineers the disadvantages of excessive heat have been entirely eliminated. The Cossor filament operates at such a low temperature that no glow is visible except in a darkened room. As a result the emission is unvarying, long lasting and extremely prolific. Every Cossor Valve, therefore, retains its maximum efficiency throughout the whole of its life—with no falling off in amplification or in quality of reproduction.

Over 50 types of Cossor Valves are available from any Wireless Shop to suit all 2, 4, and 6 volt Battery operated and A.C. Mains Receivers.

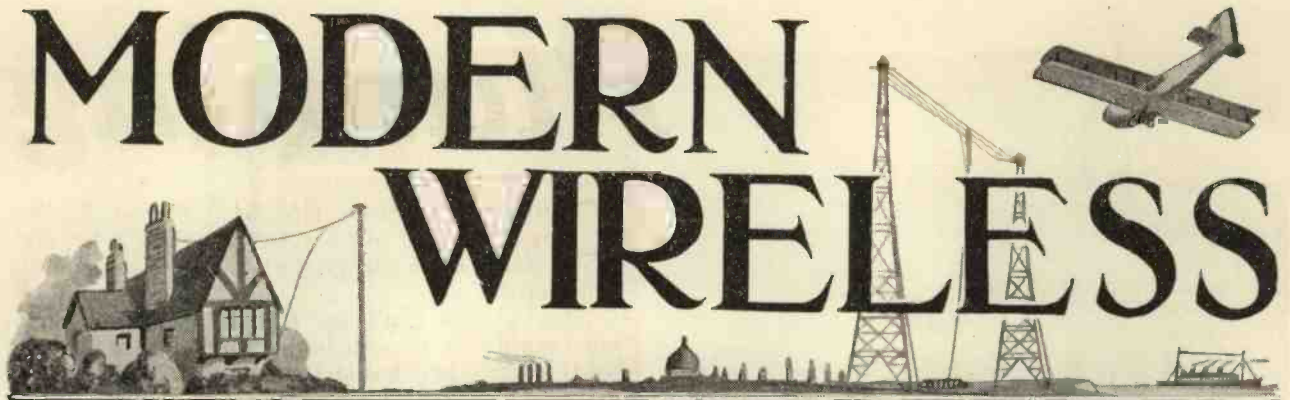
Send for one of our novel circular Station Charts, which give identification details of nearly 50 stations, with space for entering your own dial readings. Ask your dealer for a copy, price 2d, or send 2d. stamp to us and head your letter "Station Chart " M. W."

COSSOR

A. C. Cossor Ltd., Highbury Grove, London, N.S.

♥ 8609

MODERN WIRELESS



Vol. XVI. No. 56.

BRITAIN'S LEADING RADIO MAGAZINE

AUGUST, 1931

Special Band-Pass Set—Another Very Modern Receiver—Sir Thomas Beecham Again—Moorside Edge.

WHEN it comes to the question of naming the various sets designed in the "M.W." Research Department we are very often hard put to it to select titles for them.

There may not be much in a name, but a good set is worthy of a decent christening, and as time goes on, and our family of successful sets increases, we have to scratch our heads quite a lot over the problem.

Perhaps readers of "M.W." would care to put on their thinking-caps and send in a few suggestions! They will be welcome!

This month we have been guilty of using a hyphenated name for our star design—the "Lock-Tune" Four. Admittedly it is not a beautiful name—but it does, in a way, suit the set. Not that we mean to suggest the set itself is not beautiful! We venture to think it is—not only in appearance, but in behaviour. Try it, and see for yourself!

Special Band-Pass Set

Briefly, it is a specially designed band-pass receiver, embodying a single-knob tuning control, which should make a strong appeal because of its simplicity and efficiency. Constructors need have no fear about getting the ganging right, even though the set incorporates a triple-gang condenser, and the selectivity obtainable is such that *no reaction is necessary*.

Pre-detector volume control is used to enable fine adjustment to be easily obtained. The discriminating constructor will take note of these special features because he will realise not only their fundamental importance, but the up-to-date touch they give this very excellent set.

Another Very Modern Receiver

THANKS to the introduction of the new D.C. mains valves, we are able to present to our readers the full details for the construction of a set which combines simplicity of design with first-class operative efficiency.

The "New D.C." Three fully justifies its name; it is new. Three valves are used—S.G., detector, and pentode; and together with the new P.J. coils, recently introduced to "M.W." readers, they have enabled the Research Department to design a set possessing a high degree of

selectivity and sensitivity. We particularly recommend this set for long-distance and local reception.

A high-note control is included in the design, which enables every constructor to adjust the output of the set to suit his own requirements.

Sir Thomas Beecham Again

AT a luncheon given by the Radio Manufacturers recently, Sir Thomas Beecham, who was the principal guest, expressed some candid views on broadcasting.

Although Sir Thomas was quite emphatic in denying that he was antagonistic to the B.B.C., he was definite in expressing the opinion that first-class music, when broadcast, was hopelessly "misrepresented" when it reached the listener.

Sir Thomas is an idealist. He wants perfection, and he wants everybody else to be able to appreciate perfection.

But this is a very realistic age; perfection is not for everyone. We cannot all attend high-class symphony concerts; we can't afford to, even if we had the time and opportunity, and the only way many thousands of people can enjoy good music these days is via the B.B.C. or the gramophone.

Sir Thomas thinks more highly of the gramophone as a music medium than he does of the loud speaker.

Sir Thomas has a gramophone, and he makes a good many records. But, on his own admission, he does not possess a wireless set!

"No one," he said, "has offered to give me a set, and I have not had the time to go out and buy one."

If that be the case, it is all the more surprising that Sir Thomas had the time, or the nerve, to air his views on broadcasting at the R.M.A. luncheon.

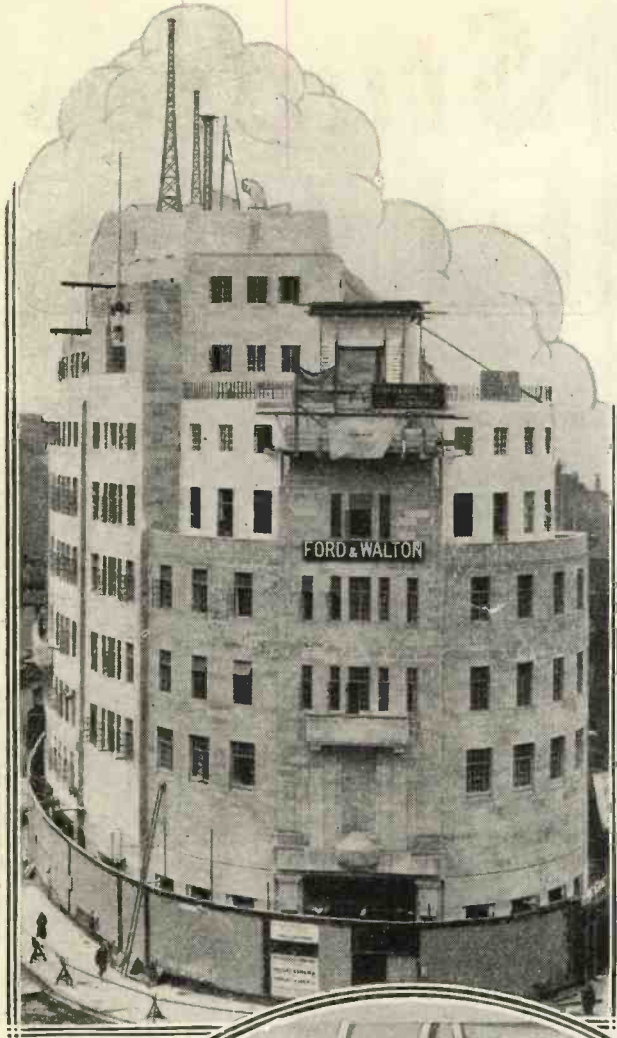
Moorside Edge

ALTHOUGH the new Moorside Edge Regional station has made a good start, it is as yet early days to pass final judgment.

The introduction of this latest recruit to the B.B.C.'s Regional giants must, of course, be responsible for some inconvenience and annoyance to certain localities, but we think that before very long Moorside Edge will be generally and widely acclaimed a real success.



Planning



COMFORTABLE places, studios! Shaded lighting, restful colour schemes, heavy carpets, a few arm-chairs, and a microphone! Simple. The simplicity is deceptive.

What visitors don't see are the concealed sound-proof ventilators, the complicated wiring for the indicator lights, control switches and microphones, and the huge masses of ugly hair-felt behind the nice tapestries.

What they don't realise are the months of research needed to get the acoustics right before even test broadcasts are made from the new studios.

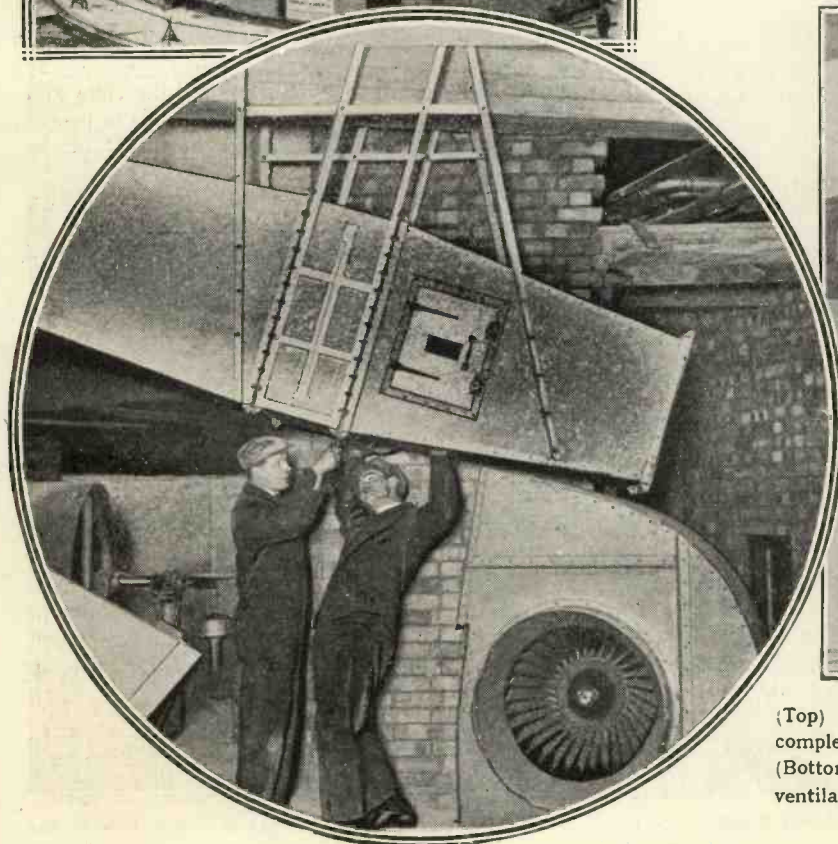
What with the proposed twenty studios and a giant concert-hall in London's Broadcasting House, and with the new studios at Manchester and Glasgow, the B.B.C. engineers have some important work in hand.

How the Echo is Arranged

If acoustics had not to be studied, but only the programme requirements of the day, there would not be any need for the ten studios at Savoy Hill, the three at Manchester, and the twenty studios which the B.B.C. will have when the new Broadcasting House is open.

Three or four studios would be ample for alternative programmes if any one studio would suit every kind of broadcast.

Unfortunately for the engineers, certain studios have to be suited to certain items, and that is why the echo period of practically every studio at Savoy Hill is arranged



(Top) The B.B.C.'s new Broadcasting House is nearing completion, as you will see from this recent photograph. (Bottom, left) Part of the ingenious and complicated ventilating system. (Bottom, right) The end of a ventilation duct in a studio ceiling.

the New Studios

With the proposed twenty studios and a giant concert-hall in Broadcasting House, and with the new studios at Manchester and Glasgow, the B.B.C. engineers have important work before them. Here is some exclusive information on the way in which these wonderful places are planned.

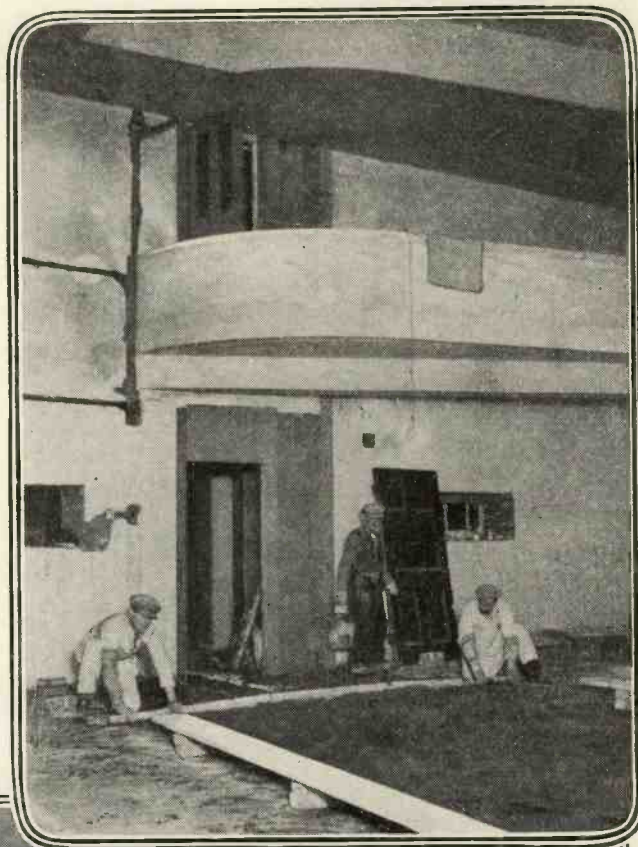
with care; and the arranging is not always an easy matter, because it involves architectural layout as well as alteration of the decoration scheme to get the reverberation times right.

B.B.C. engineers are faced with the fact that if a loud sound suddenly ceases it is still heard for a short period of time. If the walls of the studio are very absorbent the sound is "eaten up" quickly, and it will have gone in a fraction of a second.

"Reverberation" an Important Item

If the walls are of hard sound-reflecting plaster or concrete, as they are in the echo rooms in the basement, then the sound will take several seconds to die away.

The time in seconds taken for a fairly loud sound to die away to inaudibility is known as the reverberation time, and this is the thing which has to be borne in mind when designing studios.



Workmen are shown cementing the floor of the gallery of one of the giant studios in the upper picture. Below it is a view of the main Manchester studio. Note the Announcer's box on the right.

A Suitable Studio for Every Type of Programme

In the early days all studios were draped and all echo killed, because it was found that if any brilliancy were left it caused a sort of "double reception" by the microphone.

The trouble is that a studio which is damped by hanging curtains does not absorb all sounds in the same way.

THE FINAL TOUCHES



It should not be long before the B.B.C. moves into its new quarters. In some places the builders have got to the finishing-off stage, as you can see in the top picture. Seaweed is an excellent insulator of sound, and, on the right, workmen are seen putting it in the walls to keep out unwanted noises.

The absorption of sound is much greater on high notes than on low notes, and that is why in any of the old-fashioned draped studios there was a lack of brilliance (all the high notes being absorbed by the walls), and a boomy effect was noticeable because the low notes were still reverberating while the high notes had been absorbed.

The engineers tried more and more sound-damping material, and several tons of felt and cloth material were used in some of the old London studios.

Drawback of Studio Drapings

The trouble then cropped up that if the low-frequency reverberation were reduced to the proper value for the low notes, then there would be hardly any high-note reverberation at all, and this gave all broadcasts from heavily damped studios a dead effect.

It is common knowledge that in the new Broadcasting House there will be approximately twenty studios.

The much-discussed concert-hall will have an echo period similar to that of the Queen's Hall, and the only trouble that has been experienced here is in keeping all the sounds inside this huge studio.

On the first plans arrangements were made for a big organ, and the Constructional Department was put in a panic when it was suggested that while the 4-ft. thick brick-walls might insulate ordinary orchestral sounds, the low-note reverberations of the organ might leak through to the other studios and cause trouble.

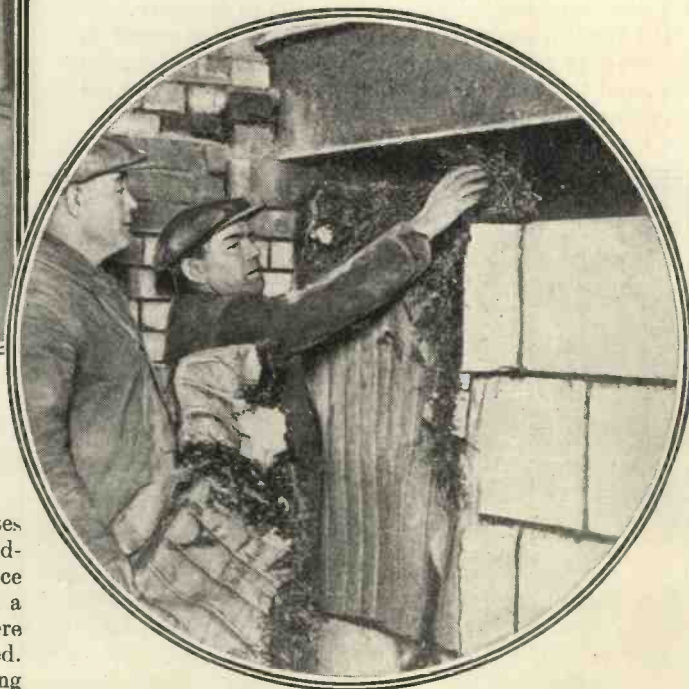
To see if this idea was correct the engineers took along a big organ-pipe to the studio and blew down it with a pneumatic blower. Observers in other parts of the building then noted any sound leakage. Between certain studio walls seaweed has been packed as a further insulation.

Height is Very Desirable

It is a notable thing that the best studios are high. Fine orchestral broadcasts are given from the No. 1 studio at Manchester, the old Queen's Hall studio at the Scottish station, and the No. 10 "wharf" studio in London—all high rooms.

The No. 7 studio at Savoy Hill was made by knocking out a complete floor of the old building and joining two rooms, one above the other.

Certain existing studios have peculiar points about them

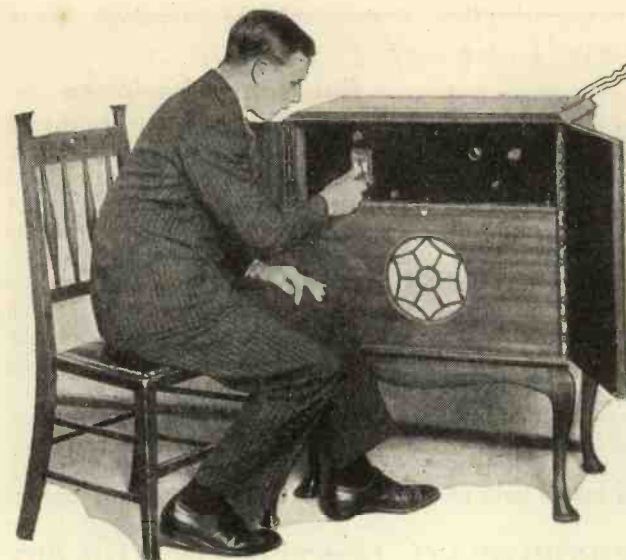


in order to get the sound characteristics right. No. 3 studio at Savoy Hill has an extraordinary corrugated roof which the engineers demanded when they found that the studio, as originally planned, did not give a suitable echo period.

The Engineering Department is always making experiments in the sound-absorbing properties of various materials used for decorating studios.

The peculiar fact has been discovered that whereas high notes are absorbed in the actual pores of the material,

(Continued on page 179.)



ALL ABOUT TONE CONTROL

By Marcus G. Scroggie

B.Sc. A.M.I.E.E.

A comprehensive consideration of the subject of obtaining a proper balance between high and low notes, including much practical information on the building of tone-control units and using them in the most effective way.

It has been explained in a previous article that the hope of obtaining perfect reproduction by means of "straight-line amplification" is a delusion, for there are many other factors entering into the matter which are likely to upset the best efforts in this direction, such as the effect of the room in which the reproduction is heard.

Getting Rid of Mush

It was also mentioned that even good loud speakers are very imperfect in this respect, and while specialists are striving all the time to eliminate these defects, in the meantime it behoves us to make the best of what we have got, and that best is not always achieved by amplifying all audio frequencies equally. However, for reasons explained at the time it is advisable to start off with straight-line amplification, and modify it by means of what are known as *tone controls* to suit the conditions which may exist.

Among the effects which may be corrected by tone control are: undue preponderance of high or low tones in the transmission (this has usually already been corrected by the B.B.C., but the listener's taste may not always coincide with theirs), excessive low tones due to generous use of reaction or highly selective tuning circuits, presence of mush (radio) or scratch (gramophone), tendency to shrillness due to use of pentode, over-emphasis of certain tones by loud speaker, and the same by the room in which it functions.

High-Note Cut-Off

For instance, due to one or more of these causes, speech often has an unpleasant "whoofiness" or booming,

and can be rendered much more intelligible and natural by cutting off the low frequencies. The combination

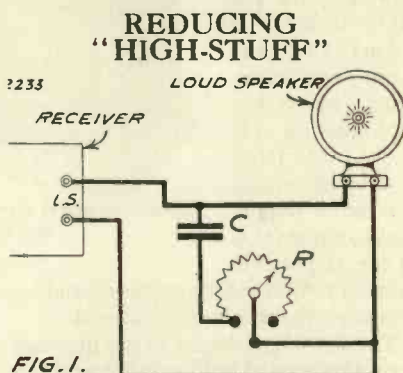


FIG. 1.

A variable resistance in series with a large fixed condenser provides a good loud-speaker shunt when reproduction tends to be too shrill.

of a pentode, a good pick-up, and a well-known make of gramophone record, which shall be nameless, introduces a grindstone accompaniment

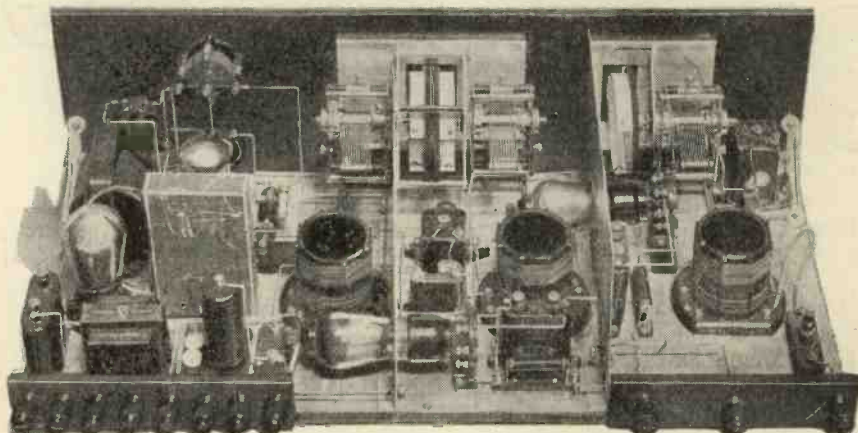
which is not usually regarded as an improvement on the more normal instruments or voices intended to be the vehicle of the composer's thoughts. This can largely be eliminated by cutting off high tones to a suitable extent.

The Reaction Method

Tone controls may be introduced in many ways, depending on the circuit used, and often may be combined with some other part of the apparatus, thus effecting an economy. Before going on to describe how a tone control can be incorporated in a set which is being built, let us first notice that even with existing receivers not so fitted it is usually possible to do something.

Most sets have some form of reaction which it is possible to bring near the oscillation point, and also some means of reducing the volume, such as by screened-grid valve filament rheostat, aerial circuit potentiometer.

ADJUSTING PITCH WITH REACTION



In a large set with a volume control and reaction on an "intermediate" circuit it is possible to lower the tone by bringing up reaction, and at the same time keeping down the volume.

or even by moving a portable set round on its turntable. If the station is being received at normal strength with little or no reaction, bring up reaction and simultaneously reduce volume by one or other of the available methods.

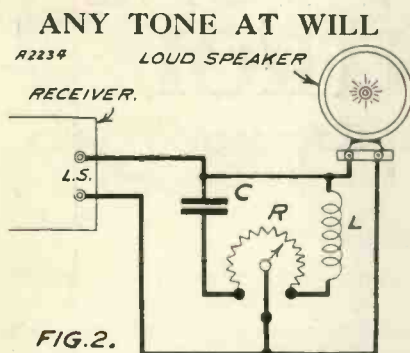


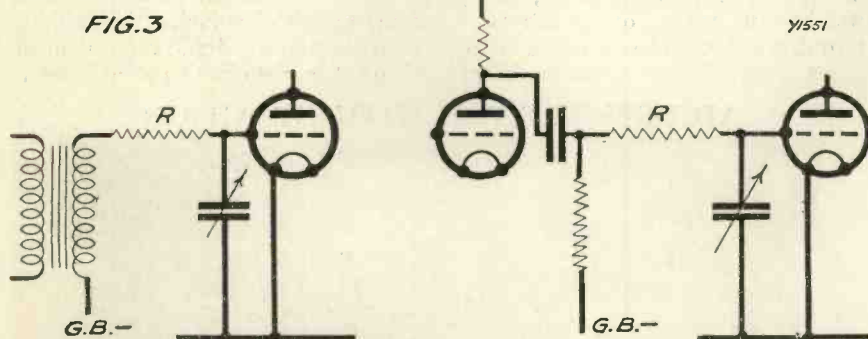
FIG. 2. According to which way the resistance R is turned, so the tone of reproduction will be either higher or lower. L may be iron-cored if desired.

If there is no volume control one may sometimes obtain the desired result by mistuning the aerial circuit if reaction is not applied to it (and it is hoped that it is not in these days). The effect is to emphasise bass and reduce high tones, which may be very desirable if the reproduction is thin or if there is excessive mush or hiss.

Watch the Tuning

It is, of course, essential to be very accurately tuned with the circuit to which reaction is applied, otherwise one may obtain the opposite effect—an emphasis of middle or high tones, according to the degree of mistuning.

HANDY ADJUSTMENT FOR HIGHER FREQUENCIES



The variable condenser can be adjusted to by-pass the high notes as desired. The introduction of the resistance R in either case increases the effect of the condenser.

Connecting a condenser across the terminals of the loud speaker is another way of cutting down the high tones. Scratch, mush, atmospherics, etc., consist of a mixture of sounds covering a wide band of tone (or pitch, or frequency), but the most obtrusive proportion is high up in the scale and

can be cut out without sacrificing the desirable high musical notes to an intolerable extent.

Also the effect of overloading and other serious causes of distortion is to introduce spurious tones of high pitch into the reproduction. Consequently ordinary condensers are sometimes offered for sale in disguised forms at inflated prices and described as wonderful inventions for cutting out atmospherics, noises, distortion, etc.

Using a Condenser

Though the effect is to convert noisy and distorted reproduction into something more pleasing (or rather, less displeasing) to listen to, it is a remedy which gives a severe pain to anybody who has become accustomed to high-quality reproduction, with the brilliancy preserved. At the same time it is admitted that there are occasions when the reproduction is badly interfered with by noise, and it is more important to reduce this as far as possible than to obtain full-strength reproduction over the whole musical scale.

The size of condenser to use depends upon the type of loud speaker and the amount of tone-lowering required, but for an ordinary high-impedance

primary of the step-down transformer.

Resistance Variation

This method gives only one change of tone, unless one uses a selection of condensers which can be switched in as desired; so it is a good idea to put a variable resistance in series with the condenser, as in Fig. 1. In this case, C may be perhaps 0.25 mfd. for the average speaker, in order to get an extreme effect at one end of the control, and the resistance may be about 25,000 or 50,000 ohms.

Choose one in which the resistance is cut out rapidly at first and then gradually, otherwise the effect becomes too rapid and almost uncon-

INCORPORATE CONTROL IN THE SET



It is better to incorporate the tone control when a set is first made up than to add it afterwards, for then there is a larger variety of ways in which it can be applied.

trollable at one end of the scale. A number of rheostats of this type, described as "tapered" or "graded," can now be obtained (Regentone, Rotorohm, Centralab, A.E.D., etc.), and are usually fitted with three terminals.

The centre terminal, connected to the moving arm, is used, and trial can be made to decide which of the others is the correct one. As the resistance is reduced the high tones are progressively faded out.

Why Not a Pentode ?

In order to produce the opposite effect the condenser may be replaced by a choke of about 0.5 henry (some H.F. chokes have as high a value as this). If it is too much trouble to switch over from condenser to choke the circuit of Fig. 2 may be used, in which L is the choke; but this has the disadvantage that, with a tapered resistance, either high tones are controlled nicely and low tones very suddenly indeed, or vice versa. A uniform resistance treats both alike, but they are both rather sudden towards the ends of the scale.

On the whole, there is a great deal to be said for using a pentode, which

Balance Your High Notes With Your Low

normally gives rather shrill reproduction and therefore makes it unnecessary for any provision to be made for low-tone reduction; all the control can be in one direction, as in Fig. 1.

Most commercial American broadcast receivers possess tone controls applied to reproduction which normally is quite "bassy" enough, and these may be likened to a barometer marked at one end "Wet" and at

are applicable only in special circumstances.

Across the Secondary

The condenser method just described can be applied to many parts of the circuit, and as the higher the impedance of the part of the circuit shunted by the condenser the smaller the condenser required to produce a given effect, it is practicable to make

HOW VARIOUS BY-PASS CIRCUITS WORK

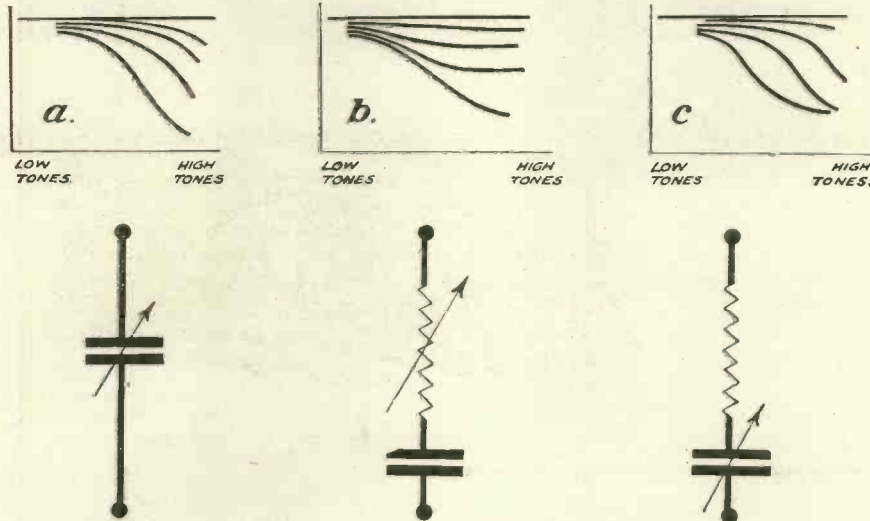


FIG. 4.

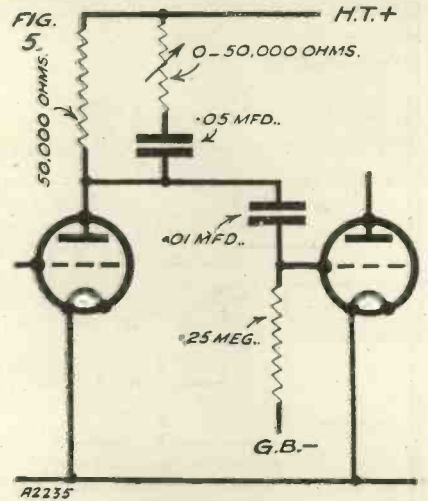
The small graphs along the top of this diagram indicate how the tone-control schemes shown below them produce different falling characteristics according to the degree to which they are applied.

the other end "Very Wet." This one-way control is only to be recommended when the tendency is in the opposite direction, so that normal reproduction comes somewhere in the middle and not right at the end.

This is particularly true when a distant station is being received and reaction is pressed into full use, giving a boominess which makes the announcer sound as if he were broadcasting from a crypt. Moreover, there are so many other things—numerous by-pass condensers, valve electrode capacities, H.F. chokes—that tend to cut off the precious high notes, which cannot be easily restored, and which impart the snap and life to music and the intelligibility to speech.

For the New Set

So much for adding control to sets which exist. If you are constructing a new receiver you will no doubt prefer to incorporate a tone control in the circuit; and, as already mentioned, there is an almost infinite variety of methods, many of which



The values shown in this diagram of an R.C. stage and volume control are particularly suitable for gramophone-record reproduction, where the bass register is usually a little deficient.

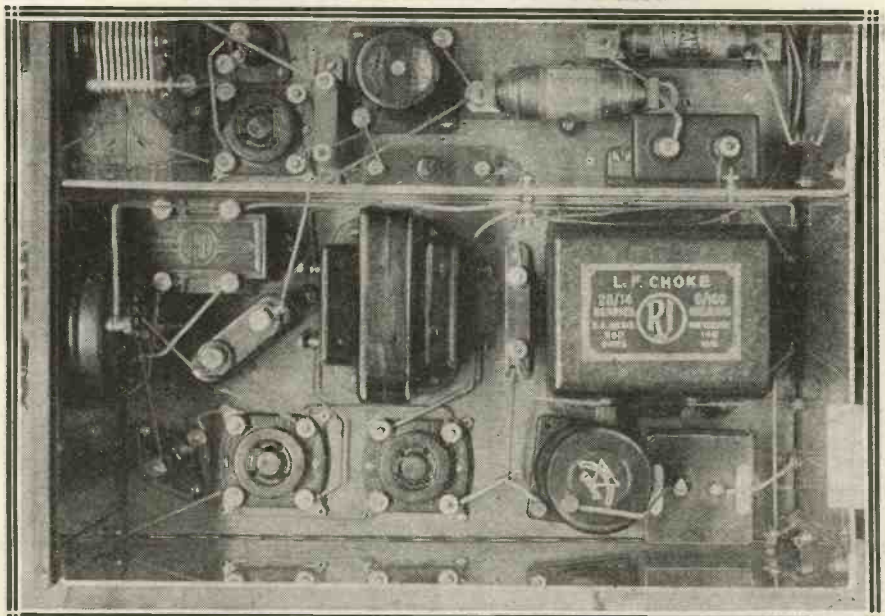
the condenser itself variable, if it is connected across the secondary of a high-ratio intervalve transformer or other component of very high impedance.

Grid Leak as Well

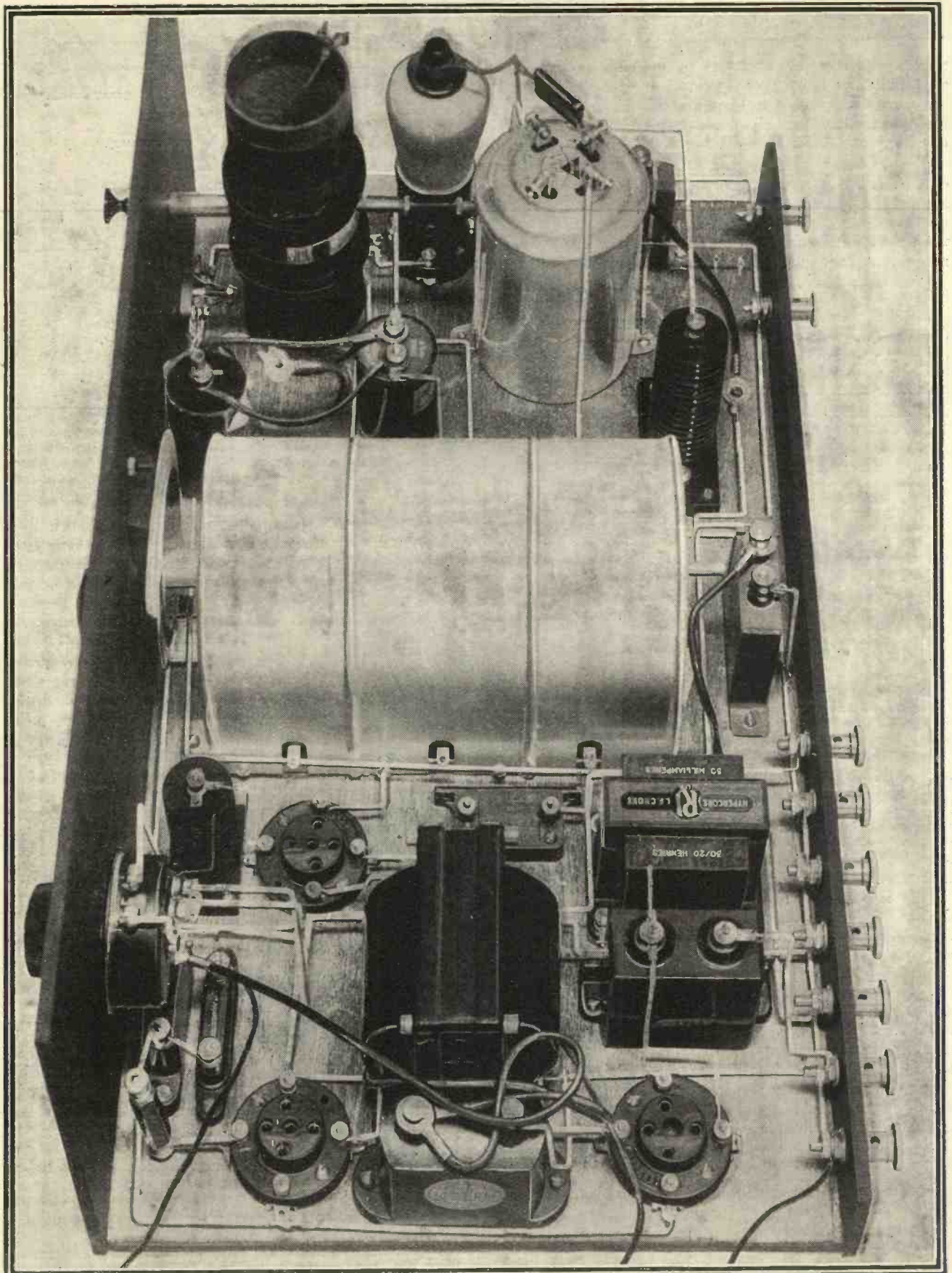
Some very compact and inexpensive variable condensers of the solid dielectric type, of 0.0005 mfd. or so, are now obtainable, and are very suitable. If such a small capacity is

(Continued on page 180.)

A USEFUL SCHEME TO FOLLOW



In most L.F. amplifiers there is a tendency for the high notes to be lost, due to various by-pass effects. The author therefore suggests that it is a good plan to use a pentode, which normally gives rather shrill reproduction, and to use a tone control which simply cuts down the high-note response.



Two of the main components, the metal-encased condenser assembly and intervalve coil, provide all the necessary screening!

The "Lock-Tune" Four

MODERN receiving conditions seem to be getting more and more hectic every month. It is true that not many new stations have been putting in an appearance recently, but many of the old ones have increased their power, and the North Regional has started transmitting on its double wave.

The Regional scheme is an excellent one for the local listener, but for the long-distance man every regional station increases his problem of getting uninterrupted reception, not only of continental stations, but also of stations comparatively near him in the home country.

Separation With Quality

The London Regional and the German station at Mühlacker are excellent examples of the kind of trouble from which listeners suffer nowadays. Another example (of a milder kind) is the proximity of the Midland Regional and London Regional.

This receiver incorporates the newest band-pass arrangement, dual-range screened intervalve coil, a metallised S.G. valve, and a three-gang, screened, variable condenser assembly.

This proximity in wave-length may not worry people well away from either station, but if you live within a few miles of either, and wish to receive the other, and, of course, it is not unusual for you to want to, then you have got to have a very well-designed set to do it.

A highly efficient and selective four-valve receiver, incorporating band-pass selectivity and single-knob tuning. It provides remarkable volume and quality with almost uncanny station separation.



Designed and Described
by K. D. ROGERS.

The ordinary "detector and two low-frequency" will not be likely to get really adequate separation between the two and at the same time give decent quality and volume from either, while the separation of the London Regional and Mühlacker is a bigger problem, and even more difficult of solution, unless a super-het. be used.

Band-Pass Principle

We described such a super-het. in this journal last month, and the "Super" receiver does give you a very valuable degree of selectivity, enabling you to pick up a very large number of continental and British stations. But there is another way

out of the trouble—the band-pass receiver.

The band-pass principle, which we were the first in this country to use in our sets, was described in this journal some years ago.

Ideal Response

Many readers will remember the band-bass scheme of "locked-tuning" circuits is so designed that the tuning curve of the circuit, while being steep at the sides, has a flat top of something like nine to twelve kilocycles width, the actual width depending, of course, upon the design of the band-pass coil.

The ideal response would be a flat-topped curve with vertical sides, and such a curve would be arranged to

THESE ARE ALL THE PARTS REQUIRED FOR THIS OUTSTANDING RECEIVER

PANEL

18 in. x 7 in. (Peto-Scott, or Permol, Becol, Wearite, Parex, Goltone, Lissen, etc.).

CABINET

Panel space 18 in. x 7 in., baseboard 10 in. deep (Camco, or Pickett, Compton, Langmore, Peto-Scott, Osborn, Kay, Lock, etc.).

VARIABLE CONDENSERS

1 .0005-mfd. triple-ganged, with disc drive (Polar, or J.B., Utility, etc.).

SWITCH

1 on-off (W.B., or Ready Radio, Goltone, Lissen, Igranic, Lotus, Benjamin, Bulgin, Junit, Ormond, Telsen, Wearite, Red Diamond, Peto-Scott).

RESISTANCES

2 600-ohm Spaghetti (Bulgin, or Ready Radio, Telsen, Varley, Peto-Scott, Graham Farish, Lissen, Tunewell, Lewcos, etc.).
1 1,000-ohm Spaghetti (Ready Radio, etc.).
1 50,000-ohm Spaghetti (Ready Radio, etc.).
1 25,000-ohm Spaghetti (Lewcos, etc.).

1 2-meg. and holder (Ferranti, or Dublier, Telsen, Ready Radio, Igranic, Mullard, Graham Farish, Ediswan, Varley, Watmel, Lissen, etc.).

1 .5-meg. and holder (Ferranti, etc.).
1 .25-meg. with terminals (Graham Farish, or Lissen, etc.).

1 20,000-ohm potentiometer with special off position (Magnum).

VALVE HOLDERS

4 ordinary 4-pin (Lotus, or Telsen, Clix, W.B., Benjamin, Bulgin, Wearite, Dario, Junit, Formo, Igranic, etc.).

FIXED CONDENSERS

2 1-mfd. (Helsby, or T.C.C., Dublier, Formo, Igranic, Telsen, Mullard, Franklin, Peto-Scott, etc.).

2 2-mfd. (Lissen and T.C.C., or Ferranti, etc.).

1 .04-mfd. special non-inductive (Dublier).
1 .0003-mfd. (Telsen, or Ready Radio, Dublier, T.C.C., Ediswan, Ferranti, Mullard, Igranic, Watmel, Formo, Graham Farish, Lissen, etc.).

1 .01-mfd. (T.C.C., etc.).
2 .002-mfd. (T.C.C., etc.).

CHOKES AND COILS

2 H.F. (Ready Radio and Lewcos, or Telsen, Varley, R.I., Parex, Wearite, Magnum, Watmel, Sovereign, Peto-Scott, Dublier, Lotus, Lissen, etc.).

1 output (R.I., or Igranic, Ferranti, Atlas, Wearite, Bulgin, Magnum, Telsen, Varley, etc.).

1 Square Peak coil (Varley).
1 Intervalve coil (Varley).

TRANSFORMER

1 L.F. (Ferranti, or R.I., Varley, Lotus, Lewcos, Telsen, Goltone, Formo, Atlas, Igranic, Lissen, etc.).

MISCELLANEOUS

9 terminals (Belex, or Igranic, Belling & Lee, Clix, etc.).

1 Terminal strip, 18 in. x 2 in.
G.B. wander plugs, H.T. plugs, etc. (Igranic, or Clix, Belex, Belling & Lee, etc.).

Flex, screws, etc.
Wire (Glazite or Lacoline).

provide good reception within the desired band of, say, 10,000 cycles, and nothing at all outside that band. The resonance curve of the ordinary sharply tuned circuit has a narrow top and rapidly sloping sides, so that we get very much better reception of the frequencies round about that of the carrier-wave, i.e. the low notes, than of the higher musical frequencies.

By the use of skilfully coupled circuits, however, it is possible to approach the ideal of a flat top and vertical sides, and that is what has been done in the "Lock-Tune" Four, described in the following paragraphs.

pretty straightforward piece of work. There is a plain inductance in the aerial circuit, and the screened-grid valve is coupled by the tuned-anode principle to the detector. It will be seen that all the selectivity is obtained in the first two circuits, or perhaps we should say circuit, controlled by ganged condensers, the sections of which have a capacity of .0005 mfd.

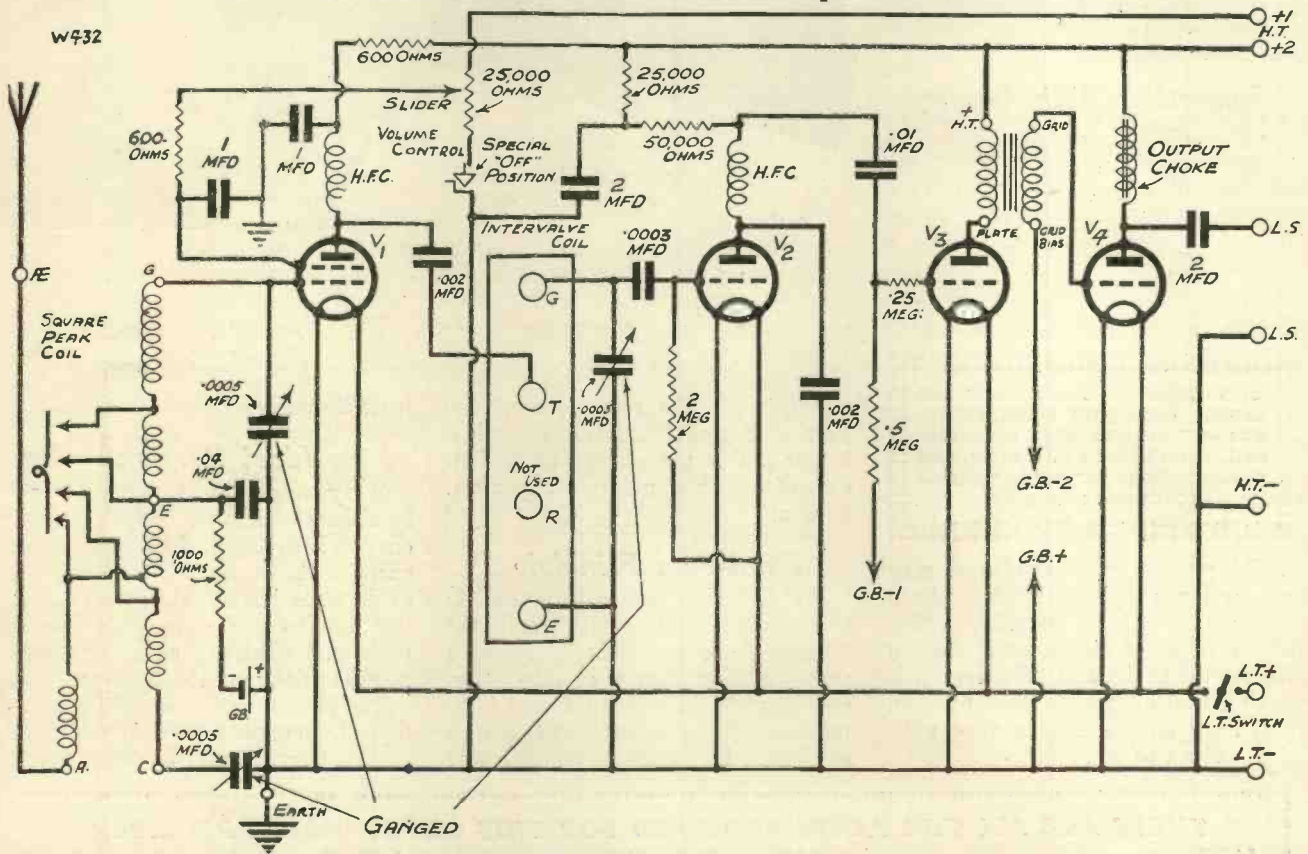
Ganging is Easy

This ganging is not a difficult job, and the most inexperienced home-constructor need have no fears that he will not get it to work properly.

Moreover, no reaction is necessary for this circuit, so that no coxing of distant stations has to be carried out. There is a pre-detector volume control consisting of a screened-grid potentiometer, which enables you to cut down signal strength to prevent overloading of the detector, and subsequent L.F. valves; but for distant stations, and anything other than the local, this potentiometer can be used full on, and reception becomes immediately a one-control procedure.

Another advantage of this receiver which will be appreciated by many is the entire absence of special screening. Screening is quite unnecessary if

Here is the Theoretical Circuit of this Fine Set



From this diagram it will be seen that an extremely efficient and selective circuit is employed. The signals are first sorted out by the Varley band-pass coil, then they are amplified by the S.G. valve before being passed on to the detector. The last two valves are low-frequency amplifiers, the first is resistance-coupled and the second transformer-coupled.

Band-pass coils are difficult to construct at home, and so instead of providing winding details for the home constructor we decided to use the new Varley band-pass coils, so that we can be quite sure that readers who build up this set will get the excellent results of which it is capable and which we obtained with the first model.

Quite Straightforward

As you will see if you look at the theoretical circuit, the receiver is a

The tuned-anode section is tuned by another .0005 condenser, which for convenience is also ganged with the first couple, so that the receiver has only one tuning control.

This is a great advantage when searching for distance stations, because all one has to do is to turn the one condenser dial with the full knowledge that the various tuned circuits will be quite in step the whole time, and that any stations going will come through at their full strength without any wangling of tuning controls.

the original layout is copied faithfully, for great care has been taken in the design of this receiver so that interaction does not occur.

Component Screening

After all, if you look at the components as seen in the photographs you will see that the tuned-anode coil is employed in a metal pot, completely screening it from other sections of the circuit, while the H.F. side of the set is completely screened from the detector side by means of

You Get Full Band-Pass Tuning on both Wave-bands

the ganged condenser, which is enclosed in a metal casing.

Therefore, in reality we have an H.F. section of the set and then a large mass of metal which effectively screens it from the detector and L.F. side. The "square peak" coil unit itself must be kept a fair distance away from metal, for if this is not done one runs the risk of seriously upsetting the band-pass action.

A Simple Layout

The screened-grid valve should be of the metallised type, so that this shall need no further screening. Thus it can easily be seen that the layout is very simple for the home constructor to copy, and the wiring, as shown by the diagram, is by no means difficult. The "square peak" coil and the intervalve coil are ganged by one spindle, the switching arrangements being inside the coils. The square peak coil and the intervalve coil are fitted together by means of

the rods provided by the makers, in such a way that the switches (which can be seen inside the formers) short-circuit the various points when the rod is pulled out.

And now we are ready to make a start on the constructional work. The panel itself has a simple layout, but, of course, wants very careful marking. The Polar condenser, which employs the disc type of drive, has an escutcheon which is easily mounted, providing you use it as a template for cutting out the quadrilateral portion of the panel.

As a matter of fact, details are given with each condenser for the cutting out of this, and it should not present any difficulty. The usual method is employed of drilling a series of holes round the outline of the quadrilateral, and then of cutting away the centre piece of panel from these holes.

The screened-grid potentiometer has a resistance of 25,000 ohms, and

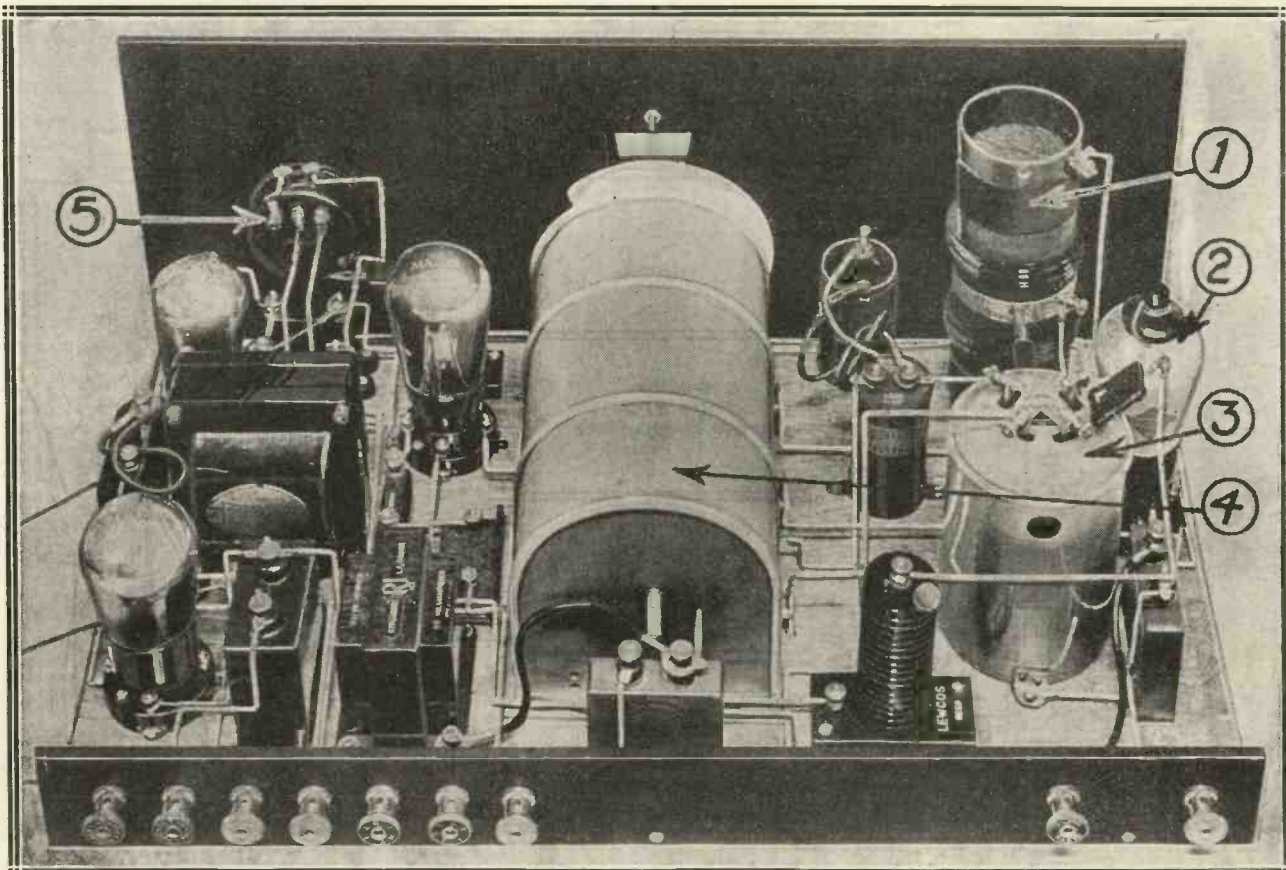
is mounted in the usual manner by one-hole fixing. It is, however, a special type of potentiometer which has an off position on it, thereby obviating the need for a three-point L.T. switch and complicated wiring of H.T. and L.T. that would accompany its use.

