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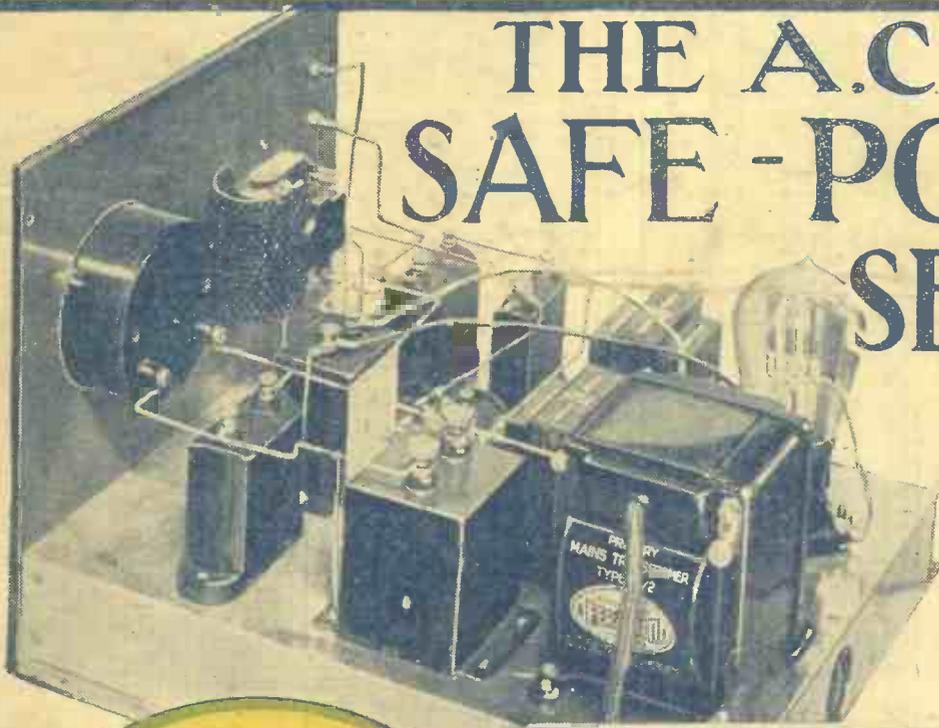
No. 426. Vol. XVII.

INCORPORATING "WIRELESS"

August 2nd, 1930.

THE A.C. SAFE-POWER SENIOR

*Full
Details
Inside*



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YOUR COMPONENTS

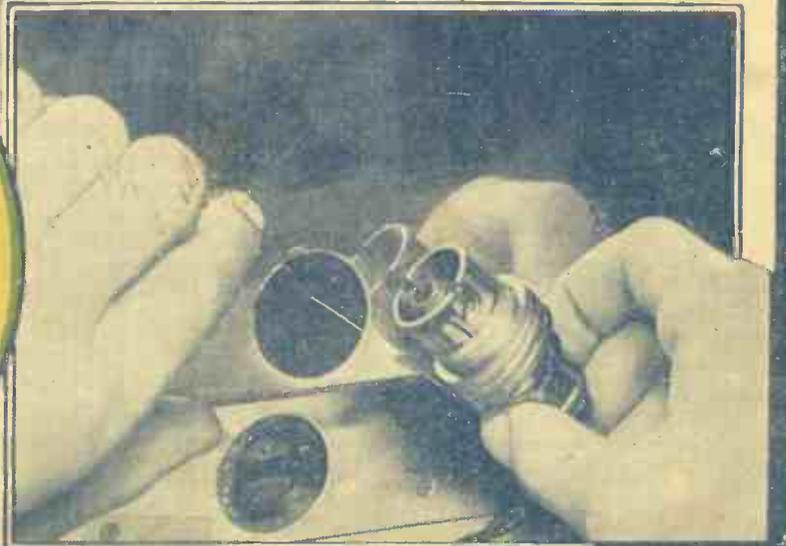
By Victor King

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By Stiles-Allen

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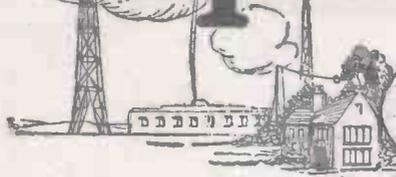
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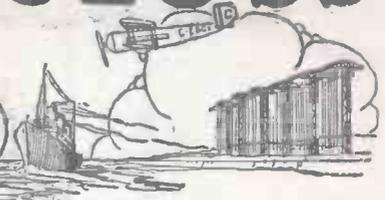
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**A TIDY MIND—
 THE SPARE EARTH—
 RADIO v. CAR—
 D.F. ON SHIPS—**

**A WARNING—
 THIS "SULPHATE"—
 D.C. TO A.C.—
 A NAUGHTY STATION.**

RADIO NOTES & NEWS

Reverie.

THE "earth" wire from my set runs down one of the upright supports of our verandah steps. Whilst dreaming in the sun over my "after lunch" smoke yesterday, and kinder staring into nothingness, I gradually realised that I was actually staring at a neatly-cut wire. The two ends were turned slightly outward, adding insult to injury; they gaped at me. I did not grasp all this at once. Too hot and sleepy!

A Tidy Mind.

"BUT," I said, "the thing is in two bits. You don't have earth wires in two bits! Its a spark-gap in the wrong place. I'm dreaming, surely! Who of all my household (Biblical touch, that!) would steal down like a thief in the night and sever my earth lead? One does not do same, does one?" *Mais oui!*—as they say on those cheap trips to Boulogne—it was true, though. The culprit was a house-painter, who "thought the wire was in the way," and would have removed it *in toto*, as Julius Caesar said—had not the tweeny set up a scream. Heroic girl!

The Spare Earth.

WHAT was the tweeny doing there? Keeping an eye focussed on the main chance, I suppose. The heart of a house-painter with a tidy mind is not lightly to be spurned.

Why didn't the receiver say that its jugular had been cut? Ah, a fair question, and if you can spare just a moment before you dash down to the beach I'll reveal all. Very dramatic! Hist! Closer, come closer! Lend me your ear! (Gracious, how your neck is skinning!). The crafty old Ariel, wise from manifold afflictions, always has two distinct, separate, indiwiddle independent, self-starting earths! He has lost earths before! Now run along, children, and do a nice bit of Lido before lunch.

Radio Versus Car.

DR. WALTER DAMROSCH DE NOO YORK sees in Radio and the Automobile two opposing forces fighting for the soul of youth; the Ormuzd and Ahriman of the twentieth century, so to speak. The car will disrupt family life; radio tends to build it up. B'gosh, there's much to be said for both. Though the "Kah" or "Kaw"—it depends on whether you live S.W. or S.E.—is liable to be made an outward and visible sign of snobbery, it can be a means of showing folk what a heavenly land we live in; and the radio set can be either an unmitigated evil or a key to the gates of wonder. The choice rests with the users.

Prophecy and Reason.

ACCORDING to a notice circulated by the Australian wireless company, which runs one end of the Marconi beam, Mr. E. T. Fisk said recently that whereas talk of radio communication "left him cold" it would probably be found that radio would solve the mysteries of the future world, and of life after death. "The reason for this belief," he said, "is that radio makes use of ether waves that permeate infinite space, and it is probable that, by means of these ether waves, there would be constant and reliable communication between the future inhabitants of the earth and those who have passed over the border into another world."

"THE UNCHANGEABLE EAST" TAKES TO THE MIKE



This up-to-the-minute view of the situation in India shows Mrs. Lilavati Munshi addressing a Bombay gathering by means of a microphone and loud speakers.

Pigs Might Fly.

UNLESS I have missed it, Mr. A. M. Low, in his wildest flights, never went so far. I fear that Mr. Fisk, in straining after an effect has dislocated some part of his reasoning apparatus. The "reason" for his belief is that ether waves permeate space. It is no reason at all! He might as well believe that pigs will fly; the same reason would serve him. Also, in speaking of "mystery" he really ought not to make so free with the words "probably"

D.F. on Ships.

THERE can be, however, but one view of the utility of wireless telegraphy. Once regarded by many sailors as an unnecessary and unseamanlike tool, the radio set has become a department of the ship. Interesting figures are given by the U.S. Lighthouse Service in relation to the stranding of large vessels on the U.S.A. coasts during the period Jan., 1927 to March, 1930. There were 143 strandings and of these 85 per cent. were of ships not equipped with radio compasses. An analysis of the remaining 15 per cent. shows that in only four instances the stranding took place in regions protected by wireless beacons.

and "probable." In fact, successful sensation-mongering requires much more skill than is apparent in his effort.

"How Diagrams Help."

MANY thanks to G. M. M. (London, N.13); for his useful letter. Technical query answered and other suggestions thankfully noted by those chiefly concerned. Can't say more about them at the moment, except in reference to the suggestion that our blue-prints should be drawn to a definite scale. I can well understand that his draughtsman's soul cries out for this, but the point has not been over-

(Continued on next page.)

RADIO NOTES AND NEWS.

(Continued from previous page.)

looked, and if he will refer to "Modern Wireless" for July, he will find our point of view in the article entitled "How Diagrams Help."

A Warning.

THE Marconiphone people have asked us to draw attention to the fact that attempts are being made to obtain unauthorised possession of their apparatus. A man visits a house and says that he has been sent to collect the set. Up to now no one has obliged the "collector," so far as is known, but it is just as well that it should be known that all Marconiphone officials carry an identification card and that their visits are announced by letter beforehand.

Fire!

REAL hard luck, Luton Red Cross Band, to suffer such havoc by fire amongst your music and beautiful instruments, and we are all very sympathetic. All normal music lovers feel safe when they see your name in the B.B.C.'s programme, and it is to be hoped that your having to become accustomed to strange instruments will not prove too powerful for you. I knew a kettle drummer who had a nervous breakdown because they changed the air in his drums!

This "Sulphate."

BY a coincidence—was it?—there was published in "P.W." for July 19th an article, "The Accumulator's Enemy," by Mr. J. F. Corrigan, and in the same number I propounded a question about "topping." No doubt 1,367 readers will point this out to me; already I hear the pens creaking in Canada, Australia, India, etc. However, now that the well-known metallurgist (mentioned above) has taken a hand I shall retire from the "sulphating" business; but I think that I shall hear some more about distilled water versus tap-water. Perhaps we may be favoured with a statement of just exactly what is the poison in ordinary water from the tap?

The Connoisseur.

J. H. M. (N. Devon) is the kind of "P.W." reader that stands in the same relation to us as a flea does to a dog; he keeps us mighty busy attending to ourselves! (This parallel, oh, J. H. M., is purely Pickwickian.) Sometimes I get a cold fit when I think of the thousands of nimble brains which are sifting my humble weekly "chat over the fence." Now, on page 487 of "P.W." July 12th, there is a "booful piter" of an insulator under electrical test. Note how it is connected! Very good!

Along comes J. H. M. and asks whether the connection is not misleading, as the wires ought to pass round the length of the "egg." In an aerial or stay the "egg" should be so connected; for an insulation test it scarcely matters how—and we can't spare the time for unnecessary frills. But 'tis a point worthy of note, and we welcome criticism of this kind.

D.C. to A.C.

IF you use a "battery eliminator" or a charging panel for your accumulators, and then the local electricity supply is changed—it will almost certainly be from

D.C. to A.C.—your apparatus won't be much use except to put into the junk box. Will the supply people compensate you or provide you with apparatus which will work off A.C.? Even if the nature of the electricity is not altered but the voltage is changed you may be in an unhappy predicament. If some understanding cannot be arrived at between "radio" manufacturers, supply companies and the Electricity Commissioners, a test case may be initiated by the radio people in the shape of legal action.

A Sensible Provision.

I LIKE the practical common-sense behind the decision of the German authorities to allow radio dealers to install receivers on approval in the houses of prospective customers for a period of eight

SHORT WAVES.

It is stated that having the ears pierced is a cure for defective eyesight. A correspondent who has a wireless and gramophone enthusiast living next door to him says he has unwillingly persevered with the treatment for years.—"Humorist."

A STARTLING DISCOVERY!

"Even standing on a wet bath mat, men have been killed just by touching a leaking electric light switch, because there was enough water on their feet to prevent the current passing through," we read in the "Evening News."

These "experts!"

This week's Optimist: The beginner who bought a crystal set and a Maori dictionary.

"Radio shrinks the earth," we read in a provincial newspaper.

A correspondent, who had to walk five miles to have his battery recharged, states that this is not authentic.

OUR ANTIQUES.

"Our broadcasting authorities," someone declares, "have prehistoric ideas." The powers that be B.C.?

"This station has the call sign SPILT," we read in an article describing various foreign broadcasting centres. Rather difficult to pick up, we should think.

"Efforts are being made to evolve a musical instrument especially suited to broadcasting." We suggest a wireless piano.—"Punch."

"When rabies attacked my Uncle Daniel, and he had fits of barking like a spaniel, The B.B.C. relayed him (from all stations) At Children's Hour in 'farmyard imitations.'" —"Humorist."

days, during which no licence fee is required. It is all done through the local postmaster and thus the wheels are greased for all parties concerned. A little more helpfulness of this nature would be welcome here; it would be better than the multiplication of by-laws which hinder trade.

Radio Criticism.

AS for Madame Muma, it would, perhaps, have been better if Joan of Arc hadn't died in French." "The Four Tromboneros played four trombones in a dark manner and I shall be very pleased to hear THEM again when we are all five descended into Heaven, and not before." "In direct contrast was the amoanated syreen of Mr. Victor Hagen, who trod the strate un na-la-row towards mother's eyes in the best prodigwail-on traditions." "Miss Zena Moller, soprano, seems all

right in a modest way." Thus, the radio critic of the Australian "Wireless Weekly." If you venture to broadcast over there it is wise to cultivate a thick skin.

Percentages of Pandemonium.

VERY interesting figures are given by "World Radio" as a result of the analysis by the B.B.C. of the letters received by them during 1929 complaining about electrical interference with radio reception. Expressed as percentages of the total number of such letters the causes of interference pan out as follows: Motors driving machine tools, 23.09; accumulator charging plant, 14.12; refrigerating plant, 10.01; generating plant, mains, etc., 9.5; overhead telephone and power lines, 6.29; cinemas, 6.1; flashing signs, 4.96; H.F. medical apparatus, 1.71; miscellaneous, 2.57. The snag is, "unidentified causes, 21.65.

Luck of the Mike.

THE name of John Morel may be added to those to whom broadcasting has given a footing on the ladder of success. In October last, when he broadcast in the last promenade concert, he was not very well known, but during his performance Robert Courtneidge had marked him down, and on the night following he was engaged to sing in "The Damask Rose" at his own figure.

A Naughty Station.

THE Federal Radio Commission, U.S.A., has cancelled the licence of the Schaeffer Radio Co.'s broadcasting station, K W B S, Portland, Oregon, for permitting offensive language to be used at the microphone, besides being an old offender in the matter of straying from the allotted wave-length. Phew! the language must have been fairly blistering for the Commission to take so drastic a step. However, I think it must have been more Pickwickian than personal, the offending speaker being a politician engaged in "roasting" his opponent.

Treats Given and in Store.

THE bells of St. Paul's Cathedral mixed up with noises from the river! Negro spirituals! Aesop's Fables brought up to date! A Buddhist chant over 1,000 years old! Chamber Music! "Syncopated pianisms"! A church service in Welsh! I mention these items in case any of you should be thinking that the B.B.C. has run out of ideas. The Buddhist chant ought to be mixed up with the Welsh service, like the bells and the barges! How came they to overlook that?

A Fine Performance.

OUR correspondent in Cincinnati, U.S.A., Mr. F. Easter, describes a world-wide "hook-up" which he heard on June 30th, namely, 2 X A F (31.48 m.), 2 X A D (19.56 m.), V K 2 M E (28.5 m.), P H 1 (16.88 m.), and P L E and P L W on 15.74 and 38 metres respectively. The U.S.A. station 2 X A D broadcast music which was relayed by P H 1 to Java, which in its turn relayed it to Sydney (2 M E). After that 2 M E relayed it to W.G.Y., which re-broadcast it. 2 X A D was used for communicating with Holland in reference to the hook-up. Its a great game, sure 'nough!

ARIEL.

YOUR COMPONENTS

By VICTOR KING

If you want the best results and maximum enjoyment from your set, see that its components are free from little blemishes such as are described by our well-known and outspoken contributor.

DO you ever examine your components critically before you actually buy them? You can take it from me that it will pay you to do so, for while there is not much real rubbish on the market these days, there is a lot of gear that, in my opinion, fails in details.

Even the products of well-known manufacturers sometimes carry little faults both in design and construction. And you don't have to be a skilled mechanic to spot them, strange though it may seem!

I don't want to cause a general mistrust of modern radio apparatus, but it is only commonsense to look your goods over carefully before paying the money. Seemingly there is an idea abroad that radio articles are very different from anything else. You will see a man buying stuff in a radio shop, straight off the hands of the shop assistant, who you know examines anything else with the keenest of eyes before he parts up with his cash.

Knob and Dial Fixings.

I think the reason for this is that a lot of people believe that electrical apparatus cannot obey mechanical rules and regulations regarding structure and finish. That is all wrong. Let me point out a few of the weaknesses to be found in many radio components, so that you can see the sort of thing I want you to look out for, and to avoid.

One of the worst features is, in my opinion, the fixings provided for knobs and dials. Very often all you get is a small grub-screw, let into the knob or dial, which runs down on to an absurdly small "flat" on the spindle. Sometimes the grub-screw, which is frequently of soft brass, operating in a soft brass bush, easily strips its thread, while at other times the flat on the spindle wears "round."

Mechanical Weaknesses.

In either case it becomes impossible to get the knob or dial to hold tightly on its spindle, and you have to trust to luck when you operate it.

You meet mechanical weaknesses of this kind in variable condensers, potentiometers, switches, variable resistances, and so on. There is no excuse for it at all, and I cannot see why properly "squared" spindle fittings should not be quite universal.

Then again, you meet that fiendish lock-screw knob or dial fixing every now and then. To hold the knob or dial in position you have to run it down a threaded spindle to a nut which you tighten up against it.

Such a scheme is generally quite satis-

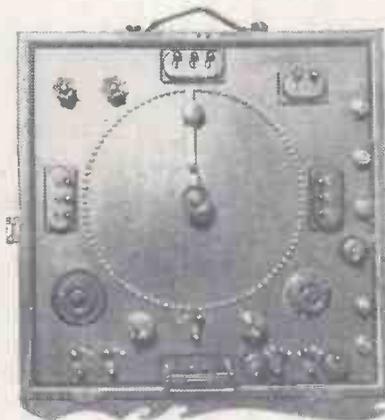
factory if you have to operate the device concerned only in a clockwise direction. But as soon as you run it in the other direction, the control loosens and you have to desist from DX for repairs!

The knobs and dials of all components that use them should fit tightly on their spindles and once fixed should never loosen accidentally. If constructors would only refuse to buy gear that was wanting in this respect manufacturers would soon mend their ways!

Annoying Valve-holder Fault.

And what of the valve holder whose terminals are held by screws running up from the bottom, screws that have an uncanny knack of loosening after the valveholder is fitted in a set?

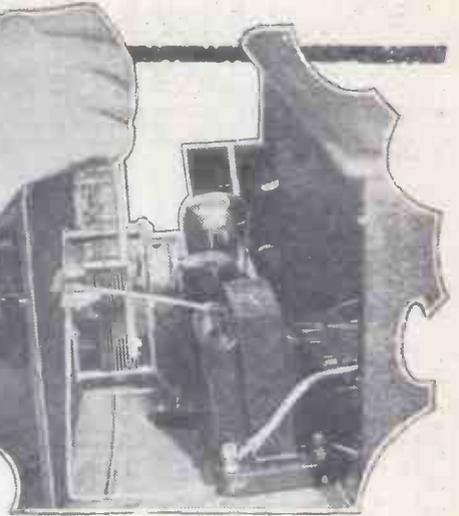
STILL WORKING!



A crystal set made in the early days of radio that is still giving good service at Clapham. The big switch has some hundred studs connected to coil taps

Unfortunately, valve holders of that kind are only too common. By the way, there are far too many tiny little soft metal screws to be found in radio components. Certainly I do not advocate the use of steel, although in many instances its magnetic properties would be quite harmless; but if a non-magnetic material is insisted upon, what about using phosphor bronze, or at least screws of decent gauge and not finicky little things that are hard to handle and whose threads strip so soon as you touch them.

Talking about screws, every one of you must have noticed how loosely the screws and nuts of many radio components hang



together. A nut should run down its screw easily, but fit snugly so that there is no "play."

Mind you, I am not pretending that I am an expert mechanic, but all the things I have mentioned seem to me to be ridiculous departures from the commonsense. Sometimes, in the evening, I sit in my study gazing at some component for an hour or more wondering how the thing passed a works manager, as I notice all the tiny little faults that seem so obvious, even to a layman.

Let us take another example, the "one-hole panel-mounting component."

Panel-mounted Components.

It is very nice to have to drill only one hole in an ebonite panel in order to mount something, but what if that one hole is over an inch in diameter? As I write I have before me a condenser that necessitates such an aperture. Can you make a moderately neat hole in an ebonite panel one inch or more in diameter? I confess that I find it jolly hard to do that, even with an expanding bit!

Again, you sometimes come across variable condensers that have to be held to a panel by nothing above a three-eighths spindle nut. For the life of me I cannot understand why small projecting pieces are not provided, at extreme outside points of the components, which would be drawn up against the back of the panel and so prevent the whole component from tending to turn.

Instead of anything like this, the whole body of the article generally stands back into the set and there is nothing to hold it but that rotten little spindle nut.

Ever Encountered This?

And what of tiny little soldering tags sitting right down on ebonite or celluloid composition insulating material? You apply the soldering iron and a wisp of smoke coils up from a bubbling, sticky black mass.

Anyway, I don't think the average home constructor does much soldering and prefers decent terminals—not tishy little things poked away in awkward corners.

You may be inclined to think that I am always grousing at something or other. It is true that I find a lot to criticise—but even my worst enemy will, I hope, admit that I attempt to, make my criticisms follow a constructive line.

SHORT WAVES IN INDIA.

The Editor, POPULAR WIRELESS.

Dear Sir,—Perhaps you would be interested to hear of my results out here. My set is a three-valve straight circuit, with a filter output circuit. This is the best all-round circuit that I have yet tried, considering its simplicity. I made a slow-motion reaction control for the moving coil from an old rev.-coupler. I append a sketch to show the arrangement.

Later, I wished to try a circuit with condenser-controlled reaction. So I used the detector portion of the "Antipodes Adaptor," with two stages of transformer-coupled L.F. amplification. I used to get Bombay (120 miles) at L.S. strength, Calcutta (1,200 miles) at good 'phone strength, and Colombo (1,800 miles) at fair 'phone strength. Some Russian stations could just be heard on the long wave-lengths (1,600 m. and over).

Now I use the circuit I mentioned at first, and will stick to it until my return to England this troping season, when I hope to build something more ambitious. Up here we are 2,000 miles from Bombay, but they come in at good 'phone strength, while with a one-valve amplifier (transformer) it can be heard 70 yards away on a small cone speaker.

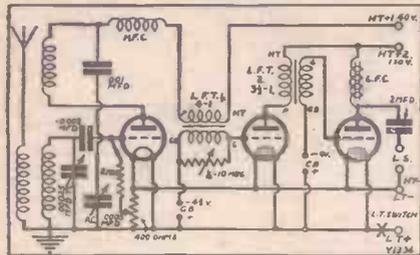
I used a Lissen H.F. choke at first, but unfortunately I broke this, and was unable to get a replacement under six weeks, so I made a choke from one half of the winding from an old Ford trembler coil. This has given the utmost satisfaction.

The L.F. choke is a Burnlept (4,000 to 120 ohms), step-down 'phones transformer, with the primary and secondary windings joined at one end. This works very well, but I don't know how many henries it is. The grid-leak across the secondary of the first L.F.T. is invaluable, as also is the pot. grid-leak control. In my opinion, no S.W. set should be without it.

My aerial is about 12 ft. high, slung between two tents, and about 40 ft. in length. My earth is a copper pin about 10 ins. long, and the earth-lead is about 3 ft. long. Below I give a list of S.W. stations, all of which I receive at good 'phone strength:

- Bandoeng, 13.9 m., 16.88 m., and 25. m.; G 5 S W., 25.53 m.; PCJ., 31.4 m.; Bangkok (Siam), 16.9 m.; Zeesen, 31.38 m.; Nairobi, 31 m.; Manila, 31.8 m.

AN EFFICIENT SHORT-WAVER



The short-wave circuit used by Mr. Weston.

DR. HOYT TAYLOR, in collaboration with the Naval Research Laboratories at Washington, of "NFK" fame, has been carrying out investigations at Washington on the subject of "skip distance" on short waves, and has arrived at some interesting conclusions which, incidentally, bear out the experience of the average amateur transmitter.

For four wave-lengths, i.e. 16, 21, 32 and 42 metres in the North Temperate Zone, he gives the minimum distance at mid-day as 1,000, 600, 300 and 200 miles. These distances are naturally shortest at mid-day and increase throughout the day. At midnight they may be between 2½ and 3 times the value stated.

Back to 42 metres.

These figures are for summer. In winter they are approximately 1,350, 730, 400 and 200 miles. It is interesting to note that the 42 metre wave-length does not show a difference between summer and winter. 21-metre conditions, incidentally, continue to be so hopelessly bad that the more enthusiastic amateurs are migrating to 42 metres, where they appear to be receiving some small reward for their trouble at last. Apparently 42 metres has become moderately lively of late.

Among the stations that may be heard there on an average night now are: VO 2 H (the "Morrissey" on an expedition in the

CORRESPONDENCE.

SHORT WAVES IN INDIA.

"WHAT WAS WRONG?"

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

I have also received about twelve others, unidentified. I can get the "Majestic" and "Leviathan" talking to London almost any night from 8 p.m. to 11 p.m. (I.S.T.). I have also heard the Radio Communication Co. (Slough), G 2 H H, calling the "Leviathan" (G 2 G N) on two occasions. Nearly every night I get what appears to be the Australian end of the wireless 'phone. Frequent mention is made of Sydney and also of the "Majestic" and "Leviathan." Strength is very good. It comes in about 25 metres, but never seems to give any call-sign, but is always calling London. I have been a reader of your fine paper for nearly eight years, and it is real value for money. I found "Pentode's" articles of great value. It was just the thing I needed.

Yours truly,
L. A. WESTON.

Razmak Camp, Waziristan,
N.W.F.P., India.

"WHAT WAS WRONG?"

The Editor, POPULAR WIRELESS.

Dear Sir,—For the benefit of other readers of the excellent "P.W." may I say how I eventually "ran to earth" a very bewildering fault.

The trouble was a crackling or "frying" noise in the 'phones and speaker. I at once suspected the transformer primaries (the set was then Det.-2 L.F.). These were tested and found O.K. Aerial and earth-leads were next eliminated as being above suspicion. Terminals were tightened and soldered joints tested, H.T. batteries tested and found O.K.

The set was next taken down and rebuilt as an S.G.-Det.-L.F. To my surprise, the fault was still in evidence! Next followed a laborious test of every component on the set, with no better result, the crackling being as loud as ever.

After the rebuilding of the set I was able, by the usual process of elimination, to confine the fault to the lead from H.T.+3 to the power valve and S.G. anode (common lead), the power valve itself and to its holder.

Then the holder was tested at terminals, etc., and found O.K., leaving the power valve and H.T. lead to be at fault. The power valve was but a few hours old, so it was thought that the trouble could not be due to a faulty valve. This left the H.T.+3 lead. Now, my battery leads consist of the 7-way cord variety, BUT (and a very big BUT) without a name! These leads were only a month old, and it was thought impossible for one of these to prove faulty so soon.

Anyway, I went over all the plugs and spade terminals and made sure that the wire was making good contact there. Still the crackling!

As a last resource I took off the power valve lead (I was using only six of the seven cords) and put the spare one in its place.

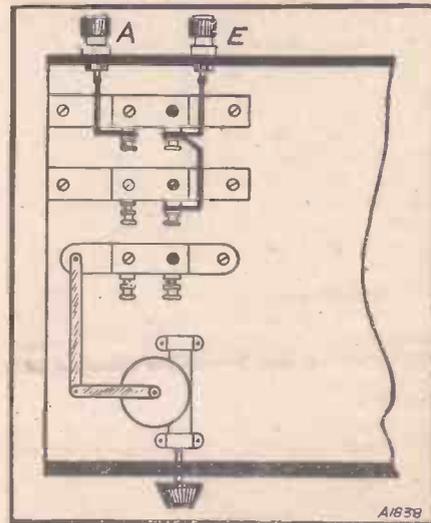
Lo! the crackling was gone and the signals were appreciably louder. You see, there is or was a partial disconnection in the wire of what looked like new flex.

I don't suppose this would have happened had I bought a 7-way battery cord from a well-known maker. *Verbum sap, eh?*

Yours truly,
ALBERT E. WATTS.

Luton, Beds.

A SLOW-MOTION CONTROL



How Mr. Weston uses a part of an old revolution-counter as a slow-motion control for his reaction.

SHORT-WAVE NOTES.

By W. L. S.

Arctic); X W I M, an American boat in the South Atlantic; H H 7 C, the first amateur station ever heard from Haiti; and occasionally a burst of United States amateurs.

Powerful Broadcasts.

Short-wave broadcasts do not appear to have suffered unduly from the long spell of bad conditions on the amateur bands, unless the reason is that Zeesen and the other giants of the ether have sufficient power to push through, no matter what etheric conditions are like at the time. I am inclined to the view (which I think is shared by others) that the whole of the blank period this year has been caused by an enormously long "skip distance"—perhaps five or six times the value that Dr. Hoyt Taylor quotes—and that those nearer stations that do get through are doing so by sheer brute force.

There appears to be something in this, because J N A, the Japanese station on about 22 metres, still comes in R 9 when there is not a weaker signal of any kind to be heard. On the other hand, when the weak

signals are pouring in he is no louder. I don't think he could be!

I don't know whether it is my imagination, but it seems to me that while our short-wave logs have been so poor, the long-wave conditions (referring to the 1,600-metre broadcast band) have been extra good. With a moderately cheap portable, during my periods of utter boredom with the short-waves, I have logged, soon after dusk, Warsaw, Motala, Kalundborg, and all the others at roaring loud-speaker strength.

I don't remember ever doing this last summer. I don't apologise for introducing the subject into these notes, as I believe it has some connection with the fluctuations "down below."

