

**THE VALVE**—By Capt. P. P. Eckersley (See Page 269)

# Popular Wireless

Every Thursday  
PRICE  
3d.

No. 519. Vol. XXI.

INCORPORATING "WIRELESS"

May 14th, 1932.

## The OUTDOOR THREE

*See  
Details  
Inside*

ALSO THIS WEEK:

RADIO in GERMANY  
HOW WIRELESS DID  
ALTER HISTORY

THAT FINAL RIPPLE

An article by G. V. Dowding of interest  
to all mains set owners.

NOTES FROM THE  
NORTH

AIR TAXI RADIO

Etc., Etc.



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(See Page 283)

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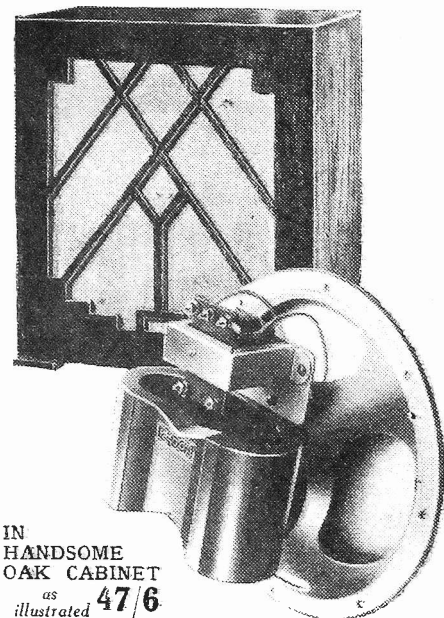
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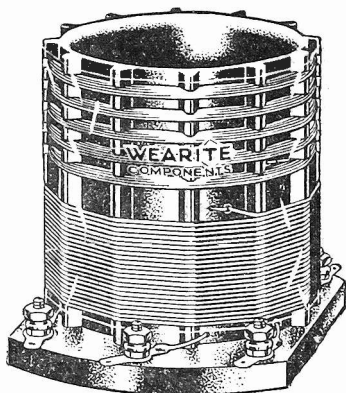
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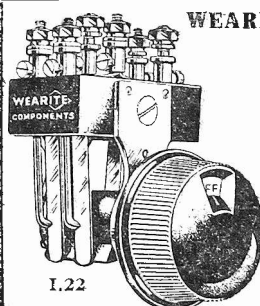
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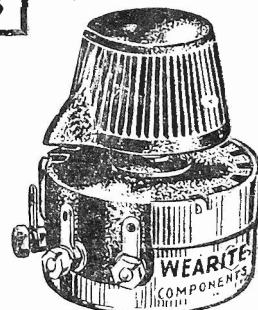
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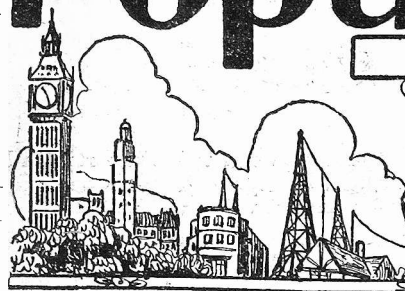
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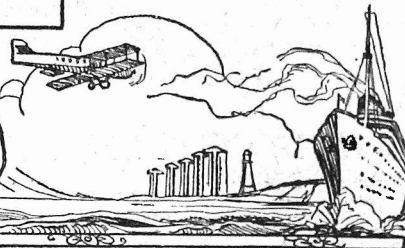
# Popular Wireless

## LARGEST NET SALES



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**BLOT-ON-AVON!**  
**HENRY PROGRESSES**  
**"ALL MAINS"**  
**THE WHIRLIGIG**

## RADIO NOTES & NEWS

**GOING NORTH**  
**A SCREEN PAINTER**  
**THE TRUTH**  
**THOSE RECORDS**

### Blot-on-Avon.

THE broadcast running commentary on the opening of the Shakespeare Memorial Theatre was, I thought, charmingly done. The acoustic properties of the inside of the theatre have received praise and the general interior design and fittings appear to have won unstinted approval. None of the speeches, however, had anything to say about the building as a sample of architecture, and I am not surprised at that. It is a red blot by the riverside, a typical new Soviet factory. Goodness alone knows what our foreign guests thought of it — or what Shakespeare would have said of it!

### Henry Progresses.

HENRY HALL and the new dance orchestra are gaining ground. Of that I am sure. Henry is developing a "mike" personality and is mastering what appeared to be nervousness. Besides, he is showing that he is a thinker. And better still, he is giving British dance music a sporting chance to fight trans-Atlantic "blues" and tom-tom rackets; in one week recently he got to within 0.8 of 60 per cent British. However, I still think that the orchestra would be improved by a touch of heavier brass, and the vocalist by singing like a 100 per cent man.

### Not Yet All Mains.

A CONTEMPORARY has just given a few striking figures about the state of affairs in regard to "all-mains" users in this country. Nearly 4,000,000 homes have an electric supply of some sort; over 8,000,000 have no supply at all. There are some 2,830,665 on A.C. as com-

pared with about 1,120,092 on D.C. This shows the balance to be on the right side, but there's a mighty lot of conversion to be done yet.

### The Amateur Intervenes.

YET another feather in the cap of the amateur radio man was inserted last month by Mr. Springthorpe, of Reading, who while "on the job" with his short-waver, intercepted an S O S from an R.A.F. aeroplane which had developed engine trouble and lost itself at 10,000 feet altitude.

and the local Woodley Aerodrome was called up. Cars were requisitioned and their headlamps enabled the pilot to land safely. A smart bit of work.

### Time's Strange Whirligig.

ONE of the most exciting "Hazard" talks will be that which is to be given by the former Zeppelin Commander, Captain Breithaupt. Once he dropped bombs on England; now he is going to tell us how he felt during the process. Probably the Zepp fellows had about as rough a time of it as did we underneath, only in other ways.

However, the Commander will no doubt let us know the details. He was brought down, by the way, at Rainham, and enjoyed our hospitality as a prisoner of war.

### A New Society.

SOMEWHAT too late to send a message of good will to be read at the first public meeting of the Kettering Radio and Physical Society, its secretary's letter has just filtered through to me. Well, here is a whole paragraph—as compensation. May the Heavyside Layer be kind to all members of this new society, and may its secretary be positively embarrassed by sackfuls of applications for membership—which should be addressed to 9, Shakespeare Road, Kettering.

Good luck to you, from "P.W.," "Ariel," and all the boys—here.

### Rest in Peace!

A CHARMING correspondent, to wit, "Gentle," of Huddersfield, asks us to reprint a Unidyne circuit. Much as we should like to please him, we must (Continued on next page)

## THE KING OF JAZZ MAKES MERRY



To the right is Paul Whiteman, hailed in America as "The King of Jazz," with a soloist whom he has found in a recent contest for new talent. They certainly seem to be enjoying themselves, don't they?

Our ready-witted "fan" switched over to see whether Croydon answered, and finding that station to be silent, cycled to a telephone call-box and told Reading Exchange about the matter. Croydon was then advised and said that a machine was overdue.

A 'plane was then heard over Reading.

## WHAT READERS SAY—

Including some specially interesting comments on the Moderator.

### VALVE GLOW.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to a query which appeared in "Captain Eckersley's Corner" in a recent issue re a pentode valve, I should like to state that I have experienced practically the same as A. N., except the glow in the valve remained constant whether signals were tuned in or not, also a slight whistling sound could be heard. I took the valve back to the dealer, who tested it and passed O.K.

On returning, I again tried it out and, hey presto, it worked splendidly! Whether the vibration of the journey had done the trick I could never explain. I have also seen the same in a screen-grid valve, without the whistling effect however. It all seemed very mysterious, and I have never heard of a similar instance till now. Wishing your paper every success, also the "Cosmic," which is O.K.

Castle Eden, Co. Durham.

CHARLES GUYTE.

### CAN YOU BEAT IT?

The Editor, POPULAR WIRELESS.

Dear Sir,—Can you beat this? My set, a four-valver (S.G. Det., L.F., Power) is run off the D.C. mains (positive earthed, I think) by an eliminator. A rather deep-noted hum was present. While experimenting I disconnected all the condensers, 6 mfd. total, in the eliminator. Immediately all trace of hum disappeared, and now I run the set off the mains with but a smoothing choke and a resistance as an eliminator!

Yours truly,

R. E. LEWIS,

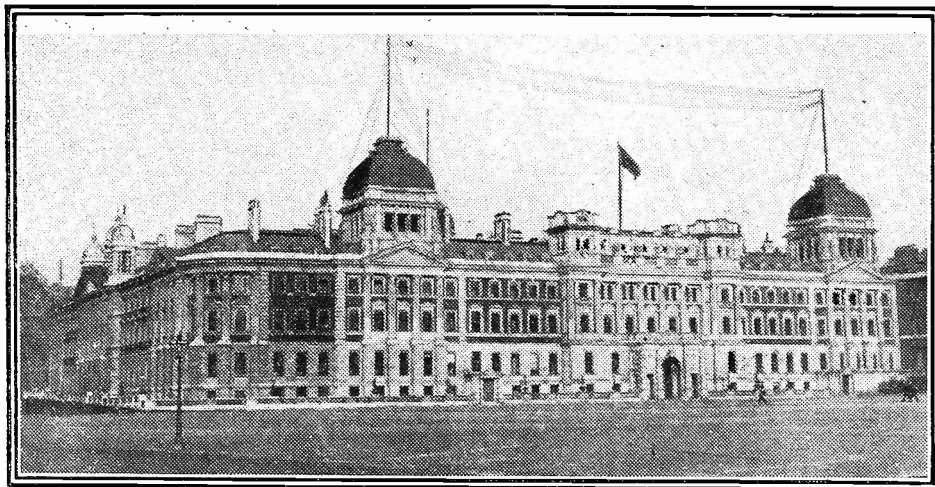
Shrewsbury.

### THE "MODERATOR."

The Editor, POPULAR WIRELESS.

Dear Sir,—You will no doubt be interested to know that as a result of fitting the Moderator Coil and Condenser, the following results can be obtained:

## THE ANTENNAE AT THE ADMIRALTY



These well-known buildings in Whitehall are the "Home" of the Navy, and the radio apparatus enables contact to be made with ships in any part of the world.

**Above London Regional.**—Nine stations can now be brought in at full loudspeaker strength while London is operating, but without London interfering.

**Below London National.**—Three stations at loudspeaker strength free of National. Several stations at quiet loudspeaker strength can be tuned in, not yet identified.

**Between the two above-mentioned London stations.**

—Eleven can be tuned in at loudspeaker strength providing one London station is not working. At this point either London station can be cut out, but only to bring the other in.

**On the Long-Wave Band.**—Three worth-while stations in addition to Daventry National can be tuned in at full loudspeaker strength.

If Daventry National only is operating it can be cut out with the Moderator, but if London Regional is also on, then for some unknown reason it comes through on the long wave-length and then the foreign stations cannot be separated from one or other of them. Very much like the short-wave band

between London Regional and National. Perhaps a new push-pull switch is required.

Very good quality can be obtained in all cases and I am well satisfied with the results of this experiment. Particularly as the set I am running—i.e. Ediswan R.C. Threesome—is not considered selective. Because of its quality, which is still superior to the latest "Four-Valve Radiogram," I did not want to discard it, and now will not need to.

Quite a dozen different methods and positions for coil and condenser were tried, logical and otherwise, but the best was as illustrated in "P.W." with this exception: Louder results and slightly better selectivity was obtained by mounting the condenser over the Moderator Coil with the control on top, say, on the lid of the set, not on the usual positions at side or front panels. Further, a remarkable difference in quality was noticed according to which terminal of the Moderator Coil the aerial lead was connected to. The lower terminal seems to be essential for quality.

The only fault that I have to find is that the set seems to be more sensitive to outside interference or abuse of reaction by others than was previously noticed.

Hoping the foregoing may prove of interest to you.

Yours faithfully,

C. F. HENLEY.

25, Gainsborough Rd., Woodside Park, N. 12.

[Naturally the set will to some extent be more sensitive to outside interference as well as to broadcasting stations, but the ratio of wanted to unwanted energy is probably quite high.—Tech. Editor.]

## HOW WIRELESS DID ALTER HISTORY

(Continued from previous page.)

days and nights would be spent in "trial and error." But always in the end, and sometimes very quickly, the cipher would be de-ciphered, the code de-coded.

For example, a series of numerals, daily

Sometimes when the Germans, with some inkling of what was going on, invented new cipher systems of extraordinary complexity they puzzled and flummoxed their own agents, official and unofficial, abroad.

And then the inhabitants of "Japan," having solved the riddle before the less expert recipients for whom the messages were intended could understand their own codes, would "listen-in" to a wireless wrangle between the German cipher experts trying to untie their own knots and asking angrily for "repeats."

### Some Inside Facts.

Space will hardly allow of a description of all the services performed by these patient students or the results of their researches. That they contributed materially to the final victory is beyond doubt. In my next article I will deal with the way in which wireless was used in an episode of the sea-blockade itself, and how it brought on the Battle of Jutland, the only occasion on which the great Battle Fleets met in combat during the whole of the campaign.

## GRID-BIAS SUGGESTIONS

A method of solving a little trouble that sometimes crops up, and a note on H.F. bias connections.

### Housing the G.B. Battery.

ON wiring diagrams for sets which use a dry battery to provide the grid bias for the output valve and intermediate L.F. valve, (if one is used) will be seen two or three flex leads labelled for the grid-bias battery. On some such diagrams a G.B. battery holding clip is shown, or a space allowed on the baseboard for the battery.

On others, however, there is simply no room on the baseboard for the battery, and you may wonder if this means the leads must be taken through a hole in the cabinet to an external battery. This is not necessary. You are bound to find one spot at least where there is ample room for the battery to be fixed to one of the sides of the cabinet on the inside. It will be just as convenient there as on the baseboard. Special clips for the purpose are easily and inexpensively obtainable or can be fashioned from stout tin-plate or aluminium sheet. Additionally, there are G.B. batteries having supporting flaps on them by which they can be fixed with drawing pins.

### Shorted H.F. Cells.

Although it is not advised as the best safety scheme and method of earthing the aerial when it is not in use, an ordinary single-pole one-way switch is sometimes employed. The aerial and earth are left permanently connected to the set and to the switch, and just shorted together when the switch is closed.

On some sets with biased H.F. valves, such a switch may short the G.B. battery via the tuning coil when the switch is closed. This happens because very often the positive of the  $1\frac{1}{2}$ -volt cell is joined up with earth and the negative goes to the tuning coil, which is connected to the aerial; this, in its turn, being shorted by the switch back to earth and the battery positive.

extracted from the ether of the Balkans without further indication of their source or system, was disclosed as the instructions of the Bulgarian General Staff, in Bulgarian words, coded into casual number groups, these latter transformed by a cipher, which changed daily!

### We Knew First!

Yet, after a few days, the cipher-experts, with the aid of Bulgarian-speaking linguists, had solved the riddle, and could read the instructions of Sofia to the Bulgarian troops on the Salonika front—information of vital importance to our own army in the field.



# THESE RADIO COMPONENTS

# A COMPLETE AND CRITICAL REVIEW

by  
Capt. P. P. Eckersley  
M.I.E.E.

AS I said in my introductory article, you cannot say "this is a good valve" or "this is a bad valve" without qualifying the statement.

