

ALL ABOUT YOUR BATTERIES (See Page 603)

Popular Wireless

Every Thursday
PRICE
3d.

No. 476. Vol. XIX.

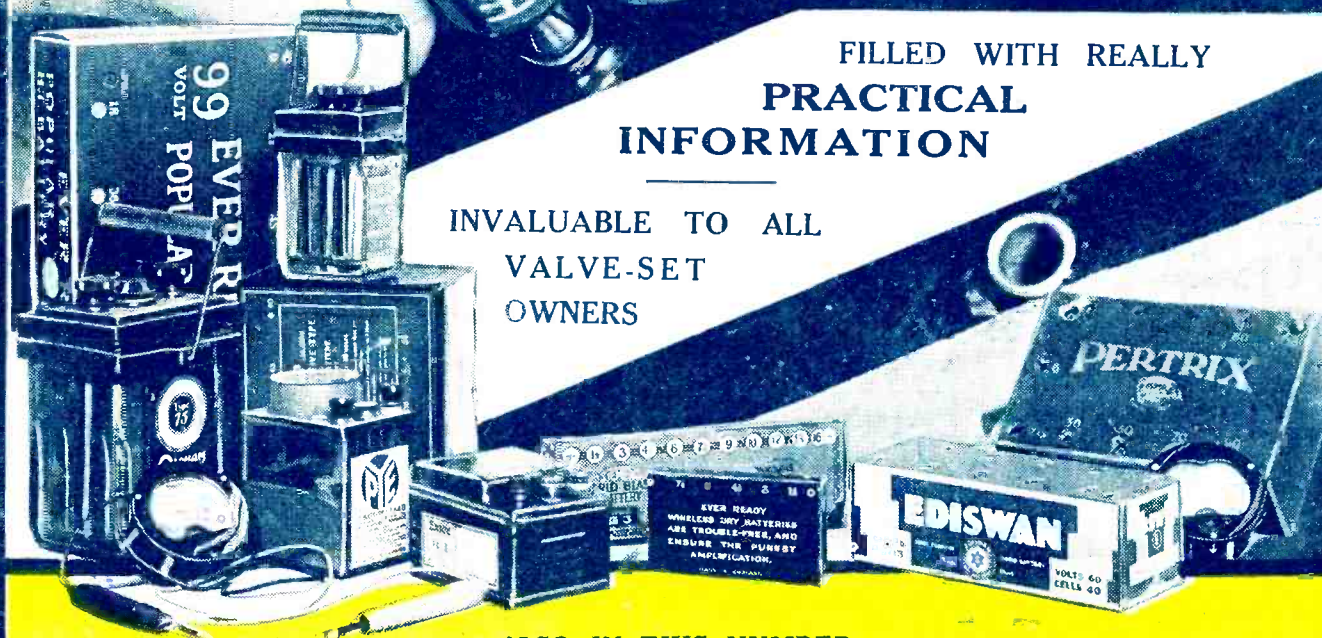
INCORPORATING "WIRELESS"

July 18th, 1931.

SPECIAL BATTERY NUMBER

FILLED WITH REALLY
PRACTICAL
INFORMATION

INVALUABLE TO ALL
VALVE-SET
OWNERS



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LOOKING AFTER THE L.T.

THE "P.W." "UNI-POWER"

AN ARTICLE BY CAPTAIN ECKERSLEY, M.I.E.E.

Etc., etc., etc.

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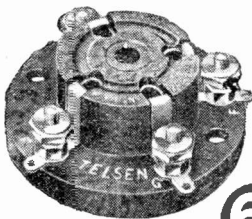
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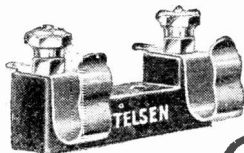
TELSEN CONSIDERS THE HOME CONSTRUCTOR NEW COMPONENTS AT AMAZINGLY LOW PRICES

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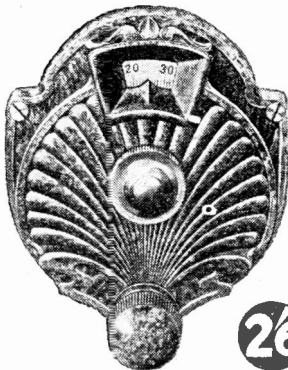
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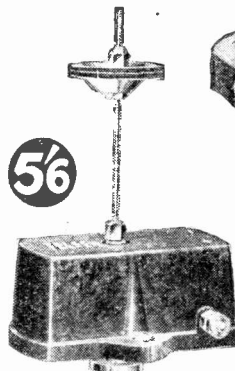
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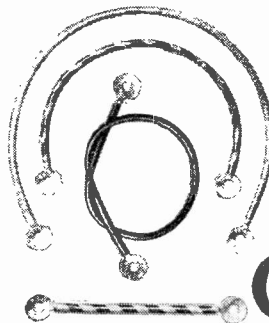
2/6

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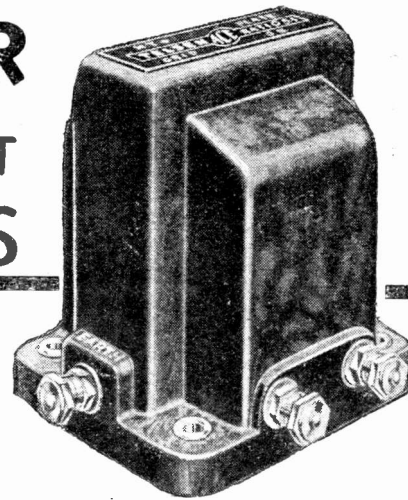
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TELSEN SPAGHETTI FLEXIBLE RESISTANCES. Terminal tags firmly fixed to the wire, clearly marked with resistance values, protected from corrosion by application of special insulating compound.

Made in the following values:

Resistance Ohms	Max. Current	Price each
300	600	42 m/A. } 61.
750	1,000	42 m/A. }
1,500	2,000	23 m/A. } 9d.
3,000	4,000	23 m/A. }
5,000		23 m/A. }
10,000	15,000	6 m/A. } 1-
20,000	25,000	6 m/A. }
30,000		6 m/A. }
50,000	60,000	3 m/A. } 1/6
80,000	100,000	3 m/A. } 1/6
150,000	200,000	1 1/2 m/A. } 2-

5/6
8/6

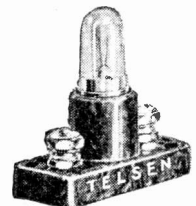
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They are now more than ever "Radio's Choice" for "Better Radio Reception." Price
Ace, ratios 3-1 and 5-1 ... 5/6 each
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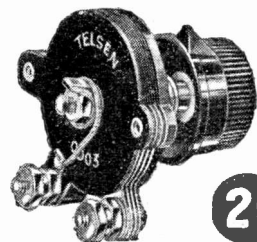
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THE TELSEN FUSE HOLDER is a definite precaution against burnt-out valves. The terminals are easily accessible and the Fuse Bulb is held firmly, giving perfect contact. Price 6d. each (without fuse).

TELSEN RADIO FUSE. Price 6d. each.



2/-

BAKELITE DIELECTRIC REACTION CONDENSER. Made in capacities of .0001, .00015, and .0003. Price 2/- each. Capacities of .0005 and .00075. Price 2/6 each.

BAKELITE DIELECTRIC TUNING CONDENSER. Made in capacities of .0003 and .0005. Price 2/- each.

BAKELITE DIELECTRIC DIFFERENTIAL CONDENSER. Made in capacities of .0001, .00015, and .0003. Price 2/- each.

TELSEN

THE LARGEST RADIO COMPONENT MANUFACTURERS IN THE WORLD

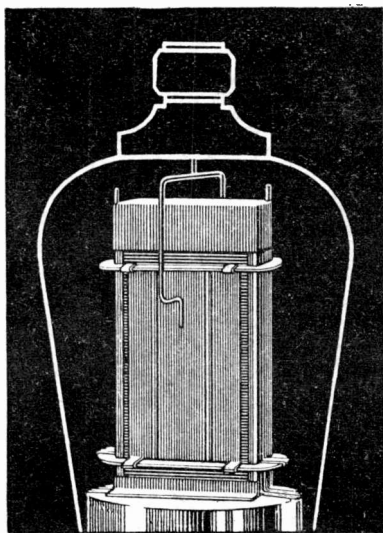
Simple facts
for Valve users

How Cossor improves Receiver performance

THE characteristics of its Screened Grid Valve largely determine the performance of any Screened Grid Receiver.

Because its inter-electrode capacity has been reduced to the order of .001 micro-microfarads—lower than that of any other S.G. Valve on the market—the Cossor Screened Grid Valve permits remarkably high effective amplification per stage resulting in increased range.

And because, due to a unique characteristic, its curve has a long



straight portion prior to the commencement of grid current, the Cossor S.G. Valve easily handles relatively heavy grid swings without risk of rectification which would cause cross modulation, thus ensuring maximum selectivity.

The use of this Valve in any Screened Grid Receiver ensures a marked increase in range and selectivity. Cossor S.G. Valves are obtainable from any Wireless Shop in types to suit all 2-, 4- and 6-volt Battery Operated and A.C. Mains Receivers.

Get one of our novel Circular Station Charts which give identification details of nearly 50 stations with space for entering your own dial readings. Ask your Dealer for one or write us enclosing 2d. stamp for postage and head your letter "Station Chart p. W."

COSSOR

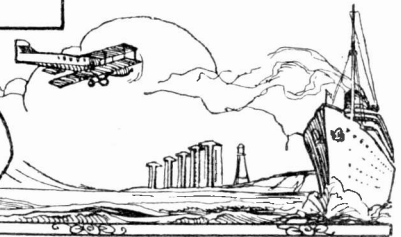
SCREENED GRID VALVES

Popular Wireless

LARGEST NET SALES



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Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.



**LIKE A MAN
U.S.A. RADIO
TESTIMONIAL
A GROUSE**

RADIO NOTES & NEWS

**A HOLIDAY TIP
THUMBS UP
SOCIETY NOTE
MUST MORSE GO ?**

Radio "Exchanges."

I AM glad to see that, so far from declaring open warfare on the ordinary wireless "trade," as some traders have done to them, some of the relay companies are showing a better spirit and certainly more practical sense than the traders. Two relay companies at least have offered local traders the opportunity of cooperating in the relay business. As one of the relay people pointed out, "When radio came along, did gramophone manufacturers try to stop it? No, they went in for it themselves." Now it's up to the dealers to show themselves to be business men.

The Making of a Vegetarian.

THE day's grub is spoiled for you and for me.

When they broadcast "Fat stock prices":
We wish we ate nuts and lived up a tree,
When they broadcast "Fat stock prices":
The thought of corned beef is as bad as can be,
Chops and steaks are mere bites off the cows on the lea,
And kidneys ain't what they're cracked up to be,
When they broadcast those "Fat stock prices"!

"Spoke Like a Man!"

S. N. who a few weeks ago got slightly "fresh" with me because I sang the praises of the "Comet" as vigorously as Chaliapine in his bath, now returns to the subject and confesses that he has since made a "Comet" Three for a friend "and nearly put the 'Magic' in the dustbin." He adds that not only do "P.W." sets deliver the goods but can be made at a reasonable price. Spoke worry 'andsome! Put it there, S. N.! It gives me a pain to tell you, after such an amende honourable, that I cannot, must not, use these columns for advertising American radio magazines. Why not ask the local radio club?

King's New Microphone.

THE MARCONIPHONE CO. have had the honour, for the second time, of making a microphone for the exclusive use of H.M. the King; it will be used for the first time at the opening of the King George Hospital, Ilford. I wonder where the first one is or will ultimately rest, and why it must needs be succeeded by a

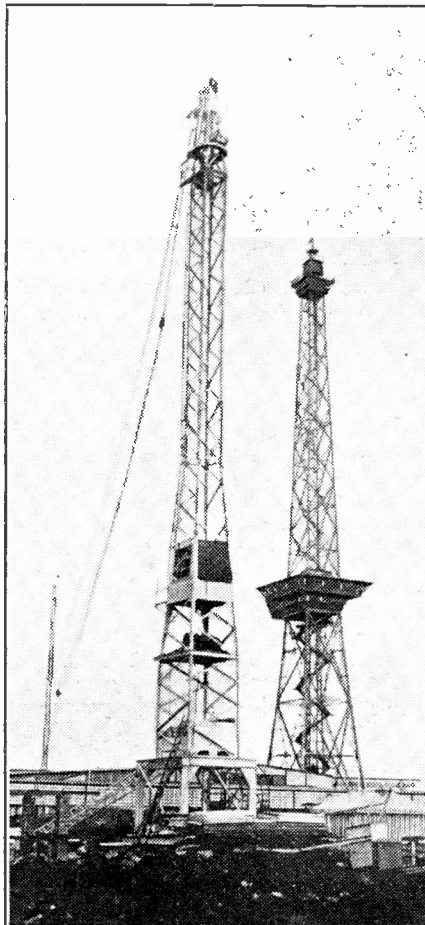
new one? I have seen No. 1, and a very handsome golden instrument it is. I would like to know! There surely can be no question of its being inefficient or worn out.

U.S.A. Radio in 1931.

AMERICA creeps into my Notes very frequently—too frequently, some may think—because one cannot overlook America, however much one may desire to

forget that land of noise and unrest. Due perhaps to the imp of the perverse introduced by the powerful Irish element in that nation-in-the-making, American radio this year runs violently to tiny "flea-power" sets, thus belying our notion that to Americans the "biggest" is the "best" necessarily. Well, they have simply reversed the connections, and now I suppose they will point proudly to their microscopes and say that by their aid alone can American receivers be noticed.

WHICH IS HIGHER ?



These are not twin towers, but one is Berlin's huge radio tower and the other just a tall crane. The angle at which the photograph is taken, however, makes the crane look higher than the tower.

The R.A.F. at Hendon.

I HAD the great privilege of being present at the special rehearsal of the R.A.F. display at Hendon on June 26th, for which I am profoundly grateful to my lucky star and the courtesy of the Ad Astra authorities. Gummy! how those fellows whizzed and swooped and fluttered! Human gnats! Great lads, all! Little does the gaping public realise the complexity of organisation which is necessary to the success of such a spectacle.

Telephone systems to control the traffic, the flying, and for the use of administration; loud speakers, wireless telegraph and telephone stations, and broadcasting arrangements! No less than 60-80 miles of wire and cable!

A magnificent display of flying and organising genius.

A Little Testimonial.

THIS comes from H. F. (Preston), who before making up the P.W. "Easy Change" Three had never handled any wireless components. Well, he collected the necessary parts from Peto-Scott and bunged them together. Then he hitched up an aerial of sorts round the bedroom wall—and then he had no trouble in separating "the two stations at present radiating in the North region." In addition he gets "many foreign stations after dark." This set has given no trouble for nine months.

A Grouse from Wales.

WITH a faith in the influence of "P.W." which makes us go hot and prickly all over, G. B., of Swansea Valley, writes to implore our aid in influencing the B.B.C. to remember Wales. Ses he: "Here, in this part of Wales where the majority of us are tied to 'Dismal Daventry,' we cannot get Cardiff, Swansea is useless, and were it

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

not for foreign stations I think I should dismantle." He wants a "Regional" for Wales. A most laudable desire, I am sure. But why cannot he get Cardiff, and why is Swansea useless?

A Holiday "Tip."

IF the weather during your holidays is fine—and Ariel will invoke all his lucky charms that it may be!—there may come hours in the languid afternoons when a chair and a magazine appeal more than more strenuous occupations. But on wet days you will probably need something so absorbing that you forget to "grouse." Good! The July number of "Modern Wireless" is plainly indicated. The "Simplicity" Super, a 5-valve super-het.; a special Supplement about foreign stations; the "Hi-Mag." Four; the "Compact" Two; and articles of technical and human interest on a number of radio subjects. All most soothing!

The Tatsfield Crash.

TATSFIELD receiving station, the B.B.C. listening-post in Kent, is very close to the track of Continental planes making for Croydon, and the other week engineers there had a scare. It was late at night and misty at the time, and a Gipsy Moth two-seater was seen to circle round Titsey Hill looking for a landing place.

It narrowly missed the Tatsfield masts, and was making a good landing when a sudden swerve snapped off the propeller. The pilot scrambled out bruised and cut, but not seriously injured, although the plane was then upside down!

Rot About Radio.

I REGRET to have to join issue with an eminent journalist like James Douglas, but he has been writing balderdash about radio. He says ("Sunday Express," June 21st) that the selfish use of radio "makes life unbearable for thousands." Bunkum! He says that the quiet reaches and backwaters of the Thames are "desecrated by punted portables." No! He says: "Remember that there are millions who hate radio and all its works." He is mistaken and he exaggerates vilely. He says that radio is a "public peril." That is Sunday journalism gone mad.

"Thumbs Up!"

IN these days when "slump," "depression," and "economic blizzard" are almost household words, it is stimulating to realise that the General Electric Company, the largest electrical manufacturing concern in the Empire, made a profit of £1,122,007 for the year ending March 31st last and declared a dividend of 10 per cent. on its Ordinary Shares. This great company has over twenty factories in Great Britain and controls selling organisations in more than thirty countries overseas. And "P.W." has the largest radio circulation in the world. So—thumbs up!

America Discovers the Pentode.

AND, moreover, here is another reason to take heart of grace and buck up. American manufacturers are now advertising that the pentode valve will be extensively used by them in their 1932 receivers. Now you and I know that pentodes have been used in British receivers for some years. So one concludes that we are ahead of the Yanks in this matter. In fact, many things go to prove that all this "go-getter" stuff from the other side is mere "sales talk," bluff, poker and poppycock. The British are brainy, and

SHORT WAVES.

The B.B.C. arrangements for broadcasting strange sounds have been fairly successful, but all attempts to catch the faint notes of a Post Office assistant saying "Thank you" to a purchaser seem to have failed.—"Punch."

Listening-in is a retreat for the husband, a recreation for the wife, and a solace for the spinster.

BRIGHTER BROADCASTING.