Bad Static.

Atmospherics have been causing their fair share of trouble this year, not as ear-splitting crashes, but as a continuous rolling noise (the invariable simile by non-technical listeners is "like waves on the shore") that makes reception of weak signals rather nerve-racking, though not impossible.

I think I mentioned before that atmospherics are seldom severe on both the short and the broadcast waves. I have confirmed that again and again, and perhaps here is another straw at which to clutch for a leader in the right direction for finding out something about these freak variations,

THE B.B.C. TODAY

BY THE EDITOR



IN order to get a clear understanding of the present position and future prospects of the Regional Scheme of broadcasting it is necessary to comprehend its background. As long ago as 1924 there was talk of the Regional Scheme, the idea of which originated in the fertile mind of Captain Peter Eckersley. It was realised then that the single programme service was inadequate, and that it should be replaced as soon as possible by a multi-programme service, distributed through several high-power twin-wave transmitters,

The First Delay.

There was then no question of an embarrassing scarcity of ether channels. Had Captain Eckersley's early recommendations and plans been adopted and pressed forward the Regional Scheme would have been completed by the end of 1926, and British broadcasting now would have been very much more efficient. But the Regional Scheme was doomed to deplorable delay.

First of all, there was obstruction at the Post Office, which was not convinced that the plan was a good one technically. These misgivings induced the Post Office to withhold sanction on the ground that a Parliamentary Committee was about to investigate broadcasting with a view to determining its future constitution.

And so the matter was left until Lord Crawford's Committee of 1925 completed its deliberations. This meant that nothing more could be done until 1926, which, being the last year of the regime of the old Broadcasting Company, was regarded as an unsuitable time to begin. Again delay and obstruction.

Commenced at Last.

The new Board of Governors, installed under the Corporation, at the beginning of 1927, instituted a fresh inquiry through a technical Committee presided over by Dr. Eccles. The favourable finding of this Committee was a foregone conclusion because Captain Eckersley and his colleagues had naturally sought the best technical advice before making recommendations. And so after another six months the Regional Scheme was approved, three years having elapsed since it was first outlined.

It was necessary to begin by experiments. Daventry (5 G B) was operated experiment-

This is the second of a short series of articles in which "P.W." is once more shining the spotlight on the B.B.C. In this article the difficulties of bringing the Regional Scheme to life are described, and its future discussed.

ally for eighteen months, and then towards the end of 1928 work was begun on the first of the new series of twin-wave stations—the one at Brookmans Park. This was completed a year later and has now been in operation for some months. The work

"P.P.E.'s" SUCCESSOR



Noel Ashbridge, B.Sc. (Eng.), A.M.I.C.E., the Chief Engineer of the B.B.C.

on the North Regional transmitter at Slaithwaite, near Huddersfield; is now in progress. It is expected that service transmission in the North will begin in February or March next year.

A twin-wave transmitter for Scotland should be ready at the beginning of 1932 and, by the end of the same year, the new station for Wales and the West should be in operation, and perhaps also the new transmitter for Northern Ireland.

Although there is no avoidable delay now in the carrying through of the Regional Scheme, the consequences of the early unnecessary delays are so serious as almost to cripple the scheme from the start. In 1924 the wave-length situation was much more satisfactory; it would have been possible then to have secured twelve good channels in the broadcasting band, and to have retained the Daventry long wave. This would have made possible a uniform, geometrical, system.

Making the Best of It.

But in the years that have passed since the plan was originated the development of broadcasting on the Continent, and the demands of other countries for facilities, have rendered it no longer possible for this number of frequencies to be secured by Great Britain. The best possible bargain has been made in existing circumstances. This provides nine frequencies in the broadcasting band, and preserves Daventry (5 X X). It also provides the B.B.C. with very serious problems in determining an equalised distribution.

Of course, London and the South-east are safeguarded, there being the two exclusive frequencies from Brookmans Park. Then the Midlands are being well looked after through 5 G B and 5 X X. There will be also two good frequencies for the North Region. That leaves Scotland, Wales and the West country, and Northern Ireland.

A Difficult Problem.

If there were six inclusive frequencies left over all would be well, but there are not: there are only five. In order, therefore, to extend the benefits of alternative programmes to these three areas it will be necessary to arrange to duplicate one of the frequencies. That is to say, either Scotland and the West country or the West country and Northern Ireland must share a frequency. They cannot, of course, put out different programmes on the shared frequency. It follows that

(Continued on next page.)

THE B.B.C. TO-DAY

(Continued from previous page.)

this must simply repeat the National programme, thereby considerably restricting the area of choice for local listeners.

In the matter of programmes, there is no doubt of the popularity of the alternative principle, which the B.B.C. is now attempting to apply by instalments. Listening with discernment and intelligent discrimination is becoming much more common than it was. This makes it all the more regrettable that the B.B.C. shows a growing tendency to increase the proportion of simultaneous broadcasts. It seems that the Governors of the B.B.C. are anxious for reasons of economy and general policy to reserve the right of withholding alternatives quite arbitrarily. This applies chiefly to religious services; but it is also true of some talks and a good deal of music.

A Great Mistake.

It is a great mistake.

The provision of alternatives should be almost invariable, and if the Regional Scheme, belated as it is, is to have the success which it deserves there should be no compromise with the basic principle.

While alternatives should be almost invariably provided, it should not be necessary to adhere too rigidly to the wave-length arrangements. For instance, the morning religious service, which is greatly appreciated by the bedridden-sick and the poor, should be made available on the frequency which gives a stronger signal over the widest area, that is on 356 and not on 261.

I commend to the B.B.C. that there should be an early reconsideration of the allotment of items to wave-lengths. There is a danger of neglecting expediency. The objective should be to get as much as possible of the programmes into the maximum number of homes throughout the country.

Another point affecting alternatives is in connection with the new tendency to concentrate unduly on London. Centralization threatens to go too far. The B.B.C. would be well advised to maintain strong and fairly autonomous centres at Manchester, Birmingham, Cardiff, Edinburgh, and Belfast. It is not enough to argue the same results would be obtained if the same programme builders were all in London.

Local Atmosphere.

Each of the provincial centres has its own atmosphere and personality. There is contrast not only in material, but also in conception, attitude, and mental process. The future of the Regional Scheme on the programme side is largely bound up in the ability displayed by the B.B.C. to foster its provincial centres.

Until all the Regional stations are completed and tested it will not be possible to determine finally the future of 5 X X. The early view was that 5 X X would be used for educational and utility transmissions for the whole country.

But it was then assumed that there

would be ten or eleven channels in the broadcasting band. As things have turned out, however, 5 X X will have to be used for the National programme to fill in the gaps that exist between the service areas of the Regional stations.

As the regional plan takes shape in new stations there is a good deal of speculation as to possible modifications before it is completed. There are some who believe it would be better to use only three wave-lengths, one for instructional and the other two for alternative entertainments. The idea would be to operate the three transmitters on a power of about 200 k.w. each, reaching the whole country on simple sets.

Highly Improbable.

This might be possible technically, if the Post Office were to approve of the use of such gigantic power: but it is a big "if." Moreover, the elimination of local interest from B.B.C. programmes would have results that would be hardly outweighed by the economic advantages. So

THE PROGRAMME SIDE



Brother of our Chief Radio Consultant, Mr. R. R. Eckersley is Director of Programmes.

I dismiss this suggestion. But it would be a good plan to put up the power of 5 X X even in its present function. Incidentally, evidence accumulates that 5 X X is easily the most popular station throughout the Continent.

Were the Stenode Radiostat to be applied in the sense in which it is now advocated, of course, all the difficulties about wave-lengths would disappear. The B.B.C. could have as many twin-wavers and single transmitters as could be afforded. The development of this invention, or something better, might indeed make it desirable to licence in this country a competitive broadcasting service receiving its share of the listener's ten shillings. With no wave-length trouble, many things are possible.

But here again the case is hypothetical. On the whole it is probable that the Regional Scheme will be carried through on lines now contemplated.

SIX-PIN COILS FOR THE "MAGIC" THREE

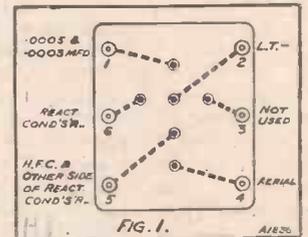
By S. R. P.

MUCH experimental work has undoubtedly been carried out since the inception of the "Magic" Series, and in conjunction with its unique circuit perhaps the most popular desire has been to utilize 6-Pin Coils in place of the standard plug and socket type.

Alterations in comparison with the original circuit are extremely simple, while results on a receiver in south-west London were found to be well worth the change-over—fifty stations being received on loud speaker, including ten stations on the long wave band.

The original circuit showed two plug and socket coil-holders and one of the coils an X coil, i.e., there were five points of contact.

No. 1 in using the 6-pin coil, No. 3 terminal on coil-holder is ignored; thus again there are five points of contact.



How the box is wired.

Easily Arranged.

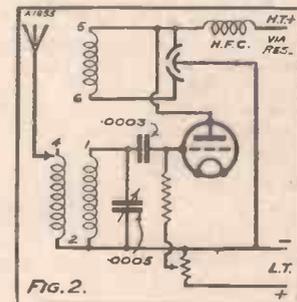
It is therefore only a question of disconnecting the leads, unscrewing the present coil-holders from baseboard, screwing down a 6-pin coil-holder and making connections to the five terminals in the manner shown in Fig. 1.

It will be seen that the H.T., viz.: 25,000 ohms resistance and H.F.C., now goes direct to plate of first valve, instead of through reaction coil. In operation it was found that in conjunction with a careful setting of the potentiometer (mounted on panel) a great improvement was noticeable.

The point-to-point connections are as follows:

No. 1 terminal to '0003 grid condenser; No. 2 to L.T.; No. 3 not used; No. 4 Aerial; No. 5 to H.F.C. and one side of reaction condenser; No. 6 to other side of reaction condenser.

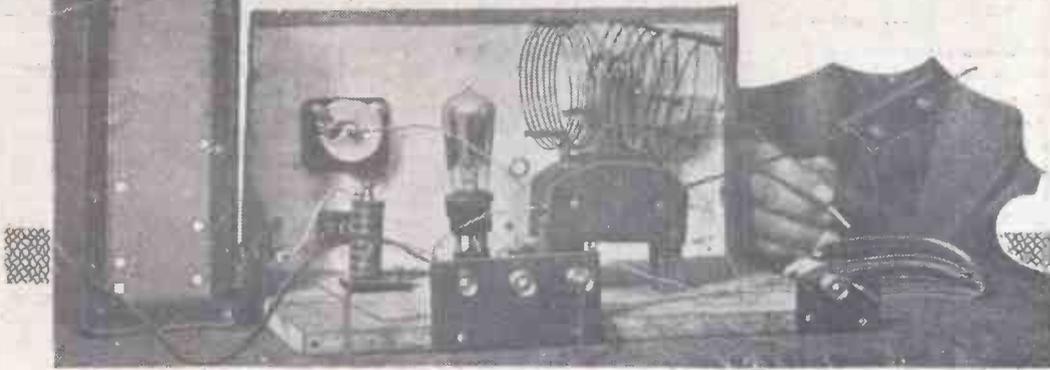
The "Magic" Three has earned a world-wide reputation, and deservedly so when such excellent results are found to be obtainable. There have been disappointments, of course, but it should be remembered that a high standard cannot be realised unless careful attention is given to the following of all directions for the construction of the receiver.



The Six-pin Magic Circuit.

A SHORT-WAVER

For
10/-



By H. PADMORE.

RECENTLY I rather rashly said I could build a short-waver, complete with valve and coils, capable of picking up W 2 X AD and W 2 X AF (the Schenectady relays of W G Y), for a cost of 10s.

A bet immediately followed, the money was staked, and I returned home with a growing feeling that in the heat of the argument I had taken on a little more than I might be able to accomplish.

However, there was nothing for it but to have a shot or lose the stakes, so the next day I went into the neighbouring town and visited some of the wireless stores.

When I explained the nature of my requirements, I became the butt of many rude remarks, including advice to try "Woolworth's."

Buying the Parts.

Evidently nothing doing at the dealers, I decided, and was wondering what to do next when it struck me there might be a radio merchant's stall in the market where some really cheap components could be procured.

My luck was in and, after the usual bartering, I bought the necessary parts for 6s. 8½d.

Next I called on a grocer and purchased a small wooden box made of ½ in. boards for 3d.

The following evening operations commenced, and a panel and baseboard were made out of the box. Although the set was to be only a one-valver, it was felt a fair amount of spacing should be allowed, as the highest possible efficiency would be required from this miscellaneous collection of spare parts if any results at all were to be obtained on 20 metres.

Low Cost Coils.

Accordingly the baseboard was cut to 13 in. by 10 in., and the panel to 13 in. by 7 in., the components being mounted in the manner shown in the illustration.

The three-way coil holder, of course, originally possessed a couple of long rods for varying the coupling between the two outer coils. These were sawn off close to the holder.

Incidentally, this ability to vary the magnetic field was most useful when dealing with dead spots in the aerial and reaction circuits, and did away with any necessity to use a neut. condenser in the aerial lead.

"Can't be done for ten bob?
I'll bet it can!" said our
contributor, and this article
tells how it was accomplished.

Cutting the pieces of ebonite into suitable strips and fitting terminals was soon accomplished, after which the whole was screwed against the baseboard and wiring-up commenced.

Next came the coils. I wound these on a 3 in. cardboard former (afterwards withdrawn), with turns of 3, 5, and 7, the wire being No. 18 gauge enamelled, and spaced with thin lengths of indiarubber firmly tied between each turn.

The ends of the coils were bent to fit the plug and sockets of the holders, and the enamel filed off 2 in. all round. The set was now ready for test, and consisted of a simple, straightforward circuit, as shown in the theoretical diagram.

A Good Start.

The next item was the valve, and as I had already expended 6s. 11½d., it followed that this component must not cost more

work. A touch on the valve showed it was "alive."

I had the satisfaction of hearing a spasm of dance music from the Hotel Kenmore, Albany, via 2 X AF, on 31.4 metres. This was enough for one night, and I retired upstairs.

The following day I invited a few of the sceptics to call round about 11 p.m., when I would endeavour to win my bet.

With two sets of 'phones in series, I switched on, and one of the visitors donned the spare pair. It was now 11.15, so I decided to go for 2 X AD. I was not quite sure where he would come in, but as 2 X AF's reading was 60°, I guessed it would be somewhere among the twenties.

Is this it?

Sure enough, on 23° a faint carrier was heard which, after resolving, proved to be dance music. Later, an announcer with a very faint American accent informed us that it was "L. J. Barnes speaking."

Shortly afterwards the station faded right out. However, although this was half the battle, the final objective was not yet gained. 2 X AF must be coaxed into audibility.

I tuned up round 32 metres, and immediately found a strong station broadcasting jazz. The power was reminiscent of 2 X AF in his palmiest days, some three or four years ago, but it seemed too good to believe that this could be him now, and it was; for shortly after an announcer spoke in a tongue that sounded like Russian—certainly not American.

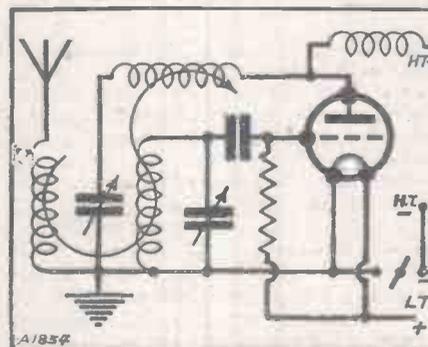
Success at Last.

It was no use spending time here, so I tuned up a shade further and came across another carrier, this time much fainter. Music was in progress here, also, but very rapid fading made it impossible for some time to tell from where it originated.

At last, however, with a rush came the words, "Our programme continues from the New York studio; this is Emerson Markham announcing."

There is not much more to add. I managed to win my bet by picking up the two American stations under rather unfavourable conditions, and thereby proving that a short-wave "fan" of even the slenderest means can enjoy the thrill of listening to programmes at great distances away.

A SIMPLE CIRCUIT



Here is the arrangement employed, and although cheap the set proved to be a winner.

than 3s. 0½d., if I were to keep within the 10s. limit.

I found a 2-volt H.F. valve of that price, connected up, and switched on. The time being about 11.30 p.m., I thought there might be a faint chance of hearing 2 X AF, if the thing could be made to

GOOD NEWS FOR LISTENERS!

British Valve Prices Come Down—The Home Constructor—The B.B.C. decides on a referendum.

By THE EDITOR.

OUR readers will be gratified to learn that, as we forecast a few weeks ago, signs of cheaper prices in the radio market are already evident.

The first move has been made by the British Radio Valve Manufacturers' Association, in deciding to reduce the price of valves. The 10s. 6d. valve, which is the type most commonly in demand, has now been reduced to 8s. 6d., while small power valves are now at 10s. 6d. a-piece, instead of 12s. 6d.

Power valves have been reduced from 15s. to 13s. 6d., screen-grid valves from 22s. 6d. to 20s., pentodes from 25s. to 22s. 6d., the 30s. pentodes to 27s. 6d.

Valuable Reductions.

These reductions represent, as our readers will notice, substantial sums, and are reported to be a direct outcome of the campaign against the Ring which, it was held, kept prices at too high a standard.

It is stated to have been shown that the profit made on a 14s. valve would be 10s. 6d.—this 10s. 6d. being divided among the makers, wholesalers and retailers. There is no doubt that there was some modicum of truth in this statement about valves being too high in price but, apart from that, the effect of the old price was to induce retailers to keep large stocks of cheap Continental valves.

Incidentally, the price reductions quoted above include all the valves sold under the British Radio Valve Manufacturers' Association terms, and consequently affect the following: Marconi, Cossor, Mazda, Mullard, Osram, Six-Sixty, Lissen.

It is anticipated that other important components will probably show price reductions in the near future, and as manufacturers this year are realising there are still hundreds of thousands of keen amateur constructors in the country, it is anticipated that this year much more attention will be paid to the needs of the home constructor than was the case last year.

The Home Constructor.

Preparations are now well in hand for a Super Radio Exhibition at Olympia, and we hope to be able to give readers more explicit details in the near future. One thing is certain, and that is that the cry last year that the amateur constructor is dying out has been fully realised to be a false alarm and that, on the contrary, instead of dying out, the constructor class is multiplying rapidly.

Incidentally, the ever-booming circulation of this journal is a clear indication of the facts of the case, and we venture to suggest to our friends in the trade that they should bear this well in mind and realise that of all the hobbies in the world radio has proved itself not only the most fascinating, but the most consistent.

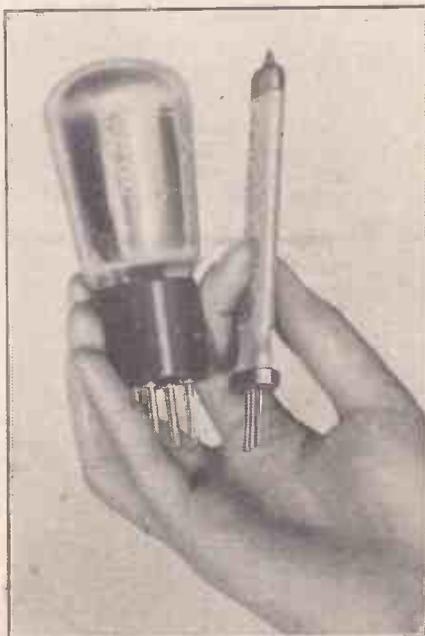
It would not be an exaggeration to say that year by year we, in this office, notice indications which convince us that the

home constructor—in fact, the amateur in general—plays a more and more predominant part in the success of the trader's year.

Balthazar saw the writing on the wall, but took no heed of it. We hope our friends in the trade will realise that this year there is more than writing on the wall pointing out the big market the home constructor offers: there is, in fact, a sky sign, which we doubt whether Balthazar himself would have ignored.

Readers of POPULAR WIRELESS will be interested to learn that the B.B.C. has

A NEW VALVE



The thin valve is a new German product for mains units, made by Telefunken. It is called the Arcotron.

decided to find out the views of listeners by means of a Referendum on subjects connected with broadcast education. Referendums are not particularly popular—witness the fate of the recently-suggested political one!—but it will be interesting to see what sort of results the B.B.C. gains.

Referendum in the Autumn.

To begin with, this Referendum will only apply to the educational part of the B.B.C.'s activities, which represents a very small percentage of the actual number of hours of broadcasting per week.

Mr. Siepmann, the B.B.C.'s Adult Educational Officer, stated recently before one of his Committees, that this Referendum will be taken in the autumn, when the B.B.C. will make a statistical survey for the express purpose of learning the views of listeners on the subject of broadcast educational talks.

If this Referendum proves anything like a success, it is possible that Savoy Hill will apply it to other programme departments. Ballots have been held by newspapers before, and have indicated pretty clearly that the type of broadcast which is most in favour is the variety programme, light orchestral music coming next, with talks very much at the bottom of the list.

As our readers know, there is a growing body of opinion that the B.B.C. rather overdoes its educational broadcasting, and that it does, in fact, attempt to usurp some of the functions of more established educational institutions.

More Showmanship Required.

We have suggested before that the B.B.C.'s educational broadcasts might be much more likeable, even by those who resent the idea of being educated by wireless, if they would demonstrate a little more showmanship.

Presentation is the keyword to successful broadcasting in all its aspects, and even a highbrow talk on "Relativity," or "The Life and Times of a Flea" from the scientific point of view, could be made quite interesting and even amusing, and definitely educational, if only more care and attention were paid to method of presentation and general "layout" of the talk.

Our readers know well enough that if they have the best components in the world and the best circuit to hook up, they will not have much success unless they pay attention to layout. It is no good slinging things together and saying: "We know all this is very good, and therefore can't go wrong." That won't work, either in set-making or in any type of broadcasting.

If as much care and attention were lavished on the presentation of talks as on some of the B.B.C.'s more spectacular play productions, then the talks would improve, not only in quality, but in popularity.

Let's hope this Referendum which the B.B.C. is going to take will again emphasise this point of view.

POINTS TO REMEMBER.

It always helps to achieve economy to experiment with grid bias voltages and H.T. supply adjustments to get the most satisfactory reception.

When putting in a potentiometer to improve sensitivity make sure its action is smooth and reliable, or else it will cause more trouble than it is worth.

Trouble with reaction overlap is often due to the wrong H.T. voltage on the detector, to an unsuitable detector valve, or to a grid leak of wrong resistance.

An H.T. battery running down, coupling troubles in H.T. mains units, H.F. currents getting through to the L.F. stages, or a badly designed choke, will all assist to cause overlap.

Thin wire as used for coil windings should not be used for H.T. leads, as it is usually insufficiently insulated.

The test voltage for a condenser for use on A.C. mains should be three times that of the supply voltage.

HOW BROADCASTING HAS HELPED ME

by STILES - ALLEN



A well-known soprano pays some graceful compliments to the B.B.C., and suggests that broadcasting must continue to play a greater and greater part in the world of music.

IN the dear, dull days now beyond recall, before broadcasting began, being a concert singer was often not all honey. On the contrary, my profession brought harder times than I had expected when I first embarked upon it.

The top of the ladder appeared to be occupied by a favoured few who, jealous of their positions, not only sneered sometimes at the aspiring beginner, but absolutely refused to help him or her to the slightest extent. Of course, there were exceptions, but they were in a minority!

When the wireless dragon first appeared on the horizon, therefore, it was natural that a shudder should run through this section of the concert world.

It seemed that this new invention might displace the self-important singers who had voices but were not really very vital, and so the legend spread abroad that broadcasting was a menace which would not only kill the concert world, but blight all art and literature into the bargain.

Tremendous Assistance.

The opposite view was nearer the truth. There are now more well-known artists than ever before. Many of the poor strugglers have been able to reach the peak at which they aimed. I myself have been helped by wireless to a tremendous extent.

In the first place, broadcasting has given me a wider public, and this in more senses than one. The B.B.C. is not supposed to transmit advertising matter in any shape or form, but it cannot help giving publicity to the singer.

Thus I find that the medium of the microphone has made my name better known. In singing to thousands, I have brought my name to many to whom it was previously unfamiliar. As a result, my services are more sought after.

I have also been assisted in my work in less direct ways. Some people have told me that I am one of the few sopranos on the wireless who do not "wobble" or quaver when singing, and this knowledge has put me on the *qui vive* to keep myself as near perfection as possible. I listen and, by hearing others, am enabled to remedy my own faults.

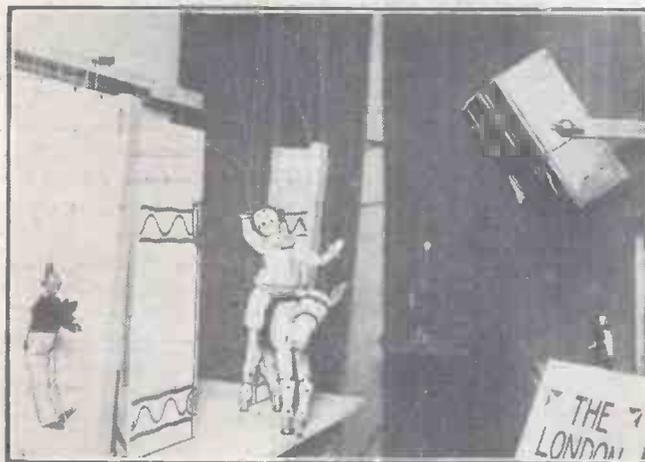
Then, again, I have acquired a more extensive repertoire, and have come to know many sweet songs which otherwise might have escaped my notice; for the wireless artist must be prepared to sing everything and anything.

Old Favourites.

Listeners have written their ever-welcome, and often charming, letters of appreciation, and criticism, and have sometimes asked for little-known melodies to be rendered. As a servant of the public, I have ferreted the tunes out and complied with the requests.

Special programmes have also brought many songs which have been delightful to sing, but which the concert-hall would never have provided. In a recent Old Folks programme, for instance, we went back to the melodies of fifty, sixty years ago.

TELEVISION "ACTORS"



An experimental transmission of these marionettes was recently carried out by the Baird people during one of their recent experimental transmissions.

All these brought their due reward of pleasure.

And there I have hit on the one quality which, of all others, I derive most from the wireless—pleasure. The knowledge that one is singing to millions and yet, perhaps, to one lonely person; that one is making friends, and that one can do just as one pleases sometimes makes studio work far more enjoyable to the artist than actual concert performances.

When facing the microphone, I try to

imagine that I am joining in a little sing-song at a family party. I visualise the little group around the glowing fire.

Sometimes, too, I attempt by gesture to picture the story of the song—this solely for my own enjoyment, of course. In the concert-hall, you see, it is impossible for the average reserved English singer to gesticulate vividly.

The audience would probably think the artist mad. But in the studio, with perhaps only the announcer looking on, I can do just as I like.

No Disadvantages.

So, save perhaps for the occasional lack of resonance in the studio, I find no disadvantages in broadcasting. The fact

that my performance is sometimes alleged not to come over very well does not always worry me. My experience is that the fault generally lies not at the transmitting end, but in the receiving sets themselves.

After giving one single performance, I have known one London friend to say, "You were splendid last night!" and another to declare that I did not come through well.

So, reader, don't blame a singer for a poor performance if you are distorting her voice by using too much volume, or vice-versa. She is doing her best. Ask yourself if you are doing yours.

I do not agree with the old theory that wireless cannot be perfect since the artist can never put over her personality. In my opinion, she can.

Personality.

Of the gramophone it may be true, but the theory is certainly incorrect when applied to the radio. When a singer is heard only once, her personality may not "get over," but when one is able to sing not once, but many times, the listener soon acquires a very good idea of an artist.

Consider Tommy Handley, Jack Payne, the senior announcer! Now, don't you know the individual characters of these people? I'm sure you do.

Yes, personality really is broadcast, although appearance is not.

LATEST BROADCASTING NEWS.

BRIGHTER PROGRAMMES
FOR AUGUST.

PROMENADE CONCERTS—PROGRAMME MOMENTS—SOME REGIONAL FEATURES—EISTEDDFOD IMPRESSIONS—HERE AND THERE.

THE programmes for National and London Regional listeners will be a bit brighter during August, or, at any rate, they should be a bit brighter by the inclusion of three special shows arranged by members of the old Co-Optimists. The artists concerned are David Burnaby, Stanley Holloway, Phyllis Monkman, Betty Chester, Harry Pepper and Gilbert Charles, and their broadcast entertainments will be framed very much on the lines of their stage performances.

The first of the special programmes will be given on August 6th for National listeners, with a repetition for London Regional listeners on the following night.

Promenade Concerts.

Without going into full details of the programmes of the forthcoming Promenade Concert season, many listeners will be interested in the dates of broadcasting from the National and London transmitters. These for August are as follows:

National Programme: August 9th, 11th, 13th, 14th, 18th, 19th, 21st, 26th, 27th and 29th.

London Regional: August 12th, 15th, 16th, 20th, 22nd, 23rd, 25th, 28th and 30th.

The programme for the opening night will include Grieg's Pianoforte Concerto, which is to be played by that veteran pianist, Arthur de Greef, who was a personal friend of the great Norwegian composer.

Programme Moments.

A new revue entitled "Stop Press" by John Watt will be included in the National programme on Saturday, August 9th. It will contain several burlesques of recent broadcast performances, including a skit called "The Bloomer," recalling C. K. Munro's more serious play, "The Rumour"; a parody on A. J. Alan stories, and a satire on another recent play, "Brigade Exchange," under the title "B.B.C. Exchange."

Another sketch by Mabel Constanduros and Michael Hogan, entitled "Poor Old Snell," is to be included in the National Vaudeville programme on Friday, August 8th. Other items will be given by Fred Spencer in the famous Mrs. Arris; Nelly O'List (entertainer) and Nancy Lovatt (ballad singer).

A service from Great Yarmouth Parish Church, the largest parish church in England, will be broadcast to London Regional listeners on Sunday, August 3rd. The address will be given by the Rt. Rev. Dr. Ashton Oldham, Bishop of Albany, U.S.A.

Here are some details of the Southern Command Tattoo, excerpts from which will be broadcast from the grounds of Tidworth

House, Hampshire, on Tuesday, August 5th. As in the case of the Aldershot Tattoo, the relays will be given at three different periods, namely at 9.30, 10.55 and 11.32, each period lasting for about half-an-hour.

Some Regional Features.