There are different valves for different purposes. Therefore you can say "this is a good valve for this purpose," or "this is a bad valve for that purpose" without meaning that the valve *qua* valve is good or bad.

Again, you may say: "This is a very good valve, but it isn't giving good results, because its associated circuits are wrongly designed."

How, then, may we compare valves *qua* valves?

Obviously, we must compare different makes of valves designed for the same function. And we must be fair to the valve by assuming that the associated circuits are correctly designed for the particular valve the performance of which we are discussing.

## How To Compare Them.

So it strikes me, when we are discussing valves *qua* valves, we must compare them as to:

- (1) Length of life.
- (2) Price.
- (3) Stability, and
- (4) Suitability for practical circuit design.

(1) and (2).

The manufacturers of valves for big power transmission work will usually guarantee the life of a valve and, if the valve fails to complete the guarantee, the makers will pay a bonus to the user. It would be impossible to make such a guarantee for reception valves used by the general public, but I often wonder if a generous attitude towards the conscientious user of valves might not increase a much-needed goodwill between manufacturer and consumer. It is perhaps unnecessary to point out that the longer a valve lasts the less pleased the manufacturer, the more pleased the customer. Money is made out of the valve trade because:

- (a) There is a price ring.
- (b) The valve is a necessity.
- (c) It is a consumable store.

## THE VALVE.

"A valve is a component. And, therefore, in this series I must write about the valve. It's a rather important component, but it's got no particular mystical significance, it is only a component."

So says "P.P.E.", who must have thoroughly enjoyed writing this illuminative and provocative article.

I cannot, therefore, give the user a great deal of advice on the subject of life and price because these mostly rule about the same. The prices of valves certainly seem too high if one compares them with those ruling in America and on the Continent.

(3).

By stability I mean:

- (a) Does the valve "stay put"?
- (b) Do valves of the same make and mark perform identically?

One may say that the valve (particularly the high  $\mu$ ) is an unstable product. Take at random any six high-frequency valves of the same make, compare them, and you may be surprised at the results. A good tip in this respect is to adjust high-frequency valves performing similar functions to the same feed current and let everything else go hang. But—

(4).

A word to the wise. If you can afford it, use two lower mutual conductance, more stable valves, instead of one very "efficient" valve.

## The Real Amplification.

Take an instance. You have a high-frequency valve with an effective impedance of 500,000 ohms, let us say. In the anode circuit of that valve you have a tuned circuit having an effective impedance with a moderate amount of retroaction applied of 100,000 ohms. The theoretical magnification is 200 (say). Then the actual magnification will be:

$$\frac{200 \times 100,000}{500,000 + 100,000} = 33\frac{1}{2}$$

There is a considerable Miller effect, and the resulting effective mag. may be only 20.

Now take a valve with a 100,000-ohm effective impedance, a theoretical magnification of 40, and the same anode circuit. Then the magnification is:

$$\frac{40 \times 100,000}{100,000 + 100,000} = 20$$

or, say, with Miller effect = 15.

There isn't much difference. If you take two low-impedance valves against the one high, you get a magnification of  $15^2 = 225$ , against a possible 30!

And by using two valves you get a better selectivity. You probably do not want a magnification of 200, and so you can cut down input and gain at any rate the same stability as with the one valve. The figures above are chosen at random to illustrate the principle.

## Some Practical Points.

For detection use a valve around the 15,000-ohm mark, and put as much high-tension as possible on to the anode. Remember, the detector is the first note magnifier, and so if you are using mains valves choose always a separately heated cathode, because these give far less mains hum. Obviously, any hum in the detector is magnified by the whole low-frequency chain.

For output valves try and use the most powerful valves of low impedance. You may find the pentode a greater economy, of course, but I have yet to meet a pentode valve which gives linear amplification within specified limits. It may interest you to know that in my opinion a loudspeaker giving only a sensible volume demands  $\frac{1}{2}$  a watt from the last valve. At a 20 per cent efficiency this means that the valve anode should be able to dissipate 2.5 watts, or at 200 volts H.T., an anode current of 12.5 milliamps. This is for just ordinary listening.

If you want real volume I should quadruple this figure and ask for low impedance valves in push-pull, the anodes each dissipating 5 watts.

(Continued on page 294.)

"P.P.E." WRITES TECHNICAL ARTICLES ONLY FOR "P.W." and "M.W."

## THE MIRROR OF THE B.B.C.

By O.H.M.

**"B.H." INSPECTED****THE DINGWALL AFFAIR—SIR JOHN SAYS "GOOD-BYE"—  
THE ALDERSHOT TATTOO—SOME COMING "PEAKS."**

NOW that the B.B.C. has allowed representatives of the Press to inspect the new headquarters in Portland Place there is a chance for more detailed and better informed criticism of the place than there was previously.

The view of those who know enough of conditions abroad to justify comparison is that in studios and studio equipment the B.B.C. is well in advance of foreign broadcasting. Nor will it be challenged in this matter of studio equipment until Roxy's famous Radio City in New York is ready.

With regard to offices, there is hardly the same unanimous approval of arrangements at Broadcasting House. Of course, the place is too small, and there was lack of foresight in planning it three years ago. Then there is far too much difference between the magnificent apartments which will house the principal officials and the almost coffin-like cubby holes where most of the rank and file will have to toil; also, there is much too much difference in the quality of furnishing between seniors and juniors.

On the whole, however, and having regard to the main purpose, which is, of course, programmes, we all have reason to be proud of the new headquarters of the B.B.C.

**The Dingwall Affair.**

The energetic Provost Murray of Dingwall has thrown down the gage of battle

to the B.B.C. For nearly a year he has been arguing with various B.B.C. officials, from Sir John Reith himself to Mr. Cleghorn Thompson, the B.B.C. Director in Scotland.

The complaint, of course, is the absence of adequate service in the far North of Scotland, where it is felt that the industrial areas both of Scotland and of England are being outrageously favoured with duplicate programme services at the expense of such outlying areas as the Highlands.

The matter came to a head with the

**AN EYE FOR BEAUTY!**

This happy snap shows Norman Long, the versatile entertainer, filming the bride and bridegroom at a recent wedding in Langham Place.

admission by the B.B.C. that the new twin-wave transmitter near Falkirk would not make the situation materially better in the far north. Provost Murray

has now determined on Parliamentary action and is seeking the support of Sir Archibald Sinclair, Secretary for Scotland.

**Sir John Says "Good-bye."**

I have just heard an account of Sir John Reith's "Farewell" to Savoy Hill, on Friday afternoon, April 29th. Having completed his work, he proceeded down the staircase to the famous west entrance, where he was greeted in the customary way by Mr. Plater, the doyen of B.B.C. Commissionaires, who had been with Sir John since the first few days of the formation of the old Broadcasting Company at the end of 1922.

Sir John was handed the key, and as he locked the door for the last time his act symbolised the passing of an epoch in broadcasting. I believe the ceremony was photographed but not for publication.

**The Aldershot Tattoo.**

Long days and hot nights are conjured in the mind by the news that a broadcast of the Aldershot Command Military Searchlight Tattoo is to be included in the National programme on Saturday, June 11th. Yes, it is some way ahead, I know, but time flies, particularly between May and September, and especially the few weeks during which most of us hope to get away from the toil of the rest of the year.

It is, of course, too early to say more about this year's relay of the Aldershot Tattoo, but I mention it now because the function always provides one of the finest outside broadcasts of the whole year if the enormous number of appreciations from listeners is any indication of programme popularity.

**Some Coming "Peaks."**

Another June broadcast of which I am able to give early intimation is a performance of "Hamlet" in the afternoon of Sunday, June 5th. In a future issue I shall tell you more about the notable cast which is being engaged. Now let us get back to the merry month of May, during which all the National listeners are to hear a Spanish sentimental comedy called "A Hundred Years Old," by Serafin and Joaquin

(Continued on page 288.)

**THE "COSMIC" THREE.**

The Editor, POPULAR WIRELESS.

Dear Sir,—As a rule, whenever a circuit appears in "P.W." which appeals to me, I generally try it out, and, of course, you may be sure that an interesting circuit like the "Cosmic" Three has not been overlooked by me. My leisure hours are so limited—only a few on Fridays and Sundays—and I was so bent on getting the set built at Easter that I commenced about 7 p.m. Easter Sunday night and kept on until I had it completed, which was 5 a.m. Monday morning.

I have always been enthusiastic about short waves, and the "Night Flight" Three has afforded me hours of amusement. The "Cosmic" has brought me in several S.W. stations, but only Pittsburgh and Schenectady from America at present. I have received ten long-wave stations and thirty-five medium, all on speaker.

As regards the short-wave stations, I think it might be more interesting to give dial readings to compare with other readers. These are what I received on April 17th; last Sunday, April 10th; and Friday, April 15th:

177 Speech not clear.	80 Vatican.
175 Music.	79 Moscow.
160 Moscow.	72 French Amateur.
159 Music.	70 Ditto.
151 Call, "Branto,"	69 Ditto.
"Branto."	66 Rome, news in
148 Not clear.	English re Siam-
146 Rome.	ese rice crop and
144 French.	American wheat
140 Moscow.	estimate.
124 Maroc.	42 Maroc.
116 Paris Colonial,	40 W G Y relaying
news in English.	programme to
113 Chelmsford.	Switzerland.
106 Moscow?	20 Pittsburgh.

Wishing "P.W." every success,  
Yours faithfully,

W. F. WILBEE.

Botley, Hants.

**THE LISTENER'S NOTEBOOK**

A rapid review of some of the recent radio programmes.

WHY I welcome the interchange of programmes with America is because it may introduce some novelty and variety into our programmes. The thing we, as listeners, are suffering from most is staleness: this is partly our own fault, and partly the B.B.C.'s. It is our own fault in that we try and force three hundred and sixty-five days' entertainment on ourselves every year. Now this amount is far in excess of our needs, and there must come a time when we answer every turn with a grumble.

Where the B.B.C. is to blame is that whereas it pretends to offer something novel, in point of fact it doesn't. For instance, its special journal gave us to expect something quite different when it presented "From Tibet to Timbuctoo."

What was this but the usual vaudeville hour?

Those taking part were all old friends, all doing the same old stuff. Leonard Henry, too, amusing as he was, dished up his usual delightful nonsense. It is because of this desire for something novel that we are mildly thrilled at the prospect of the coming series of talks, labelled "Hazard." It was for no other reason that we enjoyed the "Escape" talks so much, and that we haven't yet finished discussing or recapitulating them.

\* \* \*

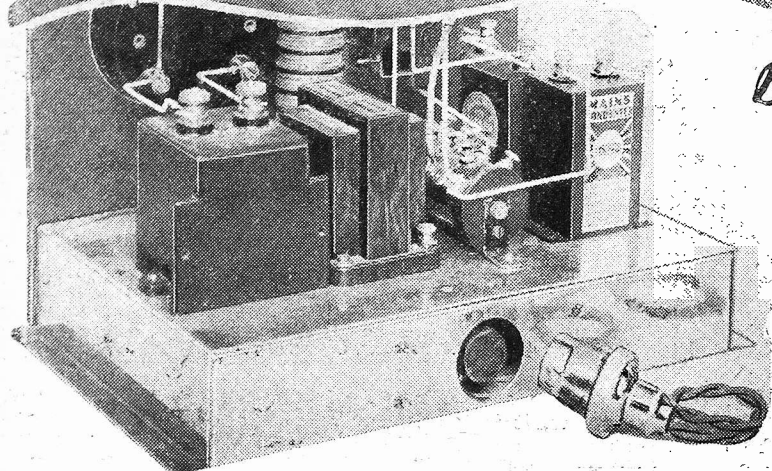
Arthur Bliss's "Colour Symphony" was food only for the highbrow. The lowbrow must have been left floundering in a state of bewilderment, and wondering what the symphony was all about. But how often this

(Continued on page 294.)



# That Final Ripple

by C.V. DOWDING  
ASSOCIATE I.E.E.



It seems to be widely believed that if you use a mains set, and even only a mains unit, a fair amount of hum is inevitable. But this is not, in fact, the case. Hum can be completely eliminated, although, in cases, it is difficult to do so. In the following article some methods of attacking the problem externally to the set are described for the benefit of those possessing inadequately "smoothed" sets and units.

ONE of the healthiest signs of worthwhile progress is keen public criticism.

In the earlier days of radio it was an axiom of the less reputable section of the trade of the time (R.I.P.), that the public would absorb without question almost anything in the way of radio apparatus.

Listeners marvelled that they were able to get results at all and, marvelling, they were in no condition seriously to question either the quality of what they got or the quality of the gear with which they were able to get it.

And if they were able to make comparisons, they did so rather on the lines of "this set is wonderful—so much better than So-and-so's," than "What a rotten set is So-and-so's."

But it didn't take long before familiarity began to breed discontent—a discontent which grew sharper as honestly-made sets and accessories rapidly improved and junk was shown as junk.

And so, with a jump, to to-day, when hardly anyone forgives the sins of a bad set simply because it is so marvellous that it can wheedle something, however thin and distorted, from the ether.

## The "Above Criticism" Standard.

Mains sets are comparatively modern innovations, and because of that they started fairly high up the scale of all-round efficiency. Nevertheless, it is an indisputable fact that it is only within the last few months that, on the whole, they have reached a standard approaching the "above criticism" class in respect of that *bête noire* of the musical listener—"hum."

But as I pointed out in a recent "P.W." article, it is far from being an easy matter even now to obtain a "silent background." Some mains are so bad that the smoothing needed is costly and its application a complicated business.

Where the hum is steady in pitch and volume, it is quite possible for many to tolerate it, even should it be audible through speech and music. The human ear is very selective, and after a while is often able almost completely to ignore a sound of distinctive character.

A listener who hears music as merely an agreeable noise can accommodate himself in such a manner without the slightest

effort. But there is a growing body of listeners who hear their radio music analytically and follow with great appreciation the patterning and composition of orchestral and solo works.

It is these who are irritated by anything in the nature of audible hum. And they find that "hum" is liable to make itself more prominent when they fit newer and better loudspeakers to their mains sets.

There isn't much that can be done about it in the case of a commercial all-A.C. receiver, although with a home-constructed model additional smoothing and screening is fairly easily carried out.

## Where Constructors Score.

But constructors are in the habit of dismantling old receivers at intervals and using many of the existing parts for new designs, and this is, of course, where the constructor scores, for his new set may cost practically nothing.

Generally speaking it is the D.C. set that gives the most trouble in respect of "hum." Some D.C. mains are really horrible, and in places like Margate and Ramsgate, where A.C. rectified by mercury arc rectifiers is distributed to the inhabitants, very special

methods have to be adopted in order to make all-mains radio worth listening to.

Where the "hum" is due to meagre smoothing in the set itself (as is frequently the case with the earlier commercial models) it is possible to add extra smoothing additionally to the set, and so make it unnecessary to scrap the instrument in favour of one of more modern design which may only be markedly superior in its freedom from "hum."