How to Switch Off

All you do when turning the set off is to push in the L.T. switch and turn the potentiometer knob hard over to the left. Then the special off arrangement breaks the H.T. negative lead to the potentiometer and prevents any leakage of H.T. through the potentiometer back to the H.T. battery.

The position of the hole on the panel through which the wave-change spindle for the tuning coils passes must be determined accurately or you will have difficulty in mounting the two coils. As a matter of fact, owing to the height of the intervalve coil

Absolute Stability is Assured by the "Canned" Condensers and Coil



This receiver is full of attractive features, and beyond the single tuning knob there are only a volume control and two switches on the panel. Some of the components are particularly novel. (1) The special Varley band-pass coil; (2) the metallised S.G. valve; (3) a dual-range screened intervalve coil; (4) three variable condensers, all ganged and totally enclosed in a metal case; (5) the volume control, which is very necessary on powerful transmissions!

up to its switch, it is found that the square peak coil does not reach down to the baseboard, and is suspended on the connecting-rod. This is no drawback, because this coil is anchored to the panel by means of the single-hole fixing, while the other end of the wave-change system is anchored by the intervalve coil, which is screwed down to the baseboard in the usual way.

Wave-Change Spindle

But when making the hole in the panel be absolutely sure that not

only the measurements given by the diagram are checked up carefully, but also that the particular coil you have will come correctly in accordance with that panel diagram.

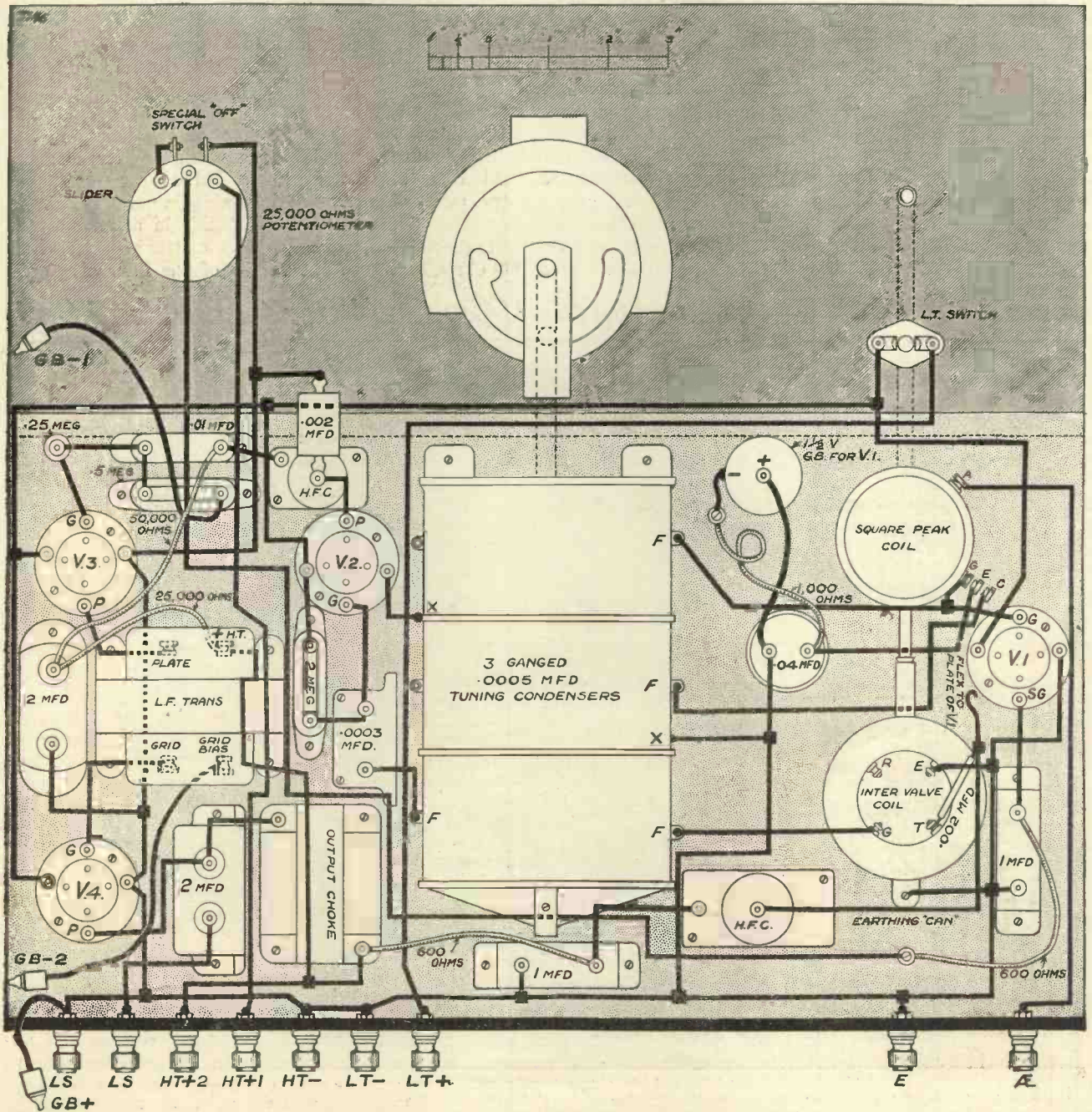
Nothing is more aggravating than to drill a hole in a panel from a diagram and then find that the particular coils you have are very slightly out in dimensions and the hole is just a little bit wrong, so that you have to reamer it out in order to make a sloppy fit so as to get the spindle through straight. This can happen time and time again, and

particular care should be taken when mounting this type of component.

As It Should Be

Another thing in mounting which may put you off for a moment or two is the fact that the spindle of the Polar-type condenser is not in the dead centre of the end plates of the metal casing. On looking at it carefully you will see that it obviously cannot be in the centre, as straight-line tuning vanes are used, but it looks at first as if there is something the matter.

The Wiring is Unusually Simple for a Four-Valver



Considering that this receiver is a very powerful four-valver the wiring is surprisingly simple, and you do not need previous constructional experience to tackle it.

A One-Knob Receiver with a "Knock-out" Performance!

The rest of the components are very easy to mount, but care should be taken that the layout shown in the wiring diagram is carried out as correctly as possible. This is a very important factor in a receiver of this description, because, although the components are not crowded, every thing is compactly arranged and anything wrong with the layout might easily upset the working of the set.

Condenser Connections

There is one other thing that may puzzle the newcomer to a set of this description, and that is the way in which the contacts are made to the various sections of the ganged condenser. Inside the condenser casing are three separate .0005-mfd. tuning condensers, all ganged on one spindle, and on one side are three little wheels something like the helm of a ship. These are attached to little compression type condensers which are used for trimming—but more about these later.

Connection to the moving and fixed vanes of the condenser sections are made as follows. The fixed vanes are taken to little tags which come out

at the sides of the unit, three tags appearing on each side, so that we have two tags both going to the fixed vanes for each unit part of the ganged condenser.

The moving vanes are all attached together, and are taken to two screw connections in the casing of the condensers. We have marked these X on the wiring diagram, and you will see that two distinct connections are made to the moving vanes, via the casing of the condenser: one from the .04-mfd. special non-inductive condenser in the H.F. section of the set (also connected to earth, L.T.—, H.T.—, and a lot of other places), and another connection is made to the filament of the detector valve. This latter connection is only made so that the filament of this valve may be connected to L.T.—, as it is a convenient way of connecting

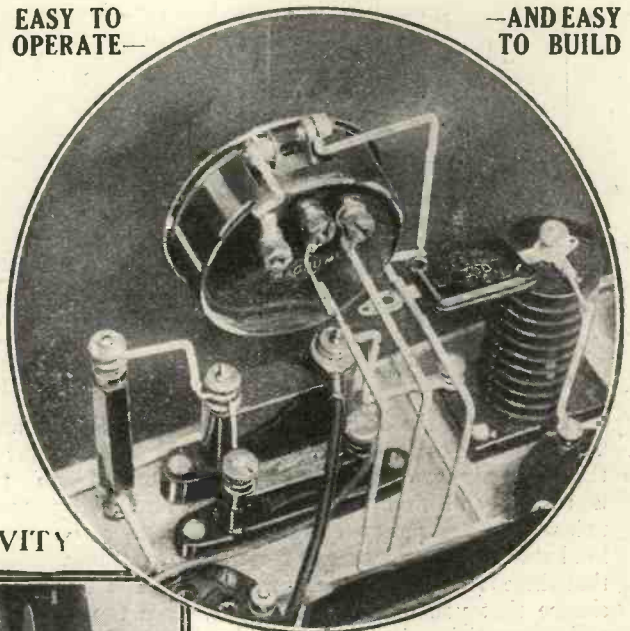
it via the casing of the variable condenser.

Stopping the H.F.

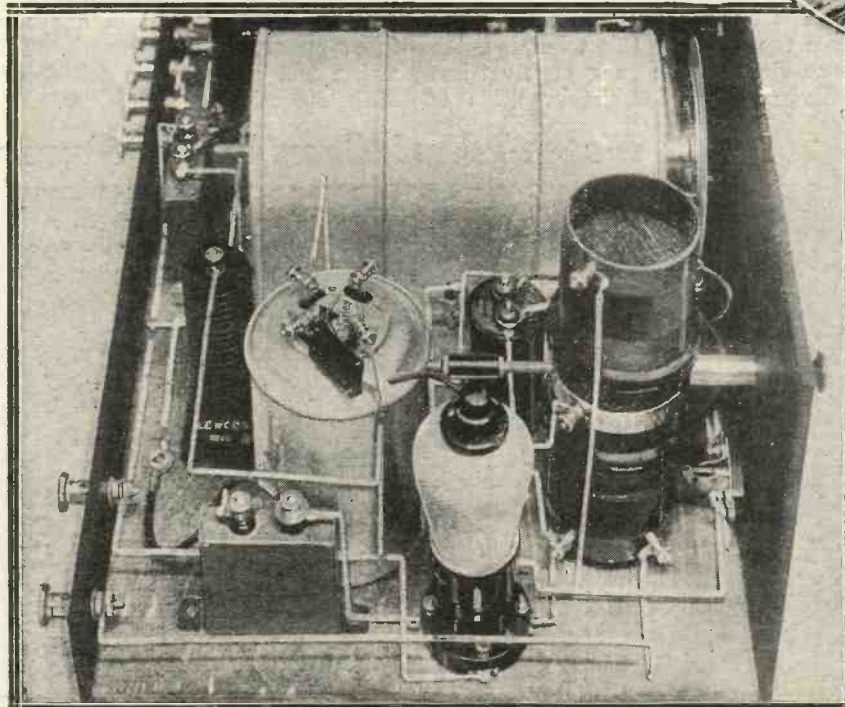
With a set having the amplifying properties and the very fine high-note response of this receiver it is essential that no H.F. should get through into the L.F. side of the receiver. Hence you will find an H.F. choke in the anode circuit of the detector valve and a bypass condenser of .002-mfd. capacity to

EASY TO OPERATE—

—AN EASY TO BUILD



EXCEPTIONAL 'FRONT DOOR' SELECTIVITY



This photograph shows the input end of the receiver with the metallised S.G. valve in the foreground. The band-pass coil can be seen near the panel, standing on end, with the intervalve coil to the left.

earth, while a grid stopper is connected in the grid circuit of the first L.F. valve to make doubly sure that only L.F. impulses reach the audio-frequency section of the set.

It is important to note the relative positions of the two tuning coils, the H.F. valve, and the H.F. choke in that valve's anode circuit. The valve is so placed that it is shielded from the choke, and the choke is very largely shielded from the coil by the metal can round the intervalve coil. This is deliberately done to eliminate any chance of interference between those various sections of the H.F. circuit, and it is advisable also for the home constructor to copy that layout exactly.

No Snags Whatever

The wiring-up is simple, and as there are no snags whatever and no peculiar connections other than those to the condenser we have already dealt with, we can leave this part of the construction with confidence

Just the Set You Need to Cope with Modern Ether Conditions

that our readers will be able to make a good job of it.

We can therefore pass on to the operation of the set, and this you will find is a sheer delight. Though we say it ourselves, it is the finest four-valver that we have yet had the privilege to offer to readers, and we think you will agree that that is making a pretty strong claim.

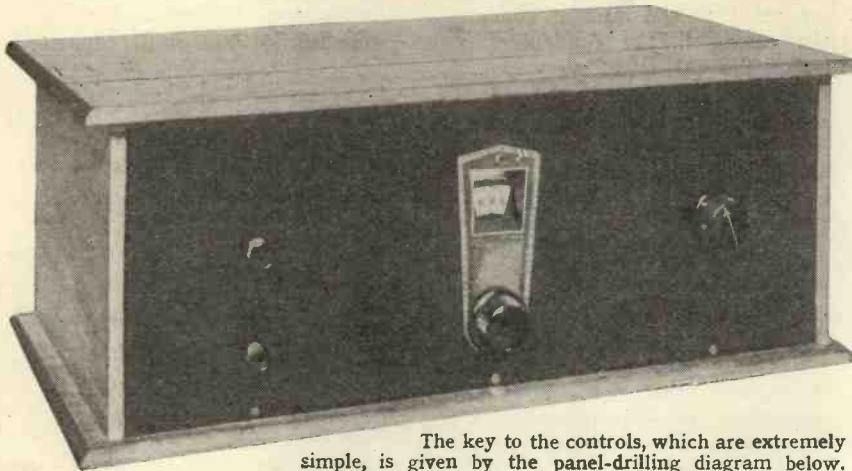
The tuning control must be carried out comparatively slowly if good results are to be obtained in the first tests before the ganged condenser has been trimmed up.

Trimming the Tuning

When you have found your local, say on the medium-wave band—the wave-change switch, by the way, is

fairly flatly tuned and so there is not much trimming to be done here. But you will probably find that the band-pass section trims fairly critically.

HERE YOU HAVE THE COMPLETED ARTICLE



The key to the controls, which are extremely simple, is given by the panel-drilling diagram below.

And now for the operating details. The first thing to do—in fact, the first thing one always does in a new set—is to try and find the local, and unless you are pretty close to the local station you can take it from us that there is a not particularly remote chance that you may pass the local without noticing it when you first turn the tuning dial.

“out” for medium waves—get a wooden skewer or a long pencil and proceed to trim the band-pass circuit by means of those little wheels on the side of the drum condenser.

The two wheels nearest the panel are the ones for this trimming, the one right at the back merely trims the tuned-anode circuit. This is

SUGGESTED ACCESSORY MAKES.

Loud Speaker. (Undy, Celestion, Donotone, B.T.-H., Blue Spot, Amplion, Rolls Caydon, Ormond.

Valves. 1 S.G. metallised (Cossor), or ordinary S.G. with screening can. 1 H.L. (Mazda, or Six-Sixty, Marconi, Eta, Osram, Cossor, Lissen, Fotos, Mullard); 1 L.F. (Six-Sixty, etc.). 1 power or super-power (Six-Sixty, etc.). Two-, four-, or six-volt valves can be used.

Batteries. H.T., 120-150 volts (super capacity) (Ever Ready, or Drydex, Pertrix, Grosvenor, Siemens, Lissen, Fuller, G.E.C., National, Oldham).

G.B., 18 volts (Pertrix, etc.).

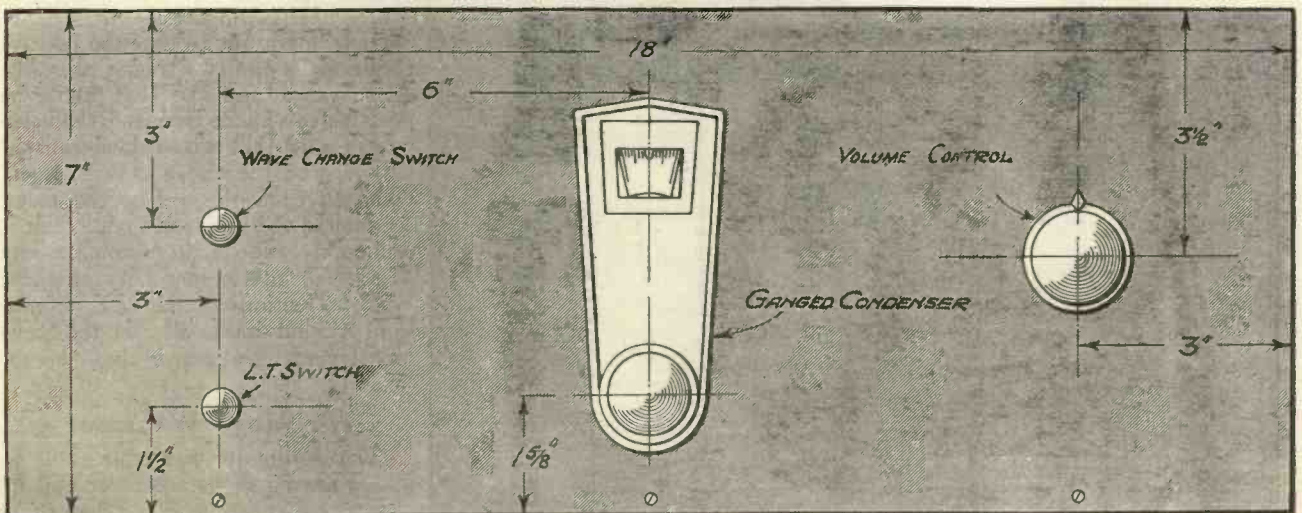
G.B. for H.F., .9 or 1.5-volt cell (Ever Ready, etc.).

Accumulator. 2-, 4-, or 6-volt, according to valves; 30 amp-hour is convenient size. (Fuller, Exide, Ediswan, Oldham, Pertrix, Lissen.)

Mains Units. State type of set, mains voltage and type when ordering. Two tappings (1 S.G. and 1 max. are required). (Heyberd, Regentone, Ekco, Tannoy, Atlas, R.L., Junit, Varley.)

As we would like to go rather fully into this matter of trimming, we shall be giving details of it in a special follow-up article next month. This article will also contain full details of the operation of the receiver.

Control Simplification Without the Slightest Sacrifice in Power



X753

PANEL LAYOUT

There are only four components to mount on the panel, and they are all one-hole fixing with the exception of the ganged tuning condensers. When fixing this assembly you will have to cut a large hole in the ebonite. A fretsaw is the best tool to use.



MORE ABOUT THE "SIMPLICITY" SUPER

Some further practical notes about the five-valve "super" described in "Modern Wireless" last month.

LAST month we discussed the construction of a five-valve super-heterodyne receiver of particularly compact and simple design. Several points have been raised by readers who are interested in the set, however, and so we are devoting a small amount of space to further details of the set.

Using Elevated Aerials

Most of the readers ask questions relating to the construction, or suggest modifications that they would like to carry out if they build the set.

One of the most generally asked questions is: "Can the set be used with an indoor or outdoor aerial—not a frame?" The answer is, of course, "No, not as the set now stands." It would be *possible* to do so, but it would not be in the interests either of selectivity or of the general listening public.

Taking the latter part first, a little consideration will show that the frame is really in an "oscillating condition." In other words, it has flowing round it the oscillations generated by the oscillator valve, and used to heterodyne with the incoming signal frequency.

Interference Troubles

Now a frame is not a good radiating aerial, and consequently these oscillations do not interfere at all seriously with near-by neighbours, even if they make themselves felt at all. But place an outdoor, or good indoor, aerial in place of the frame—using small tuned coils to take its place—and you have a "very different pair of shoes."

Your aerial is now a good radiator, just as it is a good collector of energy; and not only your next-door listener, but the whole street, and perhaps the

Don't forget that the set relies on the frame aerial for its input, so use as good a frame as you can.

whole neighbourhood, will be adversely affected.

There are two ways of altering such a set so that it can be used with reasonable safety on an aerial other than a frame. One is to use a band-pass tuning arrangement, and the other is to insert an H.F. stage between the tuned detector circuit and the aerial.

In the first case the aerial circuit itself will not be very strongly

But whichever method is chosen, it carries with it certain drawbacks.

The band-pass scheme, although it enhances the selectivity of the set, sometimes reduces the sensitivity until we have almost reached frame-aerial level, and the H.F. scheme means a carefully-designed amplifier if instability is not to occur. Furthermore, both schemes mean an extra tuned circuit; the band-pass needs a double-gang condenser to tune it, and the H.F. circuit needs a separate tuned aerial circuit.

Mains Units O.K.

The use of a mains unit with the "Simplicity" Super is also a point upon which some readers seem to desire some details.

There is no reason why the set should *not* be used with a mains unit of either D.C. or A.C. variety, *but* it is essential that the unit be well designed, incorporate really good smoothing and have an adequate safety limit.

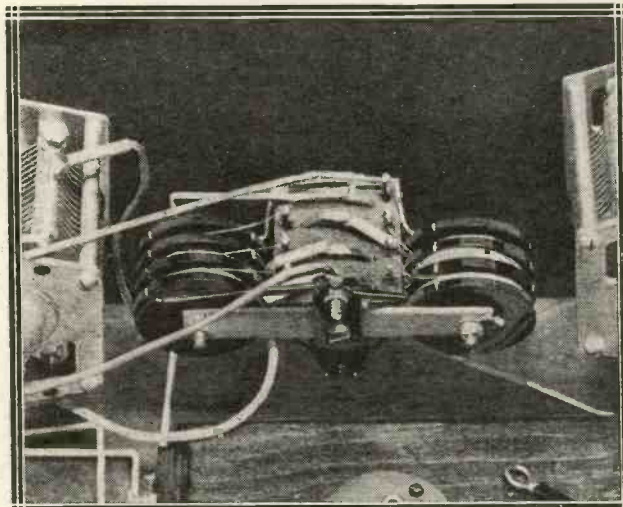
By this we mean that it should be so designed that it is capable of supplying a good few milliamps. more than are required by the set, and without dropping the

voltage below that necessary for the satisfactory operation of the receiver.

And that brings me to another point, that of H.T. voltage. What is the minimum to give good results?

We should say about 120 volts.

AN INGENIOUS UNIT



The oscillator unit switch incorporates an "off" position and is mounted on the panel between the two variable condensers.

affected by oscillation in the band-pass circuits, and in the second the H.F. stage (assuming a S.G. or neutralised H.F. valve is used) will act as a buffer and prevent the oscillations reaching the aerial.

Using a Mains Unit with the "Simplicity" Super

Below this figure it is impossible to get anything like the full magnification from the S.G. valves, and the output valve, too, is rather starved, so that it cannot adequately deal with the input it receives from the transformer.

Round about 150 volts is a far more happy figure if full success is to be achieved with the set. Then the S.G. valves get a chance to show what they can do.

Special Volume Control

Two or three readers have asked whether it is essential for the volume control specified to be used. "Yes and No" is the apparently ambiguous answer to this. The volume control—which is a potentiometer controlling the screen voltage of the intermediate valve—which was used in the original set is a novel little component in which a special "on-off" switching mechanism is incorporated.

This enables the H.T.— connection of the potentiometer to be broken when the set is not in use, and so prevents leakage of the H.T. battery through the potentiometer.

If another type were employed you would have to use a *three-point* on-off switch, re-arranging the L.T.— and H.T.— wiring of the set so that not only was the L.T.— of the battery disconnected from the L.T.— wiring, but also the H.T.— was *isolated* when the switch was in the "off" position.

An Empty Battery!

Without this switch, or the special volume control, the H.T. would gradually drain away through the potentiometer, *even when the set was "off."*

It sounds impossible, doesn't it? Because it appears at first sight that if the L.T.— connection is broken, and to it is connected H.T.—, then there can be no circuit from H.T.— via the potentiometer to L.T.— and H.T.—.

DON'T DO THIS!



The filter and intermediate coils are sent out correctly matched, and alteration of the tuning—as shown here—will upset the working of the set.

But unfortunately there *is* a path, and it goes this way. From H.T.— we go through the potentiometer to L.T.— *wiring* in the set. Then we go through the *valve filaments*—remember it is only a few milliamps., so the current can't hurt the valves—

to L.T.— + wiring. Thence we go to L.T.— on the *accumulator* and through this to L.T.—, and thence to H.T.—. A round-about route, but a sure one.

A three-point switch, which isolates H.T.— as well as L.T.—, of course, prevents this, so that if you want to use a different potentiometer don't forget to alter your wiring to include a three-point on-off switch.

Someone else has queried the possibility of using A.C. or D.C. mains valves in the set. This is not advisable unless the whole set is re-designed. These valves, apart from mains pick-up troubles, have much larger amplification factors than the battery types, and to change one to mains without altering the layout would be to court disaster.

Frame-Aerial Facts

There are one or two little things regarding the frame aerial that we should like to bring forward. The position is vital to the success of the set. Most people realise that the frame aerial must "point" towards the station to be received; that is, the frame must be edge on to the station.

But few people, unless they are experienced in the use of this type of aerial, realise the tremendous effect a building may have on its receptive powers.

In the first place, if the frame is near a wall it will very likely be badly damped and will not be such a good collector of broadcast energy as it would if the aerial were well away from the wall. Mirrors and other metallic objects are bad "neighbours" for frame aerials, and if the building is one built on the modern

THIS IS THE COMPLETE LIST OF PARTS THAT ARE USED

PANEL

16 × 7 in. (Becol, or Permcot, Peto-Scott, Parex, Goltone, Wearite, etc.).

CABINET

To take panel and baseboard 10 in. deep (Cameo, Pickett, Lock, Kay, Gilbert, Osborn, etc.).

VARIABLE CONDENSERS

2 .0005-mfd., with slow-motion (Polar, or Cydon, J.B., Lotus, Igranic, Ready Radio, Dubilier, Formo, Burton, Astra, Ormond, Wavemaster, Lissen, etc.).
1 .0001-mfd. reaction, with very low minimum (such as Polar Volcon).

SPECIAL UNITS

1 oscillator coupler and on-off wave-change switch (Rolls-Caydon).
1 filter-and-single-intermediate unit complete with valve holders and coupling components (Rolls-Caydon).

VALVE HOLDERS

3 four-pin holders (Clix, or Telsen, W.B., Lotus, Lissen, Igranic, Magnum, Formo, Wearite, Junit, Bulgin, Benjamin, etc.).

L.F. TRANSFORMER

1 medium ratio (Ferranti A.F.3, or R.I., Varley, Telsen, Lissen, Lewcos, Igranic, Lotus, Mullard, etc.).

FIXED CONDENSERS

1 .001-mfd. (T.C.C., or Telsen, Ready Radio, Dubilier, Mullard, Ediswan, Watmel, Formo, Lissen, Graham Farish, Ferranti, Igranic, etc.).
4 1-mfd. (Filita and Lissen, or T.C.C., Dubilier, Hydra, Igranic, Franklin, etc.).
1 2-mfd. (Filita, or Lissen, T.C.C., Dubilier, Franklin, Hydra, Ferranti, Igranic, Formo, etc.).

RESISTANCES

4 1,000-ohm Spaghetti (Lewcos, or Bulgin, Ready Radio, Sovereign, Peto-Scott, Magnum, Graham Farish, etc.).

1 1,500-ohm Spaghetti (Ready Radio, or Lewcos, Bulgin, Sovereign, Peto-Scott, Magnum, Graham Farish, etc.).

1 15,000-ohm Spaghetti (Magnum, or Bulgin, Lewcos, Ready Radio, Sovereign, Peto-Scott, Graham Farish, etc.).
1 50,000-ohm potentiometer, wire-wound, with special on-off switch (Magnum).

MISCELLANEOUS

1 terminal strip, 3 × 2 in.
2 terminals (Ealex, or Clix, Igranic, Belling & Lee, etc.).
1 socket strip, 2½ × 2 in.
3 sockets and plugs for same (Clix, or Ealex, Belling & Lee, Igranic, etc.).
1 fuse and holder (Ready Radio, Magnum, Bulgin, Peto-Scott, Belling & Lee, etc.).
Spade terminals, H.T. plugs, G.B. plugs, etc. (Belling & Lee, or Clix, Igranic, Ealex, etc.).
Flex, screws, Glazite or "Lacoline," etc.

The Set is Delightfully Easy to Wire

style, with ferro-concrete and plenty of iron girders, the way of the super-het owner may be a very difficult one.

Not only do such iron masses screen the frame very considerably,

RECOMMENDED ACCESSORIES.

Loud Speakers. (B.T.-H., Amplion, Celestion, Blue Spot, Undy, Mullard, Ormond, Donotone, Rolls Caydon, etc.)

Valves. (Cossor, Mazda, Mullard, Ostram, Eta, Marconi, Lissen, Six-Sixty, etc.)

In set:—

2 Cossor metallised S.G.

1 Mazda H.L.210.

1 Mazda P.220 (see text).

1 Mullard P.M.11.F. (oscillator).

Batteries. H.T., 120 to 150 volts triple capacity (Drydex, Pertrix, Ever-Ready, Grosvenor, Lissen, Fuller, Siemens, G.E.C., National, Oldham, etc.)

G.B., 9-18 volts (see text), as above.

L.T., 2-, 4-, or 6-volt, to suit valves (Exide, Ediswan, Fuller, Pertrix, Oldham, Lissen).

Mains Units. Should be very carefully chosen, as good de-coupling and smoothing is essential (Westinghouse, Regentone, R.I., Varley, Tannoy, Ekco, Atlas, Junit, etc.)

Frame Aerial. Wave-change centre-tapped (Ready Radio, or Rolls Caydon, Wearite, Peto-Scott, Lewcos, etc.).

manufacturers, and are adjusted as accurately as possible to suit the majority of S.G. valves, and particularly the Cossor metallised two-volter.

It is wise not to tamper with them, otherwise it may take a matter of hours of careful experimenting before the correct setting is again reached.

A Tricky Business

If you don't mind risking a great loss of time and perhaps never complete success at re-obtaining correct adjustment, try varying the little knobs by all means. It will give you a surprising insight into the tendencies of super-het intermediate design; but don't blame us if you never get things quite right again.

There is another point we should like to mention while dealing with the "Simplicity" Super. This concerns the reaction condenser.

The Reaction Condenser

You will remember that the reaction condenser used in the original set was a special type of Polar with a very low minimum capacity. Some difficulty has arisen over this condenser owing to lack of stocks, and we have been asked if any other type will fill the bill.

The Polar Volcon .0001 mfd. is quite a useful little condenser in

this set, and can be used instead of the model originally specified.

Special Volume Control

There has also been a certain amount of trouble in getting sufficient supplies of the special volume control, due to the popularity of the set, but we are assured that plenty of volume controls are now available,

Careful adjustment of H.T. voltages should always be made with super-hets if the last ounce is to be obtained from them.

and, in fact, one of these has been used in the "Lock-Tune" Four, described in other pages of this number of MODERN WIRELESS.

Perhaps more ought to be said about this ingenious little device. It consists essentially of an ordinary volume control of potentiometer type for controlling the screen-grid voltage of the S.G. valves. But it also incorporates a little lever action which enables the H.T.—to L.T.—connection to be broken when the volume-control knob is turned "hard over" to the left.

Thus one reduces the volume slowly until minimum is reached, at which position the H.T. circuit is broken automatically. This eliminates any possibility of H.T. leakage when the set is switched off.

but they cause all sorts of radio reflection, and consequently the directional property of the frame aerial is seriously impaired and stations may come in from all sorts of unexpected directions.

Long Frame Leads

Long leads to the frame aerial may cause loss of directional effect, especially if they are of twisted flex or other unsuitable type. The leads should be kept reasonably short—about 2 ft. is enough—and should be spaced and parallel with each other.

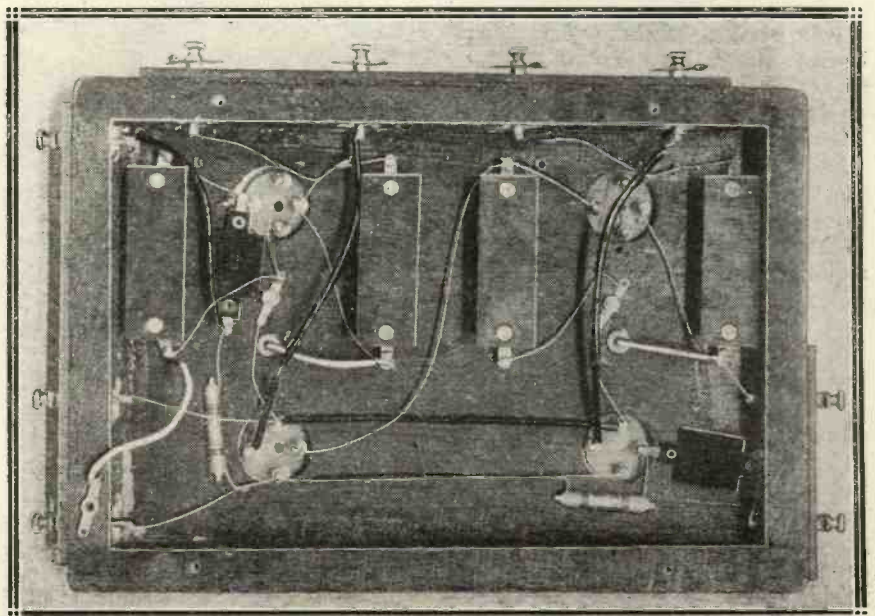
Many commercial frames are provided with parallel leads, spaced by ebonite strips so that they keep their distance all the way and cannot get crossed or mixed up with one another.

Keep the frame *away* from the set by all means, but do not place it too far away.

Intermediate Adjustment

One of the photographs in these pages shows how the intermediate and filter coils are adjusted, by means of the pre-set condensers. These condensers are set before leaving the

UNDER THE INTERMEDIATE UNIT



The intermediate unit is sold ready wired-up, and here we see it with the metal base removed so that the coupling components can be seen.



ROUND *the* TURNTABLE

Changing Records—Home Recording—Records to be Cheaper.
By "TONE ARM."

Do you find record changing on your radio-gram a very irksome business? Some people hardly use the gramophone because of this drawback.

Are We Getting Lazy?

It certainly does spoil the "atmosphere" if one has to get up in the middle of a musical selection and turn over the record; or if after the three minutes of a "ten-incher" the record has to be changed, a new needle put in, and the motor wound up.

You will say that, after all, there is no need to change the needle, as "permanent" needles can be used; neither is there any necessity to wind up the motor if an electric motor is employed.

Poor comfort for those who, either because they have no electricity supply or cannot afford it, have a clockwork motor. And yet if one looks on the gramophone as I think it should be regarded—as an "occasional" provider of entertainment—it is not a particularly terrible thing to have to carry out those simple requirements.

A Real Luxury

However, if you want to be more luxurious in your listening you can now invest in an automatic record-changer. I do not mean a complete automatic gramophone, but a little gadget that can be dropped into practically any gramophone or radio-gram that has a really deep turntable compartment.

This latter point is essential because the record holder stands up some distance from the turntable.

Electric motor and pick-up are included in the instrument, which is ready mounted on a motor platform. It will take either 12-in. or 10-in. records, and is entirely automatic in action, though if by any chance you don't like any particular item it can be changed immediately by touching a lever.

I refer, of course, to the Capehart record-changer, an American instrument that is being sold by The Sun Electrical Co., Ltd., 120, Charing Cross Road, London, W.C.2. It is extremely ingenious, and works very well indeed, and is a really valuable luxury.

Home-made Records!

And talking about radio-gram adjuncts, have you tried home-recording yet? I have had quite a bit of success with some of the recorders recently placed on the market. They are all based on the same thing, of course—the operation of a pick-up "backwards." The pick-up is used to cut the grooves in a blank aluminium disc; and very well it does it, too!

One can get quite a lot of amusement in recording the voices of friends, and it is extremely useful to be able

to perpetuate any particular radio item, such as a short song or speech by some famous personality.

Reducing the Price

And, if desired, it is quite possible to re-record so that "copies" can be done with quick and reasonable success. I won't say there is a great future for home-recording, but the idea should catch on gradually, and the outfits are not really expensive.

I hear that it is quite on the cards that gramophone records will become cheaper before long. Already Decca and Vocalion, to mention two of the many record-making concerns, have reduced the prices of their discs, and there is a rumour going about that some of the even more famous makers are seriously considering coming down.

I believe 2s. 6d. has been suggested as a new price for the 3s. record. I hope it is true, because 2s. 6d. is a far more reasonable figure, and one which will assuredly have a big bearing on the financial returns.

Good Profits

Many people who would not mind spending half-a-dollar on a record, jib at splitting 5s. by getting one at 3s.

It is not as if the gramophone people cut their profits very closely,

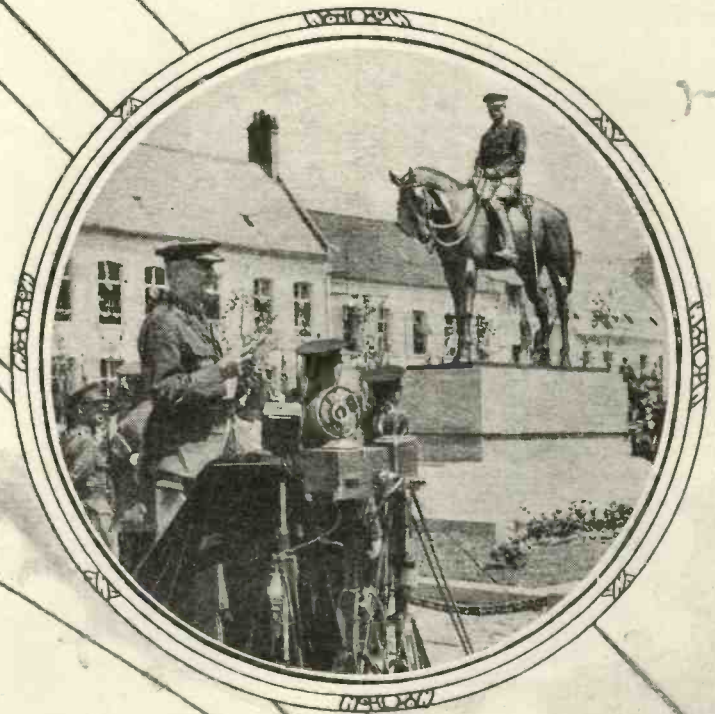
THE RADIO-GRAM "ROBOT" ARRIVES!



The Capehart record-changer undergoing tests at Tallis House. At the end of each record the pick-up lifts and comes out clear for the next disc to drop down.

either. I believe 33½ per cent is allowed the dealer on all records by at least one well-known concern. Thus your dealer gets 1s. on the 3s. record. If recognised dealers were not carefully chosen by the gramophone concerns I wot many more "canned-music" shops would make their appearance.

THE WORLD'S PROGRAMMES HOW, WHEN AND WHERE TO HEAR THOSE FOREIGNERS

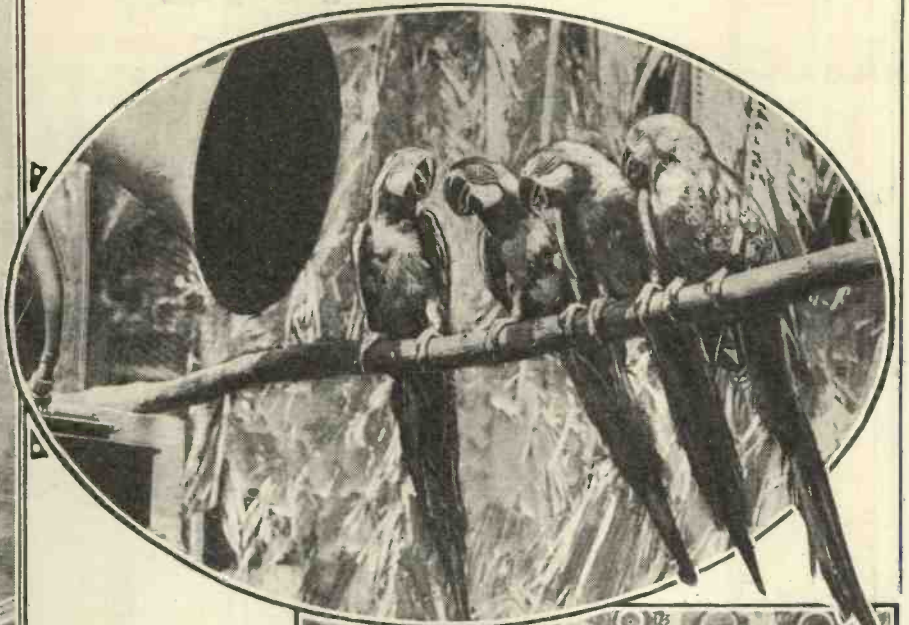
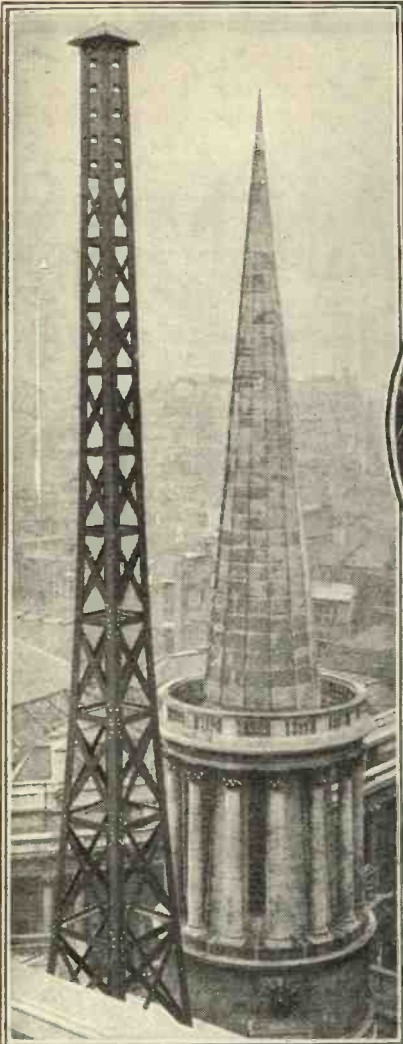


The photograph in the circle above shows Lord Allenby before the microphone at the recent unveiling of the Montreuil monument to Lord Haig.

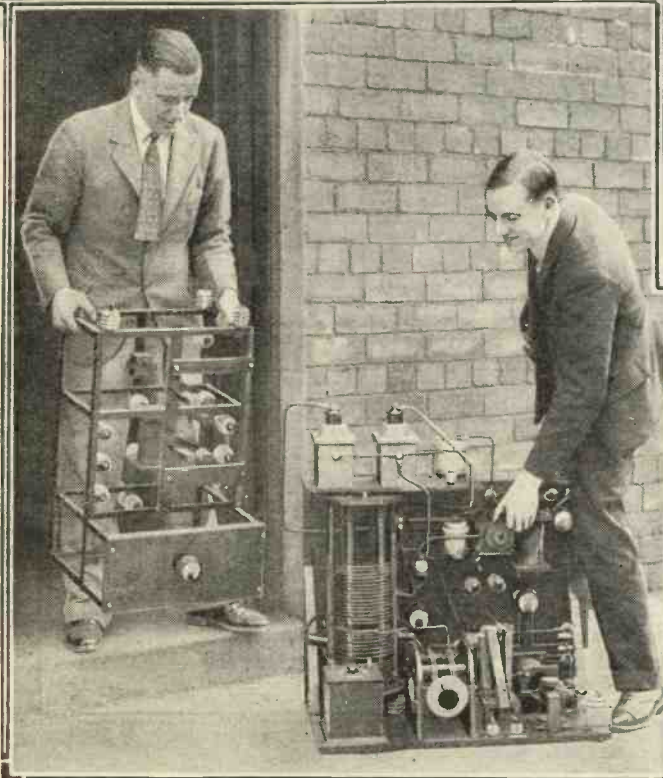
CONTENTS OF THIS SPECIAL SUPPLEMENT

	Page		Page
Picturesque Radio	114	New York's New Station	122
Countries to Listen for—		Mediterranean Meanderings	123
Sweden	115	To the North Pole	126
Short-Wave Shorts	117	Finding the Wave-length	127
The "Empress of Britain"	118	"Long," "Short," and	
Radio in the "Free City"	119	"Medium"	127
Fixing Flexible Connections	120	On the 250-550 Band	128
Station Information	121	Long-Wave Listening	128

PICTURESQUE RADIO



Happenings of the Month Caught by the Camera.



The four parrots at the top of the page are residents of New York's Zoo, and have been trained to whistle tunes on a word of command from the loud speaker. Very funny !

* * *

To the left of these feathered humorists is a view of London as looked at from Broadcasting House, Portland Place, W.

* * *

The photograph immediately above these captions shows a broadcast from Vienna's wonderful clock museum—an absolutely unique collection of beautiful old timepieces.

* * *

The last of the Leeds transmitter is shown on the left, the engineers having orders to dismantle good old 2 L S on the opening of Moorside Edge.

Countries to Listen For—

Sweden is easy to reach by radio, the most popular route being via Motala. Tune to 1,352 metres, just below the big Warsaw station, and above Moscow Trades Unions, and you will find the Stockholm programme, up till about 11 or 11.30 p.m. nightly.

An alternative route, sometimes preferred by northern listeners, is to be found on 438 metres. This is immediately below Rome, where the same programme as from Motala is always sent out by the main Stockholm station, with a power of 75 kw.

There are many other Swedish stations, of course, and of these Goteborg (322 metres) and Horby (257 metres) are both notably good programme providers. But for power and consistency most English listeners plump for Motala and Stockholm.

If you want to go in person you can get to Sweden by steamer in about thirty-six hours. Boats leave Tilbury, Hull, and Newcastle for Gothenburg—they call it "Goteborg" on the radio—at regular intervals. Usually a special train from London makes connection with these sailings.

Going to Goteborg?

Landing at Goteborg, you find yourself in an old and picturesque town, amongst a well-educated and friendly people. People, moreover, who like the English, and have much in common with ourselves.

Goteborg lies at the gateway of the Baltic, on the Cattgat, opposite Denmark. It is the second city of Sweden.

Founded in 1619, Goteborg now has a population of about 235,000. Its old moat, its canals, its steamship services, and its river, the Gota Alv, give it a marked maritime air and character.

Just north of Goteborg itself lies a picturesque region of ragged, jagged shores and winding fjords. Thousands and thousands of islets, which are many thousands of years old—as is evident from the ancient rock drawings.

The State railway links Goteborg with Stockholm and the rest of Sweden. The trains are good—very much like our own. Stock-

holm is 285 miles away, but the train does it in nine hours, travelling through a varied and beautiful country.

Stockholm itself is a wonder city.

Built partly on the mainland, partly on islands and peninsulas, it is one of Europe's most delightful capitals.



-SWEDEN

delights the eye with constantly varied vistas.

Thronged markets, busy quays, shaded promenades, imposing buildings, interesting streets—one of Europe's

"The old city," dating back to the thirteenth century, nestles snugly on a group of islands which are embraced by a long arm of the Baltic. It is usually called, with picturesque aptness, "The City within the Bridges."

One of these bridges, a granite seven-arched structure, nearly 400 ft. long and 62 ft. wide, leads to the Royal Palace. Is the Royal flag flying? Then the King is in residence.

From his water-girt home he looks upon a lovely city, strung upon the lakes and waterways like pearls upon a necklace.

His palace, lit at night, is an unforgettable sight.

The lighting of the whole city is indeed magnificently conceived and executed. Sweden's water-power, turned to electricity, stands her in good stead.

Outside the towns the great land of Sweden itself slopes gently down from the central mountains towards the Baltic. It is rich in mineral wealth.

Much Larger Than England

Iron of unusual purity, zinc, manganese, sulphur, copper, silver lead—all are there. Had there been plenty of coal as well, Sweden could not have failed to be one of the greatest manufacturing countries of the world.

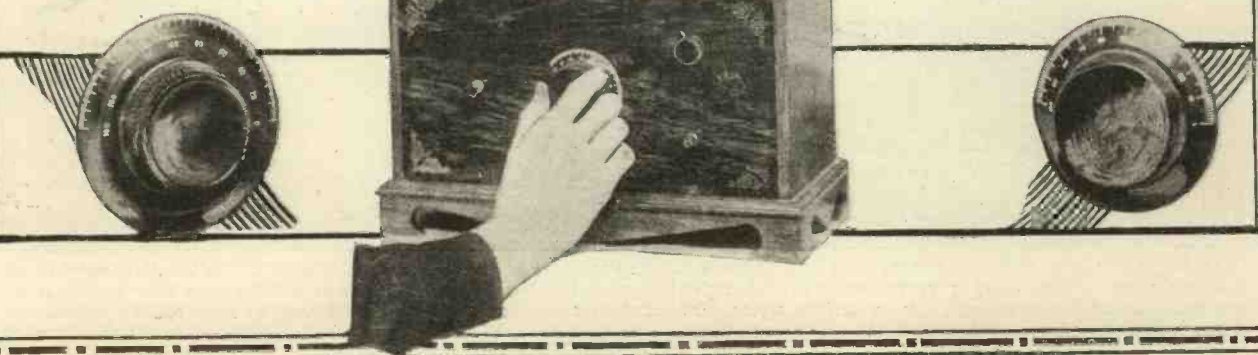
It is three times the size of England and Wales. Unbelievably rich in timber, with fine navigable inland waters in every district. Its trees alone make Sweden a notable country to visit. Fir, pine, spruce, ash, birch, oak, and beech—they clothe the countryside.

Nestling amongst the trees, and reflected on the many waters, are flourishing towns and villages, beautifully named. Norrkoping, Helsingborg, Malmo, Karlstad, Kalmar, Kristianstad, and Karlskrona—mellifluous names of prosperous places, all situated in Sweden.

In the north the predominant Nordic race gives way to another race—Laplanders. The Lapps are still a primitive people, clinging to their snowy plains, and using the reindeer, maintaining their own civilisation.



WHERE THE LONG-WAVE PROGRAMMES COME FROM.
The pencil is pointing to Motala.





And linking all Sweden together, city to town, town to village, village to hamlet, hamlet to isolated home—there is the radio. Sweden has taken to wireless like a duck to water.

Broadcasting is in the hands of a Board of Telegraph Commissioners and a radio service company. They co-operate to serve listeners, the former concern specialising on the technical aspects and the latter on programmes.

As in this country, the revenue is obtained from licence fees paid by the listeners. The rate is ten crowns per annum per receiver, and of the revenue two-thirds goes to the technical side for upkeep, etc., and one-third is allocated to programmes.

THE STATIONS OF SWEDEN

	Metres.		Metres.
Boden	1,229.5	Kristinehamn	203
Boras	207	Malmberget	436
Eskilstuna	246	Malmö	231
Falun	304	Motala	1,352
Gävle	204	Norrköping	232.2
Goteborg	322	Orebro	237
Halmstad	216	Ostersund	770
Halsingborg	231	Saffle	246
Horby	257	Stockholm	436
Jonkoping	202	Sundsvall	542
Kalmar	247.7	Trollhattan	252
Karlskrona	196	Uddevalla	229
Karlstad	218	Uppsala	453.2
Kiruna	246	Varberg	283

From a broadcasting point of view the country is a very difficult one to serve adequately chiefly owing to the scattered population and partly to its natural features.

Its great area necessitates a very large number of stations, as shown by the table on this page.

Some idea of the extent of the service area can be gained from the fact that the total length of the land-lines carrying the nightly programmes to Sweden's stations is in the neighbourhood of 4,000 miles. As far as from Stockholm to Chicago.

Although the problems of programme distribution are not so bad as in Norway—which is more mountainous—the rugged districts, especially of the north, introduce difficulties which are not met with in this country. Yet the Swedish service is good, and flourishing.

In many ways the character of the people is reflected in their programmes. The relays of outdoor sports, for instance, indicate the place that these recreations hold in the general esteem; while the frequent gymnastic broadcasts the

music, and the high quality of the educational items are all especially noteworthy.

Sweden is often named as having the finest educational system in Europe, and foreign stations are listened to with the greatest interest. Daventry 5XX is a favourite; whilst some of our Regional stations are very popular with the Swedish long-distance listener, notably the North Regional station.

The next time you tune in a Swedish station try to picture the country to which you listen. A beautiful, smiling country of forests and waterways. A country to listen for—Sweden.

LOW AERIALS

are often O.K. when erected on open ground. But if surrounded by buildings, etc., they may be too badly screened for good foreign reception.

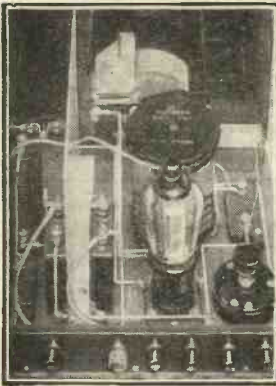
THE H.T. BATTERY

which has to supply a set with an S.G. valve (or valves) will last longer if these are properly grid-biased.

A Venice of the North—the City of Stockholm

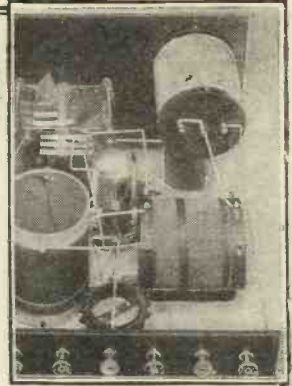


No general view of the city can give an idea of its charm, which lies more in the picturesque fringes of the water-front than in the larger vista. The building prominently in the right foreground is the Town Hall, and it will be seen that behind it lie many churches and notable buildings in various styles. In the winter the harbour is kept navigable by ice breakers, and in the summer it is thronged with small craft, the city being built on a number of islands—including several large ones—as well as on the mainland. It was founded in 1255, and has a population of about 415,000.