Fifteen minutes of the North Regional programme at 7.45 on Wednesday, August 13th, will be devoted to a recital of the County Songs of Yorkshire by Mr. Harry Hopewell. Yorkshire, it seems, has a surprisingly large number of these county songs, and Mr. Hopewell's selection for this recital includes "Scarborough Fair," which is a North Riding song, "York, York for my Money," "The Yorkshire Farmer," and "The Wassail Bough," the latter being a West Riding song.

Eisteddfod Impressions.

Professor Ernest Hughes, one of the adjudicators in the competition for a radio play for which a special prize is offered by

this year's National Eisteddfod at Llanelly, is to give his impressions of the Festival in a talk for West Regional listeners at 7 p.m. on Tuesday, August 12th. Professor Ernest Hughes is, of course, well-known to listeners, who will look forward to hearing his views on other new features of the Eisteddfod, including, no doubt, the performance of the first musical comedy in Welsh, an innovation for which Mr. Eddie Parry, well-known to listeners for his dramatic work, is responsible.

Here and There.

Another Border programme arranged by Mr. Walter Barrie, of Sundhope, Yarrow, will be broadcast from Scottish stations on Friday, August 15th. Full details are not yet decided, but it is likely to include items by the Hawick Saxhorn Band.

It seems to be terribly out of place to talk about football with one Test Match still to be played, but football will soon be here. At any rate it will soon be starting again in Scotland, where listeners are to have their first eye-witness account of the new season on Saturday evening, August 16th, when Mr. A. Y. Wilson, a well-known football authority, will describe the game between the Rangers and the Heart of Midlothian.

The Post Office Direction-Finding Van recently paid a visit to the Newcastle area. The result was that the number of licences taken out during those weeks from April to May was 4,256, whereas for the similar period of 1929 it was only 895.

MICROPHONE MANNEQUINS



During a recent "outside broadcast" of a German fête, one of the items dealt with was a mannequin parade, and lady listeners were greatly interested in a microphone description of "absolutely the last word."

FOR THE LISTENER.

By "PHILEMON"

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda" the portable set.

Temper.

YESTERDAY Belinda (my portable) was in a bad temper. I couldn't get a word out of her. I thought perhaps it was the heat, and that her heart was troubling her a bit. So I examined her valves, the right ventricle, the left auricula or polyanthus or whatever you call it.

"What's your idea of Italian broadcasting? I asked. "I think it's a cross between a grunting pig and a quacking duck," said Belinda, "Perhaps you are right, my dear," I said soothingly.

James.

Of course, I knew that this wasn't what was really troubling her. When a woman, even if she is only a Portable Set, is angry, she just picks up any stick that happens to be lying about to beat you with.

She went silent again. "What is the matter with you?" I said. "Oh, nothing," she said. Now, when a woman says "Oh, nothing," like that, you know very well that something quite terrible is on her mind. Suddenly she said, "And who is the boss in this benighted country, anyhow?" "Belinda," I said with solemn reproof. "Italy is one of the most enlightened countries of modern times, and the boss, as you call him—well, he has another name, but in polite society, acting on the principle of SafetyFirst, he is usually called James."

The Wireless Heaven.

"And is James a real boss?" said Belinda. "I have every reason to believe so," I replied. "As big as Sir John?" she said. "I believe Sir John is much taller," I said.

(Continued on page 578.)



CAPT. ECKERSLEY'S QUERY CORNER

SELECTIVITY SCHEMES—AN EARTH COMPARISON—A WINDOW-PANE CONDENSER—TROUBLE FROM THE TRAMWAY.

Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

Selectivity Schemes.

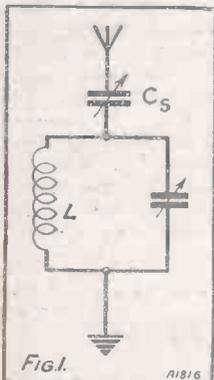
D. E. (Clapton, E.8).—"I am undecided as to which is the better of the following selectivity schemes to include in my receiver—primary and secondary aerial coils of the plug-in type, or an 'X' coil with an optional series aerial condenser. Can you please assist me?"

This is all very difficult because so much depends upon the lead-in capacity, total capacity, and resistance of your aerial.

A good practical circuit is shown in Fig. 1, but C_s must be very small for short wavelengths and L must not be too large.

I like the No. 2 arrangement very well for usual aerials. Never, however, arrange things as in the Fig. 3 diagram.

"GOOD"



A good selectivity arrangement. See reply to D. E. (Clapton).

selectivity with L small and C_s small.

An Earth Comparison.

D. A. B. (Anerley). "Until recently I had in use an earth lead consisting of seven strands of seven 22-gauge aerial wire as an earth lead, making 49 strands of 22-gauge wire in all. This lead was approximately 15 ft. in length.

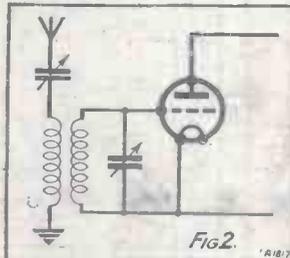
"For some reason it was necessary to move this lead and, in an emergency, I used a length of single 22-gauge wire. I find it impossible to detect any difference whatsoever in either tuning or output from my set.

Does it follow therefore, that what I have been told in the past regarding thick wire for earth leads no longer holds good?"

In an ordinary receiver installation where reaction can be used for a receiver designed

with a decent factor of safety, you will not notice any signal difference between a tiny thin wire or a great thick one, even though the earth and coil resistance is moderately good.

"ALSO GOOD"



This and the sketch below illustrate the reply to D. E. (Clapton).

A Window-Pane Condenser.

P. W. H. (Ipswich). "I have been told that it is possible to make an aerial lead-in connection by pasting a piece of silver paper on the outside of the window, and a further piece of silver paper on the inside. The actual aerial has to be joined to the sheet of tinfoil on the outside, and the aerial lead of the set has to be joined to the piece of tinfoil on the inner surface of the glass in the window pane.

"Seeing that this will act as a condenser, can you suggest a suitable size for these two pieces of tinfoil?"

The ingenious method of leading in an aerial by forming a condenser on the window pane is perfectly practicable. As to the sizes of the pieces of paper, it all depends on the value of condenser that is suitable.

I could calculate it all out, because there is a formula which involves the area of the plates and the distance between them, and the dielectric constant of the window glass,

but I am going to be rash and make a guess and say that a size of 6 in. \times 6 in. square would make a big condenser, and would not alter the tuning of your set. A size of 3 in. \times 3 in. would be quite efficient.

I hope I am about right because it is a pure guess and I have not worked it out. If the tuning is very much altered using the size I propose you will need to get bigger pieces of tinfoil.

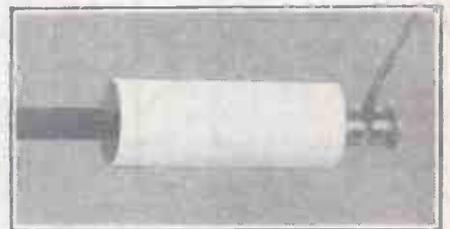
Trouble from the Tramway.

M. N. (Stone). "My aerial is in rather an unfortunate position because it runs parallel to, and within 20 ft. of an overhead tramway system.

"Whenever I switch on the set I find that the broadcast programmes are badly interfered with by a loud crackling noise, which I assume is due to a sparking between the trolley arms and the overhead wires.

"I have tried an indoor aerial, a counterpoise earth, series condensers, and several

A LEAD-IN TIP



One good method of keeping a lead-in tube dry is to use an empty shaving-stick box as shown.

other dodges, but I regret to say that these have not been successful in reducing the trouble. Am I right in assuming that it is impossible to cut out these crackling noises?"

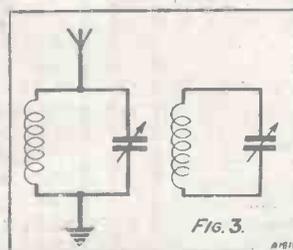
Yes, you are correct in assuming that tramway noise cannot be eliminated if you have tried all the various ideas you outline in your question.

There is only one way to eliminate it, and that is by doing something to the tram itself.

You should approach the tramway authorities and the B.B.C.

The B.B.C., with the co-operation of certain tramway authorities, have shown that by changing the connections of tram motors, and by using a more economical trolley collecting device, it is possible greatly to reduce the interference produced by trams.

"NO GOOD"



This method of connecting is NOT recommended.

THIS is to be the last of the "Safe-power" H.T. Units, so it is perhaps appropriate that it should be the biggest and most elaborate of the series. It is actually the exact alternating current equivalent of the D.C. "De Luxe" model, and has the same special virtues of very thorough smoothing, elaborate precautions to prevent motor-boating, plenty of separate positive tappings, and abundant output.

More Current, More Tapping.

It differs from the "standard" A.C. model chiefly in having more positive tappings, giving a bigger output, and being provided with a voltage-measuring and adjusting scheme which enables you to get a series of different output voltages for different purposes. It may be remembered that the standard unit was arranged to give a fixed output voltage on the principal tappings, this being such as would suit the normal receiver of medium size.

In the "De Luxe" model we have incorporated our special "Safe-power" scheme of an adjustable main voltage, and a meter to indicate it. This greatly increases the usefulness of the instrument, since it enables you to suit the needs of the moment exactly and give your valves just the treatment they require.

For example, if your power valve is rated by the makers to stand H.T. up to 120 volts, you adjust the main control until the voltmeter reads 120 under working conditions, and then you know your valve is getting just the proper pressure. The voltages on the other tappings you can estimate by methods we will give later.

Choice of Voltages.

If your power valve is of a more lusty type rated to stand H.T. up to, say, 150 volts, again you can suit it. Just set the master control to give a reading of 150 on

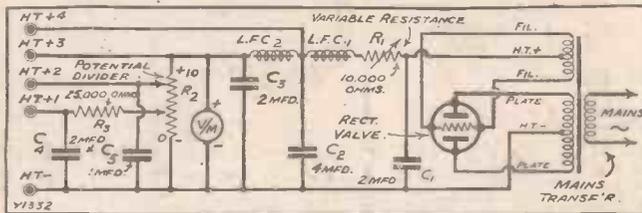
the voltmeter under working conditions, and there you are. You will now get a different series of voltages on the other taps, but these again can be readjusted and estimated in the way we shall be describing later.

This is one of the important features of the "Safe-power" series, and we believe it is one that has done much to give these units the remarkable popularity they have achieved so rapidly. Our readers have been quick to realise that here is a scheme which takes the guesswork out of mains working and gives you a comfortable feeling of knowing where you are at all times.

What it Gives.

Now let us just explain the various outputs available from the "De Luxe" model. The total current which it will give

HOW HUM IS PREVENTED



Ample smoothing is provided, and it will be seen that every output lead has received individual attention and has been dealt with according to its importance as a possible hum-producer. The result is no hum at all, and yet a not-too-expensive outfit to provide the power.

is about 50 milliamps, which, of course, is far above any normal requirements. That means that you will always be able to work well within the safety capabilities of your unit, even with the biggest kind of set you are likely to have, so avoiding all sorts of troubles and insuring a long life for your rectifier. This is just one of the many adequate "safety factor" arrangements in every "Safe-power" unit.

A glance at the diagrams of the unit will show you that it has the usual single negative terminal, and four separate positive output terminals. These latter are intended for supplying different valves or groups of valves in your receiver, and it is important that you should understand the correct ones for any given purpose if you are to make the best use of your unit. Starting at the top and working downwards, you will find first terminal H.T.+4.

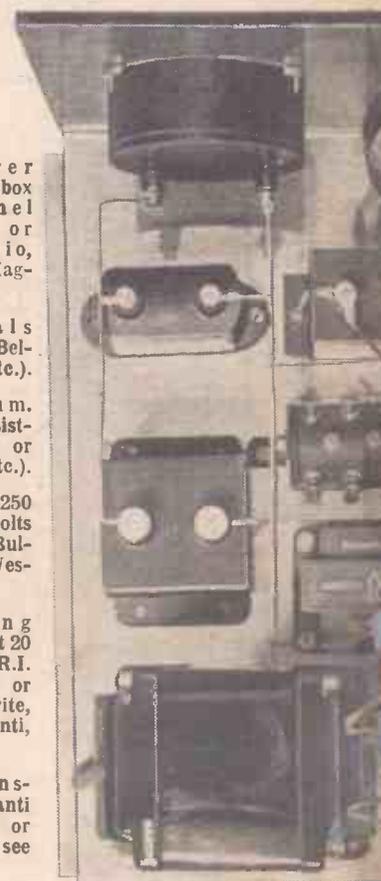
This is intended to



Long and loud have been the praises showered upon this latest one is the biggest and best of them all. It solves the H.T. problem for ever. Build it with confidence.

supply the power and low-frequency valves in the receiver, while terminal H.T.+3 is meant for the plate of the H.F. valve if this is of the screened-grid type. These two terminals give the same voltage, to within

ARRANGE THE PARTS LIKE THIS



Compare this with the wiring

- 1 Safe-Power standard box with panel (Wearite or Ready Radio, Paroussi, Magnum, etc.).
- 5 Terminals (Igranic or Belling & Lee, etc.).
- 1 10,000 ohm. variable resistance (Varley or Rotorohm, etc.).
- 1 Voltmeter, 0-250 or 0-300 volts (Ferranti or Bulgin, Sifam, Weston, etc.).
- 2 Smoothing chokes, about 20 henries (R.I. Hypercore or Varley, Wearite, Lissen, Ferranti, Bulgin, etc.).
- 1 Mains transformer (Ferranti Type E.V.2, or equivalent: see text).



THIS IS THE LAST WORD IN HIGH-T

Safe-Power Senior

Designed and Described
- By The -
"P.W." RESEARCH AND
CONSTRUCTION DEPT.

on the "P.W." "Safe-Power" Mains Units, and
for the man with his A.C. mains in the house it
confidence and use it with constant satisfaction.

a volt or two, since practically every
modern screened-grid valve will stand up
to 150 volts H.T. and, indeed, often works
a trifle better at this figure than at the
more conventional one of 120.

AND FINISH WITH BATTERIES



Diagram on the next page.

- 1 Sprung valve holder (Benjamin or Lotus, Igranic, W.B., etc.).
- 3 2-mfd. fixed condensers (Lissen & Dubilier, or Ferranti, Hydra, T.C.C., Mullard, etc.).
- 1 4-mfd. fixed condenser (T.C.C. or Lissen, Dubilier, Hydra, etc.).
- 1 1-mfd. fixed condenser (Lissen or Mullard, Hydra, Dubilier, T.C.C., etc.).
- 1 20,000 or 15,000 ohms potential divider (Bulgin, or Igranic, Wearite, Climax, etc.).
- 1 25,000 ohm resistance (Ready Radio or Ferranti, Bulgin, etc.).

This voltage is the one which is read upon the voltmeter, and the idea is that you should turn the master control, R1, until the instrument reads one of the desired standard voltages, such as 120, 140 or 150 volts, according to the rating of your power valve.

This, naturally, must be done when the receiver is actually working and drawing current from the "Safepower" unit, otherwise the correct adjustment will not be obtained. To make the adjustment is simple enough, and you start off by seeing that the correct grid bias according to the maker's recommendation is provided for each valve in the

power valve, since if there is an intermediate L.F. valve, you can assume that this will stand 150 volts quite comfortably.

Terminal H.T. +2 on the mains unit is intended to supply the screening electrode of the S.G. valve in your set, and the voltage upon this is controlled by placing the flex lead which you will see coming away from C5 upon one or other of the tapping terminals on the potential divider R2. Screened grid valves vary somewhat in their requirements here, but they usually want something between 60 and 80 volts for the best results, and this figure you will find round-about terminals Nos. 5, 6, 7 or 8 on the potential divider.

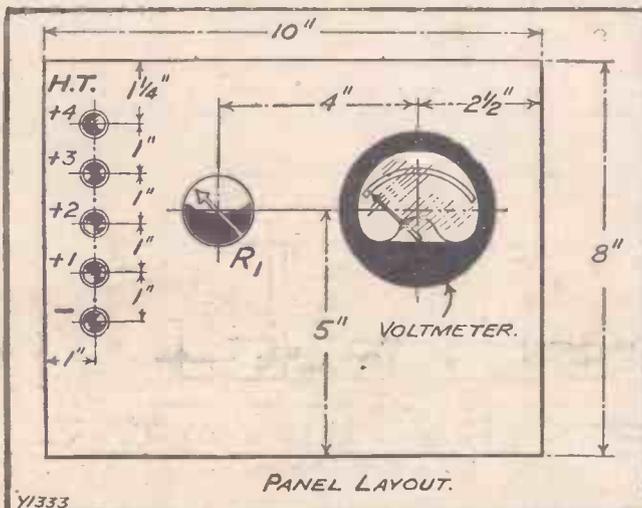
Easily Done By Test.

It is not necessary to know what this voltage is with any degree of accuracy, and the best scheme is to try the flex lead on these various terminals in turn, noting which one gives you the best signals when you are receiving a fairly weak station. A few moments of testing when the mains unit is first put into commission will settle this point, and once found the adjustment need not be altered so long as you continue to use the same screened grid valve.

Just one word of warning occurs to us here: Do not attempt to measure the voltage on any of the terminals of this mains unit (or any other) by means of a voltmeter of the ordinary type connected externally.

You will get entirely false readings since only a very expensive and extremely high-resistance type of meter can be used for this purpose.

(Continued on next page.)



The voltmeter and the resistance R1 together enable you to adjust the H.T. to the desired maximum voltage (120, 150, etc.). In this way the unit is as easy to operate as to build.

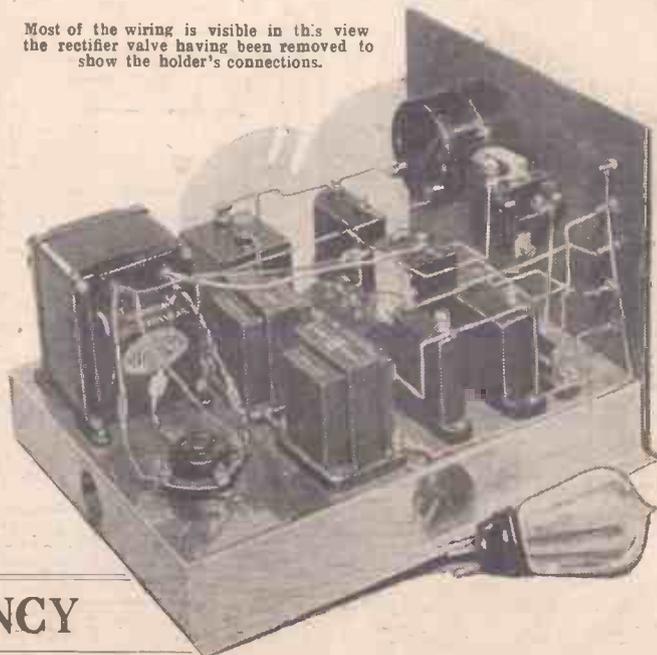
set for the particular H.T. voltage at which you are going to work.

The First Adjustment.

Then, before you turn on the set, switch on the mains unit, and turn the main voltage control R1 right round in the direction which gives you the lowest voltage reading. Now switch on your receiver and gradually turn the control knob of R1 until the voltmeter reads the desired figure. You then know that your H.F., L.F. and power valves are getting the correct treatment, and you can proceed to adjust the voltages on the other tapping points at your leisure.

By the way, you can safely let your maximum working voltage be settled by your

Most of the wiring is visible in this view the rectifier valve having been removed to show the holder's connections.



EXTENSION-FROM-THE-MAINS EFFICIENCY

THE A.C. "SAFE-POWER" SENIOR
(Continued from previous page.)

The one wired internally in the "Safe-power" unit, on the other hand, need not be of a specially high resistance and expensive type, since it is used in such a way that it does not upset the voltages.

Detector Adjustment.

Terminal H.T. +1 is intended for running the detector valve, and here again the voltage is adjustable by means of the flex lead running from the resistance R_3 to a suitable terminal point on the potential divider.

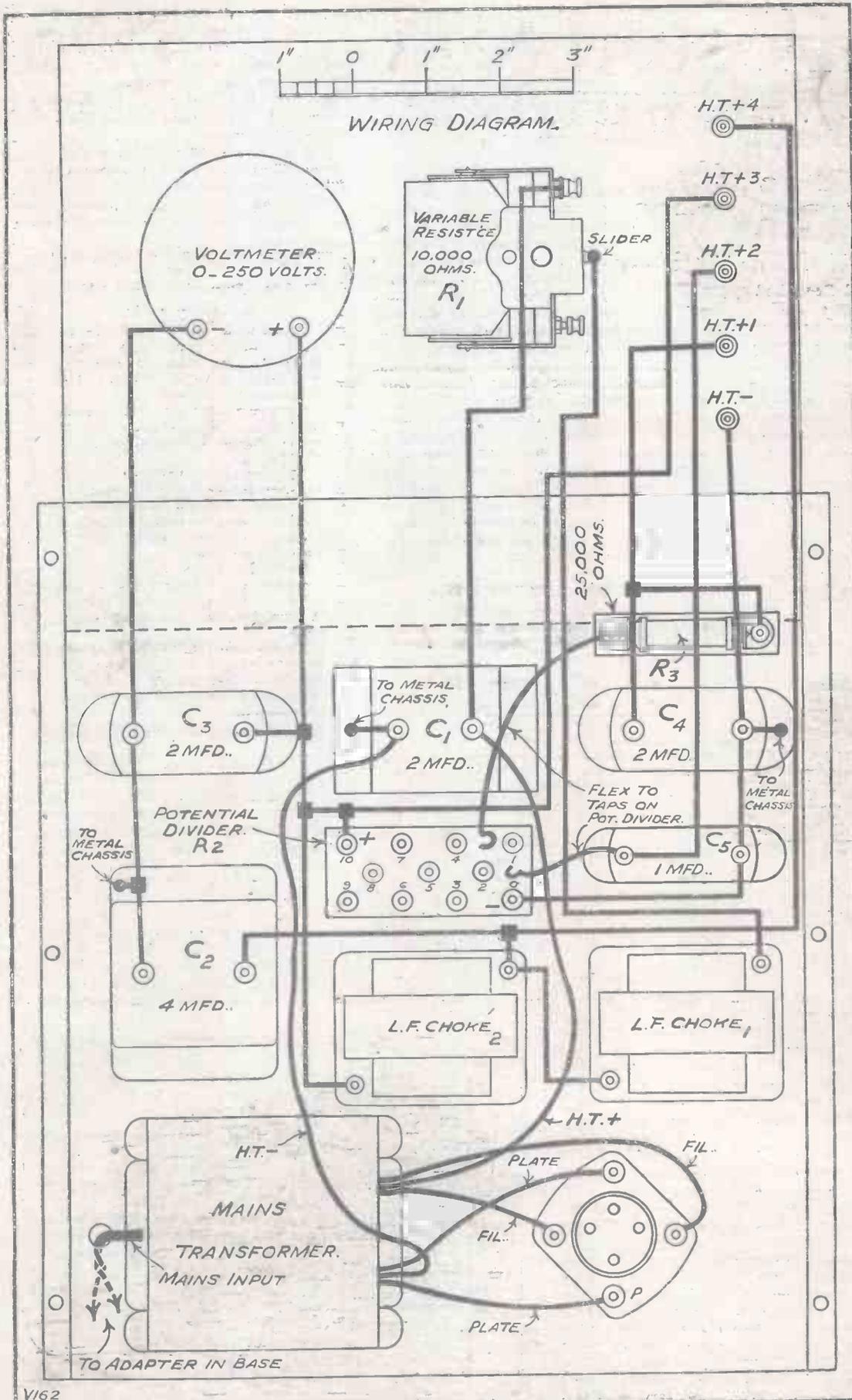
Normally, of course, you will want about 60 volts, and you will find this about the tapping points 5, 6, or 7 on the potential divider.

The precautions taken to prevent motor-boating effects in any receiver run from this unit are just the standard ones employed in the larger type of "Safe-power" D.C. unit, and you will follow these quite easily on the circuit diagram. In the first place, you will note that the tapping H.T. + 4 is taken from an intermediate point on the smoothing system.

"Separation."

Similar anti-coupling effects are obtained on the H.T. + 3 and H.T. + 2 terminals, partly by virtue of the arrangement of H.T. + 4 in relation to the smoothing circuits, and partly by the effect of the potential divider and C_6 in the case of H.T. + 2.

Even more thorough anti-coupling arrangements are made for the terminal H.T. + 1, since this supplies the detector valve, which is usually the most crucial point in the receiver from the motor-boating point of view.
(To be continued next week.)



Tested and Found—?



THE NOVOTONE.

THIS is a device for use in conjunction with gramophone pick-ups. It is an invention of Dr. McLachlan, and is manufactured by Gambrell Radio, Ltd. Its purpose is to provide compensation for the low and high note loss otherwise inevitable in a gramophone record.

As you know, the amplitude, or strength of a note is determined on a gramophone record by the "depth" of the transverse wave in the groove. The low notes cannot be represented in their full strength owing to the limitations imposed on wave "depth" by the necessary closeness of the grooves. A loss in high notes is incidental to the use of pick-ups and valve amplifiers.

In addition to frequency balancing the



A terminal for earthing the metal case is provided on the side of the "Novotone."

Novotone is designed to give greater volume.

The device comprises a moderately small metal box which has five terminals on it, two for input, two for output and an extra one for a variable resistance connection. The use of this last is optional, but well worth while. A 50-ohm rheostat can be used, and it functions as a scratch filter control. No other adjustments are concerned with the Novotone.

You connect the little box between the pick-up and the amplifier, and it can be used with practically any set and with most pick-ups, although it is advisable to specify the make of pick-up when ordering a Novotone.

I regard my tests with the Novotone as some of the most interesting tests I have ever carried out. The step-up in volume that the Novotone provides is most marked, almost approximating to that given by another valve amplifier. A pick-up that requires three stages to give a respectable volume will give a practically equivalent output using only two stages when a Novotone is employed.

And no imagination is needed to appreciate the bass lift; the low notes come out with an exhilarating punch, and a marked improvement in brilliance is the result of the increased high-note amplification—so much so that with many pick-ups, the scratch filter becomes a necessary adjustment.

The Novotone certainly does its job and provides a fine compensation against the usual falling characteristics. Particularly with a Burndept or B.T.H. pick-up does the device give surprisingly good results.

As I have said, it is not a matter of psychology, for the most inexpert ear could not fail to appreciate the real difference that results when it is used. Radio-gram enthusiasts should get their local dealers to let them hear the device demonstrated. It will probably make them most dissatisfied with their present outfits!

PUSH-PULL AMPLIFICATION.

The latest Ferranti publication deals with Ferranti Push-Pull Transformers and contains much useful information regarding their use.

NEW "EKCO" MAINS UNIT.

I have frequently recommended the use of mains units with portables. It is in the very nature of a portable to be "under-battered" to some extent, for batteries are heavy objects, so that if a portable is to be operated indoors it is an obvious economy to make use of the mains if they are available.

And Messrs. E. K. Cole, those enterprising mains-unit people of Leigh-on-Sea, are there ready to hand with mains units specially designed for portables.

These units are so compact that they can be fitted into the compartment originally occupied by the batteries in practically any set.

The model 1V20 A.C. provides three H.T. tappings at an aggregate maximum of 20 milliamps.

There is an S.G. tapping for the screen of S.G. valves, a variable smoothly running from 0 to 120 volts for any current between half and six milliamps, and a 120 / 150 - volt tapping giving approximately 16 milliamps.

The CT1 A.C. "Ekco" unit provides a similar H.T. supply, but it also incorporates a battery charger and this charger section will keep any ordinary accumulator, two - four-

or six-volt, up to scratch even when the set is used daily for considerable periods.

I, personally, would always have a unit with a charger included, for the charging presents no greater problems than the supply of H.T., while it is distinctly economical, and makes for pleasant, trouble-free radio.

Indeed, a combination of mains H.T. and trickle charging is, to me, the almost ideal solution to the radio power problem. Only a very small accumulator is needed, the type provided with the average portable

When you are Buying— 25.—A PICK-UP.

Some gramophone pick-ups are much more sensitive than others. There are those which will work very well with two stages of L.F., while others really need three.

But remember that the detector valve in an ordinary radio set can be used as the first L.F. amplifying valve for a pick-up.

You can get simple valve pick-up adapters enabling you to connect a pick-up to the set in a few seconds.

With a very sensitive pick-up, a volume control between the pick-up and set is advisable.

Remember, a poor pick-up used in conjunction with an ordinary set and speaker may give results inferior to those given by a quite cheap gramophone.

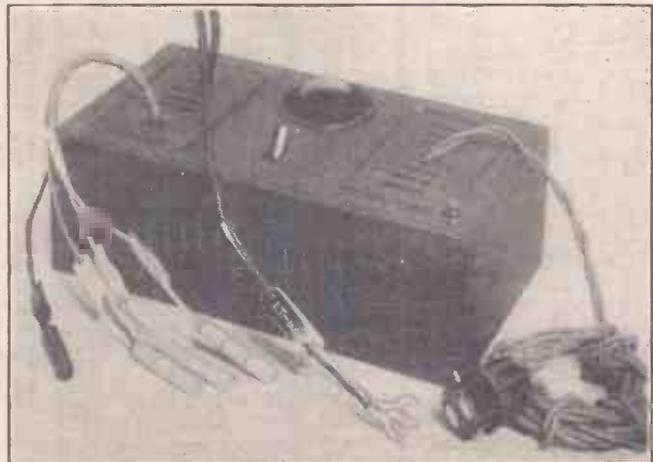
Always endeavour to hear the pick-up demonstrated on a similar set to your own before you buy it. Pick-up results can be either very good or very disappointing.

proving adequate to cope with even abnormally heavy duties. And the L.T. current is always smooth and completely controllable.

These two "Ekco" units are particularly neatly constructed, and they are certainly "Safe, Silent and Sound."

PRICE REDUCTIONS.

The Loewe Radio Co., Ltd., announces a series of price reductions. I notice that their excellent gramophone pick-up has gone down from 18s. 6d. to 15s., and their loud-speaker unit from 13s. 6d. to 10s. 6d. A new Loewe loud speaker and two new speaker units also make their appearance.



One of the Ekco combined H.T. supply and L.T. charging mains units for portables.



"MILLIVOLTS PER METRE"

Although the power picked up by an aerial is very tiny, being so many thousandths of a volt, it is amplified hundreds of times by the set, as shown in this explanation of a common but often puzzling term.

By T. B. SANDERS.