## An Effective Arrangement.

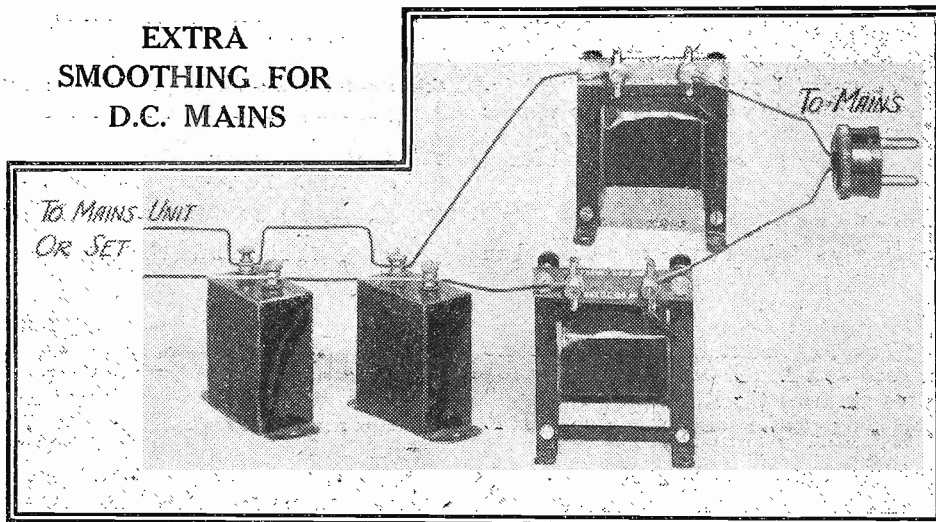
Two mains chokes able to carry all the current required by the set, and at least two 4-microfarad fixed condensers tested at a voltage exceeding that of the mains are needed.

But nothing under about one henry of inductance in each choke will be of any value. There are mains chokes able to carry half an ampere and having inductances of twenty henries, but these are specialised productions and cost at least two or three pounds each.

The above-mentioned components should be made up as a complete smoothing unit and preferably built into a ventilated metal

(Continued on next page.)

## EXTRA SMOOTHING FOR D.C. MAINS



Two special chokes and two condensers connected up as a supplementary smoothing filter for a D.C. set. These components should be housed in a protective casing.

## THAT FINAL RIPPLE

(Continued from previous page.)

case or on to a wooden baseboard protected by a cage of perforated zinc.

A socket is fitted so that the set plug which normally plugs into a light or power point can be accommodated. A short length of lead, terminating with a plug for the power or light point represents the input to the unit as shown in one of the accompanying photos.

The unit should be placed as near the power point as possible, and its lead to this kept correspondingly short.

### Easier with A.C.

I am unable to say that the above is always a complete cure for "hum" in D.C. sets, but it is a fact that the scheme has been employed with marked success in numerous instances.

I can be decidedly more positive in regard to the treatment of "hum" where only a mains unit is concerned—and this time a unit of either the A.C. or D.C. variety.

There are so many really powerful sets with and without S.G. valves being operated

should this particular scheme fail to give completely satisfactory results.

The second photo shows exactly how the extra smoothing is applied. You join the L.F. choke in series with one of the wires from the mains unit and connect the fixed condenser from one terminal of the choke to the H.T. minus terminal—or L.T. minus or earth.

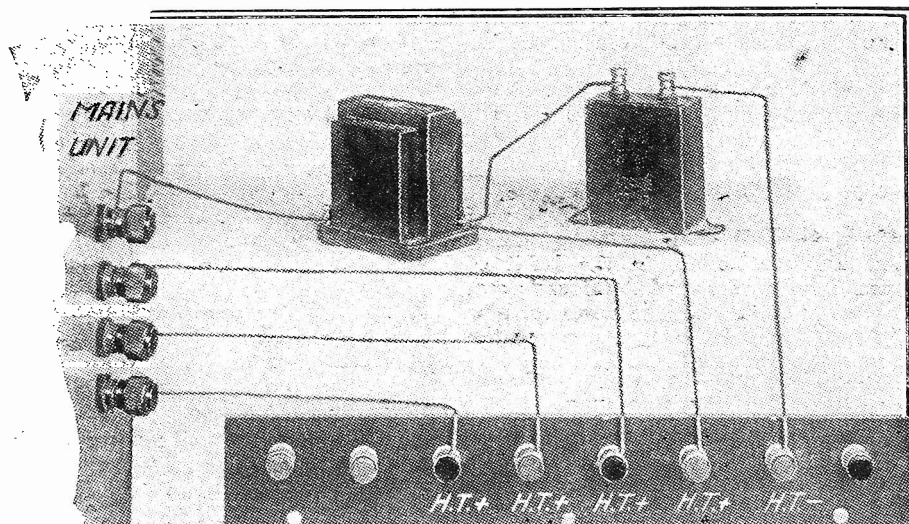
The feed to the detector valve should be tried first, although it is possible that the greatest benefit will be derived from additional smoothing in one of the other H.T. leads.

### Use Short Leads.

The choke and condenser can easily be built into a small case provided with the necessary three terminals for external connections. And it will be quite unnecessary for me to stress the fact that the shorter the connecting wires between the set and this device, and the device and the mains unit, the better.

Should one H.T. terminal on the set be feeding two of the valve stages, it is worth trying the experiment of separating them and inserting the simple smoothing components in one or other of the separated feeds—or if there is a spare output terminal on the mains unit, try taking the new point to this with or without the "outside" smoothing.

## AN INEXPENSIVE BUT EFFECTIVE ADDITION



Showing how an L.F. choke and fixed condenser can be wired between a set and H.T. mains unit in order to provide additional smoothing. The bottom terminals are, of course, supposed to be those of the set.

by commercial mains units of "thinly-smoothed" natures, that it is no wonder that our "Queries" post contains letters asking for assistance in suppressing "hum."

### Not an Expensive Business.

Happily it is both an inexpensive and an easy matter to apply additional smoothing. All that you need is a good smoothing choke and a 2- or 4-microfarad fixed condenser, a 4 microfarad being about twice as good as a 2.

Inasmuch as the R.I. Dux "Audirad" smoothing choke also "chokes" H.F. irregularities, I must say that it is most suitable for such a task.

It should also be mentioned that both components are widely used and are not likely to constitute "white elephants".

## "P.W." SETS ABROAD

A "S.G. Four" in India and a "P.W." Set in New Zealand.

### A "S.G. FOUR" IN INDIA.

The Editor, POPULAR WIRELESS.

Dear Sir,—Never having made a wireless set before, I ordered the "P.W." and became interested in your "S.G. Four," so I borrowed the back number with the set in.

I had difficulty getting the parts at a big expense, a Lissen P.T.225 retailed at home 12s. 6d. cost me Rs. 14 (over £1).

I receive regularly on loudspeaker Blue Spot 66R. Saigon, Java, Moscow, Zeelen, Nairobi, Rome and Chelmsford 6 to 7 p.m. I.S.T.

I cannot find Chelmsford in the night. As you will have noted, I am using a pentode, my H.T. is 140 volts.

Having read your remarks about tuning up the detector valve only, but being such a novice, I would

like to know how and where to connect up the ear-phones.

Is it possible to get coils for medium bands?

I must say people here with superhets say mine is excellent.

I have just had Zeelen on music, he is talking now, 10.30 p.m.—5 p.m. at home.

Just changed over to Rome on 25 metres.

Many thanks for producing the "S.G. Four," and good luck to all in the "P.W."

Yours sincerely,

A. D. LEVER.

Campbell Barracks, Quetta, Baluchistan, India.

### A "P.W." SET IN NEW ZEALAND.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have had fine results with the "Three-Coil Three" described in your paper, that I feel I must write a compliment to you on a very fine set. It may be surprising to your readers that European broadcasting stations are now regularly heard in this country in the early morning, 4 a.m.—6.30 a.m.

I have heard the following at very good strength: \*Graz (Austria) 352 metres, \*Bratislava (Czechoslovakia) 279 metres, \*Heilsberg (Germany) 276 metres, \*Leipzig (Germany) 253 metres, Barcelona (Spain) 349 metres, Strasbourg (France) 345.2 metres, Brno (Czechoslovakia) 342 metres, Lwow (Poland) 351 metres, Muhlacker (Germany) 360 metres, Hilversum (Holland) 298.8 metres, Prague (Poland) 486 metres, Brussels No. 1 (Belgium) 509 metres.

I have heard the following Americans, all verified by letter and card: K G M B, W T A M, W E N R, K T H S, K F W B, K M O X, K R L D, K N X, K F O X, K G E R, K E X, K T M, K F I, K D Y L, K T A B, K V O O, K S L, K G O, K F B I, W B B M, K E C A, K P O, K O L, W A B C, K Y W, W D A G, K F S D, K G A, K H J, K G R S, K M T R, and about 25 more not confirmed. I have heard about 26 New Zealand stations and 39 Australian. The following Japanese stations have been heard and verified by letter and card: J O G K, J O F K, J O C K, J O A K. Five more not confirmed. Canadian, verified by letter, C J O R Sea Island, B. C. Mexican verified, X E W, X E R, (75 kw.). Total 133.

All these have been received on the "Three-Coil Three," using a Mullard P.M.16 as S.G. (with 100 volts B.), Philips A.615 as det., Diatron U.X.112A as Audio.

Most of the parts, condensers, chokes, grid-leak and condensers etc. are Telsen. The transformer is a Ferranti. I am using a 40 ft. aerial single wire, inverted L type, about 98 ft. long. The distance to U.S.A. is about 8,000 miles; to Australia 2,500 miles, and Europe 11,000. It is evident that the set works well: by the way, most of these stations are received on Brandes' phones, excepting K F O X, K F I, K M O X, K Y W, W E N R, K G M B, which have all been heard on the speaker.

Once again congratulations on such a fine set.

Yours sincerely,

J. F. ADCOCK.

39, Opaki Road, Lansdowne, Masterton, Wairarapa, New Zealand.

\* Have written to, and received a letter of verification.

## TRICKS OF THE TRADE

Here are a few useful tips worth remembering.

When the diaphragm of one of the pair of telephones is bent, it sometimes restores sensitivity if the cap is unscrewed and the diaphragm is turned over to face the other way, but this requires knowledgeable handling, and the novice is not recommended to try it.

Always screw up the nuts on the underside of a valve holder before fixing it to the baseboard, or otherwise you may find the terminals "turning" and failing to connect properly when the rest of the wiring is complete.

The voltage actually on the plate of a valve is never as high as the voltage at the H.T. terminal which is supplying it on account of voltage drop in the intermediate wiring. In resistance capacity coupled sets the drop of voltage in such circumstances is very large.

If you have not a pipe-cleaner in the house and wish to remove dust from variable condenser vanes, remember that there is much to be said for a pair of bellows, or even a vacuum cleaner, for this class of work.

Never throw away an old shaving brush—it is invaluable for dusting inside a set, or for cleaning coils, and keeping similar components in good condition.



WE are going through rather an "atmospheric" period at the moment, and really one cannot wonder, for after the long cold spell, which was alleged to be spring, weather conditions have taken some little time to settle down, and we can hardly yet call them thoroughly settled. Long-distance weather prophets foretell, I believe, a fine hot summer, but since Old Sol is still prone to rather violent attacks of spots at intervals, I am rather wondering whether these predictions will be fulfilled.

What I expect myself in the way of "wireless weather" is that we shall have, on the whole, a pretty good time, but that there will be periods of two or three days in some cases, and of only an hour or two in others, during which atmospheric interference will be something of a nuisance.

#### Effect of Sunspot Minimum.

One particularly interesting change, due, I think, to the approach of a sunspot minimum, is to be seen at work on the medium wave-lengths.

On the medium band, readers will probably have observed that stations up at the top are not quite so good as they were, whilst those down near bottom are be-

ROME'S change in wave-length has had a dire effect upon my correspondence basket, for everyone seems to be writing to me with the belated news that Rome is now working on 42.9 metres. Needless to say, these suppositions are quite correct—he is, and with what a signal! What CT1AA intends to do about it I am anxiously waiting to see.

"H. L." (Prestwick) obliges with a long letter full of information. No, "H. L.," I have no connection with the "Short-Wave Listening Station," although I certainly own one! But I haven't the nerve to call it "The" listening station.

#### In the Mountains with "Buzz."

Interesting notes by "H. L." include reception of Warsaw (SP1AX) on 40.4 metres; EAQ on 30.4; Rugby on 60 metres odd working with the "Empress of Britain"; and the enclosure of some nice stranded wire that he is using for short-wave coils. Thanks for the wire, "H. L." —I have made a one-turn coil from it!

Regarding the problem of "pongs" between 23 and 27 metres, I would suggest that you wind coils of a different size, both for reaction and grid coils. Or possibly, you have an indoor aerial that tunes to that wave-length?

"W. H. C." (Virginia Water) reports that the "Short-wave" One is already going strong. He is rapidly becoming converted from an "S.G." Four fan to a lover of silent backgrounds.

"G. P. A." (Mill Hill) and "M. S." (Harlow) both send similar reports. As a

## STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

coming stronger and stronger. It would seem, then, that there is a tendency—and that it is undoubtedly due to the sunspot business—for wave-lengths below, say, 250 metres, to give better and better results at long ranges, whilst those above 450 metres show a falling off.

#### The Long-Wave Stations.

The long waves continue to be good, though a certain slight patchiness has been noticeable of late. Motala, for instance, has days when he is not up to the mark; Oslo, though generally excellent, has been weakish once or twice, and I was astounded the other afternoon to find the Eiffel Tower markedly below power. On the other hand, some stations seem to be better than ever. Amongst these are Huizen, Zeesen, Warsaw and Kalundborg.

As I suggested just now, the top of the medium wave-band is showing signs of the

times. Budapest and Munich stations at the very top are often difficult to receive at all; Vienna, on the other hand, is so powerful at times that one wonders whether alterations have not been made in the Rosenhugel transmitter.

Florence, Prague and Langenberg are

all quite reliable, and Brussels No. 1 is generally good. Beromunster has been varying very greatly of late. Rome and Stockholm are always to be found and Berlin (Witzleben), a weak transmission during the greater part of the winter, is now providing quite phenomenal volume.

#### Some More of the Best.

Sottens is frequently very disappointing, though when he is in good form splendid reception is assured. Katowice still shows a fine record, and Toulouse never fails the listener. Frankfurt and Hamburg are both usually good, though the former is liable to occasional "off" nights. Brussels No. 2 is also given to variations, but Milan has become most reliable.

On 328.2 metres, the new Poste Parisien station is now at work. The power will eventually reach 60 kilowatts, and from what I have heard of him already, this station is sure to be a standby.

## SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

matter of fact, at the time you read this I shall be in the wilds of North Wales, together with "Bonzo" (the car) and "Buzz" (the one-valver). I am going to do a lot of short-wave listening in different parts of the mountain country, and see what the screening effects really are like.

#### Watching for Directional Effects.

A 20-ft. length of rubber-covered flex will serve for an aerial, the far end being hitched to a tree, or a bamboo pole, and I shall therefore be in a position to see what sort of directional effects I can observe. You will hear all about it later on.

"H. H. B." (Simla) makes some interesting remarks about atmospherics on short waves. He finds that he can reduce them considerably by putting his hand "in series" with the aerial—holding the wire and touching the aerial terminal with his little finger!

I think the best cure for them is the connection of a small H.F. choke between aerial and earth, across the tuning coil. The winding must be found experimentally, but it is possible to devise one that will reduce atmospherics without having any noticeable effect upon signals.

"G. E. C." (nice initials!) of Sheffield, asks a ticklish question, but raises an interesting point. "Which station on short waves," he asks, "is most consistently received by 'P.W.' readers?"