1. Half-hours with the Sea Serpent. (A talk by Uncle Eye-witness.)
2. Songs of the Oyster Bed. Unique transmission by deep-sea radio, accompanied by Miss Scylla Charybdis on the cornucopia.
3. 'Stingless Bee-Tickling. (In our New Industries Series.)
4. The Sawdust Manufacturers' Annual Dinner, relayed from the Pit, Camden Town; the Circular Sawchestra will be in attendance.

A Wireless Expertlet from Bristol in error once swallowed a crystal. This caused oscillation. So, in desperation, he "earthed" himself—using a pistol.

A resident in a cathedral city wrote to us the other day saying that the chimes from the cathedral came in so strong on his one-valve set that the whole town rushed out to help extinguish the fire.

"Wireless forms bad habits," we read in the "Evening News." On these hot nights it certainly isn't an asset in the "Love Thy Neighbour" movement.

"Try breaking your valves!" runs a headline in the "Sunderland Echo." Well, that might help to relieve our feelings a little.

get on quietly with the job in hand. I prefer the British qualities and bank on them to win in the end.

British Legion Garden Fête.

THIS jolly little "do" was held at Godstone Place, Godstone, by gracious permission of Lady Kenyon, and went off splendidly. The programme of dance music was arranged by the Civil Service Supply Association, Ltd., in conjunction with Radio Instruments, Ltd. As I don't dance I investigated the "works" and became very interested in the R.I. "Madrigal" receiver, the R.I. Twin Table cinema amplifier and the Madrigal M.C. loud speakers. Undoubtedly this gear added greatly to the enjoyment of the guests.

Soldering Pastes.

IN connection with my Note a few weeks back on the subject of soldering pastes and their tendency to injure joints, O. L. C. tells me that a good substitute is

a saturated solution of lump resin in pure alcohol. Absolute alcohol is pretty costly and methylated will serve the purpose though not so well. Thanks, O. L. C. I am passing your short-wave comments to W. L. S. Always glad to have a line from you on matters of public (radio) interest.

Society Note.

DO you belong to a radio club? It's awfully good fun, especially in the summer when all kinds of interesting outings can be arranged, but also in the winter when open air is not so loud in its call. Those readers within reach of Thornton Heath might do worse than try the Thornton Heath Radio Society. Hon. Sec., Mr. C. H. Piper, 77, Torridge Road, Thornton Heath, S.E., who will be glad to give them full particulars.

The Queen's Hall "Proms."

THE greatest musical feature of the summer programmes is undeniably the broadcasting of these famed concerts. The general layout of the series, which begins on August 8th, is: Mondays, Wagner. Three Tuesdays to Mozart and Haydn, two to Tchaikovsky, one to mixed Russian music and two to miscellaneous works. Wednesdays, alternating Brahms and Bach; Thursdays, British composers; Fridays, Beethoven; and Saturdays, miscellaneous. If, as I hope, some of you attend the Hall, book seats very early and make sure that they are in a section in which smoking is allowed!

Want to Sing for the B.B.C.?

THE B.B.C.'s ban on amateurs does not, apparently, apply to the National Chorus, for there are a few vacancies for singers, and amateurs who are interested should apply to the Hon. Sec., National Chorus, B.B.C., Savoy Hill, W.C.2. Applicants must pass an audition in singing and sight-reading. Tenors are particularly wanted. (It's a queer thing; but tenors are always and everywhere scarce.) The chorus rehearses in Central London on Fridays from 6.0 p.m. to 8.0 p.m. or 8.30 p.m. As the total chorus counts about 250 singers, a place amongst them must be a source of great pleasure to singers.

Must Morse Go?

UP to the time of writing the Morse code is still being used for the transmission of radiograms. Can something better and swifter be found? Well, along one line of development we shall come to the facsimile process, by means of which a copy of the actual message is received at the station of destination. Now I hear of an American invention by means of which the message is typed out by the transmitting operator and received in typewritten characters at the other end of the radio circuit. Fine, but the speed of the typing must be very slow compared with that of modern automatic transmitters, which can work up to 200 words a minute.

ARIEL.

NEXT WEEK'S STAR FEATURE—THE S.P.V. THREE

THAT COPENHAGEN CONFERENCE

BY Capt P.P. Eckersley M.I.E.E.

I READ that the Chief Engineer of the B.B.C. was seen off at Liverpool Street by the writer of the "Notes and News on Broadcasting" in POPULAR WIRELESS. It brought a little wrench to my heart; I, too, should like to be going to Copenhagen!

There is nothing so vital to our interests as the world position of wireless; nothing so important as to decide between present knowledge and past practice as to the deciding factor in the allocation of wave-lengths.

Not Content with Present Progress.

Were I not busy pioneering new schemes, I should be at Copenhagen. I should be there simply a looker-on.

I should not now be a delegate to the Conference because, no longer having position as an executive, I no longer have the ability to understand the problems—at least, that is the implication.

But I can tell you what I think of the problems because, although no longer official I remain interested. I remain interested because my life is bound up in the distribution of "programme" to every household.

I cannot remain content with present progress because I can see how technique will evolve and, seeing it all so clearly, I am impatient of delay.

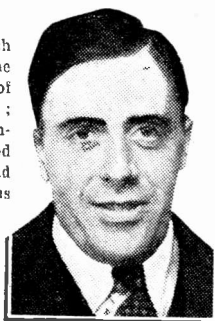
When the first sound was reproduced electrically, even though the unromantic wire was the agent, the world held in its hand a great new power for the spread of liberal thought. The technique of distribution of thought grows slowly but very surely, managed as it is by those whose problems are circumscribed.

The policy of what shall be disseminated is guided either by a grandiose commercialism pretending "uplift," or a narrow and denying autocracy delegating to itself the right to decide the fitness of the listener to hear this or that.

For Good or Ill?

I look upon our duty as technicians to find such a universality of method that there can be no excuse for denial of facility. And that is why Copenhagen has a certain importance. Even though its decisions, in fact,

Don't rush through the reading of this article; it's an unusually good one! And it concerns you!



Our gifted contributor, "P.W.'s" Radio Consultant-in-Chief, pleads for the liberation of more long waves.

mean nothing, they will show a tendency which may be either good or bad.

It is a question whether present knowledge or past practice should guide the policy of those who will hold the next executive world Conference at Madrid, and, the Copenhagen Conference, being composed of many of those who will have to decide the issues at Madrid, will show what policy rules.

Indeed, if our technicians are unable to take the bold line what can be expected of the politicians?

Take this vital question of waves for broadcasting. I am the very first to allow that the Union Internationale cannot be

expected to be allowed to grab every wave-length it demands, regardless of the commercial interests, but will there be an honest desire to allocate to it those waves which we in the B.B.C. proved to be those most suitable for broadcasting?

Or will they, through asking too much, alienate the sympathy of Governments, and will they be driven to abandon the claims for "long" wave-lengths?

Long Waves Only?

The Americans have so far agreed to a Regional arrangement in which Europe uses the "long" waves and America does not. This prevents the export of American sets to Europe. The radio trade of Europe, if it paid me one-tenth of a farthing on every American set kept out by my policy, would by now have made me a properly recompensed millionaire. Will not pressure be brought to bear to change this state of affairs?

I notice that one American has written publicly acknowledging my work on the subject, and pointing out that America could well adopt my proposals for long-wave broadcasting. But that's one independent person four years after the publication of my work!

It took three years to convince our Post Office that it was possible to separate on an ordinary set two equal-powered stations radiating from the same point, with more than 100 kilocycles per second frequency difference. Yes! It's all rather slow going, but it's the direction of thinking which interests me, and that's why Copenhagen will give us some data to think over.

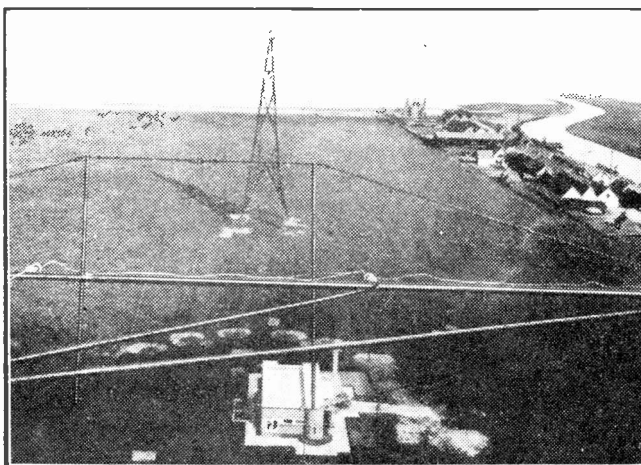
The Real Alternative.

Unquestionably the long wave is the thing. Thirty stations from 2,500 metres downwards of 200 kilowatts each and 12 kilocycles separation would make an ideal system for the distribution of national programmes, and give each listener in each nation a real alternative—the alternative of another nation's programme.

The development of an international language would then do more towards a true United States of Europe than almost

(Continued on page 616.)

ONE OF THE BEST



This is a general view of the Huizen station, which works on 1,875 metres. Although comparatively low power is used, it is very well received in this country.

THE MIRROR OF THE B.B.C.

DANGERS OF DEPARTMENTALISM. BRIGHTER NEWS WANTED— REDUCTION OF STAFF—THE BOLSHEVIST PANIC—DIRT- TRACK COMMENTARIES

ONE of the first impressions recorded on my mind after my recent resumption of criticising the B.B.C. has been confirmed by close examination. I mean the evils that flow from excessive departmentalisation.

If you care to look through the advanced summary of the adult education and general talks programmes for next season, you will get an excellent illustration of what I mean. Both these summaries contain a good proportion of first-class material. The range of interest is wide: the intellectual standard admittedly high. But as an ordinary layman I was oppressed by a sense of the tyranny of the expert.

The B.B.C. takes great credit to itself for providing a forum for the active intellectuals and younger specialists of all branches of knowledge. I would be the last to deplore this attitude were it not accompanied by a curious snobbery which seems to be vindictively disposed to the cult of common sense.

I look in vain for the, to me, at all events, very important ingredient of simple, intimate, homely, perhaps even undistinguished, treatment of ordinary subjects for ordinary people. This is a defect. I do not blame the specialists, but I do blame the administration that tolerates it. I am told on good authority that Sir John Reith is alive to the danger and its attendant evils.

I can only hope that, if this is so, those who are responsible for interpreting his views will not continue in an attitude of *laissez faire*.

Brighter News Wanted.

While I was in America I read in a wireless paper of about fourteen months ago a glowing account of how the B.B.C. expected to transform its News Bulletins by taking them over from the agencies which had been handling them from the beginning.

I was more than ordinarily curious to find out how the experiment was working in practice. Frankly, I am disappointed. It seems to me that the News Bulletins have become much too cautious. Their characteristic is now "officialise."

Mind you, I do not quarrel with the B.B.C. view that sensationalism should have no place in these bulletins, which penetrate millions of homes nightly. Indeed, I would go further and say that, on the whole, the present selection of material is not bad. But it wants much brighter presentation, and until this is brought about the bulletins will never pull their weight for the B.B.C.

Reduction of Staff.

I was present the other day at a discussion in which the principals were two of the administrative officials of the B.B.C. The discussion began on the general subject of rationalisation in administration.

But, of course, as all such discussions do,

this one soon became particular, at least, so far as its illustrations were concerned. It interested me enormously to hear my B.B.C. friends agree that they had been able to draw important lessons from observing the state of work during the holiday period.

This in the case of the B.B.C., runs from about the middle of June to about the middle of September. During this time, staff is considerably reduced.

Experience has proved that, even allowing for the slack season, the work is done definitely better than when all the staff is present. It was added, as an aside, that plans were in hand to reduce the staff all round so that the holiday average would become the average the year round.

It was not explained to me how these experts in administration would manage

their holidays with a reduced staff. Nor why they should not go on indefinitely reducing on the same principles. There was a suspicion of the "doctrinaire" about the whole contention; and I imagine Sir John Reith will have something to say about it.

The Bolshevik Panic.

Once again the B.B.C. has been accused of being an instrument of Bolshevik propaganda, only this time the critics allege that Savoy Hill is an unconscious victim: last time it was a calculated effort. My view is that there is nothing in the accusation. Of course, it will be made and repeated every time the B.B.C. gives any view not acceptable to "rightish" opinion, but who would have nothing but his own views broadcast?

Dirt-Track Commentaries.

The news that National listeners are to hear a running commentary on the dirt-track motorcycle racing at Wembley Stadium on Friday, August 14th, has set me wondering why such a long time has elapsed since the last broadcast of this kind.

Unlike another sport, called "the Dogs," which also takes place on a circular course, dirt-track racing is essentially spectacular and full of thrills and does not have to depend on gambling to attract its thousands who turn up week after week to see their favourite riders take no small risks to win the prizes.

THOSE DASHED DOTS!



Girl Guides receiving Morse messages which are being sent by wireless from a neighbouring camp.

FOR THE LISTENER.

By "PHILEMON."

This week our popular contributor deals with subjects suggested by recent radio references to Dreams.

A VERY large number of people must have listened to talks on Dreams on the Radio. If you want to study the stars, you have to go out to see them; if you want to watch for the first egg of the blackbird or the first bloom of the black-thorn, you have to go out and find them. But dreams are to hand for all of us; sometimes far too close at hand!

It is interesting to observe how modern science comes back to old beliefs—though, of course, not quite in the same way. In olden days they believed that dreams had meanings. Joseph did. So did Pharaoh.

The Happy Hunting Grounds.

There is a school of thinkers who say that the belief in the "Soul" originated with the experience of dreams—in which a man went hunting in strange fields and fighting glorious battles, while all the time he was lying on the ground. What else could it be except his "soul," which escaped the body for a moment?

Afterwards there came a time when people said that dreams were meaningless and had more to do with indigestion and cold feet than anything else. But nowadays we are again believing that dreams have meaning, and very profound meaning, too.

Having A High Time.

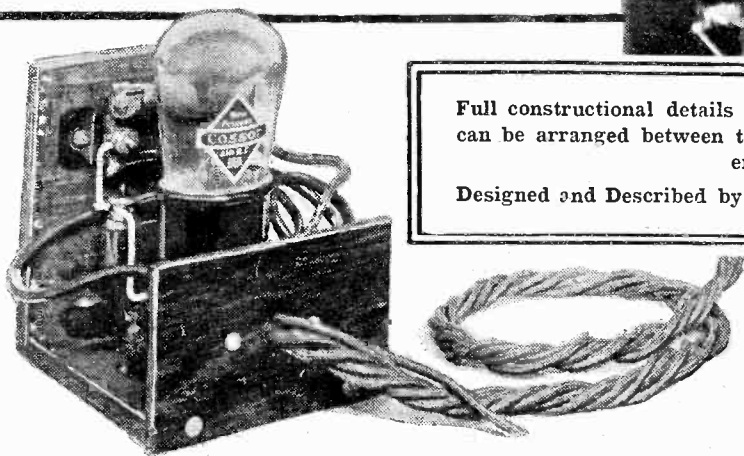
Perhaps every dream has a meaning of some sort, if we could only fathom it; but there are certain dreams which are apparently constantly dreamed by men and women all over the world. These are called "type-dreams."

The "flying" dream; the dream about raw meat; the dream of losing a tooth; and so on. These dreams are so widespread and occur so frequently, and with the same circumstances, that their meaning can be stated with certainty.

I dream the "flying" dream often. I float over the heads of a company gathered in a garden; now dipping gently down and

(Continued on page 617.)

THE "UNI-POWER"



Full constructional details of a unique plug-in valve amplifier which can be arranged between the detector and L.F. valves to give greatly enhanced volume.

Designed and Described by the "P.W." RESEARCH DEPARTMENT.

THE first power valve, although hardly a power valve at all in comparison with modern output valves, undoubtedly started a new era in good quality, powerful reproduction. It threw a new light on realistic reception, but at the same time it certainly complicated things in one connection at least.

The point we have in mind is the addition of an extra L.F. stage to a receiver with one L.F. In the "olden days" the loud speaker was plonked straight into the plate circuit of the last valve, and all was well.

Modern Practice.

The current through the output valve was not high and so the voltage drop across the loud speaker was small and of no consequence. Also there was little, if any, likelihood of the current saturating the speaker and thus causing distortion.

But now it is desirable to avoid voltage drop and saturation possibilities, and for this reason output filters are incorporated in receivers. They are, of course, desirable for reasons other than those we have

FEW COMPONENTS ARE NEEDED.

- 1 Valve holder (Lotus, or Telsen, W.B., Igranic, Lissen, Clix, Bulgin, Junit, Benjamin, Formo, Wearite, Dario, Magnum, etc.).
- 1 Fixed condenser (T.C.C., or Ready Radio, Telsen, Dubilier, Ferranti, Mullard, Igranic, Ediswan, Lissen, Watmel, Formo, Graham-Farish, etc.).
- 1 1-Megohm grid leak and holder (Dubilier, or Telsen, Lissen, Ferranti, Ready Radio, Ediswan, Igranic, Mullard, Watmel, Graham-Farish, Varley, etc.).
- 100,000-ohm Spaghetti resistance (Bulgin, or Ready Radio, Lewcos, Magnum, Peto Scott, Sovereign, Graham-Farish, Lissen, Varley, Tunewell, Telsen, etc.).
- 15,000-ohm Spaghetti resistance (Ready Radio, or Lewcos, etc.).
- 4 Valve pins, 4 valve sockets, 1 small terminal, 1 wooden plug (Eelex, or Igranic, Belling-Lee, Clix, etc.).
- 2 Nuts and bolts, screws, flex, wood, ebonite, etc.

mentioned, but voltage drop and saturation are two of the more important.

Just consider the difference between adding an extra valve to the old set and the modern one. With the former, one simply connected the input of a single valve amplifier across the set's L.S. terminals and transferred the speaker to the other end of the added amplifier and, *voila*, the set went up one stage!

But now, well—the output filter must still be kept in the plate of the last valve, and the new valve which is naturally not another power valve, must in effect go between the present two valves of the set. So alterations of the wiring of the receiver become necessary, in fact, the whole L.F. end has got to be re-made, no simple job.

