

ALL ABOUT MODERN VALVES

Popular Wireless

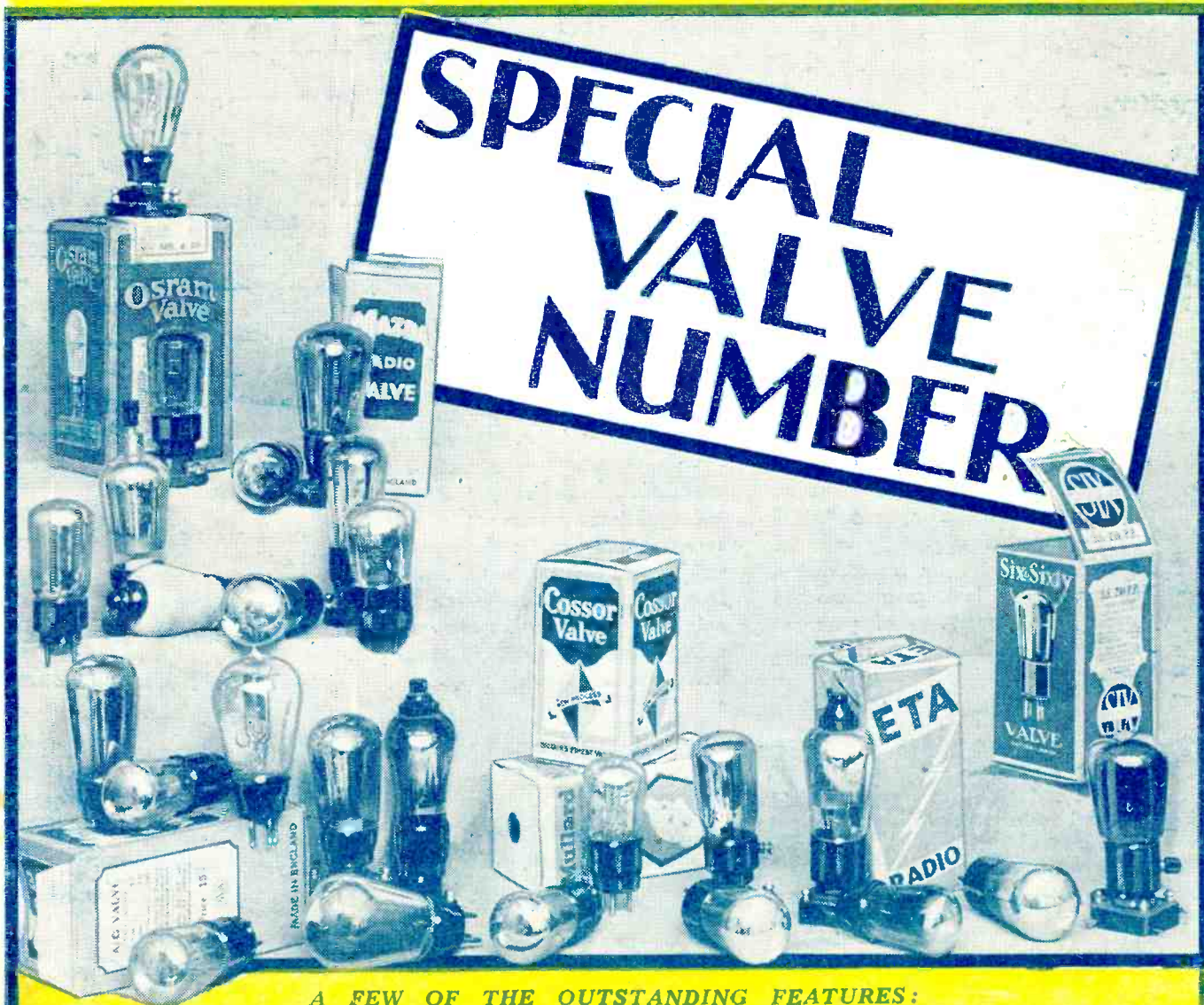
Every Thursday
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INCORPORATING "WIRELESS"

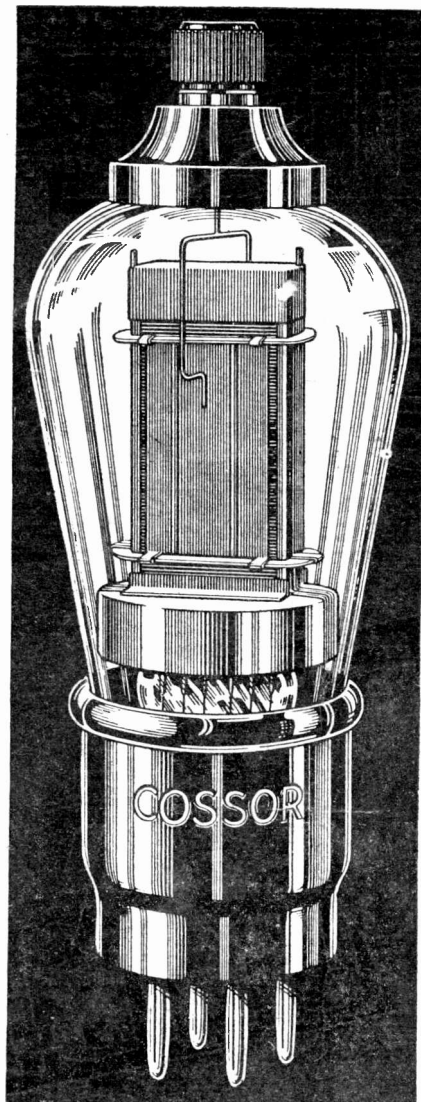
August 15th, 1931.

SPECIAL VALVE NUMBER



A FEW OF THE OUTSTANDING FEATURES:

VALVES OF TO-DAY USING YOUR VALVES
CHECKING YOUR VALVE VALUES
HOW TO MAKE AN "EXTENSER" REJECTOR



Summer reception at "winter strength"

SUMMER Radio conditions are "difficult" Stations which normally come in at good loud speaker strength are weak or even unobtainable.

Receiver performance appears to fall away — range is apparently reduced. But these conditions can be overcome. You can restore in large measure the "winter time" sensitivity of your set by fitting a Cossor Screened Grid Valve.

The use of the Cossor 215 S.G. ensures a marked improvement in range and selectivity — sufficient, in nearly every case, to counteract the loss of volume experienced

in long distance summer reception. To enjoy, therefore, the choice of stations which your receiver normally affords you, fit a Cossor 215 S.G. Valve. Its use entails no alteration to the components or wiring. You can obtain this remarkable Valve from any Wireless Shop.

Cossor 215 S.G. 2 volts, .15 amp.
 Impedance 300,000 Amplification
 Factor 330. Mutual Conductance
 11 m.a./v. Normal working Anode
 Volts 120 Positive Volt-
 age on Screen approx 60.
 Price **20/-**

Available with plain or metallised bulb.

Send for a copy of Leaflet No. L.36 which gives full technical details of the 215 S.G. and all types of Cossor Screened Grid Valves.

THE COSSOR 215 S.G.

G R E A T E S T E F F E C T I V E S T A G E G A I N

A. C. Cossor Ltd., Highbury Grove, London, N.3.

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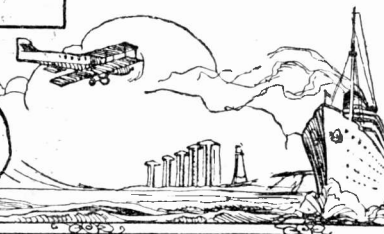
Popular Wireless

LARGEST NET SALES



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**"SO TO SPEAK"
TAKE YOUR PICK
A RECORD WILL
THE "NAUTILUS"**

RADIO NOTES & NEWS

**BACH COMES BACK!
ALL-RADIO HOTEL
A COMET IN SHORTS
WHO IS A. J. ALAN?**

"So To Speak."

BY way of an appetiser consider this gem of musical criticism which was fired off by somebody called "Kaikhosru Sorabji" in "The New Age." The subject of this lyric is Mr. Miklos Schwalb, a pianist, of whom K. Sorabji says, "he has a fine structure-sense and a subtle and wide command of tone colour. . . ."

But hist! Writing of Mr. Schwalb's performance of the Schumann Toccata, he says, "The so-to-speak mezzanine quasi-lyrical sections . . . were worked masterfully into their logical place in the architectonic design. . . ." (*Ses you*).

Take Your Pick.

A COUPLE of variants of an old joke! American, to radio dealer: "Very neat fuse-box, that!" Dealer: "Fuse-boxes this way, sir! That's a two-valve set!"

Again, American, to radio dealer: "Can I look at some of those samples of metal in that glass case?" Dealer: "Glass case, sir? Oh, no, sir! That's the very latest Pentode!"

I throw in the one about the Scot who having found a radio crystal said to his lassie, "Mary, if I get-mairrit on ye an' we hae a wee dochter, remind me that it'll no be necessary forr her tae lairrn the pianny!"

A Record Will.

MR. CHRISTOPHER STONE'S idea of recording his Will on a gramophone record is novel and appropriate—considering his enthusiasm for records—but I do not feel sure that Somerset House will like it. Mr. Stone said his part on an H.M.V. record, colour not stated, and the oral "witnesses" were Jack Hylton and the recording manager of the gramophone company.

I am led to believe that Mr. Stone added a threat to haunt any person who tries to upset the Will. I shouldn't like to be present at the "reading" of such a form of Will, even though I am fairly case-hardened.

A Bang-up Day.

BEG to report that in spite of the gamblers' weather this year, the cost of barely living, and the weight of accumulators, the Chloride Electrical Storage people ("Exide," y' know) celebrated their 15th Annual Gala, Sports and Horti-

"P.W." Leads Again!

NET SALES 129,806

A Message to "P.W." Readers

Our claim to the largest circulation of any wireless paper is once again justified by the net sales certificate which we have received from Messrs. Price, Waterhouse & Co., which we reproduce hereunder:

"To the Chairman and Directors of
THE AMALGAMATED PRESS, LTD.,
The Fleetway House, E.C.4.

July 20th, 1931.

Gentlemen,—We have examined the books of the Company and certify that the average Net Sales of "POPULAR WIRELESS" for the six months ended June 30th, 1931 (after deducting all unsold copies returned during the period and exclusive of free and voucher copies) were 129,806 copies per Issue.

We are, gentlemen,

Yours faithfully,

PRICE, WATERHOUSE & CO."

Listeners and amateurs alike are convinced that "P.W." is, in every sense of the word, the leading radio journal.

Tell your friends about "Popular Wireless," and help us beat our own record!

You have helped us in the past, and we feel confident we can continue to serve you in the future, and thus earn the continuance of your support. We thank you!

cultural Show at Clifton Junction, set to music by the Pendlebury Prize Band.

Chunks of negative plate inserted in marrows were disallowed. One enthusiast who couldn't forget "shop" and tested his bitter with a hydrometer, was suspected of being a Customs Officer in disguise, and had to be hurriedly poked into the band and told to look like second man to the trianglist! Oh, a great day!

The "Nautilus."

T. R. D. (Coleraine) tells me that on July 26th he picked up Sir Hubert Wilkin's submarine "Nautilus" on 40 metres at 14.30, the operator giving his name as Roy Meyers and the call sign as K 7 X 1. Now this is mysterious, and I should be glad to know what positive evidence T. R. D. has that he was listening to the "Nautilus," because according to my information her call signal is W S E A and 40 metres is not one of the wave-lengths allocated to her. More news, please.

The "Bart" Wot Ain't.

H. J. H. (Plaistow), who has read "P.W." since 1923 and is still running a crystal set, wants a Bartship. Sir, take a doughnut!

He then comes down with his full eleven stone upon the technical staff because they do not produce two complete sets per week, and requests me to talk to them like a bargee. While I am learning "bargeese," I will pass his letter to them with my cordial invitation to give an eight years' reader a sympathetic hearing.

Take another doughnut, brother.

Bach Comes Back!

ACCORDING to what I hear friend Bach is coming back to make of our Sunday afternoons those feasts of fun and frolic which they used to be. I always thought that they de-Bached the Sunday programme too precipitately—we had heard only about five hundred cantatas.

However, I suppose that either they have discovered another bale of Bach in the

(Continued on next page.)

THIS IS THE PAPER THAT MADE WIRELESS POPULAR!

"P.W.'s" RUNNING COMMENTARY ON RADIO TOPICS

basement and have got to use it up on the strict Aberdonian principle of "A Bach in time saves a bawbee," or that Someone with a Pull has said, "Bach goes back!"

The Terrifying Spark.

LATTERLY radio has become silent, thanks to the valve supplanting the good old spark. A cousin of mine, who is by way of being a mighty traveller—I remember seeing him sprawling on a bed, aged 12 months and 18 in. long!—has been through the Peruvian revolution, the young dog. (Dash it, I'm getting old!) And he tells me that the mob which surged over



his pet, the Cuzco radio station, was easily defeated by a few large electric sparks which he stage-managed. The wonderful riffs and still more wonderful slogans of the half-baked revolutionaries were utterly defeated by this boy and his cool English wit, aided by non-committal electrons! The devotees of liberty, equality and bloodshed fled like sheep!

All-Wireless Hotel.

THE Atlanta Hotel, Rotterdam, has gone "all out" in an attempt to surround its guests with music from the moment when all the windmills begin work till that hushed hour when the footgear is collected from the bedroom doors. All bedrooms have a choice of two programmes; loud speakers blare at you from unexpected nooks, and you can't eat a chop except to music.

Everything is relayed to somewhere else, so that you can be literally chased by the "Melody in F" from ground floor to roof garden. All very wonderful, but give me bacon and eggs in an English country inn with the birds whistling in the garden and the wasps busy bumping the windows!

"Kept In."

A HUMAN story is told by the H.M.V. people about their Hayes factory hooter. This siren, which has shrieked at 7.30 a.m., noon, and 5 p.m. since about the Norman Conquest, has become such a part of the local scenery, so to speak, that Hayes, Middlesex, has been but a poor customer of the clock trade. In fact the Hayesites have come to regard it



as something invariable, like the new moon—and quarter day. So when the thing recently had to be overhauled the kids at a nearby school were still on the job long after grub-time, when their ma's turned up in force to find out why they had not come home to cold mutton and rice pudding! The teachers were still waiting for H.M.V. to indicate noon!

They Have Them There, Too!

A READER who somehow or other finds himself at Toro, Uganda—a long way from The Hole in the Wall, boy!—caps the account which I gave of the never-say-die who couldn't arrange for an orthodox aerial and so hoisted some cistern floats, by the brilliant suggestion that a certain device known as the "three golden balls" would serve equally well. Fancy his being haunted by them down in the forest, so to speak!

He asks "How do we decide when a new volume begins?" It joins on immediately after the end of the one before, so we don't have to decide!

SHORT WAVES.

Wife: "We ought to buy a television set, Henry. It shows everything."

Henry: "Does it show us where to get the money to pay for it?"—"Answers."

THE CAT'S WHISKER.

A City Councillor, protesting against a scheme for a grandiose wireless exhibition, said: "Gentlemen, if we take up this wild-cat scheme we shall burn our fingers with a white elephant."

It is reported that headphones are practically extinct now in America.

Well, of course, you can't wear headphones and chew gum comfortably at the same time.

"Rest assured all thieves get what they deserve in the end," says a parson. Especially those who steal wireless sets! "Pictorial Weekly."

Deep in a Surrey glen
One evening, after ten,
A nightingale outpoured his highest song
With such a wealth of sound
That men for miles around
Said they had never heard him go so strong.

Again and yet again
(What triumph! Hark! What pain!)
Forth from his leaves he sang; with none to say
That wireless men had placed,
Not in the best of taste,
A microphone hard by to catch his lay.

Our Australian kin
By clever tuning in
Caught up the rapturous music as it flew,
And, though it came to them
At some queer hour a.m.,
The incongruity escaped their view
"Punch."

The "Comet" in Shorts.

THIS muscular hiker is giving a fine account of itself on short waves, and a typical report comes from B. E. W. and R. P. S. of Manchester. Fed up with Ghandi, they set up a "Comet," but used a six-pin short-wave coil as specified for the "Interchange" Three, and logged 2 X A D at excellent L.S. strength at 9 p.m.

They have also logged Rome, W 8 X K, Zeesen, Pontoise and P A O I M. Non-L.S. results enormous. By the way, J. E. S. (Bagshot) has heard C T I A A (Lisbon) testing, and wants to know if others have picked up this station.

Literal "Blues" Now.