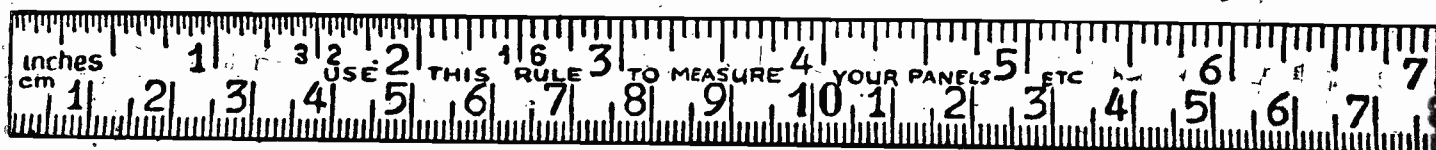
#### What About Trying This?

He has logged the percentage of times at which he has heard various stations when they are assumed to be on the air. CT1AA heads the list with 90 per cent, Rabat comes second with 75 per cent, and Moscow is third with 55 per cent.

By far the highest among the "Yanks" is W2XAF with 30 per cent, closely followed by W3XAL and W1XAZ. VK2ME comes at the 9 per cent mark, and Radio Coloniale and some others are at the bottom with 1.4 per cent. W2XAD only gets 5 per cent, which seems to me a rather low figure for him.

Suppose a few more readers try this out for a fortnight or so, and send me their logs? They would make very interesting reading, and the comparisons should teach us quite a lot.

"C. E. M." (Nairobi) has built both the "S.G." Four and my 1932 Two-Valver, and finds the little one more efficient at picking up stations, although he can't get them off his chest like his big brother.



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

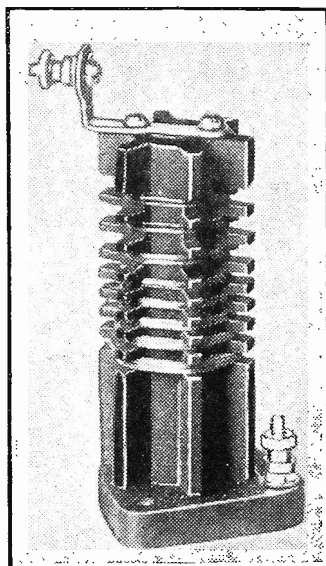
# Tested and Found—?



## A SHORT-WAVE CHOKE.

SOME of the radio components I receive for test give me the impression that they have been designed by engineers who know nothing about wireless. Others seem to suggest that their designers are quite

## LOW CAPACITY



Owing to its special form of winding, this Ward and Goldstone H.F. Choke has a very low self-capacity.

well up in radio but are the veriest tyros at engineering—mechanical engineering, that is.

There is a third and rare class of component that does not leave one with a feeling of vague incompleteness—you instinctively realise the moment you see it that it is the work of a man or men who are excel-

lent mechanics, have imagination, and a knowledge and love of radio.

I feel all that about the Ward and Goldstone Short Wave Choke; a small, inexpensive component; but note these points:

It can be mounted on either baseboard or panel, or suspended in wiring. Remove the terminal from the lug and it can, alternatively, be fixed under a valve-holder terminal, the lug being stout enough not to vibrate.

And then note the cunningly divided winding, which is broken up into different-sized sections. Some of the slots have only a turn or two in them, and others have quite a bunch.

That means very low self-capacity and an absence of resonance peaks. (Ten to one hundred metres without the slightest choke trouble!)

Yes, I like this little Goltone Choke. It retails at 2s. 6d., and I can recommend it to the attention of all short-wave "fans."

## LECTRO LINX'S LATEST.

Radio enthusiasts who have experienced trouble from soft-pronged or too-rigid plugs and tapered H.T. battery sockets will welcome the Clix "Master" plug.

It has sprung prongs which enable it to get a firm grip on the sides of practically any

of the smaller sockets—at any rate, all of those met with on G.B. and H.T. batteries.

It is marketed in two models. (A) with long shank and insulator; this type is recommended for plug and socket work and for H.T. batteries having cardboard platforms. (B) With short shank and insulator—for ordinary H.T. batteries.

Either model, in red or black, is available in a full range of markings at 1½d. each.

There is also a "Clix" Chassis Mounting Valve Holder, complete with screw terminals, and so the home-constructor is enabled to use, without soldering, a component of a type which has hitherto been restricted to manufacturers. The price of this component is 8d. for the 4-pin type, and 9d. for the 5-pin type.

## THE "ATLASTAT."

It must be five or six years ago that I showed in a "P.W." article how desirable it was to have a graduated movement in a variable resistance instead of the conventional direct relation between resistance variation and control movement in certain circumstances.

The particular circumstances on that occasion were the control of valve filament temperatures. Filament rheostats were, at that time, in universal use, and most sets had separate rheostats for each valve.

In those days valves were temperamental things, and the conditions in which they worked needed careful adjustment if satisfactory results were to be obtained.

And in my article I showed that an even variation of filament temperature was not given unless the rheostat was of special construction and was designed on logarithmic lines.

This principle of logarithmic resistance variation no longer fulfils a pressing requirement in filament circuits, but it has a valuable application in volume controlling.

Many of you will have noticed a tendency in volume controls to have little effect on volume over a large part of their adjustments, while the volume is greatly affected over a small "area" of the control.

In the "Atlastat," a new Clarke product, there is a logarithmic increase of resist-

ance for equal movements of the control knob—just what is wanted.

The "Atlastat" is, of course, a potentiometer, and is designed to carry up to 2 watts, and thus can be used in all the usual positions.

It is very small and neat and operates very attractively. The retail price is 8s. 6d.

## PLEASE NOTE.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot, in any circumstances, undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

## AN EFFICIENT SWITCH.

Charles G. Chalkley, of Wellingborough, recently sent me one of his new combined Wave-Change and On-Off Switches. It sells at 2s. 9d. complete with dial and knob, in black, walnut or mahogany finishes.

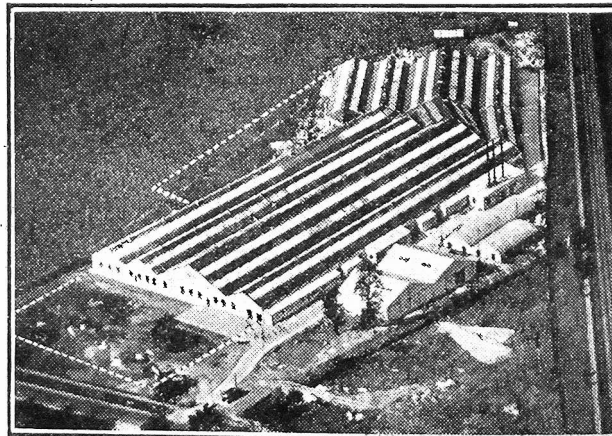
It is of the one-knob fixing rotary type, and its construction is particularly robust. The contacts are self-cleaning, and of very generous dimensions. I should imagine that it would give trouble-free service for an indefinite period, and one cannot say much more of any switch than that!

## A LOUDSPEAKER CABINET.

The Express Engineering Co., Ltd., of Poole, are making a fine loudspeaker cabinet for moving-coil or other units, which retails at 16s. 9d. It is of distinctively handsome appearance, and has a large, artistic fret on the front, which is backed by a golden-coloured gauze material.

The fitting of the unit is facilitated by the provision of a removable baffle, and this is, of course, concealed by the gauze. Constructors would be well advised to obtain details of this cabinet.

## "EKCO" STILL EXPANDING



An aerial view of the "Ekco" factory at Southend. The dotted lines indicate the area which is to be covered by contemplated extensions.





# AIR-TAXI RADIO

"HALLO. Heston! Hallo, Heston! This is air-taxi X Y Z A calling! What are conditions like over London? I am making for Croydon. Over..." Thus comes a voice out of the sky to the operator listening on the ground.

In a few moments his reply is being picked up in the snug three-seater cabin of the Puss-Moth monoplane, as it speeds along in bright sunshine above the clouds that darken the cities below.

The pilot inclines his head slightly towards his "fare," sitting back in his seat quite unconcernedly, and remarks, "I'm afraid we shall have to land at Heston, sir."

## Radio to the Rescue

"Tut, tut!" comes from the business man as he clicks his tongue. "All right, then." (It seems a pity that he must spend nearly an hour getting right across London to view that factory site near Croydon, when it has taken him little more to come right down from the North).

After a few moments the air-taxi slides noiselessly through the clouds to make a faultless landing and taxi up to the control tower. Our business magnate steps nonchalantly out, for all the world as though he were about to pay off a taxi outside the Ritz.

What a difference radio makes to this flying business. It takes all the "ifs" and "buts" away, so that no longer is it a high adventure to charter an aeroplane to make a journey across the country.

Take the scene that we have envisaged. In the case of an "ordinary air-taxi," that is to say, one without complete radio receiving and transmitting apparatus, it would not be half such an ordinary business.

It would not be possible for the pilot to be told of changing conditions, or whether he could "make" his destination. Or if he lost his way he could not be advised of his exact position in a few moments. In fact, the radio apparatus makes all the difference in the world, and it need not take up very much room either.

## Fitted Behind the Seats

Take for instance the set illustrated by the photograph on this page. It packs neatly out of the way behind the seats, but at the same time is fully controllable by the pilot while he is flying.

This is accomplished by Bowden-wire

For some years large air-liners have made use of transmitting and receiving apparatus, and now a special lightweight outfit is available for small machines, the advantages of which for air-taxi work are here described.

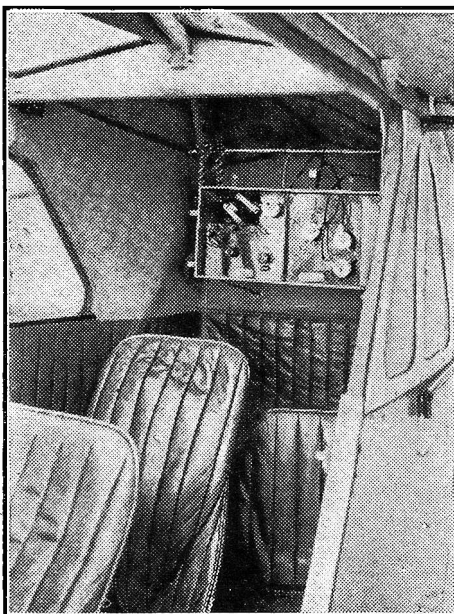
By A. S. CLARK.

type remote controls, of which there are four, conveniently placed for operation by the pilot's left hand. Captain Lawrence Hope, of Air Taxis, Ltd., is seen in the leading picture with his hand on these controls.

The machine is a Puss-Moth monoplane, and is largely used for newspaper work where speed is of great importance. Consequently radio is doubly advantageous.

For instance, should he encounter condi-

## REMOTE CONTROL PROVIDED



The gear may be stowed out of the way of the pilot, who can manipulate it with the aid of special wire-controls.

tions of bad visibility during flight, he can call up the nearest suitable ground station, confirm his position, and learn whether the conditions are local or general, and so decide with confidence if it is wise or not to continue to his destination. Such services are, of course, continually performed for pas-

senger-carrying aircraft on the air-routes, and are available for any suitably equipped private machine.

This type of information is particularly useful in connection with newspaper work, for it enables the pilot to decide while still in the air the quickest and safest means of delivering his photographs or other press matter. Also, waiting colleagues on the ground may be kept informed of his manoeuvres and intentions so that undesirable delays can be entirely eliminated.

The Marconi telephone apparatus as used by Captain Hope is eminently suitable for private aircraft. If more convenient it may be supplied without the remote control device.

## A Well Tried Design

It is of a type known as A.D.22, and is really a light-weight and smaller-powered edition of the more elaborate and powerful apparatus used on the giant passenger and mail planes of Imperial Airways, Ltd., and also other air-lines.

Normally, the transmitter and receiver are set to work on the International air wave-band of 850 to 950 metres. But it is also capable of working on the 600-metre band set aside for shipping.

The change from one band to the other is effected by means of a simple switch. The usefulness of this 600-metre band to the pilot is when he is crossing the Channel or is flying elsewhere in the neighbourhood of shipping, which could be of assistance in the case of emergency.

The whole of the apparatus is contained in one compact instrument box, and, as already explained, may be arranged for operation by means of remote control when found necessary. The whole of the power is obtained from one generator, fixed to the machine in a position where it is driven by the slipstream.

## Wind Driven Dynamo

A miniature propeller is attached to the dynamo for this purpose, and it is so governed that a constant speed is maintained the whole time. This generator can be arranged to supply not only the power for wireless, but by a special switching scheme to charge a 12-volt accumulator that can be used to light the navigation lights as well as run the radio apparatus.

This, of course, produces a definite saving in weight over a scheme where entirely separate supplies are provided for the two jobs.

# NOTES FROM THE NORTH

A well-informed bulletin of information and comment on B.B.C. activities in the North of England and in Scotland. Among other things our Northern Correspondent deals with the two widely separated groups of Scottish listeners.

THE most important current event in the North is, of course, the coming into action of the Scottish Regional transmitter.

To listeners in England (except a few in the extreme north of Cumberland and Northumberland, who are getting an excellent signal from the new station), this event is of little importance and represents merely another station on the dial—where it may, indeed, be more bother than anything else, especially as Hamburg, its next-door neighbour, is to increase power. There is only 9 kc. separation between the two.

## The Two Views.

But to Scottish listeners this is the most important event since broadcasting began. Those very ancient transmitters at Glasgow, Edinburgh, and Dundee will shortly be succeeded by the two magnificent modern transmitters at Westerglen. And the Scottish programme situation, which has been hopelessly tangled in recent times, will be straightened out.

In Scotland the B.B.C. has had to meet the demands of two entirely different publics, and of course it couldn't be done. The 100 per cent Scots were furious when large chunks of London material were relayed from their local transmitters; and yet when the B.B.C. pacified these enthusiasts by local programmes another public immediately rose up in wrath and demanded London programmes.

The Scottish Regional B.B.C. officials suggest that the two publics are approximately equal in numbers. My own impression is that the enthusiasts for Scots music, Scots plays, Scots talks, etc., are in the minority, but are gaining adherents.

## "Sliding In."

However that may be, the important fact is that both sides will be satisfied when the twin transmitters at Westerglen are eventually in full service. How soon that will be even the B.B.C. itself cannot say. The present "sliding-in" process with Scottish Regional will be repeated to introduce Scottish National to the public.

Mr. Cleghorn Thomson and his colleagues are taking very seriously their task of producing Scottish programme material in increasing quantities, and a booklet is to be issued concerning the forthcoming programme developments.

The design of the station at Westerglen is similar to that of the London Regional and North Regional, except that the

engineers have managed to combine economy with efficiency by hanging the aerials on two masts instead of four (as at Brookmans Park), or three (as at Moorside Edge).

## Aerial Ingenuity.

The original intention was, as stated in POPULAR WIRELESS, to suspend one aerial between the two masts, and split the other aerial into two halves, each running from

## THE DUCHESS APPEALS FROM 5NO



The Duchess of Northumberland at the microphone of the Newcastle station, where she recently made a broadcast appeal on behalf of the Durham and Newcastle Eye Hospital.

a mast-top to the ground. After experiments, however, it has been decided to use two "umbrella" aerials, each supported by one of the 500-ft. masts.

As the first Regional station, London Regional was opened with a blaze of glory; North Regional achieved enormous publicity owing to its unique position in one

of the bleakest spots in these Isles; but Scottish Regional has no such means of attracting the limelight. The most interesting fact about it is, in fact, quite incidental to the actual opening of the station.