No Re-wiring Required.

We say "has got to be re-made," but that is not really correct because the unit described in these pages is specially designed to make that unnecessary. "Re-making" is just what it is arranged to obviate.

With it you can insert an extra L.F. stage immediately following the detector valve, and without making any alterations to the receiver. All you have to do is to pull out the detector valve, insert a plug in its place and put the valve in the top of this plug, just like a gramophone pick-up adaptor.

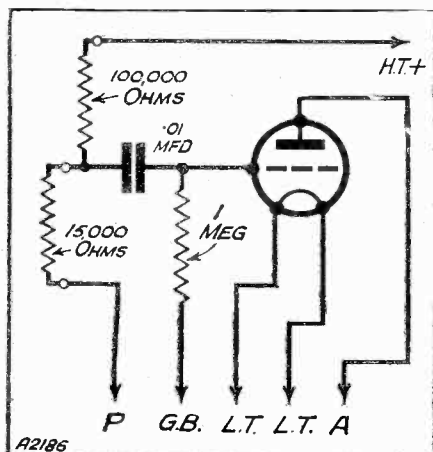
Ever So Simple.

That is all there is to it, but should you wish to use reaction still (in spite of the extra mag.) there is merely one wire to change over and the controls remain the same as before. What is more, the unit is so compact that in most cases it can be accommodated inside the receiver and generally on the baseboard.

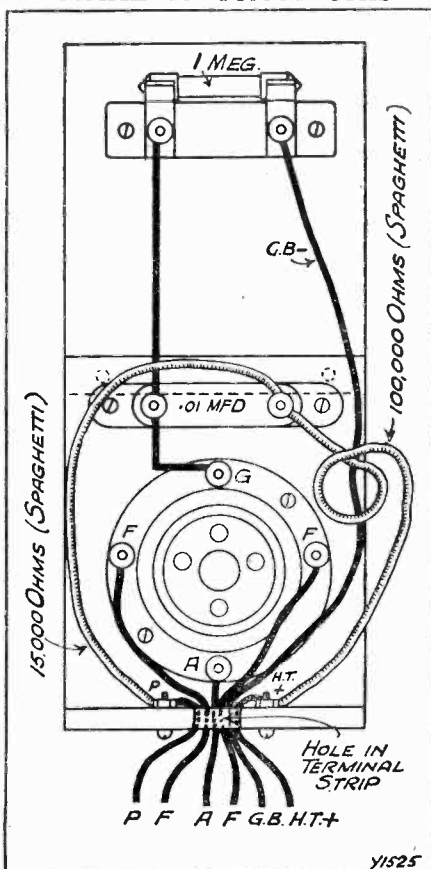
(Continued on next page.)

MAKE IT FROM THIS

PERFECTLY STRAIGHT-FORWARD



The circuit is a very simple one, and, as you can see for yourself, the coupling is of the resistance-capacity type.



Here is the wiring diagram. The letters against the flex leads correspond to those on the plug shown on the next page.

THE "UNI-POWER"

(Continued from previous page.)

The unit is suitable for any straight-forward type of set that has only one L.F. stage, providing a pentode output valve is not in use. The coupling to the new valve is resistance-capacity, and the coupling previously existing between the detector and output valves now serves to couple the new valve to the output valve.

You can follow this out for yourself from the circuit diagram of the unit and the diagram of the adaptor plug. You will note that there are two resistances of the spaghetti type.

Marking the Holes.

One of these is for coupling, while the other, the 15,000-ohm one, serves as an H.F. choke for reaction purposes. This is necessary, because the ordinary H.F. choke or resistance in the set, is no longer in the plate circuit of the detector valve when the unit is in use.

The plug adaptor is the first thing to make, and you will agree that the details are made clearer by the diagram than even a long discourse in words would make them. However, there are one or two points worth mentioning.

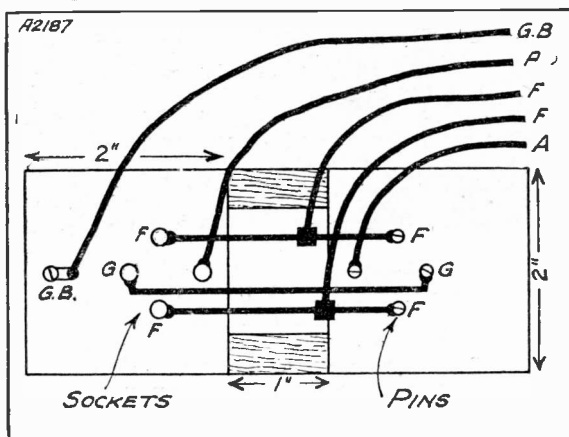
First, as regards marking out the positions for the holes for the valve pins and sockets. These are best marked by means of a paper template, made by pressing the pins of a valve on to a soft piece of paper. It is then an easy matter with a scriber or similar sharp instrument to prick through the indentations thus made.

Before finally tightening up the nuts

explanation. That is the method of securing the "back" ends of the spaghetti.

This is quite simple, and consists of clamping them by nuts and bolts to the ebonite strip at the back of the unit. Note that the flex leads making connection to these spaghetti are also clamped under these same nuts. For the rest, just follow the diagram and all will be simple, for you can't possibly go wrong.

INSIDE THE ADAPTOR PLUG



The filament and grid pins and sockets are joined together direct, while flex leads only are connected to the plate pin and socket.

Now let us pass on and assume that the job is complete, with the flex leads to the plug already in place.

Just a preliminary word about the new valve. Almost without exception this will have a transformer in its anode circuit, and most likely the detector will be of the H.F. type, so the fresh valve should be

plug. The remaining one is marked H.T. positive, and should be provided with an ordinary battery plug.

This is the H.T. supply for the detector valve now, but don't apply the same voltage to it as was given to the previous detector H.T. terminal (unless you were already applying the maximum H.T. available to it), give it more. This will apply in all cases except where the original set used resistance-capacity coupling, which is not at all likely to be the case.

Apply the maximum voltage available up to the rating of the new valve to the detector's old H.T. terminal, because this now supplies the valve that has been added. The present G.B. — plug should be left where it is, but a new lead from the terminal on the plug should be plugged in 1½- or 3-volts negative on the same battery.

Reaction Connections.

If you wish to use reaction, proceed as follows. Disconnect the lead that runs from the plate terminal of the detector valve holder to either the reaction coil or to the reaction condenser, from the plate terminal, and join this free end to the nut and bolt on the unit to which the lead marked P is connected.

You can now shut down the lid of your set and forget all about the extra valve that you have added, except to enjoy the extra volume, and most likely range, if you work on a loud speaker. You will find that many stations previously inaudible on the speaker now come through at good speaker strength.

ALL COMPLETE AND READY

This is how the unit and adaptor will appear when you have completed the construction. All the flex leads, except that for H.T. + should be twisted up together.

HERE AND THERE

Foreign programmes—Reception hints.

Buenos Aires is now working its new station on 28.98 metres, call sign L S X.

Rabat Radio, Morocco, now relays the main Rabat programme on 23.8 metres.

The ordinary H.F. screened-grid valve often works well with only 18 volts on the anode and 30 on the screen.

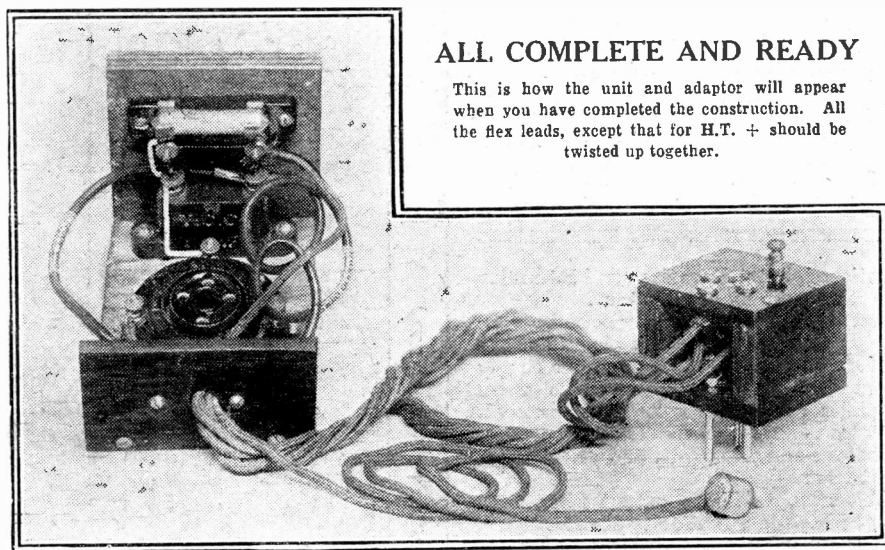
When an ordinary aerial is joined directly to the top of a grid coil it introduces an extra capacity of about 0.0001 mfd. in parallel with the tuning condenser.

The small grid bias battery so often used with a screened grid valve is a valuable aid to the reduction of high-tension consumption.

Even neodyne condensers are sometimes of too great a capacity for selective coupling, the maximum capacity allowable being about 0.00002 mfd.

Properly handled, a one-valve set with reaction and wave change should be capable of tuning in at least a dozen foreign stations.

At present the B.B.C. use about 4,000 miles of G.P.O. telephone line for S.B. work.



on the pins and sockets, place the former in a valve socket, and insert a valve in the latter. This will ensure that they are tightened up in exactly their correct positions.

The connections inside the plug, between the various pins and sockets are best made before screwing the two pieces of ebonite to the wooden sides. Short lengths of flex will be found the best medium.

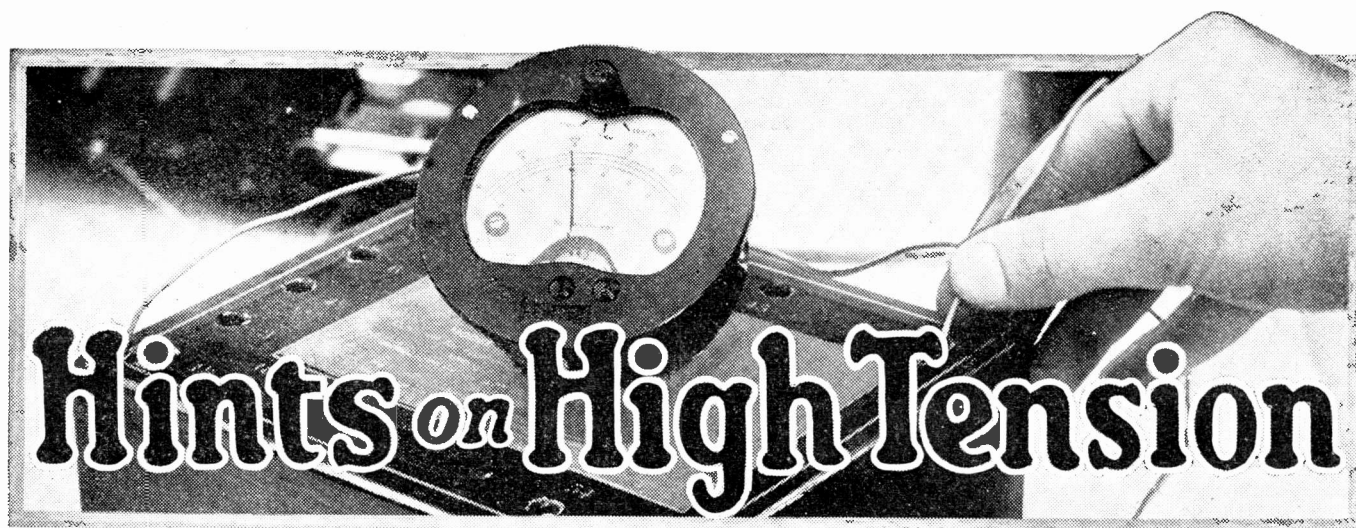
So far as the actual unit itself is concerned there is only one point that requires

an ordinary L.F. type with not too low an impedance. Its filament voltage must be the same as that of the other valves in use.

The Unit in Operation.

As already indicated, you first remove your detector valve, and insert the special adaptor plug in its place, and put the valve into the top of the plug. The new valve is placed in the holder on the unit.

There are six flex leads coming from the unit proper, only five of which go to the

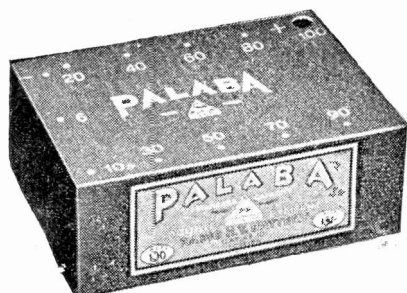


THE H.T. current consumed by a radio receiver is a rough guide as to its power. That is, providing the H.T. is regulated properly.

Generally speaking, big volume cannot be obtained unless a fair amount of H.T. is used. And attempts to reduce the H.T. current below a certain definite limit, while retaining the same volume, are likely to lead to distortion.

However, it is possible, when working under average household conditions, to effect quite a saving in H.T. and still get

USES A "DOUBLE EXCITANT"



An H.T. battery which embodies a new principle of construction and which is claimed to give much longer service on that account.

very satisfactory results by the careful adjustment of H.T. voltages and G.B. tappings.

If it so happens that only a moderate loud-speaker strength is desired the G.B. can frequently be increased on the output valve quite a few volts above the figure recommended by the makers of the valve.

The specified grid biases for different values of H.T. are the ideal—they place the valve in the position of being able to handle the maximum input within the limits of its characteristics.

But it may well happen you don't want to take the valve anywhere near its limits. And so you can, quite legitimately, increase the G.B.

Save Your Milliamps.

Supposing, for sake of example, you have a small super-power valve in the last valve holder of your set. And the makers recommend that you should use 120 volts H.T. and 12 volts grid bias.

By all means use 120 volts H.T. if you can. However, you may find that you get

You may be able to save quite a respectable proportion of your present H.T. current consumption if you adopt the suggestions contained in this practical contribution.

By H. A. R. BAXTER.

all the volume you want plus perfect quality by employing 15 volts grid bias.

This will reduce the H.T. current demanded by that last valve and may result in a saving of quite a few milliamperes. And every milliamperage is valuable where batteries are concerned.

Much the same applies in a smaller degree to a first L.F. valve.

Economising Current.

Where grid biasing is recommended for an H.F. valve, especially of the S.G. type, always use it. It means, perhaps, another small battery. But this battery will last a long time and there will be a marked economy in that expensive item, H.T.

IT REDUCES YOUR H.T.



The Grid-Bias battery has the important task of adjusting the flow of H.T. current, so it is false economy indeed to purchase any other than the very best makes. The Marconiphone G.B., by the way, has a special lid, which enables it to be fixed inside a cabinet with great ease.

Grid bias is not only a method of setting the valve right for best quality, but can also be regarded as an H.T. current economiser.

Of course, those who use mains units won't be worrying so much about the H.T. current question, though small mains units have definitely limited outputs.

And to increase G.B.'s where possible may result in an effective increase in H.T. voltages subsequent to a reduction in current drain. This frequently is a desirable condition to achieve.

WELL PROTECTED



To prevent shorts and access damp, the modern battery is well covered until it is taken into service.

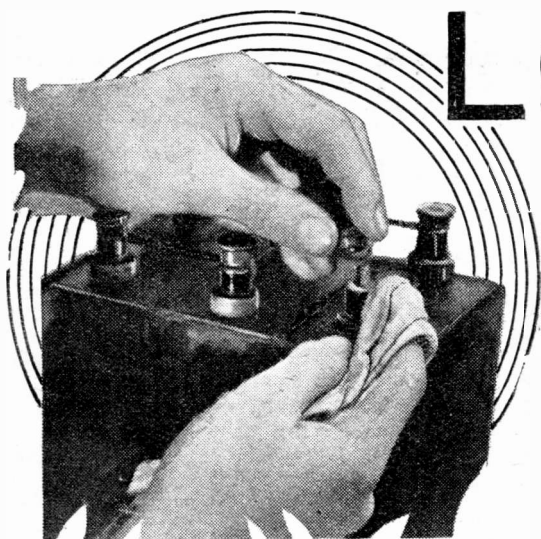
While we are on the subject of H.T. current it may be as well to repeat the warning that the H.T. current consumption of a set is not, these days, the consumption of its L.F. valves plus a negligible H.F. and detector valve drain.

If there is an H.F. stage, and it uses an S.G. valve it may run away with quite a few milliamperes—certainly enough to contribute materially towards the work a battery has to do.

A Storage Hint.

Should you be one of those who are contemplating the purchase or construction of a new set we would advise you carefully to calculate its probable H.T. current consumption. If you are restricted to batteries for the H.T. supply it will constitute a very important item in the running costs of the set.

Finally, remember that an H.T. battery generally lasts longer when kept in a dry, cool place and that if it has a cardboard lid, this should be used to prevent dust metal objects, etc. getting in the battery itself.



LOOKING AFTER THE L.T.

Your accumulator will never let you down if you treat it with reasonable care, and here are some practical hints you should bear in mind.

By K. D. ROGERS.

I DON'T want you to get wrong ideas about things because of the title of this short article; you may think it sounds rather as if there was a great deal to be done in keeping "the L.T." in order. But that is not so. "The L.T."—or in less colloquial terms, the low-tension accumulator, or power supply—is not a complicated business at all.

Nothing could be simpler than the ordinary, common-or-garden accumulator; and nothing could be more reliable and faithful in service. The average L.T. accumulator will last for several years if treated properly; and often it will endure without protest mishandling over very long periods.

About the Charging.

And the treatment of the accumulator is not a complicated one. All the wonderful little "juice box" requires is regular charging, an occasional drink of distilled water, or perhaps water with a spot of something (acid) in it, and an annual spring clean.

Let us take these three needs in order. First of all the charging.

This is not usually done "at home" by the owner of the battery, although quite a number of set users with mains *do* charge their batteries. The trickle-charger has done much to revolutionise the listener's regard of the L.T. battery.

