

"P.W." "COIL QUILTS" FOR BETTER RADIO (See Page 367)

Popular Wireless

Every Thursday
PRICE
3d.

No. 469. Vol. XIX.

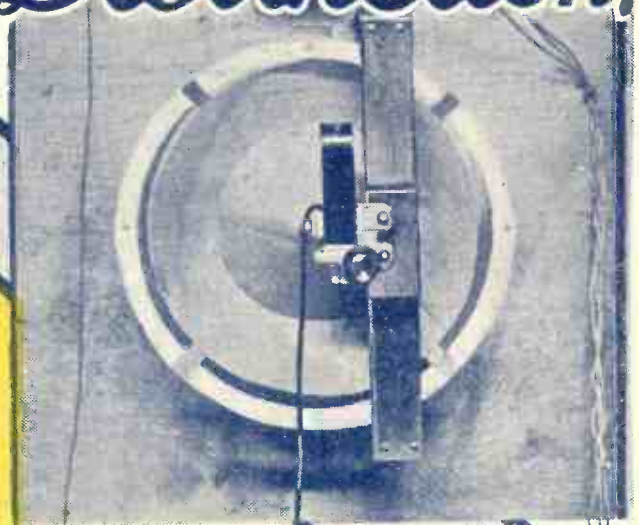
INCORPORATING "WIRELESS"

May 30th, 1931.

**BUILD
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"CLEAR-CUT"
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P.W. "POP-VOX"**



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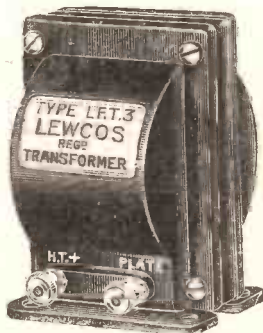
YOUR PROBLEM AND MINE

By Capt. P. P. Eckersley, M.I.E.E.



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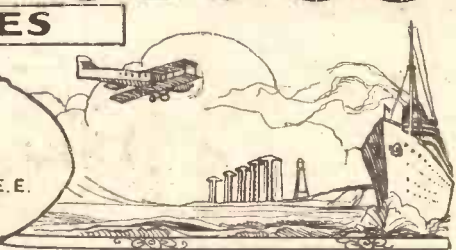


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THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

Popular Wireless

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 Assistant Technical Editors:
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"POP" AND "VOX"
 NAIROBI AGAIN
 SHALL WE BUY IT?
 AIR AND ETHER

RADIO NOTES & NEWS

REPLY TO WELLAWATTE
 COURTAULD DRAMA
 ANOTHER EGG!
 SEEN IN CEYLON!

All About "Pop."

IN view of the advent of the "P.W." "Pop Vox," I feel that a few historical notes on the subject are called for. "Pop" is a wide and profound matter. It was the noise made by the famous Weasel of the old song; it is the drink sacred to schoolboys, and the name of a popular restaurant; in American it means "father," and spelt backwards it denotes an infantile type of gun; whilst it is also applied to a particularly indigestible substance compounded of corn and sugar. It appears in Latin, such as "Vox pop, vox whatsitname," which Brutus replied to J. Cæsar after Cæsar had remarked, "Sic transit gloria mundi." ("That is the finish of another Easter Monday.")

Something About "Vox."

VOX is not so easy. There are more pops than voxes, but I recall that there was a ventriloquist called Valentine Vox. Vox is the name of a reddish-brown quadruped with a bushy tail, much esteemed—and sought after—by the Quorn, Pytchley, etc. In Latin it means speakeasy. So now it must be perfectly clear to you why Mr. Dowding called our latest gem the "Pop Vox." His article in the issue for May 16th ought to be read carefully by all sceptics, beginners, and so-far-failures. The "P.W. P. V." is one of the prettiest sets I have seen lately; it is alive with stations, and almost controls itself. It is a "Speakeasy" indeed.

Radio Savages Patrolman.

WE open this paragraph snappily, lads, for that title is carefully modelled on the "Chicago Tribune" style. I have to report in the witching small hours of an early May day a Manchester radio store started something. P.C. Moore went to investigate, when an explosion took place, and he was thrown to the opposite side of the street. Trying to get six volts into a four-volt battery, I reckon! Or else all the valves in stock had decided to commit hari-kari simultaneously, as a protest against being fitted to "non-portable transportables."

Melody in Music.

CHARMING, is it not, to find that Ariel has at least one thing in common with the Vicar of Upper Thong, Holmfirth, Yorks, namely, the desire for some semblance of a melody in music. My rev. brother, in his parish magazine, refers slightly to the tuneless music which the B.B.C. so frequently transmits. He compares some of it to the sound of a dust-cart unloading tins and bottles into a refuse tip. Not bad! He compares more of it to

ment" began she bawled from aloft: "Henry! Are you at the bottles again!" "Punch" having noted with glee the statement of a technical writer that wireless waves which reach the moon are thrown back to earth again, remarks, "Every planet to its taste."

When Nairobi Tries Again.

I ACKNOWLEDGE with cordial thanks the offering of a selection of seeds of East African plants and shrubs from a gentleman who gives horticultural talks from 7 L.O. A very pally action by a man who merely heard by a sidewind that I am interested in flowers. All I can publicly do in return is to express the hope that when 7 L.O. tries again, the lions will be vocal. I am sharing the seeds between the local municipal hot-houses, a friend who has frightfully hot houses, and my own amateur "poke, water and pray over 'em" efforts.

"Topping Up."

A WELL-KNOWN Yorkshire newspaper publishes a letter from a man who recommends users of accumulators to "top up" with boiled and filtered rain-water. I shouldn't bother, if I were you. Three-pennyworth of distilled water from the nearest chemist ought to be enough to "top up" your battery for a year. Rainwater is not always so innocuous as may be imagined; it may contain all sorts of nitrates and chlorides, and boiling will not necessarily get rid of them.

Anglo-American Radio Society.

NOW, you people who just switch on and get America at once, do you know about this Society? It has branches in Illinois, Chicago, Pennsylvania, Alabama and Ireland, and headquarters in Uxbridge, England. The optimistic President of the Hackney and District Branch is trying to organise, and I hope that you will try to support him.

Write to W. A. L. Smith, 55, Cadogan Terrace, Victoria Park, South Hackney, E.9, and you will hear all about this movement.

(Continued on next page.)

AN ADMIRAL'S AERIAL



Sir Henry Jackson, Admiral of the Fleet, with an indoor aerial of his own invention. Note the nautical-looking gimbals which enable it to be rotated on an axis at any angle.

"an elephant seated on a prima donna." Better

Two "Lifted" Jokes.

THIS parson is rich enough in his humour to stand quoting. He tells, for instance, of a man who vowed to improve his musical taste, and accordingly tuned in some highbrow "Chamberpain." His wife had retired. When the first "Move-

RADIO NOTES AND NEWS

(Continued from previous page.)

Front Windows—and Front Hair.

I MENTIONED accumulators just now, which reminds me that there has come into this office a lovely photograph of a party of "Wireless Retailers of Great Britain," taken in front of the works of the Chloride Electrical Storage Company, Ltd., which they visited recently, to see "Where the sulphating doesn't come from." As a man who bade farewell to his front wave somewhere about 1905, I was struck with the luxurious growth of front hair with which the group, with one exception, provided a view. While the front quiffs of radio retailers are thick, what can England me?

Shall We Bury It?

D. M. (Crowborough), weighs in with a word of advice on the question of buried "earths" versus connections to waterpipes, etc. He says that if you have electric mains or electrical apparatus of any kind near, or if you live where there are lots of sets working, you ought to bury the blighter. Dunno as he ain't more than half right. I have two "earths," one buried alongside a kitten, and one connected to the lead casing of the electric mains, and I let them fight it out. Water-pipe "earths" are tricky customers.

Air and Ether.

ISN'T it remarkable that after all the print which has been poured out in elementary explanations of the principles of radio there are still people—some of 'em ought to know better!—who don't understand the difference between electromagnetic (or radio) waves, and sound waves.

A well-known Midland evening paper in giving a report of a proposal to attack locusts by means of sound waves of very high frequency, heads the article "Killing a pest by wireless." Even the youngest of our readers knows, I hope, that the medium of radio waves is the ether, and that sound is produced by the vibration of material particles.

Why This Parochialism?

MY attention has been invited to the growing volume of annoyance which is evinced by listeners in the north of England on account of the apparent obsession of the B.B.C. by the idea that they, the afore-mentioned listeners, desire above all things, to listen to Northern transmissions. The folk of Yorkshire, Northumberland, etc., are not so unsophisticated or parochially-minded that they wish to hear Northern dialect plays, or the efforts of local artists, because they are local. In a few words, the B.B.C. has made a bloomer in its psychology. The clannishness of the northern English is not to be confounded with the Scottishness of Scots or the nationalism of the Welsh. I wish the "powers that be" would think again.

Reply to Wellawatte.

ST. E. W. of that place, Ceylon, says that he heard a sermon by the Archbishop of York which was broadcast to America on about 24-25 metres, not by 5 S W, and he wishes to know how it happened. Well, it looks as though it was the Post Office station at Rugby; they do

transatlantic telephony on wave-lengths of, *inter alia*, 24.41 metres and 24.69 metres, and the American National Broadcasting Company sometimes uses that telephone service in order to get "star" turns over to the States

The Courtauld Drama.

ALTHOUGH this is now over and Mr. A. Courtauld has been withdrawn from his icy hermitage, it may be interesting to readers to learn that Major Sydney Cotton, who hastened North to help, fitted his aeroplane with Marconi radio gear—a telegraph and telephone set of 150 watts. Just to let the world know that Britons can move on occasion, I may mention that this wireless apparatus was

SHORT WAVES.

MAKING IT SNAPPY.

The Union Radiophonique Suisse considered that a more coherent description of themselves was needed.

This has now been discovered. In future the Association will be known as the Schweizerische Rundspruchgesellschaft!—"Yorkshire Evening Post."

Lady of the House: "My poor man! What has brought you to this?"
Tramp: "Competition, mum. I was a teacher of H'English afore these 'ere broadcastin' lessons started.—"Sunday Pictorial."

"Professor Tschival proposes . . . to conduct experiments with a view to constructing a high-power mobile apparatus, which could be taken from place to place . . . and which would radiate waves of sufficient strength to destroy all pests in a given field," we read in the "Star."

We hope one of these "fields" will be in our neighbourhood; quite a lot of useful work could be done around there.

NO ESCAPE.

"Hush, hush, hush.
Here comes the Bogey Van;
Run and buy a licence
As quickly as you can!"
"Nottingham Evening News."

OVERHEARD IN RADIO SALES ROOM.

Lady Motorist: "And what is in this case?"

Salesman: "Carborandum crystals, madam."

Lady Motorist: "Ah, for grinding in the valves, I suppose."

My radio gets most anything
From near and distant climes.
I only wish that everything
Would come at different times!

ordered, tested at Marconi's Works, Chelmsford, installed on the aeroplane at Weybridge and tested in the air, in very little more than 24 hours.

"Crikey—That's Criticism!"

UNDER a nom de plume with the initials S. N., a Newcastle reader is good enough to criticise these Notes in an interesting but rather saucy letter. "You begin badly." Sorry! "But pick up a little as you go along." Damned with faint praise! "Londoners are always grumbling." He doesn't like hearing so much about the "Comet," as people who can't be bothered to change coils are as lazy as Ariel, who objects to winding up a gramophone. And so on and so forth; constructive criticism absent.

However, I like this frank type of letter and hope to hear further from S. N. "How do Americans get hold of 'P.W.'?" They subscribe! And our U.S.A. friends write very helpful letters, too, as a rule. Frinistance!

Another Easter Egg.

FULL of "meat," as usual, comes another budget from Mr. Easter, of Cincinnati, Ohio. I summarise it as follows: Ricbamba Station, Ecuador, uses 50 watts and 39.8 metres, transmitting on Fridays from 3 to 5 (a.m.) British Summer Time. Address: "El Prado," Fabrica de Tejidos, Riobamba, Ecuador. Station H K F (Bogota, Colombia, S. America) has changed from 38.4 metres to 38.9 metres. The Mexican station at Nuevo Laredo, X 26 A relays X E P (a long-wave station). Address: Station X 26 A, Apartado Postal 31, Nuevo Laredo, Tamaulipas, Mexico.

Long-Felt Wants.

A. E. P. (Botley) puts forward a mild plea for three items. Namely, a loud speaker capable of working from a one-valver; an article describing how to make a revolving table for records to be used with a pick-up; and a smaller gauge of "Glazite."

I have faithfully passed on the first two to our Technical people, which absolves "Ariel." In return, can A. E. P. refer me to (1) a tradesman who keeps his word, (2) an efficient opener for sardine tins, and (3) a method of growing "Potentilla Miss Wilmot"? (All my specimens of P. Miss W., curl up and die!)

Trade Note.

A LITTLE piece of news which may interest a good many people has been imparted to me by Mr. W. H. Lynas, who, you will no doubt remember, used to be with Amplion's. It is to the effect that Mr. A. E. Bowyer-Lowe has joined Messrs. Auto Electric Devices as chief engineer and works manager. Mr. Bowyer-Lowe has an enviable reputation in the broadcasting receiver trade, and I am sure that any components which he turns out will be "first chop."

As Seen in Ceylon.

WHAT a remarkable set the "Magic" Four must be! I get a noticeable sprinkling of letters from men who are so satisfied with the "Magic" that they cannot imagine anything better, not even the "Comet" or "Pop Vox."

St. E. W. (Ceylon) is such a one. His "Magic" log shows a world-wide selection, and I can easily believe that he has seen no special reason to "go Comet." However, "P.W." cannot stand still and gaze contentedly on its laurels, you know.

St. E. W. kindly sends me a copy of the Ceylonese (Cingalese? Singhalese?) School Broadcasting Time-table, from which I gather that education in Ceylon is of a high order, notwithstanding British despotism, misrule, etc.

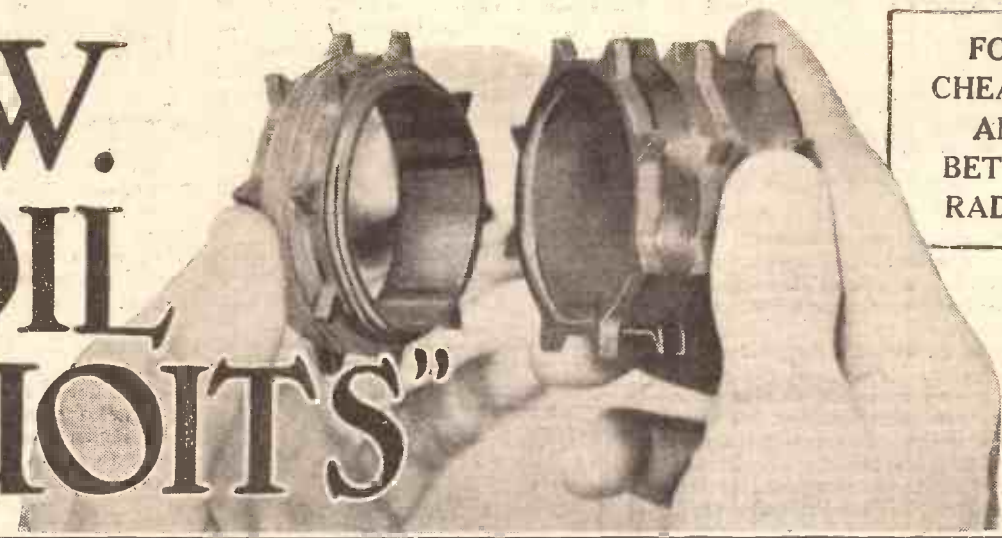
Perennial Queen's Hall Concerts.

THANKS to the B.B.C., the magnificent concerts at the Queen's Hall go on and on. The B.B.C.'s Wednesday night series finished on May 6th (worse luck!), but the famous Promenade Concerts are to begin again on August 8th and will last till October 3rd. The thirty-seventh season! Sir Henry Wood has conducted thirty-six of them, and will carry on this year. Again, I advise all who can to be present in person at one of these wonderful evenings—not that they need a "puff"; the job is, to get a place at all.

ARIEL.

P.W. "COIL QUOITS"

FOR
CHEAPER
AND
BETTER
RADIO



I AM now going to introduce you to another "P.W." innovation, and this is the "Coil Quoit." It is a simple enough little object, but you must judge its merits by the many and various uses to which we shall be putting it. Indeed, bearing these in mind, you will, in due course, consider that its very simplicity is one of its greatest virtues.

A great deal of these "P.W. Coil Quoits" will be seen in the future; they'll pop up in the most unexpected places! Already I have in mind about a dozen distinct uses for them, and you can be sure that others will arise with the passing of the months.

How They Began.

Perhaps if I sketch the reasons for their existence you will be in a better position to appreciate the scope of their application to the construction of radio receivers.

For some long time I have been considerably exercised in mind regarding the problems of coil, H.F. choke and transformer construction. Unnecessarily, perhaps some of you might think, in view of the excellent examples of such components that are already in existence.

But to take existing conditions as the "be all and end all" is a form of mental laziness that is not, thank goodness, one of my own particular vices.

Certainly, there is, for example, a quite good all-purpose coil unit freely available—I refer, of course, to the Kendall Dual-Range coil unit. And there is nothing against its frequent employment in such set designs that can make good use of it.

Nevertheless, it costs 12s. 6d., and there must be many constructors who are unable easily to find twelve-and-sixpences. It is true that it can be made at home for much less than 12s. 6d., but we want something even simpler, if

By
G. V. DOWDING, Associate I.E.E.

The following special article tells you all about a new component evolved especially to lighten, cheapen and make more effective the work of the home constructor. You will see a great deal of these extremely useful gadgets in future "P.W." sets; in the words of the author "they'll pop up in the most unexpected places!"

the majority of constructors are to be able to build such things and be certain of obtaining really good results.

Future Development.

This must not be construed as any reflection at all on the well-tried and tested "P.W." Dual-Range unit, for, in its time, I think it was as easy to make as anything else able to do even a proportion of its work. But the Kendall Coil has had a longer run than most devices do in these progressive days, and its indefinitely continued universal use will tend to restrict our future development. Many readers may not realise that the "D.R." has

figured in nearly all "P.W." sets since September, 1929.

But we have got to the stage where it is necessary, even vital, to have something else in order that we can branch out a little, though, as I must again emphasise, this particular component is not yet obsolete—it is not even obsolescent and will no doubt appear in quite a number of our future sets.

Actually, it is only very recently that I have *vitaly* felt the necessity for expansion beyond the boundaries that of necessity it must impose.

Much Greater Scope.

"Coil Quoits" give us that greater scope we now need in a most delightful manner. But I must say right away that they will not be commandeered for every task of coil or transformer construction. Almost invariably they will operate in conjunction with simple formers of a cylindrical nature—such as pieces of Pirtoid, Paxolin and waxed cardboard tubing.

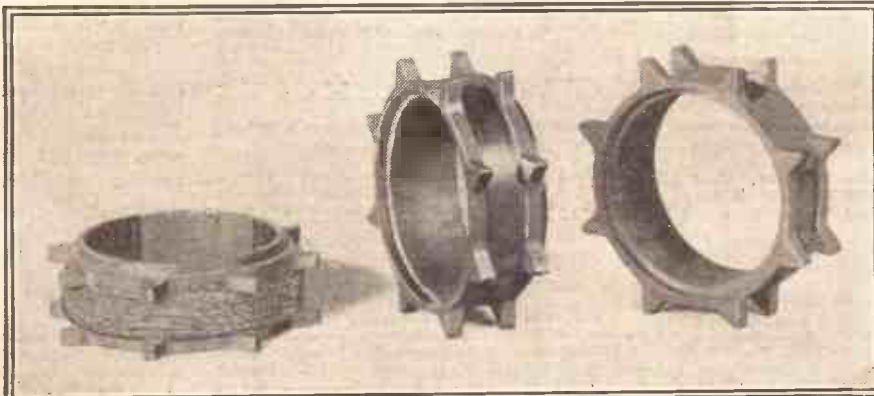
Each "Coil Quoit" comprises a small, low-loss coil former of special design into which the least expert, the most "ham-handed" constructor will easily be able to wind coils of all kinds and sizes for all kinds of purposes. And the price of a "Coil Quoit" will, of course, be a matter of merely a few pence. (One or two "Coil Quoits"

and a few pennyworth of wire will often be all you'll want for quite advanced coil arrangements for future receivers.)