This arises out of the decision to work Scottish National on the British common wavelength (288.5 metres). This is itself a most interesting experiment, but it also produces the even more interesting venture of working Aberdeen and Newcastle on international common wavelengths.

## Newcastle's New Chance.

These transmitters are at present on 288.5 metres, but could not so remain in company with Scottish National. Accordingly, they will each have a wavelength in the region of 210 metres—wavelengths used by other stations abroad, but not by any other B.B.C. stations. This means that Aberdeen and Newcastle will be able to indulge their own fancies in programmes.

On 288.5 metres they have been tied down to the National programme. Details are not yet fixed of what programme they will transmit in future, but it is probable that Aberdeen will include a large amount of Scottish Regional matter, while Newcastle will radiate a composite programme of North Regional, London Regional, and National items.

And this means that after a lapse of a considerable time the Newcastle transmitter will be able, again, to broadcast programmes produced in the Newcastle studio.

An important point for English listeners is that with the opening of the Westerglen transmitters Scotland becomes a fully fledged Region and will join with the Midland, London, and North Regions in the interchange of programmes. English listeners will sometimes hear Scottish programmes from their local Regional station.

## "Made in Scotland."

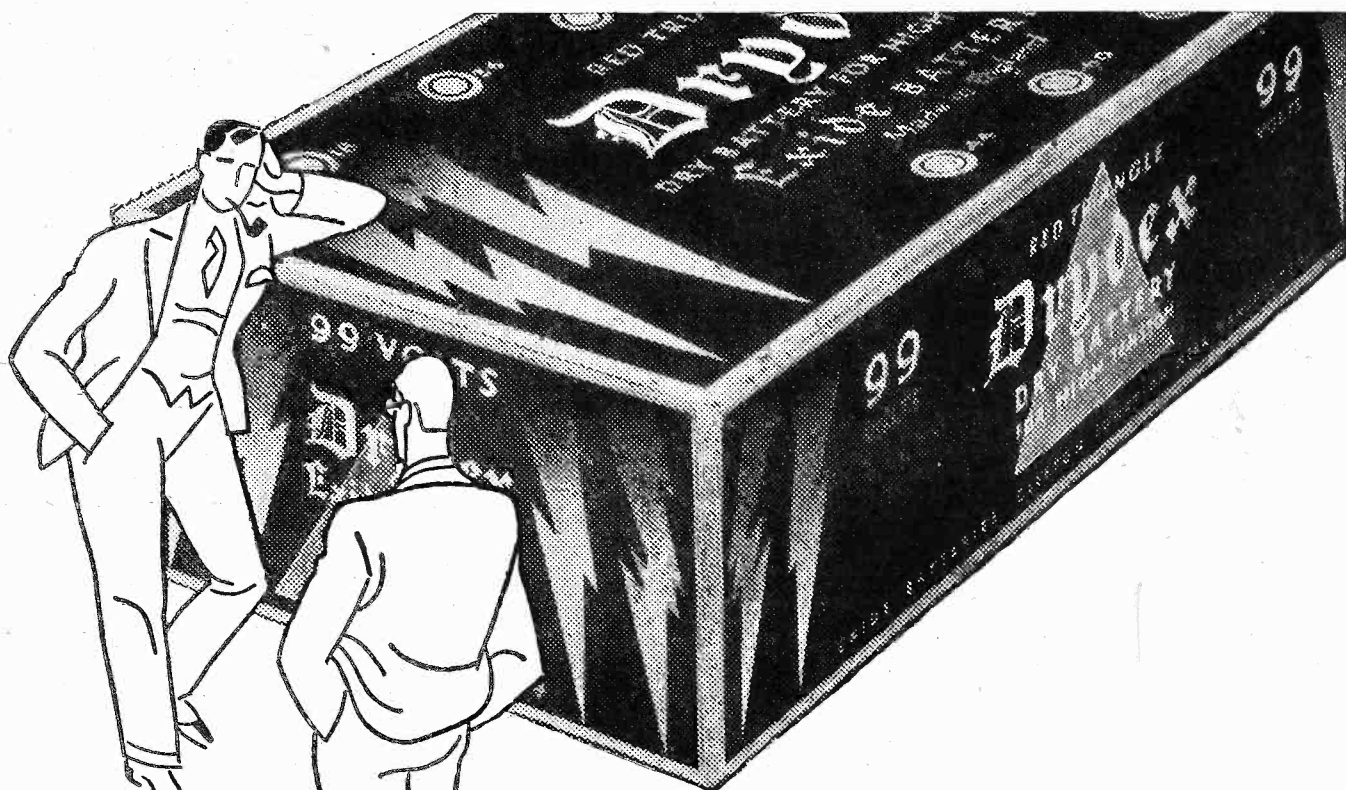
Scottish listeners will find a considerable amount of material relayed from other Regions on the Scottish Regional wavelength. In fact, the proportions of "local" to "relayed" material on this wavelength will, I gather, be roughly similar to the ratio in the present North Regional programme.

The idea of a few super-Scots that the Scottish Regional wavelength should carry nothing but programmes "made in Scotland" is, of course, absurd. There is not the talent in Scotland to support such a 100 per cent Scots programme without serious deterioration of the standard.

And amidst all this excitement in the far north how are Mr. Edward Liveing and his staff at Manchester and Leeds going on? When these Notes appear they will have launched yet another season of "Relays"

(Continued on page 294.)





**“Oh, it ought to last  
longer than that!”**

**Why don't you get a  
Drydex”**

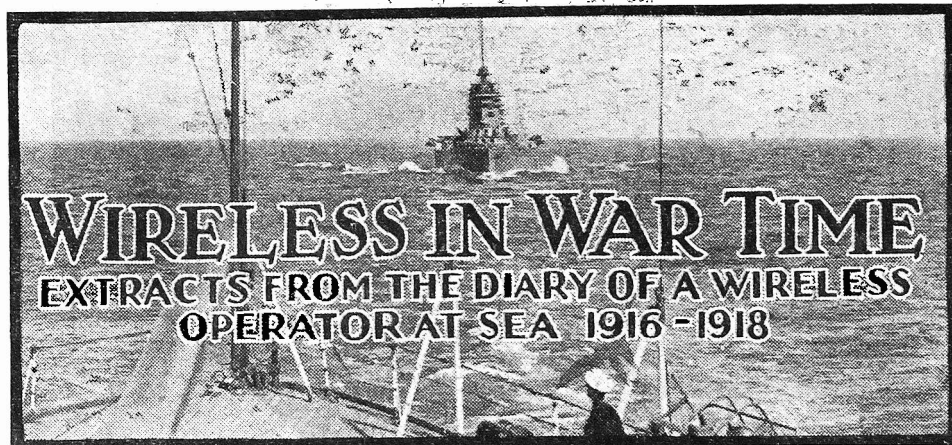
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Mr. C. C. E. of Worthing, wrote:

—“On March 30th, 1931, I purchased and installed in my five valve ‘Pye’ transportable wireless set one of your 108-volt DRYDEX high tension batteries. I am about to discard same after over six months’ use.”



JANUARY 11TH.—To-day has been most exciting. We have met the German raider! Directly it got dark this evening, large rain clouds seemed to gather in massed attack over our heads, and very soon we had a first-class storm raging. The sea was continually bursting on the decks, and owing to the wind, set up spirals of spray which made the atmosphere very misty.

When on duty about 9 p.m., old T—looked into my cabin for a chat. Going out on the Bridge again he came back to remark on the eccentric behaviour of a light about three miles away on the port bow. For some time this light, which evidently belonged to a ship's masthead, had appeared to be keeping company with us, and now it was making direct for the ship.

Old T— at once warned the Captain. From time to time, vivid flashes of lightning helped us to get a blurred image of the ship. She certainly corresponded with the description of the raider which had been sent out in various war warnings. The Captain immediately ordered all our lights to be doused and the gunners to stand by.

#### Hit by the Raider.

By this time the mysterious ship was much nearer. The Captain ordered the men at the wheel to steer a zig-zag course, in accordance with Admiralty instructions. All I could do was to stand at the door of the cabin, with the other operator, and wonder what the devil was going to happen next.

Several lights were now noticeable aboard the approaching ship, and I noted that one winked persistently. Pulling my wits together, I realised that the ship was Morsing us. She kept on sending "Stand to"; but you bet we didn't, and I've never known this ship go so fast. The stokers wanted no inducement, especially when, all of a sudden, there was a flash, and then a loud report.

We were no longer left in doubt. Our two gunners—ex-Navy men, and as keen as mustard—retaliated with our 4.7 (which is mounted on the poop), but I don't think they made a hit. The second shot from the raider carried away a part of our boat deck, and one man was knocked overboard, but the damage to the ship was not serious.

Thank the Lord the spray and the mist made an excellent curtain, and as we were now shifting for all we were worth, we soon

noticed that we were drawing clear. The raider fired about twelve shots altogether but, beyond the one which hit part of the boat deck, the shooting was pretty futile.

It's now about ten to midnight and for two hours we have seen nothing of the raider. The weather has got steadily worse, and it is 7° below freezing. Later: It is just dawn (January 12th) as I scribble these notes. There is no sign of our pursuer. We are a good deal out of our course, and I don't suppose we shall reach Norfolk, Virginia, until late to-morrow evening. Well, it's all over now; but it's been a most exciting night.

JANUARY 12TH (8 p.m.).—Two hours ago the engines broke down for twenty-five

JANUARY 19TH.—We had further information regarding the raider to-day. As so much depends on these war warnings, I'll reproduce one here:

"To all British Merchant Vessels. Government War Warning. Enemy raider last reported January 16th in latitude 7° S., longitude 25° W. About 4,000 tons. Well armed. Fitted with torpedo tubes. One squat black funnel, capable of extension, and possibly second dummy funnel. Two masts. Straight stem. Probably high speed. Take all precautions and show no unnecessary lights."

Another message runs as follows:

"British steamer s.s. Theodore captured and armed by raider. Is now operating on Atlantic routes. Take all precautions, etc."

It is estimated that this particular raider has caught over a dozen ships already.

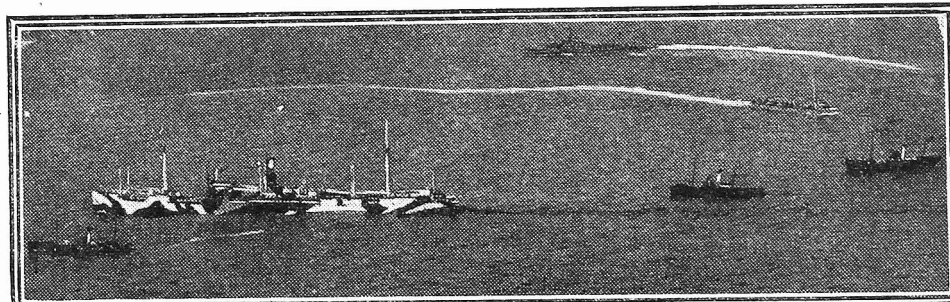
#### Another Alarm.

JANUARY 20TH.—More trouble last night. The second mate got an attack of the "jim-jams" and fetched the captain out of his bed at two in the morning, because he said he had seen suspicious lights. The captain stopped up until four, but didn't see anything.

JANUARY 21ST.—Here's an extract about the Kaiser from "Life," which is a sort of American "Punch":

"On the victorious field, he was buoyant, active, jovial, simple. He stood leaning on a cane that might have cost a dollar, and he spoke to the soldiers with the simple heartiness of a brother-in-arms."—German Press Agency. "Life's" comment was:

### A VICTIM OF THE SUBMARINES



This is an actual war-time photograph taken from the air and showing the scene as destroyers and patrol boats rush to the aid of a torpedoed merchant vessel. Notice her gay paint—a camouflage device to render sighting difficult to the enemy. She is listing only slightly to starboard in the picture, but is badly holed and sinking rapidly.

minutes. We are all wondering what would have happened if they had broken down when we met the raider. As old T— says, we should certainly have "copped it." The weather has moderated a good deal, but it is 5° below freezing, and the mercury is now dropping. We sent out a code message to-day, briefly describing our encounter with the raider.

JANUARY 13TH.—Arrived at Norfolk, Virginia, early this morning.

JANUARY 17TH.—Two of our new crew deserted last night on one of the ship's life-saving rafts, and I had to send a message to the Norfolk authorities asking them to look out for them. I forgot to mention that we have heard news here that our sister ship, the s.s. "—", has been sunk by the raider. By the way, another raider is reported from Pernambuco, South America. An Italian ship has been sunk 450 miles from here, and a Belgian relief ship has been held up about 500 miles from the Irish coast.

Twirling a dollar cane,  
Jovial appraiser,  
Of some ten thousand slain—  
Simple, hearty Kaiser.

Jovial, so might grin  
A headsman, neath his visor,  
Damn the cost so that we win—  
Buoyant, hearty Kaiser.

The dead stare stupidly.  
Who would wish them wiser?  
Their dull eyes cannot see  
Their jovial, hearty Kaiser.

Cannon food they from birth,  
Now—just fertiliser,  
Food for their mother earth—  
Simple, jovial Kaiser.

Some day, when from the sod,  
Like a wrathful geyser,  
Bursts forth the seed—then God  
Help the jovial Kaiser.

(To be continued.)



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OR BY EASY PAYMENTS 10/6 down and 11 monthly payments of 10/6

**KIT "C"** **£6:13:3**

Complete kit of Components as Kit "B" with Cabinet and free blue print.

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	£	s.	d.
1 Polished Oak Cabinet	1	15	0
1 Aluminium Box Screen and Base-board		8	6
2 Formo -0005 Log Mid-line Variable Condensers		8	0
1 ReadRad -0003 Differential Condenser		3	6
1 ReadRad Snap Switch		2	9
1 ReadRad 2-gang "On-off" Push-pull Switch		3	6
1 Sovereign Super H.F. Choke		3	6
2 W.B. Horizontal Valve Holders		2	0
1 Standard Valve Holder			6
1 2-megohm Leak, with Terminals		1	6
1 Lewcos 15,000-ohm Spaghetti Resistance		1	6
2 Lewcos 20,000-ohm Spaghetti Resistances		3	0
2 T.C.C. -0003 Fixed Condensers, Type "M"		2	0
1 T.C.C. -01-mfd. Fixed Condenser, Type "S"		1	9
1 T.C.C. -001-mfd. Fixed Condenser, Type "S"			6
1 R.I. Hypermite L.F. Transformer		12	6
2 Dubilier 2-mfd. Fixed Condensers, Type "BB"		7	6
1 ReadRad Cosmic Dual Range Coil		6	6
1 Varley Output Pentode Nichoke		12	6
1 Packet of Jiffilink for wiring		2	6
2 Ormond 2 1/2" Tuning Dials		2	0
2 ozs. 24 D.C. Wire			8
2 ozs. 32 D.S. Wire		1	10
3 Valves as specified (Cosmor 210 DET., PM.12, Mazda PEN.220	2	1	0
Flex. Screws, etc.		1	6
	<b>£8</b>	<b>7</b>	<b>0</b>

Any component can be purchased separately.

**KIT "A"** (less Valves and Cabinet), **£4.11.0**. Or deposit 8/6 and 11 monthly payments of 8/6.

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1 Ready Radio Eliminator, Type B.S.	5	17	6

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Please dispatch to me at once the following goods.....

for which { (a) I enclose (cross out line) £  
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Name.....  
Address.....