SHORT-WAVE SHORTS

News items of what the world is doing on the high frequencies.



PHILIPPINE ISLANDS. The Manila short-waver, **K A I X R**, who worked on 26.36, 31.4 and 48.8 metres, has now been suspended, and in future the station will radiate only on 485 metres, under the call-sign **K 2 R M**.

POZNAN, POLAND. This station, which often uses a trumpet call as interval signal, now transmits on 31.35 metres on Tuesdays, 7.45-10.45 p.m., and Thursdays, 7.30 p.m. to 2 a.m., on a power of 1 kw.

BARCELONA. The Barcelona **E A J 1** station, on 19 metres, sometimes relays Buenos Aires.

G 2 N M. This well-known British amateur call-sign (belonging to Mr. Gerald Marcuse) is now radiated from an address at Sonning-on-Thames. Usual hours: Sundays, from 7 p.m.; Mondays, 10 to 11 p.m.

"POSTE COLONIALE." The new Pontoise (France) station invites its more distant listeners to report on recep-

tion to Service Radiodiffusion des P T T, 103, Rue de Grenelle, Paris.

MELBOURNE. The famous short-waver **V K 3 M E** has been transmitting on Wednesdays and Saturdays between 11 a.m. and 12.30 p.m. B.S.T. Wave-length, 31.55 metres.

V K 2 M E. This Sydney station, which works on 31.28 metres, is due to broadcast on Saturdays between 6 p.m. and 8 p.m. B.S.T., and on Sundays from 11 a.m. to 1 p.m. B.S.T.

BOWMANVILLE, CANADA. The proposed start on 25.4 metres was delayed owing to licence difficulties, but the transmission on 49.22 metres will continue.

RADIO PONTOISE. Amongst the famous speakers to broadcast from the new French colonial station was the American Commander-in-Chief, General Pershing.

MOSCOW. The 50-metre Moscow programme, strongly received in this country, is sent out on a power of 100 kw., which is probably greater than that used by any other short-wave station.

RADIO SAIGON. The Radio Saigon station has recently been testing on about 25 metres for long periods.

RUGBY has been holding a regular short-wave schedule with Rio de Janeiro.

MONTE CARLO. A privately-owned short-wave station at Monte Carlo has recently been picked up at great strength in this country. Wave-length about 50.25 metres, well above Moscow. Half a dozen different languages are used in announcing.

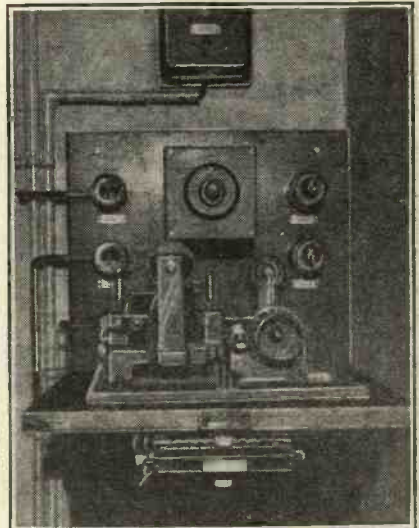
HAVANA, CUBA. The Cuban Government announces that a short-wave link with the U.S.A. will enable their new station to broadcast American concerts, etc. Cuba in turn providing American

south of Bandoeng, is to be the site of a big station to link the Dutch East Indies with Holland and the rest of the world.

DUTCH EAST INDIES. The proposed station at Dajeuh Kolot is to have twelve transmitters, four being for telephony and eight for telegraphy.

WHERE THE NOTES COME FROM!

This is the apparatus for producing Mühlacker's three musical notes which are broadcast as an interval signal. They can sometimes be heard from Zeesen, on 31.38 metres.



stations with musical programmes when required.

ZEESEN. The successful short-wave aerial system at Zeesen is to be copied and installed by Poznan, Poland (on 31.35 metres).

P C V. The 16.85-metre Kootwyk transmitter which works under the above call broadcasts in several languages (including English) on Saturday afternoons at 3.40 p.m. B.S.T.

AGEN. The French station at Agen relays the Toulouse programme on Tuesdays and Fridays from 9 to 10.15 p.m., on 30.75 metres.

DAJEUH KOLOT. This village, which is situated 8 miles

MALABAR. The present Malabar station's four transmitters will remain in operation when Dajeuh Kolot gets going, if the present scheme goes through.

JAPAN. The proposed service between Japan and the Dutch East Indies will probably employ a picture transmitter, to save the translation of the written Japanese characters.

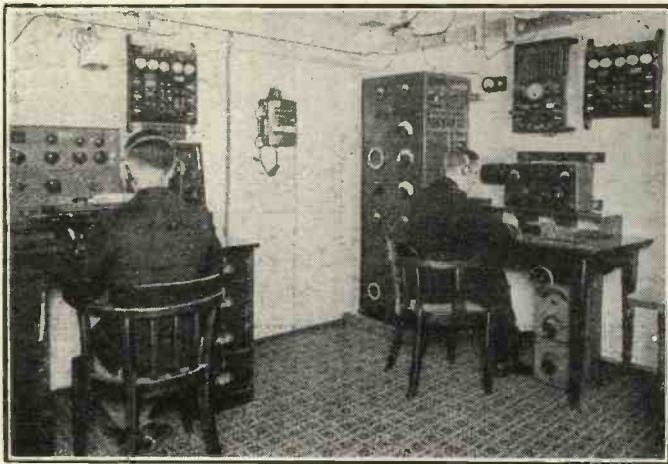
RANTJA EKEK. The Bandoeng receiving station which is at present at Rantja Ekek is to be moved to Batavia.

CHILININ. Chinlin has been chosen as the site of a new receiving station for the Dutch East Indies.

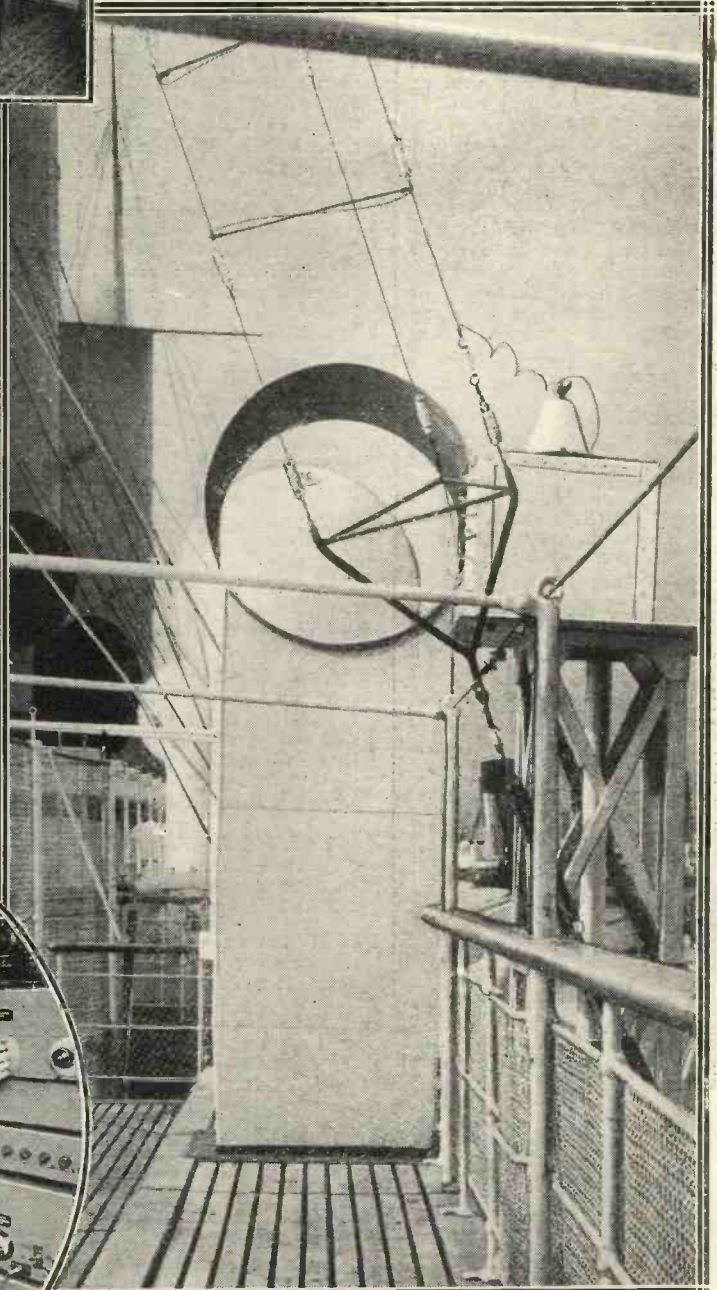
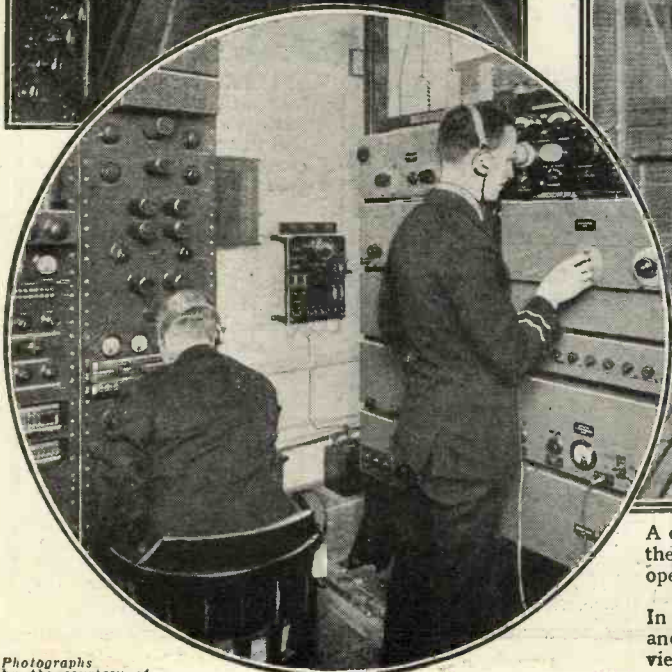


ALL ABOARD THE "EMPRESS OF BRITAIN"

Some views of the radio equipment installed on the great Canadian Pacific liner that recently broke all records for the Transatlantic crossing to Canada.



A short-wave telegraph transmitter and receiver is shown to the right, and a band repeater amplifying equipment to the left.



A corner of one of the top decks is depicted above. It shows how the feeder lines to the short-wave telephony aerial leave the operating room, which is below, and run up to the radiating aerial itself, this being situated clear of the rigging. In the circle one operator (on right) is tuning the main receiver, and another is at the control switchboard; while above the circle is a view of the main short-wave telephony outfit, which is of world-wide range.

Photographs by the courtesy of Marconi's Wireless Telegraph Co., Ltd.

RADIO IN THE "FREE CITY"

THE train trip from Berlin to Danzig is about the same length as that from London to Newcastle, but I must have struck an unlucky train!

It was during a cold spell, but the heat in the stuffy carriage of a typical Continental train would have left Dante's inferno standing. My fellow passengers en route for the "free city" included a plump-ish Teutonic mother with three offspring who unceasingly sucked some obnoxious fruit, a Dutchman who smoked some of Amsterdam's strongest tobacco, and three German business men who would keep the windows closed because otherwise the fierce gusts of wind played havoc with their card game.

A Helpful Dutchman

The orange-smelling children and the card players were hopeless as conversationalists, so I engaged with the Dutchman, who spoke English fluently, as most Dutchmen can, and the talk turned to radio.

I told him that I had worked a portable in Amsterdam (as I described in a recent article), and that strengthened the bonds of international friendship!

He offered me one of his foul cigars, and told me about broadcasting in Danzig, where he went frequently.

So when, arrived at the "free city"

There are actually more broadcasting stations in Danzig, the so-called "free city" of Europe, than the official list says! Why? Our Special Correspondent attempts to clear up the mystery in this account of a recent visit.

and my private business completed, I went out in search of the radio station, I was armed with a wealth of information from my Dutch fellow traveller.

The "Telefunken" Tale

"If you haven't a permit," he had said, "tell everybody you're a Telefunken official—right until you get into the station and see the director!"

It worked. The taximan touched his cap to me—a strange thing in Danzig, which being "free" is communistic. Danzig is more German than "free," and Telefunken in

Germany means somewhat the same as B.B.C. in England.

We drove out to the station, a big building in the middle of a clearing, and prettily surrounded by little pines and shrubs which had survived the axe and are springing up beneath the tall lattice aerial masts.

An Open Confession!

Once in the station—looking for all the world like an American's country house—I made open confession to an official in charge; told him I was not "Telefunken," and continued to tell any old tale until he himself offered to take me round.

His office was near the station entrance, so first we went out again to the grounds and he explained the aerial and earth system.

"That T aerial is for the '6 low-power set," he said, "and these fan wires" (indicating a horizontal beam-type aerial) "are for experimental short-wave plant. But the aerial characteristics can be changed.

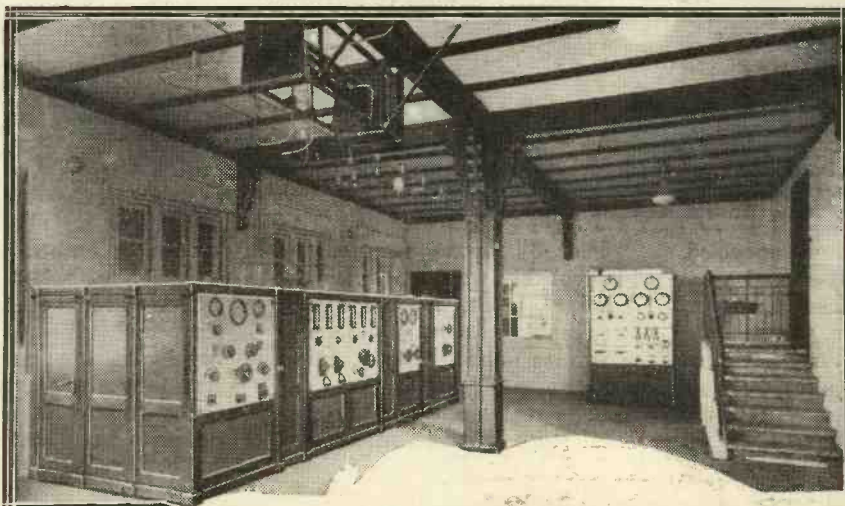
Only One!

"It is easy to change the T aerial, for example, for the 5-kilowatt set."

"But," I said, "the official wave-length lists show Danzig as possessing only one '6-kilowatt transmitter!"

"Is that so?" he said smiling. "Then the official list must be wrong. There

THE DANZIG STATION'S "DOUBLE"



Down in the depths of Danzig, this "unofficial" and experimental 5-kw. broadcasting station, which is of German design, is snugly housed. Note the elaborate lead-in along the ceiling.

Danzig Can Claim only Part of a Wave-length !

is a big 5-kilowatt Telefunken transmitter. We are working on it now. When you were announced I thought you were one of the Telefunken engineers in connection with it!"

I felt flattered. We went back to look at the 5-kilowatt—not inspiring from the outside, for the backs of the five gleaming white composition panels are covered in with wooden panelling. It was working at the time, and the taller glowing bottle-shaped valves could be seen.

Behind the Scenes

Opening a door at the side of the switchboard the station engineer led me behind the "works" of the 5-kilowatt job, where the air-spaced copper-wire coils and gigantic tuning condensers with curious white insulators stood on pillars each at the back of the respective panels.

All the bus-bar leads at the back of the panels, from the switches and instruments to the bigger transformers, condensers and valves at the back, were made neatly with metal strip; very unlike, I am afraid, some of my portable set experimental hook-ups!

Our Correspondent got into the Danzig station by a subterfuge, but nevertheless he was welcomed, and readers will enjoy this account of his experiences in the "Free City."

The ceiling of this transmitter-room is beamed (I suppose they are metal girders, but they are painted to give a mediæval effect); and to keep the H.F. feeder leads to the aerial well away from the metalwork, ribbed insulators like stalactites hang down and grip the stout copper leads.

it is a standard Telefunken job. Rather modest-looking, eh?"

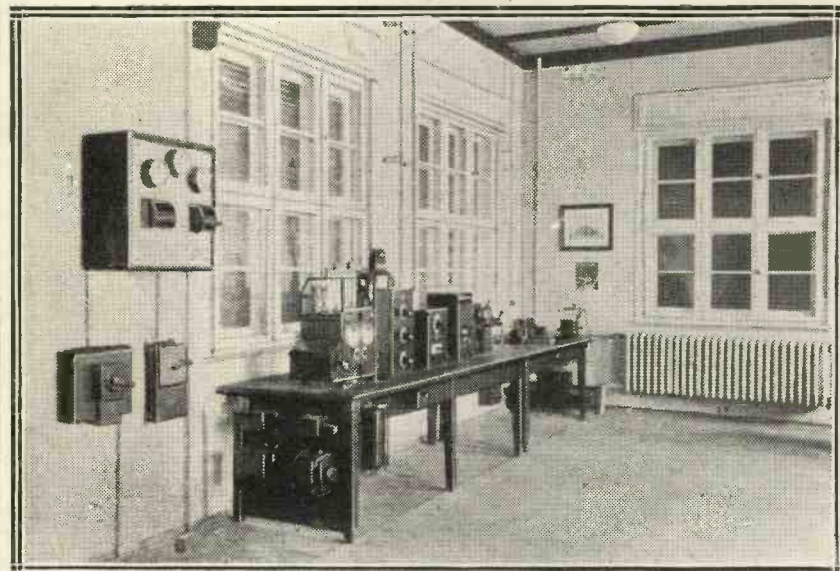
It was. It stands on a long bench, and I felt that I had played, in my youth, with more dangerous-looking apparatus on the benches of the school "chem.-lab.," but I flattered my guide by saying that, nevertheless, this little plant is heard well in England, which I fear me is but a half-truth!

Prague Proposes . . .

"Probably there is confusion about the 'free' city," said the official when I was leaving, "because the small set you have just seen shares a common wave-length of 453 metres with Porsgrund (Norway), Salamanca (Spain), Uppsala (Sweden), and other stations in Italy, Austria, Sweden, and Norway. That is the fault of the Plan de Prague. But you see we really have more than one transmitter!"

And when I get back to England I think I'll ring up the B.B.C. and ask how many stations there are in Danzig!

"IN CO." WITH KONIGSBERG



This is the "official" Danzig station, which works on 453 metres, and relays the Konigsberg programmes. It shares its wave-length with stations in Norway, Spain, Italy, Austria, Sweden, and Finland!

The valves are not water-cooled, and the extraordinarily-shaped glass bulbs gave out more heat than was pleasant. The bigger valves have "stems" some two or three feet long, so that the attachments for the electrodes are spaced well away from the hot parts.

"The .6-kilowatt set you spoke of is probably what we know as the 1-kilowatt plant, for we rate our power input and output differently—the reverse of the B.B.C.," said the engineer-cum-official.

"It is really only in the experimental stage at this station, though

FIXING FLEXIBLE CONNECTIONS

A GOOD way of making efficient connections at the ends of flexible wire is to use small brass shoe eyelets.

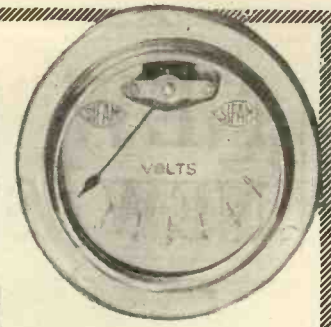
The type of eyelet that is especially suitable consists of two parts, a small serrated washer and a plain washer. The wire is placed round the serrations and the plain washer is placed over the top.

"Almost Perfect"

By giving the whole a sharp tap with a hammer an almost perfect connection is formed without the need of soldering.

You will find that there are several sizes and types of eyelets readily obtainable from any boot repairers. Naturally other types may have to be treated in a manner slightly different from that described above.





Station Information

Items of Interest for Long-distance Listeners.

SCHEVENINGEN HAVEN'S old transmitter was the one from which recent "mystery" programmes emanated on a wave-length of about 1,060 metres.

BRATISLAVA recently got the blame for an interfering whistle which spoils the Copenhagen programmes.

FÉCAMP (France)—allotted wave-length, 219.9 metres—has been giving good strength and quality with its new transmitter, but the wave-length has been very uncertain.

PALERMO, the new Italian transmitter, started its career badly by leaving its allotted wave-length (453 metres) in favour of 540.5 metres.

BOLZANO, the Italian station to which also 453 metres was allotted (common wave), has been working on 457.4 metres.

SOTTENS (403 metres) utilises 30 per cent of its time for Geneva programmes, 30 per cent for Lausanne, and the remaining 40 per cent for jointly organised "All Swiss" programmes.

BRUSSELS has been listening in to simultaneous test programmes from its two popular stations: Brussels No. 1, 509 metres, and Brussels No. 2, 338.2 metres.

SOTTENS now officially announces itself as "Allo! Allo! Ici Radio Suisse Romande! Programme de Lausanne" (or "Programme de Geneve," as the case may be).

TRANS-SAHARA aeroplanes and cars are to be equipped with radio to keep them in touch with civilisation whilst crossing the desert.

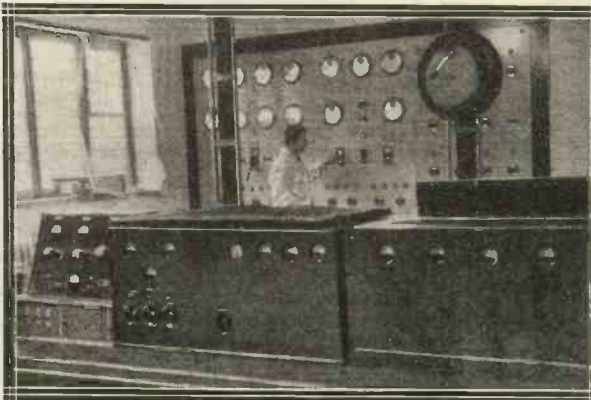
KOOTWYK is to take over the Dutch commercial news service formerly handled by Scheveningen Haven.

SCHEVENINGEN—which is better known to wireless

notion of closing down the programmes on 509 and 338.2 metres with a medley of English tunes (from an H.M.V. record called "Love's Dream After the Ball.")

NANTES, or one of the neighbouring towns, is being mentioned as the probable site for a Western France broadcasting station.

NURNBERG'S NEWEST



A view of the recently installed control panel of Nurnberg (239 metres).

operators than to ordinary listeners—is familiarly styled "Punch," the reason apparently being that the call-sign allotted to it was "PCH."

BRUSSELS listeners have been greatly intrigued by the

BEELITZ, just outside Berlin has been chosen as the German "Tatsfield," to receive American programmes, etc. Two 230-ft. towers support the special aerial system there.

ZURICH transmitter, which

was kept in use till Sottens found its feet, has now closed down.

BEROMÜNSTER (459 metres) opens with the announcement "Allo! Hier Schweizerischer Landessender! Studio Berne" (or "Studio Basle" or "Studio Zurich," according to which programme it is taking).

AUSTRIA. Vienna has decided that its new 100-kw. station shall be erected about twelve miles from the city, and has given the contract to the Telefunken Co.

MUNICH, which will follow Mühlacker and Heilsberg as a German regional station, will not have its new transmitter ready this year.

VIENNA State Opera relays are now closed for the season and will not be resumed until September.

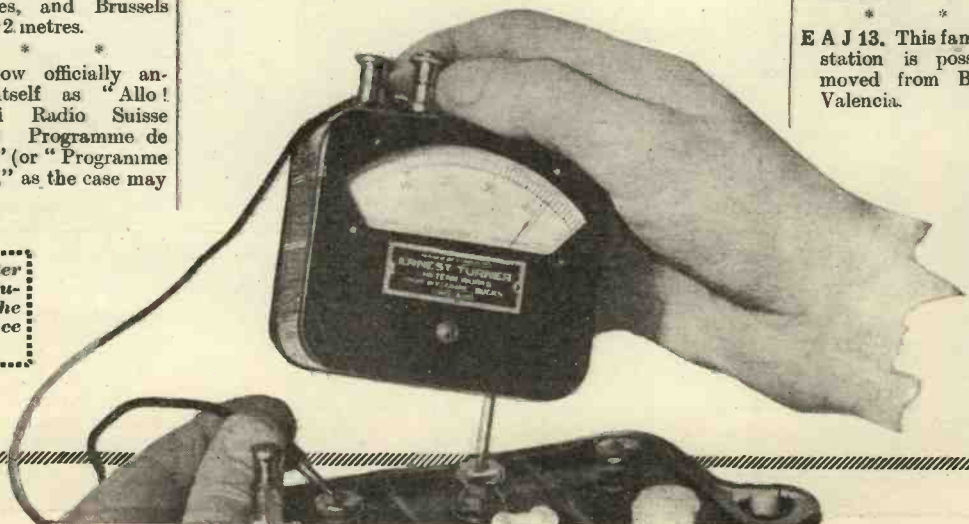
BISAMBERG, ten miles from Vienna, is named as the likeliest site for that city's new station, to be equipped with a transmitter of one hundred or one hundred and twenty kw.

POLAND is arranging to exchange programmes with the United States, there being a large Polish population in the U.S.A.

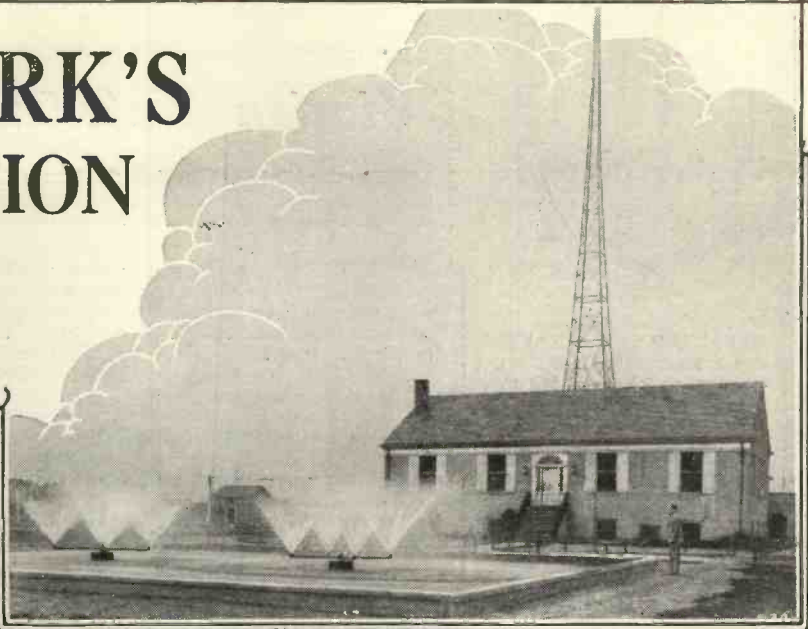
E A J 13. This famous Spanish station is possibly to be moved from Barcelona to Valencia.

A voltmeter will give valuable aid to the long-distance man.

Keep a vigilant eye on the S.G. screen voltages. They are often rather critical.



NEW YORK'S NEW STATION

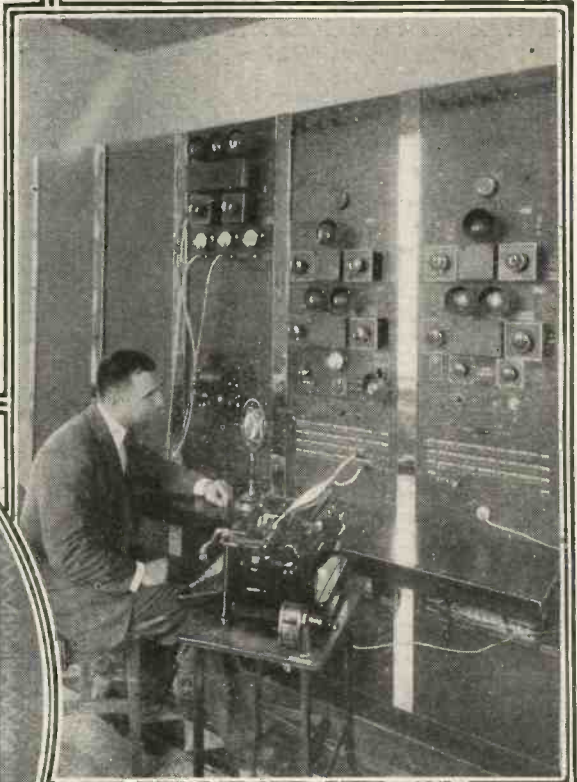


New York's great station, WEAF, situated at Bellmore, has just been enlarged and improved.

The fountains are more for business than beauty being part of the water-cooling plant.

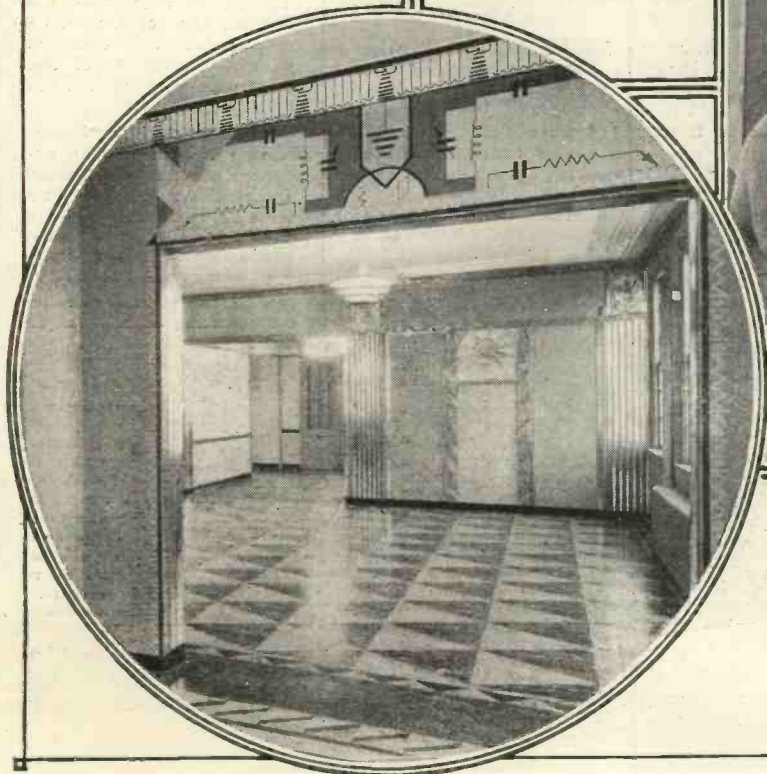


On the left is one of the huge new valves, contrasted with an ordinary little receiving valve. (Note the forgotten wooden box on which the big valve was rested until the photographer was ready. It is evidently no light weight !)



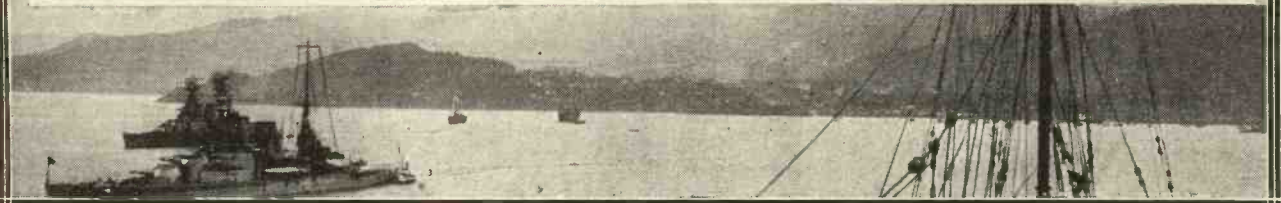
The radio decorations strike a very distinctive note, and there is quite a circuit diagram above the Visitors' Entrance to the new transmitter building (left).

The illustration above shows the engineer watching the control apparatus. Just to the left of the microphone in front of him is an oscillograph, on which a continuous "picture" of the station's output may be observed.



ROUND THE WORLD WITH A SHORT-WAVER

MEDITERRANEAN MEANDERINGS

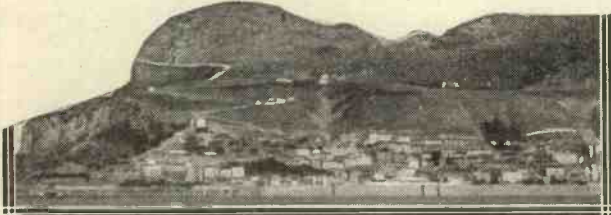


Some further adventures during a world tour with a short-wave receiver. After crossing the Pacific and Atlantic oceans our contributor is here negotiating the winding coast of the South of Europe.

By T. E. SWINTON.

SOME little time ago I had the opportunity of telling you of our experiences with a short-waver whilst "Westward Ho" across the Atlantic and Pacific oceans. This time we are cruising in the opposite direction, visiting the sunny Mediterranean and the Black Sea.

THE SUNNY SOUTH



A view of Gibraltar, Guardian of the Mediterranean.

The receiver in use is the same one that we used before with the exception that we now have a real milliammeter in the plate circuit, and we have made a new set of coils. For general use there is no doubt that a "straight" three-valver is the best of all short-wave receivers.

Important Points in Design

The intervalve coupling is a matter of taste, our personal opinion being that the only advantage offered by R.C. coupling is that of silent background if your resistances are of good quality. If they are *not*, then you will be infinitely worse off than if you were using transformer coupling.

Another important point in receiver design, or rather in coil design, is the turn ratio between reaction winding and grid winding. We know from bitter experience that too many turns on the reaction side can be as fatal as too few!

From the point of view of interest our voyage will

really begin at the time when we are crossing the Bay of Biscay; the time prior to that was spent in routine matters on the 500-kilocycle band, leaving very little time for short-wave work.

The weather was kind to us, the infamous Bay was smooth and the sun was shining—a condition which does not always obtain in that particular part of the ocean.

The Bay is like the Portuguese devil, when it is good it is all right, but when it is not good—then look out. Hail, rain, snow, fog and tearing winds all before breakfast is normal weather thereabouts.

Things seemed to be rather mushy on the high-frequencies for two or three nights, more especially to the north and north-east of us. G5SW was frankly

A GOOD SPOT FOR RADIO!



A typical scene among the mountains of Switzerland and Italy. The mountain railway laboriously winds up the heights from the lake-town nestling thousands of feet below.

In the Shadow of "The Rock"

poor, Zeesen not much better, but the Thursday evening concert from P C J came in well.

Radio Roma, too, was at good strength, while our old friends from the other side of the Atlantic were at their normal except for some annoying high-frequency fading. No sign of the Japanese commercial stations could we find, which is interesting when we come to compare this with our reception on the other side of Spain, in the Gulf of Lyons and Gulf of Genoa.

Chelmsford Bucks Up a Bit

When we were some 1,000 miles to the southward of the English Channel and approaching Gibraltar, Chelmsford began to arrive with much more power, as also did the various stations in Western Europe. Radio Roma, however, had almost disappeared, though why that should be we don't really know.

Twice we had L S G (Buenos Aires) at good strength for a while, but fading rendered him very hard to hold. Nothing at all was heard of the Australians. These gentry had been missing from the list of "receivables" for about a month with us. In fact, they have not been received well at any time during the past summer.

We were still being well treated by the weather, and the reports and forecasts from Monsanto (C T V) were a monotonous series of "gentle north-east swell, gentle breeze, etc."

Trafalgar Bay was passed in a dense fog, with some half-dozen other vessels in the near vicinity all howling and bellowing on their syrens, in as many different keys. The mournful wails which swept across the quiet waters must surely have caused the sleeping crews of the "Victory" and her consorts to move uneasily and wonder what strange sea monsters were abroad.

A ship's syren close at hand in a fog certainly makes most modern sailor-men turn in their beds. One's sense of direction and distance is warped out of all recognition and there are anxious moments until the long-drawn-out wail is definitely astern.

However, the fog did not last for long, and as we drew abeam of Tarifa Point the clammy blanket lifted and gave place to bright sunlight revealing the brown slopes of the mainland and the huge crouching shape of the "Rock."

Gibraltar furnishes a good example of wireless "shadowing," for it is very difficult to establish communication with the radio station there when to the eastward, although his westward range is quite normal.

Gibraltar Radio (G Y W) now boasts of a modern I.C.W. set, but originally he had a spark transmitter which was fitted with a blower to cool his spark-gap. Sometimes, whilst transmitting, this blower would display an excess of zeal and would blow the spark right out. He was a difficult station to receive in those days when the blower was at its fell work!

Queer Conditions are Experienced

Once we were well into the Mediterranean we began to experience rather queer conditions. Stations to the north of us were falling off in strength and those to the west, east and south were coming in with a much greater punch.

On the medium waves the conditions were reversed and commercial and telephony stations could be received with great ease. Nairobi was captured and Morse signals

from Japan and the Philippines were very conspicuous. G 5 S W had fallen away to a mere jumpy whisper, and Eindhoven, although stronger than Chelmsford, was far from his usual good strength and quality.

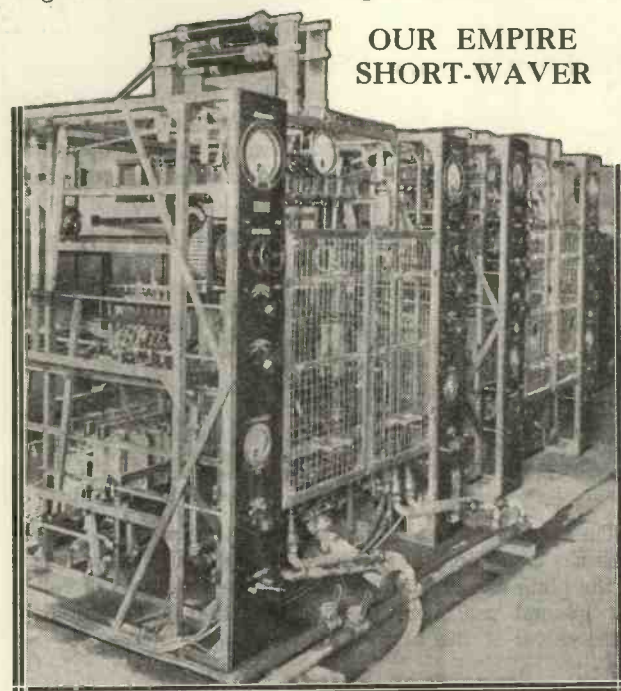
We immediately began to look for a reason, and after carefully checking up on the receiver itself we came to the conclusion that it was some outside source that was messing things up. Then, remembering Gibraltar, we promptly blamed the Alps.

At this particular point there is no doubt that we were well within any shadow that would be cast by these towering rocks, but whether that was really the cause of the loss in strength is open to doubt. If so, then how is it that the medium waves were coming in so well?

Whilst we were checking up on the receiver we came across one point of interest. Since the previous voyage, a small addition to the normal W/T gear of the ship had meant that the short-waver had been moved from its original position, with the result that we were forced to have a much longer earth lead, running more or less parallel to the aerial lead.

A Peculiar Effect is Noticed

As the cabin itself (except for the roof) is steel built, the question arose: "What is the capacity effect of that long earth lead?" As it was impracticable to reduce the



"G 5 S W had fallen away to a mere whisper," says our author as he describes radio reception in the shadow of the Gulf of Genoa. This illustration shows some of the transmitting panels at the Chelmsford station.

actual length of the lead, we tried reducing its electrical length by means of a series condenser of quite small capacity, -0003 mfd.

The effect of this was not what we expected. No difference in signal strength was apparent, but the receiver went into oscillation much more easily. The greatest effect, however, was on the tuning, which was sharpened up to an amazing degree.

We talk, rather glibly, of the "knife-edge" tuning which is obtainable with short-wave receivers; any ordinary knife would be considered blunt when compared with the edge of our tuning "knife."

The slightest slip or backlash in the dials would have made tuning impossible, and we were profoundly thankful that we had no hand-capacity to worry us. (As it was, the thought of that dial did more to keep us sober whilst in Genoa than any financial or moral considerations.)

Approaching Genoa we saw the ranges of mountains on whose broad shoulders we had laid the blame for our loss of signal strength from the stations behind them; steep-sided foothills of the Alps, the Ligurian Appenines.

Stations Still Falling Off

In the light of the sinking sun we could see the tiny white houses clinging to the slopes in what seemed to be impossible positions; the dark green of the vineyards and the tiny silver threads where cascades tumbled hundreds of feet to the swirling streams below.

At night the lights from the towns of San Remo and San Stefano became jewels; a glittering necklet laid out on black velvet with the flashing lights on Cape del Armá and Cape Maurizio forming the clasps.

Right up in the Gulf of Genoa the falling off of the northern stations was even more marked. Here are a few of the stations which we copied, and their signal strength, using the International scale of signal strength (which is 1-5): J N I (Japan), 4. S U Z (Egypt), 5. F X C (France), 2. G K T (Portishead), 3. W S L (New York), 5. L S D (Monte Grande), 3. J N A (Japan), 5. E A M (Spain), 2. D F E (Germany), 3. F T L (France), 2.

It is interesting to note that all the stations in Europe were quite weak, while the more distant stations were coming in well.

We arrived in Genoa bright and early on a Sunday morning and were berthed in the new Baisin Victor Emmanuel III, almost at the foot of the huge lighthouse known as Cape Faro, towering from the cape which was at one time actually on the coast, but now stands some quarter of a mile inland from the new breakwater, the intervening space being taken up by the new coal quays.

American Instead of British

While in Genoa we, of course, took a good look round the shops and were pained to note that all the wireless apparatus exposed for sale was of American origin. Why this is so is not quite clear. At first glance it would seem that the English manufacturers have a big advantage over the manufacturers of other countries. Italy is but a short distance from England, and communication is easy and rapid. English radio gear is quite as efficient as American and the English firms specialise in the making of components, whereas our American friends go more strongly for complete sets. One would think that our home people had missed a good opportunity here, as they have done in other countries.

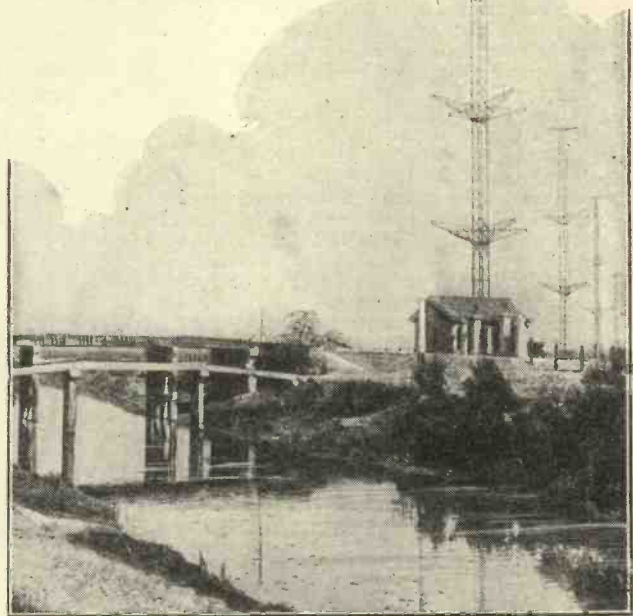
One Italian gentleman we met proudly exhibited a 1927 MODERN WIRELESS "Solodyne," built exactly to specification, the parts for which he had obtained direct from England at considerable cost; if he needed replacements he again had to obtain them direct.

Finally we left Genoa with its amazing mixture of very old and very new; its gloomy cracks of streets and its

broad Plazas; and pushed off southward, bound for Istanbul and thence the Black Sea.

The more south we got the better short-wave conditions became, until finally, three days after leaving Genoa, G 5 S W and Zeesen were coming in splendidly. All the other stations which we had been using as comparisons were at the same strength, so there must be something

IN FAR CHINA



The new Shanghai radio station which was recently opened. It carries out communication between China and America, Germany and France.

in the geographical situation of the Gulf of Lyons to account for the falling off in strength of the northern stations which was so noticeable.

We were fondly hoping that Stromboli would have some queer effect on reception, but we were disappointed.

Things began to get somewhat uninteresting from that point. All the stations were coming in with steady strength, except perhaps the Americans, who were not quite so good. However, as our clock was being advanced each day, listening to America soon became a matter of sitting up until the small hours of the morning, and we knocked off, so I really cannot give any report on the reception of these stations after passing Malta.

The End of the Trip

An uneventful run took us through the Dardanelles and so to Istanbul, where we lay three days awaiting orders.

When our orders finally arrived we were booked for a Russian port, so off we went through the Black Sea.

On our arrival in Russia our wireless gear was sealed by the port authorities, which effectively put the "lid" on any work whilst in port.

All we need say of the homeward voyage is that the results noted on the way out were more or less repeated in reverse order, which was satisfactory to us; proving as it did that the changes were really due to some external effect, and not to alterations in the characteristics of our receiver.



TO THE NORTH POLE — With SIR HUBERT WILKINS

SIR HUBERT WILKINS' submarine, the "Nautilus," which is to make the first under-sea attempt on the North Pole, is equipped with a 200-watt transmitter and the very latest receiving apparatus. She aims at keeping in constant touch with amateur short-wave workers in Canada and the U.S.A.

Her chief wireless operator is R. E. Myers, known on the air as "W3AJZ," of Bethany Beach, Delaware. Whilst lying in New York harbour on test the little vessel established short-wave communication with transmitting stations in the Antipodes.

A number of messages were exchanged between friends in Sydney, Australia, and Sir Hubert Wilkins, who was delighted at this long-distance radio reach.



THE "NAUTILUS"

—once a U.S. Naval Submarine and now an under-water seeker of the North Pole—is seen above in surface trim, making good speed in a smooth sea.

To the left is Sir Hubert Wilkins, listening-in on board the intrepid little vessel.

WAVE-LENGTHS

The following wave-lengths have been allotted to the "Nautilus":

- 800 metres
- 750 "
- 731 "
- 54 "
- 49'18 "
- 45'3 "
- 31'48 "
- 25'62 "
- 19'79 "
- 16'87 "

The "Nautilus" is 175 ft. in length, and has a cruising range of well over 7,000 miles. She is under loan from the U.S. Government for a period of five years, for the purposes of scientific exploration.

The vessel is propelled by two 500 h.p. Diesel engines when running on the surface. She can travel submerged 120 miles on one charge of her huge 50-ton battery (Exide manufacture), and is 700 tons register.

In Case of Emergency

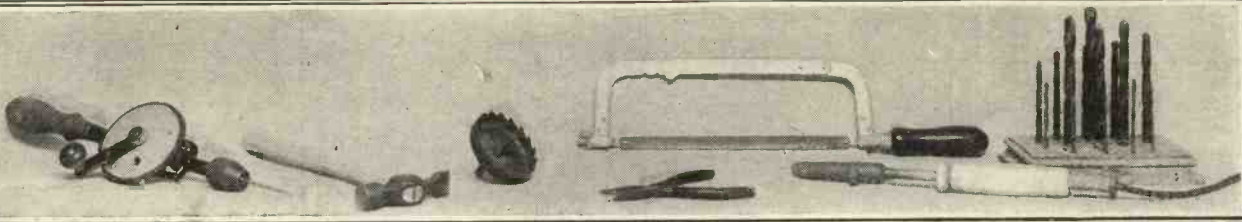
Should the submarine find herself imprisoned under a coating of ice she has a wonderful emergency ice-drill. It is 2 ft. in diameter, and is capable of being extended 13 ft. above the deck. Being hollow, a tunnel is formed by the drill, through which members of the crew could escape to the surface of the ice pack.

In addition, 9-in. drills can be added to reach to a height of 60 ft., thus giving access to the air necessary for the batteries to be recharged, without the submarine or its crew actually coming to the surface.

It will be remembered that the little vessel recently crossed the Atlantic—escorted by the U.S. Navy—to prepare in this country for the dash to the North.

At the time of writing she is being overhauled in the dry-dock at Devonport, and no definite information is available as to her next move, but no doubt the Daily Press will inform us when she puts to sea again. Her call-sign is WSEA.





FINDING THE WAVE-LENGTH

For finding your way about on short wave-lengths there is nothing like an absorption wave-meter. And nothing so simple.

Just a short-wave coil in a holder, with a good variable condenser wired across it. That is all. No valve, no buzzer, no trouble.

It has to be calibrated, of course. And accurately, too. But this can be done by any keen experimenter simply by reversing its normal use, which is as follows:

If it is desired to tune to a station on, say, 31 metres, the appropriate coil should be plugged into the short-wave set. The usual values for covering the 20 to 50-metre wave-band being a 2-turn coil in the aerial, a 4-turn in the grid circuit, and 6 turns reaction.

Easy to Work

Set the wave-meter exactly to the wave-length required, i.e. 31 metres, and place the instrument close to the receiving set, either on the same table or immediately below or above the set, so that the coil in the wave-meter and the coil in the short-wave set are only a yard or so apart, with no metal between.

Now turn the reaction condenser on the set until the receiver is gently oscillating, and then very gently rotate the tuning condenser, at the same time increasing or decreasing reaction so as to keep the set oscillating continuously, but feebly. You will find that it can be made to oscillate over the whole of the wave-length range except in one particular spot!

The reason that it will not oscillate here is that at this particular point it comes exactly into tune with the wave-meter, which then absorbs so much energy from the circuit that far more reaction is required to make it oscillate than at any other setting.

If the wave-meter is placed too close to the receiving set there may be a space of several degrees

where oscillation is affected. So it is a good plan to move the wave-meter about until a position is found where the set will oscillate gently over the whole of its range with the exception of the one very sharply defined position.

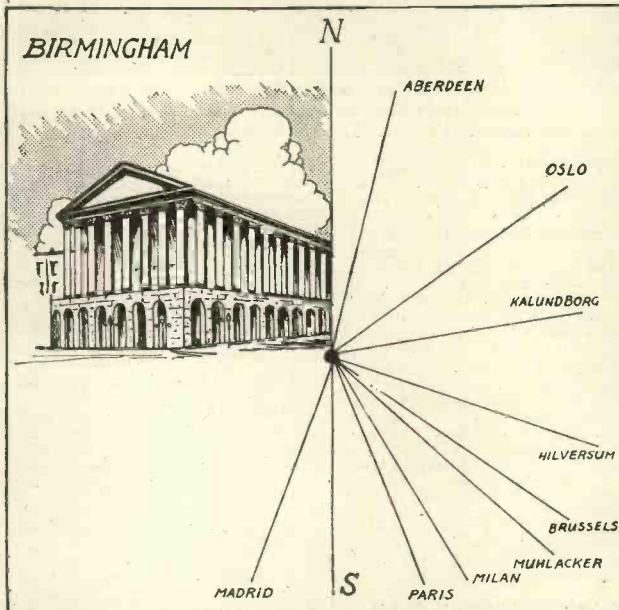
At this point there appears to be a "dead spot" on the tuning dial, but if reaction and all the adjustments are left alone and the tuning condenser of the wave-meter is altered away from its

your tuned-in set, an uncalibrated wave-meter can soon be provided with sufficient wave-lengths to draw the necessary tuning curve.

It is, however, necessary to use the greatest care if accuracy is to be obtained. The stations tuned in and used as "markers" must be reliable ones, transmitting exactly at the frequency on which they are supposed to work.

Moreover, the coils must be mounted rigidly, and must be so

FRAME-AERIAL POINTERS



To get strongest results when using a frame aerial, set it with its windings pointing to the desired station. Readers in the Birmingham district should imagine themselves on the central dot, and then the lines indicate the different directions.

setting it will be found that the set will oscillate as freely at this point as at any other, thereby proving that it is the interaction between the set and the wave-meter which is causing the failure to oscillate.

By setting the wave-meter to the desired wave-length readings can readily be plotted off on the receiver's dial, thus making the finding of any short-wave station a very simple matter. And, conversely, by taking readings from

constructed and handled that their inductive value remains constant. If, for instance, a coil is dropped and its spacing between turns is altered, the condenser reading for a given station will be found to have altered slightly when the coil in question is used again.

But if the better-known constant wave-length stations are selected as "markers," and the calibrating is done carefully, reliable readings on the wave-meter will result.

"LONG," "SHORT" AND "MEDIUM"

When the Washington Conference decided the vexed question of which were "long," "short" and "medium" waves some year or so ago, the results were so inapplicable to existing conditions that nobody took any notice of the findings. But obviously there must soon be some real classification to distinguish short, ultra-short, and so forth, from one another.

One very interesting suggestion recently put forward proposes to use the metric system as a base, with the generally accepted prefixes to denote the various wave-bands.

The Proposed System

From 1 to 9.99 metres would be the unit wave-band. (The Berlin tests have shown that specialised broadcasting is quite practicable on this wave-band.)

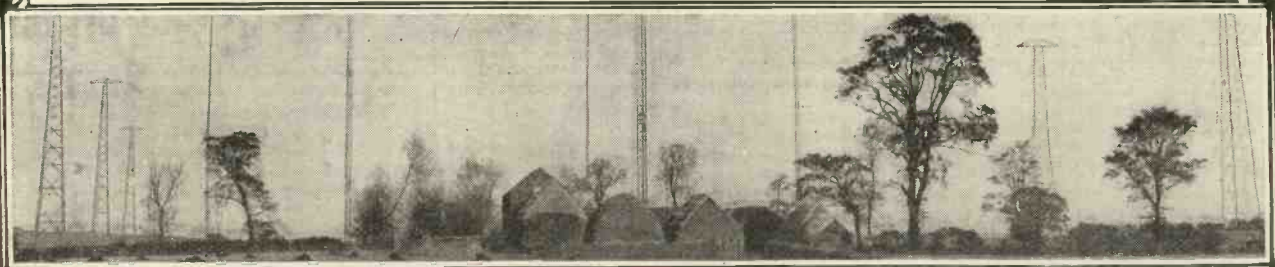
The prefixes Deka-, Hecto-, Kilo-, and Myria would have their usual significance.

Thus "Dekametre" = 10-99.99 metres, and would include G S W, W 2 X A D, etc.

The "Hectometre" wave-band would cover from 100 to 999.9 metres. This would contain most of the B.B.C. stations, and such foreigners as Heilsberg, Rome, Budapest, etc.

The "Kilometre" band would range from 1,000 to 9,999 metres, thus taking in 5 X X and Co. The very long-wave telegraphy stations like St. Assize, Rugby, etc., having wave-lengths over 10,000 metres would be in the "Myriametre band."

Similarly, the prefixes Deci-, Centi-, and Milli- would indicate wave-lengths lower than unity. The Decimetre wave-band would be from .1 to .999 metres. From .01 to .099 metres would be the "Centimetre band," and from .001 to .0099 metres the "Millimetre band." Using such a system, the figures themselves could be kept within reasonable limits, reference being made to so many "metres," "centimetres," etc.