The trickle-charger enables one to keep the accumulator "up to scratch" all the time. After the set has been in use the charger is switched on and the small amount of power extracted from the battery is replaced before the set is required again. Ever so simple, and quite effective!

The Thirst Question.

Without a trickle-charger one has to give proper "full length" charges to the battery whenever it becomes half-run down. That is when the voltmeter shows a bit of a drop below 2 volts per cell while the battery is in use, or the hydrometer's second float begins to sink.

Some batteries have little coloured balls in them so that one can tell at a glance the "state of Denmark," and these are exceedingly useful little tell-tale devices. Having had a warning that the charge is becoming exhausted, no delay should occur before the battery is placed on charge, either at home or at a reputable charging station.

Charging must be carried out at the proper rate, and kept on until the cells have gassed freely for several hours. Incidentally, far too many charging stations take the batteries off as soon as gassing is fully established, instead of allowing it to proceed for some hours.

After charging the cells should be wiped carefully, all traces of acid spray being removed, and the terminals should be coated with petroleum jelly to prevent corrosion.

And now for need No. 2. Those little drinks! These should be administered whenever it is seen that the battery needs

out the acid solution. It is then washed out and fresh acid solution of correct density is used to fill up the battery, which is placed on charge again for a few hours. The job is best done at a charging station.

A Few Don'ts.

So much for the main treatment of the L.T. battery. There remain but a few points concerning its use or misuse. One of the most important "don't's" where an accumulator is concerned is in regard to its being left a long time in a discharged condition—as soon as the battery is down to "half discharge." If you leave it a long time standing in this condition sulphation is likely to occur, and anything like bad sulphate means the beginning of the end, where the useful life of the accumulator is concerned.

Another important "don't" is that concerning the actual amount of current taken from the battery. The "amperage" of the accumulator is given on its case as so many amp. hours. The discharge rate should not be more than about one-tenth of this figure.

Thus if you have a battery whose capacity is 20 amp. hours, never discharge it for any length of time at more than 2 amps. *And* never charge it at a rate greater than that given in the makers' instructions—also usually about one-tenth of the capacity.

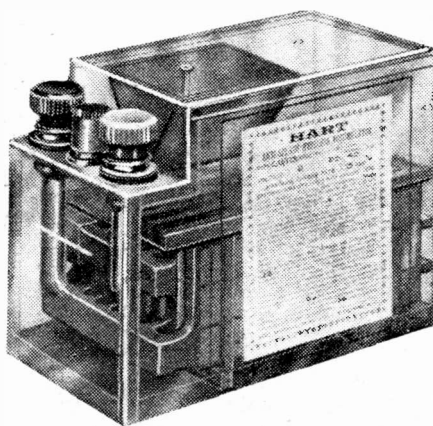
Years of Steady Service.

Summing up, then, the main points to regard in looking after the L.T. are cleanliness; (always keep the battery clean); regular charging at the proper rate; reasonable discharging; and keeping the battery properly topped up. Disregard these simple precautions, and you cannot expect to get reliable and long service from even the best of accumulators. Take care of the battery, however, and you may reasonably expect years of good steady current supply.

The storage battery is not a mere tank into which is poured so much electricity. It is a scientific electro-chemical device, and when in use chemical action with all its latent power is going on—misuse the battery and that power will be turned to wrong account.

The chemical reactions will go wrong, the once perfectly controlled atoms and electrons will run amok, as it were, and the battery will be ruined.

FOR YOUR PORTABLE

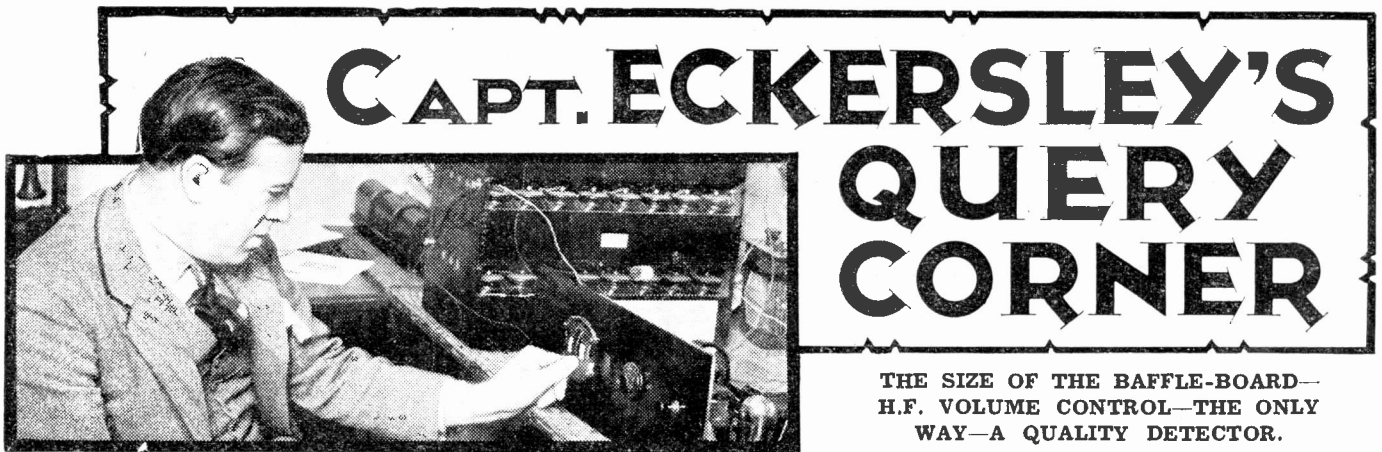


A good example of an up-to-date non-spillable accumulator.

a "spot of refreshment," and it should be placed on charge immediately after. If the level of the acid solution has dropped below the "Plimsoll," so to speak, and if you are perfectly sure none has been spilled, the battery should have a "drink" of distilled water, sufficient to bring the tide up to high-water mark again.

If, however, you know you have spilled a little of the electrolyte, or it has been lost during charging, owing to gassing, then a solution of the correct density of acid must be used. This should be added just before charging, and this addition can best be accomplished in the small radio battery by means of a hydrometer.

The annual spring clean consists in fully charging the battery and then emptying



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

The Size of the Baffle-Board.

W. T. (Kensington).—"From what principles and data is the size of a baffle-board for a moving-coil or cone type loud speaker calculated?"

"How is it possible to decide the lowest frequencies correctly reproduced by any given size of baffle, assuming that the loud speaker and amplifier give an almost perfect reproduction of all frequencies?"

Help! Must I in a few lines give the whole theory of baffles, cones, break-up, etc., even if I, or anyone else, could do so?

You see, you cannot assume "that the loud speaker and amplifier give an almost perfect reproduction of all frequencies." Amplifier, perhaps; speaker, no.

It is the interaction of the factors contributed by the diaphragm and the cone which determine perfection. I can now answer your question so long as you understand that the answer does not mean anything much!

The baffle exists to add to the efficiency of the diaphragm as a radiator. It needs to compare dimensionally with the lowest wave-length of sound radiated.

Assuming the velocity of sound as 1,100 ft. per second the wave-length at 50 cycles is 22 ft.! But use a baffle about 3 ft. 6 in., square and you will be doing all right.

* * *

H.F. Volume Control.

S. D. A. (St. Albans).—"To control volume in my set I have inserted a resistance in the first tuned circuit, which certainly gives an excellent control of volume, but also flattens tuning."

"The result is that unwanted foreign high-power stations on an adjacent wave-length break through. Can this fault be eliminated?"

High-frequency volume control! What a beastly subject and what difficulties!

If you shunt a plain closed circuit with a resistance you increase the damping of the circuit and so its power to respond to only one band of frequencies is lessened. This is inevitable.

If you put a potentiometer across a tuned circuit you have the complication that volume is not proportional to potentiometer setting, owing to capacity effects in valve and in the device itself.

If you vary screen-grid volts, you may, if not careful, upset the lineality of response of the valve.

I know of no royal road to success, and of no system which maintains constant selectivity with varying sensitivity. Luckily, if you wish to reduce sensitivity because the station is too strong, you also do not require so much selectivity.

* * *

The Only Way.

P. H. (Enfield).—"Some time ago Capt. Eckersley, in a reply to a reader's query, stated that he had once calculated the number of aerials which would have to be erected in the vicinity of the old 2 L O transmitter wholly to absorb the energy radiated by that transmitter. Capt.

which jumped to the Heavieside and came in over the top of the screen!

No, there's nothing for it but a policy of insulation—a highly protective wireless wave tariff consisting of a copper gauze box to go over the whole of Great Britain!

Then nobody could interfere with us and we could have 100 broadcasting stations, and we could interfere with nobody. Special doors for aeroplanes would be necessary!

* * *

A Quality Detector.

J. B. (Hendon).—"I am undecided as to which method of detection to use in a receiver designed solely for quality reception of the local stations."

"Either power grid or anode bend could be adopted, followed by resistance coupling. A maximum H.T. voltage of 400 will be available and the output valve will be an L.S.6A."

"Can you give me advice regarding the respective merits of the two methods?"

If your sole desire is to have good quality you want a detector having as straight a working characteristic as possible. Thus, I think

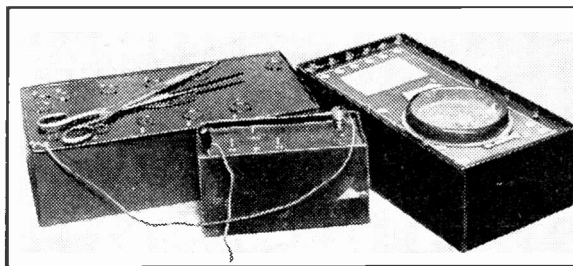
you should use either a diode detector or a grid-leak detector (power connection, so-called).

The anode-bend detector is out of it as far as straight line detection is concerned. The convenience of the anode-bend detector is that it does not damp the closed circuit and provides an easy means of applying reaction.

The diode is insensitive and must be followed by a note magnifier to make diode and note magnifier equal to a power grid-leak detector by itself. The sole disadvantages of the power grid-leak detector are that it slightly damps the closed circuit feeding into it and that the grid condenser "cuts off" the higher frequencies to some slight extent.

This can be largely overcome by careful design, and in a high-quality set damping of the circuit is advisable. I should therefore advise the power grid-leak detector.

NO WONDER THEY DON'T LAST!



It's easy to ruin an H.T. or Grid-Bias battery by shorting it. Bared wires, scissors, or anything metallic will quickly run it down if they touch different sockets simultaneously.

Eckersley implied that a very large number of aerials would be required, but I gathered that it was not impossible for a condition to be achieved whereby a station's power became insufficient to satisfy the requirements of a very large number of local listeners.

"If this is the case, could not the interference occasioned by Mühlacker be dealt with along these lines? Why not erect a large number of efficient aerials accurately tuned to Mühlacker, so that the energy created by this station in England became wholly absorbed?"

Make a screen, in fact. Yes, feasible, theoretically, for the ground ray, but what about the space ray?

We should have to erect a screen say a wave-length high (1,200 ft.) all along the east coast of Britain to insulate the ground ray. And then, having done that, night time could produce just as strong a signal

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



THE "FORMO" EXTENSER.

THERE may be a suspicion in the minds of many constructors that the first Extensers to be placed on the market must be, to a certain extent, "try-outs," or experimental constructions which are destined to revision in due course. But actually this is very far from being the case.

It does often happen that articles like coils, for instance, are structurally modified

tools and moulds could be made.

The result is an instrument of the highest possible standard, and one that is both a pleasure to examine and a joy to handle.

Its special feature is a system of switching that is completely definite and yet so sleek in action that even on the direct

drive the rotation of the dial is as smooth as that of the best of ordinary variables. There is also a slow-motion control and this, too, is exceptionally velvety.

The "Formo" Extenser is particularly neat in general design, and its overall dimensions compare favourably with the most compact of variable condensers.

Another attractive point is that all the terminals are conveniently and accessibly grouped on the ebonite end moulding.

And talking about mouldings reminds us to mention that the machine work throughout is first-rate.

Electrically, the "Formo" Extenser is perfectly satisfactory. Its minimum is low, and in that its vane shapes are similar to those of our standard, its capacity variation over both bands is, of course, suitably compensated.

In conclusion, we have no hesitation in giving the "Formo" Extenser our fullest approval and can recommend its use in any set.

ARTISTIC CONE PAPERS.

An excellent alternative to the usual materials for making cones is a parchment tinted cone paper sold by S. F. Gahan, of Northdown Road, Margate. The paper is available in brown, green, blue, buff and pink. These tints are applied in what I believe is termed a "cloudy" manner, and I must say they have an attractive appearance. Two thicknesses are available at the price of 1s. 3d. per piece. I have had one of our "Clear-Cuts" made up with the material, and find it quite satisfactory.

A USEFUL GADGET.

The problem of inter-connections in mains sets or units is one that frequently troubles the conscientious constructor. An excellent link is the Quaker Double-pole Connector. It comprises two portions, a plug and a socket. The "poles" are clearly marked, and the device is quite non-reversible.

You use this connector for joining together two pairs of leads, and it makes a vastly safer connection even than soldered joints with insulating tape. It is excellently moulded in bakelite in various finishes, and costs 2s.

CHARTS FOR CONSTRUCTORS.

The latest Ferranti chart gives full details for the construction of a Ferranti A.C. Mains Screened-Grid Four receiver. This is a powerful set claimed to give an undistorted output of about 2,200 milliwatts. A copy of the chart is available to anybody free of charge.

It is a fine production, and interested readers would be well advised to take advantage of this generous offer.

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 PRICE REDUCTION.

Messrs. J. J. Eastick and Sons announce that they have reduced the price of their "Ecelex" Earth Bowl from 5s. 6d. to 3s. 6d.

FOR MAINS ENTHUSIASTS.

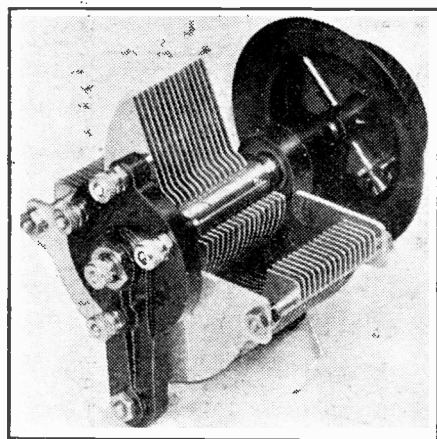
"P.W." readers interested in mains gear are invited by Messrs. Turner & Co., 54, Station Road, New Southgate, London, N.11, to send for copies of the latest list of "Tunewell" eliminators, mains components, etc.

"LISTEN TO THE MUSIC."

This is the title of an interesting Igranac folder which deals with Igranac amplifying apparatus.

NEW MULLARD LITERATURE.

The Mullard Wireless Service Co., Ltd., recently sent us copies of three new additions to their loose-leaf catalogue. The leaflets concerned deal with Mullard P.M.1A, P.M.252, and D.0/25 valves.



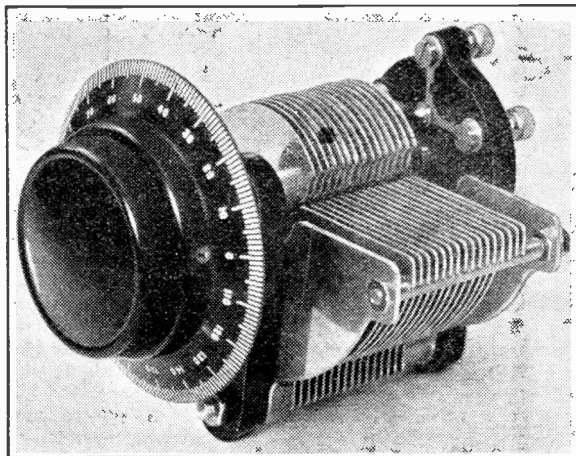
Here is the "Formo" Extenser. It is fitted with a slow-motion movement.

and minor improvements embodied during the earlier periods of their production life, but such components are quite different manufacturing propositions.

The making of an object such as the Extenser calls for the fashioning of expensive moulds and tools, and it would not be an economic undertaking to experiment with the design after going into production, for these moulds and tools often cost many hundreds of pounds each.

The necessity for these special appliances is mainly the reason why it takes time for the various concerns to get under way with the making of Extensers. And the time is not only spent in the preparation of the machines, but also in ensuring that the design is absolutely perfect before the serious commitment is made.

A case in point is the "Formo" Extenser, due, of course, to those well-known radio manufacturers, Arthur Preen and Co., Ltd. Immense thought and a colossal amount of experimentation must have been put into the design before it was finally decided that



Another view of the "Formo" Extenser showing the specially marked dial and neat "self-changer" mechanism.