THE R.C.A. Victor Company has evolved what they call a "radio electrical colour organ" by means of which acoustic power controls lighting power,

and thus renders it possible to correlate colour and music, the changing colours synchronising with the varying moods of the music. Thus "Blues" will, so to speak, come true.

I am of opinion that a display of chromatics after this fashion, combined with music or not, would bring my eyes out on my cheekbones and destroy my nerves, but perhaps the rising generation has nerves of guttapercha.

Who is A. J. Alan?

THAT mysterious spinner of thoroughly unbelievable yarns who charms us much too infrequently with his semi-insolent, "well-off" drawl, is by far the most interesting of the "anons" who have appeared before the microphone. It is fairly well known that he is a senior Civil Servant—some "first division" man, I suppose—but in what office does he do his "ten till four" shift? One suggestion is that he is an Income Tax official, but I cannot support that. His diction lacks the heartless precision of a Snowden shak. I plump for the Foreign Office or the Treasury. Failing those, I should search the Registrar of Friendly Societies' office and the Colonial Office. But I reckon that I'd not find my man, anyway!



Hot Coals from Newcastle.

A CORRESPONDENT of Newcastle (whose letters, I confess, I like to get in spite of a certain briskness of style, verging on "cheek," which characterises them) considers that "P.W." is stingy because I declined to advertise an American radio journal in these Notes. Wrong perspective altogether! Apply to the Free Library, Geordie! We are happy in our conviction that there are few readers who will support your view of "P.W. Service."

However, I forgive you and as proof give you herewith the name and address of the Newcastle-on-Tyne Radio Society, 21, Collingwood Street, Newcastle-on-Tyne. They will probably give you what crusty old Ariel won't!

Smaller Valves for Portables?

FROM the Continent or the U.S.A., or both, we may shortly receive new types of valves specially designed for use in portable receivers, motor-car sets, etc. Rumour says that they are a few times bigger than a thimble—not a very helpful specification!

However, we shall be interested to see them. Incidentally, what has become of the "peanut" valves of some years back?



ARIEL.



USING YOUR VALVES

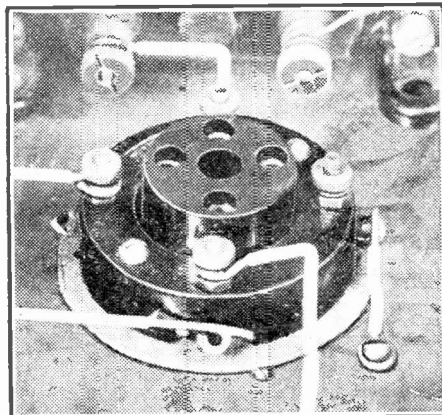
However good your valves may be, their effectiveness can be ruined if they are not properly employed, and here are some practical points that make for good results.

By P. R. BIRD.

THE modern valve is a robust and very reliable article, but we all need to remind ourselves occasionally not to misuse our valves. It is so easy to become careless—and so useless to be sorry afterwards.

After all, the valve has to hold a key-position in the set, and well deserves to be

A NECESSARY PRECAUTION



Make sure all joints are tight. A Lotus valve-holder "in action." Note the connection between valve-holder and the metal foil baseboard.

considered and handled properly whilst in service.

The actual mounting of the valve-holder in position is so easy that the unwary sometimes forget that grid and filaments must be lined up to point in the right direction if the wiring is to be short. Another

trap very easy to fall into is to use a very cheap valve holder—as leaky, when considered from an electrical point of view, as a sieve would be considered hydraulically.

Valve-holder insulation *must* be good, for, as you know, a high H.T. is applied across filament and plate. The properly designed holder will be of low capacity with firm contacts and accessible terminals.

Do not forget before mounting it to run over the nuts with a small spanner and tighten up the screws with a screwdriver, because once fixed in position it is a terrible bore to find that something is loose underneath the valve, and all the wiring has to be undone to get at it.

Watch those "Whiskers."

Pay particular attention to the mounting of the valve-holder when you are using a well-screened set where it will be mounted on foil. It is very easy to let one of the terminal tags sag or bend, and touch the "floor," with pyrotechnic results. (In such cases I always slip a piece of dry cardboard underneath the valve-holder, so that even if the wire at the contact develops "whiskers" it will touch an insulator, and not an earthed floor.)

The mounting of S.G. valves is rendered a little tricky by the almost invariable presence of metal screens around them.

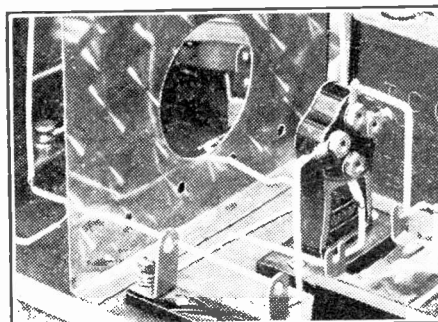
For the anode contact one of those special connectors now available is very useful. And when insulated wire is used to pass through holes in the screen it must be remembered that such insulation is very easily cut by a sharp edge, so that a little

extra insulating tape or other protector may be advisable.

For this process a short length of valve tubing as used for bicycles has much to commend it, and it is easily slipped on the end of the wire.

Detector valves are not so complicated by screening considerations, but the bugbear

FOR S.G. VALVES

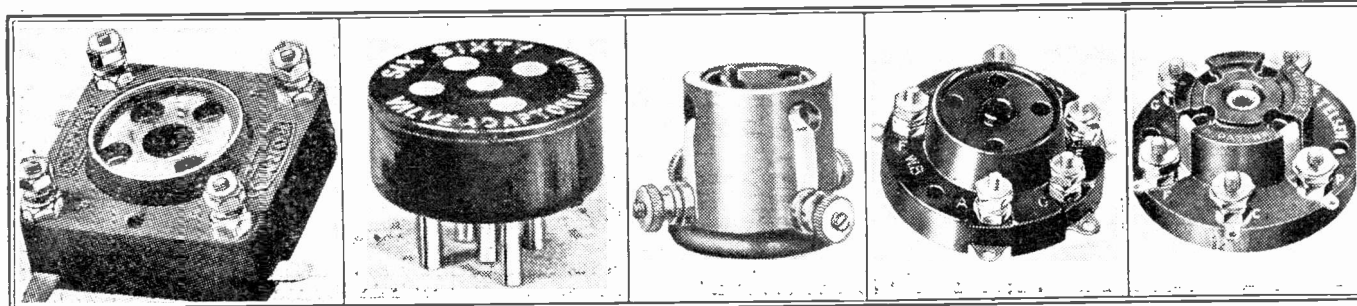


A Parex valve holder for horizontal valve mounting.

here is the liability to microphonic troubles. Many detector valves if mounted in a rigid valve-holder will "pong" whenever the set is touched, and will be liable to give vent to a rousing howl if the loudspeaker is placed too near and directed towards the set.

A well-sprung valve-holder will obviate this trouble, and has the further advantage that the valve is less liable to strain when being pulled out of its socket. Incidentally, never pull a valve out by the bulb, but always by placing the hand down over the base of the valve itself.

A VARIED ASSORTMENT OF FOUR- AND FIVE-PIN VALVE-HOLDERS



This selection of valve-holders contains a Formo four-pin type (left), the Six-Sixty five-pin adapter, Lissen four-pin, and W.B. and Telsen five-pin holders.

THE MIRROR OF THE B.B.C.

A THREATENED RAID

THE B.B.C. BOARD —
SIR JOHN TRAVELS AGAIN.

JUST when the B.B.C. was in the midst of arguments with the Treasury which looked like resulting in a considerable additional grant of licence revenue the Economy Committee suggests that the Treasury should lift nearly another half million, bringing up the State's share to well over a million per annum. It is extremely doubtful, to say the least of it, whether the programmes would continue to attract licences if they were to be starved financially as this further raid would necessitate. Anyway, the corporation can be counted upon to offer sufficient opposition to hold up the application of a new contract for some time.

A curious feature of the recommendation is that the B.B.C. had no foreknowledge even of the fact that its finances were under review. It appears that the Post Office provided all the data and evidence.

Accordingly the conclusion was reached without any expert advice on broadcasting. It was merely a matter of theory and economics. Nor can Savoy Hill be expected to be enthusiastic about the revealing of its confidential financial plans and arrangements without any consultation.

Altogether there is in this episode the makings of a first class row between the B.B.C. and the Post Office. I would not care to have the task of trying to placate Sir John Reith.

The B.B.C. Board.

The last meeting before the holidays of the B.B.C. Board of Governors took place on Wednesday, July 29th. Mr. Whitley has been back from India for just over six months, during which the affairs of the B.B.C. Board have gone smoother than for any similar period since the Corporation was established in 1926.

One of the Governors whom I met after the recent Board meeting did not show any signs of anxiety about what the Prime Minister was going to do. He wore a care-free expression, and agreed with me when I suggested that it was a practical certainty that there would be no change this year, the present Board being reappointed for another five-year term, when the licence expires. In other quarters, however, quite a different decision is expected from Downing Street.

New Blood?

It is believed that Mr. MacDonald will act entirely on the advice of Mr. Whitley, which may ask for two new colleagues and no displacements. I doubt if he would ask for an entirely new Board.

Governors of the B.B.C. are paid £700 a year for their services, and they enjoy a good deal of prestige. Odds I hear quoted are: Even money, Dick Sheppard; 2-1 against, Captain Ian Fraser; 6-1 against, Sir Robert Donald, Sir Harry Brittain,

Dame Adelaide Livingstone; 10-1 against, Mr. C. B. Cochran, the Bishop of Norwich, Sir Arthur Yapp, Mr. Nightingale, Dr. Fleming; 25-1, Mr. Donald Calthrop, Miss Hilda Matheson; 100-1, Sir Hugh Robertson, Lord Lloyd.

Sir John Travels Again.

I hear Sir John Reith is off again on his travels, this time visiting Central Europe, including Poland, Czechoslovakia, Austria and the Tyrol. He is combining business and pleasure; an excellent plan which he should have introduced five years ago.

Hyde Park has been the subject of many things, some pleasant, others not so fondly remembered, ever since it was opened by

Charles I, but, so far as I know, it has never been the subject of a radio revue. The very name is suggestive of good ideas for an entertainment of this kind, and in choosing "A Seat in Hyde Park" as a title, C. Denis Freeman has realised the opportunities which the playground of the West End of London offers without too much searching.

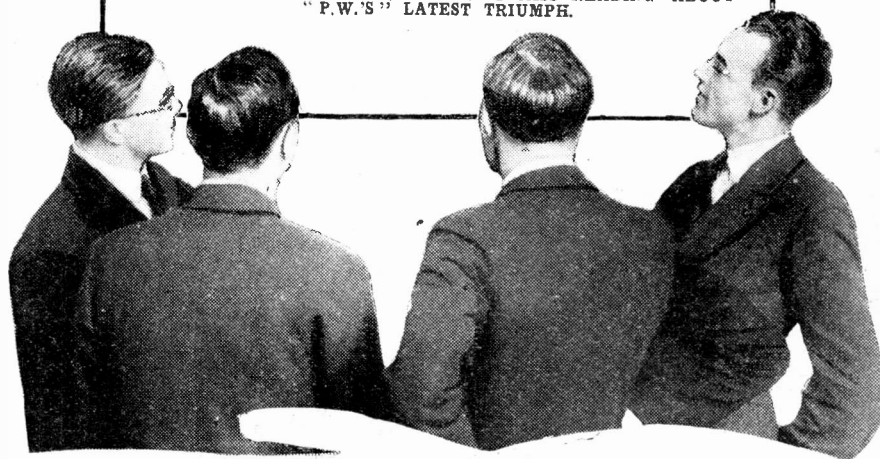
The revue is to be broadcast to National and Regional listeners on Monday and Wednesday, August 17th and 19th respectively, and without giving away too much of the plot, I can state that it will contain three love scenes at the feet of the three statues of Achilles, Byron and Rima.

NEXT WEEK

The issue of "P.W." on Sale next Thursday will contain the full details of

BUILDING THE "P.W." "SUPER-QUAD."

ORDER YOUR COPY NOW, AND DON'T MISS READING ABOUT
"P.W.'S" LATEST TRIUMPH.



FOR THE LISTENER

By "PHILEMON."

Our well-known contributor tells how he made holiday in Germany, and promptly got "on the air" from a German Station!

If any one had told me that on the occasion of my first visit to Germany I should get entangled with the German wireless programmes, I should have smiled! But so it chanced.

Pinched Philemon's Hat!

It was partly due to our habit of making no arrangement beforehand as to where we would spend the night. Some days we lounged our way along for perhaps forty miles, and other days we would race along for perhaps a hundred and forty; but always towards evening we would put up at the first village inn or roadside pub.

We had been fairly lucky; indeed very lucky so far as the lodging was concerned, for the beds were clean and the food was good. The only unlucky thing was that we seemed always to run up against Germans who were rather hazy on the matter of "meum and tuum."

I suppose they had not yet forgotten the souvenir habit acquired during the war.

At a little inn, for example, presided over by an amusing fellow who was a real England-hater, somebody pinched my best hat as a souvenir; and the next night at another pub whose landlord was a philosopher who propounded to me the proposition that Germany had lost the world by the will-to-hate and now had to win it by the will-to-love, somebody pinched my camera as a souvenir!

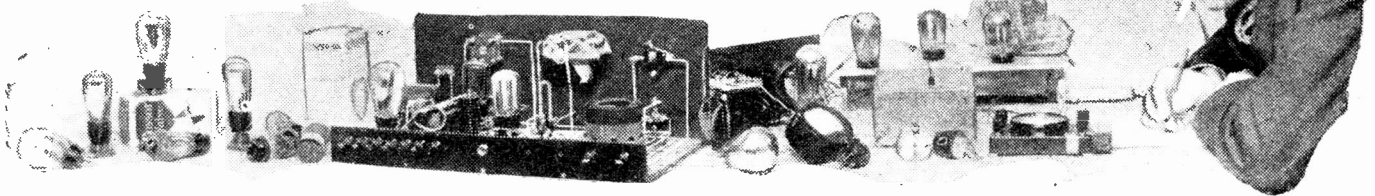
The Good Companions.

It was on the evening following that, towards sundown, our eyes were scanning the horizon for board and lodgings; when, from a largish house standing just off the roadway, we heard the sound of voices singing. We stopped to inquire.

It turned out to be one of the Youth Hostels which are almost as thick in Germany as blackberries on a hedge. Young people in Germany tramp from hostel to hostel, like tramps in England walk from

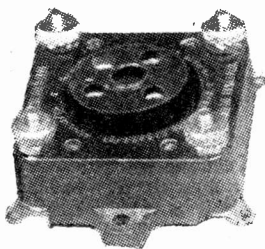
(Continued on page 726)

CHECKING YOUR VALVE VALUES



A VARIETY programme is coming through with excellent volume and quite passable quality. Suddenly, right in the middle of an item, the loud speaker is stricken dumb. Maybe, there is a faint breathing sound, but possibly there isn't even that. Ever had such an experience?

Have you on such an occasion experienced tortuous doubt as to what you should do?



Well tried and popular—the Benjamin holder.

You can quickly find out whether or not it is a station breakdown by twisting the tuning dials round to the setting of the alternative programme.

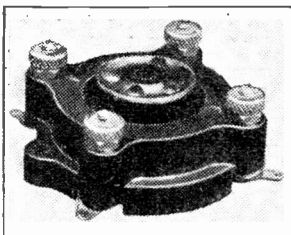
But that means throwing that so-nice adjustment of the controls right out!

And in the meantime, the programme may have re-started and you've lost something that can never be recaptured; an important announcement, the introduction to another item or something else of a like nature.

Need Not Be Expensive

But there is never any need to go through troublous periods of anxiety like this. You should connect up a meter. You are working in the dark if you haven't got one.

All you want is a cheap milliammeter from 0 up to about 30 milliamps—or a bit



This is one of the Igranic models.

more if your set is one of those big H.T. current eaters. It doesn't need to be an expensive moving-coil instrument—if you see one in the window of your local radio store at two or three shillings that will do quite well, for you do not need to take precise measurements.

The meter should be connected in the negative lead from the H.T. battery or mains unit. That is, you disconnect the negative lead from the H.T. supply and

An article of special practical value to every valve-set user.

join it instead to the one terminal of the meter. The other terminal of this is then fitted up with a wire that goes to the H.T. negative on the set.

The Trouble at a Glance

The instrument should be placed so that you can view its needle at a glance. You are now in a position immediately to see fairly closely what is the cause of any failure in reception.