P.W. 14/5/32.

Please dispatch to me the following goods.....

for which I enclose first deposit of £.....

Name.....  
Address.....

P.W. 14/5/32.

# RADIO IN GERMANY

An exclusive interview with Dr. Kurt Magnus, managing director of the Reichs-Rundfunk-Gesellschaft, Berlin.

By A. A. GULLILAND.

MAY I introduce you to Dr. Magnus, the managing director of the German broadcasting company? He is comparatively young, and looks even younger. He is responsible for the smooth working of the financial and administrative side of German broadcasting, and the German press very often terms him Director-General of German broadcasting. Actually, he is the managing director of the Reichs-Rundfunk-Gesellschaft, the mother company of nine of the German regional companies, the tenth, the Bavarian Company, is independent.

## A Man of Action.

Sitting opposite Dr. Magnus in his spacious office in the Masurenallee, I was struck by the modern furniture; without, however, the effect being ultra-modern. The windows set high in the wall and the soft light ensuing from this arrangement agreeably impress the visitor. The room was designed to suit his taste, so we can take it that Dr. Magnus is a man of modern outlook, taking advantage of modern achievement and making use of the latest technical developments.

We spoke of German broadcasting, of its intricate and complicated organisation, of the difficulties countering all endeavour to simplify it. Dr. Magnus said that it must be much easier to run a broadcasting service in Britain, where one man alone is responsible for the entire service to one board of governors.

In Germany the managing director of a regional company is responsible to his board, but also has to follow instructions given by a political and a cultural control commission. On the other hand, he is responsible to the Reichs-Rundfunk-Gesellschaft, as this company holds the majority vote on his board.

This mother company is directly responsible to stock-holders, the majority being in the hands of the Post Office. The Post Office is dependent on the Minister of the moment, the Minister to the majority of Parliament. German broadcasting is thus actually controlled by the political majority of the moment, even if its influence has to pass through endless offices, or as the Germans would term it, "Instanzen."

## The Licence Question.

But apart from this financial and administrative control, every regional company has two separate commissions appointed by the government, one generally to censure programmes and another to give advice as regards cultural improvement. The news bulletins broadcast by all German stations are compiled by an independent company called the "Dradag" for short. Here the special commission consists of one member of all the more important political parties, making a rather unwieldy affair of over fifteen members.

My leading question to Dr. Magnus was: "Why do German listeners have to pay

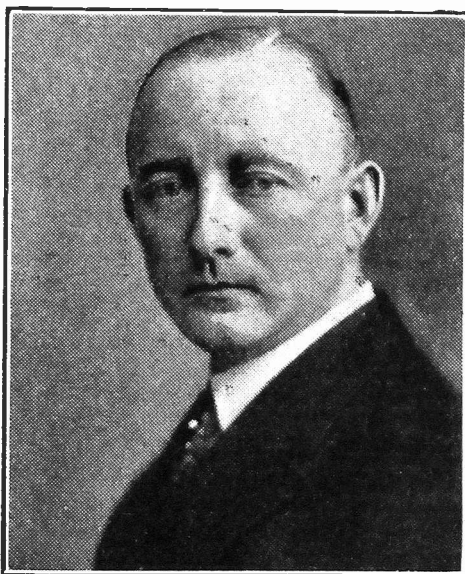
one and a half times more than British listeners for their licence, although prices are all going down in Germany, and the public are clamouring for a reduction?"

Dr. Magnus stopped a moment to think, and his answer was as follows: "Everybody has been putting similar questions to me for the past few weeks, and I answered them by broadcasting official figures." According to these, reparations and foreign debt have nothing whatever to do with it.

## Dividing the "Spoil."

"Of the eighty-eight million marks (about five and a half million pounds sterling) that German listeners will pay during 1932, only three millions will be passed on to the Treasury and only ten millions will be used to cover the deficits in other Post Office departments. So that actually 75 million

## THE "SIR JOHN" OF GERMANY



This is a recent portrait of Dr. Kurt Magnus, who, as Managing Director of the R.R.G. (Germany's B.B.C.), holds in Berlin a position equivalent to that of Sir John Reith in London.

marks could be used for broadcasting, but I have to deduct a further 7 million here as the cost of the collection, so that of 88 million marks, 68 million, or about 75 per cent., are used for broadcasting.

"But of this the German post office spends thirty million marks on technical transmitter development, on new stations, and on the operation of the German broadcasting stations. The remaining thirty-eight million, i.e. 43 per cent of the total sum, has to be enough for the administration and programme expenses of all the German broadcasting companies, including operation and installation of microphone, studio and line output amplification plant, together with the necessary development and laboratory work to keep this up to date."

Dr. Magnus told me that of the remaining 38 millions ten companies with ten director-

generals, ten programme directors, ten programme staffs, a number of orchestras, and nine broadcasting houses had to be paid for. This is because German towns and regions were politically independent up till some hundred years ago.

Every little German State had its own opera house, with permanent orchestra and singers, its own university, its special circle of scientists. And nowadays, even though Berlin has become the main centre, Munich, Dresden, Cologne and Hamburg still have a certain amount of individual culture, and are still individual centres, much more so than, for instance, Manchester compared with London.

## The Ideal Arrangement.

But Dr. Magnus quite agrees, that it would greatly simplify matters, and also reduce licence fees, if the ten companies could be merged into one big central company with ten more or less independent programme offices, instead of the present state of things, where the permanent staff numbers some 1,600, not counting the Post Office engineers out at the transmitters.

The German public want a reduction in licence fees, but they do not want to give up their ten companies. So, as Dr. Magnus smilingly asked, what was to be done?

## SHORTS FOR CONSTRUCTORS

Adjusting a Mains Set—Mounting Coils—Battery Hints, etc.

Never use a metal screw-driver in a mains unit or mains set unless you have taken the mains connecting plug right away from its socket. It is not sufficient to switch off, as sometimes the switch disconnects only one side of the mains.

When mounting coils on a metal baseboard remember that they should be arranged above this, an inch or so, unless the coil windings are at least that distance from the bottom of the former.

Even when an L.T. battery is standing idle a certain amount of evaporation goes on, and it is important to renew the loss regularly with distilled water. (The process is known as "topping up.")

The liquid in an accumulator should never be allowed to evaporate so far that it uncovers the tops of the plates, but should always be kept about a quarter of an inch above these.

It is a good plan to have your old battery acid turned out and the battery filled with new acid once every year.

Do not forget to switch off your set when you change the grid bias to the power valve; and, if you use a pentode, when you make any alteration to the loudspeaker connections.

To take out the H.T. negative plug from the battery every time you make adjustments inside the set is one of the best insurances against a radio accident.

When making a note of dial readings, remember that if an Eckersley Tuner is in use the second dial position should be noted, and not the first, as this latter alters according to the setting of the selectivity condenser.



# CAPT. ECKERSLEY'S QUERY CORNER



Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

Don't address your letters direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

## Aerial's Effect on Oscillation.

G. R. (Hayes).—"Having recently erected a good aerial about 100 ft. in length, I found that it was impossible to obtain reaction on my two-valve receiver. I was advised to try connecting a .0001-mfd. condenser in series with the aerial lead, and upon doing so found that the reaction worked normally.

"I am somewhat puzzled by this, and should be pleased if you could explain this very simply."

I should be pleased to—if there was a simple explanation!

In effect one may say that if you have a small series condenser  $C_a$  then the closed circuit L.C. is only prevented from oscillating by its own internal resistance  $R_c$ , whereas if you remove  $C_a$  the damping in the circuit is greater.

There is also the question of the phase between the feed-back voltage and the signal voltage, which with the non aerial series condenser connection may not be

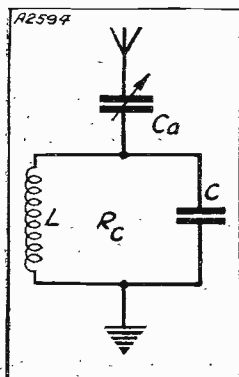
equal and is more inclined with conventional circuits to be equal if you loose-couple the aerial circuit.

The insertion of  $C_a$  is in effect loosening the coupling and thereby reduces the damping. I have made a lot of true statements but are you any clearer?

## What is Cross-Modulation?

N. M. T. (Woolwich).—"Just recently I heard a friend of mine mention the term

## LOOSER COUPLING



The effect of using a small series condenser in the aerial is to reduce damping and thereby to assist selectivity and the application of reaction.

'cross modulation.' He was saying that this effect frequently occurred with multi-H.F. receivers, but when I asked him to tell me what cross modulation was he did not seem to be able to explain it clearly.

"Perhaps you could tell me in simple language?"

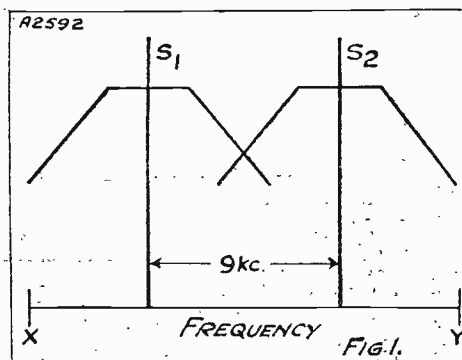
I understand cross modulation like this: Fig. 1 is a diagrammatic representation of two broadcasting stations having frequencies  $S_1$  and  $S_2$ . The tent-shaped drawing around each represents the intensity and frequency of their sidebands at same instant.

They are equal powered stations. If you

had a receiver which responded equally over the full frequency band X to Y you would hear both stations at once, each as a separate programme. This is quite obvious.

Now suppose you got a selective receiver. Then, if you selected by tuning  $S_1$ ,  $S_2$  would,

## THE INTERFERENCE FRINGE



Every two powerful neighbouring stations have overlapping fringes of sidebands, as shown here.

as far as detector voltage is concerned, look much smaller than  $S_1$  (Fig. 2). But at a frequency Z you would have two sidebands of frequency difference OZ from  $S_1$  and PZ from  $S_2$ .

Now would you have a frequency OZ as a modulation of the carrier  $S_1$ , or a frequency PZ (less than OZ) as a modulation of carrier  $S_2$ , or both at once, or what?

Well, if your tuning had made  $S_1$ 's carrier about five times greater than  $S_2$ 's carrier, demodulation would take place and all sidebands created by  $S_2$  would appear as modulations of  $S_1$ . If the stations are 9 kc. apart then a 2,000 modulation of  $S_2$  becomes a 7,000 modulation of  $S_1$ , a 6,000 modulation of  $S_2$ , a 3,000 modulation of  $S_1$ , always provided  $S_1$ 's carrier is made by tuning 5 or 6 times greater (apparently to the detector valve of the receiver) than  $S_2$ 's carrier.

Cross modulation is then the heterodyning of the jamming station's sidebands with the carrier of the station to which you are most strongly tuned.

## Using Up Old Valves.

V. C. (Stoke Newington).—"I have two LS5A valves which were given to me eight years ago. They had only been used for less than 50 hours previous to my acquiring them, and have since not been used at all.

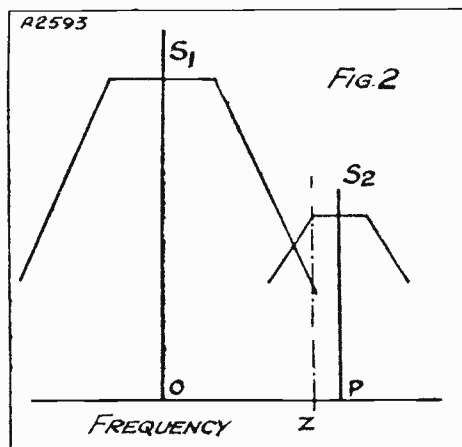
"I now contemplate making a large set, using my two valves in a push-pull output stage. Are the valves likely to be in good order after such a long period of lying idle? Or can they deteriorate even when not used?"

I do not think the valves will have deteriorated at all. But it's just a question whether any air's got in by this time! Surely not! We have examples of a vacuum being kept up in an exhausted vessel almost indefinitely.

A valve wears out because its filament wears out, and its filament wears out because you pass current through the filament which makes it hot and allows you to suck electrons out of it.

A valve (or a lamp) is more likely to wear out if it is constantly switched on and off than if it is kept burning continuously—the expanding and contracting of the

## TAMED BY TUNING



The effect of selective tuning is to emphasise one station at the expense of the other, but there will still be a certain "overlapping" producing a cross-modulation effect.

filament does a lot of harm in wearing out things.

I suppose, incidentally, your valves have never been dropped or damaged. I mean anode, grid, and filament are all isolated all right?

You can try this with a cell and a milliammeter and a resistance—just to see if any two pins (except filament) have a circuit between them.

ONLY IN "P.W."  
can you read Capt. Eckersley's  
replies to listeners' own problems.  
AND REMEMBER—  
Captain Eckersley's technical articles  
appear only in  
"POPULAR WIRELESS"  
and "MODERN WIRELESS."

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 286.)

### WHAT IS THE MAXIMUM RANGE ON MEDIUM WAVES?

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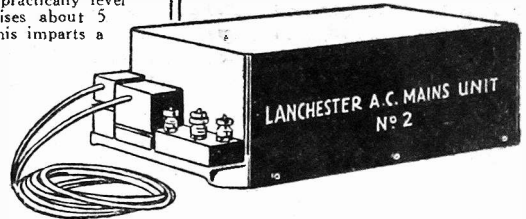
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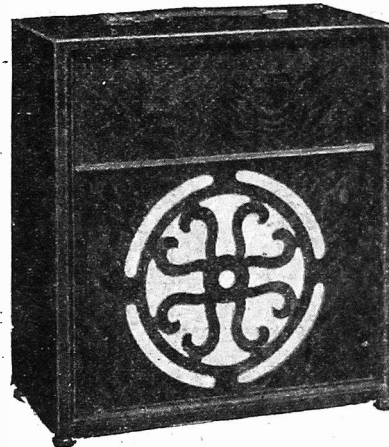
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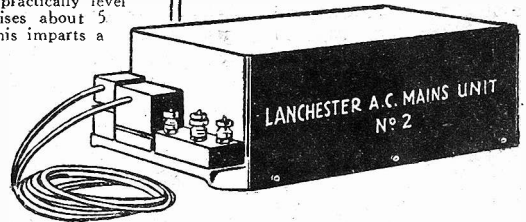
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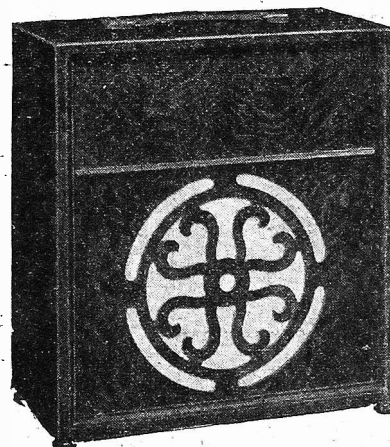
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P.W.35.

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Quintero, the English translation of which has been made by Granville Barker. Dulcinea Glasby, a member of the B.B.C. staff, has adapted the play for the microphone, and Howard Rose will produce it.

A party of students from Bonn University are visiting the London studio on Saturday, May 28th, to contribute some German students' songs to the National programme.