Sometimes one "Coil Quoit" will carry all the necessary windings for a certain job, but at other times you may want two or more windings on separate "Coil Quoits." And then it will be simplicity itself for us to arrange coupling strengths, and so forth, merely by varying the relative positions of these.

(Continued on next page.)

LITTLE UNITS THAT ARE UNIVERSAL



There is only one size of "Coil Quoit," and each has a "lip" on one side and a groove on the other, so that any number can, if necessary, be fitted together as one H.F. transformer or tuning assembly. (Note the heading photograph.) They can also be used separately. In the above photo one "Coil Quoit" is shown with a 120-turn winding on it.

THE HEIGHT OF AERIALS

Some Useful Pointers
By H. T. SAVAGE.

NOTWITHSTANDING the increasing use of aerials concealed in the loft, of frame aerials, and of aerials strung across the ceiling, a high outside aerial of the well-tried seven strands of 22-gauge copper wire, with a shortish horizontal portion, combined with a really good earth, remains unbeaten.

Many listeners have had to shorten their aerials in order to gain selectivity, but have found that by so doing they have lost signal strength. If they had raised the horizontal portion, lengthening the down-lead at the expense of the length of the horizontal part, they would have gained both selectivity and signal strength.

How to Find It.

Many people do not know the height of their aerial poles:

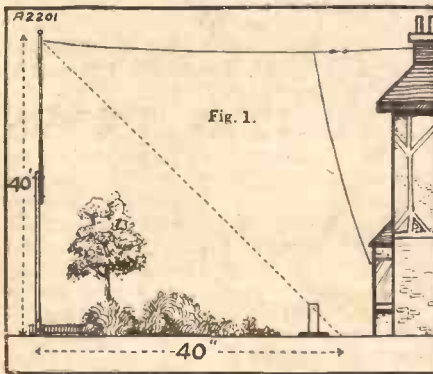
Two neighbours of mine, both retired, and peppery, had a dispute as to the height of their respective aerial poles, and went so far as to bet as to which pole was the higher.

The matter could not be put to the test of ordinary measurement because both poles were securely cemented in, and eventually a surveyor was called in, who brought his instruments and so decided the matter. If they had known of the simple device shewn in Fig. 1, they could have settled the matter for themselves.

In Fig. 2 I have illustrated a simple way in which two neighbours conveniently situated can both dispense with aerial poles, and yet each possess a good high aerial.

As will be seen, the aerial is tautly stretched between two chimney stacks; the centre unwanted portion, which may be as

A QUICK CALCULATION



To find the height, get an upright board with a line at 45° marked on it, and place it so that this comes "in line" with the aerial support. Then the distance from the foot of the mast, as shown, will be equal to the height.

long as necessary, is insulated, and the down-leads are taken from each end.

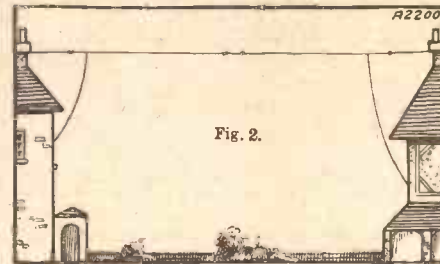
Although aerials that run parallel to one another are liable to interact adversely, no fear need be entertained in an arrangement such as this.

Having obtained a respectable height for your aerial, it certainly pays to let the downlead consist of the same wire as the aerial, without a join.

You are thus certain that you are getting no losses through a loose or corroding joint. If the aerial be thus taken straight to the set through a small length of tubing let into the window frame (thus avoiding two more connections in the usually used lead-in fixture) and the earth wire consists of wire of the same conductivity as that of the aerial, taken where possible to the main water pipe, then the whole aerial system is as nearly perfect as you can get it.

A final word: Corroding joints in lightning switches are a fertile source of efficiency loss.

A PROBLEM SOLVED



How two listeners can give each other aerial assistance!

SPACE SMASHERS

How readers are crossing the seas with "P.W." sets.

AMERICA ON THE "COMET."

The Editor, POPULAR WIRELESS.

Dear Sir,—I wish to congratulate you for giving the readers of "P.W." such a good set as the "Comet" Three.

I made it up a week after it came out, and I am amazed at the excellent results.

I am using my own made "P.W." D.R. coil, and my panel 3-ply wood. I can get all the English stations on L.S. and a good number of continental stations on L.S.

Having to be at work at 4.30 a.m., I thought I would see if I could get America on it and to my amazement I got WGY at 4 a.m. at good 'phone strength, it was coming in much better than I get W2XAF on my "Kelsey Adaptor."

I am glad to see you have in "P.W." a short-wave set for the "Comet," which I hope to make in a day or so.

If it is as good as Mr. G. T. Kelsey's adaptor given in February's "W.C.," it will be a fine set.

Wishing the "P.W." every success.

Yours faithfully,

A. G. TRIVETT.

Axminster, Devon.

THE "GLOBE-TROTTER."

The Editor, POPULAR WIRELESS.

Dear Sir,—Having constructed your "Globe-Trotter" circuit, I have found why it is so-called. I have waited a long time for a circuit of this kind, and, seeing it in your January 3rd issue, I erected it on the spot, and have achieved remarkable results. To give you an idea I will quote a few American stations; the first three named are generally moderate loud-speaker strength: W2XAD, W2XAF, W2XAL, WIXAZ, W3XX on three wavelengths, W3XAU.

The Vatican HVJ, when working, gives a volume somewhat approaching London.

CT1AA gives a strong signal, but of poor quality. PCJ and Zeesen are also very strong. Vienna, Rome, and Constantine, also Saigon, are included in my log. There must be hundreds of others. I have heard amateur stations from S. Africa, U.S.A., France, Holland, and plenty of British. The lowest I have been down to is telephony 2 or 3 metres below W2XAD. Of course, on the long waves there are bags of stations. It made me laugh to see in "Short-Wave Notes" about W2XAD not coming over very well. I've had him for months. I have followed up the serial play "Moonshine and Honeysuckle" on Sunday evenings for weeks. But still, how about that short-wave league? Can't you let us know more about it in the "P.W."? Well, cheerio! I will write again when I bag Australia—that is, when I am at home on Saturday morning.

S. PALMER.

High Wycombe,
Bucks.

"P.W." "COIL QUILTS"

(Continued from previous page.)

Frequently it will be possible to clamp two or three "Coil Quilts" together, and so form a complete unit or a part of a complete unit of a distinctly compact nature that will easily stow away on the most crowded baseboard.

And in view of the cheapness of "Coil Quilts" many of you will, no doubt, use them as a foundation for windings that ordinarily would adopt the "hank" form. Not only will that make for tidiness, but it will also prove a more convenient method as "hanks" are not really so simple to fashion as they ought to be if one judged them solely by their appearance!

Tried and Tested.

One of the purposes that "Coil Quilts" will most effectively serve concerns long-wave portions of tuning systems, though I reckon that H.F. couplings will be more easily dealt with by "Coil Quilt" methods than by more conventional systems.

Now I don't want any of you to confuse "Coil Quilts" with those clumsy "wheels" that were much in evidence three or four years ago in H.F. chokes and transformers. They are quite different from these, though I cannot expect many of you completely to appreciate their novelty until we begin to use them, for, as I have already said, it is in their applications that "Coil Quilts" must be judged.

And you need have no fear that we are going to sacrifice efficiency merely in order to take advantage of the obviously simple methods of coil design "Coil Quilts" make possible.

As a matter of fact, various arrangements we have already thoroughly tested out prove that "Coil Quilts" applied discriminately enable higher efficiencies than usual to be obtained.

Adjusting Inequalities.

It is the elasticity that they contribute which makes them even more valuable to the home-constructor. When you have one standard design, of say, a tuner, the odds are that there will be a few users of it that will not achieve their full one hundred per cent results owing to slight discrepancies, accidental and otherwise, in the "hook-up" in which it is incorporated.

But with "Coil Quilts" I am confident that we will always be able to arrange things so that the "unfortunates" will be able to make simple individual adjustments, and so bring themselves in line with the "hundred per centers."

You may not meet "Coil Quilts" in large numbers during the next few weeks, because they won't have got into their stride. Give them two or three months, and if by then tens of thousands of you aren't viewing the little circles with very friendly eyes I'll, I'll—well, I'll eat a bunch of the things!

READ

MODERN WIRELESS

"Britain's Leading Radio Magazine."

YOUR PROBLEM AND MINE

By Capt P.P. Eckersley M.I.E.E.

CIRCUMSTANCES have recently dictated that my thoughts should be much on quality and selectivity, those mutually antagonistic lions and unicorns of wireless.

I propose to submit to the readers of this journal a general survey of the problems of modern design, and my belief as to the ultimate evolution of the receiver.

In the first place, it is necessary to outline certain ideals which must be the ultimate goal of every set designer. I think fundamentally everyone wants perfect quality reproduction and a sufficient sensitivity to give a variety of choice of programme.

For Perfect Quality.

Now, what is the gamut of frequencies necessary to include if one wants perfect quality? Most engineers will reply that the practical gamut is from 50 to 10,000 cycles per second.

Most engineers are quite probably correct in this matter, but it is questionable why they then solemnly allow a state of affairs to persist which does not allow any receiver designer the slightest chance of obtaining the ideal. So long as a 9-kilocycle separation is allowed between stations so long shall we be denied the opportunity of obtaining perfect quality.

Every Chief Engineer of every European nation should be made to design receiving sets once a year. It would certainly have done me good to have had a more intimate contact with receivers while I was responsible for transmission.

Cycle Separation.

But while we are going into this question of quality, are we indeed sure that 50 to 10,000 cycles is in fact a sufficient gamut to allow? Some extraordinarily interesting work has been done in America, where two reproductions were compared—one in which all frequencies between 30 and 20,000 cycles were included; one in which a cut off was made of all frequencies above 10,000. Apparently the change was quite noticeable!

The question arises, then, ought we to legislate for a wider gamut than heretofore; ought we to envisage a 20-kilocycle separation of stations and a halving of their number?

I think that the whole question of ether broadcasting wants looking into fairly closely, and that people should, while making use of the *status quo* for future building,

Is a station separation of 9 kilocycles sufficient? In other words, do we, or do we not, need frequencies above 4,500 for really good quality? Some say "No"; some say "Yes." So read what our Radio Consultant-in-Chief has to tell you about the matter.

begin to look around and see whether we cannot find a quite new avenue along which to advance.

It is, of course, perfectly true that we can get most satisfactory results even to-day, that compromise is the essence of commercial engineering, and that it is idiotic

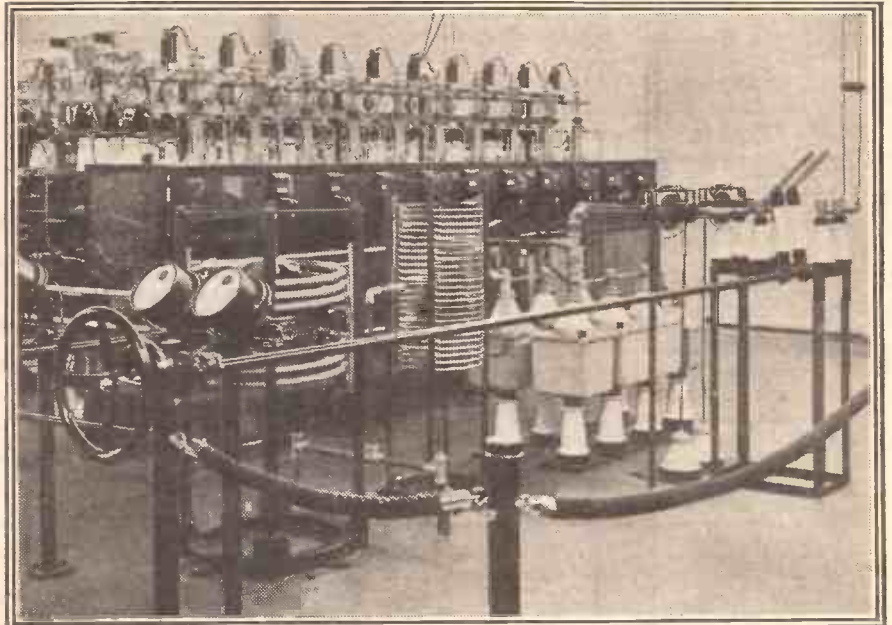
and let us assume that 10 kilocycles is sufficient for good quality reproduction. Now let us examine in a graphical form the conditions of the ether.

It is a question of knowing the intensity of the spectra of two neighbouring stations separated by 9 kilocycles. How strong are the neighbouring side-bands, and how much will they interfere one with another?

The Foreign Interloper.

I have taken a good deal of trouble to explore the intensities of the side-bands of a typical broadcasting station. The diagram of Fig. 1 indicates the relative intensities of the maxima of the side-bands of a typical broadcasting station sending out typical programmes.

POWER GOES UP, BUT NOT QUALITY



Everyone seems to clamour for more powerful transmitters, but few for wider channels. As more power means more interference between stations, so reception is becoming spoilt more and more. Something will have to be done soon!

to condemn present methods because they are imperfect. But the problems of ether broadcasting become more and more pronounced; every day the walls are closing in, expansion of service beyond certain obvious limits seems almost impossible.

Let us assume the compromise in quality,

The higher frequencies of modulation are of much less amplitude than the lower. Now consider in Fig. 2 the relative intensities of two stations. One station is assumed to be the local station and one the distant.

(Continued on next page.)

YOUR PROBLEM AND MINE.

(Continued from previous page.)

The local station has a field of 2.5 millivolts per metre, the distant station is about 50 kilowatts, and may be 500 miles distant, and yet its field strength is often 2.5 millivolts per metre. This is due to the Heaviside Layer effect. *The diagram is perfectly correct quantitatively.*

It illustrates a hideous state of affairs. It means that all the upper parts of the local station spectrum from 4,500 cycles upwards are swamped by the jamming from the distant station.

"Filthy Conditions."

It means that we cannot expect decent quality reproduction, that we must expect broadcasting to be inferior as a means of obtaining musical perfection, unless the International Union put their house in order and use a separation of from 12 to 15 kilocycles per second.

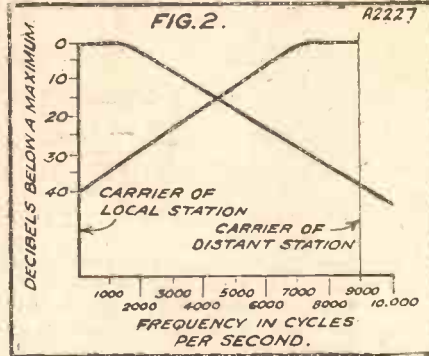
This means from 30 per cent to 50 per cent less wave-lengths, 30 per cent to 50 per cent less service area with present wave-lengths, and a general reduction in the variety of

receiver suitable to the needs of present-day transmission. If stations did not overlap what need for ultra selectivity?

As they do, and as the overlap gets worse and worse as power increases, why not hail the coming of a receiver which gives, at any rate, what there is to be had? Theoreticians may recoil in horror at a theory which lacks orthodoxy, practical people must, at any rate, give way before facts.

To my mind, if the present forcing of technique continues, we must abandon

A CASE FOR SELECTIVITY



Neither of the stations represented here could be received free of the other unless the set was made to cut off everything above 4,500 frequency.

present practice, and the superheterodyne principle, so rich in problem-solving attributes, should replace the dear old 1 H.F., 1 Det., and 1 Note. The band-pass enthusiasts may disagree, but I ask, is it not easier to maintain a selective circuit constant when the frequency it deals with is always the same than if that circuit has to deal with a frequency ratio of 10 to 1?

In the end there is only one solution to obtain variety of choice and perfect quality, and it is to that solution I shall devote my few remaining years.

INDOOR OR OUTDOOR?

A reader gives his experiences with these two types of aerials.

The Editor, POPULAR WIRELESS.

Dear Sir,—Some people swear by outdoor aerials and some by indoor aerials. I don't swear by either, but I have frequently sworn at outdoor aerials, because for some reason they have never given me really good results, in spite of care in erecting.

Just recently I decided to have one more attempt at an outdoor pick-up, and erected one as high as I conveniently could, well-insulated at either end, and with a minimum of lead-in from the point of entry into the room to the set. My first results were very good, especially on some stations, but after a day or two I came to the conclusion that for consistently reliable results my indoor aerial (under the roof) will beat the other every time. The indoor aerial is only about three feet higher than the outdoor, and each, with lead-down, is between 70 and 80 feet in length.

There are occasions when the outdoor aerial gives slightly stronger signals, especially with some stations (rarely the same stations, however, two nights running)

but there are still others, and more numerous occasions when the results are distinctly inferior to those obtained by the indoor aerial. For practical purposes, I assume that the slight extra height of the indoor aerial is offset by the screening of the roof.

I have both aerials now running to the same board above my set, with a short lead to the aerial terminal of the set, and I can in a moment switch over from one aerial to the other. This makes comparison easy. The dial readings for the two aerials vary only by about one degree.

One other thing I can do, and very often do—connect the short lead to both aerials at the same time, thus making a T-aerial of the type that Heath Robinson

"ABOVE THE B.B.C."



Workmen on one of the masts above the new home of the B.B.C. in Portland Place.

might imagine. So combined, I have a length of about 150 feet. The tuning, of course, is rather flat, even with an X-coil and a series aerial condenser. But I now use this combined aerial when I desire to receive a station at greater volume than I can get it with one aerial.

My set, by the way, is a "Magic" Two; and the speaker generally used is the Clear-Cut Cone, in a cabinet of my own, giving wonderful results with a simple reed unit, the permanent

magnet of which would just about go in my watch! What the speaker will be like when it is fitted with a real modern unit I am almost afraid to imagine.

Cardiff.

J. P. NAPPER.

A READER'S RESULTS

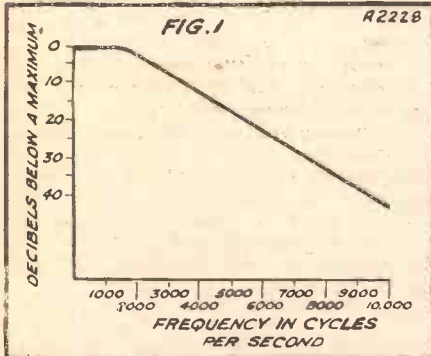
"Stations Roll In."

Dear Sir,—As I write, "Ave Maria" is being reproduced from the Decca records at Radio-Paris, wonderfully loud and clear, from your remarkable "Comet" Three. Stations roll in at very good strength any evening. My transformers are British General and Ferranti A.F. 8. My loud speaker is the wonderful Blue Spot 66L Unit coupled to their Major chassis fixed to 3-ft. baffle board. When hitched to the "Comet" it completes a wonderful outfit.

G. J. COLLINS.

Woburn Green, Bucks.

HOW THEY FALL OFF



This diagram illustrates how the power of the sidebands of a typical broadcasting station gets weaker as the frequency gets higher.

choice afforded to us in true service conditions. It seems important to do something, and I sometimes wish that I could believe that the realists (mostly technicians) could once more have control over affairs and make things happen.

And to-day it is not as if we merely have to be content to suffer poor quality,—that might be excusable,—but the average set has to put up with interference. Very few technicians have realised the need for a revolution in receiver design to make the best of the filthy conditions thrust upon us by the politicians of the International Union.

Only One Solution.

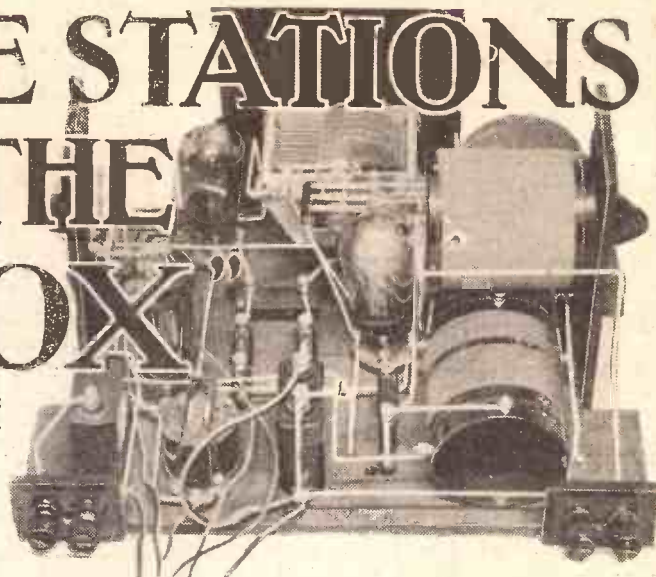
Most notably Dr. Robinson, whether we agree with his theories or not, has designed a really selective receiver. It may not give us that reproduction which is theoretically perfect, but it does eliminate that awful spitting and hissing side-band jamming.