**ON THE
250-550 BAND**

Notes on the medium wave-lengths.

Although long-distance reception had not fallen off to the extent expected during the spring and early summer, there was a noticeable decline during July. And this decline was accentuated by bouts of quite sharp atmospherics.

Fading also seemed more marked than at any time since last summer, but, nevertheless, it was a very bad night indeed which did not produce real programme interest from one country or another.

Really Reliable

Rome was the most consistent foreigner of the month, so far as my own aerial was concerned. And as the musical items from this station happened to be frequent and satisfying, it was generally on Rome that the dial settled for its foreign concert.

Toulouse, on 335 metres, was occasionally stronger, but it often fell far below the level of clear "enjoyability" which Rome managed to maintain, and even during its strong periods was liable to fade suddenly. Between these two, Frankfurt, Sottens, Kotowice, Berlin, Madrid and Stockholm were all good occasionally, frequently fairly good, but always a little unreliable.

Nearer the top of the dial, Lyons was a good station to watch, whilst Vienna provided the surprise of the month. On several nights this station on 517 metres seemed to wake up to all the old vigour which first made it such a favourite with British listeners. Buda-Pest, thought likely to be received at about the same strength as Vienna, was a mere "also-ran" in comparison.

A Powerful Pair

The Brussels stations seem to be making a firm bid for British favour. A great many people in this country must have enjoyed the closing signal frequently adopted—a gramophone record called "Love's Dream after the Ball." (Incidentally, this is H.M.V. No. C1844.) It may be heard on 509 metres (Brussels No. 1) or 338 metres (Brussels No. 2).

The extension of the North National service from Moorside Edge on 301 metres has resulted in greater interest being taken in the



Miss Maria Elettra Marconi is the very important young lady who is unceremoniously holding on to her illustrious father, on his famous experimental yacht. The Marchesa Marconi is with them.

lower-end-of-the-dial stations. There are some good ones almost adjoining the new North National wave.

Immediately below it is an old and faithful friend—Hilversum. North National's wave is 301, and Hilversum's 298.8, so that it is only a tick below the Moorsider. (Sounds a thirsty name, put that way, doesn't it?)

Hilversum sometimes gets overlooked because the Dutch keep a quaint old time of their own—20 minutes out-of-step with Greenwich. At 11.40 on a Sunday morning, for instance, you will hear their tinkling bell strike 12, and off they go with the midday concert, twenty minutes before the rest of Europe!

Incidentally, the concert is well worth trying for in eastern and south-eastern districts, the daylight strength being quite hefty.

The "Wobbling" Habit

Next to Hilversum, in descending order, comes a good station with bad habits—Turin. The bad habits are, of course, wave-length wobbling!

Turin is supposed to work on 274.2 metres, instead of which it pals up with Hilversum, and transmits on 296.4 metres. Very wrong of it, of course, but piquant—and Mussolini-ish!

The other outstanding transmission lower on the dial is Hellsberg (276.5), which is head and shoulders above all other neighbouring

NEXT MONTH

The September "M.W." will be
On Sale Sept. 1st
1/- ORDER NOW

The picture of the mast in the snow-clad field suggests Warsaw or Moscow, but actually it is much nearer home, having been taken at Moorside Edge, when the new station was erected there last year.

LONG-WAVE LISTENING

And some hints as to which stations are now coming over well.

Since our last long-wave notes were written quite a little stir was caused by a "mystery" station, picked up at good strength all over the country. It was especially good in the Midlands and South and East England, but even in northerly districts it was quite strong enough to make many an astonished Scot sit up in surprise.

The wave-length used was about 1,050 metres, and there was much speculation about it at first because of the apparent amateurishness of the announcements.

These transmissions emanated from Kootwyk, Holland.

Students of the long-wave programmes will be familiar with the market quotations announced in Dutch from Scheveningen Haven, for the benefit of business men. These are now transferred to Kootwyk, and the tests in question were the consequence.

New Long-Waver

The actual transmitter used is the same, having been moved from Scheveningen Haven to Kootwyk, where higher and better aerials are available. About 15 kw. are used at present, but this power can be quadrupled if necessary.

Exact wave-length, 1,053 metres.

Most of the long-wave stations have shown a tendency to fall off in daylight strength, but the after-dark activity on the wave-band is very enheartening.

The strength of Konigswusterhausen,—referred to last month in connection with its increase of power—continues to be really good. Germany's regional scheme is certainly providing British listeners with some good fare, especially that dished out by the long-wave Berlin relay.

Earlier in the year there was considerable speculation about Warsaw, on 1,411 metres, using the tremendous power of 158 kw. It was expected that this station would tend to dominate the distant long-waver situation, especially in daylight. But, as so often happens in radio, calculations do not work out in practice.

foreigners for reliability. And at times "Radio-Normandie" can put over a surprisingly good entertainment.

The trouble with "Radio-Normandie"—or Fécamp, as he is known officially—is that he is another of the wave-length wobblers, and although supposed to be on 219.9, may be up near the 250 mark.

Asking for Trouble!

Unlike Turin, Fécamp does not stay put on the wrong wave-length, but tries different ones. This not only makes him troublesome to find, but gets him hearty unpopularity with those stations whose neighbourhood he favours for his excursions.

Although there has been plenty of interest on the medium wave-band, despite X's and summer conditions. And a very welcome improvement which must be recorded is the freedom from spark jauning, which now is far, far less troublesome than it was last year, owing to the improved transmitters installed at the various coast stations, under the recommendations of the Washington Conference.

HEARD HIM?

He is one of Europe's most popular announcers—can you guess his station? It is Vienna, on 517 metres, and he calls it "Radio Veen." You can hear him most nights on a good 3-valver, and in private life he is Mr. Othmar Biegler.





A FEW words in explanation of the principles on which the super-het works will probably be of interest to those who are not familiar with them.

Briefly, the super-het system consists in changing the frequency of the received signal from that at which it is received to some other, usually lower, and then amplifying at the new frequency.

At first sight there does not seem to be any particular reason for doing this, but there are two very good reasons for it, and a third (equally good) reason just happens as a result of the principles involved.

Ordinary Methods Very Expensive

First of all, when you want to use two or three stages of H.F. amplification which are to include a band-pass filter, the construction of the amplifier is large and costly. Four or five tuned circuits have to be adjusted, or, if they are ganged, the building and preliminary balancing of the receiver becomes quite a difficult problem for the average experimenter.

By C. P. ALLINSON, A.M.I.E.E.,
 who describes the super-heterodyne principle and some of the bugbears that often accompany it, he also gives a circuit which he developed using three S.G. valves; it is a most attractive proposition from all points of view.

If, then, the frequency at which the intermediate amplifier works can be fixed, and all incoming signals changed to this frequency, the building of the amplifier becomes a simple matter. Large variable condensers are eliminated, the layout and screening question is simplified, and the cost of the receiver is considerably reduced.

Secondly, even the best of modern sets gives neither a constant band width over the whole tuning range when a band-pass filter is used, nor does it give constant amplification over the whole band. By working the amplifier on a fixed frequency it can be designed to give the maximum amplification at that particular frequency, and the effect of any alteration of the constants of the tuned circuits in the amplifier do not have to be taken into account.

High Amplification with Complete Stability

It is also easier to obtain a high degree of amplification at the lower frequencies (i.e. between 50 and 150 k.c.) than at the higher ones (round about 300 k.c.). This

A Six-Valve Super that "Gives Remarkable Results"

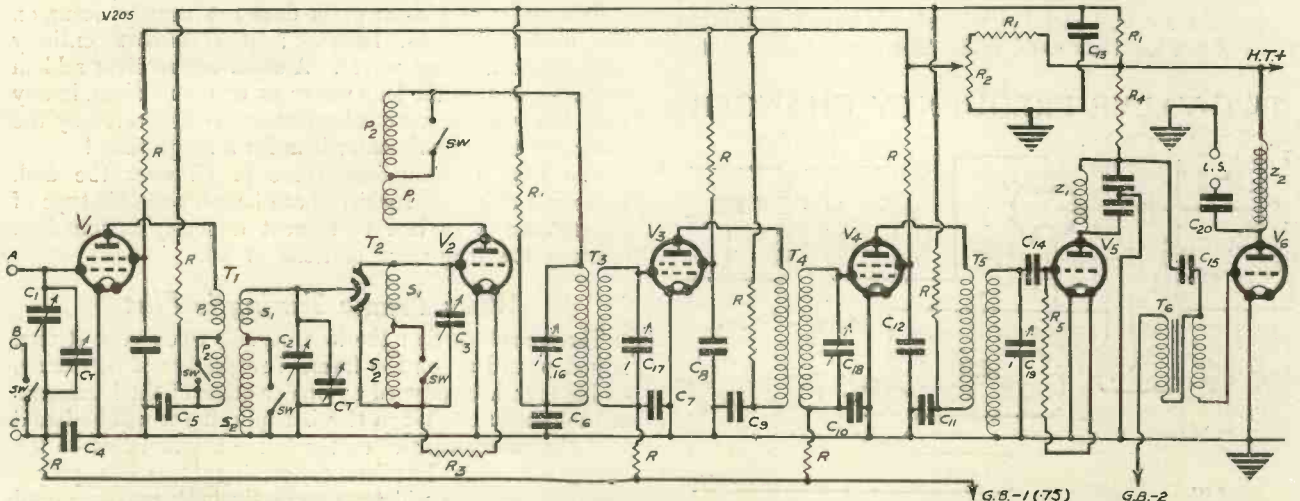


Fig. 1. A screened-grid H.F. stage, a combined oscillator and first detector, and two intermediate S.G.'s, are the main features of the above special circuit, which also includes several other items of particular interest, as is described in the accompanying article.

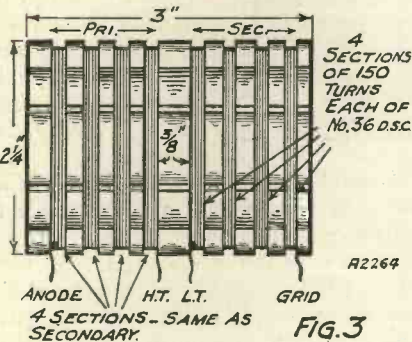
point, as a matter of fact, was a very important one in the days when ordinary three-electrode valves only were available for H.F. work, and it was only by working at a frequency of about 50 k.c. that any appreciable H.F. amplification was obtained. (This fact was almost entirely responsible for the development of the super-heterodyne receiver.)

Even to-day, however, with screen-grid valves a higher degree of amplification is obtainable at the lower frequencies, and this fact, in conjunction with our greatly improved technique of H.F. circuit design, enables a couple of S.G. stages to give far more "kick" than four of the old-fashioned ones.

Many Oscillator Circuits Available

I have been doing a lot of work on super-hets recently, and some of the things I have found, and some of the problems I have come across, have been of the greatest interest, and I feel that there are many wireless enthusiasts who would like a few pointers on modern super-het construction and design.

Now what is probably one of the most important points to settle is the question of the oscillator circuit. You can either use a separate oscillator or else an autodyne scheme. In the latter case, one valve has to do two jobs—



An intermediate transformer that the experimenter can make himself and thus save quite a bit of money.

FIG. 3

it has to detect and oscillate. The Super-Autodyne circuit is very useful, and is a later and improved form of the old Tropadyne (a circuit that gave rather a lot of trouble at times). The Super-Autodyne is shown in Fig. 2. The frame aerial is fed into the oscillator circuit $L_2 C_2$ by means of a differential condenser C_3 , which enables a correct balance to be obtained so that one does not upset the tuning of the other.

This differential condenser also takes the place of a grid condenser, and each half of it should have a maximum value of not less than .0001 mfd. The top of the oscillator

TWO-VALVE FREQUENCY CHANGER

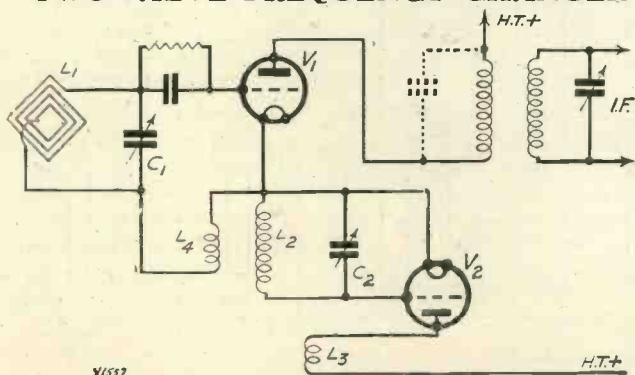


Fig. 2A. In this case one valve acts as a detector and a separate one (V_2) as an oscillator.

circuit goes to the grid of the valve and the bottom to L.T. —, through a resistance R, which is usually about .5 megohm, not more. If it is too high, "squegging" will result at the lower condenser settings. Reaction is applied by means of the winding L_3 from the plate circuit.

Thus the incoming signal from the frame and the local oscillations generated in the circuit $L_2 C_2$ are applied to the grid of the valve, and duly amplified and rectified, then being passed on to the intermediate-frequency

THE SUPER-AUTODYNE

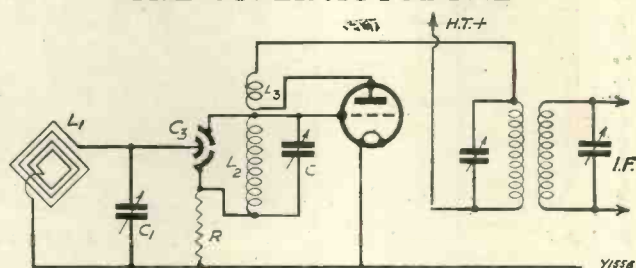


Fig. 2. A combined detector and oscillator arrangement which is a great improvement on the old Tropadyne.

amplifier. Note that the primary of the input transformer must be shunted by not less than .0005, or else the oscillator will not function properly.

A typical two-valve frequency changer is shown in Fig. 2A. Here V_1 is the detector and V_2 the oscillator. The oscillations are fed into the detector circuit by means of a small coupling coil L_4 , which is shown here connected in series with the L.T. side of the frame aerial.

Harmonics Often Very Troublesome

A number of variations of the method of feeding these local oscillations exist, and one method described many years ago in an American paper was to feed them into the plate circuit of the first detector. The chief advantage claimed for this method was that there was much less interaction between the two tuning controls C_1 and C_2 . There are numerous oscillator circuits—Hartley, Reinartz, bi-grid, shunt-fed, and series-fed—but many of these are unsatisfactory for one reason or another.

One of the chief troubles associated with the oscillator is the production of harmonics, and this is specially troublesome when the set is operated close to powerful transmissions, as in the London area, for instance. If this is happening, it is found that the local stations come in at half a dozen settings instead of two only.

Trouble of this description does not usually occur on the medium waves, however; it is almost entirely confined to the long waves. A super-het receiver seldom works as well on the long waves as on the medium, in any case, but when numerous harmonics are generated by the oscillator the experimenter is in for a rough time!

The local transmissions come in all over the dial, numerous chirps and whistles are heard, and this type of interference is so bad that great difficulty is found in locating the long-wave stations at all.

When Frame Tuning is Flat

The trouble is that the local signal, when very strong, is just picked up on the frame, irrespective of its tuning, and is then heterodyned by one or other of the harmonics of the oscillator. When this is happening it will be found that the tuning control on the frame has no effect on the strength of the interference coming in, while proper long-wave signals will tune correctly both on frame and oscillator condensers.

Full Details of a "Super" Circuit for the Constructor

This trouble is exceedingly difficult to overcome, and it requires very careful design of the oscillator circuit and adjustment of the working voltages of the oscillator valve.

I have not found any difference in this respect between the autodyne oscillator and the separate oscillator, though under some conditions I have thought the autodyne circuit less prone to it.

There is one method of dealing with it, however. That is to prevent the short-wave signal from coming into the first detector circuit. I have tried to find some means of balancing it out, but unsuccessfully. By using a stage of H.F. amplification in front of the first detector, however, the trouble is completely eliminated.

All Tuning Completely Ganged

The extra tuning control need not worry you, for it is a simple matter to gang all three together. The use of small trimmers across each condenser is, of course, necessary to get an accurate balance, and the coils and frame have to be matched up as accurately as possible. Remember, incidentally, that the oscillator coil will be a little larger or smaller (according to whether you work on the upper or lower repeat point) than the H.F. inductance. It is also possible, since the oscillator coil already has a loading capacity across it when the autodyne circuit is used, that it will not want a trimmer as well.

Now we come to the question of the intermediate frequency, and this is an important point. Since the advent of screen-grid valves we can get all the amplification we want from two stages only (I am working on a circuit using only one at the moment), and we don't have to use a very low frequency, i.e. long wave-length, as we had to with the old three-electrode valves, because we can get the amplification we want at the higher frequencies.

The chief points that concern us are long-wave interference and the choice of a frequency which will introduce the least trouble in operating the set.

Since the coils will be screened very little trouble is experienced from long-wave pick-up, and if a preliminary H.F. stage is used it can be reduced to such a level in most cases as never to interfere with reception at all.

But the second point? This needs watching. Here is a practical example of what I mean. The frequency difference between London National and Regional is 306 k.c. If, then, your intermediate frequency should happen to be 153 k.c. (about 2,000 metres), a point on the oscillator will be found where a violent heterodyne will occur between these stations which will both come in together. This will occur when the oscillator is tuned to 995 k.c., which is the upper setting for the National and the lower for the Regional.

Choosing Your Intermediate Frequency

Other powerful transmissions must also be taken into consideration, while you must not overlook the long-wave stations if you are going to listen to them.

The actual choice of intermediate frequency will, of course, be influenced to a certain extent by your local station, as you want to avoid beating this one up with any other powerful transmissions.

When a preliminary H.F. stage is used the above trouble is again reduced very considerably, and in most cases completely cured.

There are two reasons therefore why this H.F. stage should be used, and by ganging the tuning controls together all stations come in at one setting only, thus making the set very much simpler to handle than the usual one with two tuning controls.

Only One Stage Band-Passed

Now as regards the inter-frequency transformers, the type I am using consists of a 1-1 transformer wound on a slotted former, the secondary tuned in the case of the intermediate coupling, and with both windings tuned in the case of the input transformer. This arrangement gives all the band-pass effect that is required, and to my mind is better than making each stage a band-pass. The two windings have to be correctly spaced in the case of the filter input in order that the correct effect be obtained.

MORE POWER FOR PROGRAMMES



A new transmitting valve developed in America which can handle 30 amperes at 7,500 volts, and that is 225 kw. ! It is to be installed at K D K A, the famous short-wave broadcasting station.

The actual spacing depends on the physical dimensions of the coils, but where space is limited the coupling between them can be reduced by putting a single short-circuited turn of heavy copper wire midway between them.

Make All Your Own Coils

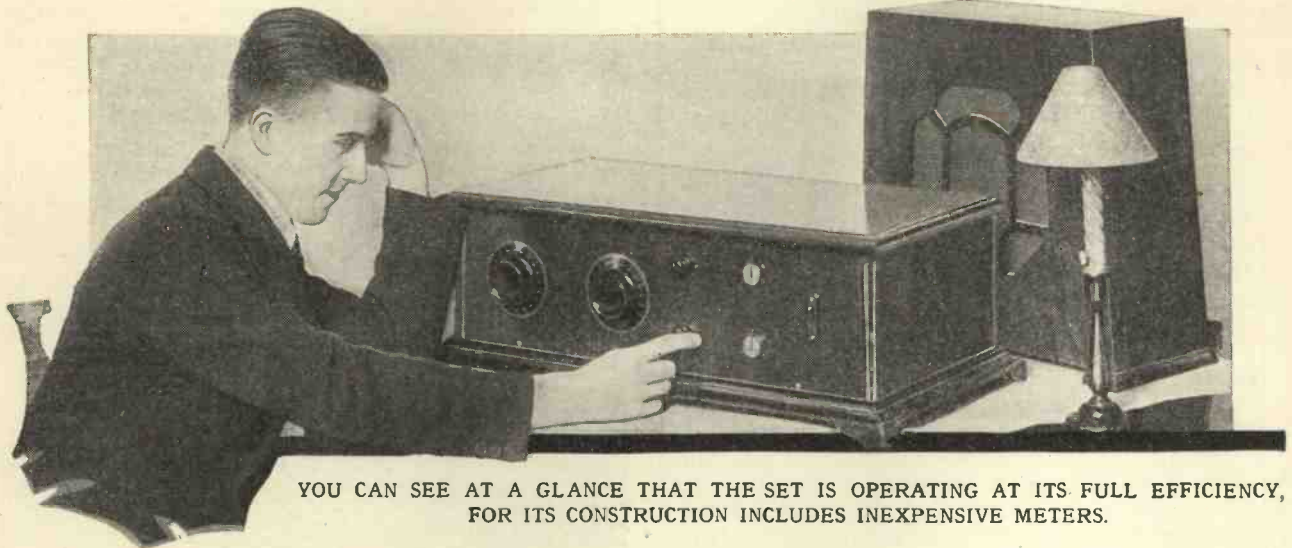
The construction of the intermediate transformers is seen in Fig. 3, and I generally make these to plug into a base. This makes it easy to try out different windings. Pre-set condensers are used for tuning the secondaries, and each coil and condenser is mounted in a small copper box, which gives the coil about $\frac{3}{8}$ -in. clearance round the side, and $\frac{1}{2}$ to $\frac{3}{4}$ in. at the ends.

For the second detector you can use power grid if you want to get plenty of punch from the stronger transmissions, or leaky grid if you want to get the maximum sensitivity. I myself incline to a compromise between the two, and I am using the arrangement shown in the complete circuit diagram in Fig. 1.

This is the circuit diagram of a super-het constructed on the lines described in this article, and one that has

(Continued on page 181.)

How to Build



YOU CAN SEE AT A GLANCE THAT THE SET IS OPERATING AT ITS FULL EFFICIENCY, FOR ITS CONSTRUCTION INCLUDES INEXPENSIVE METERS.

FOR some years it has been the custom to look upon the listener with A.C. mains in his home as a particularly fortunate fellow. The reason, of course, was that he had the opportunity to use A.C. valves, and everybody knows how much more efficient these are than battery valves.

The man with D.C. mains was almost as unfortunate as he who had no mains at all—or so, at least, the mains-set enthusiasts said. He could get a limited H.T. voltage (some-

what less than that of the mains), and he could charge his L.T. batteries from the electric light supply, but it was not possible to build an all-mains set and get anything better in results than with a battery outfit.

Much Easier to Build

Now, however, that is untrue. The average D.C. mains listener has quite as many advantages as the man with A.C. electric supply. Although the latter can transform the voltage up to anything he likes, the

D.C. man's mains set is a much less complicated affair and is therefore cheaper to build.

We are assuming average mains voltages, of course—200 volts or upwards; those freak D.C. mains of 100 volts or so are hardly worthy of the name of *mains*.

With 200-240 volts a great deal can be done, and, indeed, few A.C. sets are designed for H.T. voltages greater than 250—such high voltages are not necessary for ordinary loud-speaker operation.

CHOOSE YOUR PARTS FROM THESE RECOMMENDED MAKES

PANEL

24 × 7 in. (Permcot, or Peto-Scott, Lissen, Becol, Wearite, Goltone, Parex, etc.). Cabinet, with baseboard 10 in. deep (Peto-Scott, or Compton, Camco, Pickett, Osborn, Lock, Kay, Gilbert, Langmore etc.).

VARIABLE CONDENSERS

2 .0005-mfd. Extensers (Cylton, or Formo, Wavemaster, etc.).
1 .0001-mfd. or over (up to .0002-mfd.) differential reaction (Lotus, or Cylton, Ready Radio, Igranic, Ormond, Polar, Telsen, Formo, J.B., Dubilier, Lissen, Magnum, Parex, Burton, Wavemaster, etc.).

SWITCH

1 double-pole single-throw mains switch (Bulgin).

RESISTANCES

1 300-ohm Spaghetti (Tunewell, or Ready Radio, Sovereign, Peto-Scott, Graham Farish, Lissen, Varley, Telsen, Lewcos, Bulgin, Magnum, etc.).
1 500-ohm Spaghetti (Ready Radio, etc.).
1 1,000-ohm Spaghetti (Ready Radio, etc.).
1 10,000-ohm Spaghetti (Ready Radio, etc.).
1 25,000-ohm Spaghetti (Magnum, etc.).
1 15,000-ohm Spaghetti (Varley, etc.).
1 2-meg. grid leak and holder (Graham Farish, or Dubilier, Telsen, Ferranti, Ediswan, Ready Radio, Varley, Watmel, Mullard, Igranic, Lissen, etc.).
1 ½-meg. and vertical holder (Dubilier, etc.).

1 50,000-ohm potentiometer (Rotorohn, or Regentone, Magnum, Varley, etc.).

1 M.W.1 type mains resistance (see text) (Bulgin).

1 600-ohm and holder (Ready Radio, or Varley, Ferranti, Parex, Bulgin, Wearite, Peto-Scott, Magnum, etc.).

VALVE HOLDERS

2 5-pin (Telsen, or Clix, W.B., Lotus, Bulgin, Benjamin, Junit, Formo, Magnum, Wearite, etc.).
1 5-pin horizontal mounting (Junit, or Wearite, J.B., Parex, etc.).

FIXED CONDENSERS

1 .001-mfd. (T.C.C., or Ready Radio, Telsen, Dubilier, Ediswan, Formo, Ferranti, Mullard, Igranic, Watmel, Graham Farish, Lissen, etc.).
1 .001-mfd. (T.C.C., etc.).
1 .01-mfd. (T.C.C., etc.).
1 .0003-mfd. (Lissen, etc.).
1 1-mfd. (T.C.C. and Dubilier, or Ferranti, Formo, Telsen, Helsby, Peto-Scott, Hydra, Lissen, Igranic, etc.).
5 2-mfd. (250-volt working) (Ferranti, or Igranic, Helsby, Lissen, etc.).
1 .25 mfd. (T.C.C., etc.).

ADJUSTABLE CONDENSER

1 .001-mfd. max. (Formo, or Lewcos, Sovereign, Polar, R.I., Lissen, etc.).

CHOKES

2 H.F. (Lewcos and Ready Radio, or Telsen, Varley, R.I., Wearite, Magnum, Watmel,

Sovereign, Parex, Ready Radio, Peto-Scott, etc.).

2 smoothing (R.I., Lewcos, or Wearite, Atlas, Bulgin, Varley, Igranic, etc.).

1 output (Wearite, or R.I., Igranic, Varley, Ferranti, Watmel, Telsen, Atlas, etc.).

TRANSFORMER

1 L.F. (Telsen, or R.I., Varley, Ferranti, Igranic, Lotus, Lissen, Atlas, Mullard, Lewcos, Goltone, Formo, etc.).

COILS

1 P.J.2 (Wearite, or Formo, R.I., Ready Radio, Peto-Scott, Tunewell, Melbourne, Goltone, Parex, A.E.D., Watmel, etc.).
1 P.J.3 (Wearite, etc.).
2 coil quirts (Peto-Scott, or Ready Radio, A.E.D., Melbourne, Wearite, etc.).
4 oz. of 30 D.S.C. wire.

MISCELLANEOUS

1 milliammeter (small type) (Bulgin), to read up to 50 milliamperes.
1 ammeter (small type) (Bulgin), to read up to 1 amp.
1 mains safety plug (Bulgin, type V12).
1 twin fuse (Bulgin, type F11).
2 terminal strips, 3 × 2 in.
4 terminals (Ealex, or Igranic, Belling & Lee, Clix, etc.).
Wire (Glazite, or Lacoline).
Crocodile clips, etc.; flex, mains adaptor plug, screws, etc.
1 standard screen 6 × 10 in. (Parex, Ready Radio, Magnum, Wearite, Peto-Scott, etc.).
1 sheet of "Conductite."

the "New D.C." Three

Designed and Described by the Research Department.

Using the recently introduced special valves for D.C. mains, this set achieves an all-round effectiveness of a degree hitherto unobtainable in a receiver of a similar nature.

With his 200-240-volt D.C. mains and a good three-valve set the home constructor can get results equal to that obtainable by four- or five-valve battery sets, and he has the advantage in that no batteries at all are used, and he uses only as much power as a 100-120-watt lamp. That at least is the case at the moment if he uses the special D.C. valves at present on the market. Other special valves with a lower consumption will be sure to follow, and then the cost (already practically negligible) of running the set will be reduced still farther.

Extremely Economical

The valves we refer to are the new indirectly-heated D.C. valves brought out by the Mazda people. At the moment the current required is 5 amp., but this may quite likely be reduced. If it is, then it will be a simple thing to alter the mains-feed resistance in the set to suit, as will be seen if you read through this article, which

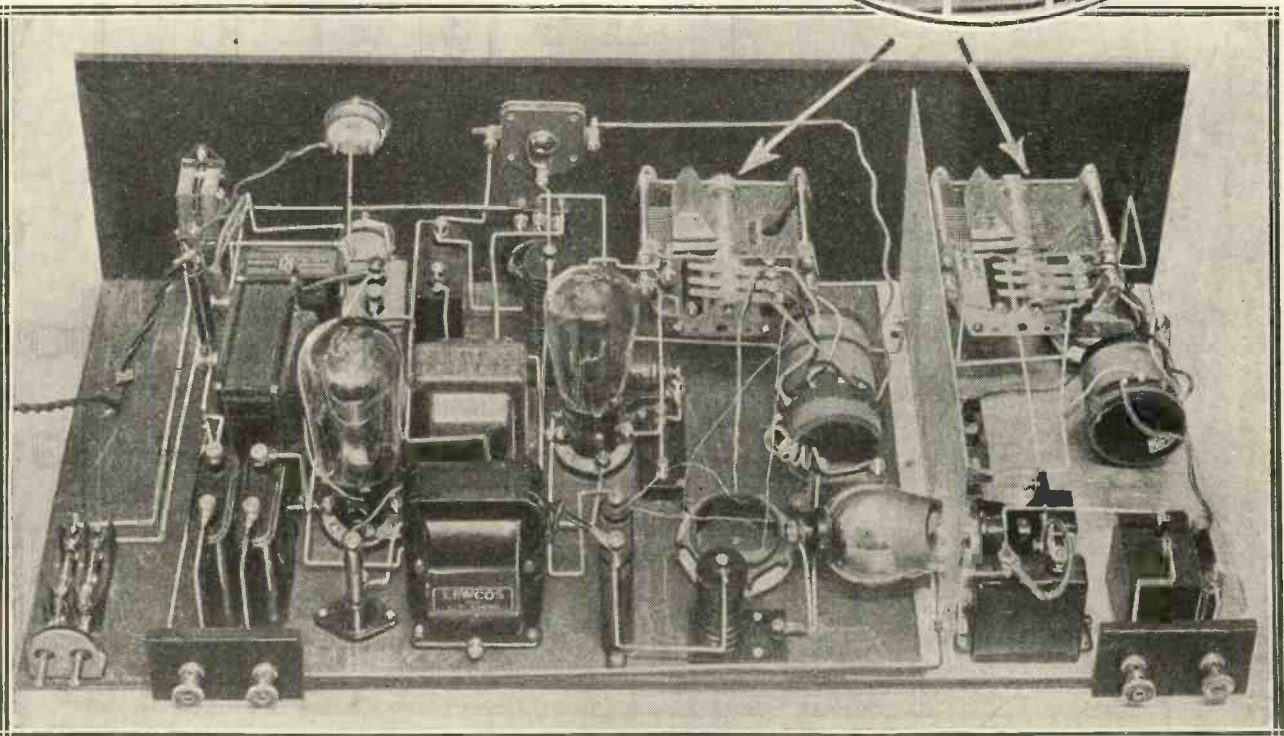
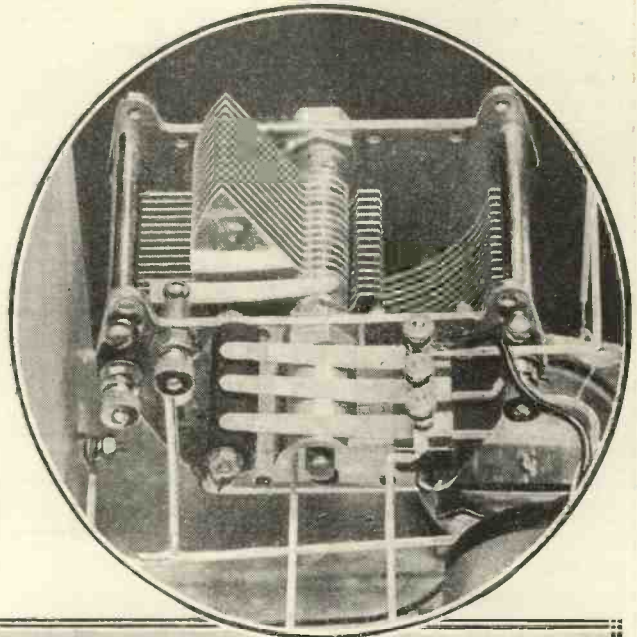
describes the construction of a D.C. set using the new valves.

The indirectly-heated D.C. valve is similar in operation to the A.C. valve and so it has the same fine characteristics. For instance, in the set under consideration an S.G., H.L., and a pentode valve are used,

and the result is a revelation in sensitivity and power-delivering capacity.

The D.C. S.G. valve is every bit as efficient as its famous A.C. brother, and the H.L. (detector) has the same

The two Extensers eliminate wave-change switches, thus simplifying the construction and increasing the set's efficiency.



Our New P.J. Coils and Coil Quits Figure in this Fine Outfit

Takes only a Small Current but has Tremendous Power!

wonderful characteristics of 11,500 ohms and amplification factor of 35. The D.C. Pen. is a replica of the A.C. Pen., and so is a really fine "bottle," capable of dealing with a fair input and delivering a surprising output.

We said earlier on that the D.C. set is not so complicated as the

ACCESSORIES NEEDED

Loud Speaker. (Celestion, Amplion, B.T.-H., Donotone, Blue Spot, Rolls Caydon, Mullard, Ormond, Undy, etc.)

Valves. (Mazda, see text.) 1 S.G., indirectly-heated type D.C.; 1 H.L., indirectly-heated type D.C.; 1 pentode, indirectly-heated type D.C.

A.C. variety. This is because no mains transformer is necessary, no rectification and very little smoothing, provided indirectly-heated valves are employed.

One choke in the priming grid lead of the pentode, and one in that feeding the anodes of the S.G. and detector, are all that are needed in the smoothing choke line; and few larger condensers are required.

The most expensive item is the breaking-down resistance, which costs about 18s. 6d. This, as will be seen from the photos, consists of a specially built winding, tapped for various mains supply voltages, in a metal case.

Mounting the Resistance

We have mounted this at the back of the set, on a little wooden platform on brackets, in order that the heat generated may be adequately and safely dissipated. If the resistance were mounted inside the receiver the heat would be "trapped," as it were, and the whole of the outfit would become overheated. Mounted at the back the resistance unit keeps adequately cool, is out of harm's way and can do its job properly.

All we have to do with a set of this description is to connect up aerial, earth and speaker, plug it into the electric light socket, and switch on. There is no bother, no fiddling about, and the receiver is perfectly safe.

The results are astonishing. The power from the local is tremendous—when "all out" it is far louder than most people require, even in a very large room. The quality is excellent, and it is indeed one of the most

effective mains receivers we have ever presented to our readers.

There are no snags in its construction. Unlike mains sets using battery valves the biasing arrangements, though automatic, are *separate* and have no effect whatever on the heater current. This is set automatically for you by the resistance, and the meters on the panel show whether everything is "ship-shape."

The only thing you can do wrong is to place the mains plug in the wrong way round, when the meter will read nothing. Change the plug over and the ammeter will show .5 amp. and the milliammeter will gradually come up to 25-30 m.a.

Useful Meters

Thus it is possible to tell at a glance exactly how the set is operating. All "fiddling" adjustments have been done away with. There is, in fact, *nothing* to adjust; all values have been pre-determined, and apart from connecting up the resistance

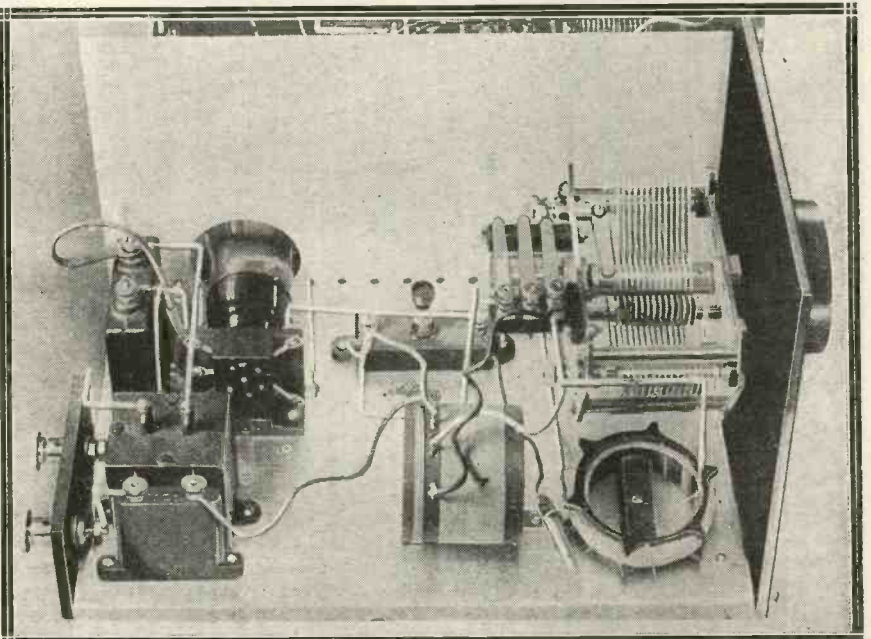
and the compression-type condenser. It can be made variable on the medium waves, if desired, by taking the aerial by means of a crocodile clip to one or other of the taps on the aerial winding on the first coil, but this was found unnecessary in the original set, and so a permanent connection was made to the A. terminal from the beginning of the aerial winding (red flex).

Several Good Points

The heaters of the valves are connected in series, and the control resistance limiting the heater current to .5 amp. is situated in the positive mains lead. The mains supply is completely controlled by the double-action mains switch which breaks both sides of the supply circuit, and between the switch and the main plug on the set are two fuses—one in each lead.

These fuses are of the .75-amp. variety, so in the event of a wrong connection on the control resistance

THE "AERIAL END" OF AN EXCELLENT SET



It is a fully Extended receiver which incorporates all the most up-to-date features, and is very easy to build. Note that this end of the baseboard is covered with "metallised" paper.

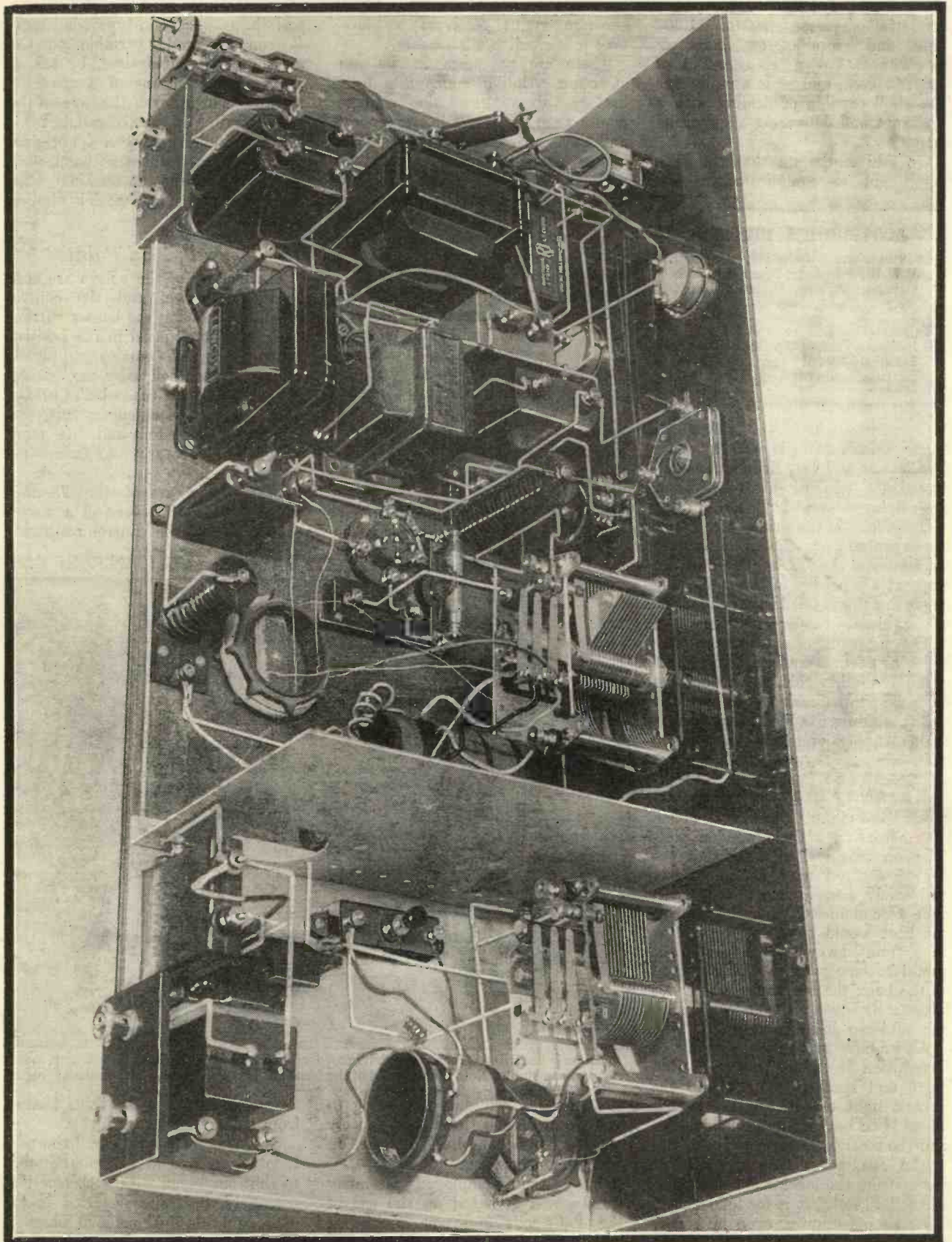
at the right terminals (according to voltage of mains) there is absolutely nothing to be done but to switch on and enjoy the programmes.

The circuit employed is fairly simple, and is based on the use of the P.J. coils and coil quirts for tuning. Selectivity is variable by means of the tapped long-wave coil

they would protect the valve heaters from a "fatal" overload.

Grid bias for the S.G. and the pentode is arranged in a manner similar to that employed with A.C. receivers—namely, resistance inserted in the cathode leads. About 500 ohms is correct for the screened-grid valve, and the pentode requires 300 ohms.

Here is a Receiver You Will Be Proud to Possess



Designed Around the Very Latest Types of Mains Valves

It will be noticed in the theoretical circuit that a resistance of 10,000 ohms is inserted in the lead feeding the priming grid of the pentode. This lead has a smoothing choke in it, and the resistance is not used for de-coupling, but to break down the voltage on the priming grid so that this shall not be too much.

away one of the finest features that has ever been incorporated in a wireless receiver.

No "Snags" Whatever!

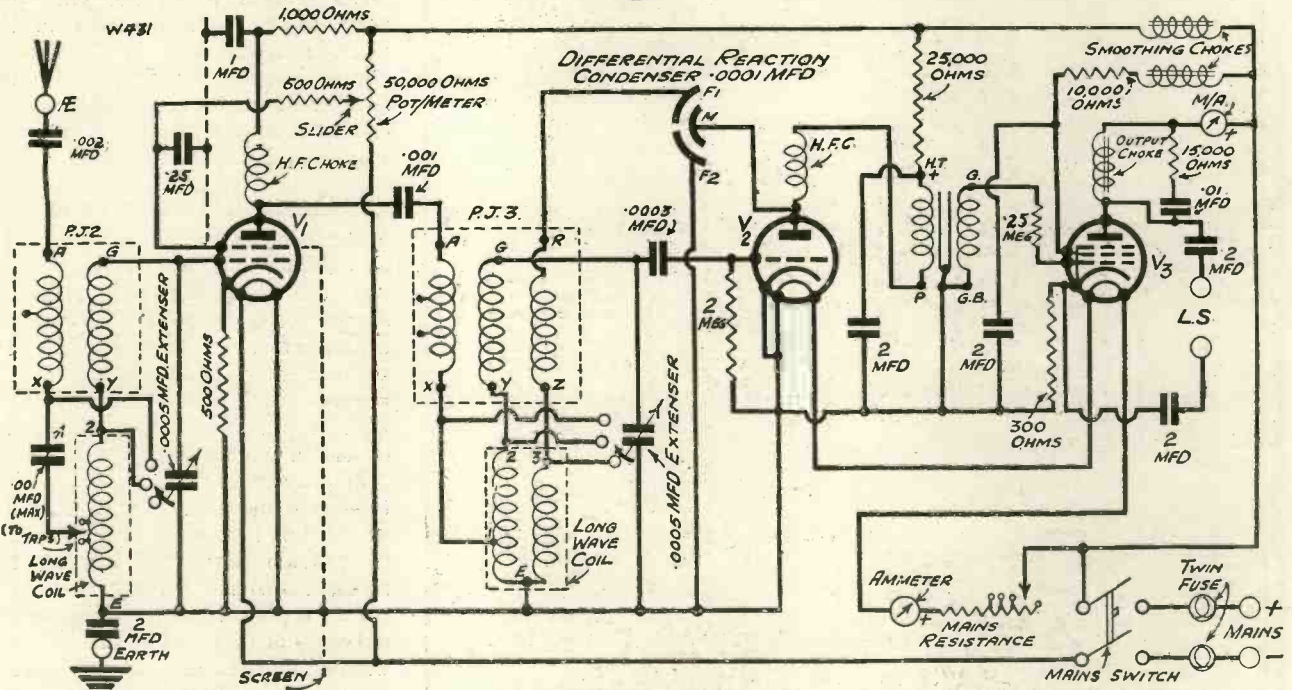
The actual construction of the set is quite simple, and no one need have the slightest fear of not being able to get the very best out of it.

vertical variety with a hole cut in it for the S.G. valve.

The S.G. valve is shunt-fed, and the tuned circuit consists of a P.J.3 coil (the full 30 turns of the primary winding being used) and a coil quoit in series for long waves.

There is a point about reaction that may be brought forward here.

Here is the Circuit of this Right "Up-to-the-Minute" Set



This diagram is rather interesting owing to the unusual arrangement of the valve filaments, which are connected in series. Another outstanding feature is the method of obtaining grid bias for the pentode from "dropped" volts across the S.G. valve filament.

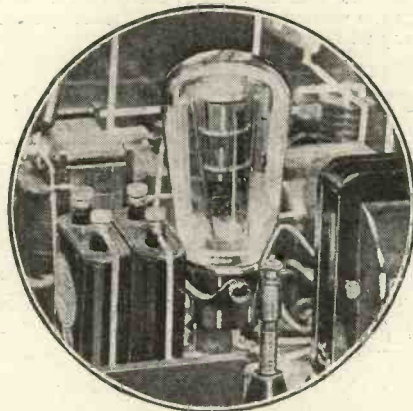
Without this resistance the voltage on this grid exceeds that on the anode when the valve has thoroughly warmed up, due to the voltage drop caused across the output choke when a current of something like 25 milliamps. is flowing in the anode circuit.

Fully "Extensered"

We have said nothing about the Extenser tuning control used in the set. This self-changing wave-band scheme makes the set absolutely the last word in modern design. Until you have handled an Extenser you can have no idea of the freedom of tuning which it gives, the operating simplicity which it imparts to the set, and the fascination that it creates as one glides smoothly from one wave-band to another.

Ordinary condensers can be fitted if desired, and wave-change switches employed, but this would at once take

A POWERFUL OUTPUT



The above photograph shows the pentode output valve, which ensures plenty of power from all programmes.

At the H.F. end the baseboard is covered with foil-covered paper (copper foil will do if this is more convenient), and this extends under the screen, which is of the usual

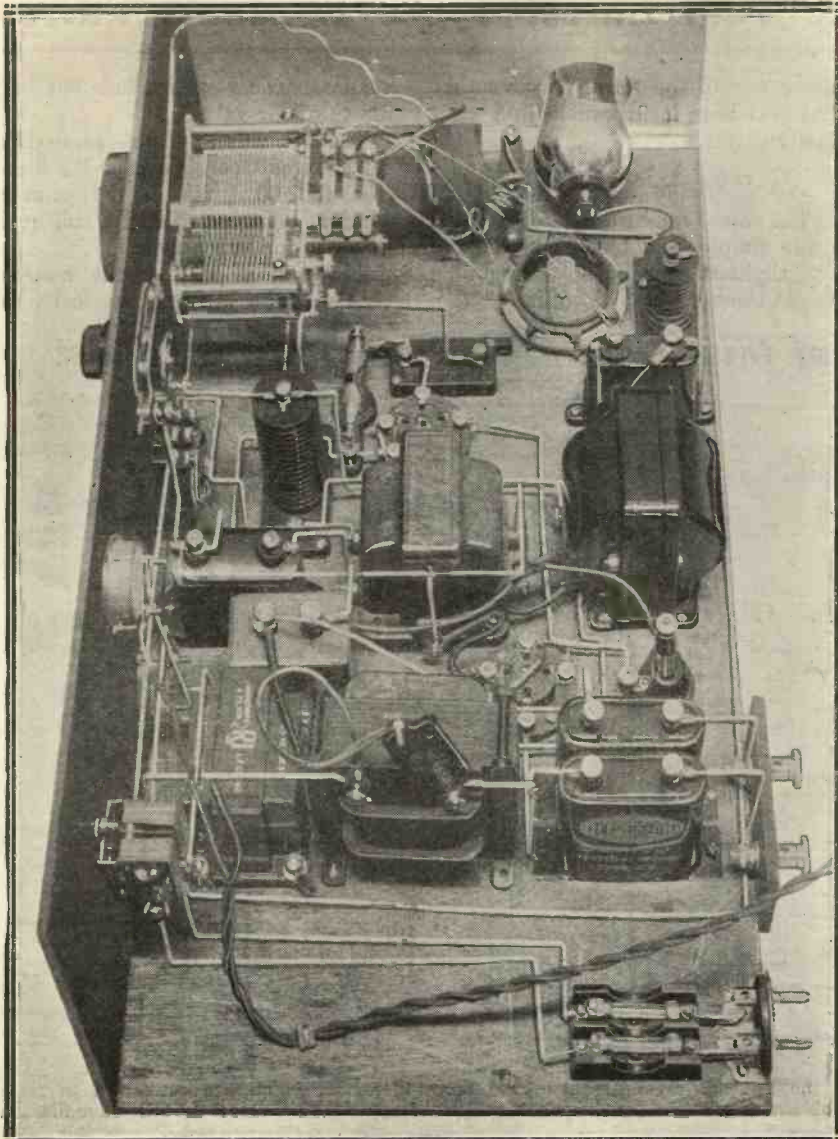
The reaction winding on the P.J.3 consists of 34 turns. This is ample for all purposes, and is designed for use with a reaction condenser of the order of .0001 mfd. Care should be taken that this condenser does not exceed .00015 mfd., or it may be found that reaction control is rather "rapid"—very little "condenser" sufficing to bring about oscillation.

Using Old Components

If you should desire to use a reaction condenser you have already on hand, and this condenser is of somewhat large capacity, it is easy enough to correct by taking a few turns off both the P.J.3 reaction coil and that of the coil quoit. Perhaps 6 turns off the former and 15 off the latter would be about right in such circumstances, assuming the reaction condenser is .0002 mfd. or something like that.

It is advisable to try the set with

HIGH MAGNIFICATION WITH SUPERB QUALITY



This photograph gives a splendid view of the detector and L.F. end of the receiver. The S.G. valve can also be seen protruding through the vertical screen, and in the foreground there is the mains plug with its fuses.

the original reaction windings first, however, as there may be no need to alter them. In the majority of cases, where the specification is given in the list of parts, there will be no need for any such alteration—the P.J.3 coils have been designed for intervalve coupling in reaction circuits and you should have no trouble from them.

The detector valve (D.C.H.L.) is transformer-coupled to the pentode, and the latter is choke-output-fed to the loud speaker. Across this choke is a resistance and condenser series scheme which not only prevents undue voltage surges in the pentode if the load in the output circuit is suddenly changed by the speaker becoming detached—but also enables a certain amount of tone control to be carried out.

Controlling the Tone

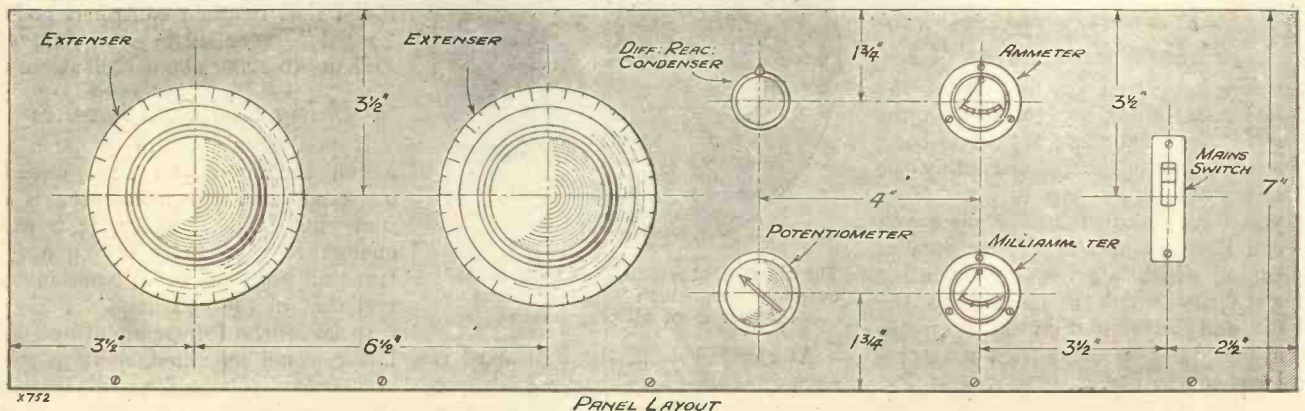
Pentode valves sound a bit "hard" on some loud speakers, and by varying the value of the resistance the amount of high-note response can be controlled to a nicety. The resistance chosen as best for all average purposes is 15,000 ohms, and this, with a .01-mfd. condenser, is included in the set described here.