I have already mentioned that Sir Thomas Beecham is to conduct the studio broadcast of Delius' opera "A Village Romeo and Juliet" on Friday, May 20th. The performance will be given in the large No. 10 studio at Big Tree Wharf, which, as I told you last week, is being retained by the B.B.C. on lease from the L.C.C. for another two years. The cast for the opera includes Kate Winter, Dora Labbette, Dennis Noble, Jan van der Gucht, and Arthur Cranmer.

### New Type Vaudeville.

On the following evening there is the second of the new type of vaudeville entertainments, also given in No. 10 studio, under the style of "Music Hall." There is no doubt that a change in vaudeville presentation was long overdue, because the "intimate" type of artiste hardly fulfilled all the requirements of those who like their vaudeville more on the lines of a stage production.

That is the whole idea of this new "Music Hall" entertainment. A stage is erected in the studio and the artistes take their curtains in the approved style before a big audience. The first programme gave Gus Elen an opportunity of making his microphone debut, and now on May 21st Lily Morris, the well-known comedienne, who tops the "bill," will also make her first appearance in the studio.

### An Able Combination.

Sonatas by Grieg and Beethoven will be included in a recital to be given on Monday, May 23rd, by Arthur Catterall (violin) and Victor Hely-Hutchinson (pianoforte). As most listeners know, Mr. Catterall is leader of the B.B.C. Symphony Orchestra, and Mr. Hutchinson, who is a member of the Musical Department staff at Broadcasting House, is now giving an important series of illustrated talks on Music Old and New.

### The Three Valleys Festival.

The Three Valleys Festival is becoming an important musical event in South Wales, and for the third year in succession it is to take place at the Pavilion, Mountain Ash, the dates selected being Thursday, Friday and Saturday, May 26th, 27th and 28th respectively. The festival, as some listeners will remember, was started to provide some relaxation and forgetfulness of trouble to the miners in the depressed colliery areas of the Rhondda, Aberdare and Merthyr Valleys, a grant being made by the Carnegie Trust for the purpose.

The main object was to give the unemployed miners something to think about, and there is nothing that Welshmen would rather bring their attention to than singing. Sixteen choirs have been rehearsing for this year's festival since last October, and this year the guest-conductor will be Dr. Malcolm Sargent.

## TECHNICAL TWISTERS

No. 113.

### THE PRAGUE PLAN. CAN YOU FILL IN THE MISSING LETTERS?

In order to avoid the possibility of mutual ..... most of the European broadcasting stations work on wavelengths allotted to them under the Prague Plan.

\* \* \* \* \*

This wavelength co-operation is voluntary, but has been remarkably successful on the whole, the basis of the plan being a separation between adjacent carrier-frequencies of ..... kilocycles.

\* \* \* \* \*

As there are insufficient frequencies for the number of stations, some of them are shared by low-power stations, which are therefore said to work on a ..... wavelength (instance the British Relays, working on 288.5 metres).

\* \* \* \* \*

Last week's missing words (in order) were: Resistance. Potentiometer. Slider. Two, Three.



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P.W. 15.



# TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio reception.

By Dr. J. H. T. ROBERTS, F.Inst.P.

## Pentode Hints.

I SAID something the other day about tone-control devices, and a reader sends me some observations about this in relation to the pentode valve. Most manufacturers of pentode valves recommend that a filter, consisting generally of a resistance and condenser in series, should be used with the anode circuit.

This, as you will remember, is in effect a tone control, and it has the advantage first of all that it counteracts the tendency to over-emphasis of the higher audio-frequencies and in the second place that it comes in useful in case the loudspeaker should be disconnected.

Generally with a pentode, unless some filter or corresponding counterbalancing circuit is used, the quality with most ordinary loudspeakers is apt to be poor. In view of this, and also in view of the rather peculiar character of the pentode valve, the instruction sheet supplied with the valve should be very carefully studied. As I have said before in these notes, often enough people using a pentode valve are disappointed with the results simply because they have not taken the trouble to consider carefully the special conditions which the valve requires.

Any component in a wireless circuit, if you are to get the best out of it, must be operated in correct or reasonably correct conditions, and this applies possibly more to the pentode valve than to any other component.

In some cases the output of the set prior to the pentode—or perhaps I should say the *input* into the pentode—is lacking in strength of the upper audio-frequencies, in which case the pentode, by its natural characteristics, will tend to bring up the higher notes. It is a very good plan, however, always to use a protective resistance arrangement.

## A Good Sample.

I have recently been making some tests with a very good sample of commercial choke, which is specified by the makers at 20 henries inductance with 50 milliamperes flowing. If the current is reduced the inductance, of course, goes up and at a current of about 10 milliamperes the inductance was about 26 henries, the D.C. resistance of the choke being just over 300 ohms.

This is obviously quite a good characteristic curve, for the choke and the inductance value can be considered quite reasonably

constant over a fair working range of D.C. values.

This compares very well with some of the chokes which I have examined from time to time, most of them giving a much more rapid variation.

## Ganged Condenser Construction.

Ganged condensers ought not only to be well made but also they ought to be free from gradual or accidental changes in the ganging adjustment. I have sometimes found cases where the construction of the chassis was not sufficiently substantial, with the result that the ganging was apt to get slightly out, due to accidental causes.

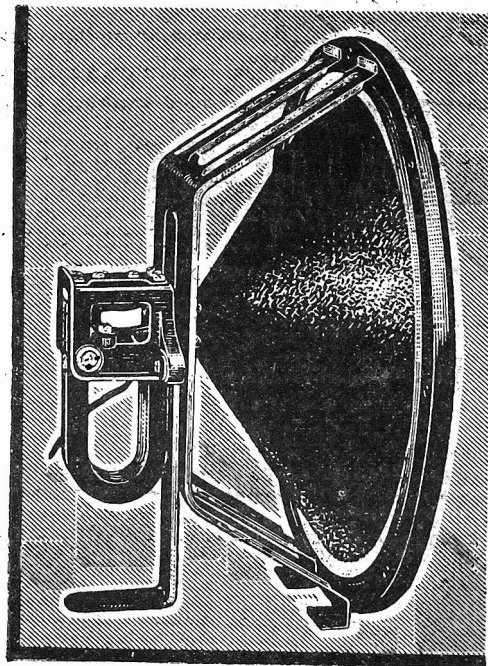
This means that the tuning will become flat, and although it is true that the trimming condensers will enable matters to be put right, this is often inconvenient, and in any case is hardly the right way to make up for unstable framework.

## Multiple Tuning.

If very good circuits are used and these are sharply tuned, it is obvious that the ganging must be very accurate indeed, otherwise the advantage of the circuits will be lost. If the ganging of the condensers is not accurate you will get broad instead of sharp tuning, and you may find that a station will come in at two or three closely adjacent points, which is very irritating. In fact, unless the tuning condenser is really a precision job, it is better in some ways not to have the circuits too good in themselves.

You cannot always judge a ganged condenser by its size or apparent massiveness  
(Continued on page 292.)

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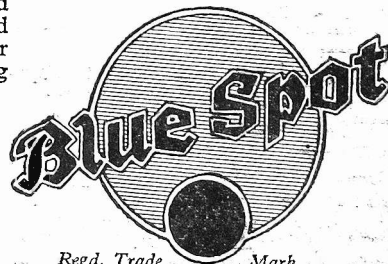
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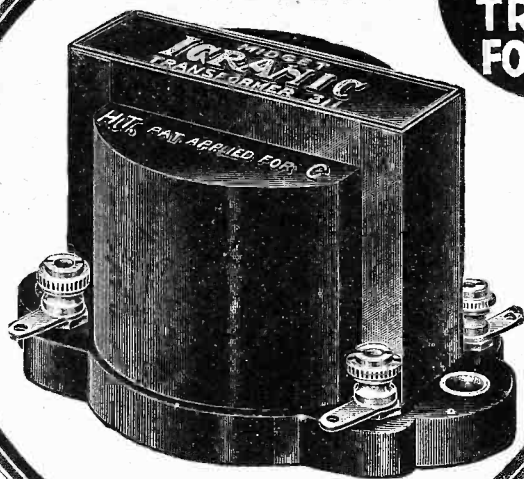
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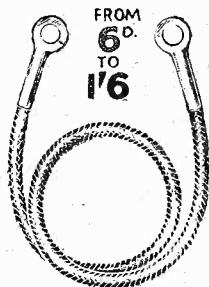
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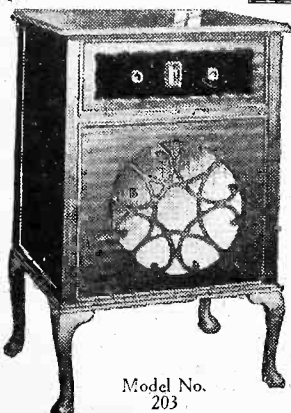
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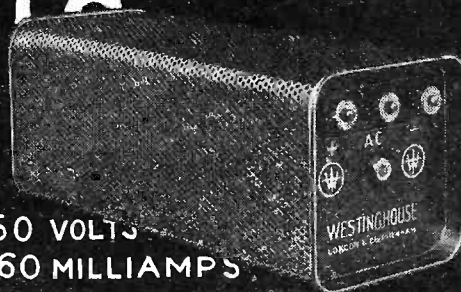
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## TECHNICAL NOTES

(Continued from page 290.)

of construction. Even when the whole of the framework is apparently very solid and rigid there may be play or "lost motion" between the moving parts, which will render the operation of the component pretty well hopeless.

### Changing Impedance.

When a valve is getting old, the change in its impedance may cause the set to whistle, due to interaction between the circuits. This is more especially liable to happen when transformer-coupling is used between the power valve and the detector, the transformer being not perhaps up to the mark.

It follows that a detector valve of too high impedance will in these circumstances produce the same results. I mention this because when a high-pitched whistle is produced in a receiver, many people jump to the conclusion either that it is being received from the aerial system, owing to oscillation on the part of a neighbour, or that it is due to the coupling set up by a defective high-tension battery.

Both of these may, of course, produce the trouble, but it may also, as I say, be brought about by too high an impedance of the valve and the mere fact that a valve when first put into use operated satisfactorily must not be taken to mean that it will go on indefinitely doing so.

### About Whistling.

As regards any high-pitched sound which may be received from external sources, this can easily be investigated by the simple process of disconnecting the aerial and earth of the set. Incidentally, it is a well-known dodge to try reversing the connections to the transformer secondary, as this sometimes makes a considerable improvement in a set which is liable to whistle.

### Screening a Wave-trap.

I have been more than once asked about the screening of a wave-trap—whether this is a very definite advantage or whether it depends upon the set itself. As a matter of fact, generally speaking, there is not much use in screening the wave-trap, unless the receiver as a whole is screened.

Sometimes you will find that a powerful station nearby will produce a sort of "shock" effect, and this may be avoided by screening the whole of the receiver and also the wave-trap, if one is used. But, as I say, there is really no point in screening the wave-trap alone and, in fact, it is more important to screen the receiver than the wave-trap, if you are going to screen only one of them.

A completely screened receiver and wave-trap is very useful if you are troubled by powerful local station effects and you want to reach out further afield for distant reception.

### Tuning with a Frame.

The winding of a frame aerial appears at first sight to be a very simple job. So it is, in some ways, but like many other simple things, there is a right and a wrong way of doing it. It is important to have the high-frequency resistance of the frame as low as possible, as upon this depends not only

the sharpness of the tuning but also the actual value of the voltage delivered from the aerial. Furthermore, you will find that the directional effect of the frame aerial is distinctly more definite when the aerial is properly constructed and is of relatively low resistance.

You can wind a frame aerial with ordinary solid wire, but it is as a rule better to use finely-stranded wire; this makes a better job and enables you to wind on the turns more taut, and also gives a lower high-frequency resistance, with the consequent advantages mentioned above.

### Effect with Super-het.

If you use a super-heterodyne set it is interesting to try different types of frame aerial, and you will find that the results which you get differ quite a lot with different kinds of frame. In fact, it is surprising what a difference there is when you use a properly made frame aerial with stranded wire.

The insulated stranded wire, especially if enamelled, is a bit awkward to deal with at the ends, where you clean off the insulation. There is no short way of doing it, and you must set to work patiently to separate the strands and clean each one individually. Having got them all nicely cleaned, you then twist them together again, but if some of the strands are not making contact with the remainder you will lose the advantage to some extent. So you want to take care that they are separately and individually cleaned and then twisted together so that they are all making contact.

### Voltage Constancy.

It is surprising what a number of people there are who have electric supply available and who still use battery operation for their receivers. Sometimes this is under the mistaken notion that battery operation, although perhaps more troublesome in replacements and so on, gives better results than mains operation.

This may have been true in the earlier days of mains operation, some three or four years ago, but it is certainly not true today, and not only is the use of the mains admittedly so much more convenient, but actually the results which can be obtained now are indistinguishable—with proper precautions—from those gained by equivalent battery operation.

I might even go further and say that in some ways they are superior, because once you have made the necessary arrangements to cut out hum and so on with mains operation, you have the very important advantage that the voltages you are dealing with, once the conditions are fixed, remain virtually constant and you are not troubled with declining voltages and all sorts of unknown factors of that kind, as you are with battery operation.

Personally, although I use battery-operated sets for experimental purposes, I cannot understand any ordinary listener, who has electric supply available, sticking to battery operation in preference to mains operation.

### Cost of Mains Operation.

On the question of cost, again mains operation has the definite advantage, because apart from the initial outlay, the actual running cost is much smaller than with batteries.

(Continued on next page.)



## TECHNICAL NOTES

(Continued from previous page.)

By the way, if you are going in for a mains unit to work a set which was previously battery operated, it is always a good plan to buy a unit which has a distinctly bigger capacity than you require at the moment.

The extra cost will not be anything very appreciable, and the unit—possibly with an artificial load to prevent excessive voltage-rise—will be all the better for working your present set; on the other hand, as you get more ambitious and you go in for a larger or more elaborate set, your mains supply requirements will be correspondingly increased. When that time comes you will be glad you bought the bigger unit in the first instance.

### Detector Stability.

I have spoken once or twice about the stabilising of the detector stage of a receiver, and I would like to say something about the use of high-frequency and low-frequency filters in this connection.

If you are troubled with high frequency getting past this stage you may have to resort to a high-frequency filter, which consists of an H.F. choke and a pair of condensers. The choke, of course, is in the high-tension anode feed and the condensers are connected respectively across the two ends of the choke and to the low-tension circuit.

The capacity of these condensers depends naturally upon the value of the choke which is used, but an average capacity would be, say, .0002-mfd. each. In passing, I should say that these condensers should not be of too large capacity as, if so, they may tend to cut off the higher notes.

Sometimes there is an advantage in introducing a fairly high resistance also in the grid lead to the next valve, that is, to the first L.F. amplifier or, if there is only one valve following the detector, this will be the power valve. This resistance may conveniently be about 100,000 ohms.

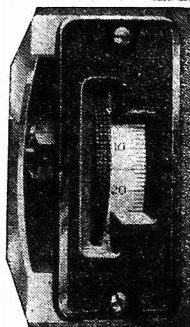
The above-mentioned arrangement constitutes a high-frequency filter, and sometimes makes a great difference to the working of the set. Incidentally, it is often used in commercially-built sets.

### Low-Frequency Filter.

Now as regards the low-frequency filter which is used for the purpose of avoiding A.C. hum. Two resistances are used, these two resistances being in series with each other in the high-tension anode feed, the second one having a pair of condensers connected across its ends, the opposite sides of these two condensers being connected to the low-tension circuit.