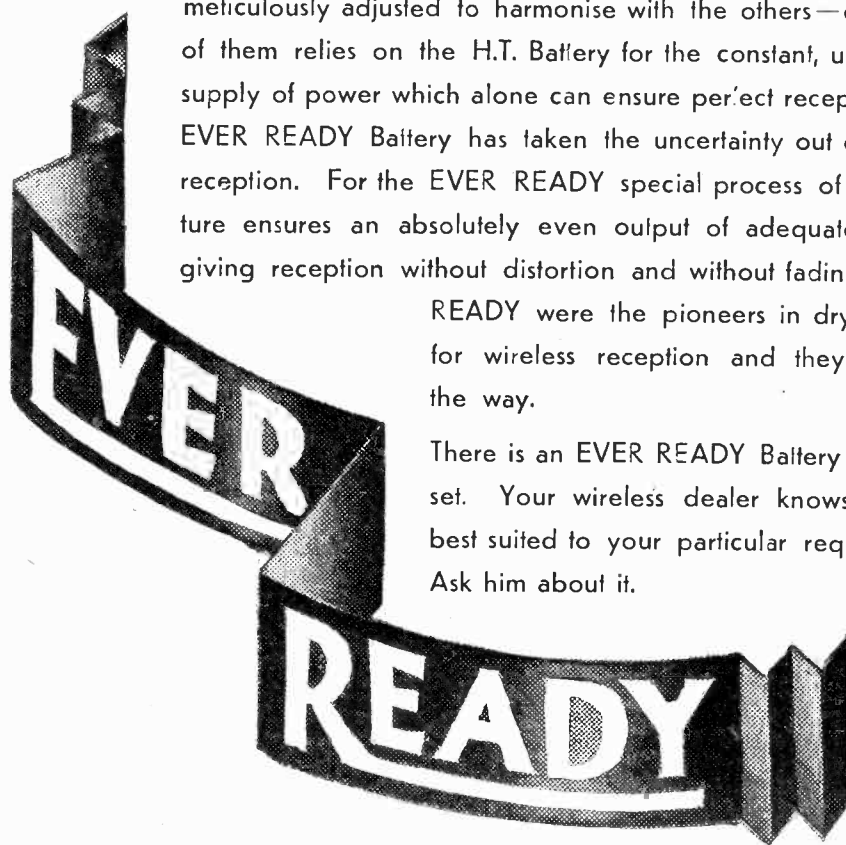
THINGS HAVE CHANGED SINCE THEN

Do you remember those early, haphazard days of wireless? When we used to fiddle with primitive 'cat's whiskers' and were thrilled by a few faint sounds? How things have changed! There is nothing haphazard about the modern wireless set. Every one of those neat, efficient-looking parts is

meticulously adjusted to harmonise with the others—every one of them relies on the H.T. Battery for the constant, unwavering supply of power which alone can ensure perfect reception. The EVER READY Battery has taken the uncertainty out of wireless reception. For the EVER READY special process of manufacture ensures an absolutely even output of adequate voltage, giving reception without distortion and without fading. EVER

READY were the pioneers in dry batteries for wireless reception and they still lead the way.

There is an EVER READY Battery for every set. Your wireless dealer knows the one best suited to your particular requirements. Ask him about it.



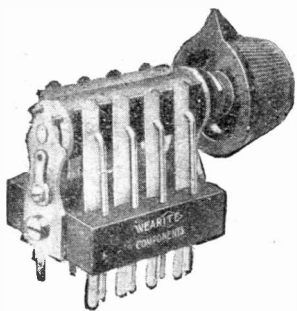
**BRITISH MADE
HIGH
TENSION
BATTERIES**

The Batteries that give unwavering power

THE EVER READY CO. (GREAT BRITAIN) LTD., HERCULES PLACE, HOLLOWAY, N.7.

MAKE THIS THE BEST SET YOU HAVE BUILT

IF YOU CONSTRUCT
THE "POP" PORTABLE
USE WEARITE COM-
PONENTS AND BE
SURE OF THE VERY
BEST RESULTS.



Rotary Type Switch

This switch is a later and cheaper model which has the advantage of one-hole fixing and has unlimited ganging facilities.

I.22, 2-way - price 3/6
I.24, 4-way - " 4/6

H.F. Choke

A first-class component with a very fine performance. It covers efficiently the remarkable range from 10 to 2,000 metres without any marked resonances. Self capacity very low.

Type H.F.O. 6/6



Valve Holder. 4- or 5-pin split sockets. Fitted with terminals and soldering tags.

Price 1/3

Paxolin Formers. 2" x 3", for medium-wave coils. Price 9½d.

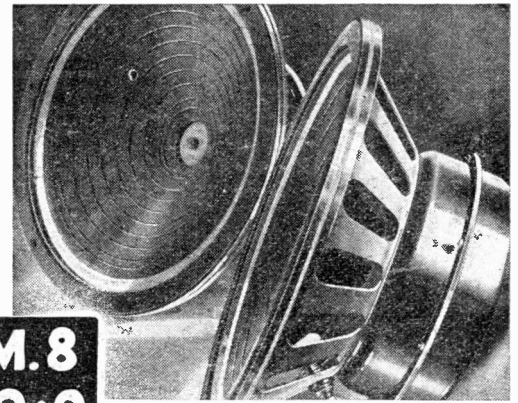
Any special length can be supplied other than above. Special diameters to order.

WEARITE COMPONENTS

Write for free illustrated lists and leaflets.

WRIGHT & WEAIRE, LTD.,
740, High St., Tottenham, London, N.17
Phone: Tottenham 3847/8/9.

PERSPECTIVE IN MUSIC



R.P.M. 8

£3:10:0

R.P.M. 12

£6:0:0

**PERMANENT MAGNET
MOVING-COIL SPEAKER**

Think of it—NEW CELESTION R.P.M. Speakers of the Moving-Coil type, utilising the finest possible permanent magnet, and incorporating the famous Celestion reinforced diaphragm. The R.P.M. Models have already created a sensation! Only with Celestion is the true "musical perspective" truthfully retained. Insist on your dealer demonstrating R.P.M. Speakers or write immediately for full particulars.

CELESTION LIMITED, London
Road, Kingston-on-Thames.
LONDON SHOWROOMS: 106,
Victoria Street, S.W.1.

CELESTION
The Very Soul of Music
LOUD-SPEAKERS



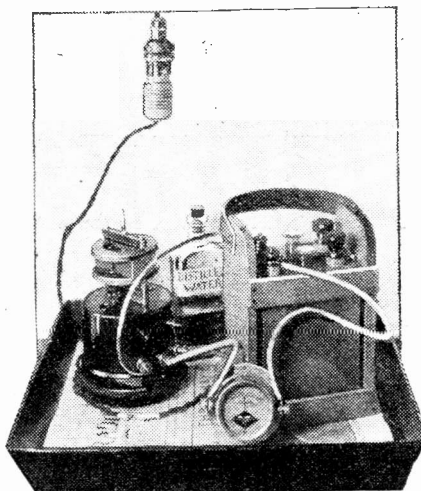
That reminds me, have a

PLAYER



The Quality and Quantity Cigarette

HOW TO CHOOSE AND USE THE BATTERIES FOR YOUR SET



To keep your batteries in good condition you can do your own recharging.

only one-half or one-third of the size of the other types.

Suppose, then, that we are going to use 2-volt valves. What size should the accumulator be?

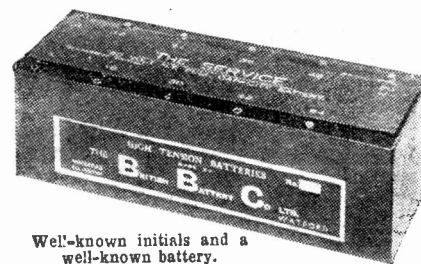
How Much Current?

To decide this, we must know the amount of current to be used. And every valve maker tells you how much is required to feed the valve he supplies to you.

For an S.G. valve it will probably be about .15 amp, and for a detector .1 amp. Ordinary L.F. valves also take about .1 amp.

The exact figures for your own valves are available, being invariably supplied at the time of purchase, either stamped on the valve itself or printed on its container or the accompanying leaflet. (If you have lost this the dealer can tell you.)

To find the total filament current of the



Well-known initials and a well-known battery.

set simply add the respective figures together. A very typical case for a three-valve set would be:

Screened-grid H.F. valve ..	.15 amp.
Detector1 "
Power valve2 "

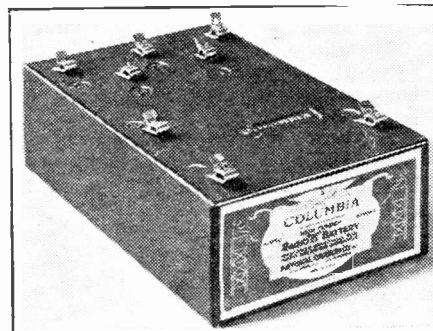
Total filament current .45 amp.

"Feeding" the Family!

Thus the set will take a little less than half an ampere from the L.T. battery all the time it is running. The next question is how long will that be?

You know approximately how much will be used, so there is no difficulty in this. Taking an average case again, let us suppose you will be using the set for about four hours per day, which gives you an average of 28 hours per week.

We now know the total current required from the low-tension battery in a week. It



Excellent contacts are provided by this type of spring "socket."

will be, in this typical instance, .45 amp. for a period of 28 hours.

You will notice that both "amperes" and "hours" enter into the calculation. So let us multiply one by the other and get it down to that very handy unit, the ampere-hour.

All we have to do is to find the product.

$.45 \times 28 = 12.6$ ampere-hours per week. This is the heart of the matter. Now that we know in this particular instance we shall want about twelve-and-a-half ampere-hours per week, we can see what the dealer has to offer us.

We find that 2-volt L.T. batteries are available in various ampere-hour capacities—20 ampere-hours, 30 ampere-hours, etc. But you may note that in referring to them the dealer may say "This is a 20-actual"; "This is a 30-actual," etc. What does that "actual" mean?



The holes in the cover provide convenient access to the sockets below.

Simply this: The ampere-hour capacity of an accumulator is very much less when it is discharged continuously for hours on end—as you will want to discharge it, for radio—than when it is discharged momentarily and then allowed to recover.

Timely Warning

In fact, its actual discharge rating, under radio conditions, will be only about half of its "ignition" rating—which is what they call the intermittent discharge figure. So you want to know the actual-ampere-hour rating.

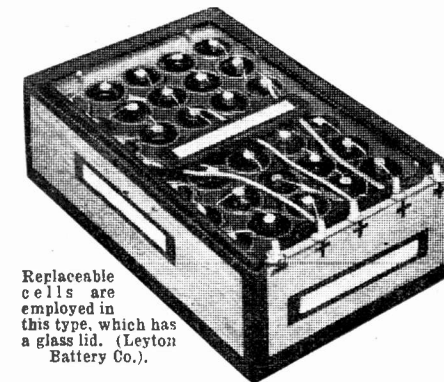
All good batteries give this figure, and all good dealers refer to it when they speak of a battery to be used for radio purposes.

But some of the so-called "cheap" batteries only give the ignition rating, in which case you must mentally halve it, and go carefully! (It really pays to go to a good man and get a good, sound article, you see.)

(That is just a bit of good advice by the way! Let us get back to the final choice of our battery.)

Knowing that you are going to use a set which takes about 12½ ampere-hours per week, your next concern will be convenience in the charging. If you get a 20-actual ampere-hour battery it would last between one and two weeks—rather awkward!

How about a "30-actual"? Two weeks' current at 12½ is about 25 ampere-hours—that leaves a nice little margin for emergencies.



Replaceable cells are employed in this type, which has a glass lid. (Leyton Battery Co.)

A "30-actual" accumulator, then, would last two weeks before it needed recharging, and you would easily remember to get it charged at the regular intervals.

Another advantage would be the margin—25 ampere-hours' use against a 30-ampere-hour rating. So you would always be on the right side if you wanted a little extra "juice" for some specially good programmes.

A Useful-Size "Juice Box"

Thus the 30-actual accumulator would be a good choice under the foregoing circumstances, and other requirements may be worked out in the same way. But there are several considerations to bear in mind.

Don't be tempted to get too big an accumulator for very infrequent recharging.

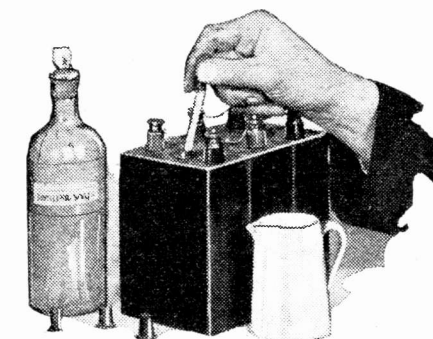
It will deteriorate if it is not kept actively working, regular discharges and charges being the ideal treatment for it.

On the other hand, too small an accumulator will often be liable to get run right down, which is not good for it. Though there is much to be said for two fairly small accumulators, one running the set whilst its fellow is being recharged. In fact, if you carry your own to the charging station this is generally the most convenient method.

Catering for all Classes

Country dwellers living at some little distance from a charging station are well catered for by the special slow-discharge type of battery now available. Unlike ordinary accumulators these do not suffer if called upon to give a small current with infrequent recharging, and so are just the thing for such circumstances.

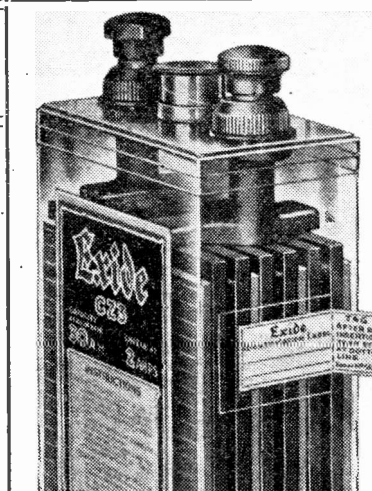
Alternatively there are special L.T. batteries, including the wet primary type,



During the hot weather the loss by evaporation should be made good with distilled water.

which need infrequent replacements to keep them in condition, for those living right away from all charging facilities. And reference to the catalogues of firms advertising in "P.W." will help the listener who is so situated.

Write to any of the good battery firm



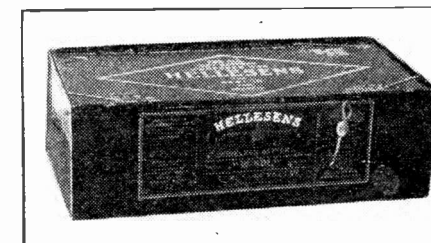
It has a label to carry the owner's name and address, saving confusion at the charging station!

stating your needs, and you will find them pleased to be of service in advising you as to the best types for your special requirements. And incidentally the illustrations in "P.W." bear testimony to the skill of the British manufacturer in catering for the radio public's needs.

As soon as listeners got into the habit of carrying small accumulators about in portable sets, which spilled the acid, the manufacturer came along with unspillable types, jelly electrolytes, and all sorts of similar dodges. Some of these batteries are little miracles of ingenuity.

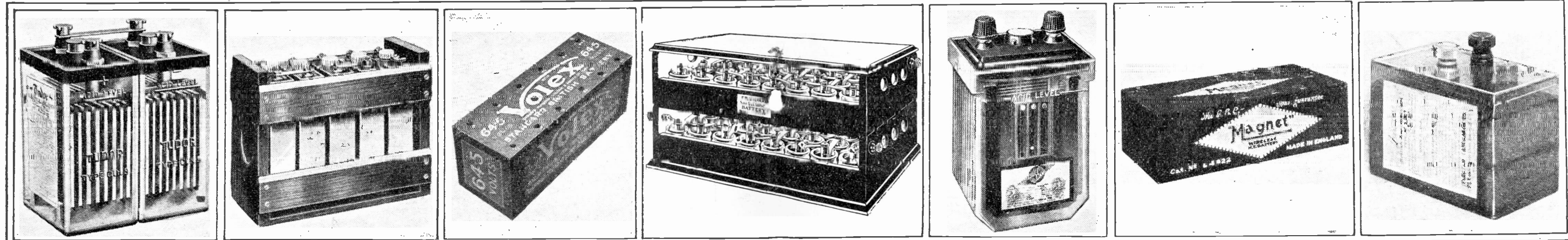
Another excellent idea is the self-contained indicator battery, in which coloured floats tell the listener when a recharge will be necessary. And transparent cases,

(Continued on next page.)



A favourite on the Continent, as well as in this country.

SOME PRACTICAL SUGGESTIONS FOR OBTAINING A TROUBLE-FREE RADIO POWER SUPPLY



Above we have several different types of battery. First a glass-contained accumulator, then one of the 6-volt "Nife" steel type, next to the "Volex" H.T., which is a Ward and Goldstone product. The fourth is a Standard Wet H.T. Battery.

Ingenuous indicators, which tell the owner when recharging is necessary, are incorporated in the Dagenite L.T.B. Beside it we have the well-known G.E.C. "Magnet" battery, and a "Jelectro" non-spillable portable accumulator.

ALL ABOUT YOUR BATTERIES

(Continued from previous page.)

ownership labels, carrying handles, and similar ingenious devices make the selection of a battery thoroughly interesting nowadays.

Selecting the correct high-tension battery is just as important as the right choice of an accumulator. It is all too easy to go about it the wrong way.

Don't Buy on Voltage Alone.

In the past too many people bought on voltage alone, regardless of the fact that both voltage and current *must* be considered or money will be wasted. Even now many readers spend far more in H.T. batteries than is necessary.

When choosing an H.T. battery you can tell at a glance whether it is designed for the voltage you want, because voltages are marked upon it. But unless you are a millionaire and can afford to throw your

H.T. current, requiring another type H.T. battery to supply it.

And if you want to waste good money a sure way is to keep on buying the wrong-capacity H.T. battery.

The ordinary small battery can only be asked to supply a set which requires up to 4 or perhaps 5 milliamps. But if your set wants more than that you must have a battery of larger capacity.

Any good make of H.T. battery—whatever the size or voltage—is rated to supply a certain maximum current, and will last for months if worked below or at that dis-

WHAT'S IN A NAME?



The makers evidently have confidence in their battery to name it thus!

charge rate. However good it is it will not last long if you over-run it.

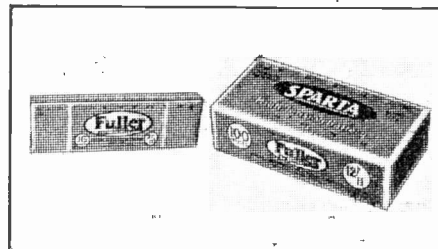
The golden rule is to find out how much H.T. current your valves need, and then buy the type of H.T. battery that can supply that number of milliamps.

Use a Milliammeter.

You can ascertain the valves' requirements by measurement (placing a milliammeter in the H.T. neg. lead) or by calculation; for the valve makers tell you the anode current, and the screen current which must be added to the anode current for S.G. and pentode types.

The best way is the milliammeter measurement, for you can easily go wrong in calculation by forgetting the effect of different values of H.T. voltage and grid bias.

Once you have determined what your milliammeter requirements are the dealer or battery maker can tell you what type of battery to use for economical running. Its first cost may be higher than you paid before



H.T. and G.B. representatives of a very long-established firm.

but you'll save the difference many times over in the long run.

Equally important from the £. s. d. point of view is the grid-bias battery. In itself it is not so expensive to buy, but neglect to use sufficient bias puts up your H.T. current immediately, and so hits your pocket directly.