Dr. Robinson has been largely attacked for his theoretical work; what few of his critics give him is the credit for designing a

ROUND THE STATIONS WITH THE "POP-VOX"

An account of a very interesting evening spent in trying out P.W.'s latest "Three" which incorporates the wonderful "Extenser."

By P. R. BIRD.



NO matter how accustomed one may have become to radio, there is always a real thrill to be had from the try-out of a good set.

This is especially the case if the set happens to be one of the distance-getting variety; for although the reproduction of good music can be quite exciting, there is an added charm if one is able to "attend" a concert that is being given at a place hundreds of miles away. So when the Editor suggested that I should take the "Pop-Vox" home and have a run round the stations with it, I was decidedly pleased at the prospect. And what made it all the better was that there were to be no prolonged schedules, but just a test under ordinary "household" conditions.

Now, as you know, the ordinary "household" has a disconcerting habit of looking at any new radio set in different ways. One member of the family may be a stickler for colour schemes, and may disapprove of the set because, forsooth, the cabinet is stained too dark! And another outspoken critic may tell you, frankly, that "there are too many knobs."

However, I felt quite confident about the "Pop-Vox" because it happens to be an unusually good-looking set. And sure enough, when the coverings were removed, it created quite a stir!

The Ideal Arrangement.

The fact that there was only one tuning dial and an on-off switch on the panel was reckoned a great point in its favour. And when you come to consider it, it does seem rather wonderful that here, in the "Pop-Vox," we have the ideal arrangement at last—one dial for station-selecting, and one control switch.

The sets of the future will all be like that; but we have grown so accustomed to cumbering up the panels with wave-change switches that at present the simplifying of the controls, now made possible by the Extenser, is one of the outstanding facts in favour of the "Pop-Vox."

As readers will know, the ornamental "ears" on the side of the cabinet conceal two other controls, that on the left being for selectivity, and the other the reaction adjustment. The first test was to find out whether these could be left set in such a position that different programmes could be

tuned in on the main dial alone.

It proved to be easy. With the Selector control set about midway between the positions where London Regional and London National were heard best, it was possible to pick up either of these programmes merely by rotating the Extenser.

A Fascinated Listener.

They appeared to be very nicely "placed," too, Regional coming in at 49, and National at 23. Moreover, by turning the dial still further the long-wave National came through in fine style, his reading being 162.5.

Personally I was a little impatient to find out how many other concerts could be tuned in between those dial readings, when reaction and selector were suitably adjusted. But this had to be postponed because of the fascination of that easy tuning!

It was altogether too much for one lady—a visitor, who had never worked a radio set before—and the ease and certainty with which that single-dial adjustment gave those three stations seemed to her to be quite wonderful.

Moreover, a faint suggestion of music just above the 5 X X reading gave promise of plenty of alternative programmes when the controls were handled knowingly, so the next part of the test was designed to find out how the set responded to reaction and selector adjustment. The dial was set at 0, the reaction turned up to the "lively" stage, and the selector adjusted to the minimum position.

Then the Extenser dial was slowly turned.

The first station came in at 41°. It was a German, talking quite distinctly, and being keen to see how far down the tuning was capable of going, I hung on for his announcement. It proved to be Königsberg.

The next worth-listening-to programme was at 9½°—Cologne this time. And at 11½° there was Lodz. There were two others coming in rather well between this and London National—the better one (at 14½°) a German, which I took to be Nürnberg.

Just up above the London National, Heilsberg, at 28°, was the outstanding transmission, while Hilversum and Bordeaux-Lafayette (33½° and 36° respectively) were also coming through well.

It would be tedious to tell you of all the other programmes picked up, for any long-distance man will recognise from the above particulars that the set is excellent for DX. However, it may help constructors to know whereabouts to look for some of the stronger stations, so more dial readings are given below.

Where They Were Found.

It should be noted, however, that these dial readings were all noted during one test. They are not intended to show exactly what the set will do, or what it will not do, but they illustrate what it actually did on this one occasion. (A far bigger list could easily have been compiled by successive tests).

The following were the dial readings noted above the Regional—50°, 55°, 58°, 65½°, 70½°, 71½°, 73°, 76½°, and 84°, standing respectively for Mühlacker, Toulouse, Midland Regional, Rome, Lyons, Langenberg, North Regional, Milan, and Buda Pest.

On long waves—without the bother of switching over to get them!—the principal dial readings were 120°, Kalundborg; 129° (probably Reykjavik); 155°, Eiffel Tower; 162.5°, 5 X X; 168°, Radio Paris; and 185°, Huizen. Note that all the long-wave stations have 3-figure dial readings, and all the medium waves are below 100°—that is another advantage of Extenser simplified tuning!

A STRIKING SIMPLIFICATION



On the front there are just two controls—one to put the set on or off, and the other to tune in to all the programmes.

THE MIRROR OF THE B.B.C.

REORGANISITIS!

MISS MATHESON'S HEALTH—
THE GOVERNORS BEHAVE—
SIZE OF ORCHESTRAS.

I HAVE been seeing a good deal of Savoy Hill the past fortnight and was somewhat amused to find there had broken out another attack of "reorganisitis." The one I remember from the old days was when Mr. Cecil Lewis left the directorship of the programmes, now in the hands of Mr. Roger Eckersley.

Once again there are all sorts of rumours about schemes afoot. I believe nothing drastic will be done until the autumn but important changes are certain to be made then.

Miss Matheson's Health.

Miss Hilda Matheson, the Talks Director of the B.B.C., has been sustaining a very bad run of luck with illnesses. The severe strain of the work told on her to such an extent that she had to go to the south of Europe for some weeks of sick leave; almost the moment she returned home she had to have her tonsils out, and this operation has left its mark on her nerves. I hear, however, that Miss Matheson is determined to get back on the job at once.

The Governors Behave.

The B.B.C. Board of Governors now get on much better with the staff than was the case when I last went into this matter. Mr. Whitley has his team well in hand; he, Mrs. Snowden and Sir John Reith make a particularly formidable aggregation now that they are working on the same wavelength. The other Governors keep step!

Size of Orchestras.

There is growing doubt at Savoy Hill whether the full-sized orchestra will be used much for broadcasting from the studio at Portland Place. The point is that beyond a certain measurable limit the addition of instruments definitely depreciates the broadcast.

It is only now after much experiment that the engineers can give definite guidance in this matter. The new facts may cause considerable change in music arrangements; but, of course, the main B.B.C. Symphony Orchestra will be retained intact if for no other reason than for public performance.

It is a pity nothing came of the proposal to tour the United States with the B.B.C. orchestra, but the stumbling block was that the orchestra could not be spared from the programmes for the period involved by such a tour.

Sir Hamilton Harty and Sir Thomas Beecham.

I think my friend, Adrian Boult, has done very well to overcome the opposition of those who for "political" reasons would have excluded both Sir Hamilton Harty and Sir Thomas Beecham from the next list of B.B.C. conductors.

True, both these conductors have said some very hard things of the B.B.C., Sir Hamilton being particularly critical last year, with Sir Thomas still displeased about his dealings with the B.B.C.

Wisdom has prevailed in that the decision has been taken purely on grounds of programme material; listeners are entitled to hear the best conductors, and both Sir Thomas and Sir Hamilton are indubitably in this category.

Mrs. Snowden At the Microphone.

Mrs. Philip Snowden's very effective broadcast the other day, when she presented wireless apparatus at the Paddington Green Children's Hospital, reminds me how rarely we hear the voice of the Chancellor's wife on the microphone. This is a deprivation which I look to Savoy Hill to remedy without delay. Mrs. Snowden should be persuaded to come to the "mike" at least once a quarter.

Broadcasting House.

Some of my friends are grumbling at the lighting arrangements in the new headquarters of broadcasting in Portland Place. They allege that the windows are too high and too narrow, and that there need not have been so large a proportion of artificial lighting.

This is a pity if true; but I doubt if the enthusiastic Col. Vel Myer, the brilliant architect, would concur. Incidentally, Col. Vel Myer has been put in the front rank of

commercial architects by this B.B.C. building.

A Popular Marriage.

In a fortnight's time Captain Derek McCulloch (Uncle Mack of the Children's Hour) will be joined in holy matrimony with Miss Barry, a colleague at Savoy Hill. Captain McCulloch is one of the most popular and versatile of our broadcasters.

He was very seriously knocked about in the war, acquiring scores of wounds. Indeed, his recovery was miraculous. He is one of the best commentators on soccer, and in partnership with Alan Howland runs the Children's Hour for the B.B.C.

An Uncle to Marry!

Among the items from the Aldershot Searchlight Tattoo, to be relayed from Rushmoor Arena on Saturday, June 13th, are a musical ride by a Royal Horse Artillery Battery, an old-time drill display by the 2nd Batt.

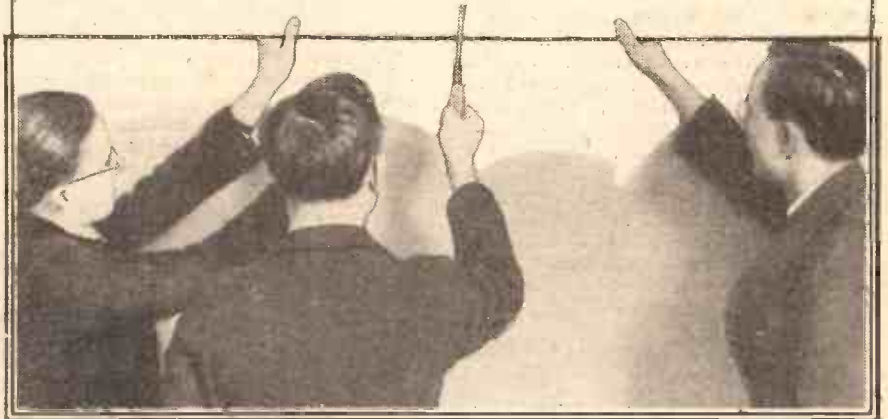
The Queen's Own Cameron Highlanders accompanied by the massed pipes and drums of the Highland and Scottish Regiments, will give a feature entitled "The Romans in England." There will, of course, be plenty of other noise provided by massed bugles and massed drum and fife bands.

NEXT WEEK

How you can

MAKE YOUR SET A "POP-VOX"

Full details for an easy conversion to get "Pop-Vox" results.



FOR THE LISTENER

By "PHILEMON."

Other people's views are not always very interesting, but our popular contributor certainly knocks the nail on the head more often than most critics of the broadcast programmes.

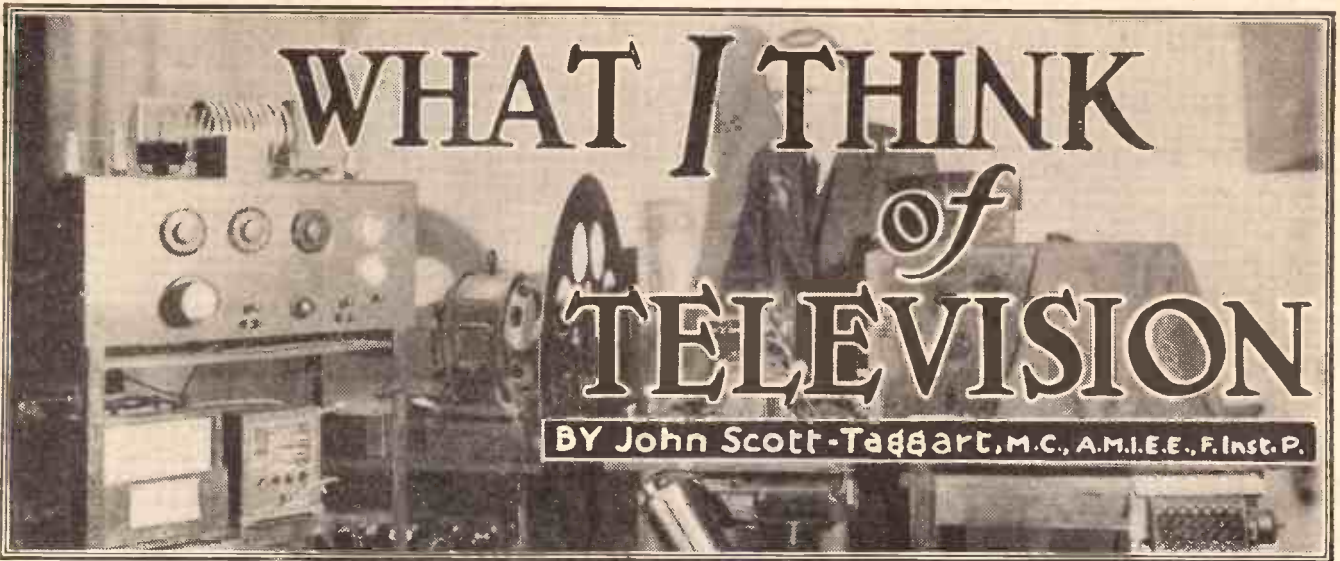
ON May 29th we have a German radio play, "Assault on Prof. Weltmann," by Felix Mendelssohn. We are promised another, "The Spy," by Fritz Lang. Not long ago we had a revival of "Brigade Exchange," another German play, by Ernst Johannsen.

Are the Germans capturing the radio-drama market here? I don't like the way these Fritzes and Felixes are dumping it on to us. I admit that it is pretty good stuff as radio-plays go; but where are our own authors?

The Germans seem to adapt themselves more quickly than we do in experimental work. They play up to the studio better. They ask what the radio producer wants, and then work to supply it.

"Brigade Exchange" was very largely a question of telephone messages. "Assault on Prof. Weltmann" is about the theft of a pocket wireless transmitter, and also makes much use of telephone and wireless messages. Apparently this is jam to the radio producer.

(Continued on page 389.)



WHAT I THINK of TELEVISION

BY John Scott-Taggart, M.C., A.M.I.E.E., F.Inst.P.

AND now for some concluding remarks. Let us confess at once that most people are suffering from "television indigestion."

They have been stuffed up (I am not using the expression in its vulgar sense) with unfulfilled promises. I am not concerned at present with the cause of this.

The fact, however, remains; and great credit is due to those who have risked opprobrium by administering that douche of cold water which helps to restrain "television hysteria," a new but highly dangerous disease of the psyche.

Keeping the Torch Burning.

The disease may be contracted by reading daily newspapers with their promises of the imminent television of the Derby, the Boat Race and cricket matches in South Africa (why is it *always* the Boat Race and cricket matches in South Africa?).

I myself have, after reading of the latest miraculous epoch-making marvel of television, dreamt the following night of the televising in three colours of stereoscopic views of test matches in South Africa played in complete darkness, and afterwards recorded on a gramophone record.

Another cause of "television hysteria" arises really out of an inferiority complex. Quite well-meaning enthusiasts desire to be associated with "the coming thing."

They develop a sense of importance and are peculiarly sensitive to any criticism of an art to which they have in no way contributed themselves but which raises them in their own esteem.

In a way, they like criticism because they can say afterwards: "We kept the torch of television burning during the Dark Ages when the Eckersleys, Rounds, Scott-Taggart and others were crabbing it."

Cool Technical Judgment.

After all, that must give one a very cosy feeling, especially in the days when television does arrive in all its glory. I include myself in this distinguished company (which could be greatly extended) because I am certain to be classed by the television seers as a Beast of Revelations for administering the strong coffee of cool technical judgment to the intoxication of tele-optimism. I shall share the obloquy with a growing band of experimenters, professional and amateur, who are level-headed enough, and self re-

* * * * *

This week the author summarises his impressions and opinions. He tells you exactly what he thinks of the present condition of television and what he believes will be the general course of its future development. It is an article to read and re-read, for it constitutes one of the fairest and most outspoken contributions to the literature of the subject that has ever been penned.

* * * * *

specting enough to refuse to be stampeded by professional optimists.

The result of all this hysterical outburst of enthusiasm is that incalculable harm has been done. Much hostility has been engendered in sober technical circles, and the general public, having been led up the

COLOURS BY RADIO



Herbert E. Ives and A. L. Johnsen, two well-known French television experimenters are seen at the controls of their latest apparatus by means of which they claim to be able to transmit and receive pictures in colour.

television garden, is beginning to react against these amateur and professional prophets, who have been confounded.

We have been told by the prophet Joel that "Your old men shall dream dreams, your young men shall see visions." It is possible, however, that it is the young men who are dreaming dreams and that it may be the old men who shall see television.

A Plea for Sobriety.

I have in a previous article criticised the televisionaries and pleaded for less vision and more television. I now plead for more sobriety in describing the current progress of this art. Looking through a semi-technical periodical of 1928 I find in about the first half-dozen pages the following adjectival comments on television developments: "Most remarkable, most fascinating, wonderful things, most convincing demonstration, latest wonder, greatest steps ever made, television successes, truly a most outstanding advance, marks new epoch, now world-famous laboratory, wonderful things he saw, a remarkable advance, very striking advance, this vast improvement, important advance, great step forward, remarkable feat, miracle."

We all know what hope deferred makes one. Does not the above sort of thing have the same effect? Or am I unduly squeamish? Whether I am or not, the hopes, certainly have remained deferred.

Those Propagandists.

We must not "despise the day of small things," but, after all, we have had five years of television and the test matches are still in South Africa and likely to remain there for a good many years, as far as good reproductions are concerned. Fortunately, there is a temporary lull in the activities of the television propagandists. But we can be quite certain that when television is ultimately perfected, they will expect us to say with Longfellow:

Thine was the prophet's vision, thine
The exaltation, the divine
Insanity of noble minds,
That never falters nor abates,
But labours and endures and waits,
Till all that it foresees it finds
Or what it can not find creates.

(Continued on next page.)

WHAT I THINK OF TELEVISION

(Continued from previous page.)

We have had the exaltation. Now let us see what the divine insanity of noble minds has so far given us: An unstable picture the size of a cigarette card and about as inspiring.

That at least is the position in most countries.

Magnifying a Mouse.

One does not necessarily complain of the inadequacy of television; and the more one knows of the limitations imposed and the difficulties to be solved, the less one is inclined to complain. Even if a mountain has laboured and given birth to a mouse,

half an hour Mon., Wed. and Thurs., from 11 a.m. to 11.30 a.m., and half an hour from 12 midnight to 12.30 a.m. on Tuesday and Friday nights. The lack of extensive "buying interest" in British television (as distinct from technical, emotional and dilettante interest) could be explained on this score alone. The periods are ridiculously inadequate and at the wrong time.

An Official Speaks.

People either do not want to or cannot "see" at these hours. Although from the demonstrations I had seen, I already had a shrewd idea of the reason for these restricted facilities, I called on the B.B.C. and asked a responsible official for the B.B.C. opinion of television. This is what he said: "Television is still in its experimental stage and it is still a considerable distance from being seriously considered for pro-

"I'm afraid," he replied, "we haven't really much confidence in television. The B.B.C. attitude is one of benevolent misgiving."

This opinion is not enthusiastic, but it is more or less the opinion of all technical men not engaged in the actual commercial sale of television apparatus. The chief research engineer of a great wireless company informed me that in his opinion it might be twenty years before we had television in the home, unless some revolutionary invention comes along. The European head of a vast telephone concern with enormous resources was frankly sceptical. "There is at present no sign of home television," he said.

Very Depressing.

I must confess that the discussions with the technical chiefs of leading British and foreign concerns interested in television have had a depressing effect; and even interviews with the companies concerned purely with television has not removed the gloom. My own opinion is that the pessimism is justified when present methods are considered. To me television to-day appears solely as a laboratory experiment. "Everything must have a beginning," of course, but an unrehearsed comedy becomes a tragedy.

"But television is here. You can buy sets," you may retort. That is true. In America a few months back I was given facilities for examining the Jenkins system.

Admirable Enterprise.

Although, two years ago, several of the big concerns had television apparatus on view at the Radio Show in New York, at the last one I saw nothing but the Jenkins apparatus. The others had apparently decided that restraint was the better part of publicity, and that it was better to learn to swim in private than to splash about in public.

In England we have Baird sets on sale, and a limited programme. No student of television can fail to admire the enterprise of this British inventor, but he is faced with both natural and official limitations. Though I myself was intensely interested in what is being done, and I have seen numerous demonstrations apart from the official ones described below, I came to the purely personal conclusion that from the point of view of the general public there is practically no entertainment value in television to-day.