ANYONE who has taken the trouble to read the B.B.C.'s many attempts to explain the Regional Scheme cannot have failed to have come across the phrase "millivolts per metre," and, to many, the term has probably been devoid of meaning.

However, it is really quite simple. When a broadcast transmitter "goes on the air," it creates a disturbance in the ether which has the effect of inducing a voltage in any aerials which happen to be within its sphere of influence. The value of that voltage depends on several things; the distance between the transmitter and the receiving aerial, the wave-length, the aerial power of the transmitter and many less obvious things:

What is Signal Strength?

It is also dependent on the height of the receiving aerial, the rule, in this case, being not "the higher the fewer," but, on the contrary, the higher we go the greater the voltage.

This voltage which we get in exchange for our annual ten-shilling licence fee is not of a very staggering magnitude. In point of fact, it is measured in thousandths of a volt, i.e. millivolts.

A very convenient way of measuring the signal strength of a transmitter at any point distant from it, then, is to erect a receiving aerial of standard height and measure the millivolts induced in it. A conventional standard height of one metre is adopted and, if a voltage of 10 millivolts is induced in such an aerial by a transmitter, we say the signal strength at the place where the receiving aerial is situated is 10 millivolts per metre.

Field Density.

The practical reader, who feels impelled at this stage to dash forthwith into the garden with a yard-stick to measure the height of his aerial mast, should restrain his enthusiasm. It is the *effective* height of the aerial which enters into the calculation and this is not measured with any instrument so crude as a foot-rule. A good average aerial of the domestic type, about 30 ft. high, will probably have an effective height of 5 metres or so—say 15 ft.!

From enquiries put to the POPULAR WIRELESS Query Department, it would appear that a good average aerial prevails

very uniformly among readers, and so we will take the case of one of them who has made the "Magic" Three, got it to work, and lives—happy man—enwrapped in a field density of 5 millivolts per metre, provided by a benevolent B.B.C.

"Magic" and Millivolts.

Such a man has got his 5 good metres of aerial, Mr. Kendall's guarantee that his three valves are doing all that three valves can do, and his 5 millivolts per metre.

A field strength of 5 millivolts per metre means that an aerial of 1 metre effective height will receive an induced voltage of 5 millivolts, so a 5-metre aerial starts off with $5 \times 5 = 25$ millivolts.

This quarter volt which is developed across the coil is also developed between the grid and filament of the detector valve, and, as everyone knows, the valve will produce in its anode circuit a magnification of this approaching the magnification factor of the valve.

This will be probably twenty times, and there ought, therefore, now to be $20 \times \frac{1}{4} = 5$ volts in hand, so to speak.

Unfortunately, somewhat of a set-back is encountered here. The detector valve, as its name implies, detects, which means that it separates from the H.F. voltage, with which we have so far been concerned, the low-frequency voltage of the speech and music, and this, you will have to take it from me and the B.B.C., is only about 20 per cent of the figure we have arrived at; which gives us 1 volt instead of the 5 we hoped for.

The first transformer helps to make up for this by providing roughly an amplification of three times at its secondary terminals,

More Mains.

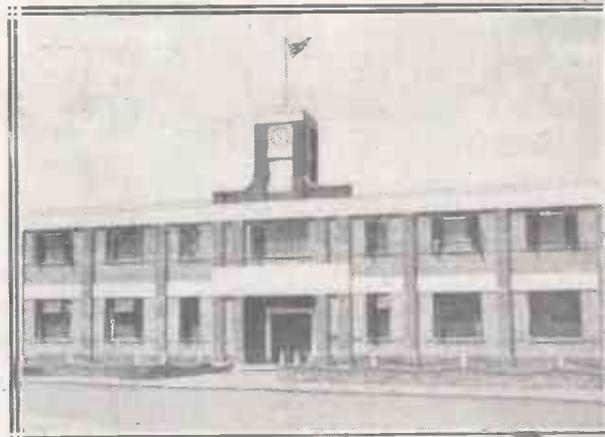
This is applied to the grid of the second valve for further amplification. This time the valve will yield about 10 and the second transformer again about 3, making 30 in all, so that the grid of the last valve has actually $30 \times 3 = 90$ volts applied to its grid.

From which it will be seen that there is nothing much wrong with the "Magic" Three.

For a valve to handle a signal input of 90 volts, it should, theoretically, be a super-power valve with at least 300 volts H.T. and 90-100 volts grid bias!

Owners of "Magic" Threes with shallow pockets, however, need not consign their receivers to the dust-bin because of an inability to furnish themselves with such costly valves and stupendous H.T. At the worst the B.B.C. only modulates fully once or twice an evening, the general level of signal strength being much lower than the *peak* we have been assuming.

A NEW RADIO FACTORY



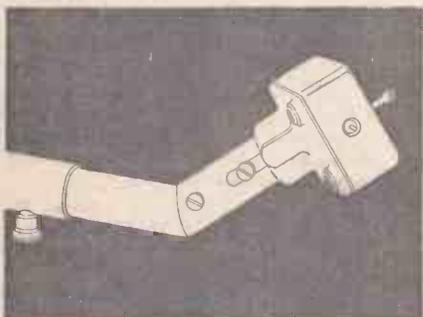
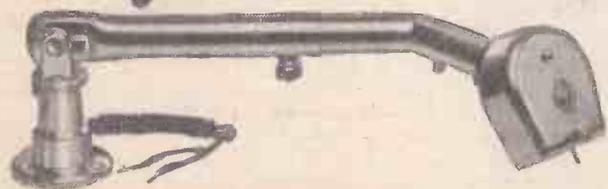
Here is a view of the new factory of Messrs. Radio Instruments, Ltd. It is situated near Thornton Heath, and the well-known firm has recently moved there from the heart of London.

This affects the "Magic" Three, and influences an "X" coil and a tuning condenser, the effect of which is to cause a voltage to be developed across the coil greater than the voltage which caused the current to flow.

Amplifying the Input.

The coil and condenser, in effect, amplify the received voltage, a fair estimate of this amplification being 10 times. So this "Magic" Three, before valve amplification enters into the question, has provided an increase of the B.B.C.'s meagre gift of 5 millivolts to $5 \times 5 \times 10 = 250$ millivolts, or a quarter of a volt.

An additional refinement



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W.78

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Type		Old Price	New Price
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L 410	H 410		
HL 610	HL 610	10/6	8/6
L 610	L 610		
P 215	P 410	12/6	10/6
P 610			
P 2	P 240	15/-	13/6
P 425	P 625		
P 625A			
S 215	S 410	22/6	20/-
S 610			
PX 4	PT 240	25/-	22/6
PT 425			
PT 625		30/-	27/6

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Marconi Valves are used by The B.B.C., Imperial Airways, Empire Communications, Metropolitan Police, Passenger Lines, etc., etc. in fact in almost every important British Service. Remember this when you buy Marconi Valves, you buy British and undoubtedly buy the best.

Buy the Valves the Experts use!

MARCONI VALVES





RADIOTORIAL

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Life, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS.

FITTING THE ANTIPODES ADAPTOR.

M. F. (Cheltenham).—"My brother who is an invalid and tied to his bed for weeks on end is very keen on trying the Antipodes Adaptor and getting short-wave stations on the set he has in his bedroom. So I am going to make it up from the blue print, but there is one point about which I am not clear, and that is, will it be necessary to move

The national anthem of Germany is set to this tune and most of the German stations play it when closing down.

Although German broadcasts have previously been received in this country on a crystal set it does not often happen at this time of the year, so it would be interesting if you could identify the station by comparing its dia' readings with that of any other station you are able to receive.

CURING HAND CAPACITY WITH DIFFERENTIAL CONDENSER.

S. L. H. (Chatham).—"My set is one of the old-fashioned Reinartz type with reaction coil close up against the grid coil.

"One side of this reaction coil goes to the end of the grid coil, earth, etc., and the other side to reaction condenser. From the remaining plates of the reaction condenser goes the lead to the plate of the valve and H.F. choke. I have tried reversing the reaction condenser connections, but I get hand-capacity with both methods.

"I should like to ask if a differential condenser would be likely to improve matters and if so what are the connections?"

You can very easily fit a reaction condenser to this arrangement and it should certainly prove efficacious in overcoming hand-capacity troubles.

Hardly any modification of the circuit will be necessary. You will find that a differential reaction condenser has two fixed-vanes terminals and one terminal which is connected to the moving vanes. The differential condenser, therefore, has three terminals as compared to the two on your present condenser.

This means an extra lead, and all you have to do is to take out your present condenser and mount the differential in its place. The lead which formerly went from the reaction coil to one side of the reaction condenser now goes from the reaction coil to one side of the differential condenser fixed plates, the other lead (which came from H.F. choke to the reaction condenser) now goes to the moving vanes of the differential condenser.

The vacant fixed plates terminal on the differential condenser is joined to the L.T. — or earth terminal and these complete the modifications, which should completely cure your hand-capacity trouble.

L.F. TRANSFORMER CONNECTIONS.

M. J. (St. Leonards-on-Sea).—"There are five terminals on the L.F. transformer in all, one marked E, and the others IP, OP, IS and OS. The blue print only shows four terminals namely, G, GB, A and H.T. plus.

"Will the transformer do, and if so how should it be connected?"

The transformer is quite suitable, and the connections are as follows: The point marked H.T. + corresponds with IP on the transformer. The wire for A goes to OP on the transformer. That from GB on the blue print goes to IS on the transformer and the wire which is joined to G goes to OS, in your case.

This leaves one terminal, as yours has an E terminal which is not shown on the blue print. As a matter of fact, it is not necessary to use this at all, but it is provided for those who wish to earth the cores of

their transformers, as it is found to be an advantage sometimes to run a wire from this terminal to the earth or to any other point connected directly to earth.

JUDY—THE SET WITH A PUNCH.

E. St. J. (Eton).—"When was the one-valve set called "Judy" published in 'P.W.'?" Details of this famous one-valver were given in No. 382 "P.W.," September 28th, 1929.

TAKING A SET TO THE CONTINENT.

"COOKIE" (London, W.8).—"What are the Customs regulations about taking a set abroad?"

Different foreign countries have different methods of dealing with this, and visitors to Great Britain, for instance, bring their sets in duty free provided the set is shown to the Customs. (For new sets a deposit has to be paid, but this is refunded when the traveller leaves England if the stay does not exceed six months.)

Belgium, Czecho-Slovakia, Denmark, Finland, Germany, Italy, Norway, Sweden, and Switzerland all make it fairly easy for the visitor to take his set with him.

In France a duty of 22 per cent of the value is payable on traveller's receiving sets, and if the set is of a higher value than 700 francs or the loud speaker of greater value than 200 francs, these are subject to an additional 6 per cent ad valorem duty. Visitors to the Irish Free State not only have to pay 33 per cent ad valorem and deposit a security as well, but they must take out a receiving licence of 10s.

HOW MANY STATIONS HAS PARIS?

A.R.F. (Winchester).—"I should have thought two long-wave stations quite enough for one city, but I have been surprised to find other Paris transmissions on ordinary wavelengths. I also understand from a friend there is a short-wave Paris station as well. How many are there in all and what are the wavelengths?"

In all, there are seven Paris broadcasting stations, namely: Radio-Paris, 1725 metres; Eiffel Tower, 1445.8 metres; Paris P.T.T., 447 metres; Radio L.L., 360 metres and 61 metres; Paris Post Parisien, 328.2 metres; Radio Vitus, 308 and 43.75 metres; and Paris Experimental, 300 metres, 297 metres and 40.9 metres. (Some of these wavelengths are liable to alteration.)

RUN-DOWN GRID BIAS BATTERY.

M.G. (Paddington).—"I am afraid I am rather inclined to neglect my grid-bias battery, and this is the second time on which reception has proved rather distorted until I remedied it by getting a new battery. Does neglect of this kind have any effect apart from distortion?"

The lack of sufficient grid bias is a sure way of taking too much current out of your H.T. battery, so if ever your H.T. battery seems to run down faster than it should you should make sure that the grid-bias voltages on the various valves are correct.

(Continued on page 576.)

TECHNICAL TWISTERS

No. 21. FRAME AERIALS.

CAN YOU FILL IN THE MISSING LETTERS?

The chief advantage of the frame aerial is that it is

For this reason it is mounted on a swivel base so that it can be in different

When the windings are "pointed" so that they are in line with the transmitting station the strength of reception is at a

The frame aerial is of great assistance in cutting out

Last week's missing words (in order) were: Evaporation; summer; Above; Acid; distilled. Electrolyte; hydrometer.

CAN WE HELP YOU WITH YOUR SET?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

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 free and post free immediately. This application will place you under no obligation whatever, but having the form, you will know exactly what information we require to have before us in order to solve your problems.

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

the ordinary wave length coils when using the set for short-waves on the Adaptor?"

No. There is no necessity to change the coils in the ordinary set when using the Adaptor. All that is necessary is to pull the detector valve out of its socket, put the adaptor plug in its place and then plug in the detector valve into this. You can then tune in on the "adaptor" without altering anything else (except joining up aerial and earth leads as mentioned on the blue print.)

FOREIGN STATION ON A CRYSTAL SET.

"RECTOR" (Yorkshire).—"In this quiet little community great excitement has been caused by my crystal set which on two occasions very late at night has succeeded in picking up a foreign station that closes down with the hymn tune "Austria." What station could that be?"

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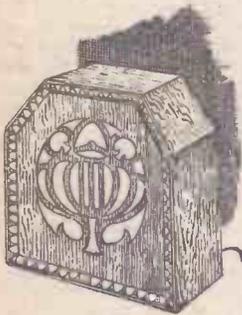


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This efficient H.F. Choke is suitable for operation on wavelengths from 10-80 metres. Excludes effectively H.F. currents from circuits where their presence would give rise to troublesome hand-capacity effects, unsatisfactory reaction control and instability.

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RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 574.)

A READER'S "WHAT WAS WRONG" ?

The following interesting letter has been received from an Ealing reader of "P.W.," and as it deals with "What was Wrong" it is printed here instead of in the Correspondence Columns:

"One of the most interesting features of your splendid paper to me is the 'What was Wrong' series. I get a lot of fun trying to solve the answers, and this brings me to a little problem I myself caused and eventually remedied.

"I constructed your 'Economy' Three which was given a few weeks ago, and put every component in its correct place (as I thought then), but on switching the set I found that I could only get the Regional programme and that was all over the dial, with the National as a background.

"I tried different coils and was amazed to find that the No. 60 aerial coil, when put into the reaction and vice-versa, I could get both stations well clear of each other.

"I rebuilt the set, taking great care that I had the aerial and reaction wiring correct, but on testing the set I found results were as before.

"Then after about a week I 'tumbled.' I had put the coil holders with their pins furthest away from the terminal strip. Of course that was soon put right!—Yours faithfully, L. HARMAN."

THE "MAGIC" FOUR.

P.W. (Reading).—"What are the coil sizes and the H.T. voltages necessary for the 'Magic' Four which was described last November?"

The coil sizes are No. 60 X for the aerial and grid circuits, and a plain No. 40 or 50 for reaction for the ordinary broadcast wave-lengths. On the long waves the X coils should both be 250 and the reaction coil size 100.

Normally, the H.T. voltages used will be as follows: 60 to 80 volts on H.T.1, 120 to 130 on H.T.2, and 60 to 80 on H.T.3. This last H.T. should be adjusted for smooth reaction by means of the potentiometer.

For the last valve H.T.4 you need 120 volts or more, according to the rating of the power valve and the voltage which is available from your battery or mains unit.

If you intend going down to the short waves the coil sizes for these will be No. 4 for aerial and for grid circuit, and a No. 6 for reaction. These will cover the interesting 20 to 40 metre waveband, and for covering from 30 to 50 metres use coils of one size larger in each socket, that is to say, two sixes and a nine.

HELLO RIO!

"SHORT WAVE" (Walton-on-the-Naze).—"What is the very loud short-wave station that calls out "Hello Rio" on a wavelength well below 20 metres?"

Probably you were listening to Nauen, Germany, which has been working with Rio on 16.5 metres.

RADIO ROMA.

R.F.F. (Basingstoke, Hants).—"I picked up Rome on about 50 metres and understand that not long ago 'P.W.' published an account of this new short-waver?"

The Rome short-wave station which has been working on 25 and 30 metres was described in an article in "P.W.," June 21st, 1930.

STOPPING MOTOR-BOATING.

R.J. (Boscombe).—"I want to stop motor-boating in my set, which is quite hopeless at present. Even with a new triple-capacity battery the popping noise is still there. What are the connections?"

The lead which goes from your detector valve H.T. positive on the set to the primary of the low-frequency transformer should be broken. A resistance of 20,000 to 40,000 ohms should then be inserted between the H.T. positive terminal and the L.F. transformer primary terminal (preferably a wire wound resistance, of course).

Another lead is then taken from that side of the resistance which is joined to the primary terminal to

LOOK OUT for the AUGUST ISSUE

MODERN WIRELESS

which is now on sale everywhere.

It contains a special section dealing with **POWER FOR YOUR SET**

Buying an H.T. Battery
Arranging your Grid Bias
Mains Units :: Battery Chargers
Etc. Etc. Etc.

Don't miss this fine number but **GET YOUR COPY NOW**

1/- MODERN WIRELESS AUG.

a 4-mfd. fixed condenser. The other side of this condenser is taken to H.T. negative.

(These can be connected externally to the set if you do not wish to interfere with the wiring of the receiver inside.)

SHORTING PART OF THE H.T. BATTERY.

E.M. (Letchworth, Herts).—"I got very loud crackles and poor results so tested the H.T. battery with a voltmeter and found that one cell was not reading at all so I took a flex wire, fitted a clip at each end of it, and poked these into the two tappings which showed no voltage across them, when the set was immediately restored to life.

Now a friend tells me that I am probably ruining the rest of the battery. Is this true?"

We don't see how you can be "ruining the rest of the battery." Unless you shorted it in the way that you have you would not be able to use the battery at all, so we should not worry about what your friend says, but carry on as you are doing.

CLICKS WHEN COIL HOLDER IS TOUCHED.

R.G.A. (Reading, Berks).—"Sometimes the set is not so good as other times, and I cannot make out why it varies so much. I notice, too,

WHAT DO YOU THINK ABOUT THIS ?

The vicar of a certain Midland parish was a very busy man, and had no time to study wireless, though he enjoyed listening to it. His set was of well-known make (Det. and 2 L.F.), and he never interfered with it.

It was scarcely ever tuned, except at night sometimes, when he could get two German stations regularly, and lots of others occasionally. Certainly the inside of the set was never interfered with in the two years it had been installed.

Suddenly one day it seemed to go wrong. Not so loud as usual, and inclined to whistle when tuned. Lively and full of hand-capacity, which it had never been before.

Could you have said **WHAT WAS WRONG ?**

N.B.—There is no prize for answering this but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to above next week.)

The Stafford reader whose volume dropped suddenly as recounted last week, found that the fault was caused by the H.T. neg. lead in his battery cord. Its outer insulation was O.K., but inside the wire was broken.

that if I touch the coil with my finger it gives loud clicks as I move it. What is likely to be the cause of that and would it affect the uneven strength?"

It looks as though you have a coil holder which is loose in its socket. Take it out of its holder and examine the pins which engage with the sockets.

Probably they are split pins having two or four prongs, which depend for good contact upon the pins pressing outwards against the sockets when the coil is plugged in.

If the pins have been "cramped" or pressed inwards they don't make good contact, but simply touch the inside of the socket-walls instead of pressing against them. All that is necessary is to take a penknife and open the prongs slightly so that they get a good "grip" on the socket when the coil is inserted.

RABAT'S METRONOME.

J.F. (Shanklin, I.O.W.).—"Several times lately I have picked up a station announcing in French on a wavelength of just over 400 metres. It is right away above Toulouse but well below Paris PTT, and the only time I heard him wind up the programme he faded so badly that I lost his call.

"I notice he uses one of those clocks ticking every second. Which station would it be?"

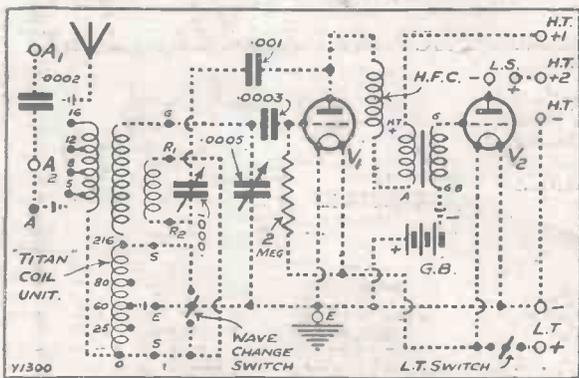
In all probability the station you heard was Rabat, Morocco, which works on a wavelength of 417 metres. Although this is only a low-powered station (2.5 k.w.) Rabat has been coming over very well and many readers have reported reception, at good strength. As this station uses a metronome which beats 60 times per minute we think there is little doubt that this is the transmission you picked up.

WHAT LANGUAGE WAS IT ?

A. E. F. (Swansea).—"On two occasions I have succeeded in picking up a station on about 293 metres which I took to be Kosice, Czecho-Slovakia, but I cannot make out what language it is. What language does this station employ? Czecho-Slovakian?"

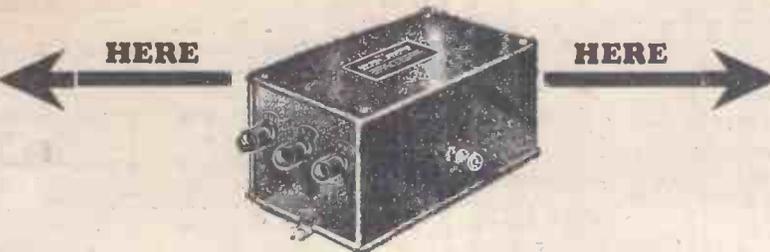
You may have heard any one of half a dozen languages, from Kosice, for this station uses more different languages in its announcements than any other in Europe. In addition to Czech and Slovak, the announcements are sometimes made in Magyar, in Polish, in Russian, or in Rumanian. Which one of these it was you heard we should not like to say!

POPULAR "WIRELETS" No. 15



The connections of a Detector and Low-Frequency Amplifying Stage (for which the "components" were given last week) are shown above by the dotted lines. It will be seen that a Titan Coil Unit, is incorporated for easy changing from ordinary to long waves, and vice versa, by means of a switch.

- ANDOVER, Hants.—H. J. Gifford, 19, Bridge Street.
- ASCOT.—Blacklock's Garage, High Street.
- BERKHAMSTED, Herts.—J. W. Wood & Son, Music Warehouse.
- BIRMINGHAM.—Malcolm and Stewart, 506, Alum Rock Road.—Cecil W. Cox, 77, Gravelly Lane, Erdington.
- BLACKPOOL.—Metcalfe's Radio Stores, 121, Whitegate Drive.—F. X. Smith, 191a, Central Drive.
- BOURNEMOUTH.—Lawrie & Co., 95, Holdenhurst Road.—Winton.—E. P. Hall, Ltd., 321-3, Wimborne Road.
- BRAINTREE, Essex.—Nicholls Bros, 104, High Street.
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- BROMBOROUGH, Ches.—W. H. McMillan, Rake Lane.
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- CARDIFF.—Thompson & Shackell, Ltd., 14, St. John Square.—Tudor Electrical Supplies, 14, Tudor Road.—Duck & Son, St. John's Square.
- CATERHAM VALLEY, Surrey.—The Caterham Motor Co., Ltd.
- CHARD.—The Chard Motor Supply Co., Ltd., Fore Street.
- CHEPSTOW.—Coles & Shirley, St. Mary's Garage.
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- LOWESTOFT, Suffolk.—Dursy, 4, Suffolk Road.
- MAIDENHEAD.—Maidenhead Radio Co., 40, Queen Street.
- MANCHESTER.—Hime & Addison, 195, Deansgate.
- PAIGNTON.—W. Sagar, Preston.
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- RYE.—Edward J. Parlett, 40, The Mint.
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- ST. HELENS, Sutton.—Leonard Davies, 47, Junction Lane.
- SWINDON, Wilts.—W. H. Winchcombe, 160, County Road.
- TAVISTOCK.—A. E. Graves, The Radio Stores, 74, West Street.
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Causton

FOR THE LISTENER.

(Continued from page 566.)

This annoyed her. She made a noise like atmospherics. "Taller!" she snapped. "What do I care about taller? Is James as powerful a god as Sir John?"

It then occurred to me for the first time that Wireless Sets must be a race of rather wonderful beings with an invisible world, a heaven of their own which watches over them and arranges things for them and supplies them with power and makes them good.

And that they worship gods like we do. They worship by their tribes and families, the Marconis, the Burdhepts, the Pyes, the Magic Fours and the rest of them. Brookmans' Park is their heaven, towards which they pray every morning and every evening. Savoy Hill is their Olympus where the greater and the lesser gods abide. The Announcer is the archangel. And Sir John (it is a solemn thought!) is the deity himself!

Italian Programmes.

So that was the secret of James and John! What Belinda wanted to know was whether James was a strong radio god like Sir John, or whether he was simply a tuppenny-ha'penny sort of Baal who was responsible for Wireless in Italy.

"I do not know," I replied to her question, being myself a worshipper at the Savoy shrine, but not wishing to offend the deities of a land in which I sojourn for a season, "Sir John is great above all the radio gods, but, so far as I know, James——" "I don't think much of him," said Belinda. "And why," said I, "don't you think much of James?"

"Well," she said, "look at the rotten programmes he sends out." "But Belinda, my dear," I said, terrified lest anyone should overhear us, "rotten is a traitorous word. I admit that perhaps they are a little—limited, shall we say?"

Complaints.

"Besides," she changed her ground, "they don't begin their programmes till half-past six. Have they nobody to tell them how to keep poultry or to make puddings in the mornings? How do you think I like being silent the best part of the day?"

"You seem to manage very well," I said slyly.

Opera.

It was eight-thirty, and, desiring this conversation to cease, I switched on without looking at the programme. It was another Opera!

There was the weirdest noise inside Belinda, out of which, like a clear star through wild, broken storm clouds, the voice of Wish Wynne, "I shall now give, by request, the story of Jack and the Beanstalk as told by a slum child."

"Did you do that on your own?" I said to Belinda when it was over. "Why not?" she said. "You don't know me yet, my man," she said, "not half!"

"She is a wonderful creature! And now that I have discovered she has a memory in addition to her valves, she will be (as Jack Hulbert delightfully sings) "such a comfort to me!"

TECHNICAL NOTES.

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

The Super-Het.

THE super-heterodyne receiver, which was so popular with the more ambitious experimenter two or three years ago, suffered something of a setback in view of the great advances made in screening and in the development of the screen-grid and pentode valves. However, owing to the increasing need for super-selectivity, it looks as though the super-heterodyne may well come back into its own again.

Many amateurs who have never operated a super-heterodyne receiver are apt to be a bit frightened of it, thinking that its control may perhaps be a little bit beyond them. As a matter of fact, the super-het is an extremely simple set to operate, inasmuch as it has only two tuned controls, its only drawbacks are the comparatively large number of valves necessary for its proper operation (say seven to nine) and the fact that consequently the amount of filament current and H.T. current required is correspondingly greater.

If, however, you have means for re-charging your own batteries the question of running costs need not be seriously considered.

Will it Come Back?

On the other hand, the super-het has many very important advantages. It is very simple to work and, of course, its selectivity is perfectly amazing to anyone to whom this type of circuit is new. An ordinary straight circuit would need to have at least three tuned circuits in order to gain a selectivity comparable with that of the super-het.

No outside aerial is used with the super-het, but notwithstanding this it will bring in all kinds of foreign stations, even during conditions which, for an ordinary set, would be regarded as adverse.

On the Continent.

The super-heterodyne is more popular on the Continent than it is here; possibly for the reason that most European countries have not such a selection of powerful local stations within a comparatively small area as we have in this country. Consequently, long-distance reception is more the order of the day and selectivity is still more important.

It is no doubt for reasons such as this that the super-heterodyne enjoys a considerable popularity in different European countries as well, of course, as in the United States, the land of its birth.

Running Costs.

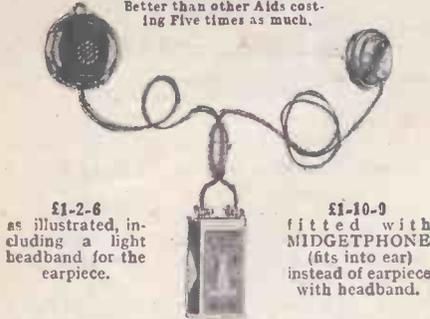
I should add that the running costs of the present super-het are considerably lower than of the older type, and also the operation is actually simpler, since the advantages of screening has now been applied to this type of receiver. This means that instead of using a potentiometer for applying a positive damping in order to obtain stability, the stability is obtained by screening and consequently the extra high-tension current consumption which was

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

involved in the positive damping method is avoided.

The screening naturally, by its stabilising effect, makes the operation of the receiver much simpler.

Question of Quality.

It has, sometimes been objected that although a super-heterodyne receiver will pick out almost innumerable distant stations and bring them in at loud-speaker strength, the quality is in some way inferior. I think this is an unjust criticism of the super-heterodyne and, certainly, if the circuit is properly adjusted, the quality is remarkably good—some of its supporters will, in fact, assert that the quality of its reproduction is equal to that of anything on the market.

Distortion by the Detector.

I am often asked whether the grid leak method of rectification can be relied upon to give really distortionless reproduction. This is putting it rather high as, of course, no receiver will give absolute distortionless reproduction. At the same time, it is important to reduce the distortion to the absolute minimum at every stage in the circuit.

The grid will carry a certain current (in the grid leak method of rectification) and this is often a cause of some distortion, the grid current arising owing to the joint effects of the positive bias applied to the grid and the positive parts of the signal current. The positive bias applied to the grid is apt, to a slight extent, to make the valve act as an amplifier as well as a detector and this method of rectification is useful where sensitivity is an important consideration.

No Grid Current.

The grid is generally given a negative potential relative to the filament, when the anode-bend method of rectification is being used, and with signals of ordinary strength it follows that the grid will not become positive with respect to the filament and therefore grid current will, in these circumstances, be eliminated.

In-so-far as grid current is a cause of distortion, this means that the anode-bend method has the advantage over the grid-leak method. On the other hand, the advantage of the better rectification which is obtained is, to some extent, off-set by the absence of the slight amplifying effect which is obtained with the grid-leak method.