A neat moulding is used by Burton.

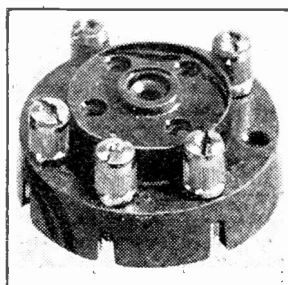
the batteries are all in good condition, and the receiver is operating in a healthy manner.

If the loud speaker volume suddenly begins to weaken and the milliammeter needle slowly falls, that most probably means that either the L.T. or H.T. battery is running down.

If a Valve Packs Up

If the needle drops a few milliamps, and then remains steady, although the set ceases to function, that is a pretty good indication that one of the valves has packed up. The total H.T. current flow has been reduced by an amount representing that taken by one valve.

This one meter will also provide



The new Bulgin five-pin holder

visible evidence of overloading. Should its needle jerk about, then the energy is too great for the valves that are being used, and you will have to ease down the volume.

Should the needle have been steady for quite a time and then started to flicker, that is probably a message to you that the grid-bias battery is packing up and needs attention.

One meter in the common negative H.T. lead will not tell you which of the various

valves is causing the distortion.

But it is an easy matter to connect the device in one or other of the separate H.T. positive leads, and so track the valve that is causing the mischief.

Take a careful note of the reading on the meter when

the batteries are all in good condition, and the receiver is operating in a healthy manner.

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valves is causing the distortion.

But it is an easy matter to connect the device in one or other of the separate H.T. positive leads, and so track the valve that is causing the mischief.

Take a careful note of the reading on the meter when

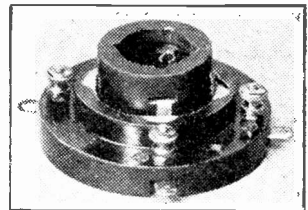
the batteries are all in good condition, and the receiver is operating in a healthy manner.

If the loud speaker volume suddenly begins to weaken and the milliammeter needle slowly falls, that most probably means that either the L.T. or H.T. battery is running down.

Should the needle have been steady for quite a time and then started to flicker, that is probably a message to you that the grid-bias battery is packing up and needs attention.

One meter in the common negative H.T. lead will not tell you which of the various

valves is causing the distortion.



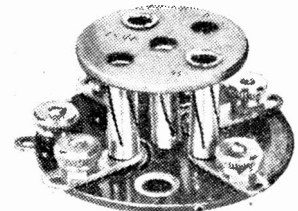
Spring contacts are employed in the Wearite anti-capacity valve holder.

Maybe, in cases, one H.T. positive is made to serve two or more valves, and then you cannot do more than narrow the search down to these without interfering with the internal wiring of the outfit.

Are Your Valves Greedy?

One of the great advantages of using a meter in the way I have described, is that it provides you with a means of detecting the voracity of your valves. It is surprising how greedy some of them can be! Three tubes in a Det., 2 L.F. can knock you up 20 milliamps, and even more, particularly if you include something moderately hefty in the way of a power valve. But a few more volts of grid bias may put weeks of life on your H.T. battery.

This point was dealt with in a recent article in "P.W.," and it is to be hoped that constructors took careful note of it. H.T. batteries are costly items, and economies in this direction are well worth while.



A Clix valve-holder for mains valves.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



THE "EELEX" FRAME AERIAL.

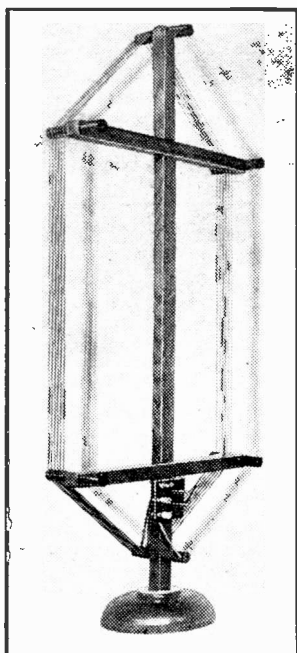
MESSRS. J. J. Eastick are making a neat little frame aerial which retails at £1.

Using only one '0005 mfd. variable condenser it covers both ordinary and long wavelengths; a neat switch being fitted to it.

There are two windings and these are paralleled when the device is switched over to the ordinary waves.

The "Eelex" frame has attractive "lines" and stands firmly on its wooden base. Its "pick-up" is good, and "P.W." readers interested in this particular type of antenna should certainly make a point of examining an "Eelex" next time they have occasion to go radio shopping.

By the way, I have been advised that J. J. Eastick are making a number of price reductions in various of their "Eelex" lines. I believe "Eelex" standardised plugs and sockets and "Eelex" treble duty terminals are subject to these—which will be very good news indeed for home constructors.



The "Eelex" Frame has a wave-change switch on its base.

GECOPHONE INDUCTOR DYNAMIC LOUD SPEAKER.

If you have thoughts wandering in the direction of loud speakers, I would advise you to send for one of the G.E.C.'s latest lists covering Gecophone loud speakers, in which their Inductor Dynamic is described. I have not tested one of these instruments, but I heard one in a showroom the other day, and it sounded most "moving-coil-ish."

LOEWE RADIO COMPONENTS.

The new catalogue describing the radio components of the Loewe Radio Company, Ltd., is well worth securing. It gives full details of a decidedly interesting range of productions.

PRICE REDUCTIONS.

I presume that by the time these words are in print most of you will have read about the Ever-Ready price reductions in our advertising columns. However, should there be a few who have by chance missed these announcements, I would advise them to search out the information, for the reductions are, in cases, quite drastic.

TELSEN COMPONENTS.

The latest Telsen catalogue, which covers all the new Telsen components, is, in itself, a fine production. Both lay-out and printing are artistic, and the colour scheme and paper of good quality.

A LOUD-SPEAKER COUPLING UNIT.

Lamplugh Radio Products have sent me one of their new "Silver Ghost" coupling units. It has been designed for use with their well-known Inductor loud speaker, although, of course, it is equally suitable for employment with any other type.

The retail price of this unit is 18s. 6d. It is built into a compact metal case on the top of which are the four substantial terminals. The structure is arranged so that it can conveniently be mounted on the base-board of a set.

It will be unnecessary for me to detail the advantages of using a unit of this nature, and the fact that it is essential when H.T. is obtained from the power mains, for all this will be well-known to "P.W." readers, so that it only remains for me to add that this coupling unit is perfectly satisfactory and comprises a convenient method of applying "filter output" to any set.

PETO-SCOTT COIL QUILTS.

It seems pretty certain that the "P.W." Coil Quilt is destined to be one of the best selling radio lines of this coming season.

Its versatility and neatness and, above all, its inexpensiveness are such that it simply cannot help having the widest possible appeal among all classes of radio enthusiasts.

By the way, "P.W." readers may be interested to learn that when I first thought of the idea the name "Radio Pennies" occurred to my mind, because I visualised the things as little circular affairs costing only a few pennies each!

But "Coil Quilt" is much more expressive and is certainly decidedly more euphonious.

The first firm to see the possibilities of these little gadgets were our old friends Peto-Scott, and they were soon away with "turned" models.

Now, however, they are producing them as high-class bakelite mouldings, although the price still remains at 6d. each. They are entirely above suspicion from an electrical point of view and so accurately are they moulded that they fit into others with beautiful ease and firmness. I did hear that

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 guarantee their safe return undamaged, 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.

some six expensive moulds had to be made, and destroyed before the final glove-like fit was achieved!

Holes are provided for securing the ends of the windings, and there is a small "cut-away" in the lip of each Quilt for the wire to pass through—an eminently practical point that.

A special feature of these Peto-Scott Coil Quilts is that feet for securing the devices to baseboards, etc., are moulded in the one solid structure. This is a very attractive point and one which adds vastly to their usefulness. And these feet neither protrude nor interfere with their coupling together.

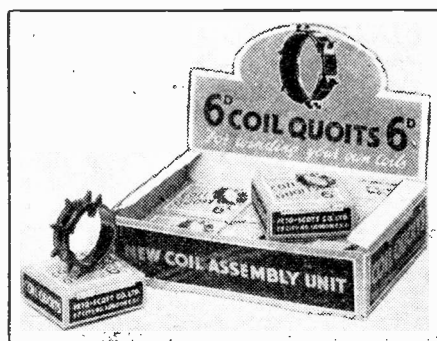
Altogether, the Peto-Scott Coil Quilt is a fine little product and does full justice, and more, to the original design.

HEADPHONE BARGAINS.

Electradix Radios have had some perfectly new Sullivan's Headphones on offer at 3/6 per pair. I say "had" because by the time these words appear in print they may be sold right out—I should think it very likely.

The headphones are of low resistance but should prove of great value to radio enthusiasts for experimental purposes. A step-down transformer would be needed for driving them properly from an ordinary set.

I have examined a pair and find them to be in new condition. They originally cost the Government 22/6 per pair!



Peto-Scott pack their Coil Quilts in attractive display boxes each containing one dozen.



THE "SUPER- QUAD" CIRCUIT



AS has already been pointed out by Mr. Dowding, the "P.W." "Super-Quad" is the result of extensive experiments over a period of many weeks. These weeks have not been devoted merely to the production of this one set, neither have the experiments been carried out with the idea of producing just the "P.W." "Super-Quad," but a very careful survey of the position of the modern super-heterodyne has been made.

If you could only come along to the "P.W." Research Department you would be amazed at the number of super-heterodynes there are lying about in various stages of construction and demolition (for when we have done with a set, of course, we do not keep it built up any longer than we can help because we cannot spare the room). But unfortunately we cannot have you all up in the Research Dept., so you must take our word for it; anyhow, there they are: four, five, six, seven, eight-valve supers of various descriptions in various stages of construction and using a multitude of different circuits and modifications.

"Why don't you publish them, then?" you naturally ask. Because the majority of them are too complicated, and not all operate properly. A lot are tricky to handle, others are expensive to build, while others have nothing really new in them, and, as our readers know, "P.W." likes to have something new to offer its readers.

Very Easy!

When you look at the photographs of the "P.W." "Super-Quad," you will immediately say: "Oh, there is nothing in it!" Quite right, there is nothing in it, yet a Dickens of a lot has had to be put in the original set and gradually eliminated in order to get the final design which we are placing before you.

The building of a super-het as a mere super-het is a simple

By K. D. ROGERS.

"P.W." has tackled the design of a super-heterodyne set on entirely new lines and has made use of the old principles only as a foundation. When you have read this article you will be able to see why it has been possible to produce such an outstanding receiver.

job. It is easy enough to run five, six, or seven valves together, using the super-heterodyne principle, and not-too-efficient intermediates so that the valves are quite stable. We could justifiably say: "Well, here we are, here's the super-het," but that sort of thing, however, does not do.

No Frame Aerial.

It does not get you anywhere, and the Research Department realises that the average super-het is a far too bulky piece of apparatus, and it has too many valves. So we said to ourselves, we will bring out a really good super-het, one that is easy to handle, and easy to build, but we will limit it to four valves. That was the task we set ourselves. To design a super

answering those requirements, and in addition we said, we will scrap the frame aerial and let it operate entirely on an outdoor or indoor aerial.

Now that is no easy task to set anybody, but the presence of the "Super-Quad" proves that we have been successful. How? Let us look at the circuit.

The first thing that will strike you is the lack of the frame aerial. Why have we scrapped the frame? For two reasons: firstly, with a frame your pick-up from the ether is smaller than it need be, and therefore you are liable to waste a valve in getting back what you have lost in the frame; and secondly the frame is often a nuisance, in many people's opinion. It is ugly, it is clumsy, and, moreover, its directional property in such a set as a super is more of a nuisance than a blessing.

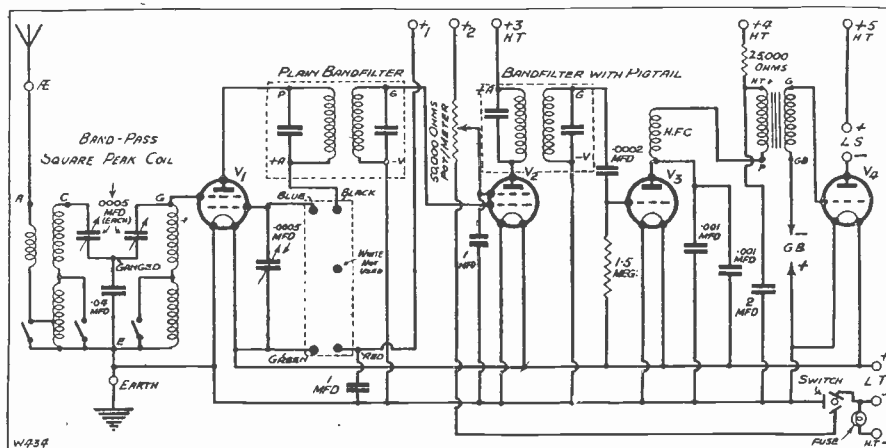
A well-designed super-heterodyne should be selective enough to cut through the stations without requiring recourse to the directional properties of a frame. And, anyway, in most places in England the directional properties of the frame will not avail listeners much, as the majority of stations, certainly the continentals, will come in at roughly one setting, and the direction of the frame will never help you to separate two Regional twin locals. So why have it?

Therefore we made a super that will work off either an ordinary aerial or what we call a "curtain rod" aerial—that is, just a wire stretched from the set up to the curtain rod or picture rail of your house.

Selectivity.

Now then, what about the initial selectivity which we have lost by the elimination of the frame, because there is no doubt a frame is selective apart from its directional properties—or should be if it is well designed. That question was

COULD ANY HOOK-UP BE SIMPLER?



For goodness' sake don't judge the capabilities of the "Super Quad" by the simplicity of its circuit. It is one of the greatest attractions of this fine little set that despite its extraordinary power and selectivity it is, ostensibly, just an unusually easy-to-build four-valver.

(Continued on next page)

THE "SUPER-QUAD" CIRCUIT.

(Continued from previous page.)

answered by the inclusion of a band-pass filter circuit, and in the theoretical diagram we introduce here you will see that a Varley Square Peak coil has been used in the aerial circuit, and this is a very important modification of the set.

It does two things. It enables the selectivity to be maintained, although no frame aerial is used, and, moreover, it prevents re-radiation of the oscillations generated by the oscillator portion of the valves into the aerial, and so out on to the ether to annoy neighbouring listeners.

Special Valve.

It has been said that the double grid valve, which we have also used, does not transfer so much back to the aerial as would a separate oscillator feeding the grid circuit of the first detector, but we took no chances, and so used a band-pass *as well* as the double grid valve. So there is no danger of annoying your neighbour when you are manipulating your set.

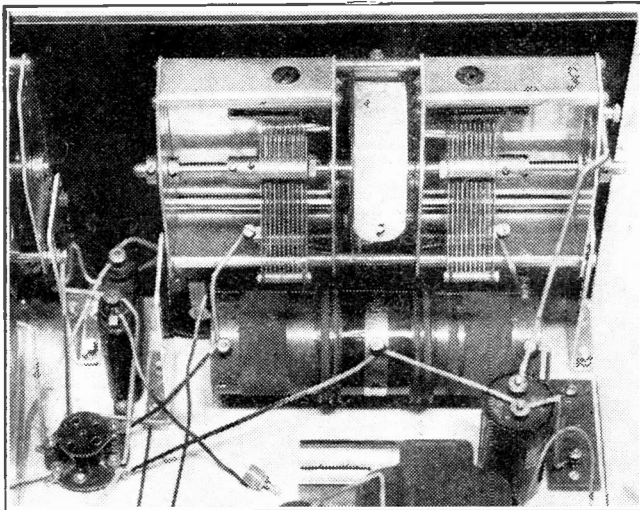
The double grid valve as we have used it eliminates a special oscillator valve and enables a very compact arrangement to be obtained, one grid being used as the control grid for the detector, and the second used for the oscillator portion of the circuit.

From the anode of the valve the mixed frequencies are fed into a filter circuit, and from there they go to a screened grid valve, which amplifies them and passes them through an intermediate transformer to the second detector. Here they are rectified and passed on to an output valve with a high ratio transformer.

Preventing Overloading.

The intermediate chosen is a very efficient one, and the oscillator coupler, which you will see from the photograph of the complete set has a wave-change knob on it, covers both medium and long waves. The handling of the set is exceedingly simple, but that does not enter into the province of

REDUCED "REPEATING"—NO RADIATION!