These two resistances may conveniently be of, say, 20,000 ohms each, whilst the condensers should be of, say, 1-mfd. each, or even 2-mfd. if you happen to have the latter condensers available. This arrangement constitutes a low-frequency filter, as I mentioned above, and should cut out any hum or motor-boating.

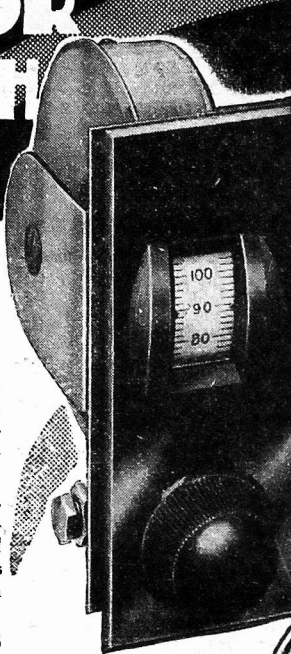
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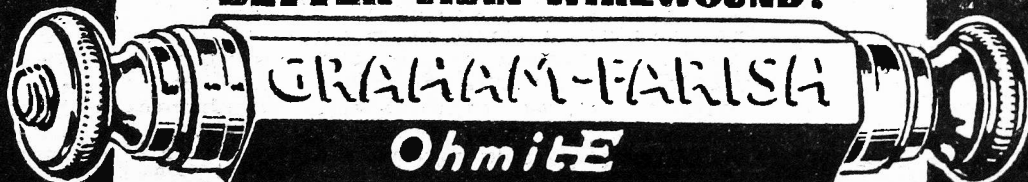
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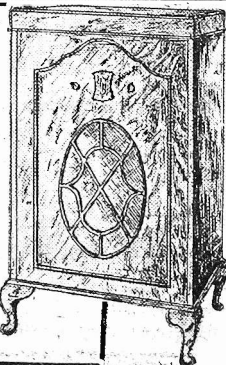
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## NOTES FROM THE NORTH

(Continued from page 276.)

From the Resorts" for North Regional listeners.

This summer they will tap Whitby, Buxton, Blackpool, Scarborough, Bridlington, St. Anne's, and Blackpool, with a possibility of Harrogate later in the season.

Musical programmes will not be relayed from the Isle of Man this year. As an entirely independent observer, I must say that musical relays over the submarine cable which links Manchester with the Isle of Man and goes on to Belfast have not been a great success in the past.

### Isle of Man Relays.

I consider that the B.B.C. is wise to go easy on these relays, and I suggest that the next time the Post Office has a cable ship wanting a job it should send her off with a new cable, specially designed for music, to be laid on the bed of the Irish Sea. I don't envy Belfast listeners, who have regularly to receive music from London over the present cable.

Omitting music, however, there will be several interesting relays from the Isle of Man—a running commentary on the Tynwald Ceremony, another on the Senior Tourist Trophy motor-cycle race (June 10th), and an eye-witness account on the Junior race, two days earlier, relayed from Douglas immediately after the event.

Other sports are to figure in the North Regional programme. The Northumberland Plate, or "Pitmen's Derby," will be relayed from Gosforth Park, Newcastle, on June 22nd. A series of eye-witness accounts of Northern tennis tournaments will be given by Mr. E. J. Sampson, tennis correspondent of "The Manchester Guardian." They will be as follows:

May 28th.—Northern tournament at Manchester.

June 4th.—Northern tournament at Liverpool.

June 16th.—Northern eliminating trials for Wimbledon, at Manchester.

August 20th.—Northern tournament at Scarborough.

## THESE RADIO COMPONENTS

(Continued from page 269.)

I think that the designer is badly served by the valve manufacturer on two counts, price and performance—the primary difficulty being price.

### The Designer's Difficulty.

I am sure that the high price of valves forces the designer to try and get more out of one valve than is technically justifiable. So we get these ridiculous high mu valves, whose magnification can never be realised except by forcing retroaction, using distorting brutalities like pentodes, and an instability of circuit due to non-matching of similar types of valve. If the price of valves were halved we might find designers inclined to do a proper job, and use the valve as it was meant to be used. We would improve selectivity and we should have a better stability, and in the end a better quality.

Now, Mr. V. M. A., I hope you are annoyed, and will reply and tell us why your prices are higher than in most other countries.

## THE LISTENER'S NOTEBOOK

(Continued from page 270.)

is the case with the so-called works of art! I would like to know what the highbrow has to say about it.

There is no doubt that Troise and His Mandoliers are a clever combination. Their turn is really first-class, both in choice of programme and in execution. It is refreshing, too, to hear a vocalist who sings. By his remarkable singing of "Speak To Me of Love," Don Carlos demonstrated that there is a better way of singing this sort of song than that adopted by our crooners.

Miss Eileen Pilcher may be an accomplished singer, but Saturday night is *not* the night for her—at any rate immediately after a Sports Bulletin. Can't the B.B.C. visualise the discussions that follow the announcement of cricket results? Brahms is not good background music, whereas a good deal of the music we get over the ether is. All that is necessary is a little rearrangement.

M. Stephan told the schools the other afternoon that he was born at Guingamp. This suggests to me that a talk (in English) by him on the Bretons in an evening programme wouldn't come amiss. What about it, Monsieur?

It is clear from the number of pieces of real music, all written by English school-children and played by Sir Walford Davies last week, that there will never be a dearth of new music in this country if these young composers carry on the good work now begun. What an inspiration Sir Walford is!

Henry Hall's policy of fresh tunes before the old ones begin to sicken is one which places him above his fellows. The Savoy Hotel Orpheans, on the other hand, find it hard to part with old friends. Their new ones of recent programmes haven't been very bright, either, while their treatment of "A Little Rose" amounts almost to sacrilege. I wish they would leave such tunes alone!

The contributions of the Headmaster of Mill Hill School to the American Series "Public School Life in Britain" must have interested many British listeners, but none more than Public School boys themselves. Their younger brothers still at their prep. schools unfortunately missed the encouragement it had for them, as they were in bed at the time of the talk. The Headmaster didn't seem to possess a good microphone voice, I thought.

Mr. Winston Churchill was in marvellous form at the Royal Academy's "do" the other night. In characteristic fashion he presented a report of the activities of his National Academy at Westminster. His observation that the Prime Minister's works contain less vermillion than they used to was typical of the many picturesque things he said. I couldn't help feeling that Winston was in the wrong programme that evening. Though his report carried the proceedings twelve minutes beyond scheduled time I bore him no ill-will, but he will probably hear about it from dance-music fans.

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## THE "OUTDOOR" THREE

(Continued from page 281.)

The H.F., detector and L.F. stages are totally enclosed in an aluminium box, which can be obtained ready drilled from Messrs. Burne-Jones & Co., Ltd. The lid of this metal box forms the panel and has attached to it a wooden baseboard of conventional type.

When the layout and wiring are finished the remainder of the box is placed into position, the various flexible leads first of all being threaded through the holes in the back of the box.

I will now go over the various constructional points in detail. Suppose we start from the beginning. On the bench in front of us we have the metal box and baseboard, together with the different components required for building the receiver.

### Arrangement of the Controls.

The front of the box forms the panel and to this we attach the wooden baseboard, fixing it in position with the aid of three wood screws along the lower edge of the front.

Next, the front and baseboard are placed in position in the cabinet (there are two wooden runners which act as bearers), so that the front of the box comes up against the front of the cabinet.

The idea is this. Since the spindles of tuning controls, reaction condenser, wave-change and L.T. switches have to project through the front of the cabinet for purposes of adjustment, it is, of course, necessary to drill clearance holes in the cabinet front itself.

The positions for these holes can be readily obtained by using the "panel" as a template, because it is already drilled. The centres can then be marked off on the back of the cabinet front and the clearance holes drilled with a carpenter's brace and bit.

The job is easier to carry out in practice than to explain in words, and the general idea will be self-evident upon inspection.

When this part of the work is completed, the next item is to secure the controls to the box front.

### Insulating the Reaction Condenser.

The spindles of the wave-change switch, two tuning condensers, and the casing of the L.T. switch are at earth potential.

That is to say, they make contact with the metal box. The reaction condenser, however, does not make connection with the box and is supplied with an insulating bush which must be inserted between the spindle and the metal work. This point is important and failure to observe it will prevent the set from functioning properly and also produce a leakage of H.T.

When the components have been secured to the box front it is a good scheme to join one or two of the leads in position, because as you will see from the wiring diagram and photographs it is no easy matter to carry out the wiring after those parts which are immediately behind the front, have been screwed down to the baseboard.

For example, the wire from the reaction condenser to the intermediate coil unit and the flexible lead from the L.T. switch are two which suggest themselves.

The remaining components may now be laid out on the baseboard, bearing in mind

(Continued on next page.)

# PILOT

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# To Success

## THE "OUTDOOR" THREE

(Continued from previous page.)

the whole time the question of wiring. If you employ fairly thin tinned copper wire and run it through systoflex sleeving, you will find that it is semi-flexible and you can quite easily secure one end to any of the "awkward" terminals in readiness for the final connecting up.

Make sure that you screw down the "Cosmic" intermediate coil with due regard to the numbering on the base.

You will notice from the photographs that the screened-grid valve passes through a metal shield bent at right angles. This also serves as an anchorage for the second wave-change switch and you should place this shield in position before you screw down the L.F. transformer and the other components in its immediate vicinity.

### Wire As You Go Along.

Do your wiring up as you go along. Then you will not discover later that your fingers are "all thumbs" and therefore much too clumsy to find their way to some of the terminals near the baseboard.

Remember to allow plenty of length for the flexible leads, because these have to be threaded through the holes in the box, and the longer you make the leads the easier the task.

With regard to the transformer, the one used in the original set is a Lissen "Hypenik." Its size is convenient and many other transformers will not go into the

### OFFICIAL "P.W." EXHIBITORS

Readers are reminded that further information regarding the components for the "Outdoor" Three can be obtained from official "P.W." exhibitors and they are, therefore, advised to refer to the lists of retailers acting as such which have been appearing in these columns during the past few weeks.

limited space available. This applies to a number of the components, which have been chosen on account of their compactness in addition to efficiency.

As soon as the wiring is completed it should be checked by the wiring diagram.

There is one point I am reminded of at this stage, that is, the positions of the S.G. and Pentode valve holders.

When you screw down these two valve holders see that they are positioned so that the two valves do not overlap the edges of the baseboard. This is highly important in view of the fact that the remainder of the metal box has to totally enclose the whole of the components and it is, of course, a sliding fit on the baseboard.

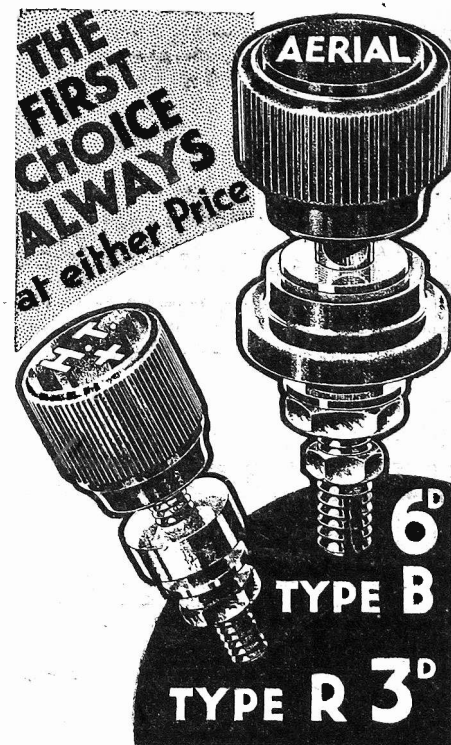
### Finishing Off the "Box."

All being well you can proceed to "box" up the set, having first of all threaded the flexible leads through the holes and marked each for identification purposes.

Then the main portion of the receiver is finished. The box is now placed in the cabinet so that it rests upon the two bearers.

The control spindles will now project through the front of the cabinet and the various dials and knobs can be screwed on. With regard to the L.T. switch, the indicator is slipped on to the projecting thread and the fixing ring screwed down.

Next week I shall give full details of the frame aerial windings, and the construction of the loudspeaker cone.



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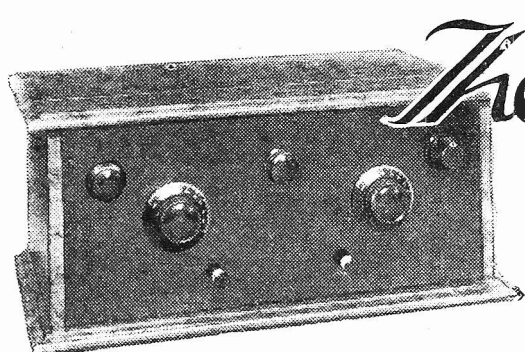
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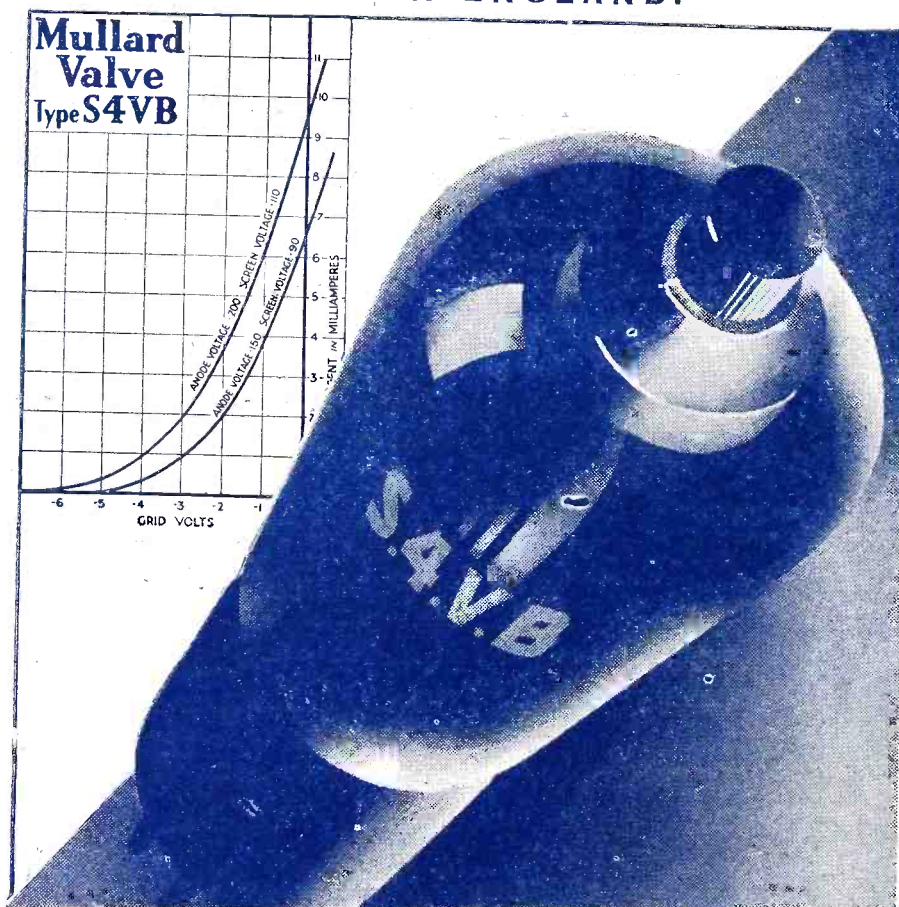


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