Selectivity is variable in the first tuned circuit in the case of the long waves, but it was found unnecessary to provide any variation on the medium waves. On the long-wave coil a tapping clip is provided so that either 30 or 60 turns of the 150-turn winding on the coil quoit can be used for the aerial tapping point, and in addition the compression-type condenser in series with the aerial circuit gives a further variation.

This condenser is automatically cut out of circuit when the medium waves

Neatly Arranged Controls Make for a Pleasing Appearance

24"



PANEL LAYOUT

Two small meters are mounted on the panel, which are not only essential for the efficient working of the instrument, but improve its appearance tremendously. There are only two tuning controls, but no wave-change switches, as the transfer from one wave-band to the other is done automatically by the Extensers.

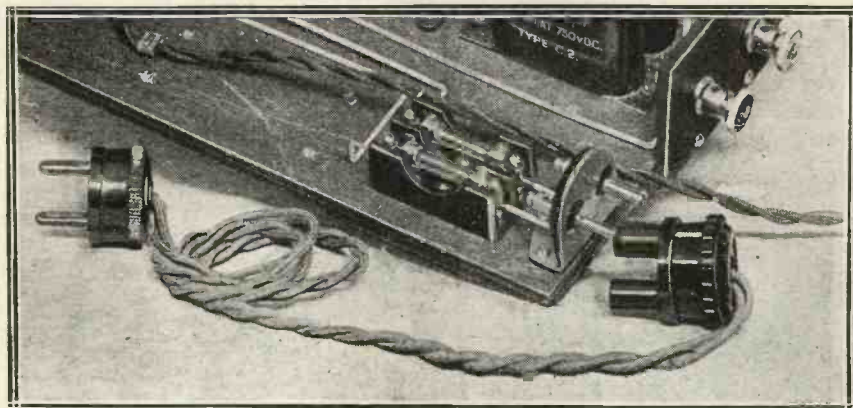
Build the "New D.C." Three and Blot Out All Battery Bothers

are being used. Before we leave the subject of the coils, however, there are one or two points we should like to bring forward, the first of these concerning the actual connections.

Uses the New Coils

Although the medium-wave coils can be home-made, it is easier to buy them ready-made, and they are being sold at very reasonable prices. The P.J.2 coil in the aerial circuit of the set, as you will see, consists of a grid winding of 64 turns and an aerial winding of 9 turns tapped at 4 and 6, but no reaction; and the P.J.3 consists of a larger primary winding than the P.J.2 (30 turns), a grid winding of the same size, and a reaction winding of 34 turns.

A PAIR OF FUSES AND A SPECIAL PLUG—



Coloured flex leads from these coil formers are used in the majority of makes, but in case you get hold of one which uses terminals instead of flex leads, we are giving the requisite lettering on the wiring diagram as well as the colouring of the flex. The colours used are quite distinct, and should enable you to connect up with the greatest of ease.

The Long-Wave Windings

The long-wave coils wound on the "quoits" are almost identical, both having 150 turns, one with taps at 30 and 60 and the other with one tap (at 40) from the earth end—that is, the "end" of the grid winding. The second long-wave coil, however, also has a reaction winding wound underneath the grid winding, and consisting of 60 turns. This reaction winding is wound first, then a small layer of empire tape is wound round the coil, and finally the grid winding of 150 turns tapped at 40 from the end of winding (110 from beginning) is wound on top of this. The beginning of the reaction winding and the end of the grid winding are joined together and

taken to the earth circuit. But more about the coils later on.

The actual construction of the set is not difficult, though care should be taken that the layout is copied as closely as possible. The heaters are in series, and not, as in the case of A.C. receivers, in parallel, nor does the wiring need to be of twisted or shielded wire, as in the case of sets with alternating current.

The mains switch on the panel is of the double-pole variety, and breaks both sides of the mains, so that there is absolutely no possibility of getting a shock on any part of the set whilst adjustments are being made, *provided the mains are switched off*; whilst the

two fuses—one in each lead—prevent any mishap to the valves or to the house lighting should a short-circuit occur in the receiver.

The two flex leads shown in the wiring diagram, one coming from the positive side of the ammeter and the other from one point on the main switch, are the connections to be taken to the mains resistance which is fixed at the back of the set on the outside of the cabinet; but we will consider that point in more detail later.

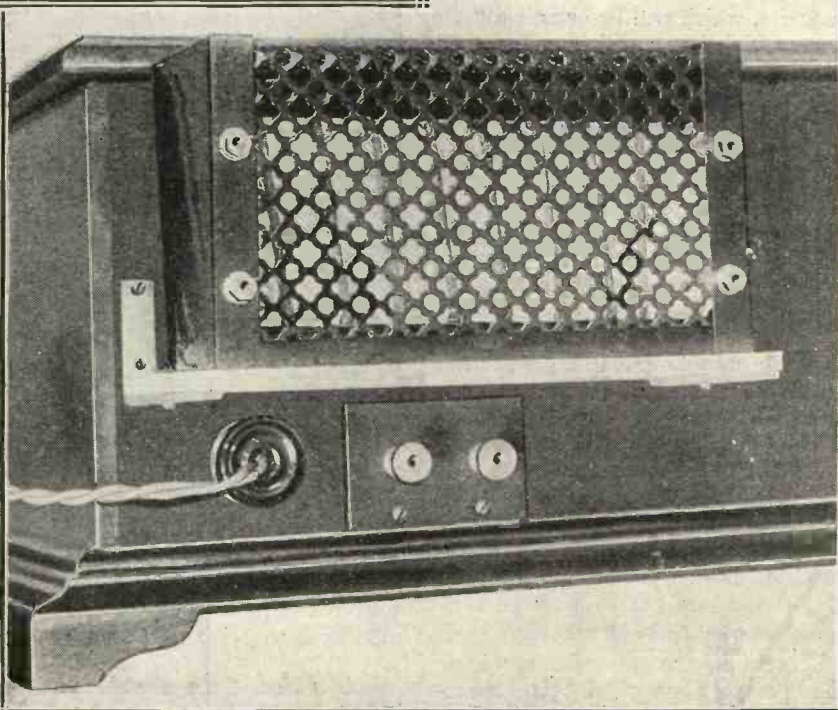
A condenser of .002-mfd. capacity is placed in series with the aerial terminal and the aerial circuit as a safeguard against the possibility of getting a shock off the aerial should the positive mains be earthed, and a similar precaution is taken in the earth lead, which is separated by a 2-mfd. condenser from the rest of the receiver.

Follow Instructions Carefully

In the wiring of this set it is important that extreme care should be taken so that you get as close a copy of the original as possible, and extra

(Continued on page 183.)

—PERFECT SAFETY ASSURED



With an all-mains receiver it is always best to play for safety, and needless to say this particular set bristles with such devices. There are fuses, and a special plug for connecting the D.C. supply to the instrument. The power resistance is also well protected, as can be seen in the photograph.

JOTTINGS FOR THE LISTENER

By G. B.

A few words about the recent meeting of the International Broadcasting Union, and the B.B.C. Summer School.

THE International Broadcasting Union held its General Assembly, with the relative Council meetings, recently at Ouchy-Lausanne.

Most of Europe Represented

The Union, which now includes almost all European broadcasting organisations, with the exception of Russia and a few small countries, represents about twelve and a half million licensed listeners in Europe alone, accepted as members the National Broadcasting Institute of Belgium, the broadcasting organisation of Danzig, and the Swiss Broadcasting Company.

Vice-Admiral C. D. Carpendale was re-elected president for the year 1931-1932, and Messrs. Giesecke (Germany) and Tabouis (France) were re-elected vice-presidents.

The Union resolved to organise a series of so-called "European Concerts," to be given in turn by the different member countries. These concerts, which will be artistically on a very high level, will be relayed as far as possible by all members of the Union.

Problem of Interference

Among the other questions appearing on the agenda was that of electrical interference and the steps to be taken against it. The Council resolved to pursue more extensively than hitherto the investigations which it has undertaken, both from the technical and the scientific standpoints, in regard to the field strength of the indirect rays radiated by transmitting stations.

The Council applied itself again to the difficult problem of the distribution of wave-lengths, which has always formed one of its principal tasks. In particular it is seeking to extend the band of frequencies separating the high-power stations, which tend continually to increase in number.

The Union also pursued its study of the possibilities which the International Convention of Madrid in 1932 may afford for the extension of the bands of frequencies set aside for broadcasting. The Union is of opinion

that the future of broadcasting in Europe may be seriously compromised if satisfaction is not given, to some extent at least, to the wishes that it has expressed, which correspond to the legitimate claims of the ever-increasing body of listeners.

The Council of the Union, on which each member country has a representative, will next meet in Rome, in the second fortnight of October.

The B.B.C. Summer School

The summer school organised by the Central Council for Broadcast Adult Education at New College was addressed at its opening meeting

with other leading men not directly associated with broadcasting, he had gathered the impression that the work of the big machine of which he and his audience were a part was very much respected abroad.

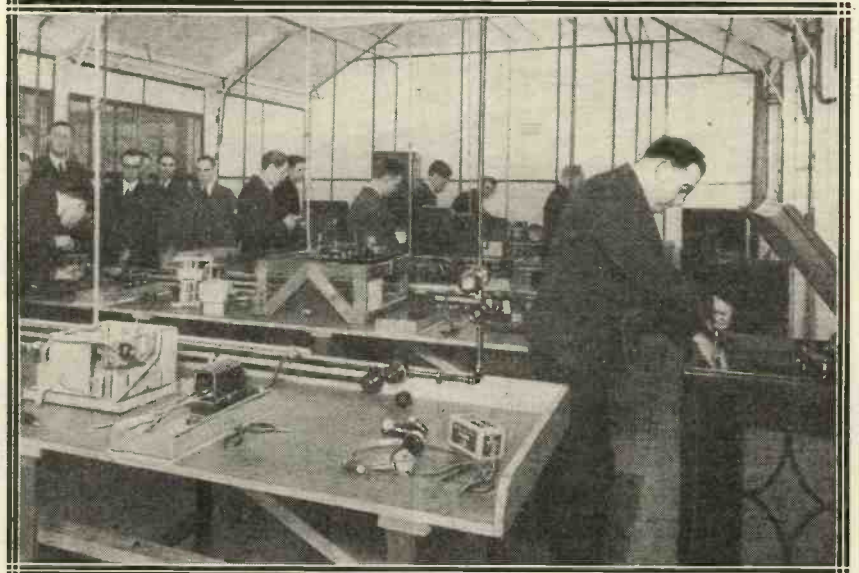
There were those who felt that wireless was merely one more mechanical menace; but even if, as some thought, the world would be better without the motor-car, the telephone, and broadcasting, such thoughts were not particularly profitable; we should do our best, being here, to make wireless a world force.

A World Force

Broadcasting could make democracy safe for the world. The formation of those groups was an answer to those who said that wireless was only a means to entertain, another example of the triumphs of a mechanical age.

The Warden of New College said this country had great influence with the world, both through the Empire and through our natural influence with the United States, and if we succeeded in giving to broadcasting all the

TECHNICAL TRAINING FOR RADIO TRADERS



A general view of the workshop at the H.M.V. training school at Dagenham, where dealers are given courses of instruction in the servicing and adjustment of radio receivers.

by Sir John Reith and by the Warden of the College.

Sir John Reith said that both the B.B.C. and the organisers of these discussion groups were pioneers in a venture the importance of which it was difficult to conceive in its early stages.

Sir John in America

From his travels in America and in most of the European countries, and from conversations there with representatives of broadcasting and

improvement of which it was capable we should materially affect the character and the taste of the world. The main advantage of broadcasting was that it brought within the reach of every citizen the best minds of the country. But it was not enough to listen to a talk over the wireless.

It was very desirable after an interesting talk to discuss it and to think about it, and the group system had been organised in order that such discussions might be held.

MY BROADCASTING DIARY



Our own Broadcasting Correspondent records the progress of the British Broadcasting Corporation, and frankly comments on the policies in force at B.B.C. headquarters.

National Chorus Plans

MR. STANFORD ROBINSON has obtained sanction for an interesting and ambitious series of features for his National Chorus next season. Some of these will be: "Belshazzar's Feast" (Walton), November 25th; "Psalm Symphony" (Stravinsky), January 27th; Mass in B Minor (Bach), April 6th; 9th Symphony (Beethoven), May 4th.

There is also the possibility of the inclusion of Mahler's 8th Symphony.

The 1931 Proms

This will be Sir Henry Wood's thirty-seventh successive season. It will run from August 8th to October 3rd without a break, except on Sundays.

Monday evenings will be devoted to Wagner, three Tuesday evenings will be given over to Mozart and Haydn, two to Tchaikovsky, one to mixed Russian music, and two to miscellaneous works; Wednesdays will alternate between Bach and Brahms.

Thursday will be British composers' night; Fridays are allocated to Beethoven, while Saturdays will be of a more miscellaneous and popular nature.

The retention of the British composers' night is interesting. After the experiment was tried last year there was a good deal of criticism in musical circles, many taking the view that it was a mistake to segregate British music in this way.

Others maintained that it was an admission of inferiority which the facts did not justify; it appears, however, that the objectors have been over-ruled.

Radio Circles

It is good sometimes to pause and take stock even when business seems to be booming, because things are not always as good as they appear on the surface.

The broadcasting officials in Scotland have recently been looking into the important matter of the membership of their Radio Circle, and have found that, while members have come in from the country (there were over a thousand new enrolments in May and June), at such places as Dundee and Aberdeen, where local Children's Hours used to exist, the membership is sadly down.

Things have never been the same in these cities since the Children's Hour has been run centrally, and it is very disturbing to find that this interest in broadcasting by

the young people at their most impressionable age should have been allowed to drop after so much hard work was put in by the local Aunts and Uncles.

I wonder if a similar state of affairs exists in the South, where the National and Midland and North Regional Children's Hours have taken over the work formerly done at the old local stations.

These big Radio Circles have undoubtedly increased their membership, but unless the aggregate for the whole country is larger than it was under the old conditions, it seems that the advocates for centralisation have failed once more.

There was a time when Nottingham (which was the first of the relay stations to go) had a membership of many thousands in its Radio Circle. So had Bournemouth, Sheffield, Hull, Leeds, Stoke, Liverpool and the rest. I wonder how present-day figures compare in the aggregate with the totals which obtained under the old conditions?

AN AMERICAN BROADCASTER AND ITS "MYSTERY" ANNOUNCER!



This transmitter is claimed to be the smallest broadcaster in the world, and is worked by the masked announcer of Philadelphia.

Latest News Items for the Listener

Vaudeville Declines ?

My recent listening has impressed me with the feeling that the set-piece vaudeville broadcasts are not as satisfactory as they were.

Of course, it may be that they are just the same, and the other light programmes are better. Several friends have made the same criticism lately.

The growing popularity of the special programmes produced by that really great partnership, Messrs. McConnell and Watts, tends to make the ordinary vaudeville rather stale and unprofitable by comparison. My view is that there needs to be some thread, or some expression of artistic unity, in every considerable broadcast programme if the effect on the listener is to be all that it should be.

Those Sunday Programmes

The war about Sunday programmes is to be renewed with much vigour in September. Although Sir John Reith has received formidable reinforcement in the views of the new Chairman, Mr. Whitley, the signs of popular discontent are more numerous than ever before.

A POPULAR PROGRAMME PROVIDER



Jack Payne's programmes are easily the most popular of all those put over by the B.B.C., and he is here seen at the other end of the wireless, listening-in with his wife.

Once again I counsel the B.B.C. to take advantage of the possibility of compromise still available. Let's have a more complete entertainment service with alternatives, both of which are possible without there being any falling away from the standards rightly laid down for British broadcasting on Sunday.

The B.B.C. Board

It is reasonably certain now that unless something unforeseen occurs none of the present Governors of the B.B.C. will take advantage of the five years' break in order to retire at the end of this year.

Mrs. Philip Snowden will go on ; so will the new Chairman, Mr. Whitley ; Lord Gainford, too, is better in health, and his interest is undiminished. Both Sir Gordon Nairne and Dr. Rendall have been doing a lot of work at Savoy Hill, and there is no good reason why they should break off in the middle.

There remains only for the Prime Minister to consider whether he should add any new blood. Both Dr. Sheppard and Captain Ian Fraser are strong candidates, particularly the former, but it is doubtful whether either would be welcomed by the present Governors, who have settled down into a steady team and are likely to resent the suggestion that any new members are necessary.

On the other hand, the Prime Minister may not be anxious to incur the odium of the accusation that he is neglecting broadcasting. On balance I would say the odds are considerably against any change, but that there is some chance of the appointment of Dr. Sheppard with a slightly worse chance of the appointment of Captain Ian Fraser.

Distinguished Patrons of Broadcasting

The Royal Family has taken a special interest in broadcasting since its early days. Political leaders, however, with a few notable exceptions, have only recently recognised the importance of broadcasting.

Mr. Baldwin was perhaps the pioneer "front-bencher" to become a radio fan. Mr. Lloyd George paid very little attention to it until recently. It is believed that Lord Lothian is responsible for arousing the interest of the Liberal leader.

Whatever may be the explanation, Mr. Lloyd George is now a terrific enthusiast. I understand also that he has struck up a friendship with Sir John Reith, whom he had previously misunderstood if the statements of those who ought to know are reliable.

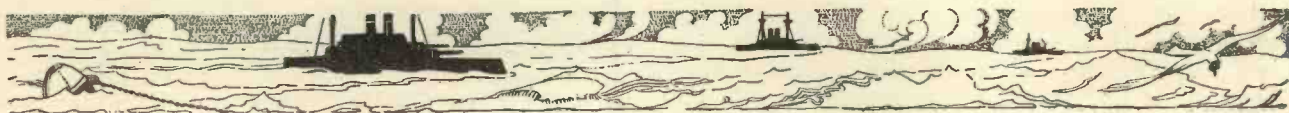
Mr. Lloyd George was particularly pleased with the wireless set given him by the B.B.C. Lord Lloyd is another political potentate to discover a new interest in broadcasting, which he is determined to divorce from the alleged taint of Bolshevist propaganda.

Conference Prospects

Now that both Copenhagen and Lausanne have had their wireless meetings about wave-lengths, the stage is clearing for the Spanish conference next year.

It looks as if the B.B.C. might possibly be asked to give up one of its best waves as the price of better general conditions. Query—at what re-arrangement of Regional broadcasting ?

All the signs point to the Madrid Conference being a momentous one, of especial importance to British listeners.



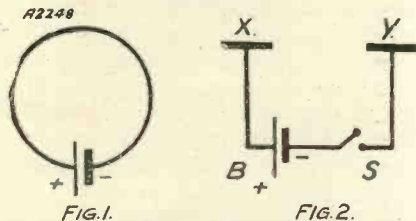


By
W.A. BARCLAY
M.A.

This month we present a series of extremely useful N-Diagrams which are applicable to the capacities of condensers.

IT is a sobering reflection that nobody, not even those scientists who have devoted their lives to the study of such questions, can say definitely what electricity is.

COMPLETING THE CIRCUIT



In Fig. 1 current will flow round the circuit until the supply is exhausted, but when the switch is closed, in Fig. 2, it will flow only for an instant, while the two plates become equally charged.

Yet, in spite of our ignorance of its fundamental nature, we have acquired a good working knowledge of its behaviour, and by means of the electron theory can account adequately for the mechanism of a receiving valve as well as that of a lightning flash.

Flow of Electrons

Every electric current which flows along a conductor is regarded as a flow of electrons along that conductor. This does not mean that any single electron travels along the whole length of the conductor. The process is more complicated than that.

The atoms forming the molecules of which the conductor is composed will alternately yield up and receive the electrons as they move along, so

that there will be a steady drift of the electrons as a whole along the conductor.

In a closed circuit containing a battery, such as is shown in Fig. 1, the current or flow of electrons will be maintained in the wire so long as there is a potential difference, or "P.D.," between the poles of the battery.

A Potential Charge

Suppose, now, we have two metal plates, X and Y, as in Fig. 2, situated a considerable distance apart from each other, and connected through

the switch S to a battery B. As soon as the switch is closed a small momentary current will flow in the wire until the plate X has the same potential as the + pole of the battery, and Y has the same potential as the - pole.

TWO DIFFERENT EFFECTS

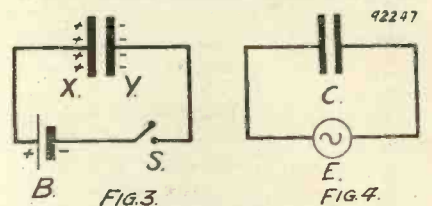


Fig. 3 shows the effect of D.C. on a condenser; it accumulates a big charge, but will not allow any current to pass through. If, however, we apply alternating current to a similar circuit, we find that its A.C. resistance varies with the capacity and frequency.

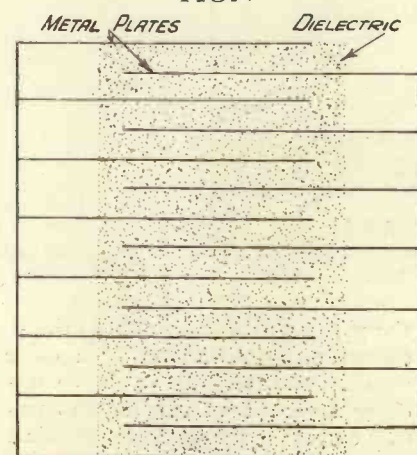
Next, let us suppose the two plates X and Y brought nearer to each other as in Fig. 3. Now, it is well known that unlike particles of electricity attract each other. The negative particles on Y will therefore attract the positive particles on X, and vice versa.

Insulation Intervenes

They cannot unite, however, owing to the intervening insulating material, or dielectric, but they press as closely towards each other as they can. The result of this "cat and mouse" behaviour is that more room is left for further electrons to be supplied by the battery.

We see, therefore, that if the two uncharged plates X and Y be placed

CONDENSER CONSTRUCTION



This diagram gives a good idea of the construction of an electrical condenser, the two sets of plates, being interleaved with each other. The greater the number of plates, and the larger their area, the bigger the capacity of the condenser for a given thickness of dielectric.

in close proximity as in Fig. 3, and the switch then closed, a greater momentary current will flow than was the case when the plates were far apart.

Increasing the Capacity

Indeed, the more closely the two plates are made to approach, short of actual contact, the greater will be the attractive effect of the electrons

wire does not form a closed circuit, since the two plates do not touch. For this reason no direct current can pass through a condenser, since the circuit is, in fact, discontinuous.

If by some means the E.M.F. of the battery were suddenly annulled, the two plates would simply be connected together by a piece of wire. Under these circumstances the — charge on

be a source of *alternating* potential we may trace the currents flowing in the wires to C as E goes through the cycle of its changes.

As E attains its maximum value it will tend to send a charging current along the wire in a certain direction. When E becomes zero (as we saw above) the condenser will discharge, the discharge current flowing in the opposite direction to the original charging current.

YOU SHOULD USE THIS ONE FIRST

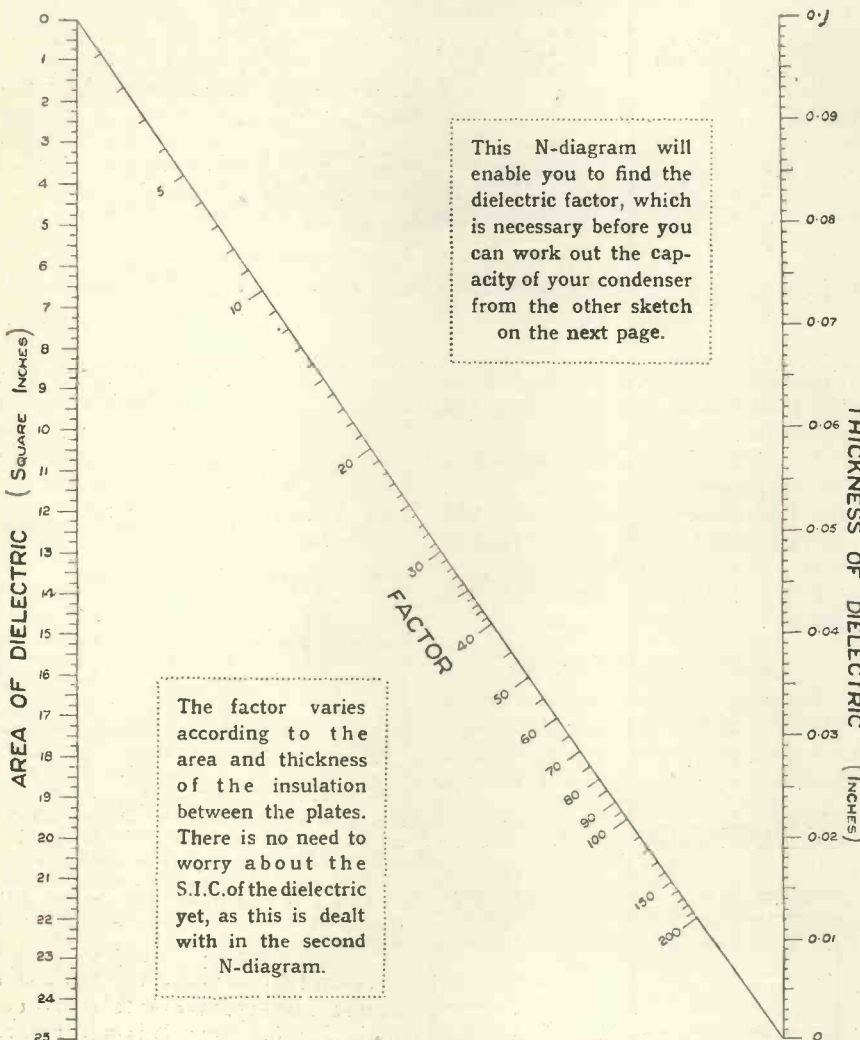


Fig. 6.

N - DIAGRAM.

Take a straight line from the number representing the dielectric area to the appropriate one on the right giving its thickness, and then read off the factor on the diagonal line.

across the dielectric, and more room made for electricity from the battery.

The "capacity" of two such plates to receive a charge of electricity thus depends upon their situation, and also, as we shall see, upon the nature of the material separating them, or the dielectric.

It is interesting to note that although a momentary current flows along the connecting wire while the condenser is being "charged," this

the plates would rush towards the + charge through the wire; in other words, the condenser would be discharged, this time by another momentary current in the opposite direction.

Alternating Current and Condensers

A little thought will show the application of the above principles to alternating currents. If E in Fig. 4

A Remarkable Fact !

Next, when E attains its maximum negative value it will reinforce this "backwards" current by charging up the condenser in a *negative* sense. Finally, as E regains the zero value the now negatively charged condenser will again discharge, the current thus set free being again in the positive or initial direction.

It is thus evident that as E changes in value from positive to negative and back to positive again, so the current flowing to and from the condenser varies backwards and forwards through a precisely similar cycle. In other words, an alternating current will actually flow in the circuit containing the condenser. The magnitude of this alternating current will depend on various factors, such as the size of the condenser and the frequency of the oscillations, and we shall show later on how the sizes of these currents may be very simply found.

At present we wish to emphasise the remarkable fact that an *alternating current can thus exist in an unclosed circuit*. This interesting circumstance is often made use of in radio work to separate D.C. from A.C. A direct current, of course, cannot pass through a condenser, whereas, under proper conditions, an alternating current may pass easily.

Effective Against D.C.

For example, a condenser is often used to prevent direct current from the H.T. source from passing through a loud speaker, though it permits the audio-frequency currents to pass easily.

The material of which the dielectric is composed plays a very important part in determining the capacity value of a condenser. Some materials have greater efficiency than others in this respect; thus a condenser having a mica dielectric will have roughly twice the capacity of a similar condenser using good quality ebonite, while this again has twice the capacity of a condenser whose dielectric is air.

This property of a dielectric is termed its "specific inductive capacity," that of air being considered as

Computing Condenser Capacities Quickly

unity, and higher values being assigned to the more effective dielectrics. The S.I.C. values for some of the most common dielectric materials will be found from the left-hand scale of the second N-diagram which accompanies this article (Fig. 7).

The unit of capacity used by scientists is the farad, but as this is altogether too large for radio purposes we use the millionth part of this, or microfarad, denoted by the symbols μF .

Allowing for Overlap

It will now be observed that some portion of the dielectric may overlap the plates, and if the dielectric be solid it is obvious that such overlap will exercise no effect on the resulting capacity. We have, then, to consider only so much of the dielectric as is usefully employed.

Our first step is, then, to find the area in square inches of the dielectric that is actually under strain between two oppositely charged plates. The next thing is to ascertain the thickness of each section of the dielectric, measured in inches.

Having found these values of area and thickness, we now turn to the N-diagram of Fig. 6, and seek the corresponding points for these values on the two outer scales. By placing a ruler in position between them we are enabled to read off the value of a "factor" on the diagonal scale. This "factor" is employed in conjunction with the next diagram to find the capacity value.

Suppose we wish to know the capacity of a condenser of sixteen tinfoil plates each 6 in. by 4 in., separated by ebonite of S.I.C. 2.5 and thickness 0.08 in.

A Good Example

Here the area of dielectric under strain is evidently 24 sq. in. Finding the corresponding point on the left-hand scale of the first N-diagram, and also the point for 0.08 in. on the right-hand scale, a simple application of the ruler enables us to read off 33.3 as the value of the "factor."

The next step involves the use of the second N-diagram, Fig. 7. Here the left-hand scale contains values of the S.I.C. of various materials which may be used as dielectrics. The names of some of these are given opposite their S.I.C. values.

In the present case we are using ebonite whose S.I.C. is specifically

given as 2.5; we therefore select this point on the scale for present use. Lastly, we seek on the diagonal scale a number equal to the product of the "factor" previously found and N, where N is the number of dielectrics under strain.

In our example the factor was 33.3, and N is one less than the number of plates—i.e. 16—1, or 15. The product is thus 33.3×15 , or 500, and this value is sought on the diagonal scale.

Joining this point to that already found for the S.I.C., we can now read off the required capacity value on the right-hand scale. This is readily

found to be $0.0025 \mu\text{F}$, which thus gives the size of the condenser.

Extending its Usefulness

It may be useful to note that if the area of dielectric is too small to be conveniently read on the first chart, we may multiply it by any suitable number on condition that we divide the capacity value thus obtained by the same number.

Thus if the area of dielectric in the above example were only 2.4 sq. in., we could multiply by 10 and proceed as before; but the resulting capacity would then require to be divided by 10, making it $0.00025 \mu\text{F}$.

A RULER IS ALL YOU REQUIRE

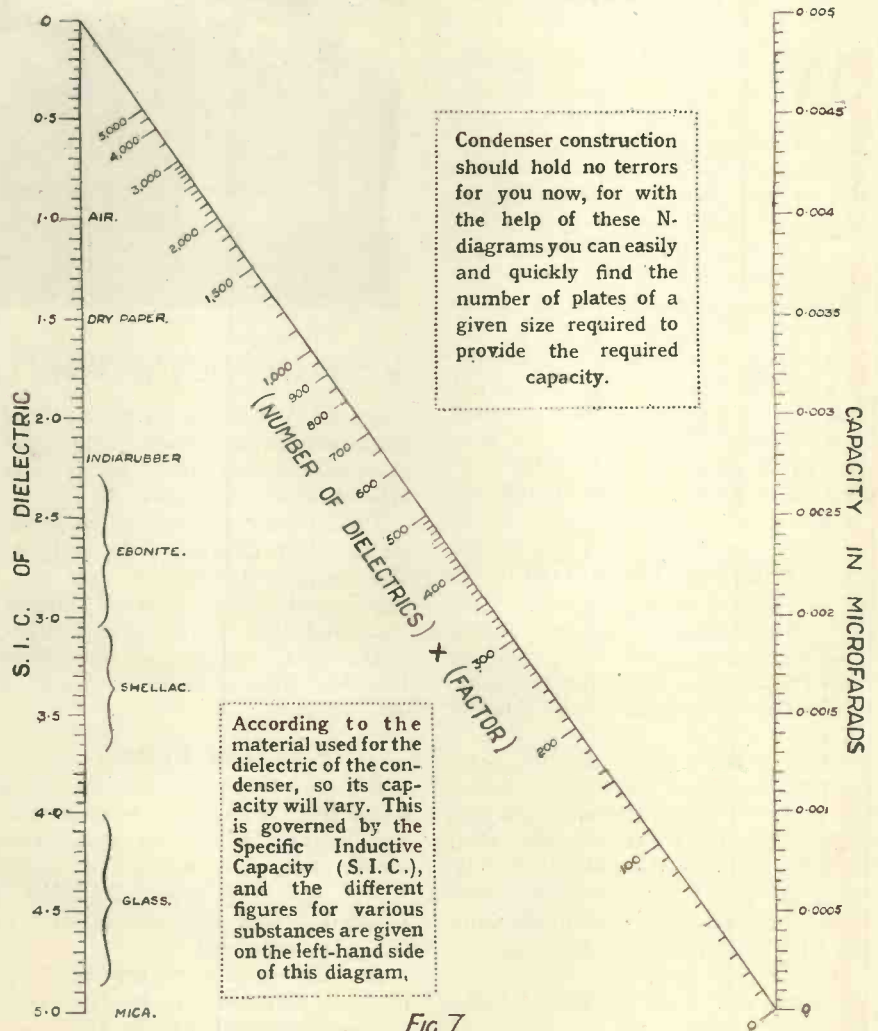


Fig. 7.

N-DIAGRAM

FOR CONDENSER CAPACITY

When putting your rule across this diagram, and if your dielectric consists of a substance such as ebonite, in which the S.I.C. varies considerably with different qualities of the material, you will get a sufficiently accurate result by taking the mean value. Thus, for ebonite, 2 would be a close enough approximation.



WHAT SHALL WE DO ABOUT THAT?

A knotty point, in connection with the muted brass to be used at a Queen's Hall concert, being discussed by Jack Payne (left) and John Ireland.

WERE I one of those people who regard the various departments of the B.B.C. as a happy family—and why not?—presided over by a benevolent parent in the person of Sir John Reith, I should most certainly know whom to pick upon for my "Plain Jane of the Family." Who? Why, the Music department, of course. Who else?

Oh, she is a neglected Cinderella, surenuff! Other departments collect all the shekels of publicity whilst poor Music, supplying as she does some 65 per cent of the programmes, goes unhonoured and un-sung.

Digging Them Out!

The Outside Broadcasters, and one or two others with obviously romantic jobs, are perpetually beleaguered by newspaper men. But who ever mentions the Music department? Hardly anyone.

It seems rather a shame until you realise that the mysterious music officials sit tight in their chairs and thank the powers-that-be for their privacy. They do not thank me. I, with customary tactlessness, rooted them out and secured an inside story about the orchestral part of the programmes.

Somewhat to my surprise I found as much sheer hard work going forward here as anywhere else in the B.B.C. What takes place before that piece of music is put out by the National transmitter? Weeks and weeks of intensive co-operation!

Some six weeks before the finished product squeezes itself into the

microphone, those who are responsible for Programme Balance and Contrast—a department at Savoy Hill of which few people have ever heard—prepare the skeleton programme which governs the week's broadcasting activities of all kinds.

Preparing the Programmes

In it appear—alongside vaudeville, plays, talks and outside broadcasts—brief sketches of what is required from the Music department. Serious music of various kinds, semi-serious, light, very light, and musical comedy stuff.

It is not a matter of haphazard choice. An eye is given to other

aged pig was given more than half a dozen times and literally done to death.

Real Hard Work

The pieces to be performed decided, the singer or instrumental soloist is chosen and requested to propose about half a dozen items with alternatives; these are selected and so yet another side of the business concluded.

But the preparation is by no means over. Now, according to the music to be done, there comes the choice of the orchestra—vitaly important this, for every type of music needs its own proper treatment.



**ONE
OF
MEANS
OF**

SOME INSIDE INFORMATION BY HAROLD A. ALBERT

programmes for that day, as programmes coming before and programmes coming after govern the type of music which is decided upon.

Then comes the choice of items within their limited range of type. The requests of listeners are consulted and, where practical, carried out. But they are not always practical. For instance, "The Blue Danube" may be done twice within one week.

Loads of Letters

By an early post there will come a letter from an excited listener who hasn't heard the Strauss masterpiece for six years, and "would like to hear it as soon as possible, please." Decidedly, this is a gentleman not easily to be obliged.

And have you heard the sad story of "The Old Sow"? It was a folk song—a recorded version of which was quite casually put out one day during a gramophone recital. The result: a positive deluge of letters asking for it to be broadcast again; a demand which continued for some weeks and indeed continues still. Consequently, the song about the

At one time trios thought it quite in order to play the "Ride of the Valkyrie," and in the early days one provincial musician wanted a Tschaikevsky symphony to be played by a sextet! However, those days are over.

One is amazed to reflect that whereas only two years ago the B.B.C. orchestra numbered no more than thirty, it is to-day a magnificent hundred and fifteen strong—a full orchestra for grand scale symphonies. and capable of division into a number of smaller combinations.

The usual light orchestral division numbers about forty players. They must have a conductor. Shall it be one of the experienced conductors on the staff, or will it be necessary to engage a guest conductor? Even the solving of this problem means hard work on the part of someone!

"Half the Battle"

That decided, the battle is still only half over. The programme can go to press, but this means nothing to the Music department. As far as they are concerned the programme only goes down to the library, where

the music may be looked out and made ready for the orchestra.

Ten people alone are kept busy all day in the Music Library. No wonder, when you remember that there are nearly ten thousand items in the catalogue, many of them in duplicate, triplicate, and even quadruplicate. And new pieces coming in every week!

A Wonderful Collection

Finding the music is simple, you think. Not always so. Although the B.B.C. now owns one of the finest standard music libraries in the world, there may be copyright pieces only existent in manuscript which have

the most careful auditions, was an artist in his line and perfect in his performance, but no one could be perfect enough. First the strings, then the wind instruments, were rehearsed separately, then the orchestra *en masse*.

A few bars were played over and over until the right effect was obtained. That such labour, such careful attention to detail should exist is a fact which deserves superlative adjectives when you reflect that the result of it all will pass to oblivion in the course of a night.

Yes. "Plain Jane" is exceedingly busy—always. The work of new composers is continually studied, new

hearse, programmes are thought out, programmes are broadcast.

Heavy Music

While down in the Music Library a young man hunts out music from fixtures and prepares it to be sent upstairs, or puts away music that has been sent down. He is the one member of the B.B.C. staff who considers the Sunday musical programmes always to be too heavy.

You should see him staggering about beneath the weight of a half-hundredweight volume of Bach or Handel, and you would understand.

There is also a special section of the library where all the gramophone records are kept. There are literally thousands of them, all carefully classified and stowed away on long shelves where any particular one can quickly be found when required.

Special Files

If all these specimens of "Canned Music" were kept in the ordinary type of folder it would be necessary to dust each one every few weeks—an almost impossible task. For this reason all the records are stored away in special large albums.

As is the case with the music part of the library, a very complete filing system is required, or things would soon get in a hopeless muddle. So next time you hear a big musical broadcast remember all the weeks of hard work it has taken to produce, and you will then realise that the B.B.C. music department has no easy job.

HOUR MUSIC WEEKS WORK



ABOUT THE PLANNING OF THE B.B.C. PROGRAMMES

to be hired when required, or perhaps special treatment of well-known airs may have to be arranged.

At the time of my visit a librarian was very worried because "The Roast Beef of Old England" did not appear to be arranged for orchestra, and another man was bewailing the fact that a certain piece was scored only for four flutes!

Ready for Rehearsal

Still, every item required by the Music department is found, and at last sent upstairs—perhaps only a bare week before the broadcast is due. Every musician involved gets sedulously to work upon rehearsals. For the average light piece, two rehearsals is the average number, but for a Symphony Concert five or more may be required. And what rehearsals! I was able, the other week, to hear the Symphony Orchestra under Ernest Ansermet being rehearsed, firstly in No. 10 studio, and then in the Queen's Hall. I, the solitary spectator, felt rather like the mad King of Bavaria who kept an opera house all to himself.

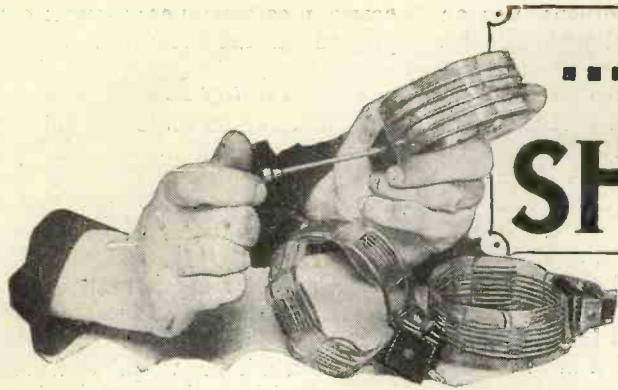
Every musician, each chosen by

pieces of music receive individual consideration from the radio standpoint. Every day orchestras re-

YOUR FAVOURITE RECORD IS SURE TO BE HERE!



This is just one corner of the B.B.C.'s music library where thousands and thousands of gramophone records are carefully stowed away until required.



... ON THE ... SHORT WAVES

By W.L.S.

The very latest news about special transmissions and concerning new stations to listen for; compiled by our short-wave expert, who also makes some observations on present "conditions."

ALTHOUGH we are now in the middle of what should be the "dead period" for radio, it cannot be said that the short-wave enthusiast finds things at all slow. To my mind this is one of the chief charms of short-wave work—the possibility of working right through the year with different stations to log every month.

Bound to "Broadcasting"!

Think of the possible plight of the man with the "super-hyper" broadcast receiver for at least one month of the year. Perhaps he cannot receive anything reliably except the locals, or he hears dozens of distant stations all blotted out by atmospherics.

How superior we can be! We may have our "off days," but, generally speaking, there is always sufficient coming in to make our short-wave bands really interesting.

I was recently struck, too, by the idea of a portable short-wave receiver for the holiday-maker. True, loud-speaker work is not too easy, but all that is needed for 'phone work from anywhere in this world is a detector and L.F., with an aerial of the "picture-rail" type.

Here are a few tit-bits for those of you who want to receive something out of the usual. Some have been sent in by readers who are kind enough to keep me posted from time to time; others I have found for myself. First in order of interest is the Wilkins' Expedition, using the call-sign W S E A, with quite useful power, on 26.00 metres.

A Useful Selection

H S J, at Bangkok, Siam, working on 18.7 metres, is quite an easy one to find, although his times are irregular. C T 3 A Q, Funchal, Madeira, on 24 metres, Thursdays and Saturdays, from 22.00-01.00, is another interesting station, and probably gives you a new country to add to your list.

T I-4 N R H, the little station at

Heredia, Costa Rica, works on 29.3 metres, and although none too easy to find on account of his low power, is worth looking for on that account only.

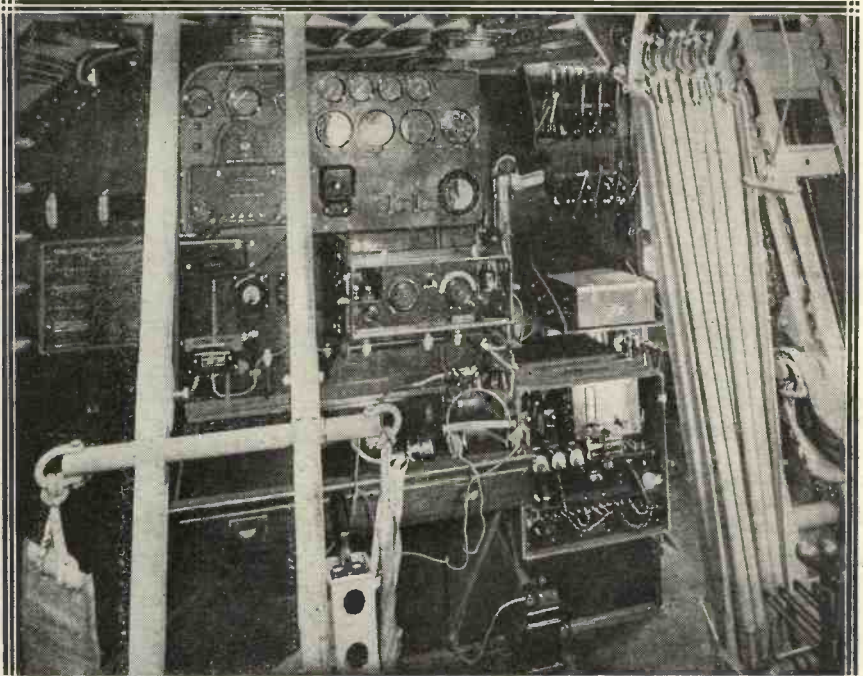
An interesting item of news, incidentally, hails from Suva, Fiji Islands, where the British authorities are said to have granted permission to a local radio club to erect and maintain an experimental broadcast station. Short waves will be used, of course.

Yet another newcomer, this time

I should be interested to hear what readers think of the reception of W 2 X A D nowadays. I see a report from South Africa to the effect that he has "gone right off the map." He is certainly going down in strength slowly, but steadily, at my own station. How does this compare with observations out of London?

Personally, I find nowadays that the stations from abroad that have the best programme value are the Americans working above 40 metres. All of them are wonderfully consistent,

500-MILE RADIO RANGE FOR FLYING BOATS!



A view of the special Marconi outfit in an Imperial Airways "Kent"-type flying boat. It is extremely efficient in spite of the large amount of metal by which it is surrounded, and can be used while the machine is in the air or on the water.

from the Antipodes, is V K 2 H R, Sydney. This station is operated and owned by members of a local club, and works on 42 metres at the following hours: Mondays, 09.00-12.00. Tuesdays, 09.00-09.15. Fridays, 11.30-13.30. Saturdays, 04.30-07.00. Sundays, 00.30-02.00.

if not enormously strong, and far more reliable than the sudden flashes received for a few nights only from stations lower down in the band.

The 30-metre band appears to be a half-way house between the two other broadcast wave-lengths—i.e. 45-40 and 15-19 metres.



THE full name given to this set by its makers is the "Varley Senior All-Electric Transportable Receiver and Gramophone Amplifier." Truly an imposing title, but one which is easily accounted for by the impressive appearance of the set itself.

A "Good Looker"

It has an unusually handsome exterior, of which only a meagre idea can be obtained from photographs. And, as might have been expected emanating from this famous firm, the workmanship is of the very first quality.

The model sent to "M.W." for test had a particularly pleasing walnut finish, and it arrived complete with instructions, just as it is supplied to the public in the ordinary way of business.

To connect it up was but the work of a few moments, and immediately this was done the programmes commenced to roll in. Full-toned, responsive, and clear-cut, the Varley All-Electric Transportable goes into action instantly.

Of course, there is a sense in which really good, crisp speech, impressive volume, and a full-toned response to music are now only to be expected immediately a good set is installed. The standard of radio reproduction is such to-day that these are features that could not fail to be found in a first-class receiver.

Many Interesting Points

On the other hand, while some such sets only fulfil the necessary conditions in an adequate manner, other sets are definitely in the "plus" class. They have an air, a quality, a name and

This famous three-valver employs a screened-grid H.F., detector and L.F. circuit, and below is an account of its chief features, with details of a stringent test under working conditions.

reputation to uphold. And the Varley all-electric receiver is in this latter class.

A closer inspection of the design reveals many interesting points, so perhaps a brief summary of the set's main features will best illustrate its merits.

As the name implies, it is truly all-

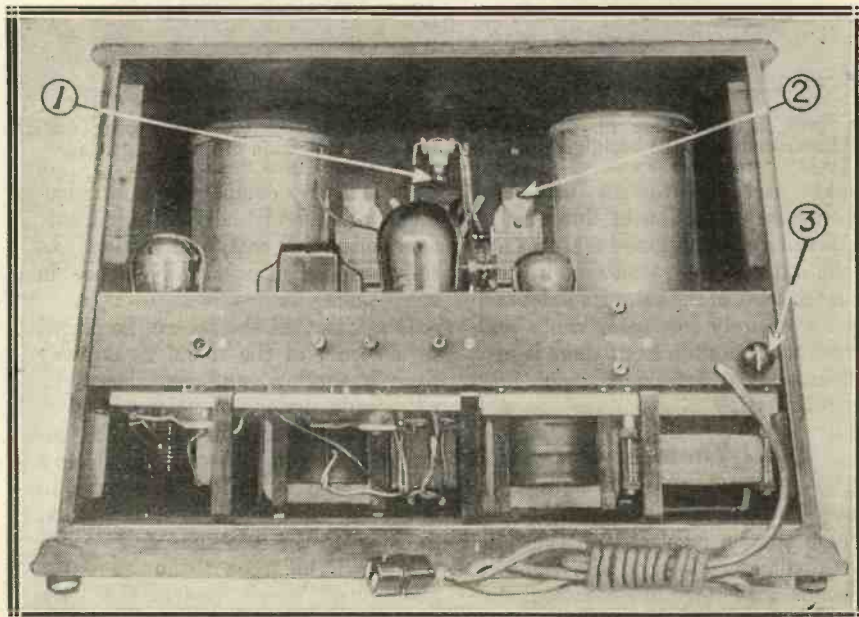
electric. No batteries to worry about (not even one for grid bias), no renewals, no charging, no constantly recurring worries of maintenance.

From the back of the set a flexible lead goes to a convenient house-lighting supply socket, and the set is controlled by the switch that governs this. It is thus placed in or out of action with the utmost ease.

Meeting Local Conditions

On either side of the flexible cord at the back of the receiver, and where they are normally out of sight, are the arrangements for aerial coupling. Two aerial sockets are provided, to enable the owner to choose either maximum volume or maximum selectivity, according to his requirements and local conditions, size of aerial, etc.

SOME POINTS FOR PURCHASERS



The little pilot lamp shown at (1) illuminates the dial and makes accurate tuning an easy matter; (2) indicates a small "trimming" condenser which needs setting only once, when the receiver is installed, and (3) is the aerial change-over switch.

Complete Screening Ensures Stability and Selectivity

A simple switch is incorporated to enable the set to be used as a transportable with very short aerial. And near this is the single terminal for the earth connection.

The only other terminals are two for the loud speaker, conveniently arranged close to the earth terminal. And in addition there is a jack, into which a gramophone pick-up connection can be plugged.

By this means the owner of the set is enabled to provide his own "programmes" from gramophone records outside broadcasting hours. And there is no doubt that most music-lovers will look upon this feature of the receiver with great appreciation, especially as it is extremely easy to

is the main tuning control. Particular attention has been paid to this latter, in view of the fact that it is in continuous use for the selection of the different programmes.

Illuminating the Dial

By means of a "window," and sloping scale (clearly marked), the ganged-condenser dial-reading can be seen at a glance. The movement is of the just-right variety, sufficiently fine to allow of really accurate tuning, and yet not so slow that to swing from one end of the scale to the other is tedious or tiresome.

Furthermore, all the time the set is in action a concealed lamp illuminates the dial from just above.

ponents, mains transformer, etc., whilst above it is the radio gear.

Large cylindrical shields are employed for screening aerial and anode circuits, with the ganged tuning condenser placed between them. Incidentally, the back-of-set photograph shows how the pilot lamp is arranged just above the condenser, where in the event of it burning out it can easily be replaced by another bulb of the same rating.

A "No Trouble" Receiver

Complete and clear instructions accompanying the receiver ensure that even the inexperienced will be able to instal it without the slightest difficulty, and, as stated, it straightway hands out a selection of programmes at very satisfying strength indeed.

The first test was made in daylight on a short and badly screened aerial. Even so, the punch from Konigs-wusterhausen (Berlin) was sufficient to operate a moving-coil speaker at quite good volume, whilst nearer long-wave stations such as Radio Paris, Eiffel Tower, and Daventry were considerably louder, as is usual in the London area.

On the medium waves two foreigners were found giving quite clear transmissions, viz., Hilversum and Mühlacker; and other carrier-waves gave promise of a good daylight selection when using an ordinarily-good aerial.

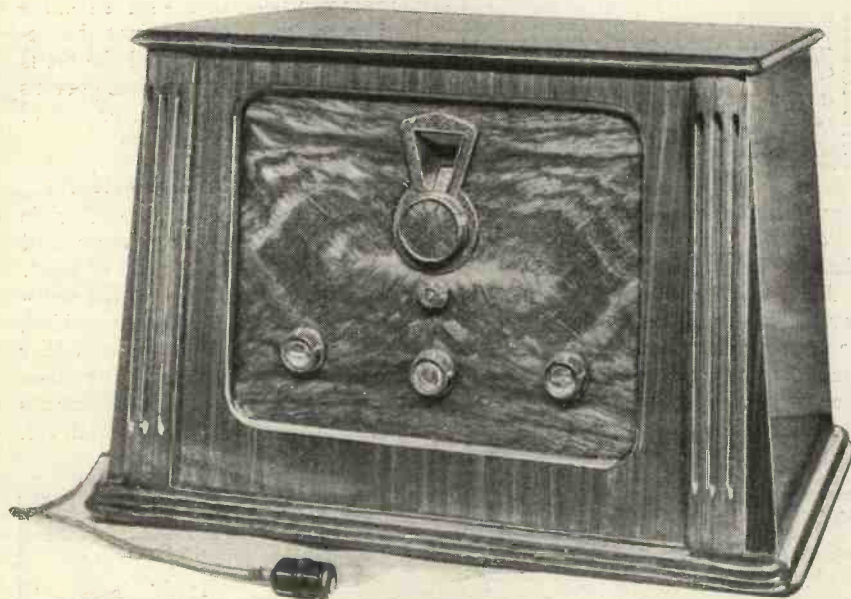
To get these foreign programmes in daylight under such conditions it was, of course, necessary to operate the reaction control, as well as tuning. And it was found that reaction on both wave-bands was easily controlled and virile, without any tendency to "plop."

Highly Efficient Throughout

This means that enormously long-range results are possible under ordinary working conditions, for the high-efficiency A.C. valves employed are themselves capable of very high amplification, and when this is backed up by easily-handled reaction the range of the receiver becomes almost unlimited.

On its second test the receiver was installed under the ordinary home conditions, using an outdoor aerial. In such conditions it gives an excellent account of itself, the after-dark variety of programmes being apparently unlimited. The price is £26, including royalties.