You can use the "Super Quad" on any ordinary aerial, for it has a band-pass (the coil and condenser for this are shown above), and this reduces repeaters and cuts down the radiation to a negligible degree.

this article, so we must leave that for a later date.

There are one or two things more which I would like to say, however. One is to point out the control of sensitivity or volume which we have arranged by means

of a 50,000-ohm potentiometer controlling the voltage on the screening grid of the intermediate valve. This is undoubtedly one of the best ways of pre-detector control of volume, and in a super-het it is absolutely essential that the second detector should not be allowed to overload, otherwise terrible distortion will occur on many stations.

The first detector—that is, the double grid valve, of course—is operating directly on the aerial, and except on the local station, if you are very near, is not likely to be overloaded, but the second detector *is*, and so a volume control which protects the second detector has been employed, and this, by means of limiting the input to the second detector, also protects the output valve, where again overloading is prevented.

It all seems very, very simple now that the set is an accomplished fact, but if you will just sum up the novelties and the special advantages, you will see that the set is simply bristling with good points.

Let us run over them again, so that when you go on to the article next week describing how to build the Super-Quad, you will realise exactly *what* you are getting, *why* you are getting it, and *what sort of results* you will obtain from it.

Three Main Features.

In the first place, we have a super which will operate on an ordinary aerial, this cuts out the expense of a frame, or the bother of making one. This means that the present super-het is non-directional, in other words, it will receive in all directions equally well *but with perfect selectivity*. This latter is point No. 2, due to the band-pass circuit, which is both easy to build, efficient, and a very big factor in the success of the set.

Then we come to point No. 3—the double grid valve, which assists the band-pass filter in preventing any re-radiation, and also obviates the use of a special oscillator valve. Finally, we have the specially chosen filter and intermediate coil and the volume control of the intermediate to complete a perfect ensemble.

ITEMS THAT MAKE THE "SUPER-QUAD" A STAR RECEIVER

SELECTION.

The oscillator tuning control does not bristle with "repeated" stations as do those of many ordinary super-hets and the "local" does not break through at eight or nine points on the long waves!

ECONOMY.

One of those new Bi-Grid valves is used and is able to do what two valves are required for in the usual way—a great saving in initial and running costs.

POWER.

An S.G. intermediate valve is employed, and at the chosen intermediate frequency great amplification is given.

SEPARATION.

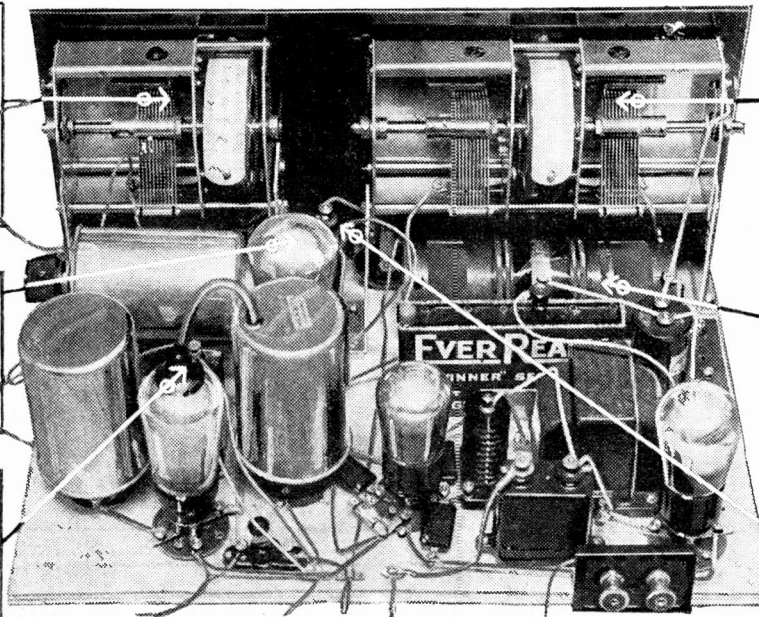
This dual-condenser operates in conjunction with the band-pass coil and knife-edge selectivity, with freedom to use an ordinary aerial result. A special frame aerial is not needed, as is generally the case with a super-het.

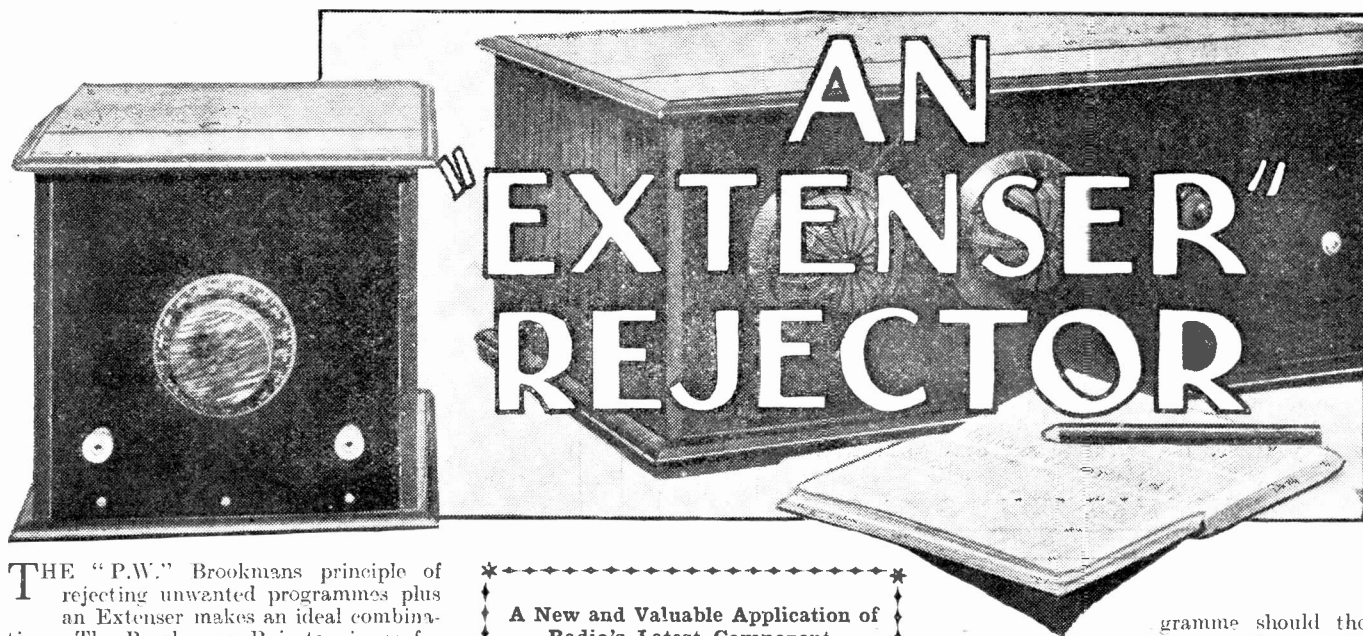
WAVE-RANGE.

The special band-pass coil covers both long and ordinary wave-lengths, and gives perfect balance and full efficiency throughout.

QUALITY.

A properly arranged control contributes a completely satisfactory adjustment of volume plus quality.



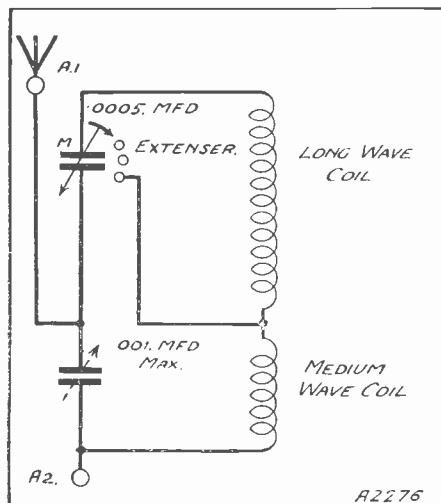


THE "P.W." Brookmans principle of rejecting unwanted programmes plus an Extenser makes an ideal combination. The Brookmans Rejector is, as far as I know, the only device in existence that is really effective on the long waves.

Two-Band "Trapping."

For instance, you can couple the "B.R." to any set of an inselctive nature and completely suppress 5 X X in favour of Radio-Paris. Moreover, the same incidental advantages of the ordinary wave-band are still present on these long waves.

AN ORDINARY WAVE-TRAP



The circuit is that of the Brookmans Rejector, and "P.W." readers will know that this means uninterrupted long or short-wave reception plus an increase in general selectivity.

The general selectivity of the outfit is improved; that is to say, although the rejector is set for the elimination of one particular station you will find that station separation on other parts of the dial is now much superior, and instead, as with ordinary wave-traps, the sensitivity of the set decreasing, there is almost invariably extra power available in the required programme.

And now perhaps you are beginning to appreciate how very useful such a unit as the Extenser Rejector can be. By using the Extenser, a two-band rejector is made

A New and Valuable Application of Radio's Latest Component.

By H. A. R. BAXTER.

controllable by the one dial and without the assistance of switches. All you do is to join the Extenser Rejector in series with your aerial and leave it permanently in that position.

Even if you never touch its control the unit will not interfere with your reception in any way whatever. Indeed, left untouched and unadjusted, it will transmit to the outfit some degree of its "better results" quality, and when you are trying to tune in a station, either ordinary- or long-wave, that is spoiled by interference, then a touch on the Extenser Rejector dial will immediately clear the matter up.

Extra Adjustment.

There is a small internal adjustment that can be made to the Extenser Rejector in order to vary its station suppression powers. You see, the Brookmans principle provides for the complete elimination of interference, but it is not always advantageous to have one programme entirely eliminated, so many constructors prefer to adjust their Brookmans Rejectors so that there is a faint whisper of the interfering station when it is tuned right in.

They can then easily turn to this pro-

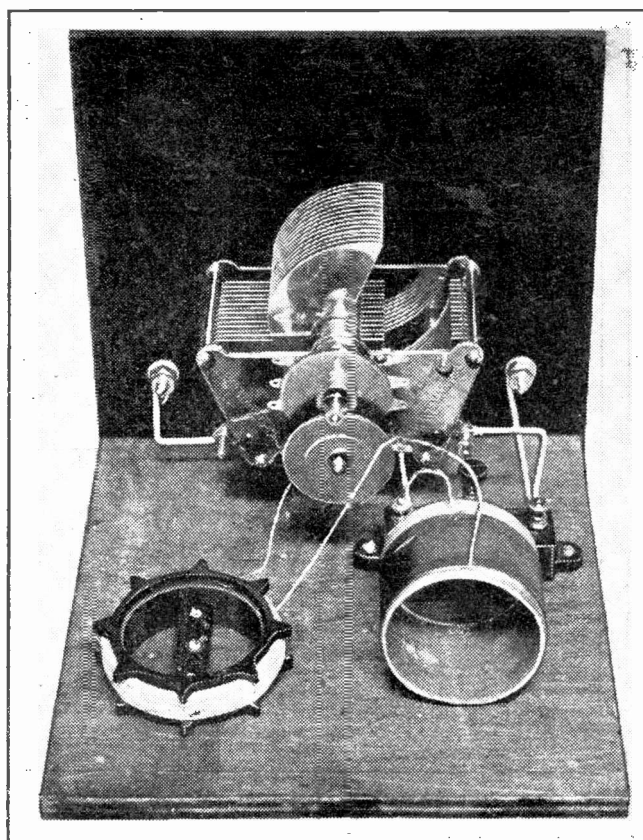
gramme should they want to listen to it; they merely turn the tuning dial around until it is correctly adjusted for this station, and then a slight rotation of the rejector dial will bring it in at full strength.

Comparatively Few Components.

The Extenser Rejector does not call for many components. The main item is, of course, the Extenser itself, and you cannot fail to obtain an efficient make, for, happily,

(Continued on next page.)

FOLLOW THEM ROUND



High and ordinary wave stations—the Extenser Rejector can cope with them all. Chase round after those that interfere, and each will disappear the moment the dial setting is right.

AN "EXTENSER" REJECTOR

(Continued from previous page.)

there are no others in existence! But this does not apply to the .001-mfd. compression condenser, and here you want to take particular note of the manufacturers' name given for this component.

Alter the Size to Suit.

It is not essential that you should build the Extenser Rejector in the same size or kind of cabinet as shown in the photos. Indeed, you need not use a cabinet at all if you do not want to, although it will protect the parts from dust and damage. But if you alter the layout to any con-

siderable extent make sure that you keep the coils at right angles to each other, as shown in the diagram.

Also, keep them at approximately the same distance apart. Now the coils in any Brookmans Rejector are extremely important items; unless you wind them in the specified manner you will not get full efficiency of trapping. This applies also to the medium wave coil, which, as you will see from the wiring diagram, comprises 70 turns of wire, No. 30 D.S.C., wound on a two-inch diameter former.

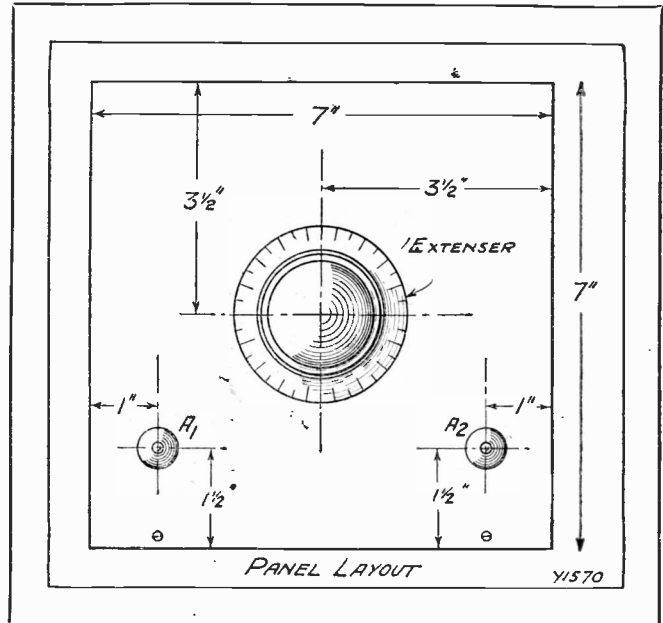
Start the winding by threading the wire through two small holes in the former, and then wind the

one layer moderately neatly, you can wind another over it, and so on.

In wiring up you will need to use only one of the self-changer terminals of the Extenser. On a "Wavemaster" Extenser that will leave three unused terminals.

You can employ any one of the four terminals on the "Wavemaster" or any one of the three on either a "Cyldon" or "Formo."

SUITABLE FOR ANY SET



It can be joined to any set in a matter of seconds, and there are no limitations as to its use.

wire on tightly, keeping the turns close together. You can finish the winding off, after 70 turns have been put on, by threading it through two further holes. Leave a few inches at each end for connecting purposes. The coil can be fixed to the baseboard merely by driving a small screw through each end of the former.

On Long Waves.

The long-wave winding is carried on a "P.W." Coil Quoit, and will not require such careful construction. But you must use exactly the same wire. You will not be able to get all the turns on in a single layer and so, as soon as you have wound

The Extenser Rejector is connected up by removing the aerial lead from the set and joining this to the A1 terminal, the A2 terminal of the Extenser Rejector being taken to the aerial terminal of the set.