In other words, the anode-bend method of rectification is probably preferable if absolute purity of reproduction is the only or the main desideratum, but for all-round purposes, and especially where sensitivity is particularly desirable, the grid-leak method should be found quite satisfactory.

Importance of Proper Values.

Of course, I should add that grid-leak rectification comes in for a good deal of unfair criticism, owing to the values of the grid leak and condenser being unsuitably chosen, especially that of the grid leak. If the value of the grid leak is too high the valve tends to become choked, whilst if the leak is too low the valve does not operate in the proper manner.

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

You want always to remember that the conditions obtaining in the grid-leak represent a compromise between a grid completely insulated and one completely earthed, and upon the grid-leak conditions being exactly adjusted for the particular conditions, the strength of signals, and so on, depends the entire functioning of the valve as a detector.

Valve Improvements.

Beginners in radio often want to know whether it is not possible to make a valve without a filament; or, rather, a valve in which the electrode taking the place of the filament is unheated. In other words, a "cold valve." They argue, not without reason, that the temperature necessary for the release of the electron current from the filament has, by successive improvements in valve manufacture, been reduced to a mere fraction of what it was in the earlier types.

There is all the difference between a valve which requires a filament-heating battery and circuit, however small the filament current may be, and one which requires no current, and therefore no battery and circuit at all.

Many attempts have been made to design a valve based upon the electronic emissivity of photo-electric substances (such as potassium and sodium) or radio-active substances, of which there are many. Valves have also been designed in which a high value of H.T. voltage is used (the valve being of very "soft" type), so that something akin to a high-tension "discharge" takes place through the gas within the valve, this discharge constituting the anode current.

In all these cases, although it is a comparatively simple matter to obtain an anode current, it is quite another thing to modify and control that current in the way which is necessary if the valve is to be applied to ordinary radio purposes.

Radio-Active.

The emission current from a small quantity of radio-active substance, for example, is in ordinary circumstances far too small to be of any use; and, furthermore, it is quite impracticable to control the amount of the emission or the velocity with which the electrons leave the electrode. In the case of photo-electric substances the trouble here is the extremely small amount of emission which is obtained.

Incidentally, a photo-electric substance will only emit when under the influence of a suitable type of radiation (of which ordinary visible light is an example), and therefore it cannot be regarded as an entirely automatic emitter, since energy has to be supplied from without.

"Soft" Valves.

The high-tension discharge method is open to the objection that the current cannot be controlled, and, moreover, the discharge is very erratic and altogether unsuitable for use in a radio valve.

I should say, however, that it is by no means impossible—in fact, I should think a distinct probability—that some practical

type of cold valve will be evolved in the near future.

Aerial Length.

In the early days of broadcasting it was the ambition of every amateur and experimenter to provide himself with a high aerial of as nearly as possible the maximum 100-ft. length.

In these days of valve developments, however, it has been found that the old "P.M.G. aerial" is generally far too long, and much better results are obtained with a shorter aerial.

Many listeners actually prefer an indoor aerial, and of those who use an outdoor aerial a considerable percentage have quite short antennae, not more than perhaps 10 to 20 feet in length.

Selectivity.

One of the great advantages of the shorter aerial is, of course, the increase in selectivity which is generally obtained thereby. With high-frequency amplification so very easy to obtain, by means of screen-grid valves, the possible reduction in incoming signal strength is quite unimportant, whereas the question of selectivity with increasing stations becomes increasingly important.

If you are in doubt about the length of your aerial, it is a good plan to try using shorter aerials. A simple way to do this is to disconnect the regular aerial from the set and to rig up (a little distance away from the regular aerial) a temporary aerial consisting of a length of ordinary copper wire, suspended on insulators, of course, in the usual way. It is better, if you want to make the test in the most satisfactory way, to take down the regular aerial and substitute the temporary one for it as, of course, the presence of the regular aerial interferes to a slight extent with the results which you get with the temporary one.

However, if it is too much trouble to take down the regular aerial, fix up the temporary one as far away from it as you can and then proceed with your tests.

Some Simple Tests.

The temporary aerial may be made a few feet shorter than the regular one to start with and the results on the receiver carefully noted. Then try cutting off a few more feet from the temporary aerial and again note results, both as regards signal strength and particularly selectivity.

In reducing the length of the aerial, of course, you cut off at the end remote from the down lead and re-attach to the insulator at that end in each case. It is a good plan to have the insulator attached to a rope so that the reductions in length of the aerial are compensated for by increases in the length of the rope.

By a few trials in this way, and also trying different heights, you will soon find out whether there is going to be any great advantage in making a change in the length of your aerial.

If the aerial was already comparatively short, probably you will not find a great deal of difference, but if it was the old-fashioned long aerial it is almost certain that you will find a great improvement, especially in selectivity, by shortening it.

Having discovered more or less the best dimensions you can then set to work to alter your regular aerial to correspond, finally re-erecting it in its new form.



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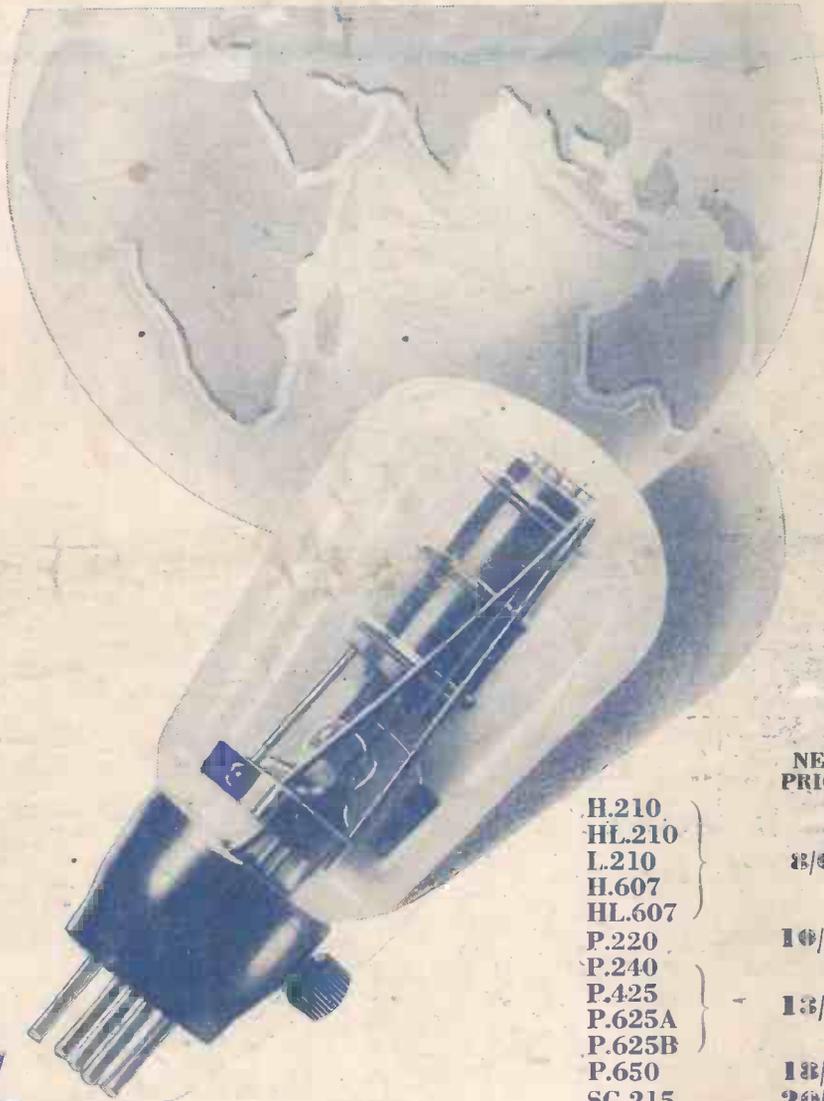
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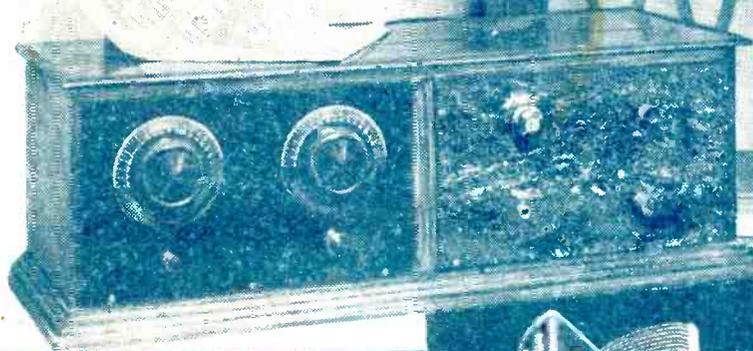
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Inside*



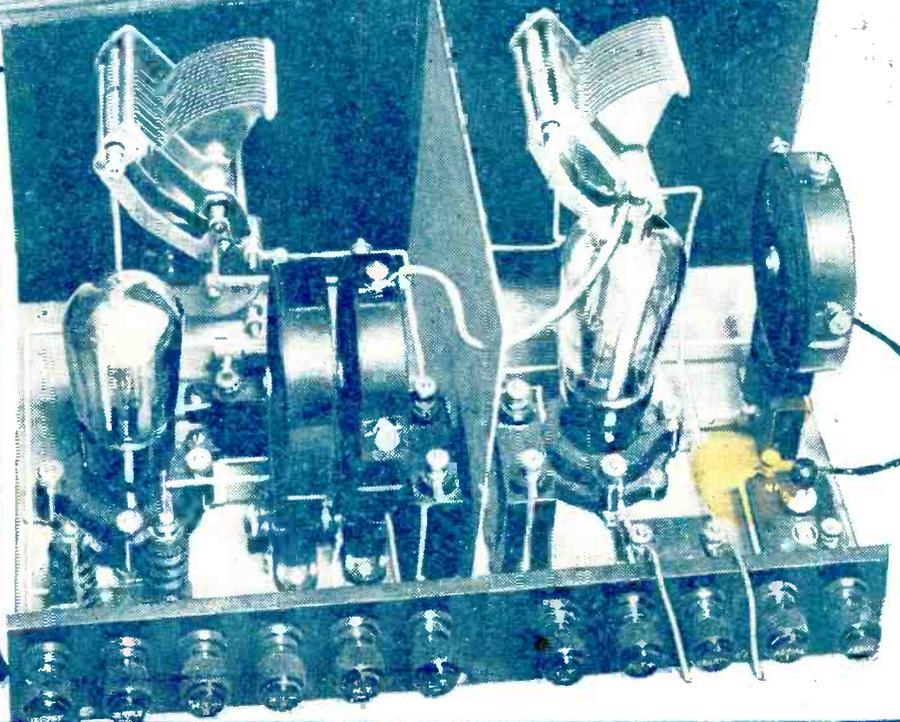
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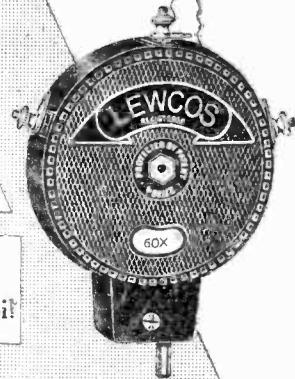
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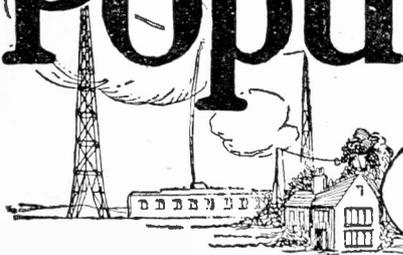
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ONE POINT OF VIEW—
 WICKED WIRELESS—
 IT BRINGS THEM OUT—
 SEANCES BY RADIO—

RADIO NOTES & NEWS

THE UNSEEN INFLUENCE
 AN AERIAL TIP—
 THE B.B.C. ORCHESTRA—
 BROADCASTING HOUSE—

One Point of View.

A SPANISH woman sunning herself at Cheltenham—of all places. A little desultory talk. She reminded me of a great, sleepy pussycat. Presently the sound of an orchestra led us to speak of radio. "My osban," quoth the duchess, as who should say "My fan, my trifle." "My osban is an—how does it call itself?—*un affectionate* to r-radio, but for me, zeñor, all thatt zeem laike to take zer gild from zer budderfly's *ouing*. Verdad? I laike zer sun shine on my corpse and zer smells in my nose and to veel zer loafly ma-ter-i-ah-les with zer 'ands. All zis mean, I weesh to live wiss life and not next doors of her." Maybe, maybe! But we cannot all live slap up against realities, moddom!

The Empire of the Fair.

AND talking of women, isn't this year witnessing a mass attack upon the predominant position of men in achievements once purely heroic? Amy Johnson flips to the Antipodes and instead of alighting with a world gesture she just combs her hair. Another lady (who combines chicken-raising with sculpting!) goes and wins the King's Prize at Bisley! Etcetera! In ten years there will be nothing left for us to do except to huddle together in top back rooms and swap stories about radio circuits. But we shall still be useful for sharpening the carving-knife, taking nice out of traps, supplying money, and a few odds and ends like that!

Education by Radio.

INCREDIBLE! The B.B.C. announces that in the autumn it will take a referendum on educational broadcasts. You all know "Ariel's" views on school-time wasting with tin trumpets. What can have happened to have brought about the awful doubt at Savoy Hill? How determinedly, and with what a show of conferences and committees, the B.B.C. has pursued its notion that it can show school-teachers how to do their jobs! And now, having shot the pianist, the B.B.C. is going to make enquiries!

The Noise War.

PIQUED at the competition which traders' demonstration loudspeakers

are offering to their trams, buses, road-excavators, etc., town councils all over the land are passing by-laws prohibiting loud speakers in this place and that. In view of this, I was horrified to read that Siemens & Halske have produced a loud speaker which can be heard more than ten miles away. Fancy using this in London and incurring the penalty thereof in Sutton!

fundamentals of religion cannot be removed from the human make-up by any human agency.

Stamping It on the Mind.

STILL, propaganda can be very powerful if skilfully applied, and well the Germans know it; their radio propaganda during 1914-1918 gave me many a poisonous hour! However, "all that" being over now (bar the taxes, etc.), they are carrying on the work by printing on some of their stamps "Become a radio listener." Whether that is a command or an appeal I do not know, but I should think that many people would welcome in its stead some advice as to the best means of finding the money for a receiver.

It Brings Them Out.

THE Post Office "detector van" seems to be a very effective form of propaganda, not only on behalf of the B.B.C. but also on the side of law and order. While the van was investigating in the Newcastle district during April 29th-June 3rd, no less than 2,648 new licences were taken out, whereas during the corresponding period of 1929 only 450 were taken out. Similar figures concerning other Northern towns show a similar stimulus. You may make whatever inference you like from these facts.

Seances by Radio.

THE whole thing has fizzled out. It was nothing but a luncheon-table repartee. Mr. Fisk has now explained, says "Wireless Weekly" (Australia), that all he intended to convey was his opinion that any communication with the spirit world takes place through the ether. He doesn't know whether such communication can be effected or whether there is anybody to communicate with.

So that's that. Perhaps Mr. Fisk would next be good enough to explain why the above-mentioned paper refers to him as "one whose scientific practicality has made possible our Beam system and our British telephone system"—a very misleading statement—to say the least!

(Continued on next page.)

THE "BANZAI" BOYS!



These two cheering flag-waggers are the grandsons of Admiral Takarabe, Chief Japanese Delegate to the London Naval Conference, and it was his broadcast speech on his return to Japan that set them shouting "Banzai."

Wicked Wireless.

ISN'T it rather a pity that in Paris there had to be a campaign against "the perils of radio," during which daily prayers were offered in all the churches on Mont St. Michel? Back of it all, so the report reads, is the opinion that radio is an organ of anti-religious propaganda. So far as the B.B.C. is concerned radio has done nothing to harm religion and much to encourage it. Anyhow, a survey of the history of mankind from the Stone Age to last Tuesday forenoon convinces me that the

RADIO NOTES AND NEWS.

(Continued from previous page.)

"Earth" All Round Him.

SALUTATIONS to "E. P." of Weston Souvenir—I mean Super-Mare, and thanks for a letter full of interest. Apart from export packing-cases and the electrical room of a hospital, I have never before heard of a room being lined with lead. That is what they have done to "E. P.'s" room, but being a wireless enthusiast he seized the chance of using the lead sheets as a "counterpoise earth," and he says that the result is equal to his gas-pipe "earth." I should say that this instance is unique.

The Crystal Diehard.

HAVING an original and independent cast of mind, "E. P." has not slavishly followed the trend of fashion. He still uses an H.F. valve, followed by a crystal with plug-in coils. With this outfit he has received (on crystal alone) P C J, Paris, and Berlin, and most of the Continentals besides, when using the H.F. valve. For loudspeaker work he uses a separate two-valve amplifier, and he can make 5 X X work three loudspeakers together, with the crystal and amplifier. A useful outfit indeed, though I just cannot bring myself to feel any affection for crystals. Well, cheery-bye!

The Queen's Hall Broadcast.

THE first broadcast of this season's "Prom" concerts at Queen's Hall takes place on Saturday, and there is a fine all-round sort of programme to it! Further broadcasts of these concerts will be given on August 11th, 13th, 14th, 18th, 19th, 21st, 26th, 27th, and 29th (all on National), and August 12th, 15th, 16th, 20th, 22nd, 23rd, 25th, 28th, and 30th (on Regional). I have seen the whole season's programmes and shall not listen in. Oh, no! I shall go to the Queen's Hall. A little too much stressing of "new works" perhaps—there are twelve—but plenty of the good old stuff, too. Sir H. Wood, of course!

A Big Noise!

SOME of you may be interested to know the composition of this fine orchestra which is 114 players strong. Here goes! First violins, 20; second violins, 16; violas, 14; violoncellos, 12; double basses, 10; timpani, 2; percussion, 3; harps, 2; flutes, 4; oboes, 4; clarinets, 5; bassoons, 4; horns, 6; trumpets, 5; trombones, 5; tubas, 2. This lot can and will make a glorious noise. If you have never been to a "Prom" you have missed a great experience. The sweep of the bows, the glorious clangour of the brass, Sir Henry inspired and working like billy-o, the rapt audience—all these must be perceived and that can be done only by being present. Give them a try out!

How They Notice!

A TEACHER friend has shown me a boy's essay on "Wireless," written for the summer exams., of which the following portion is priceless: "It makes you know science if you didn't know much before; especially your parents. You often hear my dad arguing about battris with the baker's man, but he gets it mostly out of twopenny magazines and does not

really know it. Same as my mother talks about foreign stations, but could not tell where Nairobi was. When I asked her she said 'mother's busy.'"

The Unseen Influence.

FOR some years I have had my receiving outfit, including a large 6-volt accumulator, standing on a small table which some fastidious person covered with a cheap red cloth. I never charge the battery while it is on the table, nevertheless the cloth has faded to a feeble pink, and if handled roughly would fall to pieces. It is killed with acid. Somehow or other the fumes have crept out of the tiny vent-holes and in course of time done their work. An old ebonite panel seems to be better than a fancy cloth for supporting the battery.

An Aerial Tip.

I WAS shocked to read the news about that unfortunate man who fell whilst climbing his wireless mast and was killed. But why climb masts? Insist upon having a pulley on top of the mast,

SHORT WAVES.

The B.B.C., we read, is to broadcast country sounds. We feel sure that West End revellers will be pleased to have their dance band cut off in order to hear a chicken sneeze in Sussex.—"Humorist."

GIVING THEM THE BIRD.

An orchardist in the Harz Mountains has discovered that he can keep the birds away from his fruit by installing a powerful loud speaker among his trees and turning on the wireless.

It is not reported that the different items on the programme differ in their efficacy; but further investigation seems to be called for.—"Evening News."

It is reported in the "Daily Herald" that nine tomcats alone man a warship which, during operations, is controlled entirely by wireless.

There is no truth in the rumour, however, that the cats' whiskers are put to considerable use on these occasions.

ELECTRICITY MORE POPULAR.

We are approaching the volt-age.—"Daily Mirror."

THOSE RADIO TALKS.

Talk! Talk! Talk!
From some moth-eaten guy.
And Talk! Talk! Talk!
Of how we live and die.
It's oh! to be in the fashion
And have a gramophone,
Then, when weary, have something cheery,
Not a talk on the telephone.
"Daily Record & Mail."

so that the aerial can be lowered and raised without necessitating a climb. Another point! After, perhaps, a year of undisturbed peace the wire or rope may become stuck in the pulley; the wire will corrode or the rope will swell. Therefore, before the aerial is hauled up, fasten a stout string on the wire or rope, between the aerial insulator and the pulley. If the pulley sticks, a tug on the string (which should, of course, reach hand height) will put the matter O.K.

How Not to Repair Valves.

C. (Sheffield) asks me whether—as he has been advised by "some sort of an electrical engineer"—he can join together the filaments of his four burnt-

out valves" by placing the glass part in hot water over night." The answer is just plain "No." Why doesn't this "sort of an engineer" do it for you? Tell him from me that a better way of joining together the four filaments is to break the glass gently with a hammer made of boxwood—see that the grain runs E. to W., please!—extract the filaments with a sharp tug—on the left leg, mind!—and melt them up in a ladle after carefully removing any vacuum which may be clinging to them.

The B.B.C. Orchestra.

HAVING decided to form an orchestra of 112 players, to cost £100,000 per annum, the B.B.C. has the opportunity of creating one of the "world" orchestras, like the Philadelphia, Hallé and Vienna Philharmonic. Will they do it? Or will they hamper Dr. Adrian Boult with Civil Service-like regulations? "Musical Opinion" points out that the opportunity will be lost if the orchestra is allowed to be a dumping ground for inexperienced players. It recommends, also, the appointment of a permanent conductor of eminence. We live in hope!

New York Telephone.

IN a letter to "Radio Design," an American amateur radio organ, a South African complains that he gets the London New York radio telephone conversations down there. He says that they in S. Africa are supposed to be right out of the line. Why? Who said so? The Post Office used broadcast for the service! He suggests that the Marconi people would be interested to know "all this." I should be surprised if they don't know it, though I hope our friend does not imagine that they run the service. If they did, it would be conducted by Beam.

Broadcasting House.

THE latest news from the big hole in Portland Place indicates that on the foundations which were completed last winter there is steadily arising a builder's paradise of concrete and steel girders. The central tower, which will contain the studios, is beginning to look "like," whilst underground amongst the moles two studios have already been roughly completed. The B.B.C. states that a special system of artificial daylight illumination will be installed in order to avoid any feeling of depression amongst the staff. Nothing special has been planned to cope with depression amongst listeners!

The Post Office Licence.

BECAUSE the Postmaster-General has no statutory powers to compel the owners of electrical plant causing interference with radio reception to remove the cause of such interference, many people imagine that the licence for broadcasting has been issued under false pretences. Bless you, the P.M.G. issued licences long before broadcasting was thought of, and would continue to do so even if every B.B.C. station were disintegrated. All he licenses you to do is to install a wireless receiver, and the licence in no way commits him to provide broadcasting for you to hear; in fact, if you listened only to New York he would require his ten bob just the same.

ARIEL.



MY arrival back in London from a holiday was not characterised by any particular demonstrations; it seemed superficially that things were much the same as when I went away.

My set was still working, the B.B.C. was making much the same sort of noise, the "Radio Times" looked as much like a twopenny weekly as ever, and talked about much the same kind of things in much the same kind of way, my newspapers ranted and were quietly pessimistic or scathingly sarcastic about unemployment, without, however, proposing any real remedy

"Something Exciting and Original."

To one who loves new things, and enthusiasm, and change, and was bursting as usual to show how much better everything could be done, it all seemed discouraging.

But suddenly here, in my newspaper, there was something exciting and original. The "pick of the wireless programmes" showed, that, at 3.30 on Monday, there would be a television play. The play chosen for this daring experiment was "The Man with a Flower in his Mouth." "Well! Well!" I thought, "this must be seen."

"Doubtless the B.B.C. and the Baird Company have come together at long last and have made great improvements." (Because, of course, when I last saw television it was in too crude a state to give any kind of basis for dramatic representation.)

The Truth.

I had heard through a casual talk with a television enthusiast that "things were much better," and I was anxious to know whether this meant that the B.B.C. were now more impressed with television, or that the rumoured recent reorganisation of the Baird Company was implied in "things," or that simply television had really improved.

So I rang up and arranged, and found myself (a minute or two late, it is true) peering anxiously into that small elusive swaying square (two inches by three inches, I think) and listening to a rather poor quality voice which must have been intended to go with the play.

Our Chief Radio Consultant witnessed the recent television play broadcast, and here gives readers of "Popular Wireless" his opinions.

My prejudices, as some would describe my realistic statements, are well known. Perhaps since I am nearly always right my essential fair-mindedness is not always appreciated.

I therefore assure my readers I have nothing against anyone in the Television Company, and believe the members of the staff to be honest, hard-working and en-

I am trying to be funny at the expense of serious pioneering. You will be wrong. I am trying to give you a description in terms of my emotions when I saw the affair.

As my eyes grew accustomed to the light, I saw first what I afterwards labelled as the linoleum effect. In the gently swaying image far back in the depths of the television box one saw in the 2-in. by 3-in. aperture, just a number of squares dark and light like a chess board.

The First Picture.

These supervened, as it were, from right to left. Whenever the linoleum appeared it seemed as if there was bad cross-talk in the control room, because a whiff of unrelated music stole around me. Then

as the music died the linoleum moved leftwards, revealing what I took to be an aerial view of Paris accompanied by a guide's vocal description—what looked like the clear flat ribbon of the Seine and the curious fungoid out of focus of the bordering buildings was romantically blurred but quite recognisable.

I Guess Wrong.

My guess that I was seeing an aerial view of Paris showed itself to be wide of the mark however, due to the super-imposition of a bunch of bananas enfolding an active cataclysm.

Unable to restrain a mixture of amusement and curiosity, I dem-

anded of those who stood near, the meaning of it all. They told me it was a circular marble-topped table, a glass of liquid, and a pair of hands!

No sooner enlightened than denied; my "Paris" was obscured by the drifting patchwork cloud and music called my vision-fixed attention to my ears again.

(Continued on page 583.)

BEFORE THE TELEVISOR.



The three actors in the first television broadcast play. Note the "scenery" on the left.

thusiastic. I count many in the B.B.C. my friends; my sole object in describing what I saw, where another might remain silent, is to tell the facts to those who have never seen television or a television play and believe it to be something worth while.

The incredible truth! The always incredible truth! You will, perhaps, think

MORE ABOUT THE A.C. "SAFEPOWER."

Some further details of the A.C. mains unit described last week.
By THE "P.W." RESEARCH DEPT.

THE reader will by now have got a general idea of the design and use of the unit, so next let us look over the circuit and see how it all works in a general kind of way, without going too far into technicalities. You will note first of all that we have used in this particular unit a full-wave type of rectifying valve, whereas the standard A.C. unit only employs a half-wave rectifier.

It does not follow, by the way, that there is anything inferior about the half-wave valve or superior about the full-wave, because, strictly speaking, that is not the case. It is chiefly a matter of practical expediency concerned with the amount of actual current required.

Full- or Half-Wave ?

The point is that the full-wave type of rectifying valve costs rather more than the half-wave type, and so it is customary to use it only when considerable current output may be required. The smaller half-wave type now available in many makes has the advantage of relative cheapness, and so it is commonly employed for those smaller types of units intended to give currents of, say, 20 to 25 milliamps, such as our standard A.C. model.

The smoothing filter consists of our usual double or cascade arrangement made up of the condensers C_1 , C_2 , and C_3 , and the two L.F. chokes. The condensers C_4 and C_5 also add a little extra smoothing to their respective output points, although this is not their main function, which latter is rather a matter of the prevention of coupling defects inside the unit. The net result is a particularly pure and well-smoothed output which should be sufficiently free from hum to satisfy the most critical.

The general idea of the methods adopted for the prevention of motor-boating and similar objectionable effects, and the scheme for voltage control and adjustment, we have already explained in some detail, and it just remains to point out that the main control of voltage, which we have referred to in passing as being given by the resistance R_1 , actually takes the form of a series variable resistance placed at a suitable point in the main feed circuit.

The Power Transformer.

The power supply part of the circuit you will find to the right-hand side of the circuit diagram, and you will observe the two plates of the rectifier valve are connected to the two extreme ends of the high-tension secondary winding in the transformer, the centre tap of this winding providing the H.T. — point. The filament of the valve is lighted from a small winding on the transformer which is also centre tapped, this tap providing the positive side of the H.T. circuit.

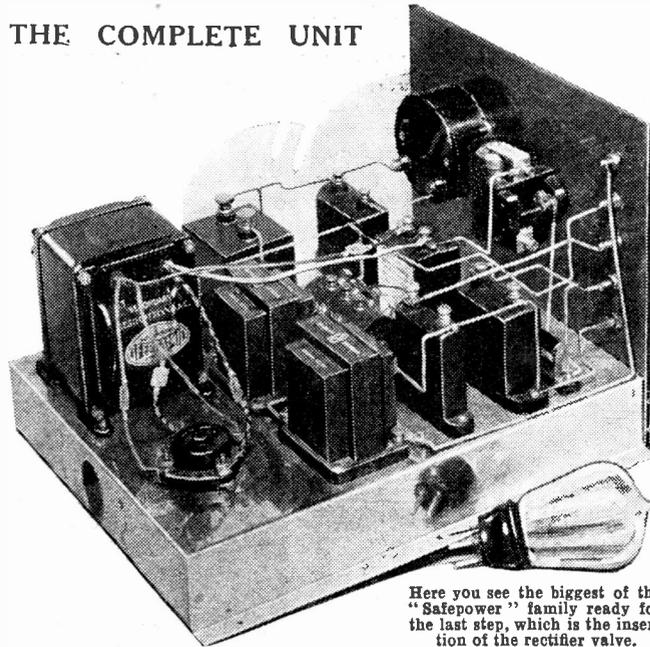
Now there are some constructional and practical points with which we must deal. The power transformer first calls for

attention, and it is to be understood that what is required here is a component with first of all a low-tension secondary winding giving 5 to 6 volts, and provided with a centre tap. This is for lighting the filament of the rectifying valve.

Next you require a centre-tapped high-tension winding, which should have a rating of either 200-0-200 or 250-0-250 volts. These are the two commonly available ratings, and either will do, since they both give a rather higher voltage than you require, and the normal procedure is to work with the resistance R_1 set back so that you only get the desired reading on the voltmeter.