CONTROLLED WITH PERFECT EASE



Not only is the action of the ganged condenser smooth, but the sloping scale, illuminated from the back, gives an unusually clear indication of its exact setting.

operate and also to get first-class electrical reproduction in this way.

All the aforementioned features are of the out-of-sight variety, controlled from the back of the set. Its sides and top are entirely free from knobs and excrescences, and in front there is just a symmetrical arrangement of four controls.

Well Thought Out

The accompanying photograph shows how these are aligned. The volume control is placed on the left, and "balancing" it on the right is the knob for controlling reaction.

In the centre is the switch for the choice of long or medium wave-lengths, and immediately above this

This is a very commendable arrangement, adding virtually nothing whatever to running cost, and yet likely to prove of the utmost convenience in use.

It means that the set can be placed in a corner of the room, right away from a window, and yet always be adjustable under conditions of clear illumination. And, of course, the person operating it can cast no shadow on it as he does so, for the little lamp is placed exactly where it is wanted to show up the dial figures.

It will be seen from the first photograph which depicts the back of the receiver that its interior is laid out on the raised shelf system. Below this shelf are the smoothing com-



DIRECTION FINDING BY RADIO

The demonstration of a patent direction-finder is attended by a "technical hitch" that proves to be particularly puzzling.

JOHAN DARE, the well-known radio consulting engineer, glanced at the printed slip of paper that had formed part of his morning's correspondence, and smiled—almost affectionately. The words ran:

"William Blazer, Esq., late Inspector of Police, New Scotland Yard, has established Enquiries, Limited, with a capable staff of assistants. He is prepared to undertake all forms of private investigation, including financial undertakings. Divorces excepted. Secrecy guaranteed, barring where he feels it his duty to place evidence of illegal actions in the hands of the Public Prosecutor. Advice given. No charge for preliminary interviews."

"He's too darned straightforward and outright to make much of a success of that kind of detection work," grinned Dare to himself, "but, [I say, here's an idea!"]"

Blazer Again

He picked up the telephone receiver and asked for the number that was neatly printed in a corner of Blazer's circular.

"Hallo, is that Bill Blazer's private police station? Now, now! Remember there's a lady listening! You heard that click? How are you, Blazer? Good luck to your new venture. You seem to find it

hard to settle down after your retirement from the Yard. If you don't happen to be right up to the neck in work, come along to my Regent Street office just as soon as you can, I think I can put a job your way. What? No, it's quite a serious proposition. Good, come right now, then."

A Protector Required

Dare replaced the receiver and continued dealing with his correspondence. He was still engaged in this interesting task when Blazer arrived. The detective flicked his hat on to one of the hooks behind the door, and extracted the inevitable cigar from his waistcoat pocket.

"What's this job of yours?" he queried suspiciously.

"Make yourself comfortable in that chair, my policeman, and I'll tell you," said Dare, shaking hands with his visitor.

"It's not exactly a Sherlock Holmes job," continued the radio expert, "still, it calls for a sound, reliable detective, and you're nothing if not that, Blazer. Next Saturday I've got to test out a new aero-radio compass invented by one of my clients. I consider that it is an immensely valuable invention, and I won't feel happy unless I have some reliable protection.

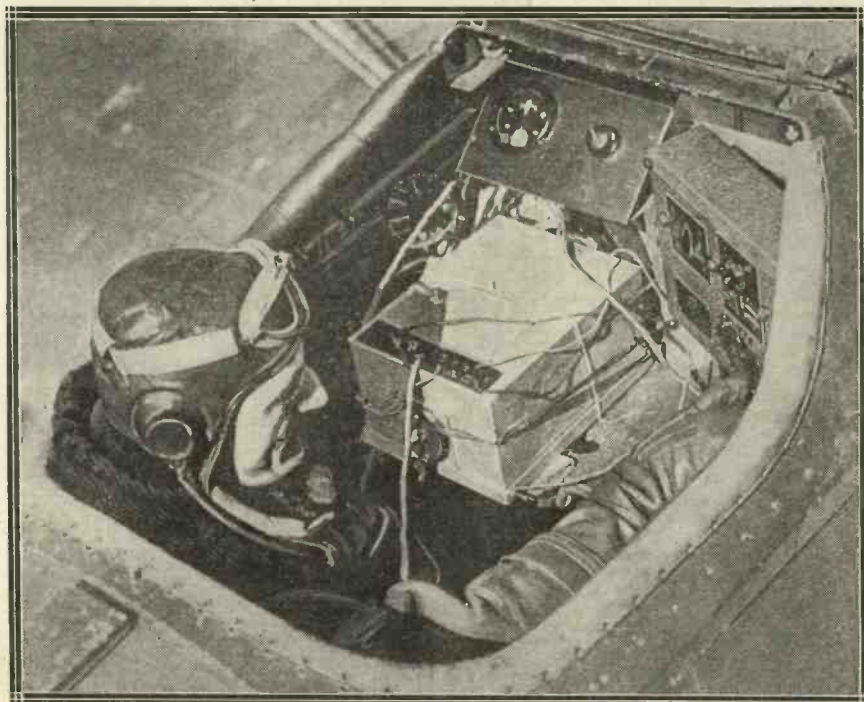
"I can look after myself all right in the usual way, but during this test I will be pretty busy making observations. It is true that it is an air test, but one has to guard against such things as forced landings in deserted parts of the countryside. Not that I anticipate such fantastic eventualities as desperadoes in the pay of foreign governments.

Stop Thief!

Nevertheless, one never knows—a petty sneak thief thinking one of my boxes was full of clothes might do enormous harm by nipping off with some of the most vital parts of the gear.

"True, it is an Air Ministry test, but only an initial one. The invention has no

AMERICAN RADIO COMPASS IN USE



An American radio direction-finder which enables the pilot to plot an accurate course even in foggy or stormy weather.

The Guiding Needle Controlled by Wireless

importance in the eyes of the Air Ministry people until it successfully passes this first try-out. Therefore, they are not treating the matter very seriously as yet. You couldn't expect them to. But I want you to come along with me, Blazer, in the capacity of bodyguard and as independent witness. Will you?"

Blazer as Bodyguard

"Sure I will," assented the detective heartily. "I'm not fond of the air, but it should be mighty interesting for all that."

The next Saturday morning found Dare and Blazer at the Epping aerodrome. A Service machine was being

wave-length as this station, and its needle will continue to point at it the whole time until we get there. The pilot has merely to set his course according to this needle and he cannot fail to arrive at our pre-determined destination. Fogs, rain—*nothing* will upset it. I am fixing the needle indicator in the back cockpit, so that I can have it under my observation, and the pilot will read its position by means of this mirror I have mounted on his instrument board."

"You seem optimistic enough," said Blazer admiringly, while the Air Force representative smiled somewhat patronisingly.

"It will work all right," affirmed Dare, "providing the Air Force

representative beside Dare, although a fair confusion of feet on the floor resulted. Dare's pointed remark concerning the traditional enormity of policemen's feet was received in dignified silence, albeit Blazer gave an indignant sniff!

Correcting the Course

With a roar that increased in volume until it reached a screaming crescendo, the aeroplane glided across the grass and was soon hurtling through the air at one hundred miles per hour.

To begin with, the pilot was obviously uncomfortable without his usual compass, but he soon managed to correct his line of flight by means of the radio indicator. The needle remained in a perfectly steady condition, and acted exactly as an ordinary compass pointer except that instead of pointing to the magnetic north it indicated the direction from which the radio signals were presumed to be originating.

Dare was soon satisfied that the device was working properly, so that there remained little for him to do but to note whether or not the pilot kept his 'plane on its correct course. The Air Force man was pleased to exhibit some slight interest, but Blazer grinned and winked as though he himself were the proud inventor.

Conversation was possible between them through telephones and microphones contained in their helmets, although the din of the two engines did not make it a pleasant process.

In Line for Liverpool

They had been flying for some hours when Dare became slightly uneasy. He could see the ground over the side of the fuselage, and, being a fairly experienced air traveller, he found it possible to distinguish roughly the route they were taking. And undoubtedly they were flying in a dead line for Liverpool!

Naturally he had enumerated in his mind all the northern Air Force aerodromes he could remember, and, although there might have been one near Liverpool, it was quite unknown to him. Anyway, he had the feeling that it was improbable that such a point would be chosen in view of the fact that it lay on an air-taxi route.

The Air Force officer had removed his telephone-equipped helmet in

(Continued on page 182.)

A RADIO CLUB INTERVENES



"We're the

Radio Society—this is our field day!"

given its final running-up by the mechanics. It did not take Dare long to fix up his radio gear.

"I propose we mask the ordinary compass," he suggested to the Air Force officer who was to accompany them.

"You see," he explained, turning to Blazer, "there is an Air Force radio station transmitting a continuous signal from an aerodrome somewhere in the north, the exact situation of which is unknown to any of us here. The patent wireless compass is tuned to the same special

station keeps on sending its signals."

"You need have no fear that it will not do so," responded the officer, "and if we are all ready we had better make a start."

The three men climbed into the machine. They had to pack themselves into a space that was originally intended only for two. Blazer squeezed himself down between the ammunition lockers and the special radio receiver, and Dare wriggled his way into a position facing the various controls. There was just sufficient room for the Air Force

AT YOUR SERVICE

by
**OUR TRADE
COMMISSIONER**



Novel "Nine-Valver"!

It will be interesting to most readers to know that the Westinghouse Electric Company of America are now making radio sets for the British Market. They are to be distributed throughout Great Britain by the Rothermel Corporation, Ltd., and will be available from prominent radio and electrical dealers in the country.

The most outstanding one is known as the Columaire, and it gets completely away from the conventional design of the average radio receiver. It consists of a nine-valve super-selective and sensitive set, the chassis being mounted in a vertical position in a pedestal type of cabinet. The control panel is located inside the cabinet.

The loud speaker is of the moving-coil variety of special design, and is housed in the top of the cabinet, the cabinet itself forming a long air column for the speaker, thus ensuring good reproduction of low notes.

An electric clock is also supplied operating from the supply mains, and therefore never requires winding. The list price, complete with valves, is £50, and the royalties amount to 45s. This receiver is to be followed very shortly by the Columette, a small, compact arrangement of an eight-valve set weighing only 37 lb., including loud speaker as well.

Training Dealers

When the Gramophone Company introduced their first radio-gram at the end of 1930 it was realised that many hundreds of dealers whose technical knowledge was adequate for the servicing of H.M.V. acoustical models would be of little use when dealing with radio.

Last year a certain amount of after-sales service training concerning the radio-gramophone 520 was given

Under this heading each month will be given news of the radio trade that should prove of interest to the home constructor, general reader, and wireless dealer alike. To enable us to provide a close link between the manufacturer, retailer, and reader, news of the wireless trade will be welcomed for inclusion in these pages, for it is only by the friendly co-operation of the manufacturer and the consumer that both sides can be sure of getting the best that radio can offer.

for the benefit of dealers, and now in order that thousands of model 521 gramophones sold throughout the

A RECORD RADIO-GRAM



A giant model of the H.M.V. Radio-Gram 521, on show at one of London's leading stores. Some idea of the size can be obtained from the photographic enlargement of Galli-Curci, which is larger than life size, and is fixed to the loud-speaker fret.

country may be serviced efficiently the Gramophone Company are conducting a series of training courses of two weeks' duration for H.M.V. dealers throughout the summer.

These are being held at the central service depot at Dagenham, which is attached to the H.M.V. factory there, and they commence on alternate Mondays. A special workshop and lecture hall has been built for the use of the learners, and the workshop is fitted out to accommodate 20 workers. The invitation to attend these courses is being extended to members of the staffs of all H.M.V. dealers throughout the British Isles.

Revised Pick-Up Prices

Twenty-one shillings is the price of the new Igranic Phonovox, an improved model of the old 37s. 6d. pick-up which was brought out some time ago. A new method of armature damping has been included, reducing record wear to a minimum, and very good sensitivity has been achieved. The pick-up is contained in a very attractive and extremely light bakelite case.

Another new line brought out by Messrs. Igranic is a series of super-heterodyne coils, comprising one triple wave-band oscillator coil and intermediate coils. The oscillator covers the short, medium and long wave-bands, and embodies a selector switch. The intermediate coils, two of which are supplied with pigtail connections for S.G. valves, are accurately matched and are fitted with standard four-pin bases, so that they may be plugged into ordinary four-pin valve holders. The price, complete with full operating instructions, is fifty shillings.

A New Valve

An interesting addition to the Mullard range of 2-volt battery valves is announced. The new valve

Well-Known "Extenser" Factory to be Extended

is known as the P.M.202, and is of the super-power type with an impedance of 2,000 ohms and an amplification factor of 7, giving a mutual conductance of 3.5. The high-tension consumption is quite moderate; at 150 volts, with a negative grid bias of 12 to 15 volts, it is 14 milliamps. At 100 it is 10 milliamps. with 7.5 grid bias, and at 75 only 8 milliamps., allowing a grid bias of 4.5.

Radio Set a Necessity

During a case in Denmark it was considered that radio apparatus is essential to the maintenance of a household. This judgment was given in a case recently, when the bailiff attempted to restrain on a Philips' radio set and speaker as part and parcel of the furniture, and the decision seems to point to the effect that the authorities recognise the importance of the part played by radio in the life of the community.

Osram Valves

Two new 2-volt S.G. valves have appeared on the market. These

ohms, and the S.22 has an amplification factor of 350 with the same impedance.

The "Lively O"

We should like to welcome Messrs. Oldham into the dry battery trade with the "Lively O" H.T. battery which has recently been brought out. They have had remarkable success with their accumulators, and we hope the H.T. battery market will provide just as good results.

Messrs. Graham Farish

This well-known firm has brought out some new apparatus in the form of a loud-speaker chassis and a variable condenser. The chassis includes an adjustable unit of the four-pole differential type, and is listed at one guinea. The variable condenser has bakelite dielectric, and is known as the "Litlos." It has previously been made for manufacturers for inclusion in sets, but has now been put on the market as a separate component.

Another New Speaker

The G.E.C. are very busy with their new inductor dynamic loud speaker, for which is claimed brilliant high-note response and rich bass, and which is sold complete in oak cabinet for £5 10s.

The Glasgow Show

It is announced that there is a strong possibility of Glasgow having a radio show of its own in the autumn, and it is said that the most suitable hall to hold this exhibition is the MacLennon Galleries, Sauchiehall Street, and that in all probability if the show comes off it will be held between October 13th and 17th.

It is hoped that the show will boost up trade in that area, for although Glasgow is the second city of the Empire, it has a remarkably small percentage of radio sets per household. The percentage is roughly 19, and is well below such cities as Manchester, Edinburgh, etc.

A New Mains Transformer

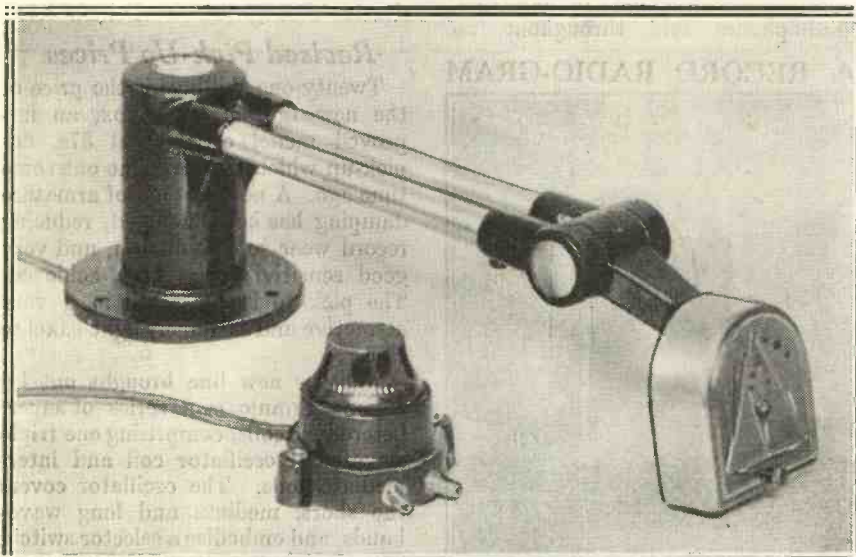
Messrs. F. C. Heyberd & Co. have brought out a new mains transformer to go with the Westinghouse rectifier H.T.8. It provides two H.T. outputs, marked "175" and "200" volts. In the case of the "175" tapping the direct current output is 200 volts at 60 milliamps., and in the case of the "200" one it is 250 volts at 60 milliamps. The transformer can also be supplied with a 4-volt 6-amp. winding for indirectly-heated valves.

Extenser Extensions

I learn that Sydney S. Bird & Sons, Ltd., the manufacturers of Cyldon variable condensers and Extensers, are shortly moving to a new factory which is being built about a mile away from the present site at Enfield. The new factory will have a floor space of something like 30,000 sq. ft., and arrangements to move in at the end of August are being made.

We are not surprised at this extension, however, for Cyldon's have been doing very good business, and the new Extenser has undoubtedly caught on. Mr. Bird was the first to place this new development in tuning condensers on the market, and the shift is a wise move, because there is sure to be very big demand soon.

A FIRST-CLASS COMPONENT



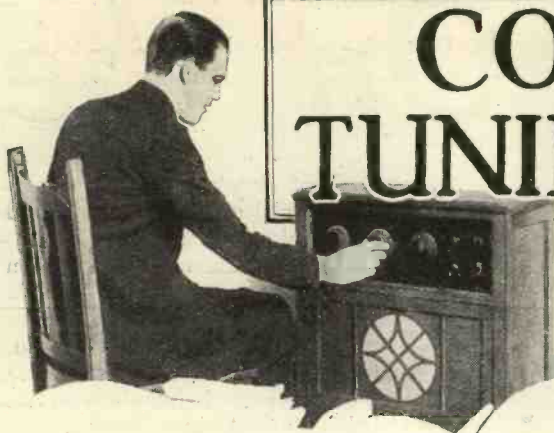
The Audak pick-up, which was discussed in a recent article in "Modern Wireless," is capable of giving very life-like reproduction and is sold by Messrs. Claude Lyons, Ltd.

are the S.21 and the S.22, having filament consumptions of .1 and .2 amp. respectively. Perfectly straight characteristics are claimed for these valves, which make for the reduction of interference known as cross modulation, and so enable the selectivity of the receiver to be increased. The S.21 has an amplification factor of 220 with an impedance of 200,000

An Amplion "M.C."

Messrs. Graham Amplion, Ltd., of Savile Row, London, have entered the moving-coil market with a permanent-magnet speaker at 67s. 6d. This is supplied complete with transformer for high, medium and low ratios, and is ready for mounting in a cabinet or on a baffle.

CONCERNING TUNING CONTROLS



There is a never-ending struggle between the general development of radio receiver technique and the simplification of set controls. At the moment the former is tending to press the other back, but various developments are at hand to alleviate this situation, and smooth the way for better and simpler radio.

IT often happens that bitter struggles between great commercial interests affecting the whole nation occur without the general public realising the fact. They may notice that the products of a certain concern have been reduced in price once or twice during a month, and that another firm handling similar goods advertises more or less coincident reductions without it occurring to mind that millions of pounds are involved in a business world fight to the finish.

Less Tangible "Wars"

Even less tangible are various "wars" in wireless between various different phases of development. One that is particularly well marked is the rivalry, if such a term can be applied, between control simplification and general radio progress in the design of radio receivers.

The unique feature of the "battle" is that it is fought out as much in the minds of individuals as among large bodies of people!

The First "Victory"

The first real victory achieved by General Radio Progress (we will use only the initials after this to save space) was the introduction of a really worth-while high-frequency amplification. Control Simplification got a nasty jar then, for every tuned H.F. stage meant another variable condenser—one more knob to twist!

But C.S. counter-attacked with the ganged condenser—two, three, and four knobs rubbed into one!

There was a smashing reply from G.R.P., who engineered a keen public demand for higher and higher efficiency; balanced inductances, nay, neutralisation, was for ever after to be essential.

C.S. staggered a little, but, subsequent to a long period of hard fighting, produced the screened-grid valve.

G.R.P. rallied and replied with the panel wave-change switch. Henceforward, went out the edict, no set was really a set unless listeners could change the wave-range.

C.S. soon countered that with the Extenser. This eliminated wave-change switching and made the tuning dial a real tuning dial, a station selector that could select without assistance.

This appeared to be a final victory for C.S., a real knock-out blow in fact. The future of C.S. seemed to be absolutely assured.

But G.R.P., though dismayed and unable to attack the Extenser as such

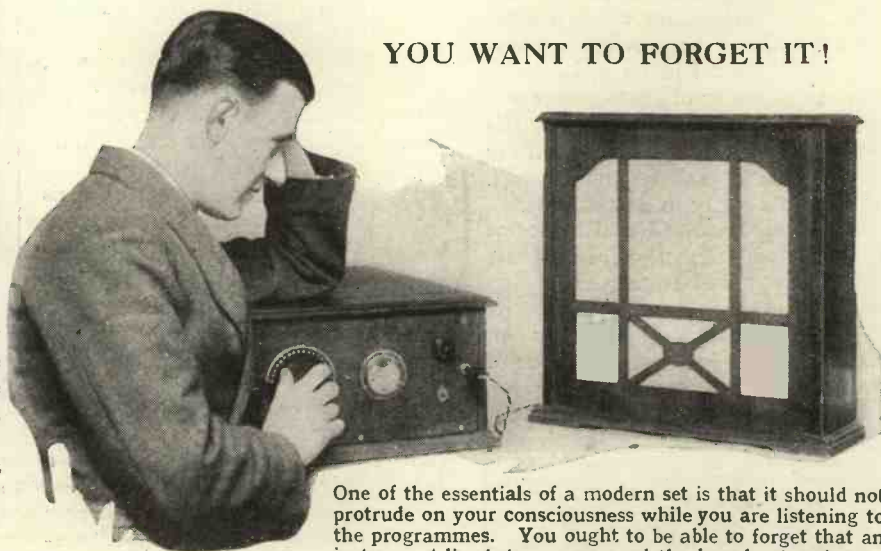
suitable for the figures on the calendar.

Another variable condenser, an additional wave-changing. Will the reply of C.S. be Extenser ganging? Will it be dual assemblies of Extensers?

The Next Move?

C.S. has not yet got his ammunition quite in order to reply to the attack.

And the super-het.; another means of obtaining selectivity plus power for pruning the mush from distant programmes. Has C.S. an adequate answer to this? Is G.R.P. fishing in the past for the benefit of C.S.?



YOU WANT TO FORGET IT!

One of the essentials of a modern set is that it should not protrude on your consciousness while you are listening to the programmes. You ought to be able to forget that an instrument lies between you and the broadcast artiste or speaker.

(indeed, he had to welcome it as a member of his own family), managed to scrape up one or two things that certainly made C.S. think very hard.

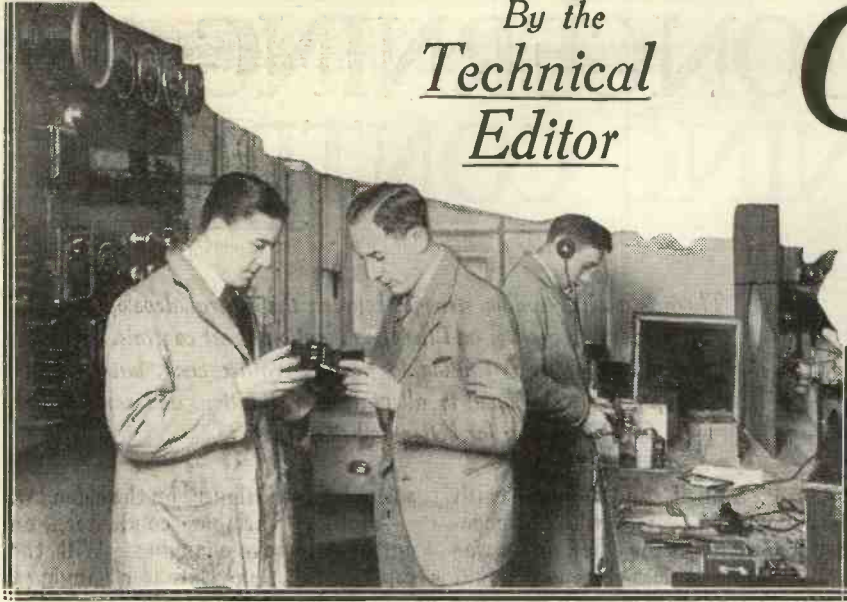
Instance the sudden realisation that modern ether conditions demanded something extra special in the way of selectivity. Thus the band-pass, no new thing in principle, was pushed forward in up-to-the-minute clothes

Is the super-het. in its present guise a mark of progress or merely an improvisation, a throw-back?

If you would welcome answers to these questions you cannot possibly do better than watch the next issue or two of MODERN WIRELESS. In these you will find all the latest news regarding the great contest of G.R.P. versus C.S.

By the
Technical
Editor

On the



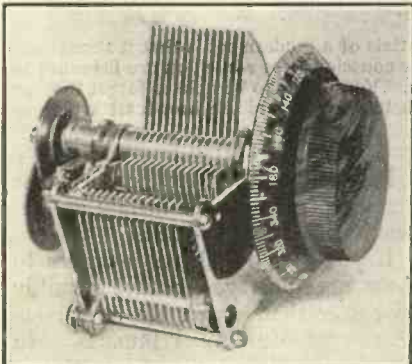
The "Wavemaster" Extenser

THIS is made by the Webb Condenser Co., Ltd., and very nicely it is made, too. It is, indeed, one of the "sleekest" components that we have seen for some very long time. Its general construction and finish reveal craftsmanship of the highest possible order.

There are two types available, one with a slow-motion and the other a direct-drive model, for which a slow-motion dial can be purchased separately. We should imagine, however, that the majority of constructors will choose the slow-motion model. The movement of this is beautifully smooth and it enables hairbreadth adjustments easily to be obtained.

The nicely moulded dial conforms with the standard method of Extenser dial markings, and an ingenious stop device is fitted; it accomplishes its stopping without the sacrifice of anything of the 360-degree rotation of the vanes!

FIVE-POINT SWITCHING!



The "Wavemaster" Extenser due to the Webb Condenser Co., Ltd. It provides for anything up to five-point switching.

The "Wavemaster" Extenser has no less than four switch terminals, so that in effect its self-changer corresponds with a five-point wave-change switch. It is true that there are at present no "M.W." circuits which call for five-point switching, but it is distinctly comforting to have a margin, and in regard to switching the "Wavemaster" certainly does provide that.

But you don't have to use all four self-changer terminals, and at some future date a distinct use may be found for that "spare."

The "Wavemaster's" switch action, by the way, is quite satisfactory and should be able to stand up to the hardest of hard work for an indefinite period without giving trouble.

The vane shaping corresponds exactly with the standard specification and thus there is perfect compensation on both "halves." The minimum capacity is unusually low, less than a twelfth of the maximum as against the tenth that was once considered quite good. The maximum is slightly above the .0005-mfd. rating, which, in the circumstances, cannot be viewed in any other way than as a definite advantage.

In conclusion, we extend a hearty welcome to the "Wavemaster" Extenser, and trust it will secure a goodly share of the very big business that will inevitably accompany the Extenser this coming radio season.

"Palaba" H.T. Batteries

We have had an opportunity of examining and testing one of those new "Palaba" H.T. batteries which are manufactured by the Pala Battery Co. (London), Ltd. The "Palaba" is designed in accordance with a novel

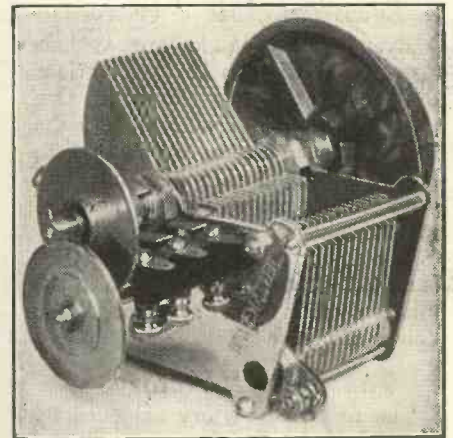
method of construction, for which certain special salts are used instead of the usual sal-ammoniac.

The process that takes place when the battery discharges is styled double excitation. Initially, current is produced without the zinc being attacked, and as the salts concerned deteriorate they bring a second group into service and these then eat into the zinc.

Substantiation of the claims made for the scheme is to be found in the resulting extra life of the battery in practice. We gave our specimen a careful intermittent discharge test and are bound to say that its useful life, as revealed by the curve taken, was considerably longer than that of the average standard type of H.T. battery by at least the 37.9 per cent claimed, if not slightly more.

The "Palaba" appears to us to be a very sound proposition. And its

SMOOTH "VERNIER" CONTROL



Another view of the "Wavemaster" Extenser, which clearly shows the fine slow-motion mechanism.

general reliability is supplemented by an evenness of discharge that is typical of only the very best makes.

Radio Bargains for Experimenters

Leslie Dixon & Co., of Upper Thames Street, London, are noted for electrical and radio bargains, and many experimenters and constructors have managed to secure fine pieces of apparatus from them at ridiculously low prices.

At the time of writing we learn that they are clearing a huge stock of new Army surplus headphones and single

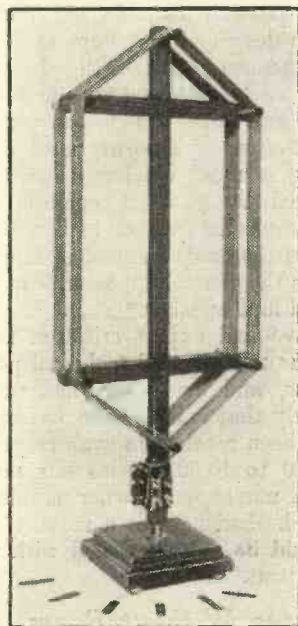
Test Bench

This month we devote most of our space to an Extenser, a very reasonably priced frame aerial, an efficient and inexpensive mains unit, and a new H.T. battery.

earpieces. The Government paid 22s. 6d. per pair for the Sullivan's headphones, but these are obtainable from Leslie Dixon & Co. at 3s. 6d. brand-new, and in original cartons, or at 2s. 9d. unboxed and store soiled.

These phones are, however, of the low-resistance variety, i.e. 120 ohms, although, nevertheless, amateurs

A WAVE-CHANGE FRAME



The Peto-Scott Frame Aerial.

should find them extremely useful for testing, etc. Of course, they can be used in conjunction with a step-down transformer, and to anyone wishing to wire up a large number of telephone receiver points in a hospital or such-like institution they should appeal very strongly.

Having examined a sample pair we have no hesitation in saying that they are exactly in accordance with their catalogue description.

Frame for Supers

The Peto-Scott people have a frame aerial which has been specially designed for use with super-het receivers. It is of the centre-tapped variety and has a wave-change switch embodied in its construction.

There is a solid base and the frame revolves smoothly in an accurately fitted bearing bush built in this.

The wire is an enamelled multi-strand, and the pick-up of the frame is unusually good.

Six spacers are provided for the three connecting leads that are needed to connect the frame to the set. These spacers ensure both neatness and efficiency.

The price of this frame is 20s.

An All-Electric Unit

If you have A.C. mains you will at least be interested in the Heyberd all-electric unit, for it embodies one or two novel features, besides being completely sound from a technical point of view.

The Model E.150, as it is termed,



The Heyberd All-Electric Unit.

have to peer closely at the panel to find out, you can see at a glance and at a respectable distance.

On test this Heyberd unit gave entirely satisfactory results. It is up to specification in every respect and is safe and sound both to operate and in operation. The price is £6 15s.

An Invaluable Gadget

One of the minor irritations of radio is the connection of leads to H.T. batteries. Many of us often give up trying to make a good job of this with wander plugs that simply will not adapt themselves to the sockets and use match sticks!

However, improvisations of this nature need no longer be made, for

WILL MANUFACTURERS AND TRADERS PLEASE NOTE

We are prepared to receive samples of radio apparatus of any description from anybody for the purpose of preparing test reports for this page. Nevertheless, the Technical Editor reserves to himself the right to select only those items of most general interest when space limitations prevent all the submitted material from being dealt with.

Also it should be noted that we cannot accept responsibility for goods forwarded to us for this free service inasmuch as it is frequently essential for components, accessories, etc., to be completely dissected in the course of our examinations.

Finally, it is pointed out for the benefit of our more technical readers that the reports are based on tests carried out with the most modern gear under strictly impartial laboratory conditions.

will give up to 150 volts at 25 milliamps. for H.T. purposes, and 2 volts L.T. for trickle-charging an accumulator. But in addition it provides, if necessary, 4 volts 4 amperes for A.C. valve filaments.

Westinghouse metal rectification is used throughout, and the unit carries with it a two-year guarantee.

There are three H.T. tapings, one of which is variable. A pilot lamp indicates when the accessory is switched on. But the feature which particularly appeals to us is the design of the silver embossed H.T. and L.T. switches.

These have a push-pull action, but by some ingenious mechanical scheme the words "on" and "off" appear in apertures to denote exactly what the switches are doing! You do not

there are now available wander plugs which do not wander by themselves from their places, and the new Clix "Vicegrip" (made by Lectro Linx,

DOUBLE EXCITATION



The H.T. battery with a "double excitant."

Ltd.) is particularly good. It costs only 1½d., complete with markings, and is a complete solution to the above-mentioned problem.

LETTERS FROM LISTENERS

Some enthusiastic and interesting letters from "M.W." readers who have constructed their own loud speakers.

The "M.W." Free-Edge Cone

Sir,—I have made several models of the "M.W." free-edge cone and found that the excellence of reproduction obtainable with your method of suspension places it beyond comparison with any other design. I was most pleasantly surprised when the first one was tried without any baffle board, just suspended in air.

However, a board improves reproduction still further, and no doubt many of your readers who have constructed this cone have found, like myself, that a baffle ring which looks nearly flat in the open takes on the appearance of a mountain range when placed between two flat boards.

This is caused by the gum distorting the paper it is made to encounter, and which occurs no matter how little adhesive is used.

How He Does It

In order to solve this difficulty I eventually came across a method of treating the paper and slightly modifying your methods of construction—the former, without unduly "weighting" the paper (I use very thin, cheap brown paper), and quite quick, cheap, and easy to apply.

My method is as follows: The paper should be well pinned down over two thicknesses of newspaper on a flat surface with drawing pins. Apply shellac varnish on a piece of cotton wool with circular motion as in french polishing.

Keep pad moving, and cover whole surface (except edges). When finished, start again at beginning.

Order of Assembly

About three or four coats will be sufficient. Leave ten minutes or so, turn over, and repeat on other side. Thin brown paper now becomes almost transparent, and the gum will not now readily cockle the paper, and truer results will be obtained.

When dry, mark out the cone with compasses and ruler, not forgetting the line where the supporting ring should rest. Mark out a circle *outside* the edge of cone for "sticking tabs." This instead of on baffle ring.

The edge of cone should be slightly "cut" with dividers so that when tabs are cut out they fold *exactly*

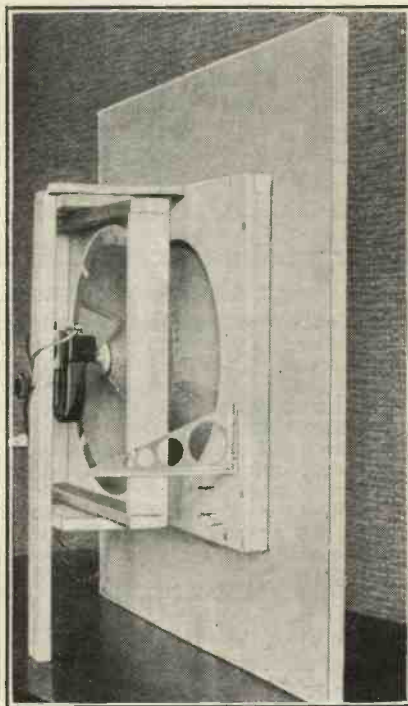
where you want them to. Proceed thus: Cut out cone, cut tabs, stick cone edges, fold tabs right back.

It Sits Nicely

Put cone aside and mark out baffle and supporting rings on same centre. "Cut," as before, supporting ring where it is to bend. Pin this paper down about two inches outside baffle ring to keep it flat.

If you now place cone upon it you will find it "sits" nicely on the ring marked out for it.

A GOOD EFFORT



This is the loud speaker built by Mr. Chaplin, which he describes in his letter on this page.

Gum two adjacent tabs at four different places around cone, and stick them in place. When firmly stuck, the others may be stuck by gumming the baffle and bringing the tabs down on to it. The point of a penknife will "persuade" any self-willed tab into its proper place, though mostly they will "come quietly."

By Gum!

Allow whole to dry, unpin and cut out the supporting ring underneath. Stick into place. Cut outer edge of baffle. The inner edge can now be

cut with those curved nail scissors kindly lent (?) by the "lady of the house."

Yours faithfully,
J. H. CARTLEDGE.

London, S.E.6.

The "M.W." "Inter-Axial" Speaker

Sir,—I have built one of your "Free-Edged Cone Loud Speakers," described in the February issue of MODERN WIRELESS, with certain modifications and, I consider, improvements, and I am truly astonished at the amazing results obtained.

I built it to fit an existing cabinet I had measuring 2 ft. square by 10 in. deep, and employed an Ormond unit in place of the 66R.

What the Experts Say

Instead of using a narrow strip for the suspension I made the double cone as described in "Popular Wireless," because I thought that I would obtain a better bass response by having two cones. This has proved to be the case. Also my method of baffling is more efficient than that described by you. I enclose two photographs that are self-explanatory, showing the exact method of mounting and the general appearance of the finished loud speaker.*

I have had expert criticism from both the musical and technical point of view, and every one has voted definitely that it is as near perfection as has been reached in even response from 20 to 10,000 cycles bar none. Even a moving-coil owner admitted that if he had not got a moving coil he would be quite satisfied with the "Clear Cut."

Bass Without Boom

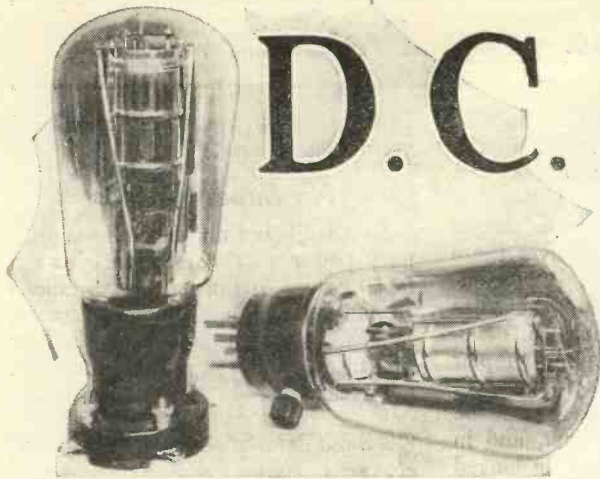
It reproduces bass without boominess, and is indeed decidedly *clear cut* over the whole musical scale. Talks and plays are now a pleasure to listen to, speech being so clear that there is no straining to make out what is being said. It is indeed the most wonderful loud speaker I have ever heard, and yet it has not cost more than £1 (without cabinet) to build. I should vote it the most outstanding improvement in wireless during the last twelve months, and I thank MODERN WIRELESS most heartily for the enterprise it has shown in producing so efficient an instrument.

Yours faithfully,
CECIL S. CHAPLIN.

Birkenhead, Cheshire.

[*ED. NOTE.—One of the photographs is reproduced on this page.]

D.C. OR A.C. ?



The new indirectly-heated valves for direct-current working have provided a fresh outlook on radio for the listener with D.C. mains. He is now level with, if not ahead of, the A.C. owner in advantages, as shown in this article.

By K. D. ROGERS.

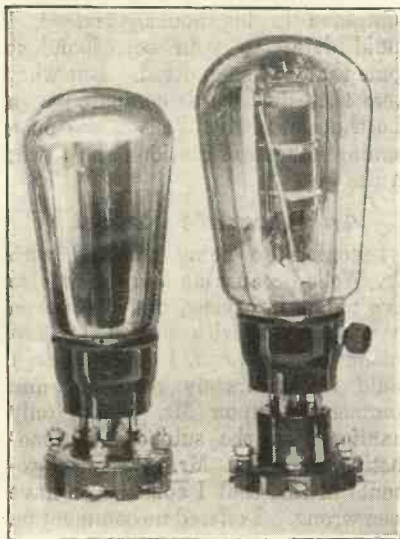
THE days when we all envied the man with A.C. mains in his house have gone. We were wont to think that although D.C. had advantages in that one could make H.T. mains units for that type of mains very much more cheaply than for the A.C., yet we realised that A.C. was really more flexible, and one could, if lucky enough to possess this type of electric light supply, use indirectly-heated valves, which were generally acknowledged as being far and away better in performance than the ordinary battery valves.

had his laugh over his A.C. brother when he thought of the troubles met with in smoothing and rectification of H.T. supply, and of hum hunting on indirectly-heated valve sets. Furthermore, the A.C. set was initially definitely more expensive than a battery set run from D.C. mains, so here again the D.C. man had the advantage over his A.C. brother.

ordinary purposes, giving sufficient pressure for any set but a super-powerful one, so the advantage of A.C. or D.C. on this point is a rather superficial one.

The indirectly-heated D.C. valves have but recently been brought out, and at the moment of writing only one make of valve is on the market—the Mazda—having a .5-amp. heater. But I understand that other types and makes of valves will soon be released, and we may expect current consumptions to vary between about .18 and .5.

WHERE THERE IS A.C.



Two well-known A.C. valves—the Mazda H.L. and A.C. Pen.

So although the man with D.C. could get his H.T. from the mains he still had to use battery valves, whether or not the current was drawn from the electric light supply, and he was, therefore, apparently doomed to inferior results as compared with his happier neighbour on A.C.

But what about the "snags" with A.C. ? The owner of D.C. no doubt

The New Valves

On the whole, from the average listener's point of view, honours were fairly even. For his extra money and his greater care in design the A.C. man could get results superior to D.C., but where the D.C. owner scored was on the question of initial expense—not running costs—and the fact that he did not have to have an elaborate H.T. unit.

With the coming of indirectly-heated D.C. valves, however, the balance of pros and cons has been upset, and at one go the D.C. man (with the exception of one thing) has obtained all the advantages that his A.C. friend possesses, without the disadvantages.

Unlimited H.T.

That one thing is the matter of voltage. With A.C. and a transformer you can step-up the voltage to practically anything you like in the way of H.T., and thus you can use large valves capable of giving you a tremendous output if you so desire; but for ordinary pleasurable listening in the average home colossal voltages are not necessary, and most of the commercial receivers only cater for voltages up to about 250 volts.

Current Consumption

Many D.C. mains are 240 volts, and, in fact, anything above 200 volts is perfectly adequate for all

Setting a Standard

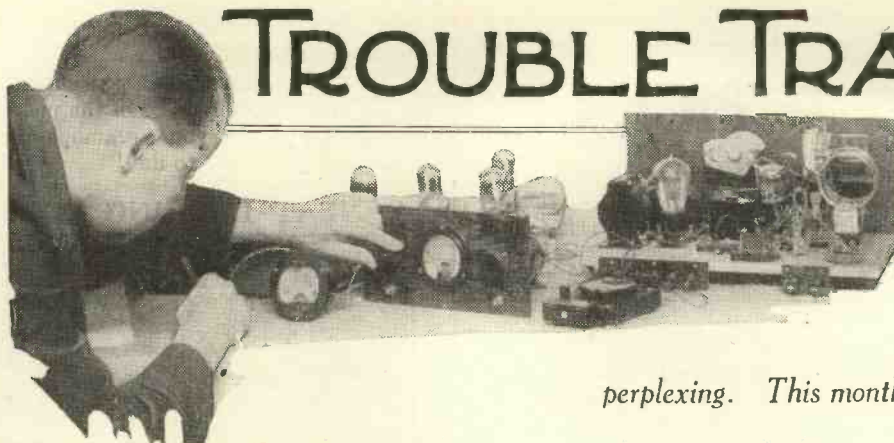
There is a certain amount of controversy going on as to which shall be the "standard" heater filament, and while there is no doubt that the .18 filament would probably save wattage to a very great extent, making the set cheaper to run, it yet remains to be seen whether long

INDIRECTLY-HEATED D.C. VALVES



Here we see the D.C. counterpart of the A.C. Pen, together with the new D.C. S.G.

TROUBLE TRACKING



On this page the Chief of the "M.W." Query Dept. discusses, month by month, some of those common difficulties and troubles which can be so perplexing. This month he deals with reaction troubles.

FULLY 50 per cent of the letters I receive from readers refer to reaction troubles. It is a curious thing that people should have difficulties in this direction, because reaction is one of the easiest things to obtain, and yet I get these S.O.S.'s from enthusiasts who apparently are unable to obtain any reaction at all, in spite of the fact that they have conducted various tests and assure me that they have used all the components specified in our various set descriptions.

The Normal Method

Suppose we consider the usual method of obtaining reaction, that is, the differential scheme in which the H.F. oscillations are transferred back from the anode circuit of the detector valve into the grid circuit by means of a variable capacity and a fixed inductance magnetically coupled to the tuned grid coil. The differential condenser normally specified has a value of .0001 to .0002 mfd., and the reaction winding itself may be either of the plug-in type or it may be fixed, that is, part and parcel of a dual-range coil or other inductance unit.

As the majority of readers are aware, in a scheme of this type it is essential to provide some means of stopping the H.F. impulses from taking the alternative path via the H.T. battery and any associated capacities back to the negative filament of the valve. Usually, either an H.F. choke or a resistance of about 10,000-15,000 ohms is inserted between the anode of the valve and the H.T. positive lead.

H.F. Chokes

Now, a good commercial H.F. choke is above suspicion, and it is extremely rare that such a component can be blamed for any lack of reaction effects. The main requirements of an H.F. choke are a very large number of turns in order to provide a high

inductance value, together with a low distributed capacity, which, of course, entails the winding of the turns in slots so as to split the choke up into sections.

If the turns are insufficient, or, on the other hand, if the distributed capacity is too high, there may be a complete failure to obtain reaction on the long wave-band. Possibly there will be peaks, and at these

but it is also probable that the receiver will not function at all, because there will be no H.T. applied to the anode of the detector valve. This also applies in cases where resistances are used instead of an H.F. choke. It is, of course, essential to choose a resistance of the value specified.

Reaction Windings

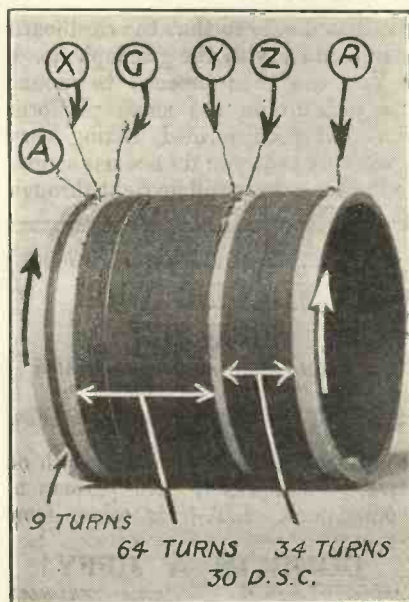
Then there is the reaction winding itself; the possibility here is that the winding may not bear the correct relation to the grid coil as regards direction. Actually the directions of the two windings should be the same. It is very easy to check this up when the reaction coil is of the plug-in type, because it is an easy matter to change over the two leads to the reaction coil holder. This procedure can also be carried out in certain cases where units combining primary grid and reaction windings are used. If the coil happens to be a commercial one, it is very doubtful whether a reversed reaction winding is the cause of the trouble; but perhaps now and again such a coil may find its way through, and in consequence, when everything else fails, there is no harm in sending the unit back to the manufacturers for test. They will always exchange a component which they find to be defective.

Use Plenty of H.T.

Next there is the question of H.T. voltage. Many reaction troubles are caused by too low a voltage on the detector valve, and this is a point that should always be checked up. Also, the detector valve should be one of the freely oscillating type.

You may ask: "What is a freely oscillating valve?" Well, so far as the detector is concerned, it is one having a medium impedance and a fairly high amplification factor, such as a valve of the "H.L." or "L." type.

SIMPLE AND EFFICIENT



Nothing could be easier to make than this P.J.I. coil. The aerial, grid, and reaction windings are all in the same direction and the connections are the conventional ones, R being joined to F_1 on the differential condenser.

points the receiver may oscillate furiously with the reaction condenser at—or practically at—its minimum setting.

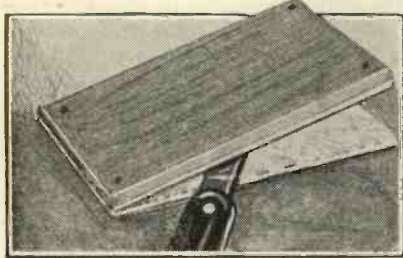
However, a good make of H.F. choke is unlikely to cause any of these troubles, and the only possibility is a complete break in the winding, in which case not only will there be an absence of reaction effects,

MOUNTING A PICK-UP

Here is an easy method of fixing without spoiling the turntable platform with screw holes. Then if you wish to remove the pick-up at any time you can do so without leaving unsightly marks on the polished woodwork.

THERE are no doubt many radio-gram enthusiasts who would like to mount pick-ups on their gramophones, but hesitate to do so because of the necessity of driving screws into the polished turntable platform.

REMOVED WITH EASE!



When necessary the wood base can be lifted off with a penknife, and the residual glue, etc., soaked off with the aid of a wet cloth.

Here is a way of doing the job quite satisfactorily and without injuring the wood.

A small piece of fairly soft wood a little larger in size than the base of the pick-up arm swivel is needed. This wood should be about $\frac{3}{8}$ in. thick, and should be neatly cut, square or round, and stained the colour of the gramophone cabinet.

A piece of cardboard should then be cut to exactly the same shape and size as the wood. The cardboard should be glued to the wood.

Don't Forget the Cardboard!

Locate the exact spot where it will be necessary to mount the pick-up, and glue the small piece of wood to the turntable platform at this point, but applying the glue to the cardboard side so that the cardboard is in contact with the gramophone.

You can then proceed to mount the pick-up on the small platform that has been formed, taking very great care that you do not use screws so long that they will go right through

the little platform and pierce the gramophone woodwork.

If at any future date you should wish to remove all traces of the pick-up fixing from your gramophone this is all you have to do:

A NEAT-LOOKING JOB!



Having glued the wood block in position the pick-up is fixed to it with short screws. This makes a really firm and neat-looking job

First of all you unscrew the pick-up. You should then take a pocket knife and with extreme care slip the blade underneath the platform and between the layers of the cardboard. If you haven't used too much glue or gum in the first instance you should be able to tear the platform off with very little effort.

The careful use of a wet cloth will soon enable you to wipe away all traces of the glue.

ABOUT the only fault one can find with a good super-heterodyne short-wave adaptor is that quite a number of connections (and disconnections) must be made before the unit is ready to work. This can prove rather a nuisance at times. For some time now the writer has used the scheme outlined here with considerable resultant gain in convenience.

Before we go any farther it would be as well to run over the connections that have to be made.

The Necessary Connections

Before we can begin to pull in the stations the following connections are necessary:

1. H.T.+ and L.T.+ connections must be made to the short-wave unit.
2. The aerial must be removed from the broadcast set and transferred to the short-wave unit.
3. The "output" lead from the short-waver must be connected to the aerial terminal of the broadcast set.
4. An earth connection must be made to the short-waver.

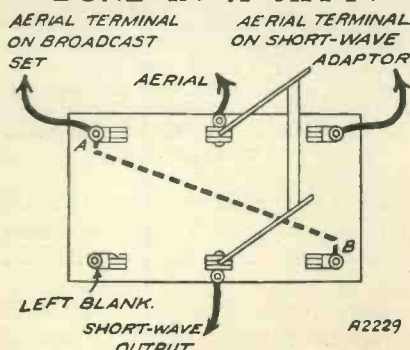
In the writer's method, Earth,

SWITCHING YOUR SUPER-HET

A worth-while modification which will save you a lot of trouble.

the "far" side of the L.T. switch on H.T.+ and L.T.+ are permanent connections. L.T.+ is taken from

DONE IN A JIFFY!



You can use an ordinary double-pole earthing switch for the aerial change-over, leaving the earth and battery connections permanently joined to the short-wave adaptor.

the broadcast set. This can conveniently be made from the L.T.+ side of one of the valve holders, or, of course, from the L.T. switch itself. By so doing it is impossible to leave the short-waver running when the broadcast set is switched off, since it is automatically switched off by the L.T. switch on the broadcast set. The short-waver should, however, be switched off independently.

The remaining connections can be made at one stroke by means of a D.P.D.T. switch.

Absolutely Foolproof

It should be noticed that when the short-waver is not in use the output connection from it is broken by the switch, since otherwise some queer happenings might result.

Having installed the switch, all that is necessary when going over to short waves is to throw the switch over, and tune the broadcast set to the necessary intermediate frequency.

In the diagram, the dotted line from 1 to 4 is a permanent connection between the two contacts.



Opening the New Pluggate Radio Exhibition!

CERTAIN duties which I have just fulfilled in connection with the forthcoming Radio Exhibition remind me that I resolved never again to let a mayor come into my life; no, not even though he promise me the chairmanship of the Slaughter-houses Committee or a job in the "Park, Municipal, Scavengers' Dept."

The Forgotten Vow

Mind you, I have nothing against mayors in the abstract, for I have never seen an abstract mayor. I wish I could. I think that kind of mayor is the best. But mayors are so fearfully concrete—and asphalt. Trams remind me of mayors. So do steam-rollers and dust-carts and war memorials. Oh, and the "tanks" in the recreation grounds! Only a British mayor (and corporation) would think of putting an ex-war "tank" in a recreation ground!

I ought to have been reminded of my vow three nights ago. Well, as a matter of fact, I was, but I forgot it again! You see, Mrs. Buxwort's husband, who is the local mayor, threw a party at their place in 14, The Mansions, S.W.34. I think they had won £439 6s. 8d. in a cross-word competition and felt *nouveau riche*. Be that as it may—as Cleopatra said when Mark Antony explained that he had called to collect the instalment on the houseboat—I dropped in at the urgent request of my aunt, who has real money and no family of her own, and, as such, needs humouring.