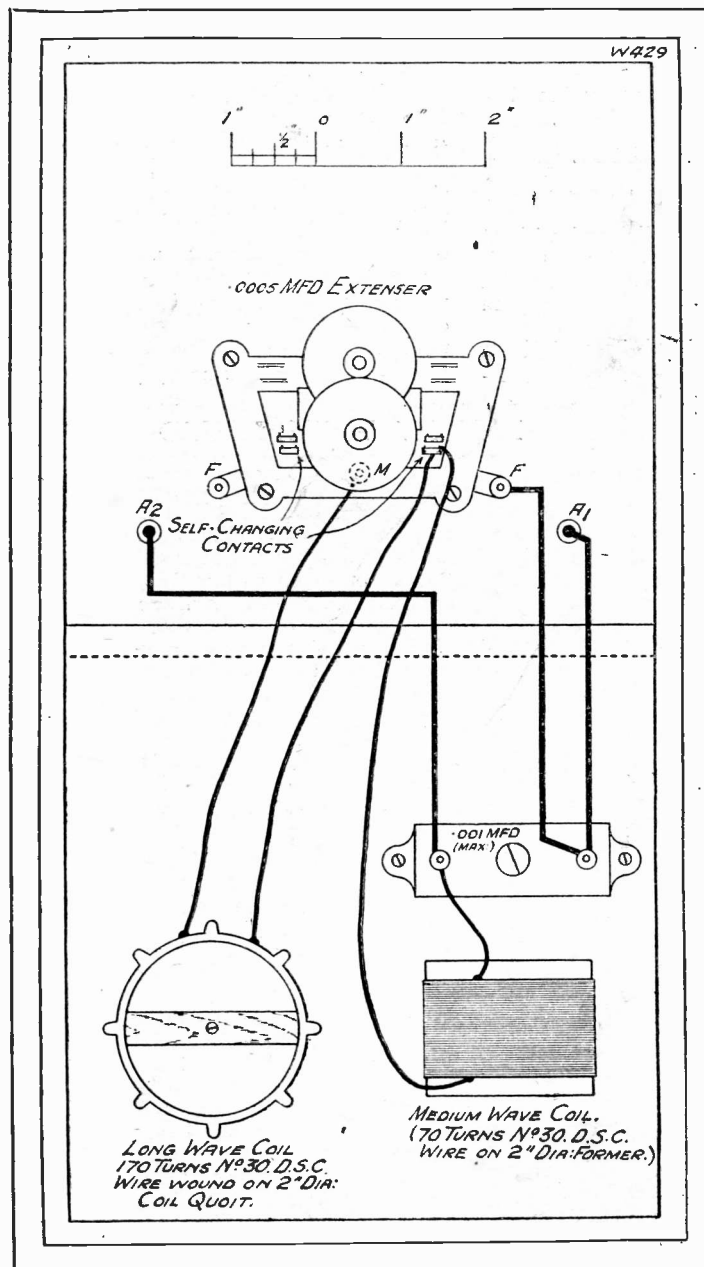
In the first instance, the compression

ALL YOU REQUIRE

- 1 Panel 7 in. x 7 in. (Peto Scott, or Parex, Permcol, Wearite, Goltone).
- 1 Cabinet to take 7-in. baseboard (Cameco, or Peto Scott, Osborn, Pickett, Lock).
- 1 .0005-mfd. Extenser (Wavemaster, or Formo, Cyldon).
- 1 .001-mfd. max. compression condenser (Formo, or Igranic, Telsen, Lewcos, R.I., Polar, Goltone).
- 1 Coil Quoit (A.E.D., or Wearite, Peto Scott, Redfern, etc.).
- 1 Coil former 2 in. diameter x 1 1/2 in. (Paxolin or Pirtoid).
- 3 Ozs. 30-gauge D.S.C. wire for coils.
- 2 Indicating terminals (Eelex, or Belling & Lee, Igranic, Clix, Goltone, etc.).
- Glazite or Lacoline for wiring, screws, etc.

condenser should be adjusted to its maximum capacity, that is with its small adjusting knob screwed right down. You then turn the Extenser dial until your loud local station weakens, or becomes inaudible, and a slight readjustment of the compression condenser will set your degree of trapping, after which it need never be referred to again.

YOU MAKE YOUR OWN COILS



The coils are very easy to wind; in fact, the whole device presents no problems, even if you have never built a radio set or unit before.



Ostram Valves

MADE IN ENGLAND

EAN
CARL

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2

THE marked improvement in all-round signal strength which occurred at the beginning of August is well maintained. At present we are having one of those periods during which strength remains level, and another noticeable improvement is due very shortly. It may even have occurred before these notes appear in print.

Last week I wrote that before long we should have Budapest coming in as well as ever, and you must forgive me if I now administer to myself a pat on the back for my success as a prophet. Here is Budapest's record as extracted from my long-distance log for last week: very good, moderate, very good, fair, very good, very good, moderate.

Milan and Munich.

Now "very good" means full loud-speaker strength; "moderate" means small loud-speaker strength, and "fair" means headphones only. You will see then that on four nights out of seven Budapest was able to give full volume from the loud speaker, and that is really pretty good for the time of year. It will not be long before he achieves full marks on six nights out of seven. Other stations in the same region up at the top of the broadcast band are also showing signs of improvement.

I recommended Vienna to your notice lately, and he has justified the recommendation. Munich, though by no means strong



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.

yet, is coming back. He is nearly always to be found there at telephone strength, and he should soon be up to the loud-speaker mark. Milan is strengthening up considerably and comes through now more often than not with loud-speaker volume.

Brussels No. 1 has been one of the most reliable of stations throughout the summer. I have usually been able to receive him at any time of day when he was working, on a four-valve portable set, using its own tiny built-in frame. He should be enormous in a very short time now.

Rome was showing considerable variations in strength during July, but he is now in excellent form and never fails to score a good mark. Langenberg, Beromunster and Sottens are other splendid stations above 400 metres. Stockholm, for some reason, is suffering a temporary eclipse, and I have not heard more than a whisper from him for some days.

Pick of the Bunch.

Between 300 and 400 metres reception has been extraordinarily good on most evenings. The pick of the bunch are Frankfurt, who seems quite reliable now; Toulouse,

who is uniformly good and appears to have got over his heterodyne troubles; Strasbourg, who is fading much less than he was; Brussels No. 2; and Gothenburg, who is now strong and steady. Hamburg and Lwow are very good when conditions are at all favourable.

but one cannot yet be sure of finding them at every trial. Bordeaux Lafayette is coming in better now than for many weeks past.

Spanish Silences.

Long-distance enthusiasts should note that the Spanish stations, Madrid, Union Radio and Barcelona, are now reappearing. They should be looked for rather late in the evening. Barcelona is usually silent from 8 to 10 p.m., whilst Madrid has an interval from 9.30 to 11 p.m.

Here are a few stations in the middle of the band to keep an eye on at present. As soon as they begin to come in well you will know that another leap forward has occurred. Katowice (408 m.), Bucharest (394 m.), Brno (342 m.), Naples (332 m.), Marseilles (316 m.).

Below 300 metres things are distinctly better so far as strength is concerned, but heterodynes unfortunately persist, mainly owing to the reprehensible wave-length wandering of French and Swedish stations. Turin, Heilsberg, Nurnberg, and Horby are amongst the best of the shorter wave stations at the moment.

THE threats that I issued recently, in connection with a new short-wave for myself, are gradually being fulfilled. When finished it will be a very "straight" broadcast receiver, with no trimmings except those on the front panel.

In this quarter I am allowing myself the luxury of one of those American slow-motion dials that project the figures in colour on a ground-glass screen. With the customary fine tuning required from short-wave work, this is appreciated when once it has been tried.

Dinky Dials.

Apart from this component the receiver will be all-British. This rather leads one on to ask why none of our manufacturers has had the courage (or is it the brains?) to put a component of this type on the market. It would certainly sell, for, apart from ease of reading, it has the advantage of showing when the set is switched on, and also it can be read in the dark without having the room lights on!

All of this, in its turn, leads me further still in the direction of the Show. Will the Show this year be as dull as usual for the short-wave man? Surely in all the branches of radio there is no one that is led up to such wild heights of enthusiasm as he, and yet year after year he "goes away empty"!

With the exception of one firm that markets very nice short-wave receivers, chiefly for overseas work, nothing else is outstanding in this line. True, most of our big manufacturers are willing to admit that

SHORT-WAVE NOTES

A few interesting observations concerning happenings down on the short waves by W.L.S., a very well-known amateur transmitter and a leading expert on the subject.

they have some short-wave gear available, if closely questioned, but how much has one ever been able to see on the stands?

I propose to scrutinise the Show very, very thoroughly, and to take note on the grand total of short-wave gear that there is to be seen there.

Casablanca Calling.

Surely I am not alone in noticing the enormous strength reached by Casablanca at times during the last week? I have found him on three days to be as strong as London Regional, and extremely good in quality.

HELP THE NEWSAGENT.

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

The English announcements that I have heard are slightly reminiscent of Maurice Chevalier, but the French gives one a better chance of realising how absolutely perfect is the speech quality. The announcement "Ra-dio Casablan-ca" is rather fascinating to the family, who never tire of listening to him.

My good friends of the International Short-Wave Radio League, who never fail to send me a copy of their monthly Official Organ, are commenting on the real "International" flavour of this short-wave business. Among the amateur transmitters this feeling is also very noticeable.

Our Great Game.

We all have friends in thirty countries or more, some of whom we may never have met, but all of whom we feel to be brother-enthusiasts, always willing to help. It is a great business, this short-wave radio!

Incidentally, have you ever reflected that the most practical receiver for providing real alternative programmes is a broadcast set adaptable for short waves? Many people seem to be cutting out the long-wave side of their receivers and putting in short wave wave-change switching in their place. In consequence they receive their two local programmes, possibly five or six more on the broadcast band, and upwards of fifteen reliable programmes on the really short waves.

Next week I will make a few remarks on the conversion of a wave-change set on these lines.

A POPULAR "TWO"



One of the Dario Two-Volters.

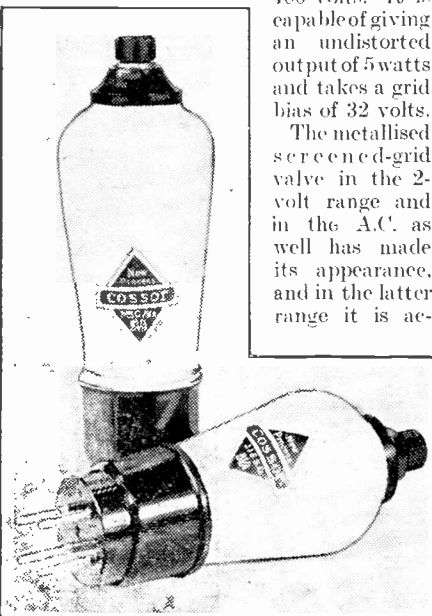
the first L.F. stage is very easily obtained, and so in the writer's opinion the S.S. 4 Det. A.C. (having an impedance of something like 7,000 ohms with a magnification factor of 16) seems to be the only type of valve that is really suitable in this position. This can then be followed by a large or moderately large output valve, and there is a good possibility of obtaining a really big output without overloading, and especially is this advisable in pick-up work.

Those Metallised S.G.'s.

An outstanding A.C. valve for power work has been the Mazda P.P.5/400, which takes 2 amps. at 4 volts on a directly heated filament, and which has a colossal plate for heat dissipation purposes and a magnification factor of 9. The impedance is about 1,200, giving a mutual conductance of around 6. Tungram, too, have a similar valve, taking only one amp. at 4 volts, and these set a standard which the battery valve will have a hard job to get up to.

It is essentially, of course, a mains-driven valve and has an anode consumption of something like 60 milliamperes at 400 volts. It is capable of giving an undistorted output of 5 watts and takes a grid bias of 32 volts. The metallised screened-grid valve in the 2-volt range and in the A.C. as well has made its appearance, and in the latter range it is ac-

SELF-SCREENED



A pair of Coscor metallised screened-grid valves.

WHATEVER YOUR RECEIVER YOU WILL FIND PLENTY OF VALVES TO SUIT IT

opinion, there is only one type of A.C. valve which is really suitable as a first L.F. for four-valve A.C. sets. It is rather a sweeping statement, perhaps, but with valves of the H.L. type, overloading in

companied by a metallised detector. It is an advance which is of considerable interest, but whether or not the practical value of the 2-volt screened-grid metallised valve is as great as one might at first imagine I am not prepared to say.

Cutting Down Hum.

The fact is that a sort of aluminium paint has been employed, and it is doubtful whether this is as efficient a screen as one could wish for. The idea is there, and there is no doubt that the screen does have some effect, but perhaps not a very great one in many cases, while it must not be supposed that it obviates the necessity for the usual type of screening in most circuits.

In the case of the detector valve of the A.C. variety I have found that the screen

perhaps the biggest of them all has come in the introduction of D.C. mains valves.

For a long time, owners of D.C. mains have had to be content either with working the set off a battery for filament heating purposes, or else have had to go in for rather elaborate D.C. mains receivers in which battery valves were used in series, and had many disadvantages.

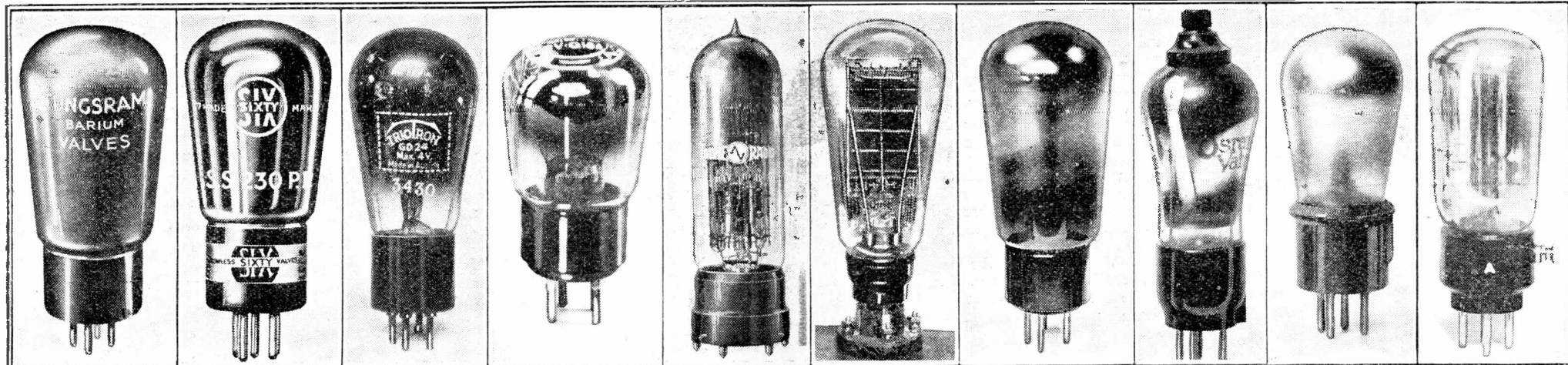
A Great Drawback.

Such a procedure has often necessitated considerable smoothing not only in the anode circuit, but also the filament circuit, and it has bound down the owners of such sets to the use of valves of the same filament consumption, thus putting an unfortunate restriction on the size of output valve.



IT
ALWAYS
RAYS

A TYPICAL SELECTION OF—



Above we have a group of valves that are well known to set owners. From left to right they are: or L.F. work; Loewe triple valve; Mazda P.P. 5/400; Vatea rectifier; Osram

TO
BUY THE
BEST

Tungram; Six-Sixty Two-volt Pentode; Triotron general purpose; Fotos B.C. 18 for detection 2-volt screened-grid; P.B. general purpose; and a Lissen pentode.

placed in series with the mains and the heater of the valves. This, of course, is wasteful, but D.C. mains when used for the filaments or heaters of radio sets are bound to be wasteful until such valves as those operating direct on 200 to 240 volts for heater purposes are designed.

More Mains Users.

But the new D.C. valves do place the owners of direct current mains in a different position from what they unfortunately occupied a year or two ago. The D.C. user is at last on a level with his A.C. neighbour as regards the results he can achieve with his radio set, and, as a matter of fact, from the point of view of cheapness in the initial cost, he has a decided advantage over the owner of alternating current supply.

The tendency in modern valve design is to go in for more and more powerful valves,

and this naturally necessitates more powerful H.T. supply, so that dry-battery users are not having a particularly enviable time supplying power for their receivers.

The super-capacity battery is being used in ever increasing numbers, and every week sees many more mains H.T. unit users. If you have electric light in your house it is a very much more satisfactory scheme to use a mains unit than to go in for dry batteries.

Pays For Itself.

The keeping of an accumulator driven set from the L.T. point of view, comes under a different category. It is a big job to convert a battery set to all-mains drive, but although there may be a little initial outlay in the purchase or building of a mains unit for H.T. purposes, the saving of batteries

to be seen how popular it will be in this country. Such a valve is used in the POPULAR WIRELESS "Super-Quad" now being described.

Radio has reached a stage in which steady development has taken the place of revolutionary inventions, and we must not expect anything exciting in the realm of valves during the next few years. There may be great and unforeseen developments, but it seems that steady progress is the order of the day, and although this is far less picturesque yet in the long run it is as a rule far more satisfactory and satisfying.

Better Than Ever.

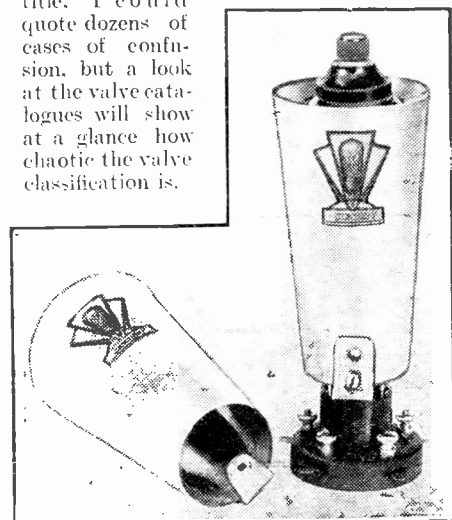
The valve-set user of to-day gets far more out of his set than he did eighteen months ago if he chooses his valves carefully and employs reliable circuit designs. There is nothing very much the matter with the modern valve. It is reliable, long-lived, and thoroughly efficient.