The particular transformer which we have employed has no terminals, but instead a number of different coloured leads emerge from its casing and upon each of

THE COMPLETE UNIT



Here you see the biggest of the "SafePower" family ready for the last step, which is the insertion of the rectifier valve.

these you will find a small tag marked to agree with the lettering on the circuits and wiring diagrams.

In other makes you may find that terminals are provided, but you should have no difficulty in following out the connections with the aid of the notes we have given.

The primary of this transformer—i.e. the mains winding, is to be connected to the usual adapter which you will find fixed under the base portion of the "SafePower" chassis. The particular transformer we employed has a stout twin flex lead coming out from the casing, and intended for connection to the mains, and this should be cut down to a suitable length, taken down through a hole in the metal base, and so to the adapter, to which its two ends should be connected in the usual way.

The various condensers should be of 250 volts "working" rating or higher, the figure quoted being the minimum for safety. In the majority of makes this means you must obtain the special mains type, although it should be noted that in the case of Lissen condensers the standard receiving type are guaranteed to stand this voltage, and some of these were actually used in the original unit.

An Important Point.

Before we proceed to consider certain wiring points there is just one other practical matter which should be mentioned. You will observe that the socket for the rectifier valve is mounted directly upon the metal base, and you should examine your valve socket to see that none of the metal parts underneath can possibly come into contact with the metal when it is screwed down. This is a possibility with some makes of holders, and if there seems to be a risk of it with your particular specimen, place under it, before screwing down, a small piece of Empire cloth or other good insulating material.

Now, there are just two wiring points to be mentioned. First note that connections are made to the actual metal of the base itself at two points, and you must be careful not to forget these. One is in the neighbourhood of the condenser C_1 , one of whose terminals is wired down to the head of a screw which secures it to the base.

The other is an exactly similar connection from one side of the condenser C_4 . Our second point is just to explain that the lead marked "mains input" from the transformer is the primary lead already mentioned, which goes down through a hole in the base to the mains connector adapter, mounted underneath.

This adapter, by the way, you will find is already fitted to the base when you purchase it.

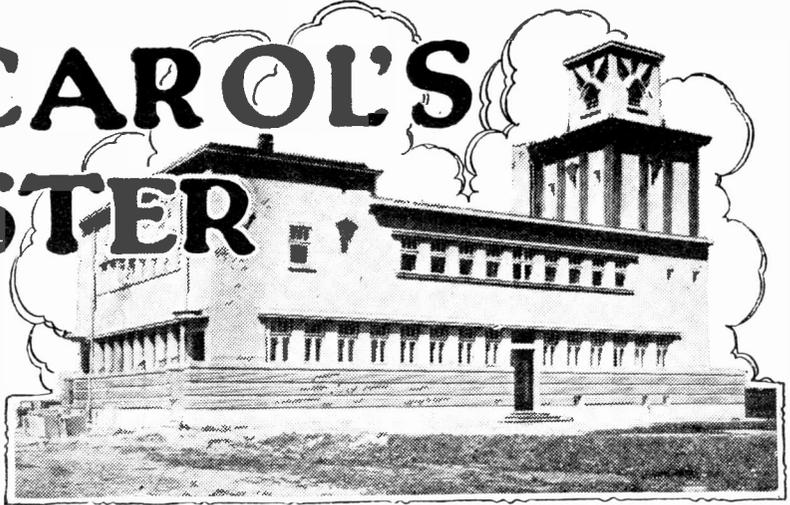
Quite Straightforward.

All the rest of the work is quite straight-

forward, and you will have no difficulty in following it out with the aid of the diagrams and photographs. All the various components on the base are fixed in position with small brass screws and nuts, the necessary holes in the base being drilled very easily, since the metal used for it is extremely soft.

There we can leave you, but we must not do so before issuing our usual warning, and that is that this is an instrument for working upon the mains, and therefore it is up to you to be careful to make a really sound job of it with good joints, carefully insulated wires, and so on. Remember that this unit is probably going to last you for some years, and if you want reliable service you must put care into its construction as well as good components.

KING CAROL'S BROADCASTER



In view of the recent coup d'etat by Prince Carol of Rumania this account of the Bucharest station should prove of particular interest.

From our
SPECIAL CORRESPONDENT.

WHILE the daily papers were making a fuss recently about the love affairs of King Carol of Rumania, I frequently tuned-in Bucharest (which comes in well, thanks to its 12 kilowatts) and heard first-hand reports of the revolution in the capital.

Probably not many listeners in this country realise that Bucharest is the capital of Rumania. It was mere chance that, being in Belgrade a short time ago, I decided to take the boat and train trip to see Bucharest's transmitter, which I had heard from the Marconi people before leaving England was one of the best 12 kilowatts in action in the European ether.

An Amazing City.

It is a pity that Rumania is off the beaten track of tourists, who will go to the Black Forest to see the Rhine, but will not cover the extra miles to see the Danube.

Bucharest itself is an amazing city, and the hotel in which I stayed, under the radio "shadow" of Radio-Bucharest, was as good as many in London. The Rumanians are homely folk, mostly engaged in agriculture, and it is strange to connect their tastes with the many American jazz bands and several cinemas featuring transatlantic talkies, which grace the night life of the capital.

But that is apart from radio. I got into conversation with the manager of the hotel, and he told me that there are no radio licences in Rumania, and that the Rumanian Broadcasting Company, which is having rather a rough time just now with all this political upheaval, derives its revenue from advertising.

I was told by the manager that this advertising is quite well done, and is not too blatant, but having only a *patois* knowledge of the language I could not judge for myself. There is certainly a lot of "talk" in the programmes.

How Bucharest Began.

From an R.B.C. advert. in a local Bucharest paper I found the address of the Rumanian Broadcasting Company's offices, and I dropped in to get official sanction for a *viza* of the station, taking my credentials from the Marconi people; but there wasn't any difficulty about getting a pass, because the R.B.C. is short of funds, and is glad to see anyone who might be interested.

So that evening we (an R.B.C. engineer and I) set out for the transmitter house,

a photograph of which you see here: a weird style of architecture, and like many of the modern buildings in Bucharest.

There we met one of the station staff, and he, an "old hand," explained how the first Bucharest station had started in 1925—almost an amateur station run by a group of bright lads of the Bucharest University, under the director, Prof. Hurmuzescu, himself a keen radio enthusiast.

They put up a 100-watt set, and the good results they obtained, due largely to the favourable locality, caused listeners' interest to grow in Bucharest so that they clamoured for a proper service and a big station.

I asked how it was possible to put up so large a station without proper funds, and I was told, in contradiction to what the hotel manager had said, that subscriptions (equal to about 15s. per set) are invited

Instead of a piezo crystal, which I was told is difficult to work in such outfits, there is a rather complicated master-oscillator circuit. Listening, back in England, I dare say you have noticed that while Bucharest is often heterodyned, its own wave length is remarkably constant.

At Bucharest they are very enthusiastic about their aerial. We went out to look at it—supported on tall, slender, stately lattice pillars (with narrow parallel sides, and not sloping out at the bottom like the Eiffel Tower) and with a host of guy wires.

Five Miles Out.

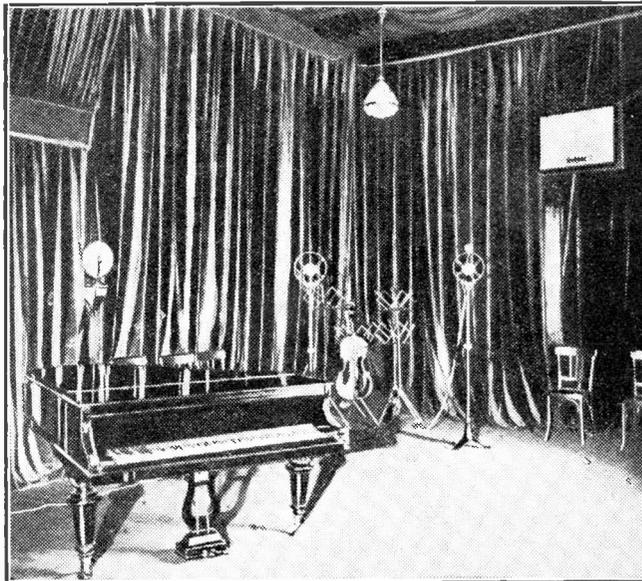
The transmitter is five miles out of Bucharest, on level, open ground. On that fine evening the view was grand, and it was obvious why the radio waves have so free a path. The big buildings of the city are not near enough to cause absorption.

We went back to the studio, and in one of the intervals I was introduced to the lady announcer, whose silvery tones you can often hear.

We were in the large studio, a lofty, heavily-draped room which a B.B.C. man would regard in horror, and there were three microphones on stands. One was used for the piano, and the others were placed here and there in the studio for the soloists and a small band.

I saw the metronome which gives the interval signal, and I saw the gramophone on which I suppose they now again play the Anthem at the close of the evening, the organ and choir record of "Traiscea Regale."

RUMANIA'S RADIO



The main studio at the Bucharest broadcasting station. The transmitter can be heard in England most evenings on 394 metres, and uses 12 kilowatts.

from listeners, and the Post Office collects these fees. But there are many pirates, and the P.O. takes a huge percentage for its trouble of collecting the money.

The transmitter itself is very little different from the many other Marconi plants I have seen at foreign stations, and it is not crystal controlled.

Jolly Programme.

There was a jolly programme, and we were allowed to stay in the main studio until the end of the evening.

Then, at the close-down, the fair announcer switched on her microphone and, in embracing tones bade listeners "Buna seara tuturor."

LATEST BROADCASTING NEWS.

5 X X PERMANENT

**AUTUMN RADIO DRAMA—
NEW SCOTTISH TRANSMITTER;
A HITCH—"THE MAN FRAE
INVERNECHY" — "DIPS"
FROM FUTURE PROGRAMMES
—FOLK SONG BROADCAST.**

THE long-wave National transmitter at Daventry, the old 5 X X, is NOT to be closed down when the regional scheme is completed. (The statement that it is to eventually disappear was first published in a technical journal (not POPULAR WIRELESS), and naturally caused great alarm to thousands of listeners who still rely on the "Big Bloke" for their wireless fare.) The B.B.C. has stated officially that the idea of closing down 5 X X is not and never has been contemplated.

Autumn Radio Drama.

The productions department at Savoy Hill, under Mr. Val Gielgud, is making plans for several outstanding broadcasts during the autumn. Among the plays which it is definitely decided to give is Mr. John Galsworthy's great industrial drama, "Strife," considered by many playgoers to be an even more arresting play than this author's other and perhaps better-known plays, "Justice," "Loyalties," or "Escape."

Mr. Galsworthy has given special permission for the microphone performance of "Strife," and it is more than likely that some novelty will be introduced in connection with the broadcast by giving representative opinions of the performance by leading industrialists and trade union speakers.

Several revivals of successful radio plays will also be included in the autumn programmes, among them being "R.U.R.," which lends itself so admirably to mechanical sound effects; "Beggars on Horseback," a satire on American habits and customs; and also that famous melodrama, "The Silver King." Arrangements are also being made to give a radio version of Shakespeare's "A Winter Tale."

New Scottish Transmitter: A Hitch.

Just when it seemed that a site for Scotland's new Regional transmitters had been found near Falkirk, a hitch occurred which will delay purchase, at any rate for a few weeks.

It is all a question of subsoil. Apparently these regional transmitters must be erected on either pure clay, gravel, or sand, and test holes for Scotland's "Brookmans Park" revealed the presence of a mixed soil which would be unsuitable for the foundations.

From one hole clay and gravel was extracted, while from another pure sand was obtained. Now more holes are to be dug to ascertain whether these mixtures are isolated streaks. If they are not a new story will have to be written.

"The Man Frae Inversnechy."

Scottish broadcasting officials lay great store on public opinion; that is to say,

they take a lot more notice of what their listeners and the newspapers say about the programmes than do their opposite numbers at Savoy Hill.

Just at the moment they are very bucked with what has been said about the relays of Harry Gordon's Concert Party entertainment from the Beach Pavilion, Aberdeen. So much so that these relays are already dubbed as the most popular Scottish programmes of the year.

"The man frae Inversnechy," as Harry Gordon calls himself, has long been a great favourite in Aberdeen, and now the whole of Scotland is so enthusiastic about his show that negotiations are going on for him to make more microphone appearances, both as a single turn in the near future and with his concert party at Aberdeen next summer!

"Dips" from Future Programmes.

Another relay from the Kursaal at Ostend is promised for listeners to the National programme on Sunday evening, August 31st. Further details of this concert will be given in our next issue.

HIS GOOD TURN—OF THE DIALS!

This happy group of Surrey Scouts are enjoying a musical interlude provided by the scoutmaster's set and loudspeaker.

FOR THE LISTENER.

By "PHILEMON"

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

Holidays.

SOMEWHERE in Italy. It sounds rather like the old days when it was always "somewhere in France." I wish you could be here with me for your August holiday, though I don't know how I should put you all up!

I am afraid that the fireflies and the nightingales have gone, but there are still the bullfrogs and the cicadas under the yellow moon; and you can buy a basket of peaches for a shilling, and bathe all day, and get either browned or blistered according to taste! Shorts and a shirt, that's all.

The Long and the Short of It.

You could also help me with the wireless. I am a fool with machinery.

I find it very odd that I can get any

Folk Song Broadcast.

Old Welsh songs, as they were sung long ago at village fairs in Glamorganshire, will be heard by West Regional listeners on Tuesday, August 19th, during a talk by Mr. John Devonald, conductor of the Kymric Oriana Choir. Mr. Devonald will describe how these songs were sung to harp accompaniment, and in the singing of them he will have the assistance of Mr. Tom Davies, a harpist.

In olden times practically every public house in Glamorganshire had its own harper—the word is correct—whose job it was to keep customers merry, to make them sing and dance.

Some of these harpers were very famous, and many will be referred to by Mr. Devonald in his talk. Among them is Mr. James James, who composed the music of "Hen Wlad fy Nhadau," the Welsh National Anthem; while his father wrote the words. A memorial to these composers has just been erected at Pontypridd.

A Running Commentary.

A continuous running commentary on the Ulster Tourist Trophy Race, from its start to finish, will be broadcast on Saturday, August 23rd, for listeners to the Belfast station. National listeners will also hear a description of the race between 3.30 and 5.15 p.m., when the proceedings are expected to reach their most thrilling stage.

The race takes place at the Ards Circuit, a course of about fourteen miles which is considered almost ideal for a road race, since it contains easy bends, bends which are more acute, as well as right-angle turns and "hairpins" demanding skill and iron nerve on the part of drivers.

number of stations on the short (medium) wave, but devil a one on the long wave. I expected just the opposite. I imagined I should get Radio-Paris more easily than Toulouse, and Hilversum than Langenberg.

I can, for instance, get the National Programme, from England on the 261 metre wave-length, and the London Regional on 556, but not so much as a squeak on the "Daventry 1554." Why is it? I do not know.

"Belinda" has five valves and 100 ft. of aerial. I have supposed that it is because I am staying at a place on the lake which is rather tucked-up underneath the Italian Alps, and perhaps the long wave goes over my head while the short comes trickling down the hillsides.

(Continued on page 602.)

THE B.B.C. TODAY

BY THE EDITOR



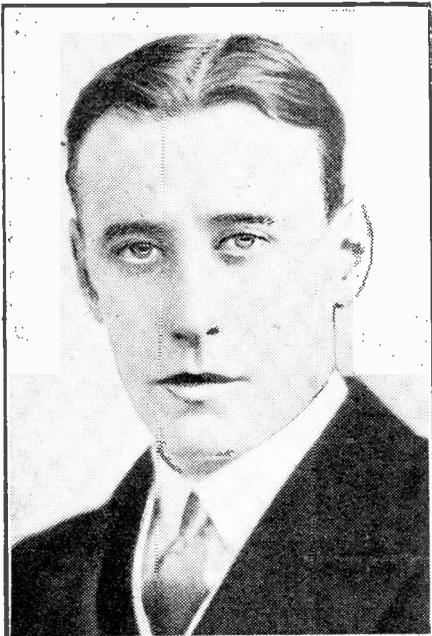
I WOULD begin this critical article with the simple but true statement that no organisation or agency so far recorded, either here or elsewhere, has placed as much good music within reach of the general public as has the B.B.C.

Staggering Figures.

The facts are staggering. A friend of mine in the Programme Department of the B.B.C. has been doing some statistical research. Amongst other things he has discovered that, counting each station separately from the beginning, the B.B.C. has broadcast over 400,000 hours of music, apart from jazz, up to the end of June.

This means 16,666 days, or practically forty-five years. Apparently even now, with far fewer stations than formerly, about 65,000 hours of music other than jazz is transmitted in a year; this means about seven and a quarter years of music,

BIRMINGHAM'S CONDUCTOR



Leslie Heward, the young conductor who has been appointed permanent conductor of the Birmingham Orchestra.

In this third article of a new series of intimate close-ups of the present policies and activities of the B.B.C., the subject of broadcast music is reviewed.

mostly good, transmitted in twelve months.

Certainly the most gigantic and beneficial enterprise of the kind ever undertaken or even conceived. Therefore when there is a change in the music directorship of the B.B.C. the event is of very great importance.

Dr. Adrian Boult was formally invested with his new job at Savoy Hill some three months ago, but he had been practically in charge since the beginning of the year. His predecessor, Mr. Percy Pitt, had played a noble pioneering part in securing serious recognition for the B.B.C., and in placing its programmes on their high original basis.

Mr. Pitt's great international reputation and his encyclopaedic knowledge of opera were of inestimable advantage to the B.B.C. Dr. Boult took over a going concern; but one which was ready for his particular contribution, which can be best assessed by considering his personality and character.

The National Orchestra.

Dr. Boult is a notable conductor but, fortunately for the B.B.C. not an outstanding one. I say this advisedly, because the music directorship at Savoy Hill requires primarily a well-ordered and business-like mind supported, of course, by wide knowledge and catholic appreciation. It seems to me that Dr. Boult combines just these qualities.

The chief task of the new Music Director is, of course, the new orchestra. Last autumn the B.B.C. made an arrangement with Sir Thomas Beecham which presumed a permanent partnership in evolving the National Orchestra. There was to be a trial season, out of which would emerge "the finest orchestra in the world" to quote a statement attributed to Sir Thomas.

But this partnership was ill-fated. First of all Sir Thomas was unable to carry out his conducting commitments to the B.B.C. At least one reason, if not the determining

one, was that he disapproved of the methods of the music department at Savoy Hill. The breach widened until now there is no hope of this partnership ever maturing.

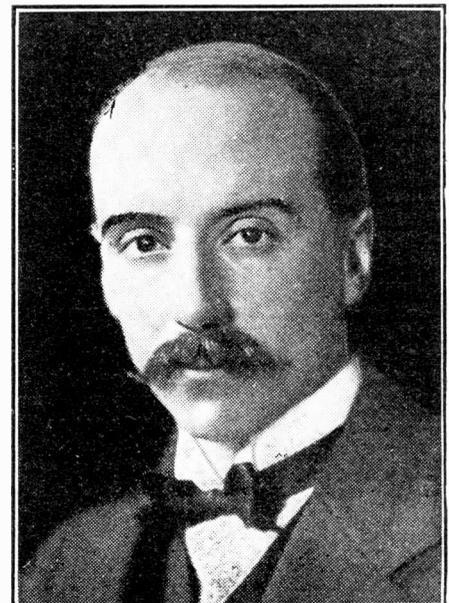
Incidentally the trial season was a heavy loss, and Sir Thomas stands to lose his part of the guarantee. So where Sir Thomas left off in the orchestra scheme, Dr. Boult takes over. I understand that about sixty-five of the contracts have been issued and signed; this leaves about fifty vacancies.

Deadlock Avoided.

There was danger of a serious dispute with the Musicians' Union over the pay, the latter body holding out for £12 12s. 0d. a week instead of the £11 11s. 0d. offered by the B.B.C. When a deadlock seemed inevitable, Sir John Reith made one of his inimitable interventions with the result that the Union gave way, and all is now amicable in that quarter. The delays and difficulties of the last season probably will impose another experimental season, and I would not be surprised to hear that

(Continued on next page.)

B.B.C.'s MUSIC CHIEF



Dr. Adrian Boult, musical director of the B.B.C.

THE B.B.C. TO-DAY

(Continued from previous page.)

the orchestra is not completed before the autumn of 1931.

Nearly a year has gone by since I offered some comments and suggestions which I thought might be acted upon appropriately by the new Music Director of the B.B.C. I said then that there was need to curb the appetites of the exponents of the cause of alleged "modern music"; which to 99 per cent of the listening public is nothing more than objectionable noise. I am gratified to note that my suggestion was taken into account.

Too Much "Vocal."

There is now much less of this "caviare to the general." But there is still too much. The B.B.C. should leave over its minority appeal music until the Regional Scheme is finished. Then it may be possible to cater for the negligibly few without exasperating the ordinary decent citizen.

The next point I would make about B.B.C. music is that there is still rather too much vocal included. Many otherwise excellent orchestral concerts are spoilt by the singers. For one thing the deficiencies of vocal soloists appear to be magnified by the medium; for another thing, it is not necessary or inevitable that all orchestral concerts should have a soprano or a tenor in every second item. I commend this to Dr. Boult's early attention.

And my next point has to do with real alternatives. This is admittedly a difficult subject, rendered not any easier by limited available material. But there has been a marked tendency lately to make the contrasts a bit thin. I have heard, for instance, "light orchestral" put on as contrast to "military bands," and there was an actual coincidence of the same musical number, both, curiously enough, including soloists but with slightly different scoring. Either light orchestral or military band is a good alternative to a symphony or to vaudeville; but not to each other.

The Birmingham Orchestra.

It is important that the splendid cheeriness of Joseph Lewis' Midland orchestra should be retained for British broadcasting whatever happens to the orchestra at Birmingham. The Saturday evening popular sing-songs from 5 G B have been the delight of millions up and down the country far out of the normal range of the Midland transmitter.

It seems pretty certain that there will not be a Midland Wireless Orchestra after the end of September. All the more reason that some special measures should be taken to preserve and foster "Joe" Lewis' splendid tradition. London is always in danger of becoming over-formalised; Joe Lewis will see to this on the musical side if he is given half a chance.

Is the B.B.C. doing all it can for British composers? This is a matter which can safely be left in the hands of Dr. Boult, whose record in this respect is one he may be proud of. I am sure he will see to it

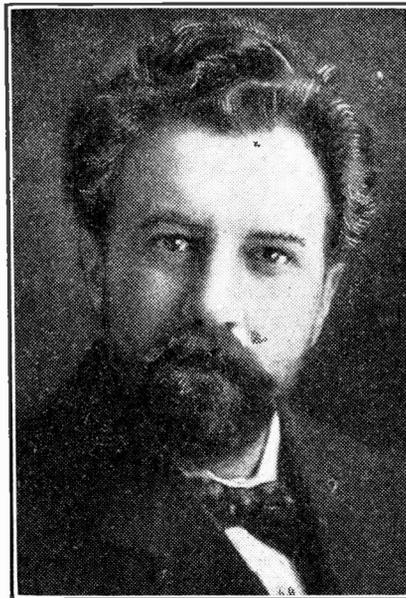
that those who put the programmes together always have in mind the British product, given, of course, "quality for quality."

With regard to opera I think the B.B.C. would be well-advised to abandon all studio productions. These served their purpose in introducing opera to the masses, sometimes in potted form. Now that a great public appreciative of opera has been created largely through the influence of the B.B.C. the time has come to broadcast only from actual performances in theatres and concert halls.

I understand that there is some prospect of the B.B.C. linking up with the new opera merger being sponsored by the Covent Garden interests. Whether or not this is so, the B.B.C. can get outside fully as much opera as should be broadcast.

Let us hope that when the Bach Cantatas have run out in 1932 there will not be any other long series to follow. It was an

FOR THE "PROMS."



Sir Henry Wood, who will again conduct the Queen's Hall Promenade Concerts.

excellent "stunt" to take on a programme feature to run every Sunday for three years at the same time. But the stunt value has long since expired, and there remains only acute and widening indignation. Leave them out for a year and then consider afresh.

The reference to the Bach Cantatas reminds me that the enrichment in popular appeal of the Sunday programmes in general is overdue, and perhaps Dr. Boult may be able to provide some impetus from his angle.

DRAMA & TELEVISION.

(Continued from page 583)

Before I could anchor myself to something firm in the sea of my bewilderment the linoleum slides silently back revealing—stop me!—the upper portions of a monkey, 2 in. by 3 in. True as I live, a monkey!

I swear it, a monkey with a Newgate fringe, black at the roots, haloed in orange, a monkey with a cleft palate and a shocking concentrated frown, a swaying monkey,

half-length only. "Moo-ow-oo-moo," went the voice, and occasionally eclipsing bananas floated dimly before the picture, obscuring the terrible mockery of that face.

And all the time fresh instalments of the monkey's body swaying up from below; orange clouds exposed as it sank rhythmically down. And only a head and shoulders always seen—and the mooring sound.

Was this the deepest symbolism? Mr. Lawrence de G. Gibbon Sieveking is known to be a modern artist, the play itself is macabre in the extreme and concerns, if my mind serves me, a man haunted by a filthy disease.

Horrid Symbolism?

Did the B.B.C. fear to show an actual man and so by subtle symbolism throw on the screen this simian disguise? And the bananas and the swaying up and down; as if the rest of the body, which we were denied, were seated in some arboreal throne swayed by the gentle winds of synchronisation?

And dare I suggest that the curious leprous effect of the edges of the figure, that growth-like cheese effect as seen beneath a teeming microscope, was all this part of horrid symbolism?

The monkey vanishes again just as I thought he must have hurt his head bumping against the roof of the screen.

But let him bump out of sight, there are fresh instalments following him up and down; one has a vision of a tribe of loyal swayers, each ready to take the other's place. The red flower in his mouth? If, as is rumoured, we were seeing a real actor, I judge from sight and sound it was better described as the monkey with the plum in its mouth!

It's all rather terrible. How sane people can put this kind of stuff over the ether, how the B.B.C. can allow itself to be party to it, makes me amazed. I believe, and have believed always, in speaking out about such things.

Call it experimental, call it what you like, the putting the announcement of a television play in the paper must deceive the public into believing that they are to see something not very inferior to the talkies. The public should not be so deceived. The worst of it is that very few members of the public saw the representation. I write as I have done for those who did not.

Wrong Methods.

I have written, in fact, in order that readers of the article may judge—albeit at second-hand—of the progress made in—is it two or three years?—the *Art of Television!*

In the end, let me clearly state that my point of view about television is that it can never have service value when applied through the medium of typical modern broadcasting stations. In America the problem is being rightly tackled, using wave-lengths and methods in conformity with its technical necessities.

Let the Baird Company leave the B.B.C. out of it and start real experimenting with their own stations. I wish them luck if they would do that, but they will need more than my wishes even then.

It is not that I would discourage their efforts, it is that public service does not enter the question at all to-day.

CIRCUIT MISFITS



THERE is room for considerable difference of opinion as to the relative merits of grid-leak and anode-bend rectification. For instance, the former is admittedly more sensitive to weak signals, though it may be responsible for a certain amount of distortion and damping of the high-frequency circuits, owing to the flow of grid current.

On the other hand, for high-grade reproduction from the local station, many listeners will vote in favour of anode-bend rectification, whilst admitting that it is less sensitive for distant work and more subject to fading.

When such important differences as these can be argued about, it is easy to see how hard it is to be pedantic about details, but the following hints will be a useful guide in avoiding circuit "misfits" on the high-frequency side of the receiver.

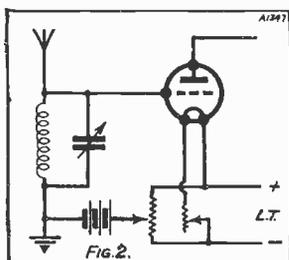
H.F. Stages.

When using a modern screened-grid valve as a high-frequency amplifier, it is better practice to use either a tuned-anode circuit or a one-to-one transformer coupling than it is to aim at getting voltage step-up from, say, a four-to-one transformer.

The impedance of the tuned-anode circuit can be made as high as the valve impedance, by using a low-loss coil and by accurate tuning. The same applies to a one-to-one transformer, especially if the secondary is tuned, since in this case the transformer is practically equivalent to the tuned-anode arrangement.

On the other hand, in the case of a four-

ANODE BEND BIAS



A potentiometer is useful for obtaining the best anode-bend results.

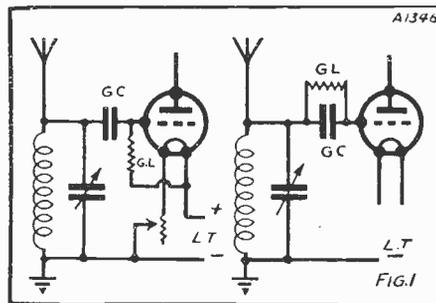
to retain the step-up advantage of the transformer, and at the same time to match the impedance of a modern S.G. valve.

In many of the older sets, step-up transformers gave satisfactory results, because the internal impedance of the older types of valve was considerably lower than those now being used. The same applies to neutrodyne valves of comparatively low impedance.

It is on the small things in radio, as much as the larger points, that success depends. Make sure these little factors are properly looked after in your set.
By J. C. JEVONS.

Such an arrangement might, for instance, work well enough with an ordinary or neutrodyne valve rated in tens of thousands of ohms, but there would be a distinct falling-off should this valve be replaced by a screened-grid amplifier rated at hundreds of thousands of ohms. In this event it

THE GRID-LEAK CONNECTIONS



Results may be spoiled by connecting the "far" end of the grid leak to the wrong L.T. lead.

is better to replace the step-up transformer either by a one-to-one type or by a tuned-anode coupling.

Another type of circuit "misfit" that one sometimes sees must be attributed to a certain lack of perspective as regards damping losses. For instance, it is quite common to find elaborately-wound low-loss coils on the high-frequency side followed by a leaky-grid detector. The damping introduced into the high-frequency circuits by the grid leak in such a set far outweighs any advantage gained by using Litz wire and careful spacing on the coil formers.

Transformer or Resistance?

On the low-frequency side the principle of matched impedances is a valuable guide, though here the conditions are modified by the fact that the valves used have a low internal resistance.

The detector valve (fed from the H.F. side) is voltage-operated, whereas the loud-speaker (fed from the L.F. stages) must be supplied with adequate energy if satisfactory reproduction is to be secured. For a given H.T. the available energy depends

upon the amount of current flowing through in the plate circuit, which in turn necessitates a low valve resistance.