But London readers can, without cost, get a complete demonstration of the 11 a.m. programmes by going to see W. H. Oates, 195, Hammersmith Road, Hammersmith. Apart from this programme, Major Oates will demonstrate television between 9 a.m. and 6 p.m. between his own local transmitter and receiver. They are connected by wire, and synchronisation and "side-band" troubles are less; you can be televised yourself and a friend can report. The results when I went were very much better than those on the B.B.C. radio transmissions. I cannot exaggerate the service to television which Major Oates is gratuitously giving.

He has the complete Baird equipment, but is independent of that company, whose apparatus he sells. His generous and courteous treatment of those interested is,

(Continued on page 390.)

A TELEVISION SET ON SHOW



Members of the London Radio and Television Society at one of their meetings. They are discussing a home-made receiver which can be seen in the far left-hand corner of the picture. The large scanning disc rotates at high speed and is synchronised with a similar disc at the transmitter by means of the apparatus seen on the end of the shaft.

the mouse should be cherished and nourished. But it should not be kept in cotton-wool and only shown to the public through a magnifying glass which makes it look like an elephant.

There are those who feel that five years of work and hundreds of thousands of pounds should have produced something better than we are offered to-day, but it is the purpose of these articles to deal in generalities. It will be time enough to go into details if these generalities are challenged.

Those B.B.C. Transmissions.

I should not be surprised to see the whole gear of a television receiver, scanning-discs, neons and everything, swept into the ashpit. It would take a separate article to explain why I believe that every single feature of television from wave-length to scanning-disc is already sentenced to death.

As regards the B.B.C. transmissions of Baird television, these are restricted to

gramme time. We believe it has improved somewhat since it began eighteen months ago. There is less flicker and the images are more clearly defined, but there have been no revolutionary changes."

I asked: "Do you consider it has any entertainment value?" He replied, "Only to the very small minority of enthusiasts for that sort of thing. It has no entertainment value from the B.B.C. point of view."

"Benevolent Misgiving."

"This is no new attitude. We have always indicated openly that the transmissions are experimental and the Baird Company will have to develop it technically before television can be considered in the light of entertainment. We believe the Baird Company is making a really honest endeavour and the B.B.C. has been helping them as much as it can."

"And what," I asked in conclusion, "do you feel are the prospects for satisfactory television?"



Letters from Listeners

Have you ever wondered how the B.B.C. deals with its tremendous post bag? Here is an interesting account describing the way all the correspondence is sorted, read and answered.

“WHAT is the use of writing to the B.B.C.?”

That is a question that I often hear from the lips of listeners. What is the answer? We hear continually about the fan mail received by individual artists, but little about the two hundred thousand odd letters which arrive at the B.B.C. in the course of a year.

What happens to them all? How are they sorted, read, and answered? And what are they all about?

Five times a day—frequently more often than that—the letters and postcards come pouring in. An unceasing stream. Inquiries about past programmes, inquiries about coming transmissions, criticisms, complaints, bouquets, brickbats, requests, contracts, suggestions, queries.

Letters from members of the Radio Circle, requests for auditions, manuscripts of talks, plays for consideration, epistles from theatre managers. I wonder whether any office boy at Savoy Hill collects autographs? By now, he must have the signature of every celebrity in England—to say nothing about a lot of foreign ones.

A Fine Organisation.

The miracle of the Savoy Hill organisation! Every letter is sorted and sent along to its proper destination within a few minutes of its arrival. The machinery—dormant only for a few hours during the night—stirs into action with the reception of the morning mail bag.

Listeners make the wheels go round. And every day, every week, every month—the same. Letters, letters, letters. A slight diminution in their number during the summer months when the “listening interest” declines. No real break.

Sir John Reith may feel the pulse of public opinion as expressed by the mail and know that all is well. Save, perhaps, after the night of the performance of an ultra-modern orchestral piece. Then he may feel that all is wrong!

What a magnificent history of broadcasting these letters, if pieced together, would form! What a searchlight upon the thoughts and manners of our generation they will provide to a future race! For almost every letter is carefully filed away.

Somewhat Amusing!

Even letters denoting the dispatch of samples of throat lozenges by enterprising manufacturers, and complaints that the wireless is interfering with the wheat crops.

Correspondence such as this is, of course, on the decline. People are beginning to understand broadcasting better. But who

can tell? The letters received to-day may provide even greater amusement when re-read by the programme officials of ten years hence!

Replying to Correspondence.

Imagine the labour involved. Every letter receives individual consideration, and is duly answered. The requests, the criticisms, the inquiries.

The only exception refers to letters about details of past programmes—the numbers of last Thursday’s gramophone records, for example. These are answered only when the senders remember to enclose stamped and addressed envelopes.

In this matter the B.B.C. people take the standpoint that although they will cheerfully answer as far as possible ques-

the worth of the programmes, and especially of any new type of programme or any new radio artists.

Criticism, when it is of the right kind, is the most helpful of all.

But it must be the right kind. No use writing to say that last night’s programme was rotten. You may depend on it, someone praised the same programme you denounced. If it seemed rotten to you, the B.B.C. want to know why.

Not Always Right.

The powers attend to and tabulate these letters with the utmost care. Every week a dummy programme is set before the official in charge of the Programme Correspondence, and when the letters about any programme in particular dwindle and die, he makes little notes in the margin of his dummy. So many good points for this item and so many bad, so many good points for the next item, so many bad. So now you know!

Not that Savoy Hill regards listeners always as being in the right. They know better. The other day a retired colonel wrote that the B.B.C. should be more careful with the Greenwich Time Signal. It was, he averred, all wrong!

He had had a certain clock on his mantelpiece for twenty years, and a more perfect timekeeper did not exist. Yet Greenwich was always two minutes fast or slow by this clock “that could not lie.” I understand that the Greenwich Observatory astronomers are not unduly perturbed.

And this letter was not an exception to the rule. The Programme Correspondence Official receives such a lot of funny letters that he finds it difficult to particularise.

The Humorous Letters.

“I can’t remember one,” says he, “unless you regard as humorous that letter from a gentleman who wanted to become a valet and asked if the B.B.C. could tell him how to do so!”

There is another joke they tell concerning the lady who enjoined listeners in a broadcast talk to keep diaries and note down all their daily thoughts. Came a letter from someone describing how she blacked a stove, worried about the holes in her gloves, and took her child to the hospital. Every thought of every moment minutely described. Even letters such as this are read right through and acknowledged!

The gem of the collection of correspondence in the B.B.C. files, however, is that from a man who thought of starting a revolution in England and wanted the officials of Savoy Hill—including the Announcers—to join him.

A SUCCESSFUL APPEAL!



Here you see one of the clerks at the National Institute for the Blind with an armful of money, the result of an appeal broadcast by Mr. Winston Churchill last Christmas.

tions about coming programmes and provide information which the listener otherwise can have no opportunity of knowing, they cannot be expected to repeat things the listener has already had a chance to hear and pay at the same time in postage stamps for doing so.

But “What is the use of writing to the B.B.C.?” Well—

Requests are most helpful in showing the potentates of Savoy Hill what listeners want. Wherever practical, they are complied with.

Praise enables the powers that be to know

THE MAN WHO INVENTED THE MICROPHONE

By G. B.

IT was interesting to note that several newspapers published articles about David Hughes, the inventor of the microphone, who was born in London just one hundred years ago.

Hughes was a real enthusiast, and science owes him a very great debt of gratitude; for, apart from the microphone, he invented a type-printing telegraph instrument which made his fortune and brought him more honours than have ever fallen to the lot of an inventor.

An Unrivalled Career.

He was welcomed as a guest of honour by Napoleon III and by Alexander II of Russia. The Emperor of Austria decorated him with the Iron Cross, and France bestowed on him the Legion of Honour.

Hughes' career has never been rivalled—no, not even by Edison. Hughes had only his natural talents to help him along the road to fame and fortune, but those talents were remarkable.

At twenty he was Professor of Music and of Natural Philosophy at Bardtown College, Kentucky, and it was during his stay there that he laid the foundation of his fortune by inventing his world-famous type-printing telegraph. In all, Hughes made about half a million pounds, which he eventually willed to form the "Hughes Hospital Trust Fund" for four London hospitals.

Early Radio Experiments.

In 1877 he invented the microphone, and so anxious was he to let the world benefit by it that he did not take out patents. If he had he would undoubtedly have secured a master patent, and its commercial value would have been incalculable.

You can still see the early models of the Hughes microphone in the Science Museum at South Kensington. One model utilises three French nails.

From 1879 to 1886 Hughes concentrated on experiments in wireless, and he eventually succeeded in transmitting over a distance of 1,500 feet. These early researches were dismissed as more or less unimportant by the President of the Royal Society, and Hughes, disgusted with such short-sighted criticism, discontinued his experiments.

But eight years later the German scientist, Hertz, discovered the electromagnetic wave, which, by the way, had been mathematically discovered by Clerk Maxwell.

Near The B.B.C.'s New Home.

Hughes was undoubtedly a true radio pioneer, worthy to rank with Lodge, Hertz, Fleming, Marconi, and others.

Curiously enough, he made these early wireless experiments at his home in Langham Place, a few yards away from the new home of the B.B.C. And if it had not been

for Hughes' microphone it is quite likely the B.B.C.'s new home would never have been built.

It is on the cards there will be no more broadcast football commentaries if the forthcoming annual general meeting of the League passes a motion banning microphones from the grounds of all League clubs.

The position looks pretty hopeless, but the B.B.C. are determined to fight against the proposed ban.

"We have done all we possibly can to persuade the League to our point of view,"

explained a B.B.C. official recently, "but they seem absolutely adamant."

"The contention at the moment is that broadcasting of the big matches is harmful to the small affiliated clubs of the County Association, but there is not one scrap of evidence to prove this."

"The League's opposition to football broadcasts is really inexplicable. They decline to offer any explanation, and we can get no written statement from them on the matter."

No Justification At All.

The B.B.C. feel that there are enormous numbers of listeners in hospitals, institutions, and others who are ill at home or unable to get out who will be greatly upset if football relays cease.

The League will certainly raise a storm of indignation if they persist in placing a ban on football relays. There is no justification for such an action. Football attracts bigger crowds than ever, and any suggestion that gate-money is reduced because of the relays is certainly not supported by convincing evidence.

A NEW WORLD FOR THEM!



These are blinded men of St. Dunstan's, listening to a sports broadcast. The work of David Hughes, the scientist, made their enjoyment possible.

RADIO RAMBLINGS

D.C. to Remain—Output of Mains
Units—Aerials for Short-Waves—
Safety First.

Although it is expected that A.C. will be developed fast in this country, it is probable that many crowded districts will never change over from D.C.

Unglazed insulators allow moisture and water to penetrate them, so not only are they less efficient than they should be, but are wet long after they appear to be dry externally.

Dirt at the contacts of an earthing switch is one common cause of poor reception.

There is usually about a quarter of a mile of wire in an average telephone earpiece.

The voltage output from an H.T. mains unit is often quite considerably different from the voltage marked by the makers.

Irregular running of gramophone records is often caused because the grease supply in the spring barrel needs replenishing, and is causing "sticking."

To provide a reliable short-wave service five wave-lengths are required by the Rugby and American Transatlantic stations, and work has been proceeding on 17, 23, 34, 63 and 90 metres.

The running costs of a wireless set deriving its power from A.C. mains are almost negligible.

Great height and great length of aerial are of no advantage at all for ordinary short-wave working, according to the experiences of many specialists.

When calibrating your set, remember that although some of the smaller European stations wobble badly in wave-length, the B.B.C. adjustments can always be relied on.

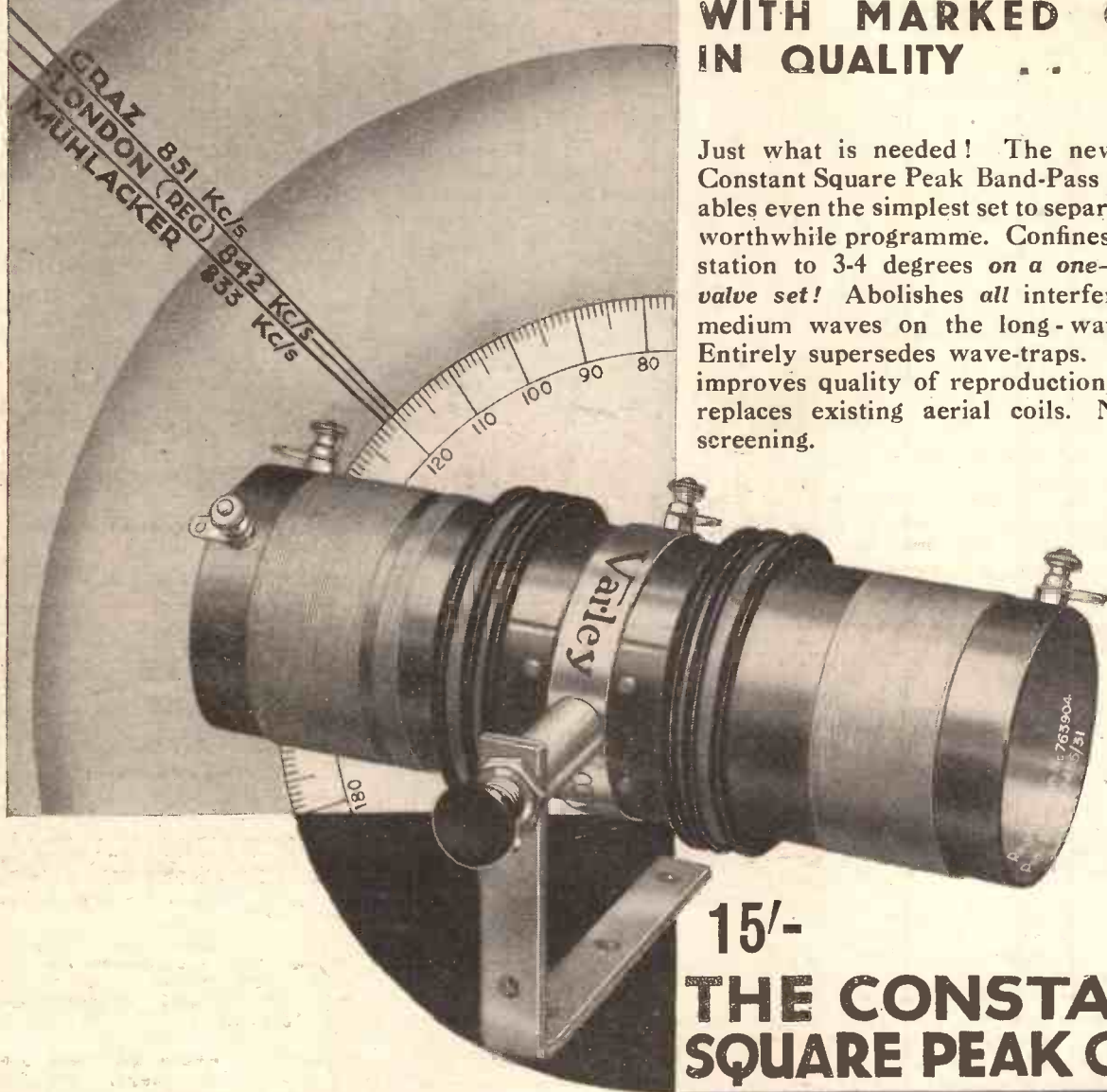
Never interfere with the inside of a mains set unless the plug connector is removed from the house supply.

**DESIGNED ON
AN ENTIRELY
NEW PRINCIPLE**

**TENFOLD INCREASE IN
SELECTIVITY . . .**

**WITH MARKED GAIN
IN QUALITY . .**

Just what is needed! The new Varley Constant Square Peak Band-Pass Coil Enables even the simplest set to separate every worthwhile programme. Confines the local station to 3-4 degrees on a one- or two-valve set! Abolishes all interference by medium waves on the long-wave band. Entirely supersedes wave-traps. Actually improves quality of reproduction. Easily replaces existing aerial coils. Needs no screening.



15/-

**THE CONSTANT
SQUARE PEAK COIL**

Varley

The new Varley Constant Square Peak Coil (Regd. Design No. 763904, Patent Pending) gives a constant square-topped peak and separation of substantially nine kilo-cycles on the whole of the medium and long wave range. It covers both wavebands, and is supplied complete with extension rod for switch and a bracket for horizontal or vertical mounting.

It is essential to use a non-inductive coupling condenser (.04 mfd). THE DUBILIER CONDENSER CO. (1925) LTD., are manufacturing a special condenser, Type 9200, for use with this coil.

AVAILABLE JUNE 1ST.



Who is he?

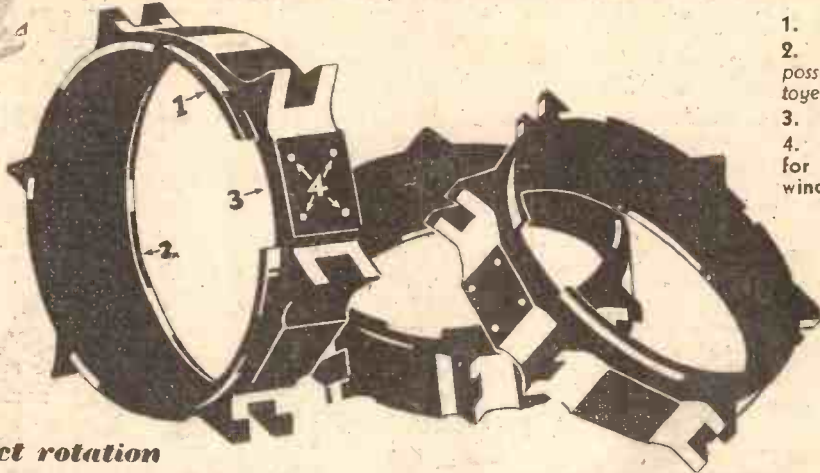
Designer of Pop Vox Cabinet—the Radio genius behind PILOT KIT organisation—now first to commercialise New P.W. Coil Quits

Deliveries in strict rotation

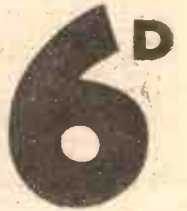
PETO-SCOTT CO. LTD.

PETO-SCOTT FIRST AGAIN COIL QUITTS

COMMERCIAL VERSION OF NEW COIL SYSTEM DEVELOPED BY DESIGNER OF POPVOX CABINET.



1. HIP and
2. GROOVE making it possible to fit Coil Quits together for coil assembly.
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4. HOLES ready drilled for starting and finishing winding.



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EACH

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EVERY Constructor will find in our New "Hermet" Switch what he has always been looking for. A switch that will last for ever, that won't come loose and drop off inside the set however much the youngsters twiddle it. A switch that is totally enclosed, keeping its contents clean and free from dust. The D.X. "Hermet" has all these qualities and more, silent smooth action, perfect contact, high insulation, one-hole fixing and a perfect electrical and mechanical job throughout.

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READY-TO-ASSEMBLE COMBINATION RADIO-GRAMOPHONE CABINET

£
3'10'0

MODEL NO. 218

A Queen Anne Radio or Radio-Gramophone Cabinet, 3 ft. 10 ins. high, 2 ft. 2 ins. wide, 1 ft. 6 ins. deep. Size of baffle board behind fret, 24 ins. x 24 ins. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. x 9 ins., or smaller.

PRICES:
Machined ready to assemble: Oak £3 10 0. Mahogany £3 15 0. Assembled ready to polish: Oak £4 10 0. Mahogany £4 15 0. Assembled and polished: Oak: £5 10 0. Mahogany £6 5 0. All Models Carr. Paid.

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Send 3d. in stamps for 56 page illustrated catalogue.

CHAS. A OSBORN, Dept. P.W., The Regent Works, London, N.1. Telephone: Clerkenwell 5095. And at 21, ESSEX ROAD, ISLINGTON, N.1 (1 min. from the Agricultural Hall). Telephone: Clerkenwell 5634.

"P.W." SETS IN ACTION.

Some interesting extracts from our postbag, giving readers' experiences.