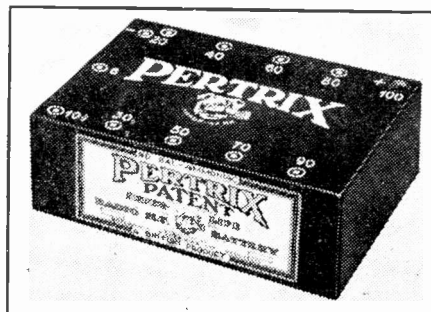
Fortunately, a good quality grid battery will usually last six months or so without letting you down or causing a moment's worry. It's a comparatively small battery, but its voltage *must* be right if you want quality combined with low running costs.

Keep a Check on Consumption.

And that brings us to the question of maintenance. How should we keep a check on our batteries?

Other articles in this week's issue of "P.W." will be found to contain good advice

MORE H.T.B.'s



Yet another favourite is the Pertrix.

on this subject, and it will be sufficient here to say that the three-valve set owner will be well advised to take regular "soundings" with a voltmeter and milliammeter to see if his batteries are up to scratch.

ALL ABOUT YOUR BATTERIES



THIS is not going to be the ordinary "All About Batteries" sort of article, because the usual zinc-and-carbon-immersed-in-a-container kind of thing is not a bit interesting. Let us look at batteries simply from the radio set-owner's point of view.

Why do we need batteries at all? We pay down good money for a battery because

Some detailed and helpful information about the choice and use of those indispensable accessories upon which your set depends for its power supply.

By P. R. BIRD.

The current that it supplies is a much smaller one than that flowing from the L.T. battery, but its voltage—or pressure—is much higher.

The H.T. or anode current must cross the vacuum inside the valve's bulb, entering at one electrode and leaving by a different one.

Big Batteries Best.

In ordinary three-electrode valves it crosses between the filament and the plate. When an S.G. valve or a pentode is being employed, some of the H.T. current uses this filament-plate route, and some more of it flows between filament and the screening-grid.

And at all these various points there must be adequate electrical power, at the correct pressure.

The foregoing facts are mentioned because it is essential to picture the batteries as suppliers of those steady and silent streams of current through the valve upon which the set depends for its whole action.

Therefore, unless these batteries are well-chosen in the first place, and well looked after in use, the very soul and centre of your set is being starved. You can never get full trouble-free service from a set unless its power-supply is adequate.

The first thing, then, is to choose the correct sort of battery. Let us take the case of an L.T. battery first.



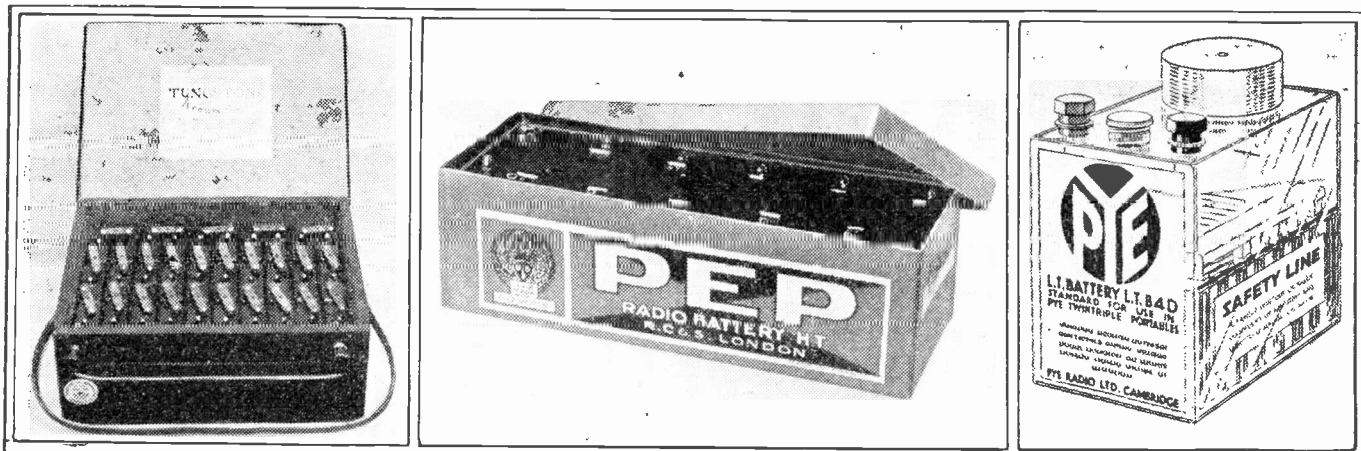
You can plug in with confidence—it is ever ready for service.

Its function will be to supply the filament current. And obviously, the more valves there are in the set, the bigger the battery will need to be.

And, of course, it must be of the correct voltage to suit your valves. The most popular type of valve is the 2-volter, because its efficiency is virtually the same as the fours or sixes, and it requires a battery

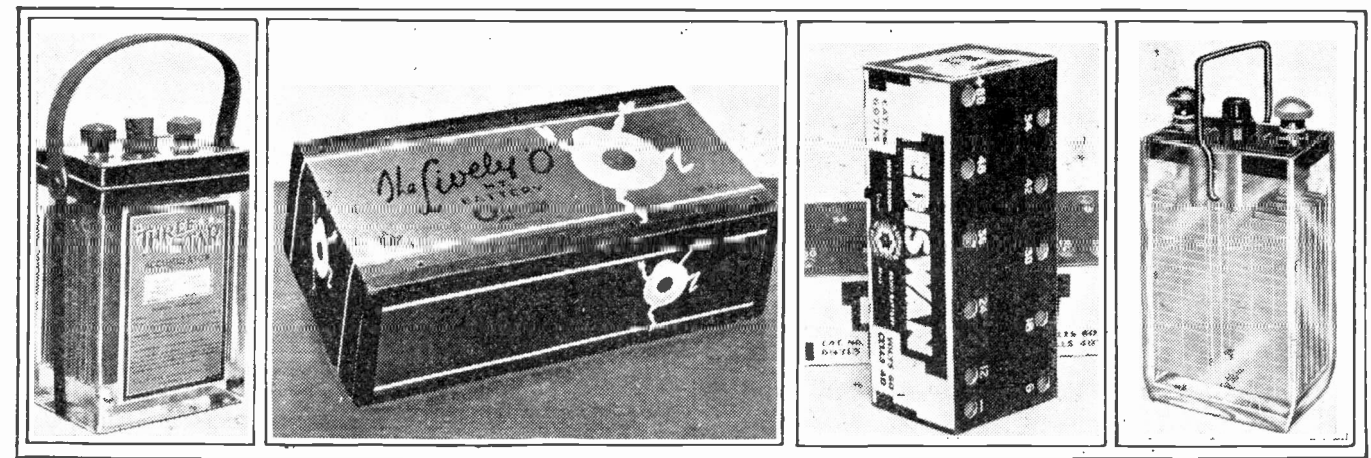
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A DIVERSITY OF BATTERY TYPES, SHAPES AND SIZES.



The first two photographs show an H.T. accumulator and a dry battery, both giving 60 volts, and on the right is an unspillable 2-volt accumulator for portable receivers.

SOME ILLUSTRATED SUGGESTIONS FOR THE PURCHASER



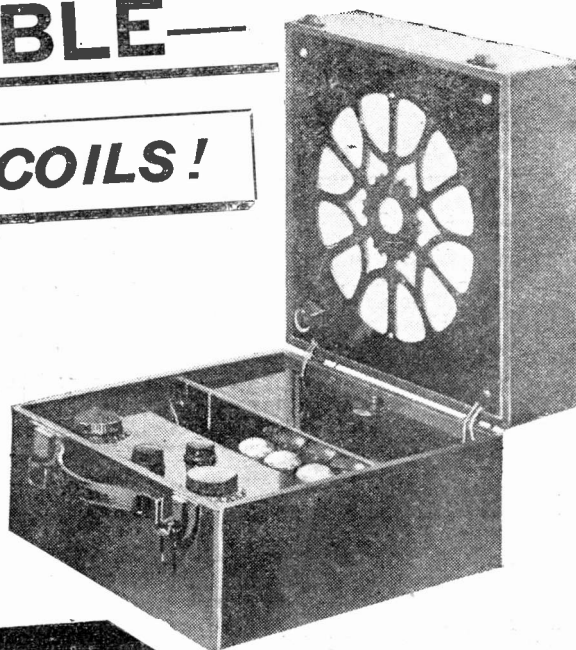
A good carrying handle like the Three-Star's is a great asset. The Lively "O" H.T. battery is, of course, an Oldham product, and beside it is another famous battery, the Edison. In the Pertrix great attention has been paid to such details as the terminals and plug and the neatly-attached handle.

AMAZING RECEPTION FROM THE POP-PORTABLE— Due to READY RADIO COILS!

The use of Ready Radio Medium-Wave Coil and Quito Coils improves the performance of the "Pop-Portable" to an amazing degree. They are wound strictly to "Popular Wireless" specification and bear the Ready Radio guarantees of utmost efficiency and first-class workmanship.

2 READY RADIO READY-WOUND QUITOS
(Long Waves) - - - pair 7/6
1 READY RADIO Medium-Wave COIL (actually
specified by "P.W.") - - - 5/-

Make sure of getting the best possible performance from
your "Pop-Portable" by buying a Ready Radio Kit!



THE "POP-PORTABLE"

	£	s.	d.
1 ReadiRad portable cabinet to specification	2	5	0
2 J.B. .0005-mfd. condensers, slow-motion log type, 40-1 ratio	1	1	0
1 ReadiRad .00015-mfd. differential re- action condenser	5	0	0
2 T.C.C. .01-mfd. fixed condensers	5	0	0
3 Telsen fixed condensers, .001-mfd., .0005-mfd. and .0001-mfd.	1	6	0
2 T.C.C. 1-mfd. fixed condensers	5	8	0
1 T.C.C. 2-mfd. fixed condenser	3	10	0
2 Lewcos 600-ohm flexible resistances	1	6	0
1 ReadiRad 10,000-ohm flexible resistance	1	6	0
1 ReadiRad 25,000-ohm flexible resistance	1	6	0
1 Lewcos 100,000-ohm flexible resistance	1	6	0
1 ReadiRad 5-megohm grid leak and holder	1	4	0
1 ReadiRad 1-megohm grid leak and holder	1	4	0
1 ReadiRad 2-megohm grid leak and holder	1	4	0
1 Telsen H.F. choke	2	0	0
3 Telsen 4-pin valve holders	1	6	0
1 W.B. horizontal type valve holder	1	3	0
1 Wearite 2-way rotary switch with terminals	4	0	0
1 Wearite 4-way rotary switch with ter- minals and indicating knob	5	8	0
1 Telsen "Ace" L.F. transformer	5	1	3
1 Set Bulgin frame aerial spacer	3	6	0
1 Screen and foil to specification	3	6	0
1 Mullard portable loud-speaker unit	1	18	6
1 ReadiRad wound medium wave coil as specified	5	0	0
2 ReadiRad wound coil quito's for long waves	7	6	0
4 Oz. reel 24 g D.S.C. wire for short wave frame aerial	2	2	0
4 Oz. reel 30 g D.S.C. wire for long wave frame aerial	3	0	0
1 Packet ReadiRad "Jiffyline" for wiring	2	6	0
4 Valves to specification (S.G., Det., L.F. and power)	2	7	6
Flex, wander plugs, spades, crocodile clips, etc.	1	10	0
TOTAL (Including valves and cabinet)	£11	9	0

"POP-PORTABLE" CABINET WITH WOUND FRAME AERIAL

The Cabinet supplied with Kit "C" can be ob-
tained separately, with ready-wound frame aerial

PRICE **£2.15.0**

Cabinet without aerial

PRICE **£2.5.0**

RECOMMENDED ACCESSORIES.

1 C.A.V. 2 N.S. 17 unspillable accumulator	16	0
1 Fuller 9-volt G.B. battery	1	6
1 Fuller W.O.P. 100 portable battery	15	0

You can now buy your Ready Radio Kit from
your local dealer, but be sure it is a genuine
Ready Radio Kit.

TO INLAND CUSTOMERS

Your goods are despatched post free or
carriage paid.

TO OVERSEAS CUSTOMERS

All your goods are very carefully packed
for export and insured, all charges
forward.

THE

"POP-PORTABLE"

Completely assembled, with valves and cabi-
net, ready for use
and aerial tested.
Royalties included

£13:9:0

or 12 monthly payments of **24/9**

KIT "A" (less valves and cabinet) **£6:16:6**
or 12 equal monthly instalments of **12:6**

KIT "B" (with valves less cabinet) **£9:4:0**
or 12 equal monthly instalments of **17:0**

KIT "C" (with valves and cabinet) **£11:9:0**
or 12 equal monthly instalments of **£1:1:0**

IMMEDIATE DESPATCH ORDER FORM

ORDER FORM. To **READY RADIO (R.R. Ltd.)**
159, Borough High Street, London, Bridge, S.E.1.

CASH ORDER. Please despatch to me at once the
goods specified for which I enclose payment in full of

C.O.D. ORDER. Please despatch to me at once
goods specified for which I will pay in full the sum of

EASY PAYMENT ORDER. Please despatch my
Easy Payment order for the goods specified for which
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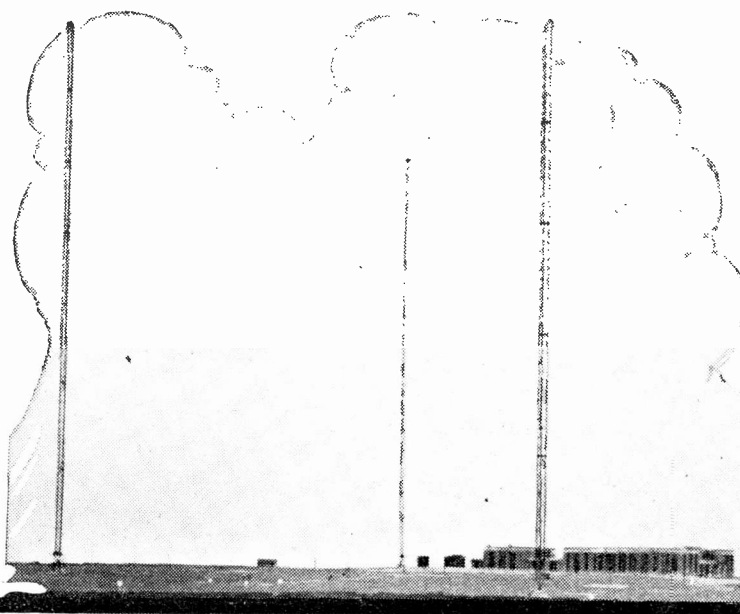
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WITH THE B.B.C. *in the* NORTH

By **LESLIE W. A. BAILY.**

Aberdeen, 500 miles from London, is the B.B.C.'s most distant outpost. This week, Mr. Baily, who has been touring B.B.C. stations in the North of England and Scotland for "Popular Wireless," tells of his visit to 2 B D.

No. 3.—**ABERDEEN.**



ABERDEEN is the B.B.C.'s "furthest North." The station stands to-day more or less as it was opened in 1923. At one time there were two large studios, but local programmes have been drastically curtailed, and the accommodation has been accordingly reduced.

There is now a small talks' studio, and one of the old "large" studios remains. ("Large" in the 1923 sense, diminutive by comparison with the latest studios at Edinburgh, Manchester and London.) Complete with old-fashioned curtaining, it is below street level.

"Silent" Microphones.

On one afternoon a week and on an occasional evening Aberdeen's studios are used; for the rest of the time the microphones hang in silence and semi-darkness. When the lights were switched on for me to peer into these vacant and somewhat gloomy rooms I wondered whether they were haunted by the ghosts of their former busy activities—of the station orchestra (long since disbanded), of R. E. Jeffrey, who was station director there before he became dramatic director at Savoy Hill, of the primitive era of broadcasting when the landlines were so noisy and so unreliable that Aberdeen always had a stand-by programme ready to put on, and when the news bulletin sometimes arrived over the line from London so mutilated and distorted that it was not "put out" from the Aberdeen transmitter.

A Wireless Link.

How different now! The news is broadcast as regularly as clockwork and the voice of the London announcer comes as clear as a bell from the Aberdeen transmitter, after a journey along 500 miles of line.

There is occasionally slight landline noise, and music relayed from London is sometimes low-toned, lacking the fine clarity of music heard from, say, Brookmans Park; but considering the length of landline the quality is remarkably good.

The alterations in the landline system, which I will describe next week, will still further improve the quality, and as the Aberdeen transmitter is definitely to be retained when the Scottish high-power

station comes into service it is reasonable to assume that sooner or later the B.B.C. will re-condition the eight-year-old transmitter.

During the daytime there is no landline connection between Aberdeen and London.

A receiving set on the outskirts of Aberdeen picks up 5 X X and hands it over a landline to the local transmitter. The quality is quite good and although 5 X X sometimes fades slightly at this distance the Engineer-in-Charge told me that the fading is generally negligible.

The main fare from the Aberdeen transmitter nowadays is the London programme, but there are frequent Scottish Regional programmes. The transmitters at Edinburgh, Glasgow, Dundee and Aberdeen are linked by landline day and night, and on these regional programme occasions this

network is connected to a studio at Edinburgh or Glasgow or Aberdeen.

"My object is to throw something worth while into the Scottish pool of programmes," said the B.B.C.'s Aberdeen Programme Representative to me. "Aberdeen's contributions are small, but they are of better quality than they used to be. We demand a higher standard now."

No "Station Director."

The "representative" (the title Station Director is now defunct) is Ian Whyte, who is perhaps better known in Scotland as a rising modernist composer. Watching the B.B.C.'s interests at Aberdeen is a part-time job, the rest of his time being spent at Aboyne, 40 miles away, where Lord Glantane encourages musical activities in which Whyte takes a prominent part.