This "association of ideas" business is simply wonderful. It works.

There was I, trying to push upstairs towards the smoking-room, while three-quarters of Putney, Hammer-smith and Surbiton, with choice bits of Ealing, were pouring downstairs *en route* for a claret cup which had got itself rumoured on the back balcony. Suddenly I saw a lady person—undoubtedly it was Mrs. Driggler, relict of "Driggler's Perfect Flue-brush"—sailing downstream without tacking or backing or filling. Her face—I mention it with reluctance—reminded me of a sheep

AN "OUTSIZE" IN MAYORS



"But mayors are so fearfully concrete—and asphalt. Trams remind me of mayors."

which I once met and conversed with near Stow-on-the-Wold, Glos. And who should be following behind but the mayor.

The moment I set eyes on him I remembered young Jas. Cardle, of New Pluggate. I say "young Jas." because we schooled it together, and many's the time I've lammed him for appropriating my bull's-eyes or ginger-beer.

I left New Pluggate to seek my fortune, and when after many years I had decided that I had no fortune

to find, I took on a hunger to see the old town again. So I trained down one Saturday last year and once more trod my native cobblestones. To my surprise I learned that "young Jas." was Mayor—for the fourth time running. And him an oil and colour-man, too!

How It Happened

I met him, quite accidentally, on "the bricks," a certain brick-paved walk whereon as lads we were wont to prance before, behind and abreast of our female fellow-citizens. They now call it the "monkeys' parade," I believe. He was studying the stars, but dropped to earth with a nasty wallop when I barked:

"Now, then, young Jas.!"

"Goo-od heavens! Old Jones!"

"Ger-racious! Young Jas.! What's his Worship doing on 'the Bricks,' eh?"

"Just walking along home, that's all. Just fancy meeting you after all these years. How are you getting on, old boy?"

"Ah, so-so! Kind of a writer bloke in London. Just managing to live; not much else. But fancy you being Mayor, young Jas."

"Huh! Reckon it was the old man's business I stepped into, nothing more. Cardle's a sort of a name round here. P'raps you heard we got the Admiralty contract for boiled oil."

"The Navy doesn't take me much into its confidence," I replied.

"No? Well, we did! And we've supplied our No. 3 Grade Sandpaper to the Biggin Hill aerodrome. Fact!"

"I've had nothing to do with the

"She was a Lady, Great and Splendid"

R.A.F. since I dodged their falling bits of shell during the air raids of 1917."

"No? Well, we did! And our White Lead——"

"Oh, shut up! How is old Molly McGinty? And Long Jack, the shrimp man?"

"Gone home years ago! So's old Harry, the town-crier, and Swivel-eyed George, who used to help clean up after market-day."

The Scheme Approved

"All, all are gone, the old familiar faces," I quoted. "There's no point in my stopping any longer."

At this he suddenly grabbed my arm.

"By George!" he said. "Yes, there's still me. I need a bit of a hand. I'm in a turr-ble hole!"

"Not such a hole that a mayor can't climb out of," I suggested.

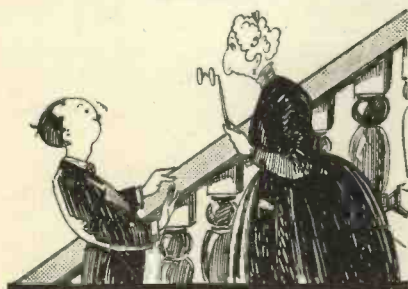
"Ay, a deep 'un! Mebbe I'm Mayor. Mebbe I knows a thing or three about the oil and colour business. But this here's beyont me. A festival!"

"Easy! Town band, coconut shies, confetti, and fireworks."

"Nay, lad! 'Tis the cen-teen-ary of New Ploogetts' Charter, and must be summat speshul."

Let it suffice to record that finally I gave up, and undertook to organise the New Pluggate Centenary Grand Bazaar and Radio Exhibition. Never again! I would rather sing "Baby Mine" at a suburban garden-party.

"THREE SHEETS TO THE WIND!"



"undoubtedly it was Mrs. Driggler, relic of 'Driggler's Perfect Flue-brush'—sailing downstream without tacking or backing or filling."

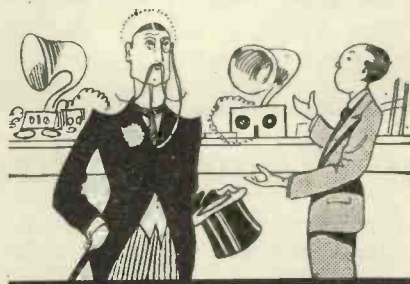
The scheme was approved by the council on the grounds that it was edifying, up to date, and might stimulate local trade. A sub-committee consisting of the plumber, the chemist and myself was formed for the purpose of arranging the

Radio Exhibition. The plumber was fairly strong on the lead parts of accumulators, and the chemist had one two-valver, 1924 vintage, in his window. I ask you!

Getting Down to It

Finally I got down to business and arranged a gallery of enlarged photographs illustrating the discovery and development of radio; some odds and

LORD OF THE MANOR



"Sir Rudolph was giving the show the once-over, as to the manner born . . ."

ends of historical apparatus lent by Marconi's; some typical sets lent by leading manufacturers, and a demonstration by a near-by amateur of remote control, in which he was to cause a rosette of electric lamps to light up. All well and good!

I was awakened at five o'clock on the morning of the fatal day by the thunder of hoofs and the fat-headed noise made by perturbed sheep. On inquiring about this I was told that it was market day.

"Dammit!" I cried. "Can't the market be shifted to another day?"

Apparently it would be easier to shift Easter to December than to alter market day in New Pluggate. So I had to console myself with the thought that the market would bring hordes of people to the Radio Show.

Ready for the Opening

At eleven of the morning I clove my way through massed sheep, dodged droves of fiery bulls, evaded swarms of aimless but irritable cows, and eventually reached the Corn Exchange, where the Radio Exhibition was located. Five bronzed farmers followed me in, clamouring for news of what was to happen. I explained. They swore that they would bring the market in—"every man Jack on 'em." I trembled at the thought of it.

I trembled still more violently when I ran into Sir Rudolph french-fluff, who was the Lord of the Manor

(pronounced "manah"). Lady ff-f had kindly consented to declarah the exhibition "oopen." Sir Rudolph was giving the show the once-over, as to the manner born—i.e. through one bloodshot eye and one monocle complete with watered silk ribbon (purple). "If this be the male," I thought, "what, oh, wot of its lady?" Then I busied myself with testing the rosette of lamps which was to be lit as the lady said "oopen." Of course, I found the connections reversed (chemist at work!).

His Little Surprise

At 3 p.m. the Exchange was full of the youth, beauty, and wisdom of New Pluggate. A breathless expectancy fell upon the assembly, for the Lady f-f was to arrive, pace majestically up the hall, seat herself upon a dais, and say her piece—what time 3 X G L P Q 4 from Old Sowgate touched his key and lit up my rosette.

A hush! Then through the door sailed the most matronly-looking sheep I have ever encountered—one of those sheep with woolly valances and most appealing eyes! This trotted smartly up to the dais, turned to the company, and emitted a pathetic "Baa-aa-a," and at once the rosette of lamps burst into brilliance and—my little surprise!—a gramophone began to play "She was a lady, great and splendid."

A FEMALE SHEEP

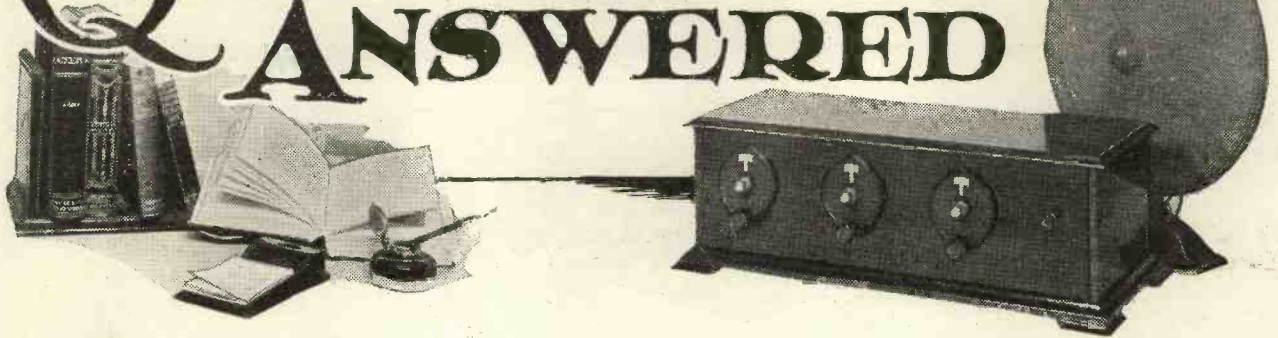


"One of those sheep with woolly valances and most appealing eyes!"

This was bad enough, but there was worse to follow, for the lady sheep was immediately importuned by a yokel gentleman who chased her drunkenly round the hall, shouting "Gie thysen ower, thee proud carlin."

I retreated to the Mayor's Parlour, where I formally resigned from the committee because my Aunt Emily was indisposed. Coward! Well—or hero?

QUESTIONS ANSWERED



H.T. Mains Units

M. D. L. (Somerton).—"I am desirous of obtaining H.T. from the mains, my present set being of the S.G., detector, and two-transformer-coupled L.F. type. The valves I am using are 2-volters, namely, an S.G. in the first valve holder, H.L. in the detector stage, L. in the first L.F. stage, and a super-power in the output. I have had an offer of a mains unit capable of giving an output of 20 m.a. Will this be large enough for the purpose?"

No, M. D. L., a total output of 20 m.a. is inadequate for a set of this type, since your super-power valve alone probably takes between 15-20 m.a., depending upon the H.T. voltage applied. Then, your S.G., detector and first L.F. valves may take 7-8 m.a., so you see that a mains unit designed for an output of at least 30 m.a. is desirable.

Do not economise in this matter, because so many of the troubles which occur when a mains unit is used are caused by the purchase in the first instance of a unit not intended to give the output which the owner frequently endeavours to obtain.

Transformer Curves

N. N. (Banstead).—"I have just been studying the N.P.L. curves for a transformer in which I am interested, and I notice that there is a definite increase in the amplification between 2,000 and 8,000 cycles. Is this an advantage, or should the curve be a straight line?"

This increase in the amplification at the upper end of the musical range is a definite advantage, owing to the fact that the majority of the amplifying stages in a receiver tend to reduce the magnification of the higher musical frequencies. For instance, a sharply tuned H.F. stage, or the use of reaction, will tend to do this—so also will an R.C. stage unless it

is very carefully designed. Hence, the rising characteristic in this particular transformer is most certainly a point in its favour.

Converting to A.C.

N. K. (Manchester).—"I am very keen to convert my det. and 2 L.F. (transformer-coupled) receiver to

mains unit and trickle charger. Alternatively we advise you to cut out one of the transformer-coupled stages and to replace this with a resistance-coupled stage, so as to reduce the overall magnification and to ensure stability.

Long-Wave C.W.

M. A. S. (Portsmouth).—"I have been experimenting with a super-het., and I find that when I tune in a station I frequently get a background of C.W. Morse. The received broadcast transmissions are free from distortion, so it is not a case of the intermediate stages oscillating. Do all super-hets. bring in this Morse background?"

Not necessarily, but it is essential to make a very careful choice of the intermediate frequency. If your intermediate stages are tunable try altering the frequency a little and note the effect. Possibly you may be able to reduce the interference. Presumably your intermediate transformers are screened? If not, it is advisable to enclose them in metal boxes to prevent direct pick-up.

A Loud "Squeal"

L. T. (Nottingham) is puzzled about a fault which has developed in his one-valve set. He is using a straightforward detector with differential reaction, and finds that directly he switches on he gets a squeal in the 'phones. The trouble occurs even though the reaction control is set at its minimum position.

Well, L. T., you have neglected to do one thing, and that is to test out your grid leak. Try this, or alternatively replace it with another in case the leak has become faulty. Also check up all your grid circuit connections, and make sure that you have no "dry" joints or imperfect contacts.

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.

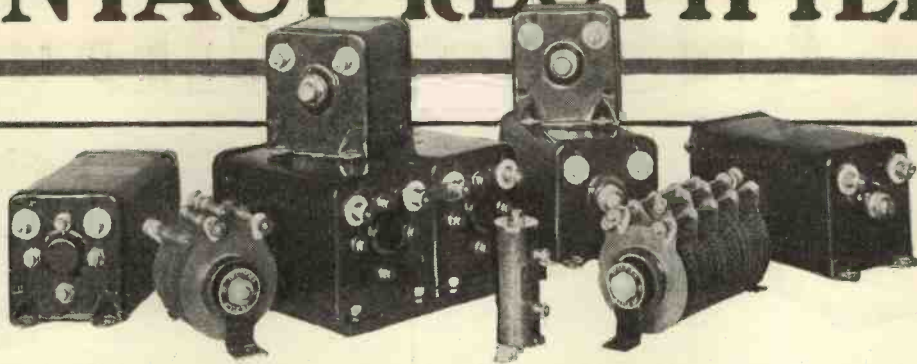
A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you 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.

'all-mains' A.C. Could I do this simply by replacing the battery valves by the indirectly-heated A.C. type and connecting the set up to an 'all-mains' power unit?"

We do not advise modifications of this nature. It is highly probable that if you attempt to convert your two-transformer-coupled set to "all mains" instability may result. We have received numerous letters from readers indicating that such modifications have not met with success, and we strongly recommend you either to rebuild the set to conform to one of our published "all-mains" designs, or to content yourself with an H.T.

CONTACT RECTIFIERS



WHENEVER an alternating voltage is applied across the junction point or boundary between two different conductors some degree of rectification usually takes place. In other words, the resistance across the contact is not the same in both directions, so that more current will pass through the low-resistance path.

If the resistance in one direction is infinitely large, then the alternating-current pulses in that direction are entirely cut off, and rectification is complete. More usually, however, there is a residual "reverse" current, the value of which depends upon the particular conductors used to form the contact.

An Electron Discharge

One of the commonest types of dry-contact rectifier is that formed by the junction of pure copper and its oxide. Here the high-resistance path is from the copper to the oxide, so that the rectified current pulses pass from the oxide to the copper.

There is a wide difference of opinion as to what actually occurs across the rectifying layer.

It is likely, however, that a direct electron discharge occurs across the contact boundary which not only facilitates the passage of the current, but also determines its direction.

The Use of Bias

The action is not unlike what occurs, for instance, in a gas-filled rectifier having a heated cathode. When the plate of the tube is thrown positive by an applied A.C. voltage, the electrons are attracted towards it, and in their passage impact with the molecules of the gas contained in the bulb and ionise them. This makes the tube conductive in that particular direction.

When, however, the A.C. voltage is reversed the electrons emitted from

By J. C. JEVONS.

Have you ever wondered how a metal rectifier works? Here the writer tells you about them in an extremely interesting manner. He also mentions a recent development, in which an auxiliary electrode is included in the rectifier for controlling purposes.

the filament are driven back towards the filament and form a layer or space charge about it. Meanwhile, the gas-path between the anode and cathode being no longer ionised stops any current flow during this half-cycle, so that a rectifying action occurs.

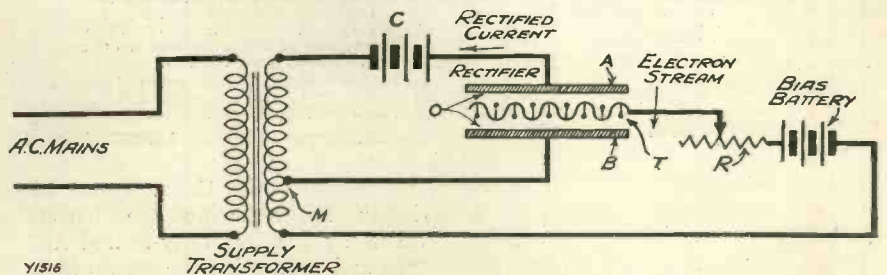
The electron discharge theory, in the case of the dry-contact rectifier, is borne out by the recent discovery that the output from such a rectifier can be regulated by inserting a control electrode or "grid" between the two main electrodes of the rectifier.

The arrangement of the "biased" rectifier is illustrated in the accompanying diagram, where the contact-rectifier is shown enlarged for the sake of clearness. The two main electrodes A, B are separated by a layer of oxide O. Mounted inside the layer, and separated by it from the main electrodes, is a sheet T of fine wire gauze, which is connected to a biasing battery through a variable resistance R.

Any Desired Current

The accumulator C to be charged is inserted in circuit as shown. The direct-current supply fed to the accumulator from the rectifier can then be regulated to any desired value, between zero and the full-load current which the rectifier is capable of passing, simply by adjusting the value of the biasing voltage applied to the grid through the adjustable resistance R.

A GRID FOR CONTROLLING THE CURRENT



This diagram shows you how the current through a dry rectifier can be controlled by inserting a grid between the two main electrodes, thus likening its action to that of the ordinary radio valve.

The control effect is similar to that of the grid in the ordinary thermionic valve, where the effective current passing from filament to plate depends upon the biasing voltage on the grid. A sufficiently negative grid voltage cuts the plate current down to zero, whilst a positive grid voltage will raise the plate current to saturation value.

The additional alternating-voltage applied to the grid due to the transformer tapping M compensates for the fact that the supply voltage across the main electrodes A, B—unlike that applied across the plate and filament of a valve—is constantly changing from positive to negative.

There's a **READY RADIO** Kit for Every Circuit

THE "SIMPLICITY" SUPER

	£	s.	d.
1 Black polished ebonite panel, 16" x 7" x 3/16", drilled to specification ...	4	9	
1 Oak polished cabinet with 10" deep baseboard ...	1	5	0
1 ReadRad centre-tapped frame aerial ...	1	0	0
2 J.B. .0005-mfd. variable condensers, with 40-1 slow motion dial ...	1	1	0
1 Gylidon .0001-mfd. Bebe reaction condenser ...	5	0	
1 Rolls-Caydon filter and single intermediate unit, and one oscillator coupler with on-off wave-change switch ...	2	10	0
3 Telsen 4-pin valve holders ...	1	6	
1 Telsen "Radiogrand" L.F. transformer ...	8	6	
1 Telsen .001-mfd. fixed condenser ...	11	4	
1 T.C.C. 1-mfd. fixed condensers ...	3	10	
1 T.C.C. 2-mfd. fixed condensers ...	3	0	
4 Lewcos 1,000-ohm flexible resistances ...	1	0	
1 ReadRad 15,000-ohm flexible resistance ...	1	3	
1 Magnum 50,000-ohm potentiometer with special on-off switch ...	8	6	
1 ReadRad 3-point strip for frame connections ...	6		
1 Ebonite terminal strip, 3" x 2" x 3/16" ...	1	3	
1 ReadRad fuse and holder ...	1	3	
2 Belling-Lee "R" terminals marked LS+ and LS- ...	6		
8 Belling-Lee winder plugs, 2 for O.B. and 6 for H.T. ...	1	4	
2 Spade terminals ...	1	3	
1 Packet ReadRad "Jiflinx" for wiring ...	2	6	
5 Valves as specified: 2 Cosmor S.G., 1 Mazda HL210 and P220, and 1 Mullard P.M.1 L.F. Screws, flex and etc. ...	3	7	6
TOTAL (including cabinet, frame aerial, and valves) ...	£12:0:0		

THE "SIMPLICITY" SUPER

Completely assembled, with valves, cabinet and wound frame aerial, ready for use and aerial tested. **£14:0:0** or twelve equal monthly instalments of **£1:5:8**.

KIT "A" (less valves and cabinet) ...	£7:7:6
or twelve equal monthly instalments of 13/8	
KIT "B" (with valves, less cabinet) ...	£10:15:0
or twelve equal monthly instalments of 19/9	
KIT "C" (with valves and cabinet) ...	£12:0:0
or twelve equal monthly instalments of £1:2:0	

TO OVERSEAS CUSTOMERS

All your goods are very carefully packed for export, and insured, all charges forward.

THE "LOCK-TUNE" FOUR

	£	s.	d.
1 Polished ebonite panel, 18" x 7" x 3/16", drilled to specification ...	5	3	
1 Oak cabinet to specification, with 10" baseboard ...	1	5	0
1 J.B. .0005-mfd. "ganged" condenser with disc drive ...	1	8	6
1 ReadRad on-off filament switch ...	1	10	
2 Lewcos 600-ohm Spaghetti resistances ...	1	6	
1 Lewcos 1,000-ohm Spaghetti resistance ...	9		
1 ReadRad 50,000-ohm Spaghetti resistance ...	1	9	
1 ReadRad 25,000-ohm Spaghetti resistance ...	1	6	
1 T.C.C. 1-mfd. fixed condenser ...	1	4	
1 ReadRad 2-meg. grid leak and holder ...	1	4	
1 Lissen .2-meg. grid leak with terminals ...	1	3	
1 Magnum 20,000-ohm potentiometer with special on-off switch ...	8	6	
4 Telsen 4-pin valve holders ...	2	0	
2 T.C.C. 1-mfd. fixed condensers ...	5	8	
2 T.C.C. 2-mfd. fixed condensers ...	7	8	
1 Dubilier .04 non-inductive type condenser ...	2	0	
1 ReadRad .0003-mfd. fixed condenser ...	2	10	
1 T.C.C. .01-mfd. fixed condenser ...	2	6	
1 Lewcos H.F. choke ...	7	9	
1 ReadRad "Hilo" H.F. choke ...	4	6	
1 R.I. Hypercore L.F. choke ...	17	6	
1 Varley Square-Peak coil ...	15	0	
1 Varley Intervalve coil ...	8	6	
1 Telsen Radiogrand L.F. transformer ...	8	6	
9 Belling-Lee type "R" terminals ...	2	3	
1 Terminal strip, 18" x 2" x 3/16" ...	1	6	
5 Belling-Lee winder plugs ...	2	6	
1 Packet Jiflinx, for wiring ...	2	6	
4 Valves to specification: Cosmor S.G.215 (metallised), Det., L.F. and power ...	2	7	6
Flex, screws, etc. ...			8
TOTAL (including valves and cabinet) ...	£10:18:6		

KIT "A" (less valves and cabinet) **£7:6:0**

or twelve equal monthly instalments of **13/6**

KIT "B" (with valves, less cabinet) **£9:13:6**

or twelve equal monthly instalments of **17/9**

KIT "C" (with valves and cabinet) **£10:18:6**

or twelve equal monthly instalments of **£1:0:0**

You can now buy any "Ready Radio" Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

Buy all your radio from **Ready Radio**
159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1.

Telephone Hop 5555 (Prime Exchange)
Telegrams: READRAD, SEDIST

THE "NEW D.C." THREE

	£	s.	d.
1 Polished ebonite panel, 24" x 7" x 3/16", drilled to specification ...	7	0	
1 Cabinet with 10" baseboard ...	1	15	0
2 Wavemaster .0005-mfd. Extensar condensers ...	1	11	0
1 ReadRad .00015-mfd. diff. reaction condenser ...	5	0	
1 Bulgin double-pole single-throw mains switch, S.58 ...	3	9	
1 Lewcos 30-ohm Spaghetti resistance ...	3	9	
1 Tunewell 500-ohm Spaghetti resistance ...	9		
1 Lewcos 600-ohm Spaghetti resistance ...	9		
1 ReadRad 10,000-ohm Spaghetti resistance ...	1	0	
1 ReadRad 25,000-ohm Spaghetti resistance ...	1	6	
1 ReadRad 15,000-ohm Spaghetti resistance ...	1	3	
1 ReadRad 2-meg. grid leak and holder ...	1	4	
1 Dubilier .25-meg. grid leak and vertical holder ...	2	9	
1 Rotorohm 50,000-ohm potentiometer ...	6	0	
1 Bulgin mains resistance to specification ...	18	6	
1 ReadRad 600-ohm resistance and holder ...	2	6	
2 Telsen 5-pin valve holders ...	1	4	
1 Junit 5-pin horizontal valve holder ...	1	9	
2 Telsen .001-mfd. fixed condensers ...	1	0	
1 T.C.C. .01-mfd. fixed condenser ...	2	6	
1 ReadRad .0003-mfd. fixed condenser ...	5	8	
1 T.C.C. 1-mfd. fixed condenser ...	5	8	
5 Dubilier 2-mfd. (250-volt working) type BC condensers ...	18	4	
1 Formo .001-mfd. max. compression type condenser ...	1	6	
1 Lewcos H.F. choke ...	7	9	
1 ReadRad "Hilo" H.F. choke ...	4	6	
1 R.I. Hypercore L.F. choke ...	17	6	
1 Bulgin smoothing choke ...	12	6	
1 R.I. Pentonite output filter choke ...	1	0	
1 Telsen Radiogrand L.F. 5-1 transformer ...	8	8	
1 ReadRad P.J.2 coil ...	3	6	
1 ReadRad P.J.3 coil ...	5	0	
2 ReadRad Quoit coils ...	7	0	
1 Bulgin (small type) milliammeter, to read up to 50 m.a. (DM19) ...	8	6	
1 Bulgin (small type) ammeter, to read up to 1 amp. (DM5) ...	7	6	
1 Bulgin mains safety plug, type P.12 ...	3	9	
1 Bulgin twin fuse, type F.11 ...	2	6	
2 Terminal strips, 3" x 2" ...	6		
4 Belling-Lee type "R" terminals ...	1	0	
1 Packet Jiflinx, for wiring ...	2	6	
3 Mazda valves to spec. indirectly heated D.C. type: 1 S.G., 1 H.L., 1 Pentode ...	3	2	6
Crocodile clips, flex, mains adaptor plug, screws, etc. ...	1	9	
TOTAL (including valves and cabinet) ...	£16:9:6		

KIT "A" (less valves and cabinet) **£11:12:0**

or twelve equal monthly instalments of **£1:1:3**

KIT "B" (with valves, less cabinet) **£14:14:6**

or twelve equal monthly instalments of **£1:7:0**

KIT "C" (with valves and cabinet) **£16:9:6**

or twelve equal monthly instalments of **£1:10:3**

TO INLAND CUSTOMERS

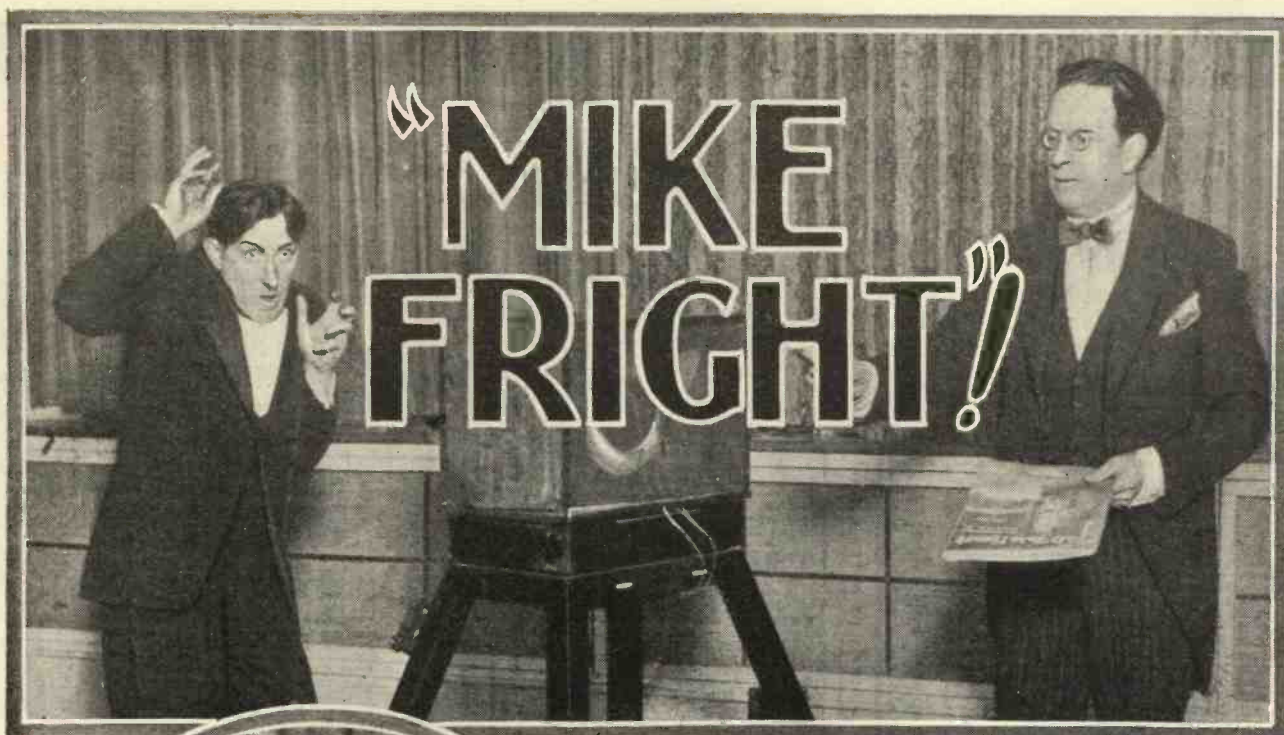
Your goods are despatched post free or carriage paid.

IMMEDIATE DESPATCH ORDER FORM

To **READY RADIO (R.R.) LTD.**, 159, Borough High Street, London Bridge, S.E.1

CASH ORDER FORM. Please despatch to me at once the goods specified, for which I enclose payment in full of
C.O.D. ORDER FORM. Please despatch to me at once the goods specified, for which I will pay the full sum of
EASY PAYMENT ORDER FORM. Please despatch my Easy Payment order for the goods specified, for which I enclose first deposit of

£ Name.....
£ Address.....
£
KIT REQUIRED



TEDDY BROWN

From Robert Hale,
the well-known artiste.

IT happened when the B.B.C., as an experiment, arranged to broadcast a brief variety concert from an aeroplane, while it was actually in the air—and I was one of the aerial artistes.

It was a foggy day, and flight was dangerous, but to make matters worse someone discovered that it was the thirteenth! Then we discovered that we were thirteen in party, and then I chanced to pull out my wallet and saw that my season ticket expired on the thirteenth! After this, of course, we all began to discuss the perils of aviation and the terrible disasters of the past.

By the time we were all nice and cheerful, I was in the throes of mike fright and every other kind of dread. The Air Ministry bucked matters up by sending us a wireless message telling us to descend, but the pilot saw a break

in the clouds and made for it. And then the broadcast began!

The noise made by the engine was so great that we could scarcely hear a word of it! The band and the pianist did their worst, but you couldn't hear what they were doing. The pilot shut the engine off for a time, then discovered we were getting too close to the ground and had to start her up again.

When I asked the band to give me a fanfare for my "entrance," they gave it, but you heard nothing. It was terrible!

I got through my song somehow, and one of the electricians shouted through to the Biggin Hill station, "Mr. Robert Hale has just sung 'Queen Elizabeth,'—will you give me a flash, please—one for good, two for bad." The reply was an extraordinary bang which might have meant anything, so that I never knew the verdict on my efforts.

Sir Hamilton Harty,
the celebrated conductor.

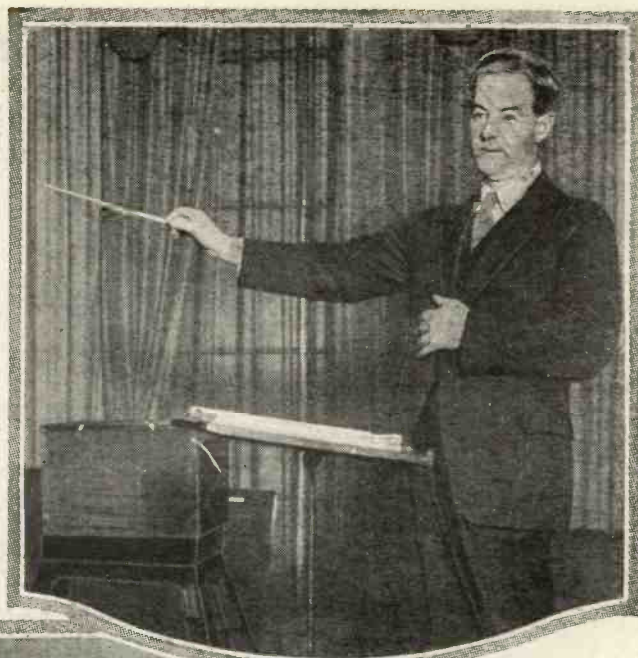
I have never been afraid of the microphone. The reason for this may be that in concert halls they are generally arranged behind one, and "what the eye does not see, the mind does not fear." Besides, one generally concentrates on the music, and is so intent on giving the best performance possible that one forgets the little eavesdropper.

Seymour Hicks,
the noted actor.

During my first broadcast, in the very early days, I was not at all nervous of the "mike," but I simply quaked at the knowledge of a party of six expert announcers sitting directly behind me, who, I am sure, were thinking that I was about the worst broadcaster they had ever heard!

That I am not far wrong is shown by the fact that these six scarcely moved a muscle during my whole quarter of an hour of funny stories, and when I had finished they all got up in silence. Save one, who said to

Robert Hale—Sir Hamilton Harty
—Kate Winter—Teddy Brown
—Seymour Hicks—Sandy Rowan
—and Albert Sandler
 tell us about "mike fright"—that strange
 dread of the microphone.



Sir Hamilton Harty, conducting in one of the London studios.

me: "I liked that last story of yours!" And I had been speaking for fifteen minutes!

Kate Winter,
 the popular singer.

At the time of my first broadcast, which took place when the B.B.C. had its headquarters at Marconi House, everything was so informal that the would-be radio artiste had no time to think about being afraid. And after the first time you get accustomed to studio work. It needs something very much out of the ordinary to interrupt your calm.

This interruption I had when I sang at the Radio Exhibition at Olympia three or four years ago, in the "show studio" which was erected in the hall especially for the exhibition. It was perfectly ordinary in every respect save one—there was a glass window on one side through which a passing stream of people continually peered.

Singing there with a host of faces drifting by in perfect silence was a peculiar sensation indeed!



Elsie and Doris Waters,
 the well-known variety artistes.

We have only been afraid of the microphone on one occasion, and that, of course, was at the time of our first broadcast.

You know the terrible experience of going to the dentist's. You wait and wait and put everything off till the last moment, and you imagine over and over again what is going to happen and where he is going to hurt you most—and then you are pleasantly surprised to find that the actual extraction is not so bad as you anticipated. That's how it was with the first broadcast.

We filled our minds with all manner of imaginary fears and magnified every little unpleasant thought about the studio until we were both of a mind to let listeners down. We didn't even eat a crumb all day. No wonder we felt weak at the knees on entering the studio.

But it wasn't at all bad. And then we went out to dine.

Teddy Brown,
 the famous dance band leader.

I became quite accustomed to the microphone in America, and it was there that I had my worst dose of "mike fright." I was about to announce a waltz and a foxtrot when I happened to look at the dancers and espied—the Prince of Wales!

This, absurd though it may seem now, so startled me that I found myself quite unable to address listeners with any degree of sanity, and all that America heard was a series of gurgles and gasps. Until, calm restored, I at length managed to get the words out. But it was hopeless. The words came in their wrong order. I told listeners

Below is a recent portrait of Miss Kate Winter, one of the B.B.C.'s best-known soloists. To the right, Mr. Seymour Hicks.



How It Feels to Face the Microphone

about the imminence of a foxtrot, and the band struck up a waltz.

Albert Sandler,

the violinist.

I have never been afraid of the "mike." To me it is more of a help than a hindrance. I find the knowledge of the vast audience that is listening-in to me most inspiring. I play better at the very thought of it.

But my great fear is lest anyone dining in the restaurant should suddenly wish to broadcast their voice to the world and should shout into the microphone before I can stop them. I know that the engineers at the control end would see to it that the shout did not get over, and as yet, indeed, no one has ever tried to demonstrate their presence in this manner, but nevertheless the fear remains.

People occasionally ask me whether they might "just whisper into the microphone," but, of course, I never permit it. The dread lest they should do so without asking is often upon me.

Sandy Rowan,

the Scotch comedian.

Awa wi' microphone fright, say I. There's nobody but meself suffers mair. Like an auld wife am I in the studio. I hae my hands in my wee pockets, and hope blithely that the Announcer is nair a bit thirsty.

I tell meself o'er and o'er agen, "Mon, it's guid siller ye'll get for this," but I ken they might not pay me if I am not good. And then when the broadcast is finished, y'ken—hoots! I gang out and hae a wee drap.

Firm Favourites with the Listening Public



Albert Sandler (left) is easily recognised, but would you have known Sandy Rowan (centre)? The portrait on the right is that of another very well-known artiste—Mr. Robert Hale.

THERE has recently been developed in the United States an instrument for measuring electrical interference heard on wireless receivers. This meter locates the source of the noise and measures its intensity.

The need for such a measuring instrument has been felt for some time. It makes possible a comparison of the test results of different investigators; and it gives manufacturers of electrical apparatus a means of measuring the amount of wireless noise created by their apparatus.

Provides a Basis

The meter also gives a method of obtaining facts upon which fair and reasonable rules and regulations can be drawn up regarding "permissible interference" where such rules are necessary.

MEASURING ELECTRICAL INTERFERENCE

Details of a useful new meter which enables direct comparisons of radio noises to be made.

The wireless noise meter consists of two parts: a receiving unit to detect and indicate wireless noise, and a calibrating unit to measure the intensity of the noise in millivolts per metre, which is the customary unit of measurement for radio signals.

The receiver is enclosed in an aluminium box and weighs 30 lb. Six valves are used. The pick-up is obtained with a rod antenna, 2 metres long. A search coil may be used to

investigate noises around motors, transformer ground leads, etc.

The calibrating unit is also enclosed in an aluminium box which is fastened to the side of the receiver. It is so designed that the wireless noise may be measured with any antenna that may be used with the receiver. The output of the calibrating unit may be varied from zero to 1,000 millivolts per metre.

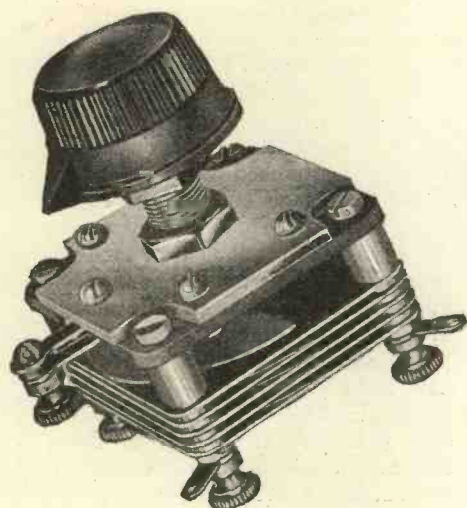
The Standard Noise

A feature of the instrument is the standard noise created and by means of which it becomes possible to measure the noise intensity.

The standard noise is obtained by alternately charging a network of small condensers from a dry battery and discharging into the antenna.

SPECIFIED for the "NEW D.C." THREE, the "LOCK-TUNE" FOUR and every efficient receiver

BECAUSE experience has proved their reliability



DIFFERENTIAL REACTION CONDENSERS

Moving and fixed vanes interleaved with Bakelite discs of highest dielectric qualities. Chemically treated all-brass parts.

- '00007, 5/3 ;
- '00013, 5/6 ;
- '0002, 5/9 ;
- '00027, 5/9 ;
- '00034, 6/-

Confidence in "LOTUS" Components prompts the designer of every modern set to specify them to constructors.

They know, from actual experience, that "LOTUS" Components are reliable and give the results they themselves have achieved.

Far too many sets are working inefficiently through the substitution of other makes of components for those specified. To ensure the results obtained by the designers it is essential to follow their recommendations.

For the "NEW D.C." THREE, described in this issue, the following components are specified:— The "LOTUS" Differential Reaction Condenser, two "LOTUS" 5-pin Valve Holders, and the "LOTUS" L.F. Transformer. For the "LOCK-TUNE" FOUR:—The "LOTUS" "On-Off" Switch, four "LOTUS" Anti-Microphonic Valve Holders, and two "LOTUS" H.F. Chokes.

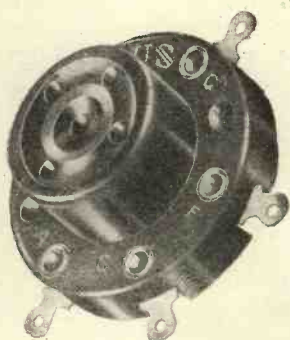
Be sure to ask for "LOTUS" and ensure success. If your dealer cannot show you the components you require, write to the makers for an illustrated list.

For reliable components specify

LOTUS

RIGID VALVE HOLDERS

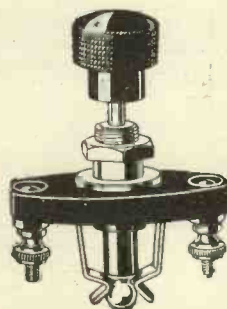
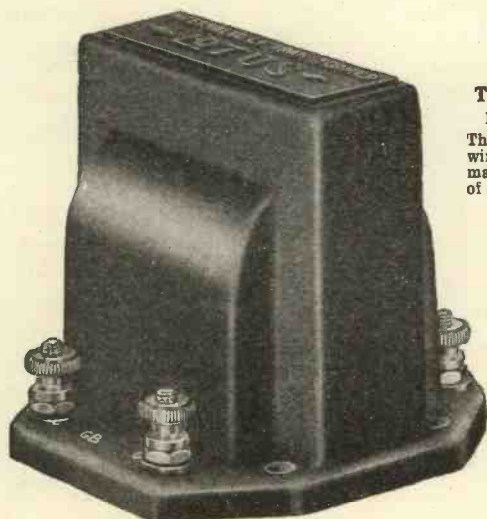
For 4- and 5-pin valves.
Highly-finished Bakelite mouldings with specially heavy sockets.
With terminals ... 10d.
Without terminals .. 9d.



L.F.

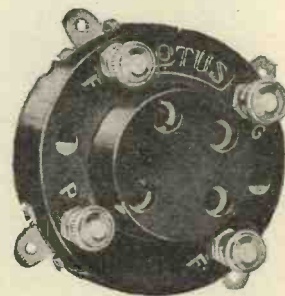
TRANSFORMERS

Ratios 3-1 and 5-1.
The special method of winding ensures remarkable reproduction of all frequencies.
12/6 each.



BATTERY SWITCH

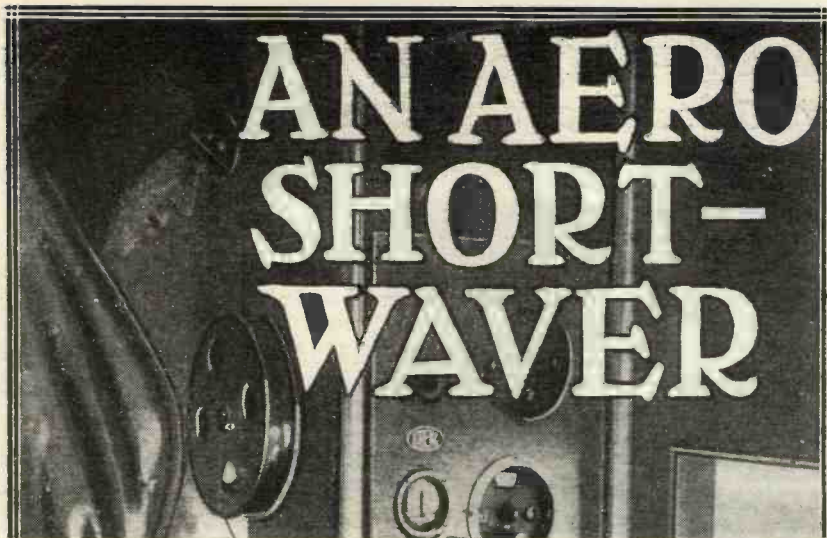
A neat and efficient push-pull switch fitted with both terminals and soldering tags. 1/6 each.



VALVE HOLDERS

(Anti-Microphonic).
Finest Bakelite mouldings with one-piece phosphor-bronze springs and leg sockets.
With or without terminals, 1/- each.

LOTUS RADIO LTD., MILL LANE, LIVERPOOL



By Dr. ALFRED GRADENWITZ

Opening up a new radio channel for aeroplane communication.

A POWERFUL Dutch aeroplane, "PH AGA," a three-engined Fokker 'plane which recently set out from the aerodrome of Schipol, near Amsterdam, to fly in twelve stages to Batavia in the Dutch Indies, carried radio apparatus of particular interest.

Long and Short

The main transmitter was a long-wave installation covering from 550-1,350 metres, and having an aerial output of 120 watts. However, as this would not have been capable of providing a permanent radio connection between the airplane and stations on the ground, a short-wave station

(as powerful as possible) had to be used as well.

No special short-wave sets have so far been adopted for regular use on international air services, because of their limited range and the large number of existing aeronautical radio

in spite of the many sources of electrical interference.

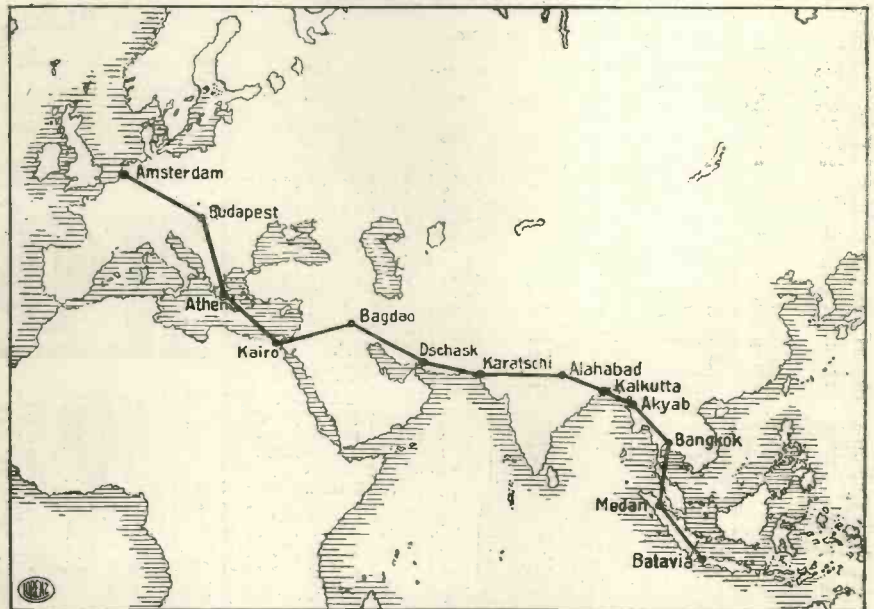
The route at first adopted had to be altered, it being prohibited to fly over Constantinople with aeroplanes fitted with radio. This is why the route was laid over Athens and Cairo, thus entailing a crossing of the Mediterranean, and flying about 480 miles over water.

Communication Throughout

A permanent connection with either the starting or finishing points was secured by means of the short-wave outfit. Current for the transmitter is supplied by a rotary converter fed from the accumulators on board. The aerial stretched along the wings of the aeroplane enables the short-wave outfit to be put into operation during flights as well as after landing, thus ensuring a permanent connection in the event of emergency landings in uninhabited tracts.

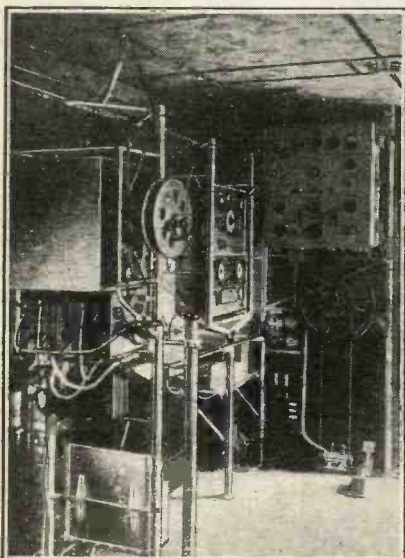
The flight was carried out without any incident in twelve stages, as arranged. The "PH AGA" was, during her flight, as far as Jask, Persia, on the Gulf of Omar, in permanent short-wave connection with home stations, the longest dis-

THE DUTCH KEPT IN TOUCH BY RADIO



Here is a copy of a map showing the route traversed by the aeroplane during its unique flight. A small-power short-wave transmitter was used and proved highly successful.

SPECIAL RECEIVER USED



The Lorenz short-wave transmitter and special 5-valve receiver fitted to the aeroplane.

stations. A transmitter with an aerial power of 40 watts was installed, its wave-range being from 20 to 60 metres.

The wave-length actually used could be adjusted to suit the distance to be covered and the time of day. A special 5-valve receiver guaranteed perfect reception in the flying machine,

tance bridged in duplex communication being about 3,300 miles.

From Jask on, the stations of Bagdad, Audier and Bandoeng were in communication with the 'plane, the last-named station handing on any messages received to the Kootwijk high-power radio-telegraph station direct.

23 years
before
broadcasting
began



For thirty years Helsby Condensers have been supplied to the exacting standards of the G.P.O. and the Admiralty. Plates are of pure metal foil, and each condenser is vacuum-dried, impregnated with non-hygroscopic material and tested to double working pressure. Capacity is guaranteed accurate within 10 per cent. These are reasons why one large manufacturer has recently ordered 130,000 Helsby Condensers, and why dealers everywhere are finding them such ready sellers.

TWO POPULAR SIZES :

- Type 209T
 Working voltage 250 D.C.
 1-mf. 2/7
 2-mf. 3/6
- Type 212
 Working voltage 400 D.C.
 1-mf. 3/7
 2-mf. 4/9

Helsby
condensers

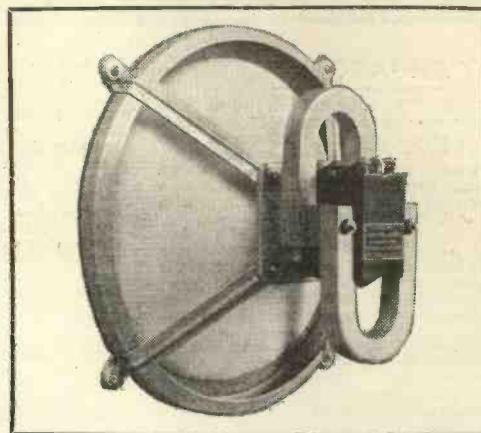
Made in all sizes from the smallest to those which weigh more than two tons. For full particulars and terms, write to the makers: BRITISH INSULATED CABLES LTD.

PRESCOT LANCASHIRE. Makers of B.I. Cables.



SAFEST
TO SELL
OR TO USE

IF YOU HAVE A GOOD SET—



THE
FERRANTI
INDUCTOR
SPEAKER

will provide you with reproduction surpassed only by the best Moving-Coil Speaker.

Ask your dealer to let you hear one in your home with your own set.

PRICES

- Chassis (as illustrated) £3.10.0
 Cabinet Model £5.10.0

FERRANTI LTD.

HEAD OFFICE AND WORKS: HOLLINWOOD, LANCs.
 LONDON: BUSH HOUSE, ALDWYCH, W.C.1



BROADCAST

AMONG the "Tens" there are two or three light numbers for summer listening that will appeal to a large number of radio set owners. The first is by Sandy Powell, who gives a humorous sketch entitled *Sandy the Charabanc Driver*. This is a real holiday number which is bound to fit in with some of your lighter moods (720).

Bubbling Over With Love is the title of a quick-step by the Riverside Dance Band, coupled with *Pretty Kitty Kelly*, on 724; while *Dreaming of My Indiana Sweetheart* and *You'll be Mine in Apple Blossom Time* form a couple of tuneful vocal duets by the well-known Vocalion stars, Mellow and Rich.

In the Broadcast "Twelves" we have Walford Davies' *Solema Melody*, played by a string orchestra, with organ, at the Stoll Theatre, London, and this is one of the outstanding releases in this series of records. It is an extremely fascinating piece, and coupled with Widor's *Serenade*, by the same orchestra, makes an extremely good two shillingsworth. It is on record No. 5243.

For those who like the old-fashioned baritone songs, *The Drum Major* and *The Gay Highway*, sung by Arthur Vivian, with orchestral accompaniment, on 5241, will have a big appeal. Those are the two Broadcast Twelve records which appeal to us most this month, though, of course, many others are being released, and it is always well to go carefully through the list before choosing records in order to see if there is anything which particularly takes your fancy.

There is a very lively selection in the Broadcast "Super Twelves" for this month. Heading the list we find Sophie Tucker, singing *That's How I Feel About You, Sweetheart* and *Egyptian-Ella*. Sophie never seems to tire any more than do her particular fans get tired of her. There is nothing particularly outstanding here, however; they are just typical Sophie numbers. Recorded on 3062.

One of the most successful revues of modern years has been Noel Coward's *Bitter Sweet*, and on 3064 we have a couple of sides of vocal gems by chorus and orchestra. A very excellent record.

Among the dance numbers in which the Broadcast "Super Twelve" is especially successful we have a waltz medley from *White Horse Inn*, coupled with *My Temptation*, a quick-step by the Manhattan Melody-Makers, on 3069, and the same band playing *You're Twice as Nice As That Girl in My Dreams* and *Fiesta*, on 3068. A third dance number which we have picked out to bring before your notice is played by Billy Mason and his *Café de Paris Band*, and the items are: *Got the Beach*, *Got the Park*, and *I Surrender, Dear*, on 3067.

COLUMBIA

One of the most outstanding Columbia releases is Mahler's *Fifth Symphony*, played by Mengelberg and his Orchestra. (L.1798.) Of lighter type we pass to Albert Sandler and his Orchestra, playing *Reachin' for the Moon* and *Girl of a Millioia Dreams*. (DB533.) Two old favourites are the *Old Friends' Medley*, played by Percival Mackay's Band, on 9122, into which such old memories as "The Man That Broke the Bank," "Two Little Girls in Blue," "Let's All Go Down the Strand" are revived. The second record is called *A Revue of Revues*, played by Debroy Somers' Band, and this is the second record of a series making an interesting remainder of the musical stage. In this record, DX257, the hits from "Hullo, Ragtime," "The Bing Boys," and "The Bing Girls" are played in the gay style that made the first record, DX227, such a popular hit.

A very fine duet record is sung by Harry Dearth and Raymond Newell, in which they provide *That's Us* and *A Sailor's Philosophy*, on DX255. It is a really magnificent recording, and the partnership between Harry Dearth (bass) and Raymond Newell (baritone) is a truly fine one. Running this very close is one by Harold Williams and the B.B.C. Male Chorus, giving *The Lincolnshire Poacher* and *Wrap Me Up in My Tartanin Jacket*, on DB524. Both are rendered in excellent spirit and with understanding.