THE "NIGHT-FLIGHT" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I should like to join with G. W. Clayton, Romford, in congratulating the staff of "P.W." in giving us such an interesting set as The "Night-Flight" Three. Several "P.W." sets I have built, but none has ever afforded me such pleasure as The "Night-Flight" Three. For three years I have wanted a short-wave set, and gave up the "P.W." "Short-wave" Two in disgust, as I could never get a sound on it. But this one makes up for what I have lacked. At present I am listening to Schenectady, to the Davey Tree singing hour, with practically no fading. Last Sunday night I had the same station from 9.15 p.m. till 11.15, and no fading, with L.S. volume. Other stations I have had are Radio L.L. Chicago, W.S.X.A.L. Winnipeg, Bound Brook, C.T.I.A.A. Zeesen, Paris Experimental, Dutch station P.O.O.I.M., P.C.J. and Vatican on 50.25. Several amateurs, both English and French. The coils I am using are 18 S.W.G. C.C. wire on basket coil holders, 3, 5, and 9 turns, 4 and 5 inches diameter. The aerial is made up of 7/22 copper and electron with 7 joints at 6 different angles. So far I cannot find any trace of Nairobi or Australia, nor even Rome, so I wonder if my coils are the right size. Although the set is, I believe, not designed for the medium waves, I can get from Cork to Vienna, but nothing above. Should like to see other reports about the set and if possible to get into communication with Mr. Clayton, Romford. Wishing "P.W." every success.

Yours faithfully,
W. F. NILBEE.

Botley,
Hants.

FLEXI-COUPLING THE "MAGIC."

The Editor, POPULAR WIRELESS.

Dear Sir,—I started my acquaintance with "P.W." with the "P.W." Ultra Crystal set, and have made quite a number of sets from your designs. But the 1930 "Magic" Three is my favourite.

Still, with 60X coil, here in East Kent, with 70 miles of open sea between us and the growling numbers of powerful continentals, something was wanted to add to the "Magic" Three to improve selectivity, and the Flexi-coupler has done the trick.

When you applied it to the "Comet" (before your article appeared modernising the "Magic" Three), I made the selector coil and flexi-coupled it to the "Magic" Three as it stood. It works first-class.

I took a piece of former, 1 in., same diameter as ordinary coil, took two turns of flex round it, fixed the flex in position by means of silk tied loosely, fixed a coil base and placed it by the side of the late aerial coil (as per enclosed illustration).

The crocodile clip, previously on X coil, is now transferred to switch of selector coil. The trap is cut-out by transferring clip back to 60X coil.

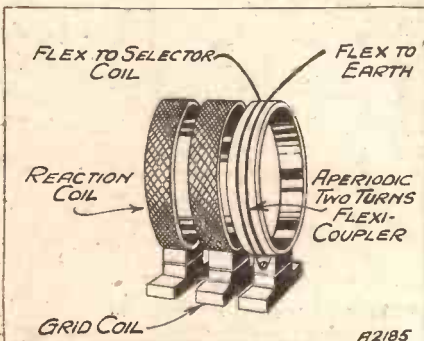
I have tried the "Magic" Three in N.W. London, Southampton, Bournemouth, N. Wales, Devon (twice) and nowhere do you get anything approaching the trouble with continentals you get here. The trouble is to shut them out. I know here we are splendidly placed for reception!

It is with a certain amount of timidity I address this screed, as it is the first, though I have never missed a copy of your paper since the first three or four issues. I have to thank "P.W." for all my knowledge of wireless.

Yours very truly,
W. G. HUMPHRIES.

Ramsgate.

HOW HE DID IT!



This was Mr. Humphries' stunt.

THE "NIGHT-FLIGHT" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—A few months ago I decided to build the "Night-Flight" Three short-waver, and I now enclose a list of stations received at speaker and phone strength. There are others not identified, and many telephone and amateur stations too numerous to mention.

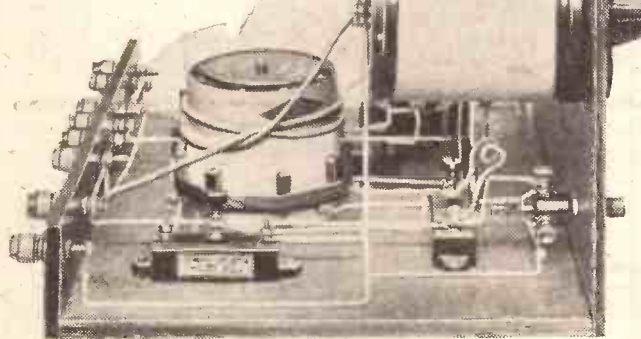
Thanking POPULAR WIRELESS once again for such a fine circuit.

Yours truly,
H. HUXLEY.

Leamington Spa.

		Metres
PMB	Bandoeng (Java)	14-55
LSG	Monte Grande (Buenos Aires)	15-02
PLE	Bandoeng (Java)	15-93
HSJ	Bangkok	16-9
W2XAD	Schenectady	19-56
W8XK	Pittsburg East	19-72
	Radio Vaticano	19-83
XDA	Chapultepec (Mexico)	20-5
Rabat	Radio Maroc	23-8
W3XAL	Bound Brook	24-25
W8XK	Pittsburg East	25-25
3RD	Rome	25-4
	Vienna	25-42
G5SW	Chelmsford	25-53
LSX	Buenos Aires	28-98

A FAMOUS ONE-VALVER



The "P.W." "Comet" One.

Poznan	Poland	30-5
NRH	Heredia (Costa Rica)	30-88
W3XAU	Philadelphia, Pa.	31-28
PCJ	Eindhoven (Holland)	31-28
W1XAZ	Springfield (Mass.)	31-35
Zeesen	Germany	31-38
W2XAF	Schenectady	31-48
OXY	Lynghy (Denmark)	31-51
VK3ME	Melbourne (Australia)	31-56
Rabat	Radio Maroc	32-26
W2XV	Long Island	32-68
CTIAA	Lisbon	42-9
EAR 100	Madrid	43
VRY	Georgetown (British Guiana)	44-6
	Moscow	46-6
HKC	Bogota (Columbia)	48-35
HRP	Tegueigalpa (Honduras)	48-62
VE9CL	Winnipeg (Canada)	48-7
W8XK	Pittsburg East	48-86
	Saloon (French Indo China)	49
W2XE	Richmond Hill (N.Y.)	49-02
W3XAL	Bound Brook (N.J.)	49-18
W3XAU	Philadelphia (Pa.)	49-5
W9XF	Chicago (Ill.)	49-83
7LO	Nairobi (Kenya)	50
	Radio Vaticano	50-26
	Prague	58
	Radio L.L. (France)	61
AFK	Dobertitz (Germany)	67-65

ALL ON A "TWO."

The Editor, POPULAR WIRELESS.

Dear Sir,—Perhaps you may be interested in some of my experiences in short-wave reception.

My receiver is home constructed, being a detector unit coupled to a two-stage transformer-coupled amplifier. Being a "Modern Wireless" receiver.

My present log is as follows: American stations, W2XAD, W2XAF, W8XK, W3XAL, W2XE, W6XN, W9XF, W2XO, W2XV, W3XAU, W2XK, W8XAL, W1XAZ,

W9XAA, WND, WOO, WMC; also CJRX, Winnipeg; VE9GW, Bowmanville; and CGA, Montreal, Canada; LSX and LSN, Buenos Aires; HRB, Honduras; 3LO and VK3ME, Melbourne, Australia; VQLO, Nairobi, East Africa; HVJ, Vatican City; 12RO, Rome; PCJ, Holland; Rabat, Morocco; Zeesen, OXY, Denmark; Moscow, USSR; GFVV, S.S. Majestic; GMJQ, S.S. Homerie; GLSQ, S.S. Olympic; WSBN, S.S. Leviathan; Yacht Elettra; beside many amateur stations.

I have received verifications from all these stations. I also hold many letters of appreciation of my reports which I send to them from time to time.

I do not wish to boast, but I think you must admit that it is not bad reception with a two-valve receiver. Most stations can be put on the loud speaker by switching in the third valve. I wonder if other readers can report such reception on two valves?

I think the short waves can rightly be called the thrill bands. Some of my biggest thrills has been in receiving Australia, some 12,000 miles; LSX, Buenos Aires, 6,000 miles; and W6XN, on the Pacific Coast, in California, 6,000 miles.

Yours faithfully,
A. E. BEAR.

Rotherhithe, S.E.16.

INTERWAVE COUPLING FOR "TITAN" COIL.

The Editor, POPULAR WIRELESS.

Dear Sir,—No doubt many of your readers are still using the "Titan" Coil, and in many cases are getting interference on the long waves through the local station breaking through. I am pleased to say that I have solved that annoyance and I should like it to be known amongst all your readers who are still using that very efficient coil.

I now consider that the "Titan" coil so adapted comes very close to the "P.W." Dual-Range coil for efficiency.

In my case the Midland Regional used to break through the lower end of the dial on the long waves, but since the new transmitter at Moorside Edge has been test-tuning on the same wave-length (479.2 metres) it has simply swapped the long waves completely. I then set out to try and cut this nuisance out; it suddenly dawned on me to try your "Interwave Coupling." Immediately it was a glorious success. The following will assist users to adapt their coil with the "Interwave Coupling."

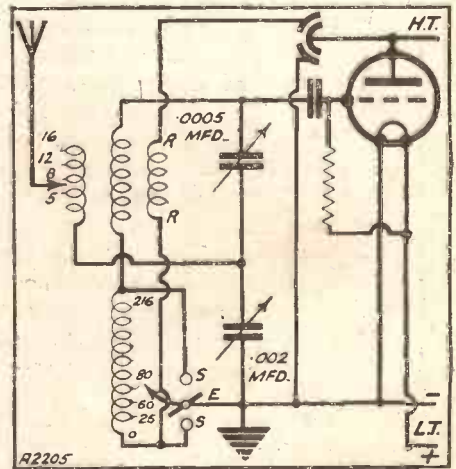
Disconnect the end of the aerial primary winding which joins to the long-wave loading coil at "0." then connect this to one side of a .002 compression type condenser (a fixed one will do), from the other side of condenser take a lead to any nearest point which is earthed. Then disconnect the wire that goes to the earth side of the tuning condenser (0005); instead, join a wire from the latter to the side of the small .002 condenser where the primary is connected, and the job is complete.

Again thanking you for your valuable information.

Yours faithfully,
A. E. SEYMOUR.

Sheffield.

A "TITAN" TIP



Here is the circuit referred to above.

CAPT. ECKERSLEY'S QUERY CORNER

Some questions and answers of general radio interest that will aid you in your radio reception.



WHY IS A DETECTOR'S GRID MADE POSITIVE?—H.F. IN L.F. STAGES—H.F. NEGATIVE BIAS—HIGH-PITCHED REPRODUCTION—H.F. AMPLIFIER FOR SHORT WAVES.

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 Captain Eckersley, however, a selection of those received by the Query Department in the ordinary way will be answered by him.

Why Is a Detector's Grid Made Positive?

D. B. W. (Dulwich).—"I have recently changed my set from ordinary to A.C. valves, using normal grid leak rectification. I am at a loss to follow why, in the manufacturers' data for these valves, they advocate positive bias to the detector valve.

"As the set was arranged with battery valves, this was not necessary, the bottom of the grid leak being merely connected to L.T.+"

Grid leak rectification depends upon the fact that positive impulses of signal voltage attract electrons to the grid of the valve unit. These leak away slowly back to filament and so cause a general negative potential bias to remain on the grid, which bias is proportional to the strength of the signal.

It is all a question of the grid current grid volts characteristic whether the device is both linear and sensitive; and certain valves give improved results if, before the signal arrives, there is a little positive on the grid. It's all a question of valve characteristics, and obviously these are different for different types of valve.

* * *

H.F. in L.F. Stages.

R. J. (Dundee).—"It is often stated that, if suitable precautions are not taken, H.F. can get into the L.F. stages of the receiver. If the L.F. amplifier is resistance-capacity coupled, it is further stated that the valves therein can thus be caused to oscillate at radio frequency.

"I do not understand how this can possibly happen, as a conventionally arranged resistance-coupled L.F. amplifying valve does not appear to me to possess any of the essential features of an H.F. oscillator. Would it be possible for a brief explanation to be given of the manner in which such an L.F. valve can oscillate at high frequency?"

Let us assume that an ordinary medium high-impedance valve has its grid energised at high frequency. Its anode circuit is through an anode resistance to earth via the H.T. and through the grid condenser and resistance to earth.

The resistances may be sufficiently inductive (or capacitive) to offer a very high impedance to the high frequency. If via some small coupling capacity the potentials built up on the anode circuit are fed back into the grid circuit, there is reaction. And if that reaction to the high-frequency circuits is great enough there is oscillation.

I doubt myself, however, if this occurs often in practice. More likely that the high frequency keeps the grid sweeping up and down to an extent which limits the possible low-frequency sweep and so produces grid current and distortion earlier than if the H.F. were eliminated.

In any case, it is obviously much better to have a high-frequency stopper between detector and first L.F. to stop any re-rectifications, grid current production, or even H.F. oscillation.

H.F. Negative Bias.

L. H. (St. Albans).—"I notice that in nearly all of the latest designs a negative bias of 1½ volts is applied to the grid of the

GIVING IT A LIFT!



When mounting a coil on a metal-covered base-board remember to provide it with blocks of wood to raise it. You then get at the terminals better, and prevent losses due to damping.

S.G. valve. I can understand that this will reduce the anode current, but are there any other advantages in using it?"

Your question prompts me to stress the fact that people still seem to think that non-linear amplification of the high frequency does not matter. It *does* matter.

The negative on the grid of a valve is not put there to save anode current (it's kind of it to do so, incidentally), but to arrange matters so that, whatever is being input as a signal, the circuit connected between grid and filament shall not make the grid more positive than the filament and so create grid current.

Most high-frequency circuits cannot stand the load of grid current without performing

unequally. Asking a high-frequency circuit to give the same volts whether it is loaded or not is like asking a small dry battery to light the headlamps of a car without dropping volts!

Both dry battery and high-frequency circuit has a high internal resistance, so avoid grid current, and avoid it by putting a proper amount of negative on the grid.

* * *

High-Pitched Reproduction.

L. R. N. (Stafford).—"I have a three-valve set, det. and two transformer-coupled L.F. stages. It works perfectly except for one thing. I find that the reproduction tends to be high-pitched, although the transformers are first-class components.

"There is a continual 'hissing' background, and all high notes seem to be over-amplified and slightly distorted. Why is this?"

Without the circuit and circuit component values it is difficult to say, but I suggest that the low-frequency side is oscillating when the signals come along. Try reversing one transformer primary, avoid all back couplings, try even decoupling the first stage from the others. Anything for stability, because I think it must be oscillation.

At the same time, if any stray capacity tuned a transformer secondary you would get a high-pitched result. Is there any small capacity shunting a transformer? Sorry I can't be more explicit; it's impossible without fuller details.

* * *

H.F. Amplifier for Short Waves.

B. N. (S.W.9).—"I am desirous of making up a super short-wave receiver. Is it possible for me to use two tuned S.G. H.F. stages?"

"I ask this question because a friend tells me that such an arrangement would be hopelessly ineffective on these very short wave-lengths."

Leave out of your mind any idea of using two high-frequency magnifications for short waves; it's unnecessary, would be very unstable, and would be anything but "super."

It's bad enough to get such an arrangement stable on the medium waves, let alone the ultra short. If you want something very sensitive, try the super-heterodyne; it's a very good principle, anyhow, and is particularly applicable for short-wave working.

A CORNER "CLEAR-CUT"

Following on our recent description of the "Corner" Two, we are giving details of a loud speaker, based on the famous P.W. "Clear-Cut" principle, which makes an ideal companion for that set.

By the "P.W." RESEARCH DEPARTMENT.

The baffle screws on underneath the receiver, and if desired a piece of beading can be taken along the top to hide the place where the join in the baffle and the set occurs.

The speaker unit employed in this is a Blue Spot, and the cone is made on the famous "P.W." "Clear-Cut" principle, employing a double cone. This will be quite clear from the photographs. The framework, which is the first job, is made of ordinary wood $\frac{3}{8}$ in. thick, and consists, apart from the baffle in front of a main upright 12 in. long, fixed behind the baffle by two $3\frac{1}{2} \times \frac{1}{2}$ -in. pieces of wood.

On the main 12-in. piece of wood the unit is fixed, and the whole chassis is mounted to the back of the baseboard simply by these two pieces of wood. The unit may have to be "built up" behind the main crosspiece to get the distance of the baffle right, but this is easily done by a piece of wood.

You will see from the photograph, better than we can describe it, how this chassis is made, while the diagram gives you the dimensions of the main portions.

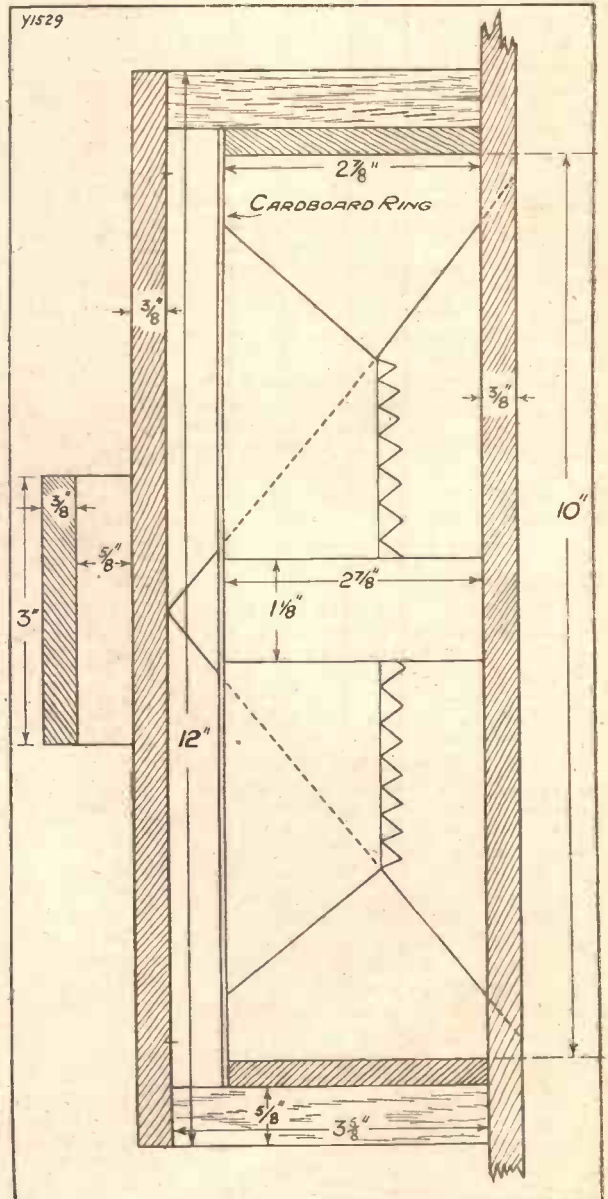
Two Cones.

You will see also from the photograph that a 10-in. hole is cut in the baffle, giving just a nice size for the cone. There are two cones: the first, the main cone, being a complete one, and to its apex is fixed the loud-speaker unit; while the second cone is truncated, being really only about half a cone. This is stuck

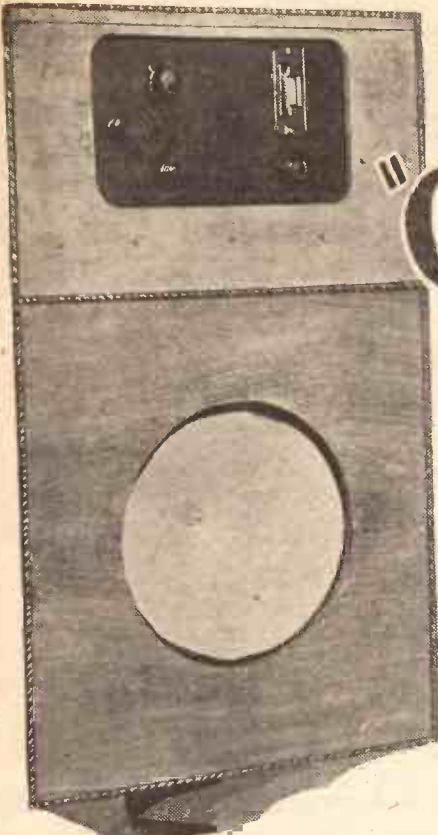
on the main cone half-way along its length. This also will be clear from the photograph and diagrams.

You make the main cone first by cutting it out of a piece of kraft paper, this cone
(Continued on next page.)

SEEN SIDEWAYS



This sectional drawing illustrates the method of assembly.