This rugged young Scot, Ian Whyte, is a virile and unconventional person. When I interviewed him in his office at Aberdeen he discussed broadcasting, Scottish music, Sir Harry Lauder, opera, the public taste, and himself in such outspoken terms that it would be indiscreet of me to reveal them here, and all the time he was scrawling on sheets of music manuscript the instrumental parts of a new work of his which was to be given its first performance by the B.B.C. orchestra at Edinburgh.

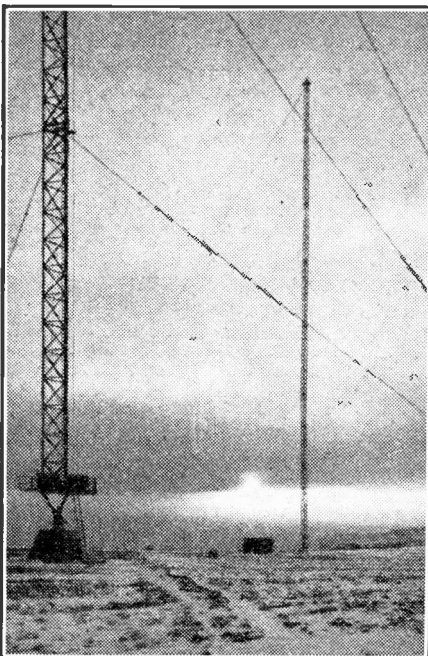
A Staff of Twelve.

The staff at Aberdeen consists of Whyte (who has been associated officially with the B.B.C. only a few months), the Engineer-in-Charge (who has been here since 1923), Ronald L. Malcolm (who has lately been appointed assistant to Mr. Whyte), seven engineers, and two typists.

The transmitter, about a mile from the offices and studios, is installed in a wing of a steam laundry. The aerial hangs between two 110-ft. steel masts. Recently tuning-fork control apparatus was fitted so that Aberdeen could go on the common wavelength (288 metres), the Aberdeen wave (301 metres) being required for the North National transmitter.

The transmitter is of the "Q" type, as fitted to what the B.B.C. used to call its "main" stations. Its power under the new rating is 1.2 kilowatts.

MOORSIDE'S MIGHTY MASTS.



A view taken soon after the erection of the great masts for the B.B.C.'s North Regional station.

The perfect jelly acid battery . . .

Engineers have known for a long time that the jelly acid battery would be the ideal battery for portable sets if only it could be made as efficient as a liquid acid battery. Its advantages in safety and cleanliness were obvious.

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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.

IN the early days of the Great War we used to comfort one another with the reminder that the first seven years were always the worst. So with summer wireless, at any rate, in 1931.

We have had a bad time with atmospherics during the earlier part of the lighter and alleged brighter period, and one can fairly safely prophesy that conditions will rapidly improve now that we have passed the longest day. It has been on the whole the most atmosphericky summer that I can remember.

Atmospherics on the Increase.

It has been suggested that we notice atmospherics more nowadays because we are using more sensitive sets.

But I don't think that this is entirely true. A great deal of my own listening, for example, is done either with a frame aerial or with an indoor wire suspended round three sides of a ground-floor room. Both of these collectors are much less susceptible to interference than the big outdoor aerial which I used in previous years.

No; atmospherics have undoubtedly been worse than they were last year, the year before, or the year before that, and the

increased sensitiveness of sets has nothing to do with the frequent appearance in our logs of those big black X's which do not represent kisses.

The only thing to do when atmospherics are a nuisance is to resign yourself to your fate and to tune the set either to the local station or to one of the very powerful foreigners. The strength of the transmission will then, as a rule, be very much greater than that of the atmospherics, and although an occasional very powerful crackle or bang will force itself through, you will, in the main, have little trouble with X's.

Naturally, you want to make ether trips abroad when you can, and on most evenings there are periods when atmospherics fall to a minimum as regards both number and strength. Be on the watch for such periods, and when they occur make hay whilst the sun shines.

Long-wave Landmarks.

On the long waves the outstanding stations just now are Radio-Paris and Warsaw, both of which I very heartily recommend to your attention. You can be sure of good programmes from either, and you can be equally confident of plenty of volume.

Zeesen is also worth attention, and Kalundborg is quite good at times in the broadest daylight. I have just tuned him in, for instance (mid-day), on a four-valve portable with no auxiliary aerial.

On the medium band there still remain a good number of really first-class stations. For consistency the palm must be awarded at the present time to Toulouse, which never fails to score the highest mark in my log.

This is rather remarkable when you come to think of it, for Toulouse is only an 8-kilowatt station. He is situated in the very south of France, and his transmissions make almost the whole of their journey to this country overland, which is supposed to be the least favourable route for radio waves.

Pick Your Programme.

Milan has quite come back again as a first-rate transmission, and if you haven't recorded him lately in your log I would recommend you to try for him now. Budapest has also been very well heard on several recent occasions.

Brussels No. 1 is usually good, and you can rely upon Langenberg on most nights. Rome is pretty consistent, but Stockholm varies just now in the most surprising way. Beromunster is nearly always worth tuning in, though Sottens, the other Swiss station, seems to be less powerful than he was quite recently.

Frankfurt is providing good reception on many nights; Lwow has his evenings, and Breslau is now much better heard than he has been for some little time.

Brussels No. 2 is usually a strong station. If you have not heard Gothenburg lately, try for him now. Remember, also Strasbourg, Hamburg, Turin, Heilsberg, Prague, the Ecole Supérieure and Bordeaux Lafayette.

YOU remember my little dissertation last week on telephony transmission as compared with C.W. At the risk of harping on one subject, I should like to carry on with a few remarks on "telephony versus C.W." after it has left the transmitter and has been hurled into the mêlée of signals already occupying the ether.

Personally, I should say that genuine 100 per cent modulated "fone" is as easily, and almost as reliably, received as C.W. But there is such a little of it about. Very few amateurs are capable of putting it out, and very few of the broadcast stations try to do so.

Smooth Reaction Essential.

Thus it has become a general rule, where short-wave work is concerned, that it is impossible to receive good telephony unless the man at the other end is putting out such a lusty C.W. signal that he would be extremely loud if he were doing Morse work.

We had better forget the nightmare telephony perpetrated by some stations and consider only the real stuff, which is still, alas, quite rare. To receive this well and reliably, you must have a receiver that goes in and out of oscillation without a loud explosion.

All those "ploppy" reaction controls mean that once the receiver has stopped oscillating, it is a long way out of oscillation. Obviously, this is of little use for the reception of weak telephony. And this is, I think, first on the list of difficulties attendant upon telephony reception.

SHORT-WAVE NOTES

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

The moral of this is—don't put up with a ploppy receiver. I am not going to enumerate all the causes of this trouble—I have done so at great length and on several occasions. So look up your back numbers until you find some remarks on the subject.

Next, I might mention that an H.F. stage, whether of the screened-grid variety or not, is always worth while for telephony reception. You may not notice any difference in the strength of the carrier-wave when the set is oscillating, but the sensitivity is much higher with the set in a non-oscillating state than is ever possible without H.F.

Don't Forget the L.F. Side.

Needless to say, I am talking about H.F. that works. Here is another opportunity for the back-number department.

And my last point is this. For good telephony reception you must have a respectable L.F. amplifier as well. This appears to be rather a rarity among short-wave enthusiasts, who go in for great sensitivity and easy operation and rather

forget the great "quality craze" that has come upon us of late. All these peaked audio stages for the reception of nice sharp Morse signals will, of course, have to be scrapped for telephony work.

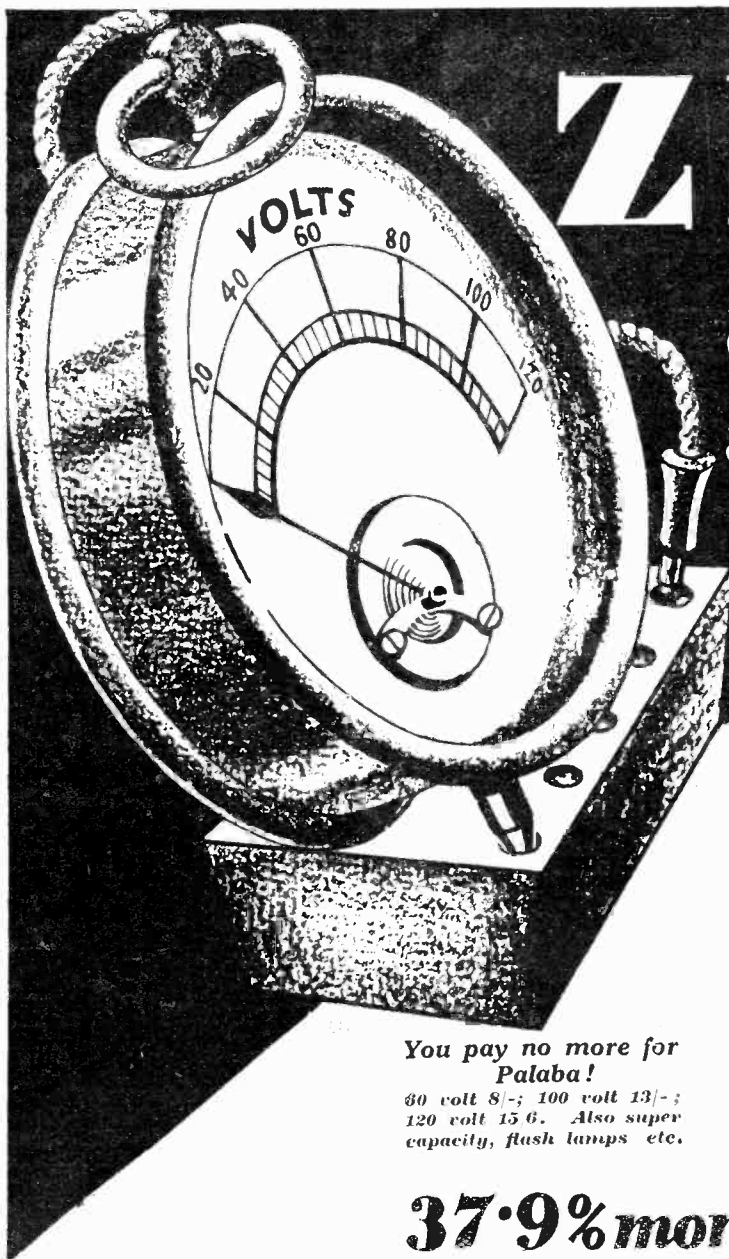
Here again I do not intend to elaborate. Any short-wave enthusiast who doesn't know how to make an L.F. amplifier is beyond hope! That is, with the help he has received in "P.W." from the pens of all the acknowledged masters of the subject. So I will leave you to think it over and get down to it.

Waiting for the Winter.

And now to come back to current topics once more. The short-wave bands appear to be rather dead at the moment of writing. When this appears in print I shall be holiday-making far away, and shall not have the slightest idea of conditions, so please do not rise at me for saying this! The only American stations that are really consistent appear to be W 2 X A F and W 1 X A Z. Others are very loud at times, and entirely absent at others.

W 2 X A L on 49.9 metres is worth looking for, and he now relays W R N Y, New York. Another useful station for the DX-hunter is Y V 2 B C, located at Caracas, Venezuela. He works on 50 metres, and is audible between midnight and 4 a.m. every day except Monday and Wednesday.

Yet another newcomer, and one which may swell your list of countries heard, is C T 3 A G, Madeira, on 24 metres, every Thursday and Saturday.



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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 612.)

All current flow takes place backwards or forwards along the conductor, and if the wire reaches from a point near your left hand to a point near your right hand, you can imagine a *direct* current like a river, and flowing continuously from left to right. (Of course, it could flow just as well from right to left; but in any case a direct current flows *continuously* in the same direction.)

"WHY IS IT SO NOISY 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.

Alternating currents, on the contrary, continually change their direction. You can imagine one commencing to flow like a river, from the left to the right, but as soon as it gets into full swing, the current slows down, stops, and then commences to

flow back again, in the direction from which it has just come.

As it commences each time there is only a small flow of current but it gets bigger and bigger until the stream is in full force along the wire. But immediately this happens it slows down again, comes to a stop; and then reverses and goes through the whole performance once more.

The number of times per second it goes through this complete cycle of operations is called frequency.

A common frequency for ordinary electrical lighting current is fifty. Wireless currents, which are essentially similar, although, mostly incomparably smaller, have frequencies which run into millions.

You ask what is the exact difference between D.C. and A.C. It would take a big book to answer that question fully, but the fundamental difference is that given above.

The D.C. current starts, builds up, attains its maximum, and then continues to flow in the one direction.

An alternating current commences to flow, builds up, attains its maximum, falls away, ceases altogether. It immediately begins again, but in the opposite direction, builds up, attains a maximum, falls away to zero again, and so on, many times, every second.

HOW MANY MICROHENRIES?

"EXPERIMENTER" (Halifax).—"While studying for an electrical examination I find radio an ideal hobby, for although akin it is a complete change from power station work. I am especially interested in coil design, but I must say I find the formulas are awful time wasters.

"Are these charts and 'short cuts' to coil inductances sufficiently accurate for preliminary calculations?"

"Abacs" and "N Diagrams" are merely "geometrical" expressions of the various formula and should give you pretty close results if properly prepared. However, if you want to improve your "maths", we would advise you to tackle the working out of each calculation from the original formula. But if you feel you are strong in that quarter it would be a great pity to waste time with a lot of laborious figuring when you could get the same result by a ruler and a table. Your best plan would be to get a copy of "Modern Wireless," and

read up the series there dealing with the various N diagrams, in which a great many time-saving tips are given. (The July, 1931, number of "M.W." contained one which is particularly useful to those who are interested in coils.)

TECHNICAL TWISTERS

No. 70.—"DX"

CAN YOU FILL IN THE MISSING LETTERS?

The term DX means

Thus a "good DX receiver" means a sensitive and selective set, capable of picking up plenty of stations.

The letters DX are taken from telegraphic practice, where they usually mean "Duplex," most long-distance lines being worked in duplex, i.e. transmission and reception.

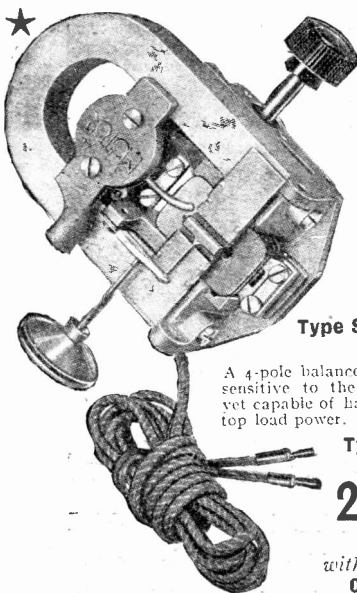
Last week's missing words (in order) were Terminals, Resonance, Rattle.

THAT BROOKMANS PUZZLE.

We are indebted to G. F. F. of Falkenham, Ipswich, for a note on this rather interesting subject. He says: "In the 'Radiatorial' questions and answers on page 492, POPULAR WIRELESS, dated 20th June, 1931, you publish a reply to 'P. M.' headed a 'Brookmans Puzzle.' I have had the same experience

(Continued on page 616.)

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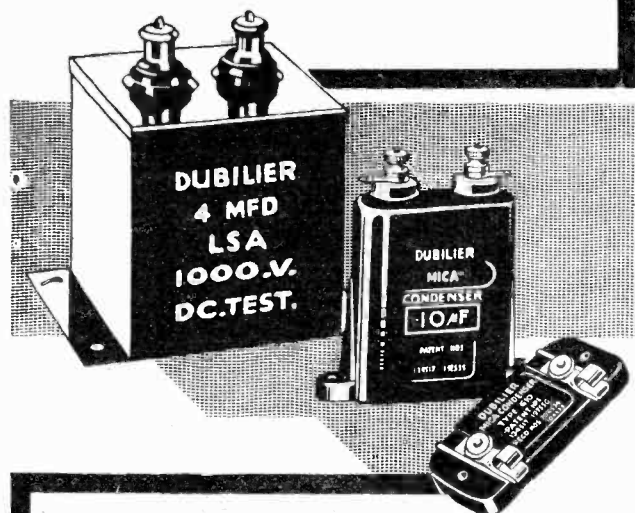
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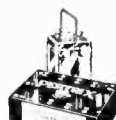


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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 614.)

as 'P. M.' with an adjustable condenser, and in my case it was due to a rather slack adjusting screw."

Readers' experiences of this kind are always welcome, and we should like to thank G. F. E. (and others who send in similar accounts for the benefit of those suffering from peculiar faults) for the friendly spirit displayed.

WHAT SIZE OF H.T. BATTERY.

G. W. D. (Cheltenham).—"What size of H.T. battery should I buy for a three-valve set?"

Before we can tell you which would be the best, and cheapest battery to buy we must know more about the three-valve set.

You see, the H.T. battery has to supply the plate current of ordinary three-electrode valves, and the screening-grid current of the S.G. and pentode in addition to their anode currents. Consequently sets using these types of valves take widely different currents from sets using ordinary valves.

Moreover, it is very important that the battery is chosen in conformity with the current which will be taken regularly from it, for it is a little wasteful to buy a very big battery when a smaller one would do, and it is very wasteful indeed to buy a small battery when a large one is needed.

The small battery will then be over-run by being discharged at a greater rate than it is capable of supplying, and this is a most ruinous plan, very detrimental indeed to the life of the battery. Heavily over-run it will not last half as long as it would have done had it been of sufficient capacity to supply the current properly.

As some three-valve sets only take about seven milliamps while other three-valve sets may be taking 20 or even more, you will see that it is essential to know more about the valves employed before giving an opinion as to which H.T. battery should be chosen.

WHEN THE STRENGTH VARIED.

J. B. C. (Prescot, Lancs.).—"For over two years I have been working my set, with but an occasional change of crystal, and always at about the same strength (apart from the various changes you could account for, such as winter and summer, etc.). Recently I have had a new neighbour and he works a very powerful four-valve set.

"It seems to have made my set louder. I do not mean that when he is playing the programme I can hear it coming over from his house, or anything like that, because even when the doors are shut and not a sound is coming from his house I still think my set is louder than it was before.