Clapham and Dwyer have been having another spot of bother, and have recorded their well-known broadcast sketch, *A Day's Broadcasting*; while Layton and Johnstone are still hard at it, having made two records, *Hawaiian Stars* are *Gleaming* and *Rosalita*, on DB531, and *The Land of Smiles* and *Walking My Baby Back Home*, on DB532. We should also like to draw attention to *The Geisha*, a vocal-gem record in two parts on DX256, sung by the Columbia Light Opera Company, and containing the essence of the famous songs and favourite melodies of that popular musical comedy. This record is particularly timely, as the "Geisha" has recently been enjoying a successful revival at Daly's Theatre. Two further records worth hearing are organ records, one by Terence Casey, playing *Eileen Annab* and *A Perfect Day*, on DB527, and the other by Reginald Foort, playing a medley of *Song Hits*, including "Drink, Brothers, Drink," "Baby's Birthday Party," "My Temptation," "Walking My Baby Back Home," etc., on the *Regal Cinema Organ*, London. This is on DX258.

Jack Payne has recorded another half-dozen dance numbers, including *A Love Song of Old Valencia*, *Tango Lady*, and *Tell Me a Tale of Old Virginia*; while Debroy Somers and Billy Cotton are both busy recording for Columbia.

DECCA

The Hastings Municipal Orchestra is always a favourite with Decca listeners, so that they will be pleased to learn that this popular combination has just recorded two items from Delibes' *Sylvia Ballet*. This music of the 19th century is some of the most popular of all large-scale musical works, and the second record, the *Pizzicato*, is certainly one of the best known and most popular of these airs. (On F2354.)

A brief selection from some of the records released during the month. They have been chosen because of their special value to the pick-up user.

The xylophone and the vibraphone always make interesting gramophone records, and this month we have Rudolph Star, playing the *Wedding of the Three Blind Mice* and the *Parade of the Minutes*, on F2364, a couple of novelty numbers that are well worth hearing. Of the dance numbers in the latest Decca list we should like to mention *I Surrender, Dear*, by Bert Haring and his Orchestra, on F2369; *Ho, Hum* and *Were You Sincere?* by the Blue Lyres, on F2368; and *Bell-Bottomed Trousers*, on F2363, played by the Millionaires.

H.M.V.

We have been trying a large number of H.M.V. records lately, and all have been so good that it is rather difficult to bring forward any particularly outstanding numbers, but a light one which we think would probably meet with general approval by a very large majority of radio listeners is called *Old English Medley*, by the Frederick Sharpe Sextet, and coupled with a negro spiritual medley by the same combination. It is a twelve-inch record of quite unusual charm.

Chalpin, that wonderful Russian bass, should never be missed by anybody having a really good radio-gramophone, and he has recently recorded for H.M.V. his latest operatic success, *The Death and Farewell of Boris*. It is difficult to describe the power, the majesty, or even the sheer horror of his characterisation of this tragic monarch, and in this record we have a perfect reproduction of a profoundly moving piece of musical art. It is on DB984, and though it is not a new recording we feel we ought to bring it to your notice.

Peter Dawson is probably the most popular baritone of the gramophone studio, and this

month he gives us a couple of songs of the open road, *The Fiddler of Dooney* and *Song of the Highway*. Peter Dawson has recently gone to Australia but before he went, accompanied by his friend, Mark Hambourg, he spent some days in the H.M.V. recording studios, and this record is one of the results. (B3874.) A wonderful organ record is that of *The Valkyrie*, portraying the wonderful Ride of the Valkyries, and the *Grant March* from *Tannhauser*. Played on the organ of the Alexandra Palace, London, by G. Thalben Ball.

And now for some lighter music. Here are some records which we feel a large number of our readers will like to hear, and probably to purchase. First and foremost we will take Alexander and Mose, the popular broadcast "coloured" gentlemen. In this case they are discussing the misfortunes of Mose in a record entitled *The Chicken Chasers*. We will not tell you any more about the record except to advise you to go and hear it. (B3876.)

A lively and melodious pianoforte number is that by Raic da Costa, *Would You Like to Take a Walk and The Match Parade*. This is recorded on B2888. Jack Hylton secures another success on B6027, in *When the Moon Comes Over the Mountains and Breathin' on de Window*. This latter is a particularly fascinating little fox-trot. Winnie Melville and Derek Oldham sing *Love What Has Given You This Magic Power*, from "The Land of Smiles," coupled with *I Sing a Love Song*, from the film "Viennese Nights," B3805; and finally we must mention a record by one of the finest bands in London, Ambrose and his Orchestra, *Whistling in the Dark* and *Ho, Hum*. (B6032.)

There are plenty more H.M.V. records which we would like to talk about, but space does not permit, but we think we have given you a fairly varied and interesting selection from which you will be able to pick out at least a few good items to add to your radio-gran library.

ZONOPHONE

The last few weeks the weather has on occasion fulfilled everybody's wish, and Zonophone have turned out some fine favourites which will be ideal for outdoor entertainment if the summer continues the supply of fine weather.

We have received on GO102 a welcome Lauder re-recording. We say welcome, because although Zonophone have re-recorded many of this comedian's records recently we have not received a specimen "copy for some time. Although Sir Harry is "getting on in years" he still sings with his old vigour and fun, and all his "fans" should procure this record, together with its companion on the list (GO101), which contains a very new broadcast song entitled "Pin Your Faith on the Motherland," which was recorded by Zonophone, by special request, on the day he sailed for South Africa—Bonnie Leezie Lindsay and The Referee (GO102).

No. 5895 contains two rousing titles by Foster Richardson, that splendid bass singer and well-known B.B.C. artiste: *Drink, Brothers, Drink* and *A Vagabond of the Sea*. From the manner in which he sings the former title we should imagine that Foster is in entire agreement with the sentiments expressed therein.

Norman Blair's titles this month suit his rich voice absolutely perfectly. The plaintive tunes of *River, Stay 'Way From My Door* and *O Lord Send Us the Sunshins* roll out in true "spiritual" style. We thoroughly recommend Blair's version of these two very popular numbers, and the record is one of the best we have yet heard.

Frankie Marvin is very good with two real Cowboy numbers, *Six-Foot Lou* and *The Wild and Woolly West*. (5898.) The yodelling will amaze you and the accompaniment is unique and very entertaining.

On No. 5900 we have the inimitable Billings again, singing this time with Carson Robison a ballad of the real American type, all about a man who shot his best pal—another "Frankie and Johnny" farce. Very good entertainment, an "out of the rut" record which you should also make a point of hearing: *Oklahoma Charlie* and *Carry Me Back to the Mountains*.

We have received only one dance record this month—No. 5906—out of the four issued by Zonophone; a full list of which we give below: (5904) *Oklahoma* and *Topsy Turvy Talk*. (5905) *Blu*. Again and 99 Out of a Hundred. Both numbers are played by the Orpheus Dance Band. (5906) *Lady of Spain* and *Reaching for the Moon*. (5907) *Happy I Found You* and *Laughing at Life*. Both numbers are played by The Rhythmic Eight.

These are all excellent renderings of very popular titles, and particularly as we recommend the specimen copy sent us. Zono's two Dance Records are classed with the finest bands in the country for good tempo and first-rate orchestration.

Though at the time of writing we have no definite details (these if available before we go to press will be given in the Notes and News columns), we understand that on September 1st many record price changes will take place, especially welcome being the fall of price of the 3s. disc to 2s. 6d. A long overdue reduction!

ENJOY GOOD RECEPTION!

You must use good components to enjoy good reception, therefore use "Wearite" when you build the "New D.C." Three.

"Wearite" Medium-Wave Coils.
These coils were chosen by the designer of the "New D.C." Three because of their dependability. You cannot do better than follow his example and fit "Wearite" components.
Types P.J.1—P.J.2—P.J.3
Price **7/6** (per set of three).

"Wearite" H.F. Choke.
A first-class component especially recommended for the "New D.C." Three. It covers efficiently the remarkable range from 10 to 2,000 metres without any marked resonances. Self-capacity very low.
Type H.F.O., **6/6**

Write for leaflets of these and other components.



WEARITE

COMPONENTS
WRIGHT & WEAIRE, LTD.,
740, HIGH ROAD, TOTTENHAM, N.17.
Phone: Tottenham 3847/8/9.

THE CHEAPEST A.C. MAINS UNIT ON THE MARKET

REGENTONE MODEL W.I.F. FOR A.C. MAINS (H.T. ONLY). OUTPUT 120 V. AT 12 M.A.
THREE FIXED TAPPINGS: S.G. DETECTOR, and POWER. SIZE 7 1/2" X 4 1/2" X 2 1/2". Price 47/6
Write for FREE Art Booklet, "The Simple Way to All-Electric Radio," giving full details of the Regentone range.



MODEL 47/6
W.I.F.

REGENTONE, LIMITED, Regentone House, 21, Bartlett's Buildings, E.C.4.
Tel.: Central 8745 (5 lines).
Irish Free State Distributors: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin.

SEND or CALL—Personal Attention from PETO-SCOTT

VARLEY COILS FOR THE LOCK-TUNE 4

Consisting of the New Varley H.F. Intervalve Coil, Varley Constant Square Peak Coil and Dubilier '04 Non-Inductive Condenser
Sent C.O.D. Pay the Postman.
25/6

COIL QUITS

As specified and included in latest "P.W." Sets. Bakelite moulding with winding holes ready drilled, shoulder for coil assembly and lugs for baseboard or panel mounting. Ask your dealer
Or 8d. **super free.** EACH **6d.**

"P.J." COILS

Wound exactly to specification; supplied with Brackets for vertical or horizontal mounting.
"P.J." Coil No. 1 - 2/-
"P.J." Coil No. 2 - 1/6
"P.J." Coil No. 3 - 2/-

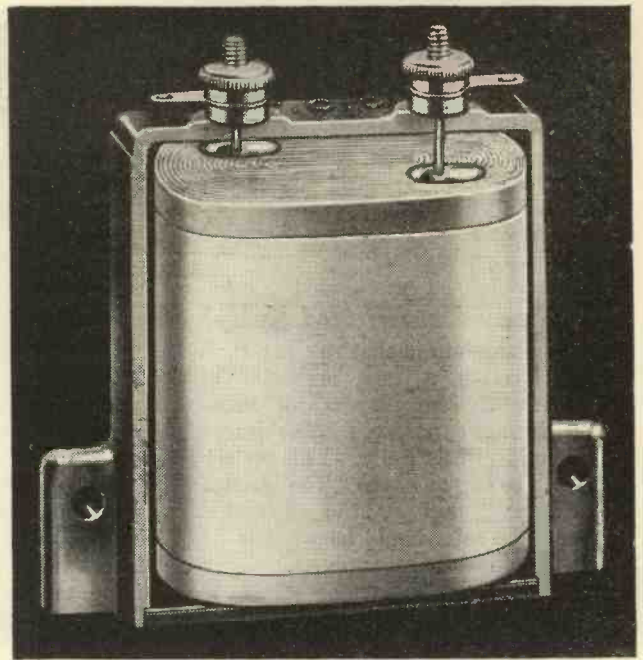
"P.V." COILS

Wound exactly as specified by "P.W."
"P.V." Coil No. 1
"P.V." Coil No. 2
The **6/6** Pair

SUPER HET-ING? FRAME AERIAL—Century Type. With Solid Base, accurate fitting bearing bush, wave-change switch, 3-way leads, and six spacers. Enamelled multi-stranded wire covered overall ensures maximum results. Correct centre-tapped. A new type frame aerial designed for modern Super Sets. From your dealer or Pay the Postman.

£1

PETO-SCOTT CO. LTD. 77 City Road, London, E.C.1. Clerkenwell 9406
82 High Holborn, London, W.C.1. Chancery 8266



What is in a T.C.C. Condenser?

YOU know a T.C.C. Condenser only by its green moulded case. In all probability you have never seen inside it. You bought it because you relied on the reputation enjoyed by T.C.C. And what has enabled T.C.C. to win this reputation? Two things—one, the remarkable reliability of their Condensers, the other, the excellent workmanship put into them.

The reliability of T.C.C. Condensers is largely due to the use of the finest materials. Take, for example, the paper used to insulate the two long strips of foil. T.C.C. use only the best linen tissue. It costs much more than inferior paper—but it ensures much longer service. And long service is what you get when you buy a T.C.C. Condenser.

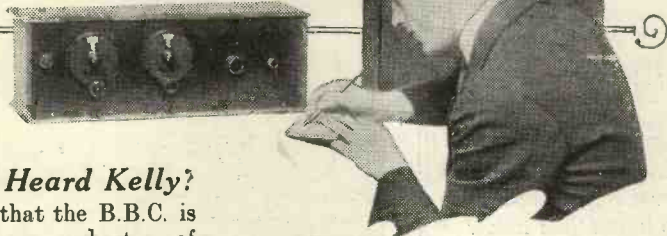
You are safe when you choose

T.C.C.

"Green for Safety"

Advertisement of
Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton, W.3.

RADIO NOTES and NEWS of the MONTH



Gland Specialist." He wanted to erect a powerful broadcasting station in order to send out medical prescriptions. It appears this doctor has already had one station in Kansas, U.S.A., from which he broadcast talks concerning the treatment of debility by the use of goat glands, but recently he was barred from making further broadcasts in the United States:

Received with Open Arms

The doctor, it seems, has now gone to Mexico, where, on the borders, he proposes to build a new powerful station. He has already had many offers from Mexican City Councils in Northern States desiring to build a hospital and a station in their cities.

Moscow's Invitation

The Moscow station is inviting British listeners to send criticism of the transmissions from that station. You can hear Moscow conclude its programme these days with this request: "In the meantime, write to us about our transmission. Give us your impressions and suggestions. Our address is: 'Trade Union Radio Station, Palace of Labour, Solianka 12, Moscow.'"

(Continued on page 178.)

Anybody Here Heard Kelly?

It is announced that the B.B.C. is forming a new orchestra of twenty-four players for revue and dramatic purposes. The leader will be Mr. S. K. Kelly. This orchestra will be known as the "The Theatre Orchestra," and by the time this issue is on sale should have made its debut before the microphone.

Sir John Interviewed

In an interview the other day, Sir John Reith—apropos of his visit to America—said: "I rather think it is not for me to say whether the B.B.C. or the two great broadcasting companies in America are doing the better work, but there are two things to which they aspire most of all in America. Their two great aims are towards greater concentration of management and, secondly, to in-

creasing recognition of service obligation."

U.S. and Ourselves

Sir John thinks it is difficult to say which country leads in the matter of wireless licences. In the first place, he said, the Americans have no means of checking their numbers, though it is said that there are about fifteen million receivers, as against the 3,600,000 in this country. Probably pro rata to the population there are more receivers in Great Britain.

Should a Doctor—Broadcast?

Broadcasting must be rather fun in the States. A story in one of the newspapers the other day told of a doctor who was known as "The Goat

MAGNUM WIRE WOUND POTENTIOMETER

A new design similar to above illustration but incorporating a special "On-Off" switch is specified for the "Lock-Tune" Four - Price **8/6**



The "Lock-Tune" Four, "D.C." Three, "Simplicity" Super, and all sets described in the leading radio journals, are supplied as constructional kits or ready wired and tested. Every set is individually hand-made and tested by skilled craftsmen, thus ensuring perfect performance in the hands of the user. A comprehensive range of lists, including a list of short-wave stations, Free on request.



A NEW COMPONENT MAGNUM VOLUME CONTROL

This is an entirely new design of very compact form, 1 1/4" diameter and 3/4" deep. It is made in two values of 1/2 megohm and 2 megohm, and is one-hole fixing. Contact is by a floating spring disc, thus eliminating noise and wear. Price **5/-**

BURNE-JONES & CO. LTD.

"MAGNUM HOUSE," 296, BOROUGH HIGH STREET, LONDON, S.E.1.

Telephone: Hop 6257 and 6258.

Scottish Agent: Mr. Ross C. Wallace, 54, Gordon Street, Glasgow, C.1.

Why you should choose a WAVEMASTER Extenser Condenser

- 1 Guaranteed to stated capacity as tested and approved by "Popular Wireless."
- 2 A Precision Instrument of rigid construction.
- 3 Insulation of best quality Bakelite.
- 4 Removable spindle may be gauged to any number of Extensers.
- 5 Definite pigtail connection to rotary vanes.
- 6 Stop on rotary vanes, giving 360° of movement on dial. (Patent pending.)
- 7 Cone bearings giving a very smooth movement.
- 8 Double locked one-hole-fixing bush, ensuring perfect alignment of vanes.
- 9 Special fixing nut makes loosening of Extenser on panel impossible.
- 10 Wavemaster five-point switching device, giving a very smooth and quick movement, contact points are self-cleaning and give correct time change over from short to long waves.

Cat. No. 90 EXTENSER - - - - 12/-

Cat. No. 90/a SLOW MOTION DIAL 4/6

Cat. No. 95 SLOW MOTION EXTENSER COMPLETE WITH KNOB AND DIAL 15/6

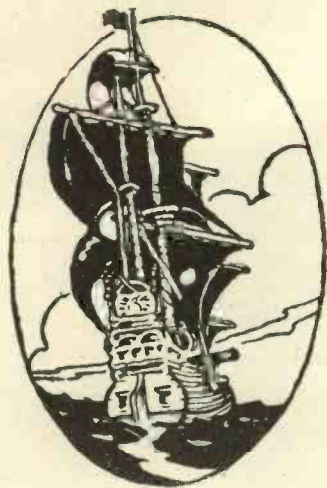
Obtainable from all Dealers, or in case of difficulty please apply to:

The Webb Condenser Co., Ltd.,

Manufacturers of Wireless Variable Condensers,

42, Hatton Garden, London, E.C.1.

Tel.: Holborn 2260.



All for One Shilling

A COMPLETE BOOK-LENGTH NOVEL

and 10 Brilliant Short Stories

Appear in the September Issue of The ARGOSY

The ARGOSY has become famous as a magazine devoted to the best fiction. It contains the widest possible selection of great stories written by contemporary and classic writers. It is a magazine that is steadily growing in popular favour. More and more people are realizing the value of a magazine which not only prints stories of the highest excellence but also gives a wider variety of great stories than any other magazine to-day. The September Issue on Sale August 7th contains a Complete Book-Length Novel entitled

“Barbe of Grand Bayou” JOHN OXENHAM’S

immortal story of romance. A novel that is also a great story and equal in length to the average novel published in book form.

The ten short stories include masterpieces by such well-known writers as

W. W. JACOBS, MARTIN ARMSTRONG
H. A. VACHELL, MAARTEN MAARTENS
MILDRED CRAM, FRANK H. SHAW
AMBROSE BIERCE, HAMLIN GARLAND

and others

September Issue on Sale August 7th.

*At all
Newsagents
and
Bookstalls*

The **ARGOSY**
MAGAZINE

Order YOUR Copy To-day

FORMO
ARTHUR PREEN & CO. LTD.



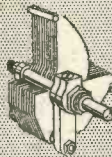
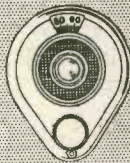
-DUAL RANGE COIL 12/6

The Formo Dual Range Coil is scientifically tested and absolutely reliable. Universally acknowledged the best type for radio constructors. It is of superior finish, being wound on a well-designed moulding. For best results and easy assembly make sure you get a "Formo." Your local dealer can supply. Catalogue of the complete range of Formo quality components sent on request.



DIFFERENTIAL CONDENSER
3/9

VERNIER DIAL 3/6



MID-LOG LINE VARIABLE CONDENSER
4/6

ARTHUR PREEN & CO., LTD.,
Golden Square, Piccadilly, W.1.
FACTORY: Crown Works, Southampton.

Advertisements

As far as possible all advertisements appearing in "Modern Wireless" are subject to careful scrutiny before publication. but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager. "Modern Wireless," 4, Ludgate Circus, London, E.C.4.

The Picture Paper with
the MOST News

SUNDAY GRAPHIC

RADIO NOTES AND NEWS OF THE MONTH

—continued from page 176

As Bad as the Census!

It appears that when a listener writes to the station he gets a Questionnaire which he is invited to fill in. These are some of the questions:

What do you think of our lectures and concerts?

What lectures and concerts would you like to hear?

Do the days and hours of transmission suit you?

What is your vocation?

Moscow can be heard on 50 metres (short-wave station) and 1,304 metres also. Programmes in English are sent out on Sundays, Mondays and Thursdays.

Shorter Waves for Ships

It is reported in "The Times" that Marquis Marconi is devoting much time to the perfecting of some standard commercial short-wave receiving apparatus. He is also said to be preparing tests of the practical value of waves a few centimetres in length, with a view to their application to some special ship-to-ship and shore-to-shore wireless safety device, principally to establish the accurate position of vessels in a fog.

A Nasty "Dig"!

Captain James Stewart, M.P., who recently took up the question of wireless reception in Scotland in the House of Commons, has now been answered by the B.B.C. In a reply the B.B.C. said:

"The solution of the problem lies in the allotment of more or better wave-lengths to broadcasting services, and not in any immediate action which it is possible for the B.B.C. to take, such as the erection of further transmitters. You will be aware that a new high-power station is at present being built near Falkirk. This new Scottish Regional station will provide two programmes to the majority of Scottish listeners, one of which will give full scope for the inclusion of Scottish programme talent." Scottish listeners, please note!

Thirty Years of Radio

A man who has done a very great deal for wireless telephone progress, Mr. E. H. Shaughnessy, recently retired from the Post Office after forty-four years' service. Mr. Shaughnessy began his wireless experiments in 1900

A Good Ghost Story

In an interview the other day he said: "I remember years ago how everyone was worried by the messages from a ghost transmitter which were sent out every night at 11 o'clock. I got a man to pick up a station which I suspected was the origin. His results were compared with those of the man who complained of the ghost messages, and they were practically identical. Then I was able to explain that the ghost messages were simply wireless instructions sent from Portsmouth to the Mediterranean Fleet."

Did You Hear Him?

One of the best jokes at the expense of the B.B.C. was pulled by Major E. H. Jones, when he gave his "escape" talk some couple of weeks ago. Major Jones described how he recited an incantation to the mystification of his Turkish gaolers. "What I said to them was," said Major Jones, "Gwyn fyd no chai cymru ei diwif ei hym."

GOT A.C. MAINS?

IF SO, DON'T MISS

NEXT MONTH'S

"MODERN WIRELESS"

in which there will be full details of a fine

ALL-MAINS A.C. 3-VALVER

Out Sept. 1st Price 1/-

According to Major Jones, when the Turkish officials heard that they were afraid. The joke is this, however, that Major Jones's Welsh incantation, when translated into English, means: "Oh, that Wales had its own broadcasting station!"

Congratulations to Major Jones!

A Great Pity

The National Orchestra of Wales will be dissolved, unless a miracle happens, for lack of funds, on October 7th next. The B.B.C. has hitherto financed this orchestra, and offered to continue to support it at the rate of £7,000 for two years on condition that a similar sum was raised in Wales. An appeal for funds was issued and a certain amount was collected, but it was urged that an extended time limit was necessary. It now appears that the Council of the National Orchestra of Wales, after reviewing the circumstances, could not agree. So donations will probably be refunded and the orchestra dissolved.

(Continued on page 179.)

MODERN CONDITIONS

THE improvement in the design of modern components demands a switch which is beyond suspicion. Many elusive faults and indifferent results can be traced to a defective filament switch. Therefore it is imperative that you should choose a Bulgín switch to ensure best results. The Rotary "On-Off" Switch, Type S85, is totally enclosed and possesses a self-cleaning snap action. The insulation is highest quality bakelite and the indicating frame clearly marked. It is the Modern Switch for Modern Conditions. - - - 1/9
Type S86. A Single-Pole Change-Over Switch for use on Radio-Gramophones Walnut or Mahogany finish 3d. extra. - - - 2/-
Send 2d. postage for 60-pp. Illustrated Catalogue and Manual.



A. F. BULGIN & CO., LTD.,
9-10-11 Curstow St., Chancery Lane, London, E.C.4
Phones: Holborn 1072 & 2072.

WILL DAY LTD.

THE LEADING HOUSE FOR
ALL MAINS COMPONENTS,
SUPER-HETERODYNES,
FRAME AERIALS, GRAMO-
PHONE MOTORS, ETC.

WILL DAY LTD.,

19, Lisie Street, Leicester Square, W.G.2.
Phone: Gerrard 4476.



"De-Luxe" Radio-Gram CABINETS!

HUGE REDUCTIONS FINAL CLEARANCE

£12/12/- reduced to £8/8/-
£7/7/- reduced to £4/18/-
£3/3/- reduced to £2/15/-
(Cash or deferred.)

The Superior QUALITY delights! A fine charm of style that people desire. Advantages also of PIANO-TONE Baffle and sound chamber (no distortion, no drumming). Quite new—as supplied to leading experts, B.B.C. and Radio Press. You may have ON APPROVAL and return at OUR expense if you wish to part with it. This bargain offer is open for ONE MONTH. Photographs and full details FREE!

PICKETTS, Radio Furniture Works (M.W.),
Albion Road, Bexleyheath, Kent.

Make
The DAILY SKETCH
YOUR Picture Paper

PLANNING THE NEW STUDIOS

—continued from page 179

a loud sound of a note just below middle "C" takes just over a second to die away completely, while a 3,000-cycle-per-second note dies away in 0.4 second.

A studio of exactly the same size covered with the hard felt gives fairly even absorption of sound between 100 and 1,000 cycles per second, these notes taking about 0.6 second to die away.

Effect of Curtains

Then the reverberation time rises up to the limit of about 3,000 cycles, and a note here takes 0.9 second to die away. If curtains are hung round about one-third of the room the reverberation time for the high notes is dropped a little, and a 3,000-cycle-per-second note dies away in about three-quarters of a second.

Very accurate measurements are possible, and an attempt has even been made to forecast the reverberation times of the Broadcasting House studios. Throughout the whole design of the studio tower of Broadcasting House the engineers have worked hand-in-hand with the architects, and the engineering requirements for acoustically suitable studios have been followed by the builders.

ALL ABOUT TONE CONTROL

—continued from page 101

not effective enough when connected from the grid of the power valve or preceding L.F. valve to earth, it may be made so by interposing a grid leak R, of 0.1 or 0.25 megohm, as shown in Fig. 3, which indicates the method for both transformer and for resistance or choke couplings.

Incidentally, this arrangement may also have the effect of removing or reducing unpleasant reaction effects, such as threshold howl, caused by stray H.F. currents.

Varying Effects

On the other hand, the original rheostat method may be used, with a fixed condenser of about 0.0005 mfd. and a rheostat of 1 megohm. It must not be supposed that these methods are exactly equivalent, as actually they work rather differently, and this

can best be shown by means of curves.

The horizontal line in each of the diagrams of Fig. 4 indicates the condition with no tone control applied; high and low tones equal. The other four lines show the progressive reduction of high tones in the cases of (a) a simple variable condenser; (b) rheostat in series with fixed condenser, and (c) variable condenser in series with rheostat.

Removing Low Notes

In (a) the higher the frequency the greater the cut-off. In (b) the high notes as a whole are reduced fairly equally until the resistance is all cut out, and in (c) the band of tones left unimpaired is gradually reduced.

The same curves apply to inductance in the place of capacity if the words "high" and "low" are interchanged.

If control circuit (b) is connected across a resistance coupling, as in Fig. 5, the values shown are correct for most purposes. This is particularly suitable if the set is used for gramophone amplification, because the recording of the lowest frequencies is deficient owing to the restricted space available for the groove, and most types of pick-up only partially compensate for this. It also enables one to reduce scratch to some extent.

More elaborate systems can be devised, for cutting down or for strengthening middle tones; the former is sometimes useful in connection with a loud speaker which emphasises middle frequencies at the expense of low and high, a rather common failing.

The "Middle" Frequencies

A fixed capacity and inductance and a high value rheostat, all in series, enable this to be done; the capacity and inductance being chosen to resonate at the frequency it is desired to suppress. Those who are enthusiastic enough to experiment along these lines will no doubt be sufficiently well acquainted with the principles of such circuits to be able to follow up the suggestion.

It may be helpful, however, to supply the formula in its most convenient form, $f = \frac{160}{\sqrt{LC}}$, where f is the

frequency to be suppressed, L is the inductance in henries and C is the capacity in microfarads.

The higher the impedance across which the tone control is connected, the higher should L be in order to avoid serious loss of volume. On the other hand, if it is too high the resonance is too sharp.

S.G.'s IN SUPER-HETS
 —continued from page 131

given me remarkable results. The following is a practical specification :

Short-wave frame is connected to terminals A and B, long-wave to B and C. C_1, C_2 and C_3 are .0005 each, gang controlled. C_t are the trimmers. T_1 and T_2 form the H.F. transformer for the H.F. stage and the oscillator coils respectively. T_1 has approximately the following windings (depending on the way it is wound) : P_1 , 40 turns 28 D.S.C. ; P_2 , 150 turns 36 D.S.C. on 2-in. former slipped inside 2½-in. former carrying windings, S_1 of 55 to 60 turns 28 D.S.C. and S_2 of 200 to 250 turns 36 D.S.C.

Oscillator Windings

T_2 has the same secondary windings less about 5 per cent or plus about 5 per cent, to allow for the difference in frequency between this circuit and the signal circuit, but P_1 and P_2 must be cut down to the lowest possible number of turns which gives stable oscillation over the whole range of the tuning condenser C_3 . This will probably be about 15 turns for P_1 , and 50 turns for P_2 . The same gauges of wire may be used as before.

R_3 is the grid leak for V_2 , and may be .5 to 1 meg., not more. Be careful to see that the capacity to earth of the bottom of S_2 on T_2 is low. C_3 , if ganged, must be insulated from earth, and the spindle of the adjacent condenser and its capacity to earth must be small.

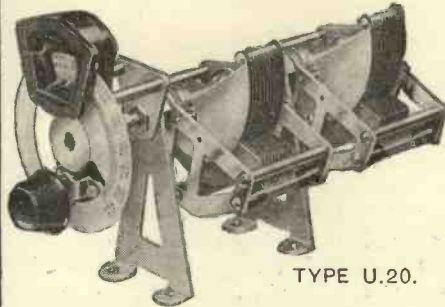
T_3 is the filter input, T_4 and T_5 the coupling transformers. The details of these have already been given. The condensers C_{16}, C_{17}, C_{18} and C_{19} are the pre-set condensers used to tune the inter-frequency transformers, and should have a maximum value of .001 mfd., not less.

The Second Detector

The grid condenser C_{14} for the second detector V_5 is .0001, and the grid leak R_5 will depend on whether you want power grid or ordinary leaky-grid rectification. It will be .1 meg. in the first case, but 1 to 2 meg. in the second. A compromise can be struck by using .5 meg. In this case the detector will accept quite a heavy signal and yet give good sensitivity on weaker signals. Z_1 is an H.F. choke with two condensers connected either side of it to earth, these condensers being about .0005 to

(Continued on page 182.)

RECOMMENDED by Varley



TYPE U.20.

**for use with
 THE CONSTANT
 SQUARE PEAK
 COIL**

Extreme accuracy is essential in the condensers used with the new Varley Coils. So Varley recommend J.B. types U.20 and U.30.

The special method of adjustment ensures very accurate ganging. **Dial calibrated in wavelengths** as well as in the usual manner.

J.B. Type U.20 2-Gang Condenser. Capacity, .0005. Complete with Illuminated Disc Drive, 24/-.



Type U.30 3-Gang Condenser, specification as Type U.20, but with an extra stage to tune the H.F. Intervalve Coil. Capacity, .0005 mfd. Complete with special screen and Calibrated illuminated Disc Drive.
 Price 34/6.

**PRECISION
 INSTRUMENTS**

Advertisement of Jackson Bros., 72, St. Thomas' Street, London, S.E.1.

Telephone: Hop 1837.

**A SPECIAL NUMBER FOR
 CONSTRUCTORS**

Make sure you get your copy of the September issue of "M.W." for this will be a particularly fine issue.

In addition to full details of a
MAGNIFICENT

FIVE-VALVE SUPER-HET

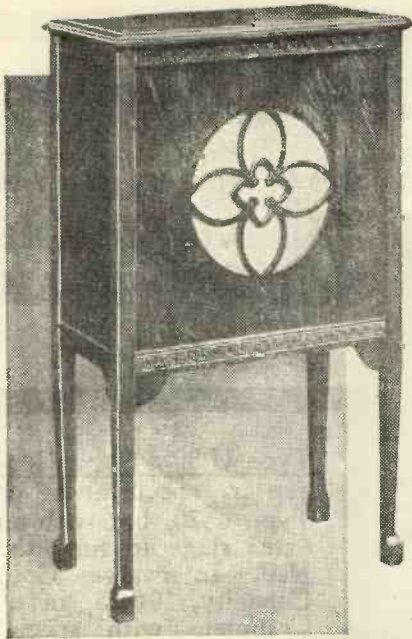
and a first-rate

A.C. MAINS THREE-VALVER

there will be articles of special interest to present owners of Titan coils, radio-grams, etc.

ORDER YOUR COPY NOW

Price 1/- - ON SALE Sept. 1st



A SPEAKER CABINET OF PRACTICAL DESIGN



The Camco "Regent" Speaker Cabinet is practical, because it is specially designed to avoid resonance. The Regent will get the best out of your dynamic or moving-coil unit. Space for batteries should it be desired to place set on top of cabinet. Only 23, in Oak. Send coupon for free Catalogue.

REGENT SPEAKER CABINET
 CARRINGTON Mfg. Co., Ltd., 24, Hatton Garden, London, E.C.1.
 Phone: HOLborn 4209.
 Factory: S. Croydon.

Name.....
 Address.....
 M.W.7.

FUSES for every radio use



WANDERFUSE

Fuse and wander plug combined. Lies flat on battery top—takes no extra space. Use one in the H.T. lead to protect valves and H.T. supply. Fitted without tools. 150 m/a fuse .. 6d.

Price 1/-



FLEXIBLE LEAD FUSEHOLDER

Use one where a fuseholder cannot conveniently be placed inside set or unit. Fitted without tools in any flexible lead. 1/2-amp. fuse .. 6d.

Price 6d.



BASEBOARD FUSEHOLDER

The best method of mounting fuses inside any set or mains unit. 1/2-amp. fuse .. 6d.

Price 9d.

SPARE FUSES

Belling-Lee Fuses are standardised and interchangeable. 60 and 150 m/a, 1/2, 1 or 2 amps., 6d. each.

BELLING-LEE FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Queensway Works, Ponders End, Mdx.

S.G.'s IN SUPER-HETS

—continued from page 181

.001 each. If power grid detection is used with plenty of H.T., then they should be .001 to .002 each.

The value of R_4 , the filter feed resistance for T_6 , will depend on the H.T. voltage available, and the impedance of the primary winding of T_6 the L.F. transformer used.

An all-round value is 30,000 ohms. C_{15} , the coupling condenser, may be .1 mfd., and the L.F. transformer is connected as shown to give an auto-coupled arrangement by means of which an extra step-up is obtained.

De-coupling Details

The output valve is filter-fed to the loud speaker by means of a L.F. choke Z_2 , and a condenser C_{20} of 1 mfd.

The resistances R are all de-coupling resistances of 600 ohms each, and the condensers C_4 to C_{13} are bypass condensers of .1 mfd. each.

The H.F. stage should be well screened, and all inter-frequency transformers must also be screened. The oscillator coil also must be shielded, as it is coupled to the H.F. secondary, and trouble would therefore result if it coupled up with the frame.

Resistances R_1 are voltage-droppers, of which the values will depend on the voltage available from your eliminator and the actual valves used. R_2 is the potentiometer used as a volume control, and it will be noticed that it controls the H.F. stage as well as the intermediates.

This is important, for otherwise the first detector will be badly overloaded on the local station. In some cases it may be found desirable to use two potentiometers ganged together for the H.F. and intermediates.

R_2 should be about 25,000 ohms if it is feeding three valves, or 50,000 ohms if feeding two only.

Suitable Valves

The frame aerial, of course, needs to be accurately matched up to the other coils, and a bit of work may have to be spent on these items to get the three circuits to gang up nicely on both short and long waves.

Now as regards valves, the following are indicated: V_1 , a high impedance S.G.; V_2 , an H.L. valve; V_3 and V_4 , medium-impedance S.G.; V_5 , another H.L., or even an L type; V_6 may be a large power valve, or a pentode may be used.

DIRECTION FINDING BY RADIO

—continued from page 152

favour of a more comfortable woollen affair; so, without turning his head or moving his lips, he said:

"Blazer, I believe the darn thing's gone wrong!"

Blazer allowed a tiny grin of encouragement to flicker across his face.

"Course it hasn't," he returned. "Keep your pecker up, old man."

"The Needle Has Dipped!"

Dare casually examined the apparatus, but it all seemed in perfect order. The signals were coming through loudly, too, as he discovered when he checked them up on telephones.

"Have a peep over and see if you can recognise the country," he urged.

Blazer hoisted himself up a bit and craned over the side.

"Looks like any patch of country to me," he said; "but I say, there's a lot of men—look like dots from here—chasing all over that big field—it might easily be a landing place—and even from this height I can see something that looks like a radio station."

"By Jove!" shouted the radio expert excitedly, "the needle has dipped. That means we're right on top of the transmitter."

He waved his hands to the officer and to the pilot to indicate that they had reached their destination, and that they should land in the huge open space over which they were flying. The pilot nodded, switched off his engine and commenced to spiral downwards.

"Here We Are!"

They made a perfect landing, and this was real proof of their pilot's skill, for the ground was seen to be quite rough.

The machine came to rest about fifty yards from where a temporary radio station had been erected—a small affair with a quite short aerial fixed on two sectional masts. Some fifty men were in the immediate vicinity, and they gathered around as the travellers alighted.

"Well, here we are," announced Dare cheerily.

But there was no response to this greeting.

"These are not Air Force personnel," announced the Air Force officer in a detached voice. It was now plain to see that he was frankly bored with the proceedings.

(Continued on page 183.)

DIRECTION FINDING BY RADIO

—continued from page 182

“Who the devil are you?” queried the radio expert with pardonable irritation, addressing his remarks to the silent ring of spectators.

“We’re the Coppleton Radio Society,” answered one of the older men quite politely. “This is our field day.”

“Field day!” cried Dare. “You mean,” he continued, waving his hand in the direction of the transmitter, “that you have been transmitting continuous signals from that station while all your members endeavoured to locate its position with frame-aerial sets and so on?”

Further Complications

“Yes, that’s it. We’ve finished now, and were just going to pack up.”

“And we’re finished, too, it seems,” groaned Dare. “You see, Blazer, that amateur station has been sending the signals that operated our radio indicator. As you know, it is possible quite sharply to define the direction from which radio signals are coming with an ordinary portable set such as I see these people have been using.

“You turn the thing round until the signals come in at their weakest, and you then have the frame aerial at right angles to the line running between you and the transmitter. This invention we’ve been testing works on this principle, although it is supposed to have in it various things to reduce the usual errors. Anyway, we have accidentally joined these good folk in their game of radio hide-and-seek. I suppose you were sitting right bang on our one hundred and forty-five-metre wave-length?” he concluded, turning to the local radio man who had answered his other questions.

“Oh, no, we’re on one hundred and eighty,” was the reply.

“Are you sure?” queried Dare amazedly.

Blazer’s “Bias”

“Absolutely; we’ve got the club wave-meter with us to check things up.”

Dare turned to Blazer.

“I can’t make it out,” he said wearily.

The Air Force representative smiled significantly at the pilot.

Blazer was, of course, right out of his depths in all this talk about wave-

lengths and so on, and all he could do was to scratch his head sympathetically with one hand while with the other he fished about in a waistcoat pocket for a cigar. But instead of one of those comforting “weeds,” his fingers came into contact with a hard object that felt strangely unfamiliar. He pulled it out and gazed at it with mingled astonishment and affection.

“Young Bill’s,” he remarked.

“A toy magnet!” Dare exclaimed disgustedly. “Blazer, I always said you were my jinx, and this finally proves it. You were biasing the blooming indicator all the way with that darned thing! For goodness sake stop slopping over it, you miserable, homesick policeman.”

“And he was looking for that, the poor little rabbit,” muttered Blazer; but he was not referring to Dare.

HOW TO BUILD THE “NEW D.C.” THREE

—continued from page 139

care must be taken that the cathode heater connections of the valves are carried out as shown in the diagram.

If you follow the anode circuit of the pentode valve you will see that it returns not to its own filament or heater of the cathode, but via the heater of the screened-grid valve. This is important, because the heater resistance of this valve acts as part of the biasing of the pentode, and provides with the 300-ohm resistance near the cathode a total bias resistance of about 312 ohms.

Important Points

Note also that the Cyldon Extenser has two fixed vane terminals and that in the second Extenser we have used both these as anchoring points. The same result would be achieved by taking both the wires concerned to one

of the fixed vane terminals instead of the two.

Pre-detector volume control is arranged by means of a potentiometer controlling the screened-grid potential of the S.G. valve, and this enables the input to be controlled to a nicety, so that under no circumstances need overloading of the detector or the pentode occur. Careful decoupling has been carried out throughout.

The smoothing in this receiver also is extremely simple, no smoothing being necessary in the heater circuit, and only a limited amount on the anode of the detector and the screened-

(Continued on page 184.)

THE NEW W.B. PERMANENT MAGNET MOVING-COIL SPEAKER for £4:10:0

So sensitive that any 2- or 3-valve set will drive it! No mains or batteries needed. Its powerful Sheffield made Cobalt Steel Permanent Magnet is guaranteed for 5 years.

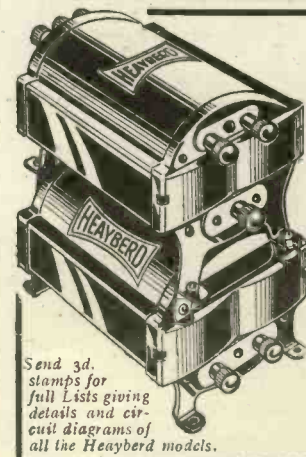
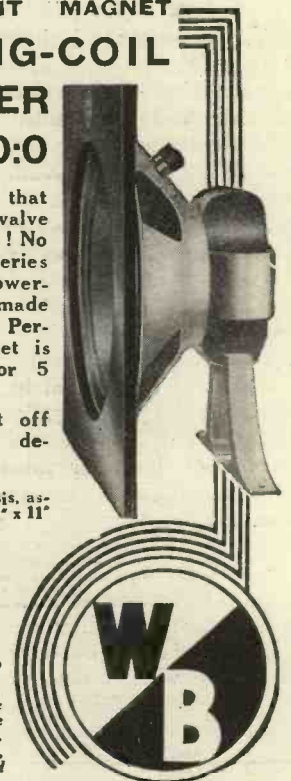
Don't be put off —insist on a demonstration.

Type PM2 chassis, assembled with 11½" x 11" baffle board £4:10:0. If fitted with a double-ratio step-down transformer, 15/- extra.

Write for lists of W.B. Speakers from 25/- to £9:9:0.

Made by the makers of the famous W.B. Cone Speakers, Switches and Valve Holders.

Whiteley Electrical Radio Co., Ltd., Radio Works, Nottingham Road, Mansfield, Notts. Irish Free State Distributors: Kelly & Shiel, Ltd., 47 Fleet Street, Dublin.



Send 3d. stamps for full Lists giving details and circuit diagrams of all the Heayberd models.

The Very Latest MAINS TRANSFORMER

Designed specifically for use with the new Westinghouse Rectifier H.T.8 in All-Mains circuits. The Heayberd reputation for Transformers of quality and service is worthily upheld with this latest product.

— MODEL W.31 —	
Rectified Outputs:	
200 v. at 60 m.a., using tapping	175 v. with Rectifier H.T.8
250 v. at 60 m.a., using tapping	200 v. with Rectifier H.T.8
L.T.: 4 v. 6 amps. for A.C. valves.	
Price	25/-



10, Finsbury Street, LONDON, E.C.2.

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.

**HOW TO BUILD THE
"NEW D.C." THREE**
—continued from page 183

grid valve, and the priming grid circuit of the pentode,

The panel layout is symmetrical, the tuning controls, reaction, and volume control being at one end of the panel, and at the other end the mains apparatus and the mains switch. The ammeter and the milliammeter are of quite inexpensive types, and are easily mounted on the panel, but they are very valuable guides to the operation of the set.

Current Consumption

The ammeter, which reads up to 1-amp., shows the heater current consumption of the valves, and this should stand consistently at 5 amp. The milliammeter reading will vary somewhat with the voltage of the mains; with 210-volt mains it will probably be somewhere round about 25 or 26 milliamps., and on 240-volt mains it may rise to something like 30 milliamps., but it should never exceed 30 milliamps. if the pentode is to have a really useful life.

This meter is placed in the anode circuit of the pentode valve, and does not give any indication of the anode current of the other valves. Owing to the automatic biasing arrangements in the receiver it is unnecessary for the constructor to worry about the bias, no matter what voltage his mains are, for correct bias is obtained within pretty wide limits.

And now let us consider the mains resistance, which is placed on the back of the cabinet. This resistance is an extremely neat piece of work, and

consists of resistance wire wound round an asbestos former and tapped off for 200—210—220—230 and 240 volts, so it does not matter what your D.C. mains are, provided they lie between 200 and 240 volts.

The Power Resistance

The resistance is encased in a perforated metal box. We have fixed it in what we consider to be the best position for it, because a certain amount of heat is generated, and it is easily mounted by a couple of ordinary panel brackets, the resistance itself being mounted on a piece of wood. Connection is made to the set by the piece of twin flex, which we have already discussed, one end of the flex going to the positive terminal of the resistance marked *mains*, the other end going on to one of the other positive terminals marked by the 200—210—220—230, etc., according to the voltage of your mains. You will find that one tapping does for anything 200 to 210, the next tapping covers from 210 to 220, the third tapping 220 to 230, and the last one 230 to 240. (The two black terminals—negative—are not used in this receiver.)

Low Voltage Mains

In the event of your having very low-voltage D.C. mains, something of the order of 150, a special resistance can be obtained from the makers, but with such low voltages it is doubtful whether the building of a receiver of this description is worth while, because the H.T. left after automatic bias and smoothing has been carried out will be something well under 140 volts, and this on the D.C. pentode does not really give it a chance of showing its full powers. There is no doubt that the set would *work*, however, and work

fairly well, but it would not, of course, give the tremendous volume of which it is capable when working under better mains conditions.

There is very little more to be said about the construction, except perhaps to point out that the mains resistance is best mounted with the terminals inwards towards the back of the set, the flex leads being attached before the resistance is finally screwed in position. The position of the terminals is now such that they cannot possibly be undone without great trouble, and there is no possibility of receiving a shock from the mains themselves.

P.J. Coil Particulars

And now a word to those who wish to make their own P.J. coils (medium-wave units). The P.J.2 consists of a 2-in. diameter by 2-in. former (Paxolin or Pertoid), and on it are wound three windings of 30 gauge D.S.C. wire.

1. Aerial, 9 turns tapped at 4 and 6 turns. Beginning of winding marked A (red flex) and end marked X (blue flex).

2. Grid winding, 64 turns of 30 D.S.C., the commencement being $\frac{3}{8}$ in. away from end of aerial winding. Beginning marked G (white flex) and end marked Y (black flex).

The P.J.3 coil (3 in. by 2 in. diameter former) has a primary of 30 turns of 30 D.S.C. tapped at 10 and 20; beginning marked A (red flex), end marked X (blue flex); $\frac{3}{8}$ -in. away is the grid winding of 64 turns marked G. and Y. in the P.J.2, and $\frac{1}{4}$ in. away from this is the reaction winding of 34 turns (30 D.S.C.), marked Z at beginning of winding, and R at the end (green and yellow flex respectively). All the windings are carried out in the *same* direction.

INDEX TO ADVERTISERS

	PAGE
Argosy Magazine	177
Belling & Lee, Ltd.	182
British Blue Spot Co., Ltd.	Cover iii
British Insulated Cables, Ltd.	173
Bulgin, A. F. & Co., Ltd.	180
Burne-Jones & Co., Ltd.	176
Carrington Manufacturing Co., Ltd.	182
Cossor, A. C., Ltd.	49
Day, Will, Ltd.	180

	PAGE		PAGE
Edison-Swan Electric Co., Ltd.	Cover iv	Telegraph Condenser Co., Ltd.	175
Ferranti, Ltd.	173	Varley Products	Cover ii
Heyberd, F. C., & Co.	183	Webb Condenser Co., Ltd.	176
Jackson Bros.	181	Whiteley Electrical Radio Co., Ltd.	183
Lotus Radio, Ltd.	171	Wingrove & Rogers, Ltd.	93
Peto-Scott Co., Ltd.	175	Wright & Weaire, Ltd.	175
Pickett's Cabinet Works	180	Westinghouse Brake and Saxby Signal Co., Ltd.	179
Preen, Arthur, & Co., Ltd. (Formo)	178		
Ready Radio	167		
Regentone, Ltd.	175		

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.

**"I want to tell you
to - night about my
holiday in Norway"**



BROADCAST TALKS

are only interesting when you hear everything. One muffled word, an ill-timed groan from the loud speaker—and the thread of the talk may be lost to you.

A BLUE SPOT Unit allows you to enjoy talks, because it not only brings in every word audibly and clearly, but exactly reproduces the idiosyncrasies and individual characteristics of each voice. The personality as well as the message of the speaker is conveyed to you

unmistakably. So great is the illusion of reality that you can quite picture him sitting opposite you in an armchair chatting to you.

And when the talk is done how splendidly BLUE SPOT entertains you with music, singing, jazz and vaudeville — every item in the evening's programme is perfectly reproduced. The pure mellow tone of a speaker with a BLUE SPOT Unit is a delight at any time.

PRICES: 66K UNIT 25/-; 66P UNIT 27/6; 66R UNIT 35/-.
CHASSIS (Reg.No.761721) MAJOR 15/- SPECIAL 7/6



THE BRITISH BLUE SPOT COMPANY LTD.

BLUE SPOT HOUSE :: 94/96 ROSOMAN STREET :: ROSEBERY AVENUE :: LONDON, E.C.1

Phone Clerkenwell 3570

Grams: "Bluospot, Isling, London."

Distributors for Northern England, Scotland and North Wales:—H. C. RAWSON (Sheffield and London), LTD., 100 London Road, Sheffield: 22 St. Mary's Parsonage, Manchester: 183 George Street, Glasgow.

COLONIAL AGENTS:

INDIA—Bombay Radio Company, Ltd.,
The Wireless House,
Queen's Road, Bombay 2.

BURMA—Messrs. Rowe & Company,
P.O. Box 77, Rangoon.

NEW ZEALAND—
Messrs. Rodger Importing Company, Ltd.,
159 Manchester Street, Christchurch.

MALTA—Messrs. Mamo Brothers, Ltd.,
262 Strada Reale, Valetta.

SOUTH AFRICA—
Messrs. Blue Spot Radio Supplies,
41 Burg Street, Cape Town.

AUSTRALIA—Messrs. H. Hecht & Co.,
450 Collins Street, Melbourne, C.I.

Mazda Achievements

Mazda engineers introduce the first indirectly heated valve—1926. Made the all-mains set a commercial possibility.



Mazda engineers invent method of applying insulating coating direct to heater. Now universally adopted by valve manufacturers.



Mazda engineers introduce first indirectly heated S.G. valve—1928. And the first indirectly heated pentode—1930.



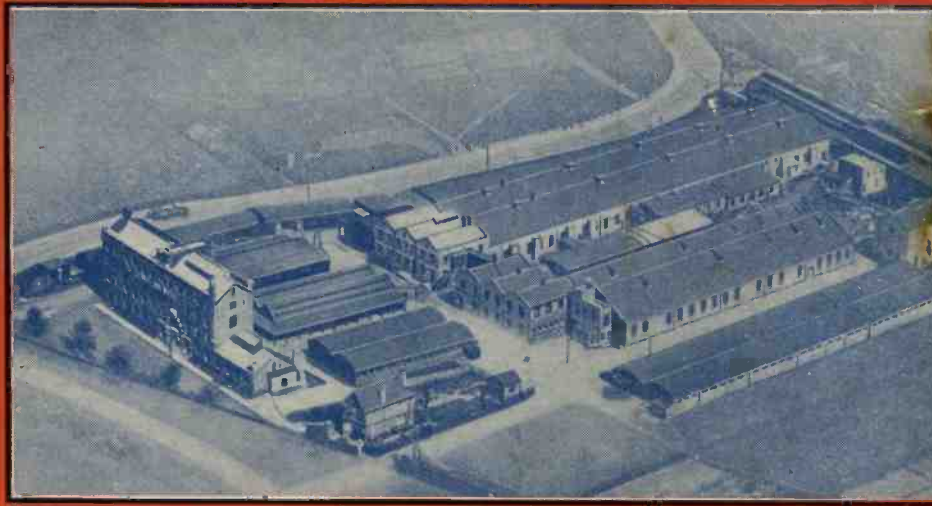
Mazda announce the new Unitary Structure principle and so ensure absolute uniformity of characteristics.



Mazda introduce anti-microphonic filament supporting hooks and produce the first really non-microphonic battery valve.



Mazda makes the first D.C. mains valves already standardised by leading set makers.



Where Mazda Valves are made—Brimsdown, Middlesex.

In all those epoch-making developments which have attended the evolution of the modern radio valve, Mazda has led the way. From the time when the first indirectly heated valves made the commercial all-mains receiver a practical possibility, Mazda engineers have been in the van of achievement.

MAZDA RESULTS

The reason for the amazing success of Mazda valves need not be sought. They are used by the leading set manufacturers and are generally acknowledged by public, trade and press to be the finest range of valves the radio world has known. Remember that when you equip your set with Mazda valves you get Mazda experience—Mazda quality—Mazda performance.



THE EDISON SWAN ELECTRIC CO. LTD.
Incorporating the Wiring Supplies, Lighting Engineering
and Radio Business of the British Thomson-Houston
Co. Ltd.

Radio Division;
155 Charing Cross Road, London, W.C.2
Showrooms in all the Principal Towns.

EDISWAN

MAZDA

THE
BRITISH
VALVES

All-mains, battery and
rectifier types, from
all good radio
dealers.