In these circumstances, it becomes practicable to use a step-up transformer coupling having an effective impedance substantially equal to that of the valve, and thereby to take advantage of the extra amplification due to the voltage gain.

With two stages of L.F. it is common practice to use one choke or resistance coupling followed by one transformer coupling. It would usually be a "misfit" to reverse this order, and to insert the transformer-coupled stage in front of the resistance or choke-coupled stage, particularly in mains-driven sets.

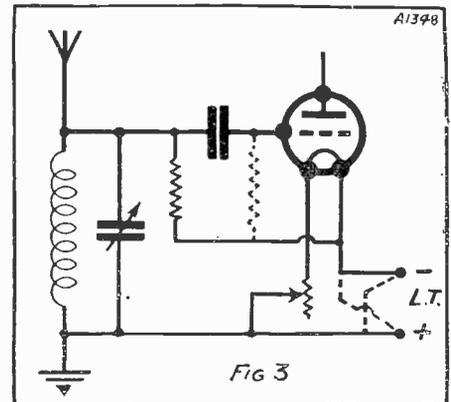
An L.F. Hint.

The reason is that if there is any hum or extraneous "noise" present, this will obviously be emphasised more if it is first stepped-up by the transformer and then amplified by both valves, than if the transformer is so placed that it only feeds the last stage of L.F. amplification.

Finally, it is easy for the most careful constructor to make an occasional slip in assembling a receiver from a selected kit of component parts. There have been many instances where the whole effect of an otherwise admirable piece of work has been spoiled by the apparently simple error of connecting the leak resistance to the far side, instead of to the grid side, of the blocking condenser.

The result of the incorrect connection is, of course, to insulate the grid so that it rapidly builds up a high negative charge which completely paralyzes operation.

REVERSING L.T. POLARITY



The whole effect of a good piece of work can be spoiled by connecting the grid leak to the wrong side of the blocking condenser, or by reversing the connections to the L.T. Battery.

SHORT-WAVE NOTES.

A discussion of the effect of atmospheric conditions on the Heavyside layer, and of other matters of interest to the short-wave enthusiast.

By W. L. S.

TAKEN from the radio amateur's standpoint, there is no doubt that 1930 can be classed as a "black year"; and it is interesting to note that it has been a very unfortunate and troubled year from several other points of view. I refer to the disturbances in Japan, the recent terrible earthquake in Italy, the flooding in Yorkshire and the thoroughly abnormal weather conditions both here and in France for July.

There must be some connection between terrestrial conditions, atmospheric disturbances and radio reception, and probably another half-dozen years like this (though not consecutively, please!) might furnish sufficient data to begin to work something out.

Earthquake Effects.

I was interested to see, on the authority of a meteorologist and scientist, that, after a severe earthquake shock, the distribution of barometric pressure, particularly between Europe and America, may be upset for some years.

Looking at it from the pure tyro's point of view, knowing nothing whatever about matters meteorological, it seems feasible to me that a great mass of light volcanic dust suddenly puffed up to the upper atmosphere might easily upset the whole scheme of reflection of radio waves.

We are told that after the great eruption of Krakatoa in 1883 the upper layers of the atmosphere were abnormal for a long time, and that wonderful sunset effects prevailed for a year or more. Possibly similar conditions may arise after an earthquake such as has taken place this year.

There is, at all events, an obvious chance for the better-equipped radio laboratories to make an attempt at getting nearer to the solution of what might be called the one big remaining problem.

Trouble on 20 Metres.

The angle of reflection for the 20-metre amateur wave-length still seems to be all wrong, and many of the London "hams" with whom I am acquainted have trekked back to 40 metres, on which wave they are working telephony with locals! If one can't get the thrill of real DX it is better to talk to the man in the next street than let the transmitter become buried in cobwebs!

A new station has appeared in the 24-metre region, and I have to thank three or four readers for pointing him out to me. I refer to G2GL of the "Homeric." Up to date he has only been heard working with EAQ of Madrid.

"R. C. A." reports this station, and asks queries regarding FKILM, VQ3MSN and VRIA. FKILM is a Kenya station using the old prefix and should now, I believe, be VQ4LMA. VQ3MSN is an amateur station in

Tanganyika, but VRIA has me beaten completely. "R. C. A." says that one can log American amateurs on the 40-metre band if one doesn't mind sitting up till 3 or 4 a.m. The trouble is that I do!

New Short-Wave Broadcasters.

"E. H." reports the arrival of a Norwegian broadcast station on about 31 metres, and also finds Sydney coming over extra well. He also mentions Rome on 80 metres, all over the house on the loud-speaker.

Several readers also query the station PXMG, calling amateurs on the 20-metre band. To the best of my knowledge this is a boundary expedition in Brazil. Several Britishers have been in touch and at one time the location was given as Malu River.

Another new short-wave broadcast hails from Belgrade, Serbia, on about 31 metres,

whom is getting short-wave broadcast all over the house on the loud speaker while the other can't hear anything, even on 'phones. But it is so common that I am quite used to hearing about it.

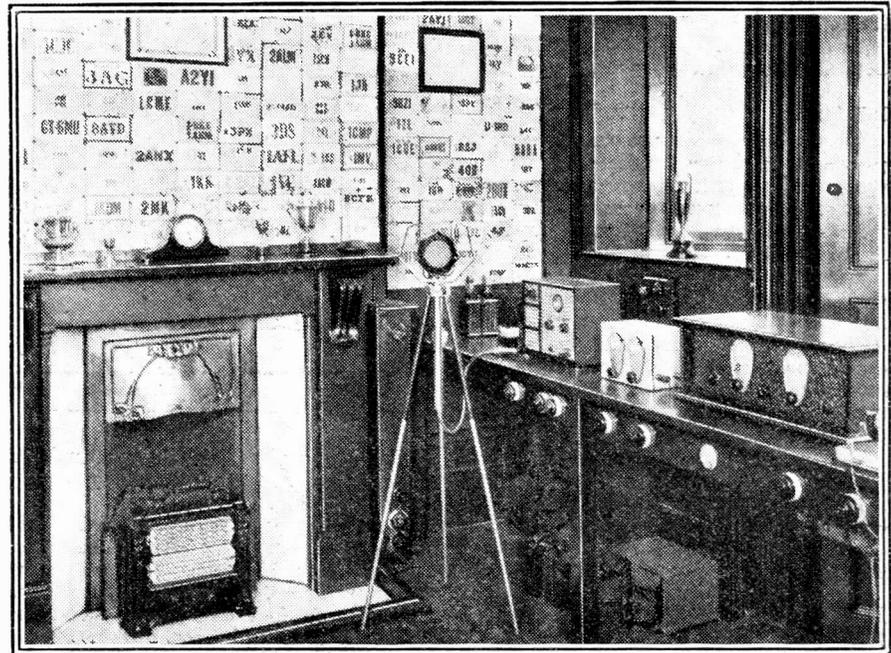
Where do the "duds" go wrong? None is keener to know that than they themselves! I think the only generality that helps is that they are simply too careless all round. They don't think it worth while to take pains over this and that, until the total amount of pains not taken is great enough to act as a protective blanket against the entry of any signal into their 'phones!

I have come across the same with amateur transmitters. Given power for power, it is nearly always the man with the neat, well-laid-out station that bags the records. The old axiom that an untidy set works best, true as it was when it was acknowledged, does not apply to short-wave work. "The difference between tidiness and "sloppiness," may be the difference between good results and nothing at all.

What Will Happen?

As I write this I am viewing with fear and trepidation the arrival of a new metal box in which I have to build my own short-waver, which has now grown untidy enough to cause rude comment among my

FIRST AMATEUR TO WORK ALL CONTINENTS



This neat-looking amateur transmitting station G5BY belongs to Mr. O'Heffernan, who was the first to gain the "Worked all Continents" certificate issued by the International Amateur Radio Union.

and is reported the usual R9, "full loud-speaker strength all over the house" by those readers who have got him at all.

Good and Bad Results.

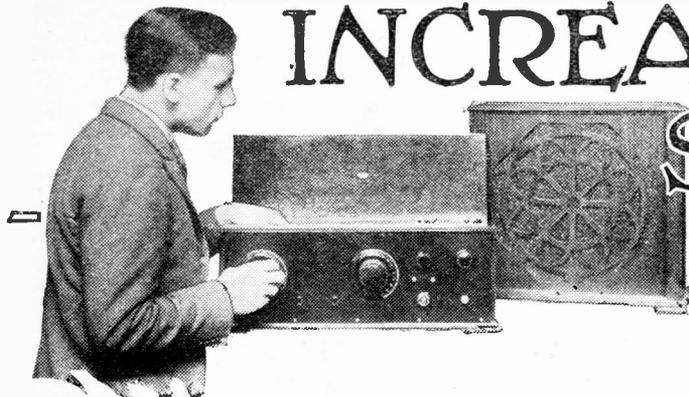
Incidentally, this is characteristic of short-wave receivers; at any rate, those owned by "P.W." readers who are sufficiently interested to write to me and pour out their troubles. Apparently "when they are good they are very, very good, but when they are bad, they are—"

It is very strange to think of two people with sets built to the same design, one of

friends, who never fail to inform me that I don't practise what I preach, when they have the chance.

At present I have my detector and L.F. in a small metal box, with the S.G. stage outside. I now have to build the whole thing in the one box; I object to it on principle because it works so well as it is! But probably it will work better still when the cobwebs have been swept away once more. Incidentally, I hope to make it possible to use A.C. or D.C. valves at will, and will pass on next week anything I have found out on the subject.

INCREASING YOUR SET'S POWER



How can I get more out of my set? This is the question that is answered in the following instructive article.

By A. JOHNSON-RANDALL.

THOSE of you who have a small set have often thought how much better it would be if you could get many of the stations at much greater strength. If you add a high-frequency valve you will increase the range and bring in more stations and also, of course, bring up the volume of those stations you already receive, but in doing this you will make the set more difficult to control, since you add to it another tuning dial.

In addition, you do not increase the receiver's handling capacity, because that is a function of the last stage, which will naturally remain the same. Therefore, although you make stations louder, you will probably get distortion on your local transmission due to overloading.

Adding an L.F. Stage.

The easiest way out of the difficulty, provided you do not want to bring in more stations, is to add a low-frequency valve which can conveniently be transformer coupled. To do this you can build up a separate amplifier unit, or if there is sufficient room on the baseboard, you can obtain a transformer, together with an extra valve holder, and modify your existing wiring accordingly.

The addition of an extra low-frequency valve is a more straightforward matter than that of an H.F. type. There is less likelihood of trouble, and the results from the loud-speaker point of view are usually more satisfactory. The reason why one so often hears of cases in which howling and so forth have been produced when the extra transformer-coupled stage has been added, is because the additional valve has been connected up in an haphazard manner without the knowledge that with the greater amplification then available there is also a bigger likelihood of something going wrong.

Inserting De-coupling Device.

If the set already includes a transformer stage, the second instrument should have a very low ratio, certainly not greater than 3 to 1. Moreover, it is just as well to incorporate a volume control of some sort such as a potentiometer connected across the secondary winding, because this will give a means of adjusting the power supplied to the last valve.

In order to make certain that motor-boating and other low-frequency troubles do not occur, it is advisable to insert an anti-motor-boating device in series with the detector valve. This can be carried out as follows. Break the lead which at present goes from H.T. positive to one side of the transformer primary in the first stage. Insert a wire-wound resistance of 20,000

ohms or thereabouts, taking one side of the resistance to H.T. positive, and the other side to the transformer primary. On the transformer primary side of the resistance, join a 2-mfd. or 4-mfd. condenser, taking the remaining terminal to L.T. —.

Present Valve Suitable.

You will thus have a means of bypassing, via the condenser, any stray L.F. which may act as a means of coupling through the H.T. supply, to the last valve. Remember that a 4-mfd. condenser is better than a 2-mfd., but you can always try the lower value first and connect another one of the same value in parallel to make 4 mfd.

It is possible that the existing valve, which was previously in the low-frequency socket, is of the power type. If so, this can still be used with advantage, but it is advisable to increase the grid bias on it in order to cut down the plate current passing through the

Now in the case of the last valve, you will need one of the super-power type, because if you want to handle really loud signals and get good distortionless reception, it is no use inserting a small power valve in this socket. A super-power valve will enable you to handle with 120 volts H.T. a grid swing of 16 to 18 volts, which is quite adequate for ordinary domestic purposes. Your volume control across the transformer secondary winding will permit you to obtain the necessary graduation in strength and there will be no excuse for the valve being overloaded.

How to Use a Pentode.

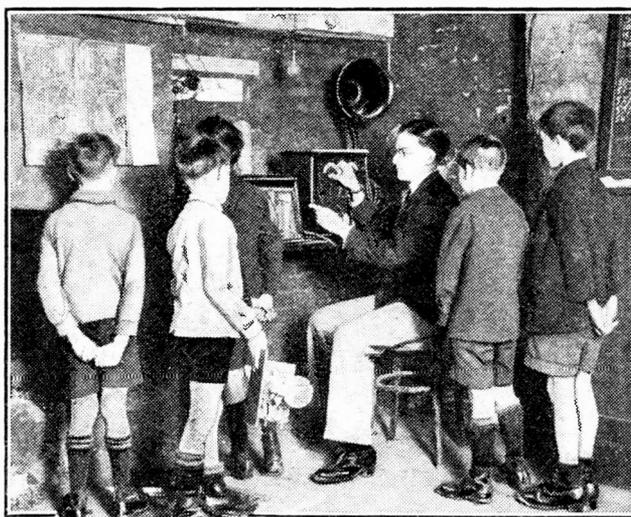
There is a further advantage, and that is that you will be able to cut down the amount of reaction you are using, because of the additional magnification due to the new L.F. stage, and in so doing you will if anything get better reproduction.

There is another method of getting much greater volume, and that is by using one of the new pentode valves. These valves, as most readers are aware, have five electrodes, but from the practical point of view all that one has to remember is that there is an additional terminal on the base of the valve which is connected to H.T. positive.

The only point which seems to prohibit the use of a pentode, somewhat, is the fact that a special output transformer should be used. There is nothing very terrible in this, because all that one has to do is to insert the primary winding of the transformer in series between H.T. positive and the anode of the pentode valve. The loud speaker is then connected across the secondary terminals.

With a pentode one can get much greater power without the necessity of using an extra low-frequency stage, but care must be taken to ensure an adequate H.T. supply. However, if the H.T. supply is sufficient to work a super-power valve, then it is quite good enough for a pentode. With a pentode it is desirable to have a volume control.

THOSE "CRYPTIC" CIRCUITS



A choir boys' radio class in progress after practice hours in connection with one of the well-known English churches.

second transformer's primary winding. By so doing, you will remove any possibility of saturation occurring and, moreover, the comparatively low magnification given by such a valve will reduce the possibility of L.F. troubles. It is never advisable to get too much magnification per stage, and although you may grudge this slight loss of volume, you should bear in mind that this is better than to have a very big volume with distortion. After all, the loss of volume will be quite small.

AS soon as we set to work to design this little receiver we discovered that we had taken on a peculiarly difficult job, which will probably strike you as strange when you have had a look at the photographs and noticed how extremely simple the instrument is. As a matter of fact, it was just in that very simplicity that the greater part of the difficulty was encountered, as you will see when we explain how it all began.

Extending the Range.

Well, it started when we decided that our readers would probably like to have a design for a companion receiver to use with the "A.P." Amplifier which we described in a recent issue.

The idea was that this amplifier would probably be constructed by many readers possessing a single-valve receiver and desiring to progress to loud-speaker reception, and that once they had discovered the pleasures of receiving foreign stations upon the loud speaker, they would probably desire to extend the range and power of their outfit still further.

Special Requirements.

The "A.P." Amplifier, in conjunction with any good single valve receiver, should bring in quite a number of foreign stations upon the loud speaker, but there is always the feeling that an efficient H.F. stage would bring them in still better, at greater volume and with improved quality; further, that

it would bring in still more foreigners which were out of reach with the single-valve arrangement.

Hence, we concluded that these constructors of the amplifier would be pretty sure, sooner or later, to wish they could employ with it a slightly more powerful receiving set; in other words, an instrument with a screened-grid H.F. stage and detector in place of their single-valve instrument.

So far, so good, but when we came to think out the requirements in a little receiver for this purpose we soon realised that they were distinctly unusual—and, in fact, that something quite out of the ordinary was required.

In the first place, then is the question of economy. Obviously, anybody who is making this change will be scrapping a single-valve receiver which has in the past no doubt given him good service, and he will wish to make the change as economically as possible. Evidently, then, a very strict eye must be kept upon the question of cost in making

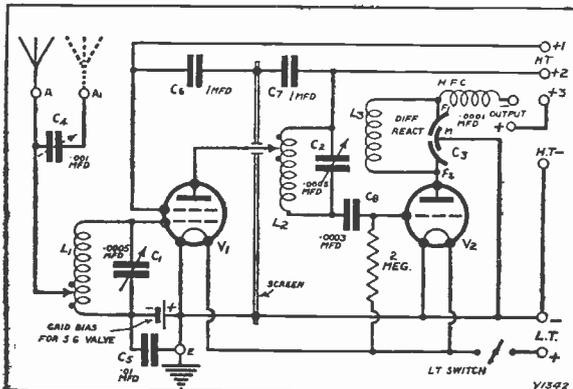
the "H.F. and Det." unit, and a still closer watch upon the types of components used.

These must obviously be, as far as possible, perfectly standard ones, so that almost all the parts in the existing single-valve receiver can be used over again in the H.F. and detector unit. Again, it is quite likely that an outfit of this sort will appeal to the man who likes to do a certain amount of experimental work, trying out different circuits, and so on.

It is a particularly convenient form of installation for such constructors, because to try out any new receiving circuit all that is required is to build up just the H.F. and detector portion of it and then to hitch this up to the existing amplifier and proceed to put it through its tests.

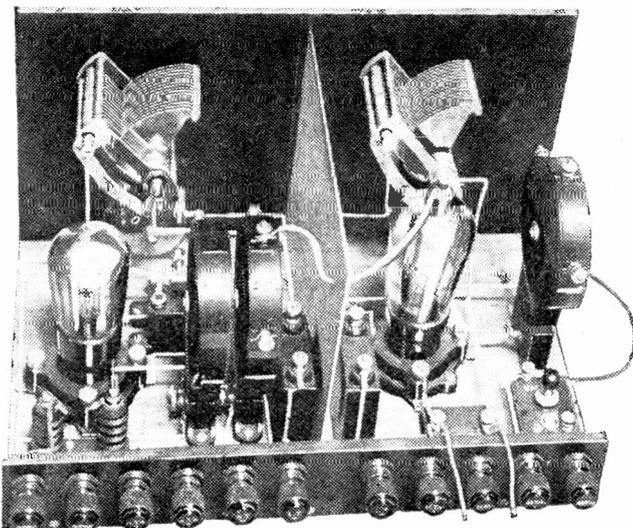
In the course of such work it is quite possible that some time in the future an arrangement will be tried out which seems to be more attractive than the existing receiver unit, which latter would presumably thereupon be

A SIMPLE CIRCUIT



The circuit is an extremely simple one, but it is remarkably effective, and is capable of being built by anybody. There are no awkward "snags," and as long as the constructor carefully follows the directions he will meet with no pitfalls. "X" coils are used, forming a very economical method of getting both selectivity and sensitivity.

HIGH DEGREE OF SELECTIVITY



This is a general view of the "A.P." Two, showing how the set is divided by the screen and how the various components are placed. Your set should look exactly like this when it is completed.

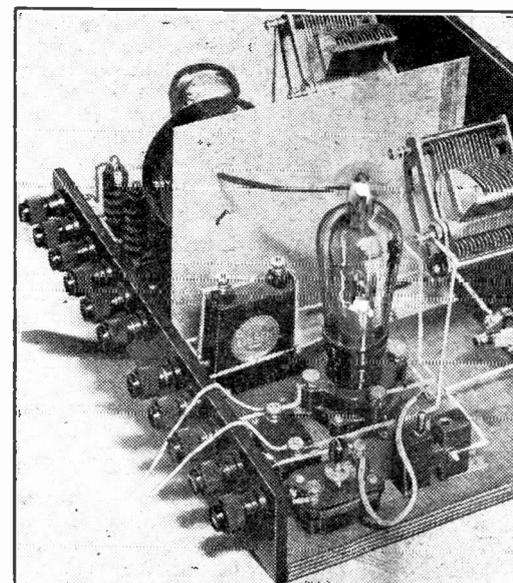


Here is a companion unit to the "A.P." Amplifier; described in "A.P." Two is a really efficient screened-grid and detector receiver stations with remarkable strength. Add it to the amplifier (if desired), and you have a powerful four-valver of first-class quality.

THE PARTS YOU WILL REQUIRE

- 1 Panel, 12 in. x 7 in., or 12 in. x 8 in. (Lissen, or Paxolin, Goltone, Trolite, etc.).
- 1 Cabinet with baseboard 7 in. deep to fit.
- 2 .0005-mfd. variable condensers (Ready Radio, or Lissen, J.B., Polar, Lotus, Ormond, etc.).
- 1 .0001-, .00013-, or .00015-mfd. differential reaction condenser (Lotus, or Ormond, Lissen, Polar, Dubilier, Ready Radio, Wearite, etc.).
- 1 L.T. switch (Ormond, or Lissen, Benjamin, Igranic, Lotus, Red Diamond, Bulgin, etc.).
- 1 .001-mfd. (max. compression type condenser (R.L., or Formo, Lewcos, Lissen; Polar, etc.).
- 3 Single coil holders (Wearite and Lissen or Red Diamond, Lotus, Igranic, etc.).
- 2 Valve holders (Igranic, or W.B., Benjamin, Lotus, Bulgin, Wearite, etc.).
- 1 .01-mfd. fixed condenser (T.C.C., or Dubilier, Lissen, Ediswan, Mullard, etc.).
- 2 1-mfd. fixed condensers (Lissen, or Dubilier, Mullard, T.C.C., etc.).
- 1 .0003-mfd. fixed condenser (T.C.C., or Ediswan, Lissen,

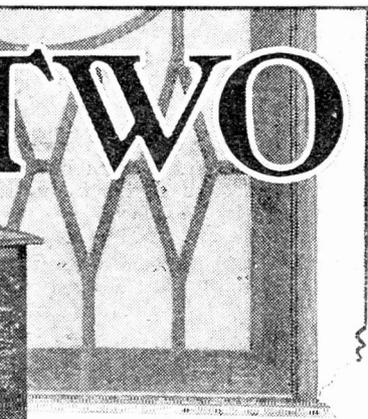
IDEAL FOR LONG-RANGE RECEPTION



The H.F. end of the set. The spacing of the components is a feature of the design and in your copy of the set you should see the arrangement given as closely as possible. The grid-bias legs of the valves are shown coming over the terminal strip.

Brings all
Europe
To Your
Home

EASY TO BUILD



Designed and Described

By

"P.W." RESEARCH DEPT.

in our issue for July 12th. The receiver, capable of bringing in distant stations in one cabinet as shown above if desired, and exceptional sensitivity.

E.

Ferranti, Mullard, Dubilier, Atlas, Igranic, etc.).

1 2-meg. grid leak and holder (Dubilier, or Lissen, Igranic, Ediswan, Mullard, Ferranti, etc.).

1 H.F. choke (Watmel, or Varley, Ready Radio, Lissen, R.I., Dubilier, Lewcos, Lotus, Wearite, Bulgin, etc.).

11 Terminals (Belling & Lee, or Eelex, Igranic, etc.).

1 standard "P.W." screen 7 in. x 6 in. (Magnum, or Paroussi, Wearite, Ready Radio, etc.).

1 Terminal strip, 12 in. x 2 in. Wire, flex, screws, etc.

CEPTION



Continental
Stations
Sound Like
Locals

is an important... could follow the... as for the S.G.

scrapped and a permanent version of the new arrangement built. To feel free to do so the constructor must not have tied up a great many components in his standard receiver, and, again, they should be of types likely to come in useful in the new unit.

Simple and Compact.

On top of all these limitations, it was taken for granted that the design should be of the highest possible efficiency, to be in keeping with the high standard set by the "A.P." amplifier. It must be of excellent selectivity, and be a real "distance-getter."

Taking it all round, you will see that to produce a design which would fill the bill was quite an undertaking, and indeed we actually spent a good deal more time upon it than we have upon many larger sets.

If you will now take a look over the various diagrams and photographs, we think you will agree that we have managed to turn out a set which does actually meet the case. You will observe that it is exceedingly simple, compact, and easy to make, while the circuit diagram will show you that it gives every promise of an excellent performance, a promise which we can assure you was amply fulfilled by its behaviour on test.

Few New Parts.

You will see, further, that every component is of a standard and universally useful nature. Moreover, you can work into it practically every part which came out of your single valve instrument.

In a modern single-valver, for example, you will almost certainly have a differential reaction condenser and certainly a .0005-mfd. tuning condenser, an on-off switch, a valve holder, a grid

condenser and leak, and an H.F. choke, quite probably also some single coil sockets. All of these can be incorporated in the receiver we are going to describe, and so only leave you a few extra parts to buy.

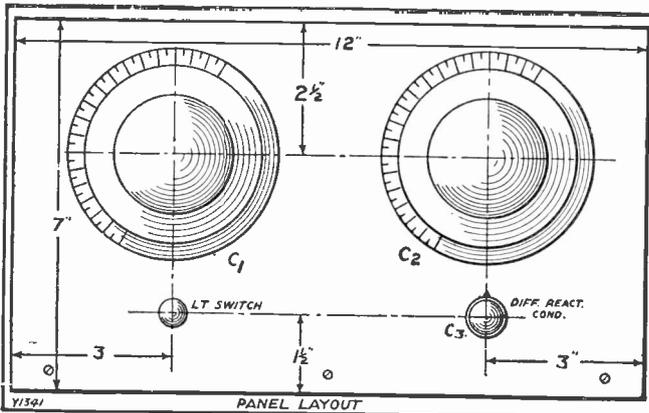
Now let us take a look over the set more in detail and see how all this has been managed. The most convenient point of reference here is the circuit diagram, and your first glance at this will show you that we were not far wrong in claiming exceptional simplicity for this little receiver.

First of all observe that standard plug-in "X" coils are used for the aerial and tuned

secondary circuits, and for the inter-valve coupling circuit. This latter is of the "tapped tuned anode" variety, and the use of an "X" coil here enables a very good compromise to be achieved between amplification on the one hand and selectivity on the other.

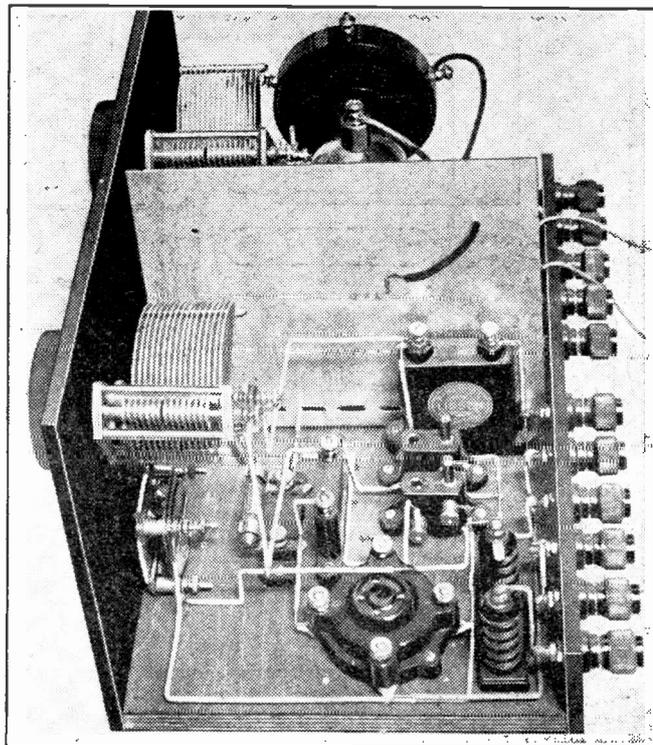
The aerial coupling and secondary tuning arrangements which form the grid circuit of the
(Continued on next page.)

SYMMETRICAL DESIGN



The panel layout is neat and symmetrical. On the left is the aerial tuning control and on the right the dial belonging to the tuned anode circuit. Below this dial is the reaction control, the remaining knob being that of the L.T. on-off switch.

SMOOTH REACTION—EFFICIENT DETECTION



Differential reaction enables the most efficient type of reaction control to be obtained, while the "X" coil used for the tuned anode provides a high degree of selectivity. Note the careful screening between the H.F. input and output circuits of the screened-grid valve.

EASY TO WORK

THE "A.P." TWO.

(Continued from previous page.)

screened-grid valve (V_1) will no doubt be found perfectly plain sailing. Due note should be paid to the fact that there are two alternative aerial terminals, one of these bringing in a series condenser of the semi-adjustable type in the aerial lead.

This enables you to obtain a higher range of selectivity adjustment than can be got

upon the "A" terminal, a further control of selectivity being given by the use of one or other of the tapping points upon the X coil. The general selectivity of the receiver is very good, and for most situations you will find it is quite enough to use the terminal A and try the flex lead on one or other of the tapping points on the coil.

Adjusting Selectivity.

Where conditions are exceedingly difficult, however, you can obtain a still higher range of selectivity adjustment by transferring the aerial to the terminal A_1 and trying various adjustments of the compression-type condenser C_3 . When this condenser

is in use, by the way, you will generally find it best always to work with the flex lead on that tapping upon the X coil which gives you the louder signal.

The usual grid-bias arrangement is provided for the screened-grid valve, the grid-bias cell itself being shunted by a .01-mfd. condenser to prevent it from having any undesirable effects upon the tuning if the cell should chance to be of high internal resistance as the result of long use.

A modest amount of screening is employed, consisting of just a simple vertical metal screen suitably placed so as to prevent any undesirable amount of interaction between the intervalve coupling

circuits and the grid circuit of the screened-grid valve. This, you will find, is quite sufficient to render the receiver completely stable, and it adds very little indeed to the work involved in making the receiver.

Reaction Control.