"Would this be possible? If so, why should it sometimes be quite strong and at other times not better than it was before?"

It often happens that a powerful valve set, especially if of an old-fashioned type, will affect a crystal set in the immediate neighbourhood. "Sometimes the effect is to weaken reception, and sometimes to strengthen it.

You appear to be lucky, inasmuch as the latter effect is taking place in your case. But it is only when the set is tuned in to the same programme as you are receiving that the effect occurs, and this is probably why you have noticed the strengthening only at certain times.

"P.W." PANEL NO. 28.—REACTION.

In radio the term "Reaction" is usually understood to mean the feed-back of amplified impulses from a plate circuit into a preceding grid circuit.

Generally a coil (reaction coil) is arranged in close proximity to the grid coil, to provide inductive coupling, and a variable condenser controls the amount of current flowing in the circuit.

The best form of reaction condenser is the "differential," which is arranged so that when adjustments divert current from the reaction coil an alternative path to filament is provided, the filament-plate capacity of the arrangement remaining sensibly constant.

THAT COPENHAGEN CONFERENCE

(Continued from page 593.)

anything except a universal currency. But the broadcasting stations could so easily come first, the language difficulty second, but the currency would obviously follow third.

The liberation of the long waves is terribly important. The Union has pressed hard for their possession (let us hope their demands were not so numerous that they spoil their case for the only thing that matters—long waves, not lots of waves). The bureaucrats should listen and recommend, Madrid should act.

It is important, is it not? I wonder if machinery could be devised to speak out even in the face of criticism?

The Listener's Fault?

It is said that "the British Government delegation must be conservative." If that is so, it is the fault of the British listener. But the British listener is only informed through an instructed press and supported by the B.B.C. representatives.

I used to try to make the listener understand my policy, and I see the present Chief Engineer has been repeating my policy. This is to the good. My articles are certainly read, as I know from correspondence and occasional talks with those who understand broadcasting and are still in the B.B.C. I think we should all of us bring friendly pressure to bear upon all directly concerned with broadcasting interests and who are in direct contact with the international situation.



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Every CAMCO Cabinet bears the CAMCO Seal

FOR THE LISTENER

(Continued from page 594.)

skimming over them; now sailing away from them to a distance; as if I were already an angel! Sometimes it is as if I were attached to an invisible giant-stride.

You remember the giant-stride in the school playground?

Those Dream Companions.

And round and round I go, in vast airy sweeps, over the heads of the gathered company. There always is a company. It wouldn't be worth while going through with such a performance unless there were somebody looking on with envy and admiration!

It is a very pleasant dream. I am glad that many other people have it!

There are people who dream the same dream so often that they actually know and recognise the people they meet in them. They have a waking world of friends, and a dream world of friends. Mr. W. B. Yeats, the Irish poet and dramatist, says he has dreams like this.

Dream-companions whom you meet and talk with, just as you meet a different set of people when you go down to the country for the week-ends. I suppose you pick up the threads of acquaintance in one dream where you let them drop on the previous occasion; like the man who mislaid something when he was drunk, and could not remember where he had put it until he was drunk again!

The Unconscious Mind.

Dreams, Professor Seligman said, rise from the unconscious. The mind is like a deep pool. Our waking thoughts are like the ripples and the currents on the surface.

When these are stilled in sleep, bubbles from the depths beneath rise, float for a little while, and disappear. And because the same kinds of dreams are dreamed by men of all races and all ages—the type-dreams—it is likely that, in spite of all our surface differences of custom and culture, Humanity is one and the same in the depths. It is good to be able to believe that.

He also said that, when we fall asleep and stop thinking, the unconscious mind expressed itself in pictures. These are our dreams. Moving and talking pictures. Queer pictures sometimes.

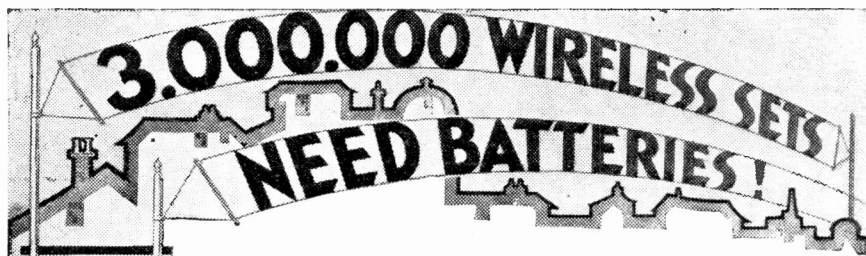
Your waking mind is clever and can think in abstract terms; but your unconscious mind is not clever and can only express itself in pictures. So that our dreams represent pictorially our unconscious feelings and desires.

Surely Not!

I suppose that is why I have the "flying" dream; because my unconscious desire is to be an angel! Toots, man! Very unconscious, I assure you!

He also said, (though this hadn't very much to do with dreams, but I thought it very amusing,) that when a man becomes a vegetarian it is probably due to a revolt against an unconscious desire to be a cannibal! Now at last Mr. George Bernard Shaw's cat is out of the bag!

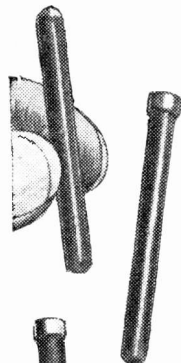
I am afraid that I have not made much direct programme mention this week, but I hope the foregoing shows how thought-provoking some of the B.B.C. talks can be.



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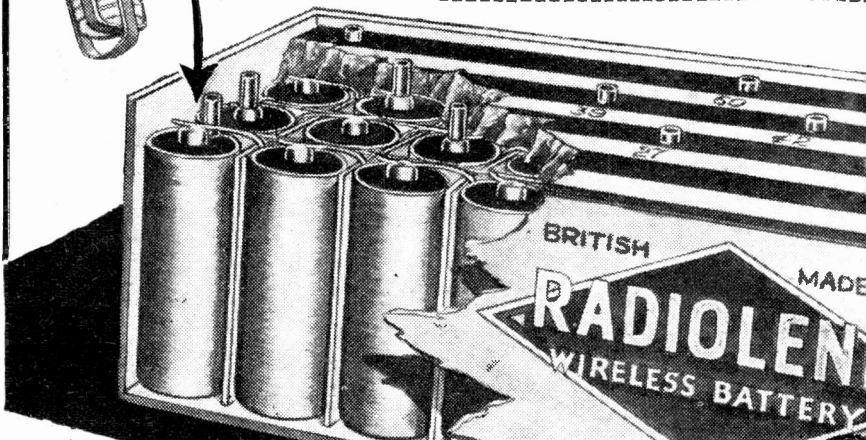
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"Popular Wireless," 18/7/31.



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TECHNICAL NOTES.

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

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

A Baffling Mystery.

A GOOD deal of mystery often seems to surround the use of a baffle in connection with a moving-coil speaker, and some readers appear to think that the loudness of the sound determines the required size of baffle. Also there seems to be a common impression that the larger the baffle the better the results.

Now, although in one sense these impressions are wrong, at the same time there is a germ of truth in them, and that is why I want to make it clear to what extent they are true and to what extent they are misleading.

As you know, the purpose of the baffle is to prevent the sound-waves from the back of the diaphragm from coming round and neutralising or partly neutralising those from the front. This effect takes place in all diaphragms, but becomes more serious when the amplitude of vibration of the diaphragm is very large; it is for this reason that the baffle is commonly associated with the moving-coil type of speaker.

You will see also that to this extent the question of the baffle is bound up with the question of the loudness of the sound. When the diaphragm moves forward a compressional wave is sent out into the atmosphere, but at the same time a wave of rarefaction is proceeding from the rear side of the diaphragm.

Neutralising Sound-Waves.

If the compressional and rarefactional waves occupied the same position in the atmosphere at the same instant, they would neutralise one another, and there would be no sound at that point. Obviously, therefore, you want to try and keep them separate as far as possible, and this is done by surrounding the diaphragm with a fair-size baffle-board, so that the rarefactional wave from the rear of the diaphragm has to travel an increased distance before it reaches a point in front of the diaphragm.

If the extra distance happens to be about half a wave-length of the sound (this obviously depends upon the frequency), then the back rarefactional wave may arrive at a point in front of the diaphragm at the precise moment that the rarefactional wave from the front of the diaphragm is also arriving (this wave from the front of the diaphragm having been produced half a vibration later than the one which has arrived from the back). In this case the two waves will reinforce or assist one another.

Practical Considerations.

This is the kind of thing we are aiming at, but clearly it depends upon the actual frequency, which is varying from moment to moment, and also upon the position of the point which we are considering, that is, it will not be the same at all positions.

In view of all this we can only compromise and provide a baffle which meets the average conditions reasonably well. It is clear that if the baffle is increased in size very much, the sound from the back of the

diaphragm is almost completely suppressed, anyhow, so that questions of phase relationship become of small account.

Also, it is not a practical possibility in most cases to use a very large baffle, and in general practice you will find that a baffle some three or four feet square will meet average requirements.

I should add that although it does not do to go in for extremes in the way of baffle-boards, nevertheless a baffle-board of some kind or other is very advantageous with a high-amplitude speaker, and it is still worse to go to the other extreme and do away with a baffle-board altogether. The function of the baffle-board is really to prevent violent interference in the immediate region of the edges of the diaphragm, and this is accomplished by a comparatively small baffle.

Radio Developments.

It is curious how the pendulum swings to and fro in radio developments. Quite often we have seen a particular type of circuit come into popularity, then gradually improved upon and finally superseded, only to return to favour again a year or two later, when some further development in another direction has revived its usefulness.

I was thinking particularly of the various forms of wired wireless which are now attracting so much attention amongst listeners in different parts of the country and, in fact, throughout the world.

Wired wireless was something of a curiosity, and then a drug in the market, about five or six years ago, when we frequently had reports of the experiments of General Squier, of the United States Army, and other workers, mainly in the United States, in connection with the sending of high-frequency impulses over telephone and power lines.

Wired Wireless.

For all practical purposes, so far as radio listeners were concerned, little was heard of wired wireless in the intervening years until the last few months, when it has suddenly sprung into considerable prominence.

As you probably know, local relay stations are springing up rapidly in different parts which supply a broadcast programme from a master receiver, being distributed by means of special wires joined up to loud speakers in the different homes on the system. It is, of course, a comparatively simple matter to adapt this for transmitting communications by means of high-frequency or radio impulses passing along—or perhaps I should say directed by—the line conductors and it is in one sense the disadvantage, and in another sense the advantage, of this system that the signals transmitted are not broadcast in the ordinary sense; in fact, the distribution has been aptly described as a "limited broadcast."

The American Situation.

It is perfectly possible to transmit programmes over the electric light wires and over the telephone line. I mean, of course,

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

by high-frequency waves and altogether additional to the ordinary functions of these conductors; the difficulty—if there be a difficulty—is not so much of a technical as a commercial character.

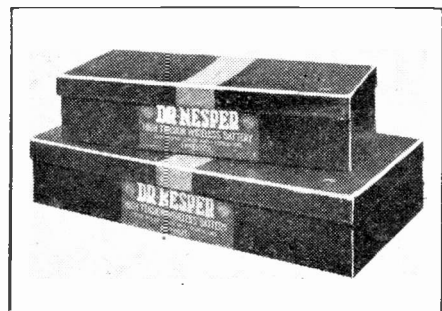
It is evident that when you propose to make use of telephone lines and electric light wires for totally fresh purposes you are entering upon a project with almost infinite ramifications.

In fact, in the United States of America, where the system of transmitting programmes by wired wireless has made much greater strides than it has in this country, an extremely interesting situation has arisen as between the various parties concerned, which include amongst others the National Broadcasting Company, which owns a huge chain of broadcasting stations, The American Telephone and Telegraph Company, Wired Radio Inc., The Radio Corporation of America, The Victor Talking Machine Company, The Radio Keith Orpheum Company, and The American General Electric Company.

It remains to be seen how the position will work itself out, but at present it is an exceedingly complicated one.

Technically Easy.

On the purely technical side there is, as I say, very little difficulty involved and it is quite a simple matter to give a choice



another favourite is the Nesper H. T. Battery.

of programmes over the wire to a number of homes within a comparatively circumscribed area; this is, in fact, what is proposed in the case of the so-called "relay stations," which have sprung up in the past few months in different parts of the country.

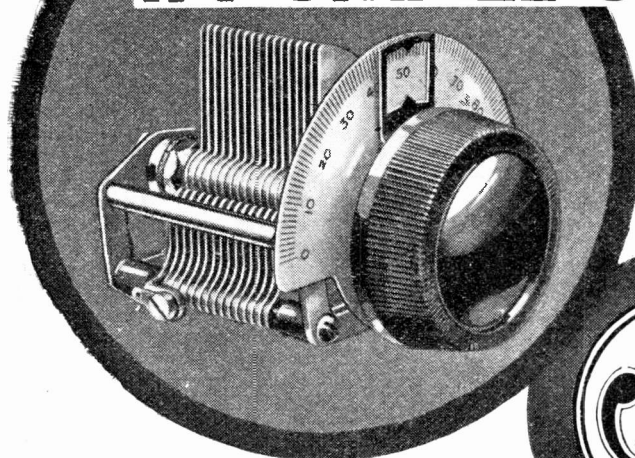
At any rate, this new development, for new development it is, is well worth watching, and it seems to me that it is likely in the near future to have an important influence upon the growth of radio broadcasting.

Is Field Current Essential?

The moving-coil speaker has for a long time been held up as a standard in loud-speaker principle and design, and the use of a separately excited field magnet naturally gives it a great advantage.

With the great improvements which have lately been made, however, in magnet steels, it is possible to produce a permanent magnet which, in conjunction with improved design in the moving-coil system, is capable of giving results to all intents and purposes equal to those of the separately excited speakers.

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

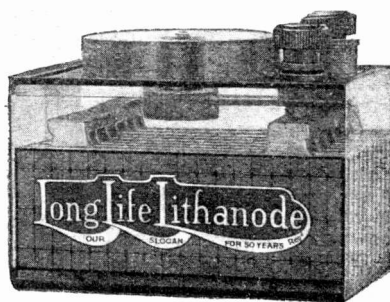
The new Amplion unit is of this type, and in view of its extreme sensitivity and splendid performance, it is clearly no longer necessary to lament that a separate field current is essential for moving-coil reproduction.

Matching Output.

Another valuable feature is the inclusion of a transformer with the speaker, this transformer being, of course, specially designed for the purpose—so avoiding the use of an unsuitable transformer which so often happens—and has three alternative ratios so that the speaker can readily be matched to the output of the receiver.

It very frequently happens that a low impedance moving-coil type speaker is fed from a comparatively high impedance output owing to the use of an unsuitable transformer or to other causes, and in these

A MODERN BATTERY



It is impossible for the acid to leak from the case.

circumstances it is impossible for the speaker to put up anything like its best performance.

Incidentally, not the least of the drawbacks of an ordinary separately-excited type moving-coil speaker is the great weight of the pot, which renders the unit very cumbersome to handle; with the permanent-magnet type the weight is very much reduced.

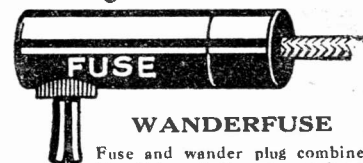
A Safe Job!

An interesting letter this week, from a Croydon reader, refers to a recent article in POPULAR WIRELESS (of which I was *not* guilty) entitled, "Are Short Waves Dangerous on Battleships?" The author of the article in question suggested that, owing to the currents induced in the guns of the battleships by short-wave radiation from the aerial, there might be a danger of the guns getting sufficiently hot to fire prematurely.

My correspondent, by means of some elementary and rather amusing mathematics, proceeds to show—I must say very convincingly—that, if this were the only risk on a battleship, the navy would compete with the statistical railway train as the safest place on earth!

His letter concludes: "No, sir, it sounds too much like energy for nothing from nowhere."

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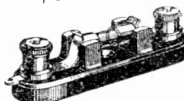


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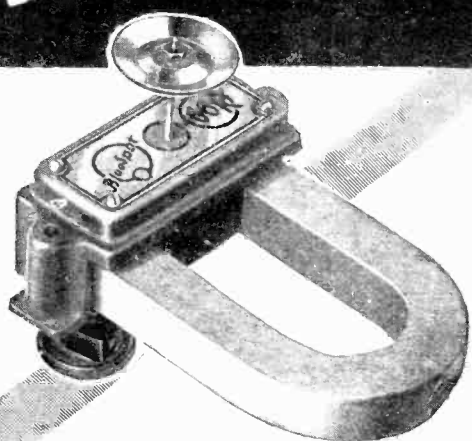
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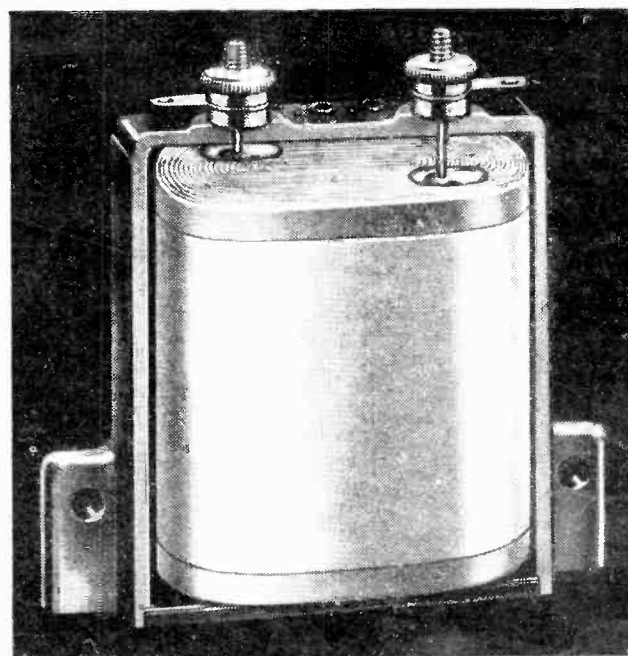
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