But it is, however, a thousand pities that with all their skill in valve design and construction, the British manufacturers have not seen fit to standardise the nomenclature of their valves. Let the various makes have different characteristics, by all means, but do let us know whether a valve is H.L., L., or S.G., by a mere glance at the designation.

Methods of Designation.

As matters are now we have such things as the B.Y.6, S.21, 215S.G., P.M.21, all denoting S.G. valves of somewhat similar characteristics, and only one (the third) is anything like a suitable title. I could quote dozens of cases of confusion, but a look at the valve catalogues will show at a glance how chaotic the valve classification is.

WELL SHIELDED



A useful method of screening is this scheme devised by Six-Sixty.

A RECENT ARRIVAL



One of the new Eta valves.

CHOOSE YOUR VALVES CAREFULLY AND GET THE MOST OUT OF YOUR SET



Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your questions to Capt. Eckersley, however—a selection of those received by the Query Department in the ordinary way will be answered by him.

A Jack for the Pick-up.

J. B. (Burton-on-Trent).—"I wish to add a pick-up switch to my set, and have decided to use a jack of the type commonly employed for L.F. switching."

To obtain adequate volume, the jack is to be inserted in the detector grid circuit. Is a jack of the above type suitable for inclusion in this position?"

Perfectly. You will need to arrange things so that you put negative on the grid of the detector when used as a low-frequency amplifier, otherwise the amplification will not be linear.

I do not know whether you are using grid leak or bottom bend detection, but you will need to work it out so that the jack emerges from circuit, as shown below, when using the gramophone.

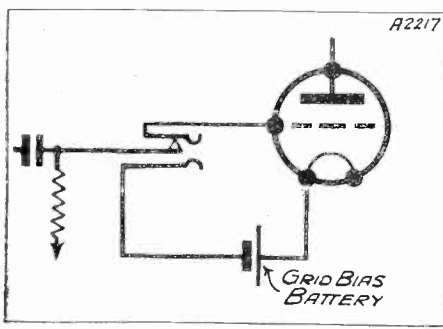
Anode Bend that Doesn't!

H. R. (Gidea Park).—"In an endeavour to find the best value of grid bias to apply to an anode-bend detector, I went to the trouble of taking a curve of the grid volts anode current characteristic of a medium impedance valve with a resistance of 80,000 ohms connected in the anode circuit."

"The result did not help me in the least, as my Curve appeared to be nearly a straight line. There was, in fact, so little curve about the characteristic that I was forced to conclude that my readings were in error. Repeating the experiment, however, gave the same result. How does rectification occur with anode bend that doesn't bend?"

Suppose we draw absolutely straight line

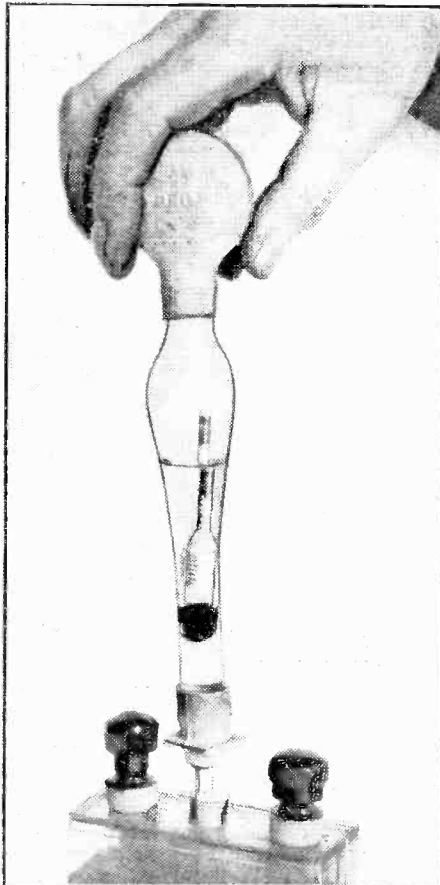
GRID CIRCUIT CONNECTIONS



When the gramophone jack is withdrawn its grid bias is disconnected and the detector grid connections are restored.

anode current-grid volt characteristics as I have. I suppose those resemble your curves

GOT ONE OF THESE?



The hydrometer, which only costs a shilling or so, enables you to detect the first sign of L.T. trouble!

to some extent. Now suppose the grid voltage is V_g . There will be no anode current.

Now suppose a high-frequency impulse of peak volts V_s is added and subtracted to V_g . Obviously signal voltage V_s (-) does not produce any anode current, but the extension V_s (+) produces a peak anode current I_a .

So the valve rectifies since only one half of the signal produces anode current. The

"bottom bend" is at the point P and may be more or less angular or less or more a bend—what's in a name, anyway?

We mean a rectifier is a bottom bend rectifier when an impulse of signal voltage one way produces more anode current than a signal voltage the other way.

Heterodyne Wavemeter Accuracy.

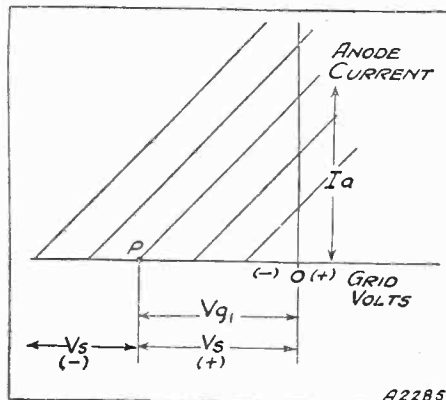
B. Y. (Carlisle).—"I have made a wavemeter of the heterodyne type, using the conventional Hartley oscillator circuit. I want, if possible, for this to remain accurately calibrated throughout the life of the valve."

"Can you tell me if the valve is likely to alter its characteristics after use, and, if so, will such alteration give rise to much change in the dial readings of the meter?"

I should think that once the wavemeter has been calibrated the valve will not greatly upset the calibration as time goes on and the valve goes (a bit) off. But I should be more confident if I knew that your circuit never allowed grid current, i.e. that you used a grid negative battery of correct value to prevent grid current, and not a grid leak for your oscillator.

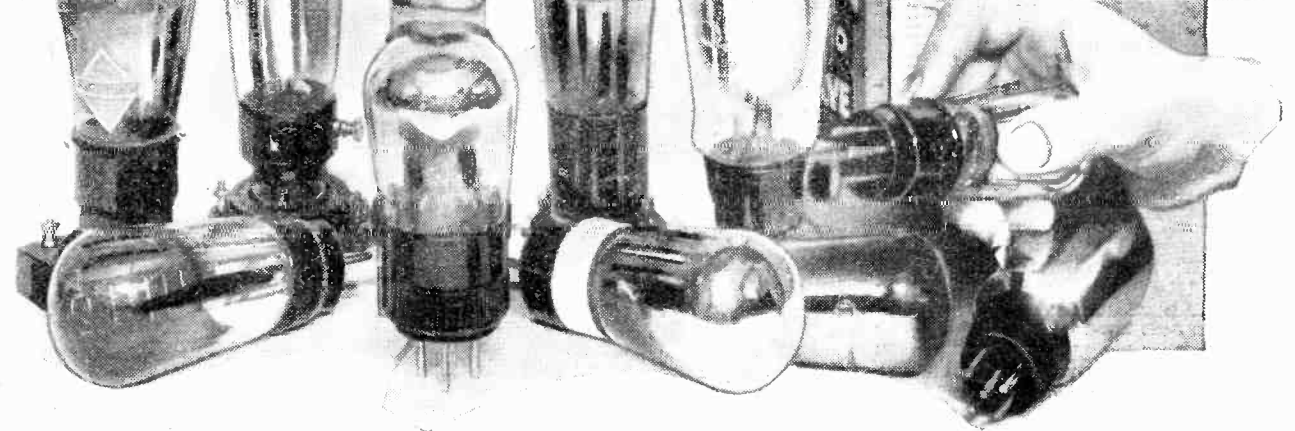
It is most important to avoid grid current in a heterodyne wavemeter if calibrations are to stay put. At any rate, remember that the B.B.C. stations maintain an accuracy of wave-length above the standard order, and you can keep a constant check on 3 or 4 points in this way.

HOW DETECTION OCCURS



Look at this diagram when reading Capt. Eckersley's reply to H. R. of Gidea Park.

VALVES OF TODAY



IT is well over twelve months since we published a special valve number of POPULAR WIRELESS, and consequently in reviewing the situation of the modern valve, one may expect to find considerable new development. Nothing very startling has been brought out during the last year, but steady progress on all sides has been maintained.

The Popular Two-Volter

The 2-volt valve, which is of particular interest to POPULAR WIRELESS readers, is no longer merely a valve which will do "quite well" in place of the 6-volter; it has definitely outstripped its higher wattage brother, and it is now safe to say there is no more efficient battery valve on the market than the 2-volter.

The reason, of course, is that the 6-volter is gradually being dropped by most of the manufacturers, one or two alterations have been made, notably to the 625 and the 625A, but on the whole the 6-volt valve has been neglected (and quite rightly) in favour of the 2 and the 4.

But whereas all along the line from H.F. to L.F. the 2-volter has been improved, the 4-volt battery valve has been left pretty much the same except for the output type. This, of course, is the logical outcome of the use of A.C. mains, the indirectly heated valve having a 4-volt heater potential.

This being the case, the 4-volt output valve is an important addition to the A.C. range, because often it can be used as an output valve with raw A.C. on its filament without causing trouble due to hum.

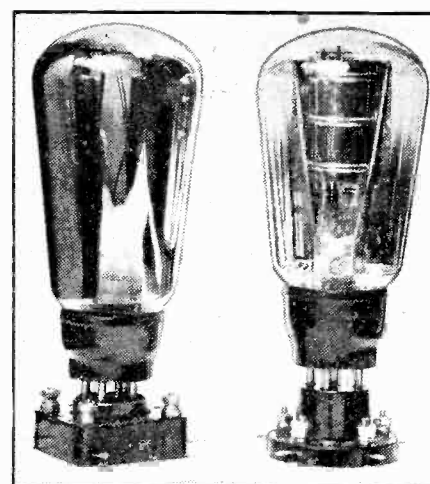
The P.X.4 is an excellent example of

In this article some of the outstanding advances in valve design are described, and indications of future developments are given.

By K. D. ROGERS.

this. This valve is one of the most popular A.C. output valves on the market. It is equally suitable for accumulator use because it consumes only 6 amp. at 4 volts, and so it is a valve of extremely valuable characteristics.

FROM PONDERS END



Two of the new Mazda D.C. valves—made at Ponders End—the D.C. H.L. and the D.C. Pen.

Valuable additions to the 2-volt range, of course, are the new P.2 and the L.P.2, the B.W. 1304, and similar output valves which have exceedingly fine characteristics.

A.C. Improvements

These have high mutual conductances which were at one time thought to be the prerogative of the indirectly heated A.C. valve, but the 2-volt valve is gradually catching up the A.C. valve; a decided achievement of the valve manufacturers.

A.C. valves have also been improved, however, the Cossor A.C. indirectly heated 41 M.H. and 41 M.H.L. having been given the outstanding amplification factors of 72 and 52 respectively. But, of course, there must be a limit to these high amplification factors, and the more we go in for stage amplification the more difficult it becomes to arrange valves so that the output stages will not be overloaded.

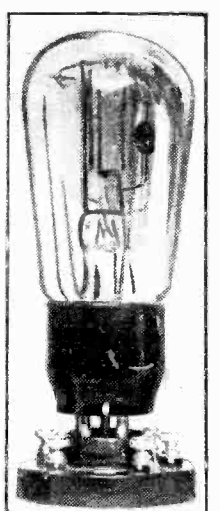
Tremendous Amplification Increases

For instance, if we have a very high magnification screened-grid valve and a high mag. H.F. valve used as a detector, we find we have to use quite a large output valve in order to carry the grid swing handed to it from the detector. There is also danger when using a high mag. detector (owing to the fact that it has, of course, quite a small grid swing) of overloading the detector.

I think that these tremendous increases in magnification which are taking place must be looked upon with a certain amount of circumspection. It is a great achievement to bring put a valve having a very high amplification factor, but such a valve will easily overload on the local station unless pre-detector volume controlling is employed, and without this precaution overloading from only one H.F. valve is quite a likely and usual occurrence.

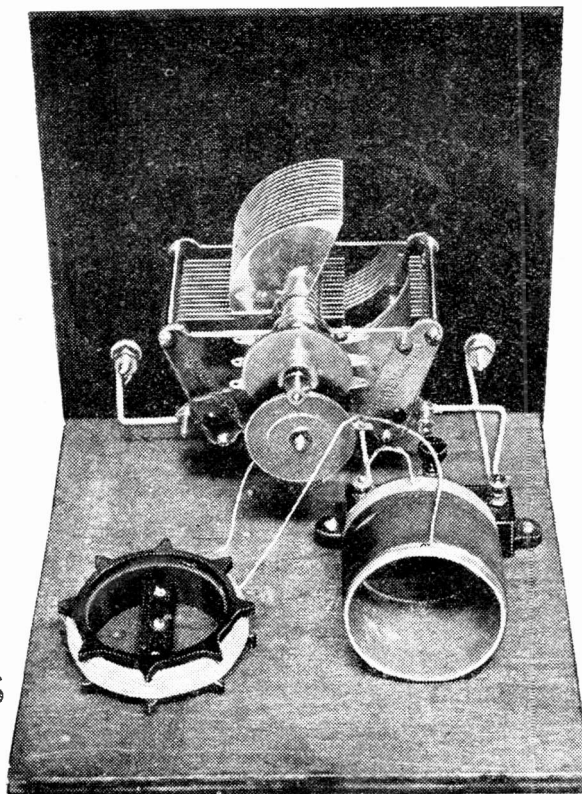
Similarly, the high amplification factor means that we cannot use anything like an ordinary L.F. valve, after this detector, and should we by any chance want to use a four-valve set, then we are rather confined in our choice of A.C. valves to follow it. As a matter of fact, in the writer's (Continued on next page.)

—AND L.F.



This is the M.H.L.4, both Osram valves.

**Make
your set
really
selective
on both
long and
short waves**



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"Extenser"
Rejector
and
cut out
all
interference**

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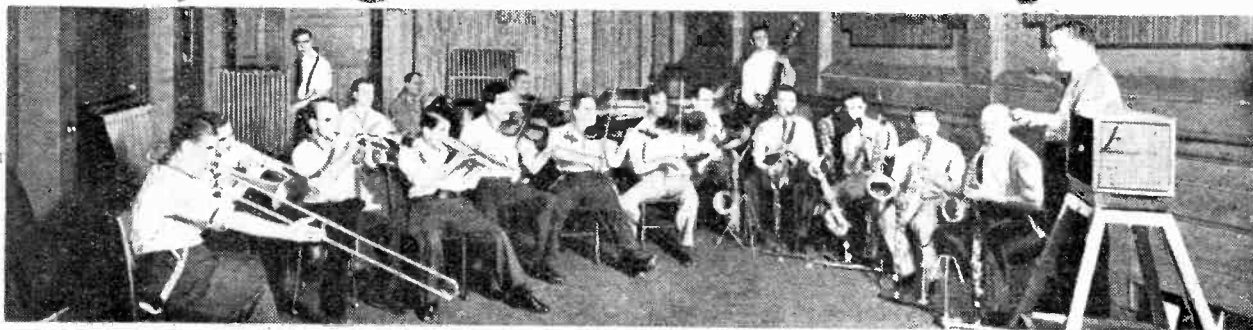
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goods specified for which I enclose payment in full of
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I enclose first deposit of

£..... Name.....
£..... Address.....
£..... Kit required.....

Keeping Cool at Savoy Hill



IT was one of England's few broiling days. The heat rained down.

A friend of mine was singing to the world that afternoon via a B.B.C. studio. With memories of Savoy Hill in a heat-wave six years ago, I was not looking forward to the task of affording her even moral support.