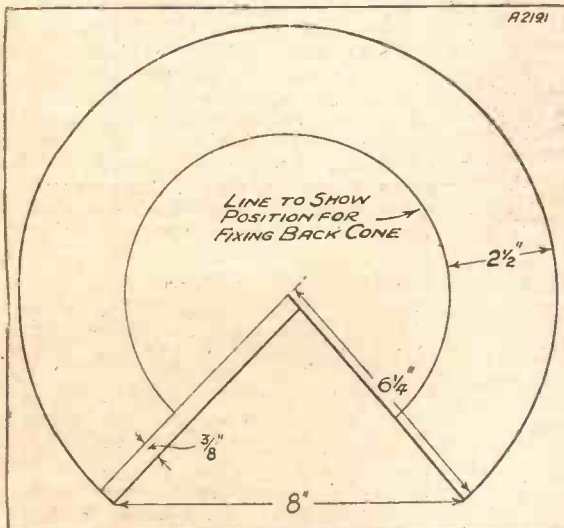


This shows the Corner "Clear-Cut" loud speaker in position below the "Corner" Two, which was described in P.W. No. 466 (May 9th).

A FEW weeks ago we gave constructional details of the "Corner" Two, a neat little two-valve set which was so constructed that it would fit up in the corner of any room.

This week, we are giving details of a suggested cone loud-speaker construction to fit

THE MAIN CONE



The main cone is cut from kraft paper according to the dimensions shown.

into the corner below the set, or elsewhere if required.

The "Corner" Cone is mounted on a baffle-board, which is of the same width as the front of the set, and the speaker unit is fitted on to a plain chassis on the back of the baffle,

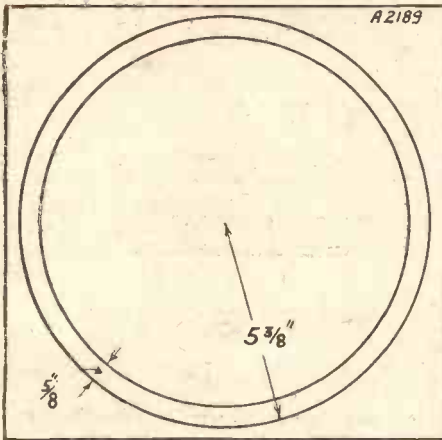
complete one, and to its apex is fixed the loud-speaker unit; while the second cone is truncated, being really only about half a cone. This is stuck

A CORNER "CLEAR-CUT"

(Continued from previous page)

being $6\frac{1}{2}$ in. radius, and a triangle is cut out of it having a chord of 8 in.; $\frac{3}{8}$ in. is left for overlap, as seen from the diagram, so that one may fold it over, and when this is done you have the correct size of the diaphragm.

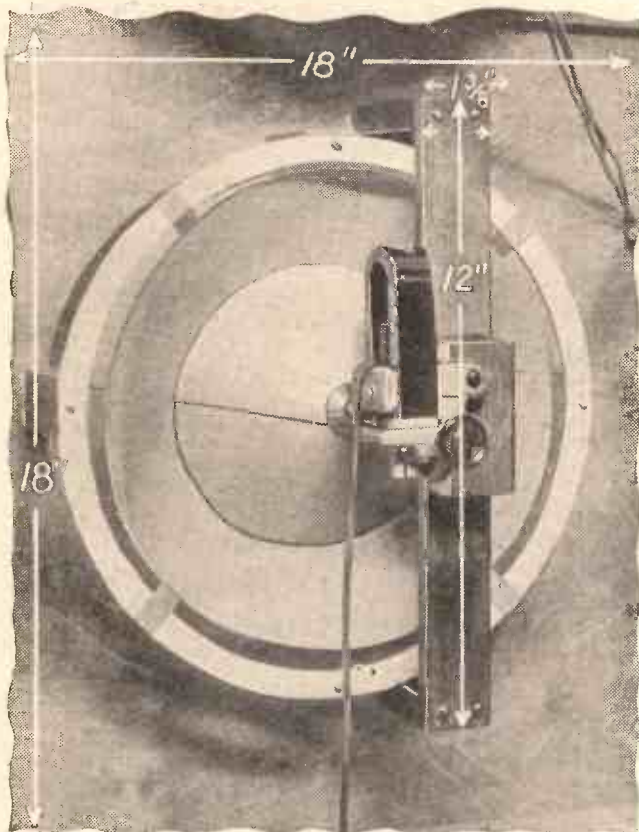
KEEPING IT UP



The cardboard suspension ring is cut as shown here.

While this is setting the second cone, or rather portion of cone, is made by cutting another piece of paper, as shown in another diagram, and then cutting round again

HOW THE UNIT IS FIXED



The dimensions of the baffle and the main support are given in the photograph. Note how the unit is "built up" on a block of wood. This must be rigidly mounted if success is to be assured.

so that you have a ring of paper $2\frac{1}{2}$ in. in width. Round the inside of this ring serrations $\frac{1}{4}$ in. deep, and of the same width, are cut carefully all the way round, and once again a triangle in the ring must be cut, with a base of $7\frac{3}{4}$ in.

This ring is now stuck on to the main cone at about half-way along so that it forms a second fixed on the back of the main cone, and facing in the opposite direction.

The Support Strips.

The mounting of the cone is quite simply carried out. The unit, of course, is fixed by the usual method to the apex of the main cone, but this fixing should not be tightened up until the suspension to the back cone has been arranged. Four pieces of wood $2\frac{1}{2}$ in. \times $1\frac{1}{2}$ in., are fixed to jut out from the back of the baffle-board, besides the two pieces of wood which form the main stay of the loud-speaker unit's mount. These pieces of wood, as you will see if you look at the diagrams, are to hold the cardboard suspension ring.

The main unit mounting strip is, as you will have seen, placed a little bit out of centre so that the unit itself may come exactly in the centre. The four other pieces of wood are fixed radially round the hole in the baffle and at equal distances all round.

The suspension ring is $\frac{5}{8}$ in. in width and about $10\frac{1}{2}$ in. diameter. It is fixed by means of drawing pins on to the back edges of the four jutting pieces of wood pulling out from the baffle.

To this ring at equal distances from the four jutting pieces of wood are stuck, by means of secotone, four strips of kraft paper about $\frac{3}{8}$ in. in width and about 2 in. long. When these have set, the main cone, with its back cone stuck upon it, is placed on the loud-speaker unit and is put into position in the framework.

Free Edge.

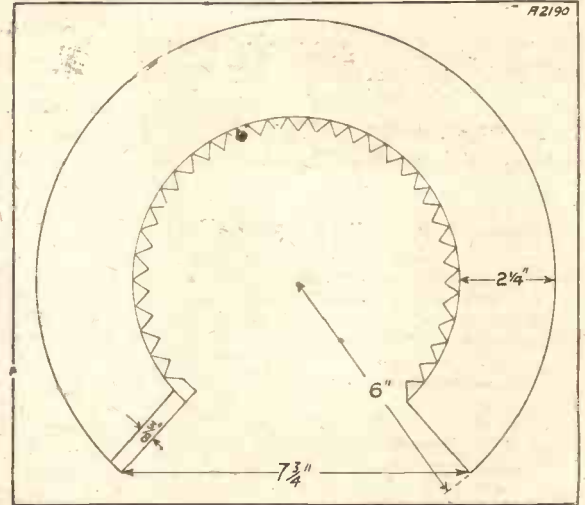
It will then be seen that it is an easy job to stick the four pieces of kraft strip attached to the suspension ring to the edge of the back cone, and this should be done in such a way that any strain on the unit spindle or rod is taken off by means of the kraft strips. These should be tight, but not, of course, so tight as to pull

either the cone or the ring out of shape.

When you have supported the cone in this manner and tightened up the nuts on the unit rod, not forgetting, of course, that the cone washers must be in their places properly, the speaker is finished.

The baffle can easily be stained to match

MAKING THE DOUBLE CONE



The smaller cone is made by cutting a piece of paper as shown. This is then stuck to the larger diaphragm.

the rest of the set, and mounted in position as mentioned previously.

The method of suspending the corner cone is one of the great secrets of its success, as a perfectly free edge cone is obtained with complete rigidity of suspension, enabling really fine response of the higher notes and good bass response to be obtained.

The "Corner" Cone can be fitted to the wall without the set if desired by means of wall brackets, or as already remarked it can be fitted underneath the "Corner" Two, which was described a few weeks ago in these pages.

The Unit Used.

We have specified a Blue Spot unit in the construction of this speaker, but, of course, there is no reason why any other good loud-speaker unit should not be employed, provided that the slight alterations necessary for the support of the unit at the back are made. The dimensions given in the photographs are for a small Blue Spot unit, and, of course, in order to get the unit central it would be necessary to vary these dimensions if any unit other than the Blue Spot were employed.

A final piece of advice—when you have got it all complete try it out before fixing it up because you may not be able to adjust it easily when it is fixed to the wall.

THEY SAY THAT—

Radio engineers are now successfully overcoming night effects which previously ruined the accuracy of direction-finding after dark.

One of the difficulties of working a short-wave transmitter on board ship is that powerful oscillations are generated in loose conductors such as the stays and rigging.

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1 ReadiRad L.T. switch	1 0
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1 Fuller "Sparta" S.W.X.7	11 0
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1 Amptlon Cone Loud Speaker, A.C.21	1 19 6

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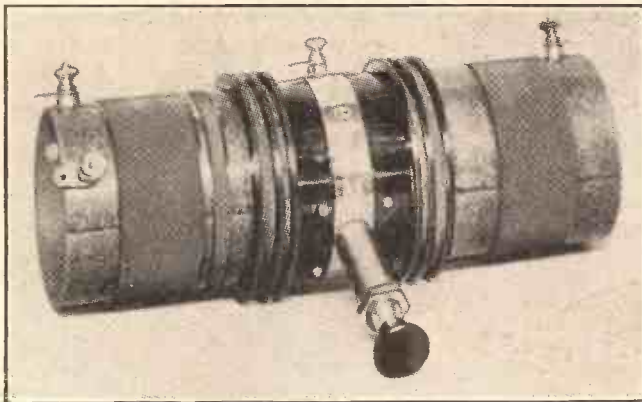
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



SELECTIVITY FOR SIMPLE SETS.

SELLECTIVITY of a high order is essential for any set before it can successfully cope with modern ether conditions. But it is easier to quote this quality than obtain it. True, it is possible to build up all the selectivity needed for all ordinary purposes by employing a string of H.F. amplifiers, each with its properly designed



The Varley Constant Square Peak Band-pass Tuning Coil.

tuning stage, but only a few constructors can afford big "multi-valvers."

Even so, unless great care is taken, the quality of the output is likely to suffer in the process.

One of the very soundest methods of obtaining selectivity is to employ some sort of "band-pass" scheme. One such has very successfully been applied by Messrs. Varley to a complete wave-change coil unit which they style the Varley Constant Square Peak Bandpass Tuning Coil.

Indeed, so successful is the result that one of these new Varley devices, replacing an ordinary coil arrangement in a simple set of the Det. L.F. or Det. 2 L.F. variety, will increase its selectivity to an extraordinary extent.

And it does this without that objectionable "side-band snipping" that mars only too many otherwise excellent selectivity devices. In fact, it is a true "band-pass."

The device comprises five coil windings neatly compacted on a reasonably sized former. There is a wave-change switch, and this is ingeniously arranged so that it projects through the single one-hole panel mounting.

One of the very special features of this interesting Varley product is that it covers

exceptionally wide wave-bands, viz. 220-580 and 1,000-2,300 metres.

Also it gives a constant station separation throughout the whole of this range, a fact that proves the practical perfection of its design.

An additional variable condenser is needed, although it should be noted that reaction can be applied with good effect through one of the existing windings of the unit.

The scheme is not that well-known one that calls for the use of a small coupling condenser of the "neut" type, the linking of the two tuned circuits is carried out by a non-inductive fixed condenser operating in conjunction with the special windings on a quite new principle of "B.P." working.

The Varley "Square Peak" is a beautifully made component, and it has that combination of robustness and delicacy of finish that only a very few manufacturers other than Varley seem to be able to achieve.

We tested it in a Det. 2 L.F. set, and the results were impressive. There was not the usual loss of signal strength that one almost automatically associates with "band-passes." In

fact, sensitivity was maintained at practically normal level—and that is no mean feat in view of the sharp station separation given.

"Break through" was reduced to inaudibility.

The Varley Constant Square Peak (etc.) does not transform a Det. L.F. into a superhet., but I do think it is quite the best commercial wave-change coil unit that has yet been produced.

EXIDE IDENTIFICATION LABELS.

A novel means of identification for celluloid cells, whereby charging station assistants can tell at a glance the particular battery of a customer, and owners be sure of receiving back their own property, has recently been adopted by the Chloride

Electrical Storage Company, Limited. The device consists of a thin strip of fine celluloid secured to the side of the container, under which is placed an identification label bearing a space for the owner's name and address. The *modus operandi* is to pull the label from the celluloid cover by the projecting tag, write on it the required name and address, re-insert, and then tear off the projecting tag down the dotted line. The label will then firmly be fixed in place, and it will be found that it is almost impossible to remove it.

This little bit of forethought should prove

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.

a boon to Exide battery owners, and save them many of those anxious moments which everyone has experienced when called upon to identify his property from a mass of similar looking batteries.

BLUE SPOT LOUD-SPEAKER UNITS.

The British Blue Spot Company, Ltd., ask us to draw the attention of the public to the fact that a number of units stolen from their works have been sold. In many instances these units do not function at all, for invariably they have not been properly adjusted or passed through the full stages of manufacture. Purchasers of Blue Spots should make sure that the devices are contained in their proper cartons, having on them the well-known Blue Spot trade mark.



This photo illustrates the novel and useful Exide idea dealt with in the above paragraph.

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STATIONS WORTH HEARING

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

THE early part of the summer of 1931 will probably go down to meteorological history as one of the coldest, wettest, and generally beastliest on record. It will earn the blackest of black marks in the diaries of cricketers, fishermen, motorists, gardeners and hikers; but in the logs of wireless enthusiasts it will be shown as a wonderful period in which long-distance reception was a sheer joy.

Or rather it would have been a sheer joy had it not been for the one fly which usually manages to find its way into any ration of ointment. In our case the fly has taken the form of those most undesirable of noises, atmospherics.

It Can't Be Done.

Still, atmospherics have really not been too bad, all things considered. You really cannot expect at this time of year to have perfect long-distance conditions on seven evenings in the week during four weeks in the month.

We have averaged about four really good evenings each week, and that is not too bad. Still more cheering, we can look forward to a better period when the weather settles down to be seasonable and we hear less about those depressing depressions over Iceland.

A Prophet Indeed.

I was bold enough to prophesy some little time ago that we should not experience this summer anything like the decline in the number of foreign stations receivable and in their volume that had been noticeable in former years. So far this prediction has been borne out, and if you care to turn back the pages of your log until you come to the corresponding period of last year and the year before you will find that the number of alternative stations of genuine entertainment value is now far greater than it was then.

Take daylight reception, for instance. Huizen is coming through in broad daylight much more strongly than he was in 1930,

and that powerful newcomer, Warsaw, is always there when wanted. Kalundborg, too, is showing excellent form, and Oslo is living well up to his 75 kilowatts.

Stations Galore.

On the medium band in daylight you have the two Brussels stations and Hilversum where previously you had nothing at all. Then, early in the evening, when in former years you were lucky if you picked up more than two or three stations you can now find on most evenings Rome, Beromuenster, Sottens, Frankfurt, Toulouse, Str asbourg, Gothenburg, Bordeaux, and Turin, all coming through very well indeed.

And besides these there are a number of others which you are likely to capture. Amongst them are Milan, Lyons Doua, Witzleben, Lw ow, Breslau, Gleiwitz and Hoerby, and a few on the lower wavelengths. I am not prepared to take the risk of recommending individual stations in the lower part of the broadcast band, since conditions there vary so enormously.

For some reason many of those who have wave-lengths in that region appear to regard themselves as exempt from all the rules of the Prague Plan.

Real "Rolling-Stones."

They wander about in the most astonishing manner as a result of which they heterodyne each other and are heterodyned in turn. Still the band between 200 and 300 metres is always worth exploring, for frequently it yields something really interesting.

OWING to more important matters, I had last week to hold over my acknowledgment of several letters concerning Strasbourg, "A N C." I mentioned that I thought the call-sign must be wrong, but a number of readers have told me that the full signature is F8 A N C, the station being of the "semi-amateur" type.

"16 years" (Suffolk) is among these readers, and also sends an interesting list of short-wave amateur telephony stations received. I see that my own is included. Can you place it, "16 Years"? (I should think W3 B I Z is very likely, as I have heard him myself.)

An Enterprising Transmitter.

Considerable confusion appears to have arisen over the Nairobi broadcast and C T I A A's relay thereof! Those who have read "The Wireless Constructor" will have all the details by now, but one plaintive man asks me how on earth a Portuguese amateur can broadcast tom-toms and native noises!

"D.T." of Ipswich, sends in a very creditable list of DX stations logged on a receiver with only 25 volts H.T. He mentions that no one seems to think it worth while to say what voltage they use. The general run, "D.T.," you will find, is 50-60 volts on the detector and anything up to 120 on the L.F.

And now comes forward my champion! A gentleman, who wishes to be unnamed, says all sorts of rude things about the other man I mentioned that said—quite bluntly—that he didn't believe all I said about DX reception. My champion says: "What I like about your notes is that you are not always claiming to be first with every new

SHORT-WAVE NOTES

Here are some useful remarks on happenings down on the short-waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

station that comes along, but let your readers take the credit."

If that is true, it is only because I haven't as much time as I should like to be always on the job. This anonymous gentleman also says: "Thank heaven 'P.W.' is not like the motor papers, in the correspondence columns of which you read of drivers of ancient Fords that average 60 miles per hour for five hours, and similar feats, all obviously impossible."

One of the things about radio is that any claim that is not quickly substantiated is at once forgotten!

Now we have another batch of readers who can't "get down" below certain figures—one below 25 metres, one below 30 metres, and others below 20 metres. This is largely, I think, a question of lay-out, and I will deal with it in a separate article, as it is a large subject and one that can cause lots of trouble.

The Polar Expedition.

I am not clear, from all the different accounts I have read, about the equipment used by Sir Hubert Wilkins for the forthcoming expedition. Except that the submarine's call-sign is to be W S E A, I know very little. Are any further particulars available? I should be glad to have them.

"R.S.D.A.," on H.M.S. Glorious, sends an interesting log of short-wave stations heard while steaming from Malta to Gibraltar. Rabat, curiously enough, was only R3/4, while Rome and some of the American were R8.

He found the four days from March 10 to March 13 exceptionally good. So did we, "R.S.D.A." My notes in the issue of March 14 were written some time before the good spell arrived, but from March 8 to March 23 the Americans, in particular, were wonderful.

Two New Arrivals.

Apropos my remarks on "bagging new countries," there are two more arrivals that might be interesting, in the shape of Z C I S (Trans-Jordania) and V I B L (Bahamas). Also in the early mornings the West Coast of America and occasionally Hawaii can be heard on 21 metres. The two best stations in the latter are K   B O E and K   E R H.

I have just noticed in an old letter, which I am afraid I had overlooked, a useful hint from "R.D.M.," Bath. He cures his hand-capacity troubles by leaving off the earth lead and substituting a few feet of flex hanging down from the earth terminal. A miniature counterpoise, "R.D.M."!

Did you see my remarks about "tuning" the earth lead with a small series condenser? That is quite the most useful thing I have struck, and it was quite an accident.

I am still receiving reports of reception of Moscow on 50 metres, and he appears to be stronger over most of this country than either Rome or the Vatican City station. Why he should work there when he is usually relaying the programme from Moscow, R E N, on 46.6 metres, I cannot say.

The P 240 will give you increased volume and far better quality

Its huge power-handling capacity and extremely low impedance ensure this. It is sensitive, too, thus requiring a minimum of early amplification and giving a greater output—sufficient, in fact, to work a moving-coil speaker at ample volume for domestic purposes.

Quality, too, is vastly improved and the P.240 will make a world of difference to any set using 2-volt valves—from the modest 2-valver to large sets designed to give an appreciable output.



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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 page 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 patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

REACTION ON THE "COMET."

Mrs. A. T. (Salford).—"I have had a 'Comet' Three set made for me and it is quite satisfactory but for one thing. Each time I get over the centre of reaction there is a terrible howl. Can you please give me any advice on this matter?"