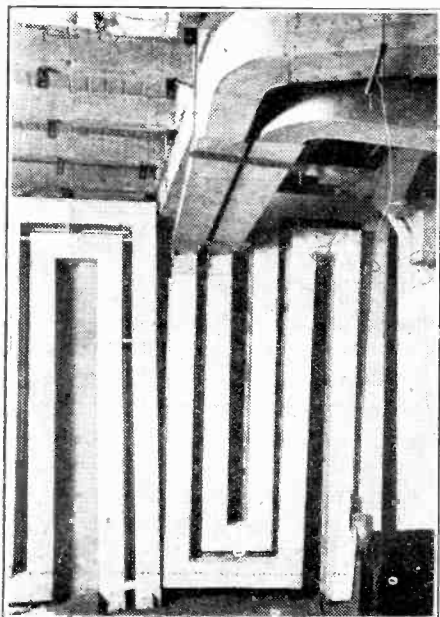
Very Hot Work

In the days when studios were small and heavily draped, broadcasting during a heat-wave was hot work. I remembered an occasion when Rutland Boughton conducted "The Immortal Hour" one summer night.

The studio was like an oven. The composer took his coat off. The orchestra mopped their brows from time to time. The singers sang, and having done so, flopped into chairs in melting despair. Small wonder that I seriously considered leaving my friend to her fate!

I did not do so. I prepared myself for the ordeal beforehand by steeping my hands in cold water. As it turned out, this precaution was quite needless. Savoy Hill in these days is one of the coolest places in London.

INSIDE THE WALL



Some of the 150 tons of special cooling ducts at the new Langham Place Studios.

How heat-waves are fought to keep the artistes in the studios cool.
By A Special Correspondent.

Lucky indeed are the artistes who work there in a heat-wave!

The privacy of a studio does not necessarily infer that one can do as one likes in the matter of keeping cool. Jack Payne and his merry men, when they have a studio to themselves, can and do work in their shirt-sleeves when they wish. Other orchestras are sometimes allowed to wear alpaca coats.

Shed His Shirt!

But for all formal occasions full dress is essential. In Washington a short time ago a speaker who found the heat rather trying removed his shirt. Englishmen are not so informal, but there is a suggestion of discourtesy in partnering a lady or fulfilling an engagement even in shirt-sleeves. And the Announcer always in his dinner-jacket sets a good example.

Not that the broadcasters never disrobe. A few spirits refuse to be quelled. Sir Harry Lauder insists on absolute comfort, and removes his collar. Chaliapin, when he broadcast, took off his coat. In the small talks studio itself, possessing as it does a large window, speakers occasionally remove their coats.

But all these gestures to the sun are unnecessary. Every one of them. Savoy Hill can give points to our luxury hotels in the matter of ventilation.

Special Cooling Plant

At one time the engineers experienced difficulty in getting fresh air into the studios because of the heavy draperies. Now that these have gone, everything is simple. Thousands of cubic feet of cooled and clean air are brought into the studios every hour in hot weather—the supply varying according to the number of people in the studio.

Down in the basement they showed me a giant fan. This is the starting point. From here the air passes through oil filters, then through metal ducts, and so into the studio through inlet panels at a high level.

After the people there have duly consumed it—with perhaps a passing thought as to its purity!—the enervated air is extracted at a low level. And all this in absolute silence as far as the studios are concerned.

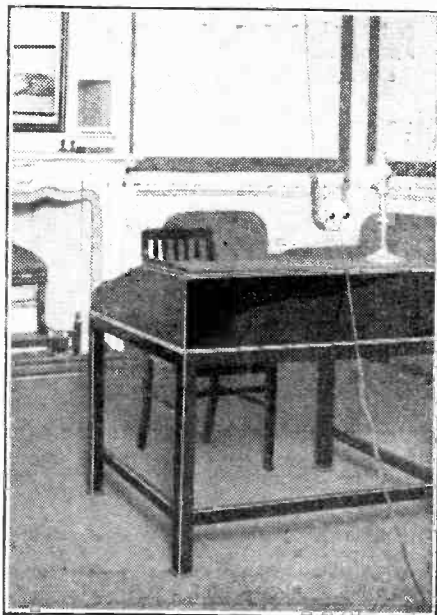
At Broadcasting House next year—or this, if we happen to have a heat-wave in December—conditions will be even better. I have just seen one of the gigantic steel ducts that supply conditioned air to the studio—tremendous things fully six feet in diameter in some cases. Through these 143 tons of air will be pumped in one hour.

Silent Circulation

Were the steel ducts not carefully insulated against sound waves, they would carry not only the sound made by the fans and motors of the air-conditioning plant, to the studios, but also from one studio to another. These de-humidifying and cooling plants are made to be "commercially silent" since they are usually used in cinemas, talkie studios and similar places, but for Broadcasting House more than the usual precautions had to be taken.

For the "mike" is so sensitive that even the swirl of the air in the ducts and the sound of it entering the studio would, unless specially regulated, interfere with broadcasting. Listeners would take the sounds of the ventilating apparatus for the breathing of the Announcer!

AT THE TALK'S DESK



Some talkers even remove their coats, but no doubt their listeners often get "hotter" than they do.

THE BEST WILL ALWAYS STAND OUT



PERTRIX SUPER LIFE DRY BATTERIES & ACCUMULATORS

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YOU HEAR IT BETTER WITH PERTRIX

WITH THE B.B.C. IN THE NORTH



No. 7—Behind the Scenes at Moorside Edge.

By LESLIE W. A. BAILY.

EACH day now, as regularly as clockwork, the North Region Station sets out on its voyage of the ether; each early morning it "docks," the engines stop, and a green B.B.C. 'bus takes the staff home through the darkness to Huddersfield.

When last I came to Moorside Edge, to the launching of the station, all was excitement. Now, visiting on behalf of POPULAR WIRELESS, I came to see how this giant station runs under routine service conditions and how its "crew" find life up there on the Pennine Hills.

Making Everything "Ship-Shape."

Walking along the rough road leading to the squat transmitter building, I noticed that labourers were still busy concreting and trimming up the paths round the building, and I was told later that the B.B.C. has a scheme for making the station site generally smart in appearance—which will be no small job, for Moorside Edge is a wild plateau covered with coarse moorland grass.

Inside the building, however, everything was as spick-and-span as on board a battleship. In the entrance hall a man was putting a highly efficient polish on the floor—a naval sort of polish. Then the captain of the ship came forward and courteously greeted me.

Grant me that this is an apt metaphor, for the Engineer-in-Charge of a modern wireless station has personal responsibility over a complex mechanism in the service of the public; he has a motley crew, ranging from men who are expert with a shovel to others who are more at home with a slide rule; and his own duties are as varied as those of a liner's captain.

"All Quiet."

At Moorside Edge there are 16 wireless engineers, a separate staff of four engineers in charge of the Diesel engines, a cook, a clerk, four labourers, and a watchman—a complement of 27. When I arrived, both the transmitters were "on the air." A pretty sight they look.

It was quiet in the big trans-

In this article of his series on B.B.C. stations in the North our contributor gives an interesting picture of the North Region Station.

mitter hall, but when you see the valve filaments of both transmitters glowing white, and you notice the meters on the switchboard marking their thousands of volts and amps., the quietness seems pregnant with some enormous force. That force is, in fact, leaping through oceans of space from the aerials outside.

We walked along to the engine room. If one end of the station is quiet, the other makes up for it. Three of the four 345 h.p. Diesels are in action when both transmitters are radiating.

The Engineer-in-Charge has discovered how to pitch his voice to penetrate the noise, so I let him do all the talking (especially as the cook, in a neat white jacket, suddenly appeared and offered me a cup of tea).

"How long before a transmission com-

mences do you start the station up?" I bawled, to set the conversation off.

"Half an hour," shouted the Engineer-in-Charge. The engineers, he explained, come to the station from their homes by a B.B.C. 'bus. The Diesels are started by compressed air, then the generators leap into life, and then the engineers go round throwing in switches according to a routine plan.

There are dozens of switches to be "thrown" and scores of meters to check during this process, but the station has been designed in such an ingenious fashion that it is practically impossible to do things in the wrong sequence, or, say, to put 10,000 volts H.T. across the valve filaments.

Further Outlook "Unsettled."

Quite rightly, the men have not been expected to take up living quarters on Moorside Edge. Hence the B.B.C. 'bus. At this time of the year the Pennines often look lovely, balmy breezes come across the heather, and there are wonderful views.

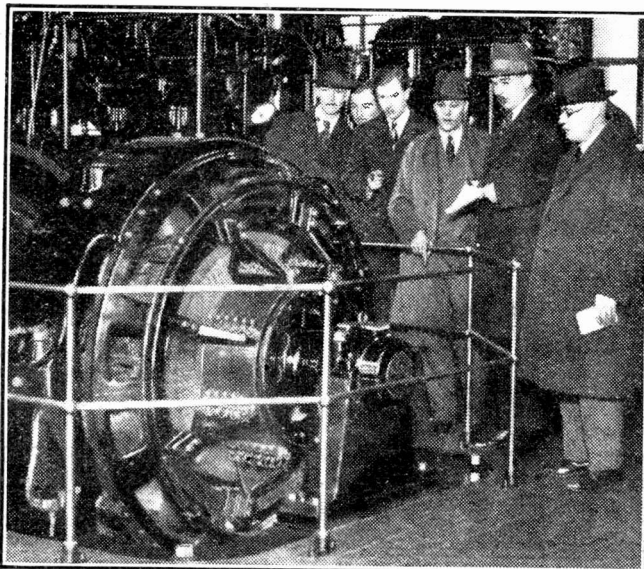
But last winter I went up there while the station was being built and I saw snow yards deep. I saw the masts disappear into solid grey mist a few feet above the ground. I know what the North Regional station will face next winter.

During cold spells the aerials will be electrically heated, to prevent them becoming loaded with ice. Incidentally, the Engineer-in-Charge pointed out to me that although the North National aerial appears to be like the North Regional aerial—a "T" supported by two 500-ft. masts—actually the vertical wire is insulated at the top so that the span is not used. The length of the upright is exactly half the wave-length (301 metres).

Input and Output.

In the special "listening" room are two switches. One gives you "Regional" one way and "National" the other. The other switches the loud-speaker over from radio reception to direct contact with the land-lines, providing a comparison between the music as it arrives and as it leaves.

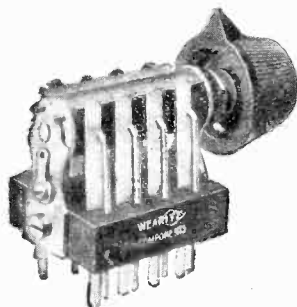
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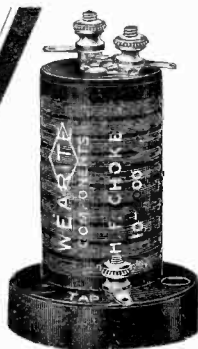
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patenters to use the patents before doing so.

QUESTIONS AND ANSWERS

RESULTS FROM RESISTANCES.

F. L. L. (Middlesbrough).—"I am going to make the 'S.P.V.' Three, which has 'fair took my fancy.' But before I join up all those resistances I would like to know what in the name of crikey they all do?"

"The detector has one grid leak, and three resistances in the plate circuit, 1 sec. And the

L.F. valve has one plate and two grid resistances. And the power valve has one in front of it, which doesn't seem usual! Please tell me what they are all for, and why each one is necessary, for I can't 'resist' wondering about them all!"

We will take them in turn, and need not linger over the detector's grid-leak resistance, for this is found in nearly all sets. Working back from the plate terminal of the detector we come first to the 10,000-ohm resistance. This acts in place of an H.F. choke, to enable smooth reaction effects to be obtained.

Connected to the "far" end of it is a 100,000-ohms resistance for R.C. coupling. Voltages are developed across this by L.F. impulses and these are applied to the succeeding valve via the '01 coupling condenser.

Between the 100,000-ohm and H.T. + 1 is a 25,000-ohm resistance which is for de-coupling the H.T. supply circuit from the detector's L.F. plate currents. (You see, all the resistances have important work to do, and consequently you must stick to the values specified.)

So much for the detector part of the circuit. The first L.F. valve is in a normal R.C. stage. The grid leak (500,000-ohms) in front of the output valve is quite usual. (Such a leak is not necessary with transformer-coupled stages, but this is a stage of R.C. coupling.)

The only other point is the use of two grid resistances in front of the first L.F. valve. The .25-meg. resistance is inserted between the 1-meg. leak and grid to act as an "H.F. stopper." It prevents unwanted H.F. impulses from appearing on the L.F.

WHEN WRITING TO US

will readers please note that all Technical Queries, Orders for Back Numbers and orders for Blue Prints should be addressed to The Fleetway House, Farringdon Street, E.C.4, and not to Tallis House.

side, so spoiling quality of reproduction. The 1-meg. resistance is, of course the usual grid leak to enable grid bias to be given to the R.C. stage.

tone control values.

W. H. N. (Cheltenham).—"With the idea of reducing gramophone scratch and also of toning down a tendency to shrillness, I have been recommended to insert a tone control in my resistance coupled amplifying stage, which consists of a 50,000-ohm anode resistance coupled to the next valve by an '01 condenser."

"The scheme recommended is to join a variable resistance and fixed condenser in series across the anode resistance. If this is practicable, what would be the values to use?"

For an anode resistance of about 50,000 ohms you should use for your purpose an .05-mfd. condenser and a 0 to 50,000 ohms variable resistance.

(Continued on page 724.)

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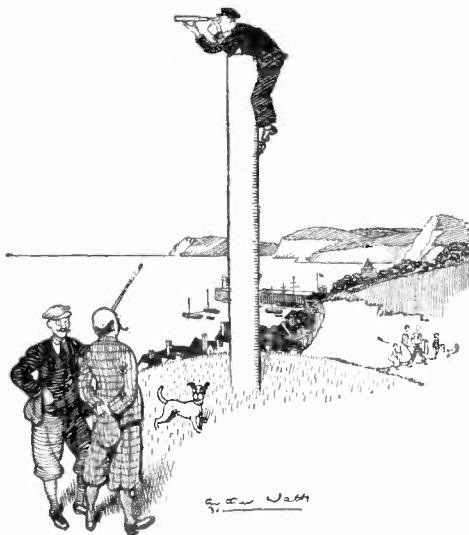
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

"The trouble is that having a really first-quality sensitive milliammeter in the plate circuit of the last valve, I can, whatever I do, detect a slight flicker of this, on very loud passages!

It seems impossible to cut it right out, although I have got it so steady that all my trouble so far seems worth while. But the question now is, ought I to go on until it is *absolutely* perfect, or would you be satisfied now that it is really steady and the quality excellent?"

Do not worry about that last little quiver at all, for with a sensitive meter a small needle vibration is inevitable when considerable energy is being handled.

PRE-DETECTOR VOLUME CONTROL.

L. B. (Old Trafford).—"The set is H.F. Det. and two L.F. and incorporates a volume control on the low-frequency stages. But I want also to control input before the detector.

"I am a little undecided as to which is the better method—control of the screened grid potential by a variable resistance, or control by a high resistance potentiometer across the tuned circuit, with the grid sliding off the required potential.

"Either way would be easy for me to do, though I should like an opinion as to which is the better from a theoretical point of view."

You are far more likely to get efficient amplification by controlling the input to the valve than by changing its screened grid voltage. Theoretically the input control is undoubtedly the better method, and can be applied as suggested or directly to the aerial input by joining the aerial itself to the slider, and connecting the resistance across the aerial coil.

In this latter application the potentiometer can be of a much lower resistance than it should be theoretically for placing across the tuned circuit, so if it is of the order of 50,000 or 100,000 ohms we should use it across the aerial input coil, while if it is a really high value of potentiometer, of half a megohm or so it can be connected as described by you.

CALCULATING THE RESISTANCE.

R. D. (Littlehampton).—"I have 200 volts available, but wish to drop it down to about 150 volts. What is the resistance required for this?"

For a reason to be given further on you will have to calculate this out for yourself, but it is very easy to do by means of Ohm's law.

One way of stating Ohm's law is to say that

$R = \frac{V}{I}$ We can call the resistances R , the volts to be absorbed by that resistance V , and the current to be passed by the resistance I .

You will now see that in order to solve the equation in your case it is imperative to know the current to be passed. This you do not mention.

This current, of course, is the anode current which must flow through the "dropping" resistance, and is easily ascertained either by measurement, or by calculation from the manufacturer's literature on the subject.