Well Madam, the truth is that the set is behaving all right, but its reaction dial must not be turned so far round as to make it howl. Allgood sets will howl if reaction is pushed too far, and when they do this they may interfere with the neighbours.

Reaction is a good servant but a bad master, and if you attempt to work it too hard it will make the set howl. This means that you must then slacken off the reaction a little bit, for with reaction tuned up to just below the howling point the set is giving you as much as it can possibly give.

You will find some very valuable hints on handling reaction, and a good deal of useful information on oscillation generally and on the handling of sets in the B.B.C.'s free booklet, which is called "Oscillation." This can be obtained either by dropping a

MEASURING THE CAPACITY OF AN AERIAL.

"EXPERIMENTER" (Sevenoaks, Kent).—"What is the method of estimating the capacity of an aerial-earth system by means of an accurately calibrated wave meter?"

The easiest way is to connect an ordinary coil of 40 or 50 turns or so between aerial and earth, and then measure the exact wave-length of the arrangement with a loosely coupled wave-meter. Leave the wave-meter coupled to the coil, but disconnect the aerial and earth leads completely, and in their place across the coil connect an accurately calibrated variable condenser.

Adjust this until the arrangement is in tune with the adjustment on the wave-meter, at which point the capacity of the external condenser will be equal to the capacity of the aerial and earth.

POSITIVE OR NEGATIVE?

"PUZZLED" (Ham, Surrey).—"Will you please tell me which is the actual positive side of a standard wet or ordinary dry H.T. battery? I was always under the impression that the zinc was negative and the carbon positive, but a friend of mine has a book dealing with this states that the carbon is negative."

If an H.T. battery were made according to these instructions and fitted to a set, what would be the result? Also on the working of the receiver?

"I have examined several different types of batteries and found my theory correct, but surely the book cannot be wrong. It is not a cheap one."

Your uncertainty is quite natural, and is due to the old confusion between negative and positive.

This confusion arose originally from the fact that as we cannot see electricity, much of its action has to be guessed at. And this was particularly the case in the early days.

The very first experiments showed that when the electrical circuit was completed something flowed in it, but nobody knew whether this mysterious something flowed from the zinc end of the battery and round to the external circuit to the carbon rod, or from the carbon rod round to the zinc. After much speculation and learned discourse, many years ago it was agreed that the probability was that current left the carbon positive pole, traversed the external circuit, and eventually arrived at the zinc. So the carbon was called positive, and the zinc negative.

As luck would have it this was an unfortunate decision. Further research has proved that electrical current is merely a movement of electrons, and electrons are negative. The electron flow is thus really

and truly, from the zinc via the external circuit to carbon.

Fortunately, however, it does not matter in the least which way round you consider current flow, so long as you are consistent about it.

Most radio text books will point out that the electrons flow from negative to positive. But many other electrical text books prefer to stick to the old assumption that the current flows from positive to negative, and as long as one does not have to deal with electrons as such, this is quite a satisfactory rule to follow.

As regards connections, treat the carbon as positive and the zinc as negative, and you will be in conformity with standard practice.

TRACING INTERFERENCE.

V. M. (Tunbridge Wells).—"What is the simplest way to set about finding noises that cause interference in the programmes?"

Alas! there is no simple way. There are so very many causes of crackles and interference—humming, whistling, clicks, and so forth—that often it takes an experienced person to form an opinion as to where the interference is coming from.

There is much to be said for the old-fashioned plan of removing aerial and earth wires to see if

"WHY DOES IT CRACKLE TO-DAY?"

Perhaps the switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an unrivalled service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

LONDON READERS, PLEASE NOTE: Inquiries should NOT be made by phone or in person at Fleetway House or Tallis House.

the interference comes from outside, as a rough and ready guide. But in difficult cases all the following points have to be attended to.

Batteries, accumulators, and so on should be checked for loose connections and accumulations of dust, etc., which might cause electrical leakage and thus give rise to noises. Every connection in the set, and in the leads, should be inspected.

The whole of the earth-aerial system must be examined for imperfect contact, or contacts making accidental earths through the aerial swinging, etc. A poor connection under the ground is often a cause of trouble.

Valves which have been pulled out of their holders (or dropped, thus loosening their bases) may give rise to the trouble, and so also will poor contact at the valve's electrodes. Dust or dirt in the set and across condensers frequently causes trouble, and a leak or breakdown in a bypass condenser will often do so.

Jacks and switches, and the leads to these, can cause trouble by loose fitting or an imperfect connection. And, in addition to all the above, noise can sometimes occur through battery voltage irregularities!

THE ORDER OF THE ELECTRODES.

"CURIOUS" (Bury St. Edmunds).—"An accidentally busted pentode opened my eyes with regard to the intricate construction of the valve."

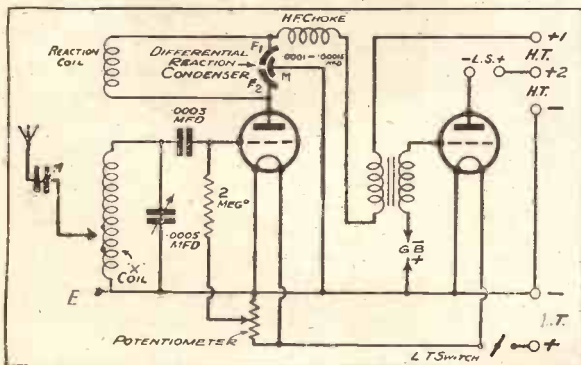
"What is the actual arrangement of the various electrodes with regard to the filament? That is to say, supposing an electron leaves the filament and goes over to the plate, in what order does it pass the grid, etc.?"

The order from inside working outwards, as it were, is as follows: Filament, control grid, screened-grid earthed grid (or pentode grid), and anode.

Thus an electron leaving the filament for the plate would first of all have to pass the control grid, to which is connected the L.F. transformer, or other input component. Having negotiated this, it would be confronted with the screened grid to which a high positive potential is applied.

(Continued on next page.)

MISSING LINKS, No. 8. A SIMPLE DET., L.F.



Here is last week's problem diagram with the two missing "components" in place. It will be seen that an earth connection was also necessary to complete the circuit.

line to any B.B.C. station or calling for it at the station, where it is presented to any listener free of charge.

In the meantime, please keep that reaction condenser turned to its lower readings, where the set does not howl, or you will disturb your neighbours' programmes.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

There is now only one other grid between it and the plate which is its objective, and this grid is connected internally to the filament by the valve maker, though there is no connecting point externally, to which an extra lead must be taken.

ON 1,300 METRES.

"TRADE UNIONIST" (Bradford).—"What is the German broadcasting station on about 1,300 metres? I have tried for Moscow on this wave-length, but could only get a station giving a long talk, and this was followed by an announcement and 'Achtung, Achtung,' the German call.

"According to the lists, Konigwusterhausen is the only station anywhere near this, and there is a big discrepancy in wave-length. Is it a new German station?"

No; in all probability it was Moscow on 1,304 metres that you heard. The Trade Union station at Moscow has a habit of announcing in several different languages, including German, and frequently uses "Achtung, Achtung" to preface remarks, announcements, etc.

If you had listened a little longer the probability is that you would have heard English used as well, as many of the transmissions are intended for long-distance listeners.

IDENTIFYING PROGRAMMES.

F. M. (Maidenhead).—"We are expecting a visitor from Dresden, Germany, and I should like to be able to pick up the Dresden station for him. My set has frequently got other foreigners, but I have never received Dresden, and should be glad of any hints on picking up this station."

It is going to be very difficult, for Dresden is a low-powered station, and it shares a wave-length with Sofia-Rodno-Radio, Bulgaria.

The latter is a much more powerful station which is not infrequently heard in this country, but Dresden is comparatively difficult to pick up. Your best plan would be to try for Leipzig, which generally puts out the same programmes as Dresden.

Dresden's wave-length is 319 metres, and the wave-length of Leipzig is 259 metres. This is almost exactly the wave-length of the London National station, being just below it, so that if you set your receiver to get the London National you should be able to hear Leipzig when the National closes down.

In all probability London will be too strong to allow you to hear Leipzig when both stations are going, unless your set is a particularly selective one, or your local conditions happen to be more suitable than might be expected from an aerial situated in your district.

You can identify Leipzig not only by the usual German formula, "Achtung, Achtung," etc., but also by the interval signal which consists of four chords struck on bells.

AVOIDING THRESHOLD HOWL.

I. P. A. (Lancaster).—"In both my previous attempts at short-wave working I have been troubled with threshold howl, so before having another go will you tell me what is the main point to watch to guard against this?"

"I am very keen on short waves, and quite understand the possibilities that their distance covering properties offer: but I am not prepared to lay out time and trouble and money on another set unless it is going to be a distance-getter."

You do not say what kind of circuit you are going to use, etc., and in your shoes we should be very careful how you use your old components, for perhaps one of these is a dud and would cause the same difficulty again.

It is not easy to lay down laws against threshold howl, as it is caused in many different ways, and consequently what would cure it in one set may be ineffective in another case. One of the most important, however, is to use potentiometer control for the grid potential.

That is to say, the grid leak should not go to the L.T. wiring directly; but should go to the slider of a potentiometer which is connected across the filaments. Another almost vital necessity is decoupling, for unless the H.T. supply is particularly "clean," and is absolutely incapable of giving trouble in this respect, it is essential to use some form of anti-motor-boating device.

Very often the trouble is due to such a simple thing as wrong value of grid leak or an unsuitable high-frequency choke. And it should be remembered that one of the latter which is perfectly O.K. on ordinary waves may not be good enough for short waves on account of the very great importance of capacity bypass effects in this latter class of reception.

Even if your new set does seem inclined to give trouble, do not forget that very often quite a simple alteration will effect a cure. For instance, connecting a high resistance like a grid leak across the secondary of a transformer, or across the primary, or between the secondary of the L.P. valve and its grid.

An extra H.F. choke in the plate lead of the detector, or in the phone leads, can also be recommended as a likely cure where an output filter has not been incorporated; but for really good short-wave work the latter is a necessity, and the system of H.F. chokes, etc., only a makeshift to overcome troubles caused by lack of a filtered output.

CONVERTING THE "COMET" TO INTERWAVE.

R. M. (Thirsk).—"I want to change over my 'Comet' Three to interwave long-wave coupling, but have lost the April 4th issue, in which details were given. What is the method of changing over to this?"

The conversion is a very simple job, especially if you have the original blue print of the "Comet."

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 St., E.C.4, and not to Tallis House.

However, that is not essential for you to follow out the alterations, for you can do it from the wiring of the set itself almost as easily.

Looking either at the blue print or the set, identify the .002-mfd. compression condenser which gives Brookmans aerial coupling on the long waves. Note that a wire runs from one side of this condenser to the moving plates of the tuning condenser.

Remove this lead and, instead, wire the moving plates to the other terminal of the compression condenser. This is the terminal which is also wired to earth and wave-change switch, to S₂ on the coil, and to F₂ on the reaction condenser.

Now remove the wire joining this terminal on the compression condenser to S₂ on the coil. Instead, wire S₂ to the other terminal of the .002 condenser (i.e. to the one from which you previously removed the lead running to the moving plates of the tuning condenser).

Those are the only alterations you have to make, and it obviously won't take you long to complete the little job. The final step is to connect a 25,000-ohms "spaghetti" resistance across the terminals of the .002 condenser.

Grip one tag of the resistance under one terminal, then grip the other tag under the second terminal, and that is the end of the conversion.

USING 'PHONES WITH LOUD SPEAKER.

R.A.S.W. (Southampton).—"Is it possible to use a variable 100,000-ohm resistance with a loud-speaker to bring down the volume for telephones? I require the latter for long-distance listening."

For such a stunt you will, of course, use an output filter. If we assume that this consists of the usual L.F. choke with a condenser (2 mfd. or so) connected to one end of it, the condenser's other end going to the loud-speaker terminal, it will only be necessary to place the 'phones with variable resistance across this terminal and the other loud-speaker terminal (which goes to L.T.—, H.T.—, etc.).

In other words, join the telephones and variable resistance together, and then take the free end of the 'phones to one "loud-speaker" terminal and the free end of the resistance to the other "loud-speaker" terminal.

FOR THE LISTENER

(Continued from page 372.)

I hope that, when the perfect radio play comes, it will not depend so much on this sort of thing; but, meanwhile, these German fellows are mastering the technique and delivering the goods.

Dr. L. du Garde Peach seems to be our only Horatio defending the bridge against this invasion. There are others who cut down Shakespeare for us, or adapt novels, or concoct character sketches like "Dr. Abernethy"; but Mr. Peach appears to be the only one who puts out much original work with any success.

He works on different lines from the Germans. Personally, I think on better lines. He is more likely to produce a fine radio play than they are. But why does Horatio stand alone?

I admit that it is a difficult job. I have tried my hand at it, and failed. But then I am one of those persons, commonly called "critics," who know when a thing is wrong and when it is right, but for the life of me cannot do it right myself! But surely there are others.

The Limit.

What is the limit of your powers of concentration in listening? I asked myself this question the other evening when I sat down to listen to Galsworthy's "Forest." It was timed in the programme to last for two hours!

Two hours! This was rather terrifying; but I put an ample supply of provisions on the table, and tucked myself into my chair. By the mercy of heaven, and some odd mis-calculation on the part of the producer, it lasted twenty minutes short of that time—an hour and forty minutes.

I was grateful for the respite. I stuck it out, and was nearly done in. I admit that it was not a very happy choice of a play. More than most plays, "The Forest" requires the help of visible setting. And it was rather gloomily produced; without any musical background to assist us in visualising the forest scene.

Perhaps the silence was meant to do that. If it was, it was the least successful part of the play. But in any case I felt that it would have been too long!

In the theatre, a play is cut up into acts partly for the sake of giving the audience some relief in concentration.

A Continuous Performance.

And it is much easier to concentrate in a theatre where you can see interesting faces, on the stage, or pretty frocks, or effective scenery, or exciting movement, and listen to the play at the same time. But with a radio play you are not only concentrating your mind on the story, but your imagination also on the setting and the movement; and it is a continuous performance.

Few films last for more than an hour; and it is easier to watch a film for an hour than to listen to a radio play for an hour. So I conclude an hour is about the limit. An hour and forty minutes is—well, the other sort of limit!

ADVERTISER'S IMPORTANT CORRECTION

Ready Radio, Ltd., have pointed out that a printer's error appeared last week in their advertisement of the "Pop-Vox" on page 353.

Kit A was wrongly given as "with valves and cabinet." It should have been Kit A—less valves and cabinet, £5-0-0.

"P.W." PANELS, No. 21.—RESULTS WITH A CRYSTAL SET.

Weak reception is often due to a broken wire in the earth or aerial leads.

Twisted joints—however well made—will in time give weakened reception equal to a broken lead.

Firm contact at the crystal point can often be helped if the set is mounted on spongy rubber, or some similar "cushion."

Intermittent reception is generally due to faulty 'phone leads, or to a 'phone-nut having become loose.

WHAT I THINK OF TELEVISION

(Continued from page 374.)

however, the result of a deep sympathy and interest in the art, and an extremely commendable desire to help it forward. I strongly advise every reader who can, to go and see a demonstration there, but to draw his conclusions from the B.B.C. television rather than from the local transmissions by wire. If you are new to television you will probably be amazed and thrilled, but if you watch the programmes for several mornings, you will probably come to the conclusion that the best part of television is the speech and music.

Demonstration Experiences.

The first morning I attended at the Oates receiver, the half-hour's programme was a complete failure. Half the time the picture was unrecognisable even as a picture, and for most of the remainder of the time it was a negative instead of a positive (i.e., like a film instead of a print).

A coal-black mammy was singing, but most of the time she was snow-white. I believe (I am not sure of this), she said something about going to her plantation on the Mississippi. She apparently went there; at any rate she suddenly whizzed off the "screen," although her voice continued.

"They must be experimenting," explained the demonstrator. Old hands at wireless will have a new technique to learn when explaining television failures to their friends. Instead of "batteries are down," "emission's going off," "H.T.'s low," or (for experts only), "they must

have had a breakdown, no good waiting," the televisionists' talk of: "they're experimenting" (which will cover anything), "neon's getting old," "big motor must have started up next door" (to explain bad synchronising when using mains-driven motors). All, of course, unfortunately, are genuine causes.

The second morning was much better. But the picture moved up and down like a celluloid ball on a fountain at a shooting range. If the movement were sideways one would walk away; which explains perhaps why vertical scanning is used in England instead of horizontal. At the end of each item, as the announcer took the place of the artist, the whole apparatus went out of synchronism, the pictures whirling madly round.

At the Baird laboratories, I also had a demonstration. I recognised one person who was televised (having seen him immediately before), but the other was a somewhat doubtful case. Two people at once were, in my opinion, unsatisfactorily produced. The picture lacked brilliance.

If the signals were made stronger the brilliance improved but the two persons developed side-whiskers and beards. In television demonstrations you must always be on your guard. Immediately suspect people with beards, moustaches, flashing eyes, black horn-rimmed spectacles, bald heads, bushy heads, characteristic noses, chins or ears. Insist on the "object" being a man with a face like a white rabbit's. Then see if you recognise him.

At one laboratory I visited, I was struck by the startlingly vivid appearance of all the demonstration staff. They all had faces

which were not unlike those of ventriloquists' dolls. I suspected a deliberate choice, but this was officially denied. Apparently, it was simply an Act of God.

Also, if a young lady puts her head on a man's shoulder and sings a sentimental song, the idea is not to appeal to your heart but merely to get the two "objects" into the narrow space available.

"Easy" Objects Essential.

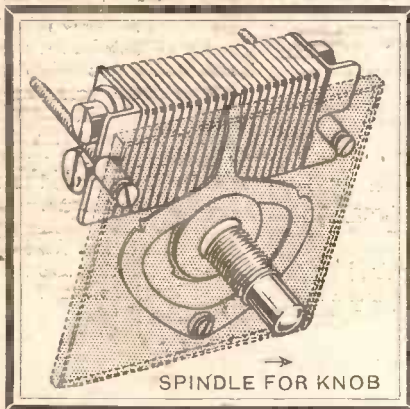
If you who are reading this happen to have hair like a Harlene advertisement, eyebrows à la George Robey, a generous black moustache and beard, flashing white teeth, a nose like an eagle, a powerful check suit, white collar and black stock tie, and large albino eyes behind horn-rimmed spectacles, your wife or best friend will recognise you on a television screen.

But if you belong to the pastel-coloured (or wishy-washy) type, they probably won't. In an identification parade held by television by Scotland Yard, you would quite likely be recognised at once as the latest Jack the Ripper.

The Baird reproductions are, however, reasonably good. Some of the poor reproductions are due to the apparatus (and the optical enlarging lens may be at fault in some cases), but the fundamental difficulty (independent of the system) is to get enough image elements transmitted per second. The more detail and the larger the size of picture the more elements per second have to be sent, and this widens the side-band for transmission.

In a press photograph 7 in. by 5 in., as sent by telegraph, there are 350,000 tiny

(Continued on page 392.)



SPINDLE FOR KNOB

"X-ray" view, showing resistance pack and vernier movement of contact arm.



Notice the clean appearance of the A.E.D. Log-Law Volume Control. One-hole fixing, of course.

PRICE COMPLETE

8/6

Supplied in the following values:
Model P.100, 100,000 ohms
Model P.250, 250,000 ohms
Model P.500, 500,000 ohms
Other values to special order. One-hole fixing.
Dimensions: 2½ in. deep by 2½ in. square.

ANOTHER PAT ON THE BACK!

"—most commendable production"

Says "Popular Wireless" writing of the



LOG-LAW VOLUME CONTROL

A Recent "Tested and Found . . ." article in this journal said: "Fine Volume Control. The A. E. D. embodies features usually only found in large and expensive apparatus. . . It is a compact device of ingenious construction. . . The fine current carrying capacities of 8 m.a. for the 100,000 ohms and 3 m.a. for the ½ megohm models are obtained . . . a most commendable production . . . reflects credit on both designer and manufacturer."

This is just one of many such strong recommendations. Ask your radio dealer to show you a sample. You will not find a more stable, more evenly graduated, well made control of sound—from the merest whisper to full volume—at any price!

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WHAT I THINK OF TELEVISION

(Continued from page 390.)

elements which make up the mosaic of the picture. All these have to be sent 16 times per second for television. This means a frequency of 5,600,000 with which we are supposed to modulate a broadcast "carrier" wave of, say, 1,000,000 frequency (300 metres). This is not practicable.

It is therefore hopeless to expect to get reproductions as good as in the final telegraphed product. We must have a much smaller picture and less detail, and we must have easy objects to televise.

A moving face is one of the easiest things to transmit. If we split up the picture into several parts and send each part on a separate wave-length we should still clutter up the ether, but this process definitely makes practicable the transmission of television to cinemas by wire, since overhead lines can be designed to carry a 50,000-frequency band. But the radio problem remains.

Unavoidable Limitations.

In considering a television demonstration one has to remember these difficulties inherent in any system. That is why a criticism of the Baird transmissions in this country tends to become unfair. One can only say what one sees. Complaint about lack of detail is not a criticism of the system but merely the result of fundamental difficulties and imposed limitations. Let us hope that some new approach will lessen these difficulties.

Perhaps something may be done on the very short wave-lengths. The shorter

wave-lengths on which fading is experienced are probably useless. The very short wave-lengths are more likely to be useful. The Germans have broadcast on seven metres but you have to be able to see the transmitter's aerial! Put more accurately the waves go in straight lines. And then we may use the waves measured in inches. Telephony has been accomplished across the Channel on these wave-lengths.

Meanwhile, we must stop treating television as a marvel and cease regarding sane critics as "superior persons" who want to "crab" a new art. They are as keen as anyone for success, but they know the difficulties.

TECHNICAL NOTES

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

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

Impedance and Slope.

SOME of the newer screen-grid valves are characterised by high impedances and steeper slopes. Perhaps I should say something about the "slope" of the curve of a valve; the significance of the slope is not always clearly understood, especially by those who are more or less new to wireless.

The simplest way to explain what is meant by the "slope" is that, for a given

impedance, the greater the slope of the valve the higher is its magnification factor. For instance, if a valve has an impedance of, say, a million ohms and a slope represented by the numeral 1, its magnification factor will be 1,000, whilst if the slope is doubled the magnification factor will be correspondingly doubled.

Danger of Distortion.

The increasing of the slope of a valve is not always an unmixed advantage, because if the slope or the impedance is increased the grid base of the valve is reduced and consequently less grid bias can be used and strong signals are liable to overload the valve. The result is that if strong signals are applied, grid-current may set in and a degree of rectification take place which has the effect of distorting the signal before it gets any further.

If a screen-grid valve is replaced by another having a greater impedance, even though it has also a greater slope, there is a possibility of the magnification being actually decreased, since the large slope renders the valve particularly sensitive to grid bias. It may be that the grid bias is already fixed for the first valve, so that, in view of the great sensitiveness of the valve to variations in grid bias, conditions may be altogether unsuitable for the second valve.

It is very desirable to use always the maximum value of screen-grid voltage. The impedance of the valve is diminished by increasing the voltage applied to the screen.

When it is desired to control the strength of a fairly powerful signal, this should not be done by reducing the screen voltage,

(Continued on page 394.)

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- 5 Definite pigtail connection to rotary vanes.
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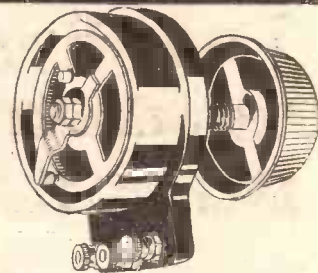
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Generally, full-wave rectification is the better method to use.

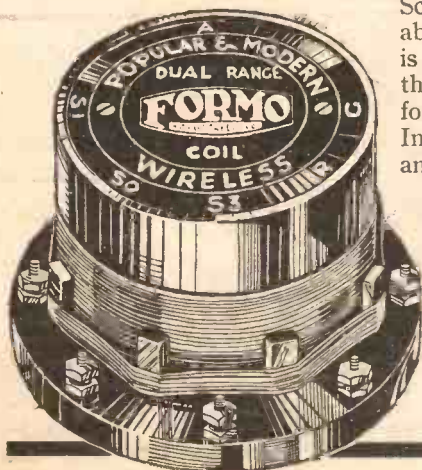
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CONDENSER

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CONSTANT SQUARE PEAK COIL

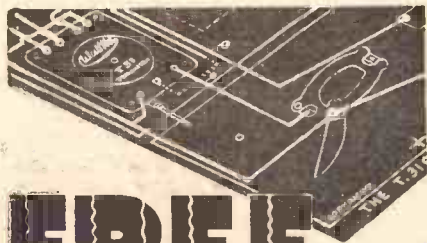
The Varley Constant Square Peak Coil is one of the most revolutionary inventions in the history of radio. It increases selectivity tenfold without impairing quality.

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Dear Sirs,—May I, as a satisfied customer, express my thanks for a very efficient tuning unit. Until recently I was using a circuit of a very well-known firm, and was very dissatisfied; but happening to notice your offer of a free blue-print incorporating an S.G. H.P. stage, I wrote, and after receiving a prompt reply enclosing blue-print and other items of interest, I immediately decided to build the set.

Stations now roll in, and when things brighten up in this part of the world I intend dumping my old components and using your make.

Faithfully yours,
(Signed)

UNIVERSAL DUAL-WAVE TUNER TYPE 31
This tuner can be incorporated in all receivers and greatly increases the selectivity of any set, cutting out all interference. It has had exceptionally good press reports and is accepted as the most efficient tuner possible.



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TECHNICAL NOTES

(Continued from page 392.)

as this has the effect of reducing the grid base, and most probably will introduce distortion.

Tricky Valves.

When going over to A.C. valves after having been used to operating the battery type you will often find them a little bit more "tricky," especially the screen-grid valve. You have to remember that this valve is capable of enormous amplification, and therefore the screening should be very carefully attended to in order to avoid feed-back.

It goes without saying that every screen-grid valve should be carefully screened, but this is not always done as efficiently as might be desirable. When it comes to the A.C. type, however, with its enormous magnification, as just mentioned, the need for screening is greater.

Similar remarks apply to the leads which carry the heating current, and these are liable to introduce a serious mains hum unless precautions are taken to avoid the same. The heater leads should ideally be lead covered, the covering being earthed, or they should be of carefully twisted flex and kept as far away as possible from the wiring of the set, particularly from the anode and grid circuits.

With a mains receiver using indirectly-heated A.C. valves, if proper precautions are taken it is possible to reduce the A.C. background to really negligible proportions. I have myself in use three receivers of this type, and in all of them the background is really quite insignificant, whilst in one of them no background at all can be heard unless you listen very carefully up against the loud speaker when no programme is coming through.

I should say that nothing better, so far as this particular point is concerned, could be desired.

Tinplate for Screens.

The part of the mains receiver which contains the supply units usually requires careful screening from the rest of the set. This is best done by the use of sheets of magnetic material (ordinary iron sheet or a number of sheets of "tinplate" are very suitable) the screens being, of course, well connected to earth. A sheet of similar screening material should be inserted between the heater wiring and the main body of the receiver.

To sum up these points with regard to A.C. background, if you are getting any unpleasant degree of A.C. hum due to interference between the heater wiring and the receiver circuits at some point or other, you have only to go carefully over the set, making sure that you have eliminated, by screening, all points where interference is likely to take place, and you should very soon succeed in cutting down the "background" to quite insignificant proportions.

Moving-Coil Speakers.

Many readers whose sets are somewhat on the smaller side—for example detector and one low frequency—express doubts as to whether they will be able to use a moving-coil loud speaker with their set, and seem to be under the impression that this type of speaker necessitates a

(Continued on next page.)

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2-Pin Type (Patented)
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Set of 4, 2, 4, 6, 8
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TECHNICAL NOTES

(Continued from previous page.)

very powerful receiver. I have also been asked more than once whether it is essential to use 6-volt valves in a set intended to work with a moving-coil speaker, or whether the ordinary 2-volt valves will be capable of handling sufficient volume.

Working Light.

The answer to all queries of this type really lies in the fact, not that a moving-coil speaker necessarily requires a very large input of energy, but that it is capable of handling relatively large inputs and producing correspondingly large volume of reproduction.

Perhaps a simple illustration is the case of a high-powered motor-car capable of doing, say 80 m.p.h.; when it is actually doing its maximum speed its petrol consumption is obviously pretty heavy, but it does not need to go always at maximum speed and is probably quite capable of operating efficiently at, say 20 or 30 m.p.h.

Returning to the moving-coil speaker, although this has, so to speak, a reserve of power, that does not mean that it is not possible to operate a moving-coil speaker quite effectively at a volume which is much below its maximum volume.

Provided, therefore, that you are not expecting very large volume output, there is no reason at all why you should not operate a moving-coil speaker with a comparatively small set such as the one indicated above.

Six-Volters.

As regards 6-volt valves, there is really no necessity for these in the ordinary way, and you should easily be able to find a 2-volt valve (for instance, the P.240) which will handle sufficient volume in the output stage of a three-valve.

It is, of course, important to give careful attention to the question of H.T. voltage in the output stage; and with the valve just mentioned an H.T. voltage of at least 120, preferably somewhat more, should be used, together with a grid voltage of about 21 volts.

With these arrangements it should be possible to obtain quite good volume without any distortion, although, should you at a later date go in for a more powerful receiver, you will naturally look for bigger volume of reproduction from the speaker.

Signal Strength.

Whilst on the question of output volume I should perhaps mention in passing that many people, especially beginners, think that a longer aerial will necessarily bring louder signals, and I am frequently asked this question in one form or another.

It is in one sense true that the longer aerial will increase signal strength, but there are so many other considerations to be borne in mind that generally you will find that

(Continued on next page.)

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THE PICTURE PAPER WITH THE MOST NEWS
—SUNDAY GRAPHIC—

TECHNICAL NOTES

(Continued from previous page.)

with a long aerial the disadvantages outweigh the advantages.

For example, in these days selectivity is becoming more and more important, and, unless a set is sufficiently selective, mere signal strength is of no value. Selectivity is usually much better with a short aerial than with a long one, so that if you go in for increasing the length of your aerial you are practically certain to diminish the selectivity of the receiver.

If signal strength for some particular station is not sufficient and you wish to increase it by altering the aerial, it is far better to raise the average height of the aerial, keeping the total length (including the lead-in) more or less the same, rather than merely to add to the horizontal length.

Output Valves.

Talking of the power-handling capacity of a loud speaker naturally brings us to the question of the power capacity of the output

TECHNICAL TWISTERS

No. 63. CRACKLING NOISES.

CAN YOU FILL IN THE MISSING LETTERS?

The commonest cause of crackling noises is an imperfect

The trouble may arise if the break is in the of the set itself, in the aerial or or in the battery or output leads.

It is very often found in a lead, and in such cases the covering may make it difficult to trace.

The actual crackle is caused by slight movements affecting conductivity across the gap, and so is liable to accompany any slight of the set, or shaking of the lead in question.

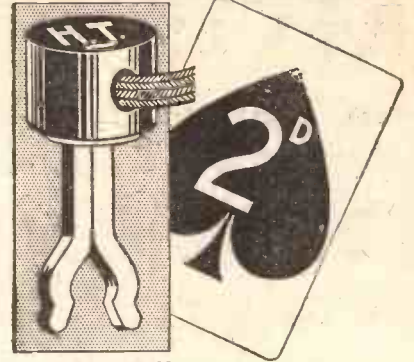
Last week's missing words (in order):
Electricity. Heard. Lightning.

valve. A good deal of the distortion which is often experienced is due to the output valve being unequal to its job.

Most people know nowadays that to get really successful working of a loud speaker it is necessary to have a power valve of some kind or other in the output stage of the set; but, nevertheless, I have actually seen sets using a loud speaker in which the output valve was an ordinary low-frequency one.

Another point is the high-tension and grid-bias voltage applied to the valve. If the loud speaker is connected in circuit with the anode of the output valve, this will knock off anything up to 20 volts from the voltage of the H.T. battery or unit—that is to say, the voltage which actually reaches the anode when current is flowing may be as much as 20 volts less than that at the output terminals of the H.T. battery or unit. The remedy, of course, is to apply a voltage of 20 or more volts higher than that which you actually wish to reach the valve.

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A pungent article which paints a vivid pen picture of the great author.

"... He likened broadcasting to a little toy telephone he had been given for a plaything when a small boy, with which, from one little pill-box to another along a length of string, his brother and he attempted to transmit human speech. . . .
 "... But let us be merciful. Mr. Wells has, maybe, changed his mind. Or why does he allow his maid a wireless set all to herself in the kitchen, and why does he contemplate the installation of radio in his house in France?"

"No, I should not have reminded the great man of the time when he donned the cap and bells . . ."

A SUPER-HET ADAPTOR

FULL details are given in the June "Modern Wireless" of an ingenious "super" attachment that can be added to any set with an H.F. stage.

"... there is no interference with the inside of your receiver; the change-over from broadcast to short-wave reception, or vice versa, being a matter of plugging the aerial into either converter or receiver and switching on—which takes but a few seconds. . ."

A LOUD-SPEAKER "BANDSTAND"

FOR outdoor radio reproduction this is a novel and most effective idea. It is easy to make and when completed can be used on scores of occasions where outdoor radio or gramophone reproduction is desired. Full details for building this ingenious loud speaker are given in the June issue of "Modern Wireless."

THIS MECHANISED MUSIC

Sir DAN GODFREY says:—
"MECHANISED" music has popularised music; it has introduced music into hundreds of thousands of homes which, comparatively few

years ago, were without it. It has cultivated a broader and nicer taste; for music is one of those things which improve, rather than deteriorate, with familiarity.

"You can no more become contemptuous of good music than you can of a good picture. What is good must remain good, and the more you have of it the more you are likely to appreciate its finer points!"

SHIELDING THE S.G.

"NO one will insist that the screened-grid valve is really easy to employ. At first sight the fact that it was self-screened and did not need

through a hole in the screen in order that adequate screening be obtained. The trouble—I will not say difficulty—in screening the S.G. valve has been one of its drawbacks, but now the manufacturers have come to the set designers' assistance; and although their latest advancement will not obviate screening, it will to a large extent assist in enabling full stability to be obtained."

HOW MANY CYCLES?

"THE so-called 'low-frequency' currents which are responsible for the musical sounds emitted by the

A DAY IN THE LIFE OF JONES!

"DISINTEGRATE yourself, brother! Disintegrate yo'self," I said. "Hush yo' mouth about dat," replied my conscience. But the idea of writing my autobiography gnawed at me until I placed my conscience in the pocket of my Sunday waistcoat and began to dally with the notion.

"Mature consideration revealed to me that the autobiog. of a man who has never done anything more thrilling than to 'sack' a cook—there were eighteen empty gin bottles divided between her mattress and the chimney of her bedroom!—would not be a seller, except for Messrs. Foyles', who on occasion sell old books at fourpence a pound! Nevertheless, after a gas-meter inspector had told me the history of a day in his life I realised that even the drab daily round of Brown might be of great interest to Robinson.

"I propose, therefore, to describe a normal day, a working day, of my life." And you will see the part that radio played that day! . . .

A "PLUS-VOLT" UNIT

"SOME people would blame the weather, or it might occur to them to take a voltage reading of their still 'new-looking' high-tension battery, and they would be horrified to find that instead of getting the full reading of 100 volts, which was expected, it will only give, say, 70 volts. What is to be done about it? Put their hand in their pocket and buy a new battery, or make the best of their remaining 70 volts and be satisfied with the local programme?"

Obviously the answer is a mains unit, and a cheap and reliable little unit is fully described in "Modern Wireless" this month. Read all about it and then—build it.

The above are extracts from the latest "Modern Wireless"—on Sale May 30th.

TOUR THE WORLD with "DX"

Every month in MODERN WIRELESS.

All you want to know about the World's Programmes—How, when and where to listen for them—is included in a fascinating, fully illustrated 16 page supplement.

Here are some of the contents in the JUNE "Modern Wireless" supplement:

- | | |
|--------------------------|---------------------------------|
| Warsaw's Wonder-Station. | A Selection of Firm Favourites. |
| More About Mühlacker. | Notes on Long Waves. |
| Getting Good Reaction. | Above 1,000 Metres. |

THE WORLD'S PRINCIPAL SHORT-WAVERS

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| Radio in Other Lands. | Making a Tuning Curve. |
| Americans to Look For. | Short-Wave Shorts. |
| News from the Stations. | Those Long-Distance Results, etc., etc. |
| Canada's Short-Wavers. | |

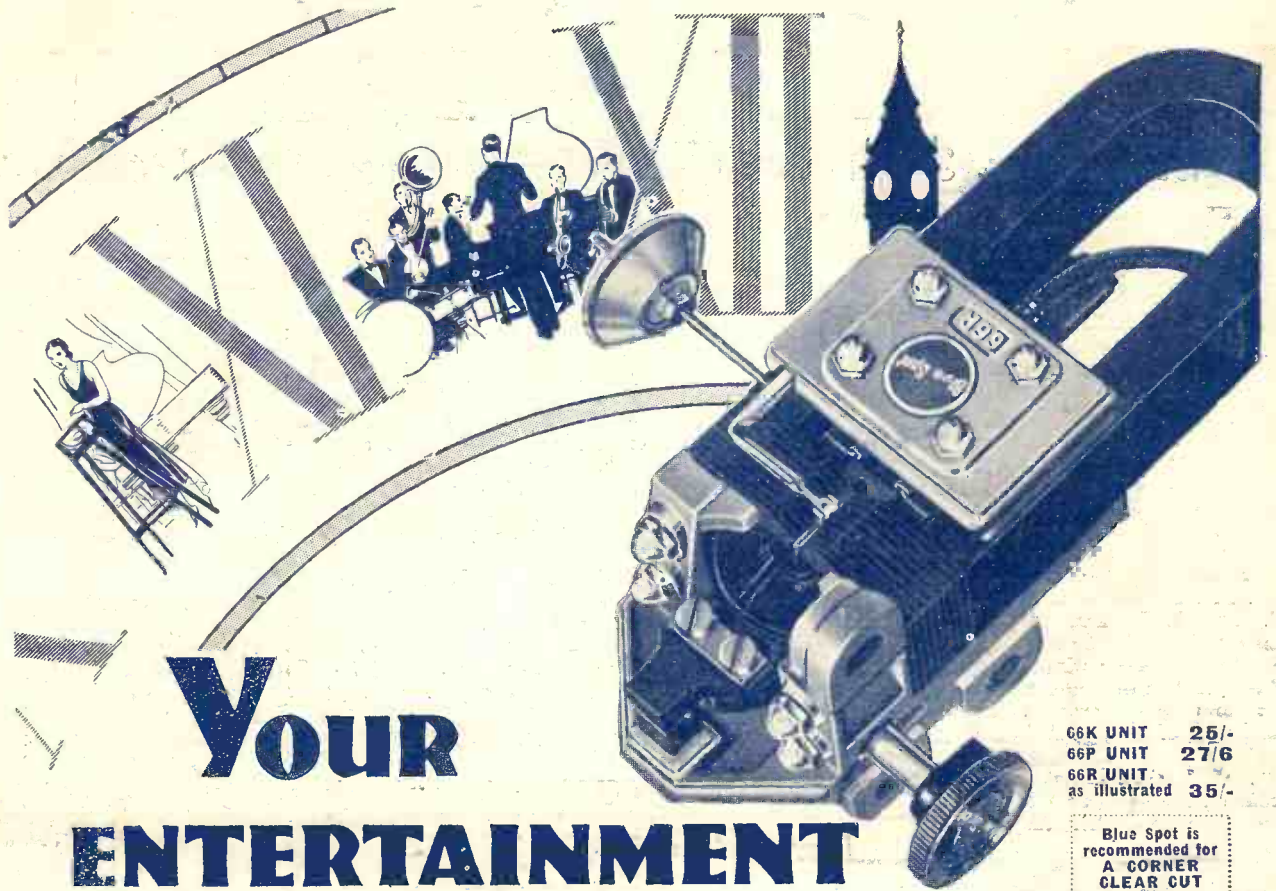
neutralising would make it appear that it was a simple type of valve and one which was almost 'foolproof' . . .

"... Nowadays with the increased magnification factors it is becoming increasingly important that the screening should be adequately and properly carried out.

"The mounting of the valve vertically behind a screen, and the taking of the anode lead through the screen, gradually became inadequate in most cases, and one usually has to arrange the valve horizontally

loud speaker may have any frequencies between 50 and 5,000 cycles per second, while the very highest notes, such as the 'harmonics' of a violin, have frequencies even higher than this. These frequencies, of course, represent the highest possible rapidity at which it is possible to cause the mechanical diaphragm to vibrate in order to affect the auditory nerves in our ears. . . ."

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