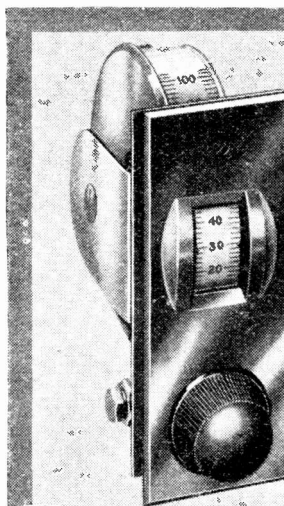
Suppose, for instance, that you find the resistance must pass a current of 1 milliamp, then the equation is easily solved because the required resistance R will

$\frac{200}{1} = 200,000$ be equal to —
0.001 amps.

The 50 volts are, of course, those to be absorbed by the resistance and the 0.001 is the 1 milliamp expressed in amperes. It will be seen that the answer to this is 50,000, and this is approximately the number of ohms required in this instance.

Other values may be worked out in exactly the same way.

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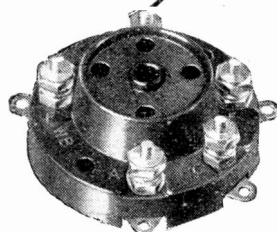
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FOR THE LISTENER

(Continued from page 704)

Union to Union. You meet them everywhere on the roads.

And this was one of their Hostels. A group of them were singing on a patch of grass in front of the house; and to my astonishment they were singing into a microphone! Singing jolly well, too. Students' songs, or glees, or something like that.

We were not hikers. We had really no business to be there. But they were interested because we were English, and they warmly welcomed us.

You could hire a bed—they call it a "cot"—for threepence; and, if you wanted a blanket, you paid twopence more. A cup of coffee cost a penny; and there was a canteen where you could buy food at similarly ridiculous prices.

It was the cheapest line we had ever struck. So we housed the car under a tree in a lane out of sight, and prepared to make friends.

I asked about the microphone. Apparently in Germany they broadcast hikers, as we broadcast nightingales. One of the smaller broadcasting stations had arranged that night for an "Evening with the Hikers." There were talks on hiking—where to hike, what to carry, the care of the feet, what it costs to hike, and so on—given by who ever happened to turn up at the Hostel that evening.

Like the Roosters.

They enjoyed themselves thoroughly, interrupting the talk with backchat and jokes. They reminded me a little of our own Roosters, except that it was all impromptu.

There were musical items, for wheresoever two or three hikers are gathered together, there will be a musician among them with a ukulele or a banjo.

It was in the middle of the programme that the organiser of the show asked me if I would "pay my footing," and say something. It was all just as friendly as that!

At first I thought I would broadcast an S.O.S. asking the man who had "found" my camera to send me his address so that I might post him my unused films; but that would hardly have been playing the game; so I said something different, boosted Germany a little, boosted England more, and added my little undertone to what Mr. MacDonald and Mr. Henderson had said in Berlin!

In the Morning.

Apparently no damage was done. On the following morning Germany stood where it had stood the night before. No flying squad of police appeared. The papers didn't even mention me!

The hikers had obviously passed a good night. So had I. It was a comfortable cot; and the hot coffee was good in the morning when we set off. It was a very pleasant and amusing experience.

I haven't the foggiest idea what the name of the place was. There were hills, and pine woods, and a lovely pattern of clover fields and cornlands over a wide landscape.

Bavaria is a beautiful country; and, if those young hikers were Bavarians, as they probably were, I feel that if I weren't an Englishman I should like to be a Bavarian!

TECHNICAL NOTES

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

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

Overloading H.F. Chokes.

IN case any of you wish to try an H.F. choke in the mains lead to your all-electric receiver for eliminating crackling, etc., I should point out that although the effect may be tried temporarily by means of an ordinary H.F. choke, just to see whether this cures the trouble, this kind of choke should not be used permanently because it will be heavily overloaded and probably damaged. If you find that this is the solution of your trouble you will need to make up a choke for the purpose, adapted to carry the necessary load.

The Right Valve.

I have remarked more than once before how very much the operation of a set depends upon having the right valve in the right place, and this is a point which is overlooked by a surprisingly large number of experimenters. For example, supposing

TECHNICAL TWISTERS

No. 74.—DISTORTION INDICATIONS. CAN YOU FILL IN THE MISSING WORDS?

When a milliammeter is placed in the circuit of an L.F. amplifying valve, the kicks due to distortion generally indicate how the fault should be remedied.

If the milliammeter needle kicks . . . to a reading it shows that average current is increased because grid bias is too for the H.T. being used.

When the milliammeter needle kicks the grid bias is too

If the valve cannot handle the signals being fed to it without distortion, the input to it must be (The best method is to use a)

Last week's missing words (in order) were: Milliammeter. Plate (or Anode). Milliammeter. Amplitude.

you change over from two stages of transformer-coupled amplification to one stage only of transformer coupling and one stage of R.C.

After having made the necessary alterations you may find that the volume is only two-thirds or perhaps half of what it was before, and the quality has perhaps suffered in the process as well.

This may seem very puzzling, and you begin to wonder whether anything has gone wrong with the H.T. supply or whether the anode resistance is of the proper value. In nine cases out of ten the trouble is not due to

(Continued on next page.)

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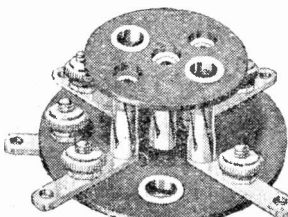
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TECHNICAL NOTES

(Continued from previous page.)

the battery or to the anode resistance but to the fact that the valve which was suitable and had the right characteristics for transformer coupling is now quite unsuitable for the Resistance Coupling circuit arrangement.

The impedance of the R.C. valve should be round about one-third of the value of the anode resistance, and if you choose a valve of suitable impedance you will probably find your troubles disappear. For instance, if the anode resistance is, say, a quarter of a megohm and the valve impedance is 70,000 to 100,000 ohms, the relationship will no doubt be found to be quite suitable and the set to work as efficiently as expected.

In this connection remember that the internal impedance of the valve is affected very greatly by the amount of negative grid bias applied.

Mains G.B.

Talking about grid bias, it is often convenient to obtain grid bias from the mains, and if you are using a home-made H.T. unit it is a comparatively simple matter to get your G.B. from this source. With power valves taking a high tension of 200 to 400 volts the grid bias necessary may be anything from 50 volts upwards.

If an additional winding is put on the transformer, you will then require for your grid bias a rectifier, preferably of the Westinghouse metal type, together with a smoothing circuit and a tapped resistance. One end of the grid-bias winding on the transformer is connected to the rectifier, the other side of the rectifier to a smoothing resistance, the other end of the smoothing resistance to the tapped resistance, and the other end of the tapped resistance to the remaining end of the transformer winding.

The latter point of the transformer winding is also connected to the common terminal of two smoothing condensers, the opposite terminals of these two condensers then going to the two ends of the smoothing resistance.

Values Required.

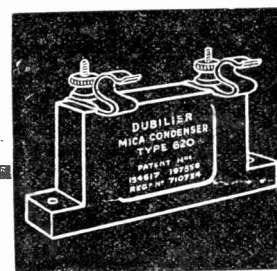
The number of turns in the grid-bias winding on the transformer will depend upon the voltage which it is required to generate for the tapped grid-bias resistance. The two smoothing condensers should be of at least 2 mfd. each, whilst the smoothing resistance, across the ends of which the condensers are connected, may conveniently have a value of 10,000 ohms. For the tapped resistance for taking off the different values of grid-bias voltage, a value of about 30,000 to 40,000 ohms may be used.

Choke Characteristics.

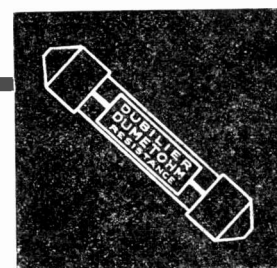
Some low-frequency chokes have a broken or incomplete core, and people often wonder why this is. Apparently the first purpose of a choke is to provide a high inductance and, inasmuch as a gap in the magnetic circuit reduces the inductance, it would seem to be directly contrary to what is required.

If we examine the characteristics of the choke, however, we will see that, in the particular conditions in which it is used in radio work, the problem is not quite so

(Continued on next page.)



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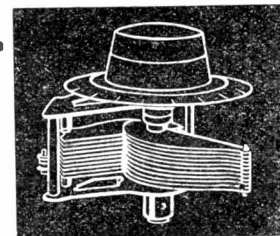
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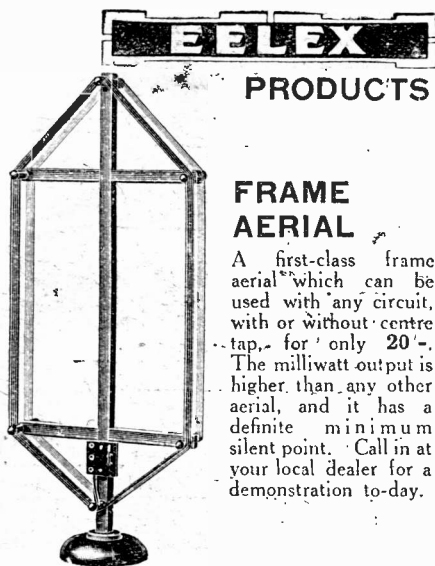
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TECHNICAL NOTES

(Continued from previous page.)

simple. The complicating factor is the presence of a strong current in the choke, and this may completely upset the inductance.

In practically all circuits in which iron-cored chokes are used to-day there are not only fluctuating currents but also direct currents, so that we are really concerned with the effect of the choke upon fluctuating currents when it is already carrying a steady current. Now it is a well-known fact that the inductance of a choke diminishes more or less rapidly as the steady current through the windings of the choke is increased—at any rate this is true throughout the greater part of the range of steady current values.

Effect of D.C.

Consequently, if there is a substantial D.C. current in the choke its inductance, which is what matters from the point of view of the effect of the choke in stopping current fluctuations, may be very much reduced. Scientifically we may say that the inductance depends upon the permeability of the iron, or whatever metal in the core, and since the permeability depends upon the state of magnetisation, which again depends upon the steady current, therefore the inductance depends upon the steady current.

If there were no iron core, but merely a core of air or of some other non-magnetic material, the inductance would be relatively very small. The more we can pack the core space with magnetic material, and the greater the magnetic permeability of this material, the greater will be the inductance.

Gap in Magnetic Circuit.

It follows directly from the foregoing remark that if we introduce a gap in the magnetic core this will have the effect of reducing the magnetisation produced by a given steady current. In point of fact, the effect of even a very small gap is quite considerable, very much greater than you might judge by looking at a diagram of the core.

Now the curious thing is that for very small magnetising forces the permeability increases; it soon reaches a maximum, after which, as already mentioned, it begins to fall. It is obviously desirable, if we can manage it, to work somewhere near this maximum point and this will mean keeping down the magnetic field to a certain extent.

"P.W." PANEL No. 32.—USING RESISTANCES.

For portables and other sets where small space is available the "Spaghetti" type of resistance can generally be used for R.C. coupling, de-coupling, etc.

Such flexible resistances are useful also in many cases where an H.F. choke is normally employed, such as in the plate circuit of a detector valve.

If two resistances of equal value are joined in series the total resistance is doubled.

If two resistances of equal value are joined in parallel the total resistance is halved.

It is for this reason that the gap is made in the magnetic circuit. This gap, as I have indicated, has a similar effect in the magnetic circuit to putting a resistance into an electrical circuit. Of course, the size of the gap for the best results has to be very carefully arranged in relation to the other constants of the circuit.

Points of Design.

In a well-designed commercial choke in which the size and position of the gap have been carefully worked out, the inductance should prove reasonably constant over the whole range of variation of the steady current met with in actual practice. Instead of a rapidly falling curve with increasing D.C. current, we get first a curve which is first of all practically parallel to the horizontal axis and only begins to fall very gradually when the steady current reaches a high value.

A High Inductance.

You might think that in getting away from serious variations in the inductance we were sacrificing the actual inductance value, but this again is not necessarily so. The two curves, showing the variation of inductance with D.C. current with and without the air gap, will cross one another at a certain point, so that beyond that point the actual inductance value without the gap will be less than with the gap.

It so happens that the D.C. currents usually met with bring us on to this part of the curve, and so in practice not only are we getting a more uniform inductance with the air gap in the core, but we are also getting actually a higher value inductance. So you see that, owing to the special conditions in which the choke is used, the effect of the gap is almost exactly opposite to what would at first sight appear.

Stray H.F.

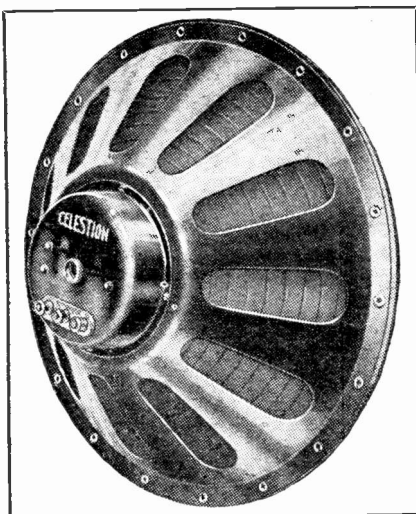
A reader tells me of a curious experience he had with a receiver in which a howl was produced owing to H.F. currents in the loud-speaker leads; as this is not nearly so uncommon as you might think—I have known it to happen in several cases—I think it may be worth mentioning, as it may be useful to other readers.

The set in question had a single power valve on the L.F. side and a shielded H.F. amplifier. Sometimes the set would behave itself more or less normally, but often, long before the anode circuit of the H.F. stage had been brought to the oscillating point, the set would start squealing.

An Unwanted Coupling.

It was noticed after a time that the trouble was more liable to happen when the loud speaker or the loud-speaker leads came near the high-frequency end of the receiver, and this seemed to indicate the presence of H.F. currents in the loud-speaker circuit. You can easily see how coupling would be set up

between the input of the receiver and the loud-speaker leads, and as the presence of high-frequency currents in the speaker circuit is not uncommon, I thought it might be worth while to draw attention to what might perhaps seem rather mysterious to some of you if you happen to come up against it.



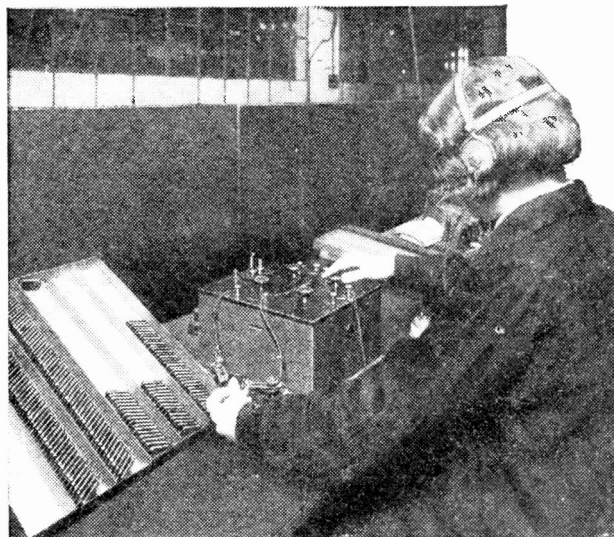
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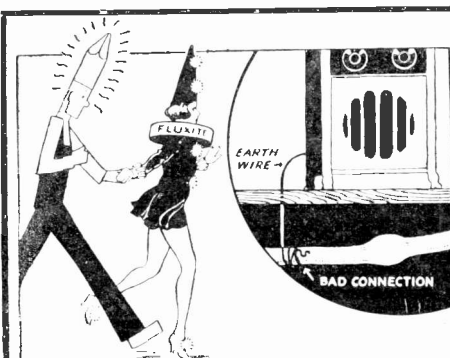
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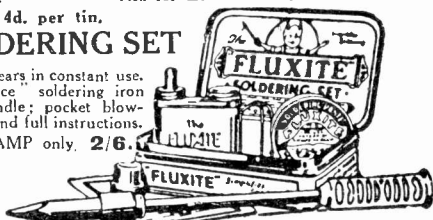
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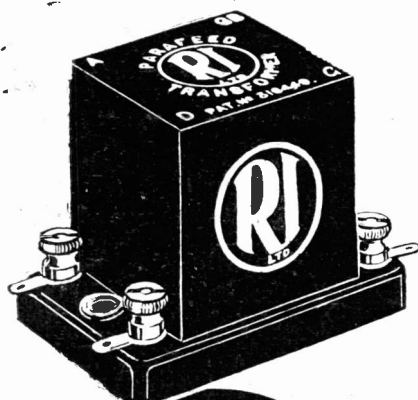


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