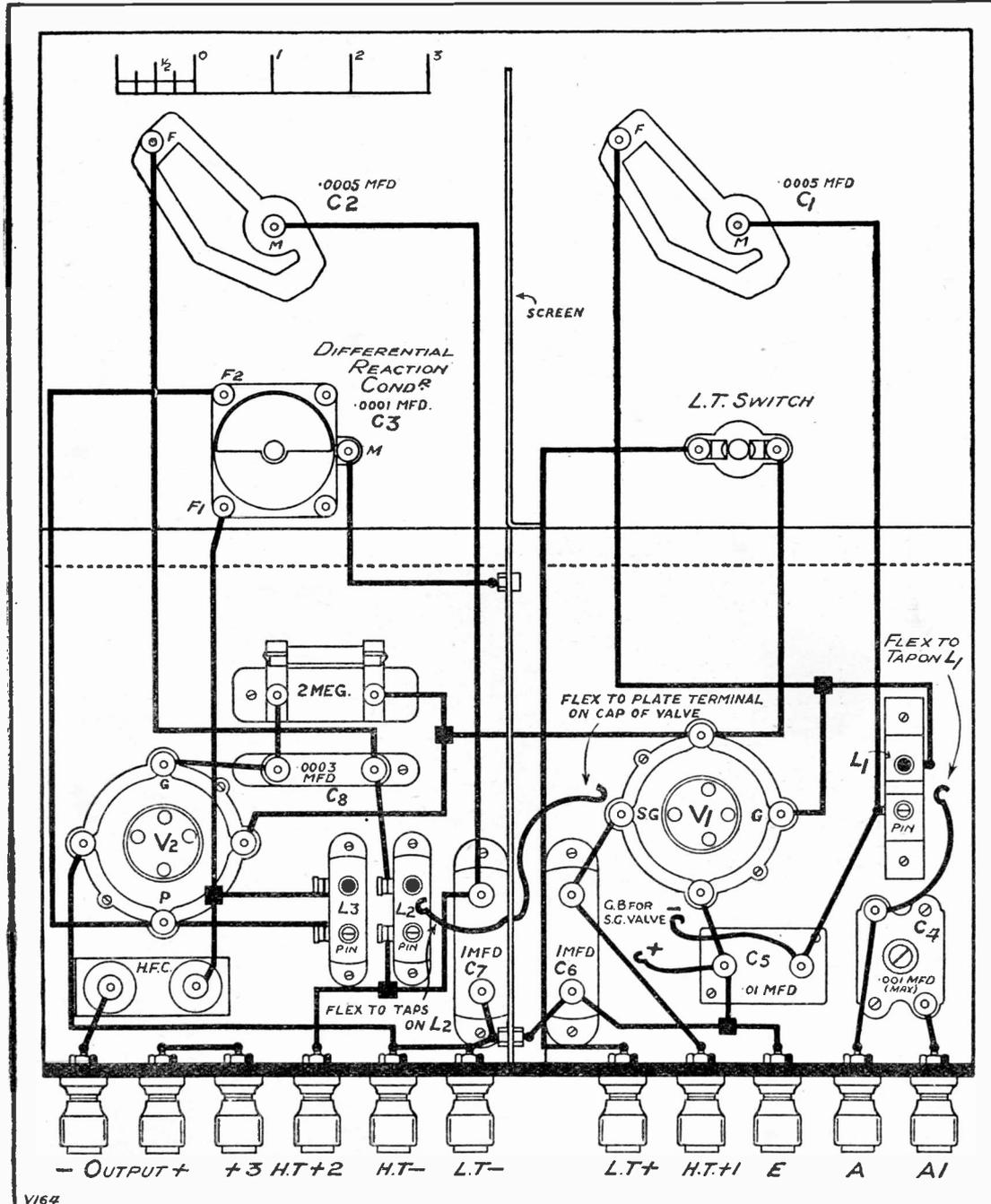
The "X" coil in the anode circuit of the screened-grid valve is so arranged that just a small proportion of the coil intended for coupling purposes is included actually in the anode circuit, so that a weakened-coupling effect is obtained in order to get good selectivity. The whole of the coil is tuned by means of the variable condenser C_2 , and the usual connection is taken off from the high-potential end of this circuit through a grid condenser to the grid of the detector valve.

Reaction is of the special throttle-control differential type developed for use in POPULAR WIRELESS sets, possessing the usual features of particularly smooth control, improved sensitivity, and absence of any effect upon the tuning of the circuit to which reaction is applied.

All the rest of the circuit is perfectly standard and straightforward, and we do not think it calls for any special explanation. Just note, however, that the two H.T. positive leads for the screened-grid valve are by-passed with 1-mfd. condensers in order to reduce the chances of any battery coupling effects with a high resistance H.T. battery.

Further details about this extremely interesting receiver will be published in our next issue.

SCALE WIRING DIAGRAM OF THE "A.P." TWO



This is a scale design of the layout and connections of the set. Note that the screened-grid valve holder has its "anode" socket and terminal marked "S.G." This is done to avoid confusion, as the screening-grid pin plugs into this socket, the anode of the valve being taken to the cap on the top of the bulb. The marking of the holder thus—a standard practice in our sets where S.G. valves are used—does not mean the purchase of a special type of holder.

CAPT. ECKERSLEY'S QUERY CORNER



PROS. AND CONS. OF CHOKE COUPLING—
THE DETECTOR'S BY-PASS—A SELEC-
TIVITY QUERY—THOSE "JAMMING"
SHIPS.

Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

Pros. and Cons. of Choke Coupling.

P. C. (Cardiff).—"I notice that choke-capacity L.F. amplification is very rarely used these days. I was listening to a set quite recently which had two stages of this form of coupling, and the quality was all that could be desired. Has choke coupling any disadvantages?"

It is true to say that choke coupling has advantages and disadvantages. The advantages of choke coupling are that one does not drop voltage on the anodes because the choke has small D.C. but large A.C. resistance (or impedance really). But the impedance of a choke varies with frequency, and may therefore give different effects at different frequencies, giving less magnification at low than at high frequencies.

If the chokes are made very high they have capacity effect, and spurious resonances may come in; furthermore, resonances are set up as between the inter-coupling condensers and the chokes.

However, it isn't all so bad as it sounds if it's worked out practically. Theoretically there are snags which the R.C. coupling gets over in practice.

Choke coupling is perfectly good if one isn't aiming at absolute theoretical perfection, and it is handled by someone who understands the quantitative implications.

The Detector's By-Pass.

R. W. T. (Hounslow).—"Having been advised to fit a fixed condenser of a value not exceeding .0003 mfd. across the plate and negative filament lead of my detector valve (which does not include reaction), I find that a marked increase in volume results. This, of course, appears to be an improvement, but it has since struck me that a definite loss of the higher frequencies also occurs. Is this so, and do you consider the increase in sensitivity outweighs the disadvantages mentioned? A differential reaction condenser would appear to give a similar effect when set at 'minimum.'"

Certainly the effect of the condenser might be to diminish the higher frequencies, but not very much in common types of circuit, but I think this is more likely to

occur owing to spurious reaction effects than simply *per se*.

The increased volume would not occur if the condenser were only by-passing high-frequency, unless that high-frequency was saturating your low-frequency system. Thus I suggest your increase of volume is due not to by-passing H.F., but rather to increased spurious reaction effects owing to changing the phase of the detector anode currents. Whatever it is it's purely for you to decide which arrangement you like best.

A Selectivity Query.

J. S. B. (Enfield Town).—"I have in use a simple form of rejector to eliminate one or

tivity in series with a non-selective device the result is determined as a balance between the two factors. If you have a device which helps the selectivity in series with a fairly selective device the result is better than without that device.

The tapped coil is moderately but possibly not wholly sufficiently selective for the purposes you require. The addition of the rejector adds just that extra selectivity required.

The plain coil arrangement is very unselective, and the addition of the rejector is not enough to make the whole arrangement sufficiently selective. Merely once more a question of magnitudes.

But I suggest if it's *only* the two Brookmans Park transmitters you want, a smaller aerial and a tapped coil will not want the addition of a rejector. Again a question of magnitudes.

Those "Jamming" Ships.

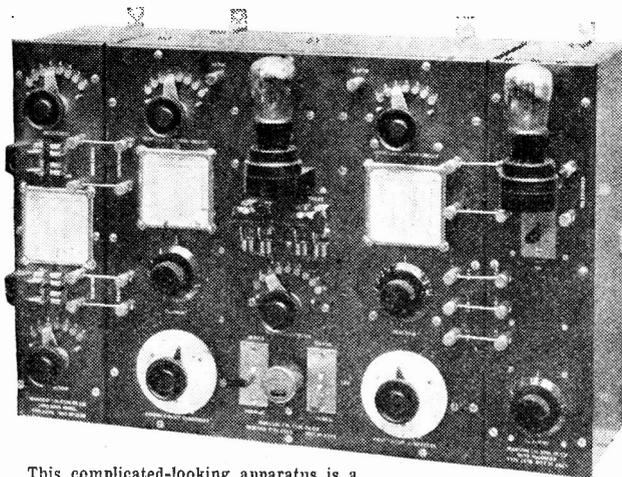
G. R. C. (Dover).—"I am getting serious interference on my three-valve (det. and 2 L.F.) set from Morse stations, which I assume to be ships working in the Channel. This interference frequently interrupts the broadcast programmes, and I shall be pleased to know if there is any method of cutting it out?"

I have no personal experience to guide me in answering this question. I think the jamming experienced at Dover is probably impossible to eliminate altogether, because spark transmissions overlap from the fundamental wave they are supposed to use into the waves assumedly reserved by international agreement for other services.

It's all a question of relative magnitude. I do not know the degree of magnitudes involved, but I very much doubt if you can do anything technical to your set to be rid of the nuisance.

But you can write to the B.B.C. and the Post Office and ask them why if you pay your licence you should be troubled in this way. I have been trying for years to get people to take a proper view of these problems, and to ask that ships shall be compelled to use apparatus which technically meets the needs of other users of the ether. Every little helps!

A SHIP'S RECEIVER



This complicated-looking apparatus is a Marconi marine receiver, which has a wavelength range of from 220 to 27,000 metres.

other of the Brookmans Park transmitters. With a plain aerial coil this device merely alters the tuning position of either station, but does not enable me to eliminate them.

"Using a tapped aerial coil under similar conditions permits reception of one station free from the other by using the rejector. Why should this happen?"

If you put a link capable of standing ten tons in series with your watch chain and subjected the whole device to a pull of five tons the whole device—watch chain plus strong link—would break. The weakest link determines the strength of the chain.

If you have a device which helps selec-

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



NEW PICTORIAL MAGAZINE.

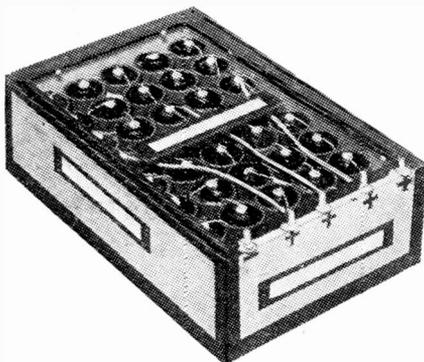
NUMBER 1 of Vol. 1 of "Radio" has made its appearance. "Radio" is a monthly pictorial magazine due to the Marconiphone people and its purpose is "to popularise radio in general and Marconiphone radio in particular."

The publication consists almost entirely of pictures and there is even a strip cartoon. It is excellently produced and should accomplish its objects quite easily. "Radio" is being distributed only through Marconiphone dealers and the price is 1d.

MAKE YOUR OWN BATTERIES.

Two great advantages attend the home assembly of H.T. batteries. One is that it saves money and the other that you get a clearer insight as to the quality of its innards. For some years the Leyton Battery Co., Ltd., of Church Road, Leyton, E.10, have specialised in the production of battery parts for home assembly and, from time to time, we have chronicled their progress in this interesting sphere.

Their latest scheme provides a reliable, robust and handsome H.T. battery that is



Here is the Leyton Battery Co.'s new product.

well within the capabilities of the average radio constructor to assemble. It is built into a glass-lidded box with the tapping sockets taken out at the one end, and it really does look an attractive proposition.

We have tested the cells that are made for this particular battery assembly, and find them of first-class quality. We would advise "P.W." readers to secure the leaflet regarding this interesting design.

MAGNUM RESISTANCES.

Quite a novelty in the way of radio components is due to Burne-Jones & Co.,

Ltd. This is the Magnum Spaghetti Resistance which in appearance is nothing more than an insulated flexible lead, having a ring terminal at each end.

It measures about 4 in. in length and can, of course, be wired in circuit just like a short connecting lead. Rather a

curious idea, that, but one that definitely does make for the saving of space and ease of construction.

The Magnum Spaghetti resistance is available in any one of some dozen values from 1,000 to 50,000 ohms. Up to 40,000 ohms the carrying capacity is 10 milliamperes, and that of the 50,000 ohm type, 5 millamps. The price is 1s. 6d.

USEFUL LISSEN DEVICE.

If your set should necessitate one or more of those little compression type condensers, or should you be building a wavetrap or "P.W." Brookmans Rejector, don't forget the claims of the Lissen Pre-set Condenser.

It is not an absolutely new component, and I have the uncomfortable feeling that I received one for test quite a long time ago. However, I hasten to repair the omission of its review in these pages.

The little variable is of distinctive design, as you can see by the photo, and it is so arranged that it can be mounted either vertically or horizontally.

The moulding of the case is first-class and the adjustment smooth and easily set.

Altogether one has no hesitation in saying it is well up to the highest standard that can be set for such a device.

AN "ATLAS" BATTERY ELIMINATOR.

H. Clarke & Co. M/C., Ltd., of Manchester, are producing some fine mains units these days. Indeed, they are well in the front rank in this respect. We have had two or three pass through our technical department during the past few weeks, and I was particularly attracted by the A.C.16.

This is an A.C. mains unit of unusually attractive design having one variable tapping, and two fixed, giving up to 150 volts. Full-wave rectification is employed and

the maximum output in milliamperes is 25.

This particular model, the A.C.16, was tested in conjunction with several different sets, and in every case it gave complete satisfaction. The smoothing is good, rather better than in the average commercial mains unit, and I found the outputs identical with the specification.

The variable tapping gives a smoothly-controllable range with none of that jerkiness or noisiness that is so disconcertingly

When you are Buying—

26.—SCREENS.

Screening partitions and screening boxes are used in many modern receiver designs.

Aluminium is mostly used for those screens figuring in H.F. circuits, but for the screening of mains transformers, H.T. units etc., a stout gauge of iron sheeting is desirable.

In the case of aluminium screens for H.F. stages, see that any holes cut for valves are of correct sizes. The valves should fit closely.

Some A.C. valves demand larger holes. Also watch the insulation of leads passing through and ensure that connecting screws are provided, as aluminium is a difficult material to solder.

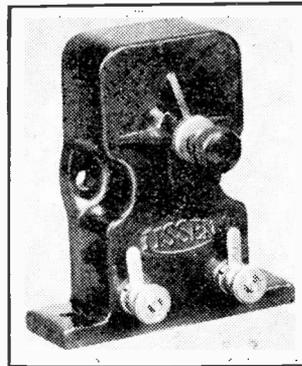
Adhere very closely to the recommended specification, as if the screen is of different dimensions it might fail in its purpose.

If a complete box with lid is advised don't attempt to improvise with less effective screening.

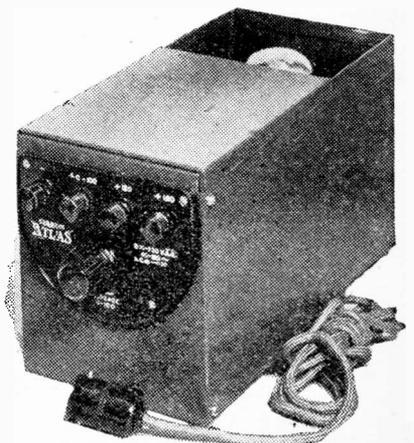
prominent in some units. Also, there is an unusually good separation between the tappings and, altogether, it is obvious that the design and construction are quite sound throughout.

AN "EKCO" MAINS UNIT.

I made a slight slip last week in reference to that "Ekco" A.C. Mains Unit that provides you with both an H.T. and an L.T. charging current. I referred to it as the "Ekco" (CT1 A.C.), whereas it really is the CPI A.C.. I hope I have not caused any confusion anywhere by this little error.



The Lissen Compression Type Variable Condenser.



The "Atlas" A.C. Mains Unit.

EVERYTHING *The* **G. & C.** ELECTRICAL
your guarantee

Osram Valves

Sold by all
Wireless Dealers

MADE ENTIRELY IN ENGLAND. REDUCED PRICES

The following types of OSRAM VALVES are REDUCED IN PRICE as shown, the reductions becoming operative immediately.

TYPES		OLD PRICES	NEW PRICES	TYPES		OLD PRICES	NEW PRICES
Osram	H.L. 210	10/6	8/6	Osram	P. 2	15/-	13/6
"	H. 210			"	P. 240		
"	L. 210			"	P. 425		
"	H.L. 410			"	P. 625		
"	H. 410			"	P. 625A		
"	L. 410			Osram	S. 215	22/6	20/-
"	H.L. 610			"	S. 410		
"	H. 610			"	S. 610		
"	L. 610	Osram	P.T. 240	25/-	22/6		
Osram	P. 215	"	P.T. 425				
"	P. 410	"	P.X. 4				
"	P. 610	12/6	10/6	"	P.T. 625	30/-	27/6

Prices apply only in Great Britain and Northern Ireland



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

QUESTIONS AND ANSWERS.

ADJUSTING THE POTENTIOMETER.

L.B.F. (Birmingham).—"So for the time being I am going to hook up my single-valver and reach out with that. The idea was to put a potentiometer in the grid return circuit, the ends being wired across the filament and the slider going to the non-grid end of the grid leak."

"It certainly seems to make a difference, though I am not sure how it should be adjusted

CAN WE HELP YOU WITH YOUR SET?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

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, Farrington Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you free and 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.

for maximum strength and distance getting. What is the best way?"

At first you should put the potentiometer slider about half-way round and ignore it until the other circuit conditions are satisfactorily adjusted. Get your coil-coupling right, adjust your H.T., etc., and when the set seems absolutely O.K. see to the final touches to the potentiometer as follows:

Usually the detector valve requires comparatively low H.T. voltage, perhaps 35 or 40 or 50, and its filament should be turned nearly but not quite full on. Now set the tuning condenser somewhere near the middle of its scale and move the potentiometer slider round to the positive end of its travel.

If you now test the reaction condenser you will probably find it rather plumpy, so gently move this slider round slowly towards the negative end, adjusting the reaction control as you do this,

You will find that it gets smoother and smoother as the slider is advanced further towards the negative, but the disadvantage of proceeding in this way is that the signal will probably be weakened slightly the further negative you go.

The detector anode voltage and its filament current should be readjusted with the object of finding a setting which will enable you to turn the potentiometer slider round as far as possible towards the positive end without spoiling the smooth reaction which is so essential for successful working. The farther you are able to get the slider towards the positive the more sensitive the set will be.

Remember that you should not be tempted to carry it round too far, however, and thus make reaction go in and out with something like a "plon," for it is quite hopeless to attempt to tune in long-distance stations unless the set comes up towards and goes smoothly through the oscillation point.

Remember also that the degree of coupling on the aerial will also affect reaction, and on no account forget that both filament voltage and H.T. voltage on the detector are of vital importance for getting maximum results.

FITTING A FUSE.

J. H. V. Z. (Cape Town).—"Your 'Magic Four De Luxe' circuit is all that is claimed for it, and gives splendid results at the Cape of Good Hope. In trying to safeguard my Mullard 4-volt valves I put a safety fuse in the connection between the negative H.T. and negative L.T., but I find that the tiny globe glows with the L.T. current switched on but the set will not work. Can you tell me what is wrong, and what position should the fuse be in circuit, in order to give the desired results?"

It is evident from your description that the fuse is at present in the L.T. circuit, and this, of course, is "all wrong."

Apparently you have broken the wire from the L.T.—terminal on its way to the valves. This wire should be restored as before, and the fuse holder inserted instead in that section of the lead which goes from the L.T. wiring to the H.T. battery (H.T. negative) only. If you employ a common terminal for L.T.—and H.T.—you must break the flexible lead which comes from the negative of the H.T. battery, the idea being that this fuse holder should be inserted in the lead which comes direct from the negative of the H.T. battery before it joins any other part of the set.

When the bulb is placed in the holder after the alteration has been carried out you will find that switching on the L.T. current does not cause the bulb to glow. In fact, it should not glow under any circumstances unless something is wrong in the wiring, or in the conditions under which the fuse is being operated (such as a faulty by-pass condenser causing a short or connections touching wrongly somewhere or some similar fault in the circuit).

The operation of the set will, in fact, be exactly the same as before, and the fuse will act just as a piece of connecting wire, the only difference being that in the event of excessive current being carried through some fault in the circuit, the fuse will glow brilliantly for a moment and then burn out, thus giving notice of the fault and breaking the circuit for you until the trouble is put right.

In this way, insertion of the fuse ensures safeguarding of the battery.

CONDENSER CAPACITIES.

F. C. I. (Dollis Hill, N.W.10).—"How can one tell the strength of different variable condensers, i.e., variable .0003, .0005, .00035, when the condensers are not marked? Also, what are the grades in common use?"

"Also block condensers, some makers mark the capacity on them, some do not and some only mark the boxes. But when they are loose with no boxes, how can one tell?"

We presume that by the "strength" of condensers you mean the capacity. This can be calculated (in the case of variable condensers) from the active area of the surface, and the spacing between fixed and moving plates.

This calculation is rather a troublesome one and hardly worth giving, for no one attempts to work it out these days. Any dealer can usually tell you at a glance what the capacity of a variable condenser is or failing this someone experienced will do so without the necessity for calculation.

The capacities in common use are as follows: For tuning, practically all variable condensers are .0005. This value in conjunction with ordinary coils happens to be a convenient one, spacing the stations nicely apart when tuning, and allowing the wave-length band to be covered with the average coil.

For short-wave work, and certain special circuits, smaller condensers are advisable, and in this connection there are .00035, .0003, and .00025 on the market, and also a limited number of smaller condensers, such as .0002, .0001, etc., though these are not commonly used. Sometimes you can settle the question of the capacities of your condensers by how many plates they have, or alternatively the capacity can be tested out on tuning.

To do this, join one side of the condenser to one side of your tuning condenser in the set, and join a flexible lead to the other side of the condenser under test, using for this a crocodile clip, or similar method of easily cutting it in or out of circuit as required.

Now tune your set condenser when one side of your test condenser is disconnected, so that it is out of circuit, and notice the dial readings for various stations. If your tuning condenser is a .0005 mfd. you may find that at, say, 25 degrees the National comes in, at 50 degrees the Regional and 75 degrees the Daventry 5 G B. Now join the other condenser across it, turn the tuning condenser all out so that it is not effecting any tuning at all, and then tune in on the condenser under test.

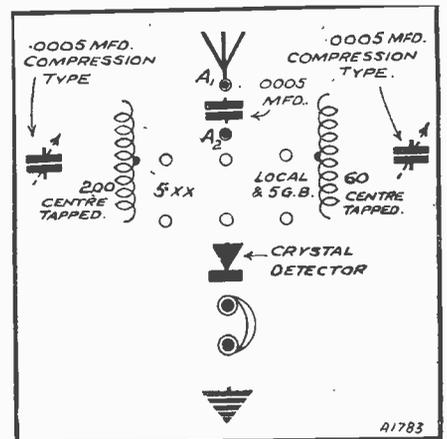
If it is the same size as the tuning condenser, the readings will be approximately the same, namely 25, 50, and 75. If, however, it brings in the National at 50 degrees and the London Regional at 100 degrees it is obviously only about half the capacity of the original condenser, namely .00025 mfd.

By comparison in this way you can easily arrive at the capacity, remembering that those values quoted above are the only ones likely to be in common use.

The same applies to fixed condensers, though in this case, it may be necessary to vary the tuning condenser slightly to bring in a test station. This is in order to ascertain whereabouts the fixed condenser is "tuning," as it is unlikely that a fixed capacity will exactly bring up the set to the required value to show you whereabouts you are on the tuning scale.

(Continued on page 600.)

POPULAR "WIRELETS" No. 16



Here are the "parts" for a crystal set with easy change-over from 5XX to the local station, and vice versa. Either a D.P.D.T. switch or flex can be used for switching, and once the condensers have been set they can be left and either programme received at will without re-tuning.

Can you "WIRE UP" this set?
(Look out for the answering diagram next week.)

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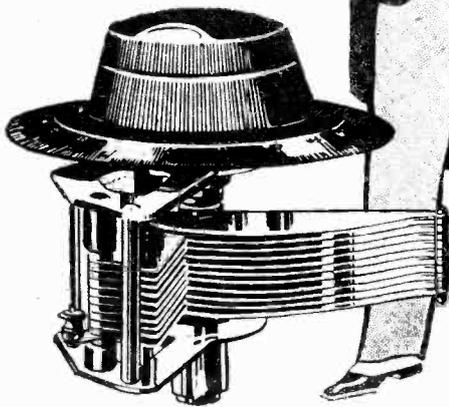
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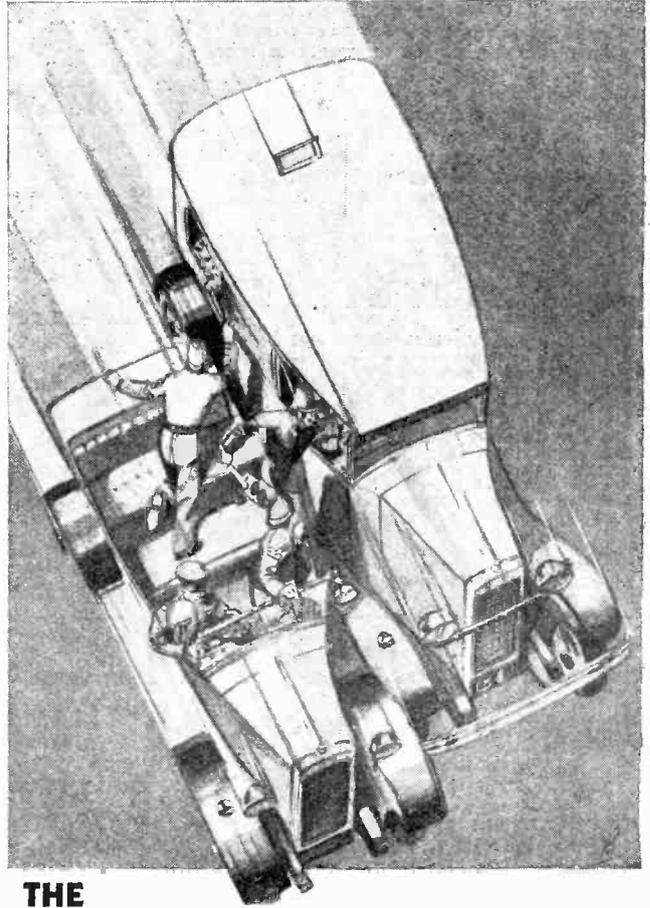
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RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 598.)

USING THE WAVE-TRAP COIL.

F. S. (Ponders End, Middlesex).—"I am enclosing a sketch of my circuit, which shows that the set is good for long-distance but has been modified in order to put the lid on Brookmans.

"As a matter of fact, I hardly listen to the local station at all, but am only too glad of a good wave-trap which cuts it out completely. However, all tastes are not alike, and my mother is rather anxious to listen-in during the daytime, and she, of course, wants to hear L.O.

"As she likes to listen on 'phones, I was thinking of making an alteration to the set to enable her to do this, but I do not want to spend more money than is necessary. So could I use a wave-trap coil for the purpose by means of a switch or something to control it to save fiddling about with tuning?

"If this cannot be done easily, I may decide not to bother at all, as although she would like it, I do not want to go to any expense about it, nor to alter the set much just in order to get the local station?"

It is the simplest thing in the world to get the local station, and all you need for the purpose is a crystal detector and a pair of telephone terminals. You need not alter the tuning of the set, nor affect it in any way, but simply make the following small modification.

Join one end of the crystal detector to one end of the wave-trap coil, the other side of the crystal detector should be taken to one of the new telephone terminals. The other new telephone terminal should be joined to the remaining side of the wave-trap coil.

This is all the alteration that is necessary to make the set ready for local reception. You will find that when no 'phones are connected up to the two new telephone terminals the circuit is unaltered and remains exactly as it was before.

All tuning, etc., will be unaffected, so that the set can be tuned, switched on and off, and left as it was

without any attention being paid to local listening. When your mother wants to hear what the local station is doing, all she has to do is to put a pair of telephones into the two new terminals.

Then, whether the set is switched on or not she will hear the local programme. When she has finished she merely takes out the 'phone tags and the set is then again as before for long-distance reception.

WHAT DO YOU THINK ABOUT THIS?

It is a fault that doesn't very often occur and yet not long ago several "P.W." readers reported identical cases of it on the same day. These were the symptoms:

An H.F. unit employing an S.G. valve was built up from a theoretical diagram. The wiring, etc., was carefully done, but when the unit was connected up it cut off the signals instead of amplifying the weak ones.

Evidently something was radically wrong, but tests of batteries, etc., seemed to indicate that it wasn't an ordinary fault like a break in the circuit.

Can you guess

WHAT WAS WRONG?

N.B.—There is no prize for answering this, but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to the above next week.)

The trouble which was described last week—poor strength, hand capacity, etc.—was found to be due to a defective earth lead. It had broken through just below the surface of the ground, and when a new wire was fitted the set was restored to full results again.

WIRING IN WORDS.

C. L. (Coventry).—"The wiring in words says, 'Join L.T. neg. to H.T. neg., to earth terminal, to one side of the coil holder, to one side of the V. condenser and to one filament terminal on the valve holder.' Does that mean all separate wires?"

No. When two points are joined together by a connecting wire they become, in effect, one. So in carrying out the above, if you first join L.T. neg. to H.T. neg., and the "earth" terminal, connection can be made to L.T. neg., or to H.T. neg., or to the wire joining these.

The next step is to carry on to the coil holder, so this join would be as short and direct as possible, and would go from the coil holder to the nearest available point. That might be L.T. neg. itself, H.T. neg. itself, earth terminal itself, or any point on the wire joining these together. And so on.

'PHONES IN PARALLEL.

E. N. (Hamilton, N.B.).—"Recently you told R.A., Sheffield, how to join 'phones in series.' But you did not explain 'in parallel.' How are 'phones connected in parallel? (Please give the same kind of easy-to-understand description, as I know next to nothing about wireless.)"

Suppose you have the set in front of you, with its telephone terminals ready for the 'phones. And you have two pairs of 'phones, which we will call "pair A" and "pair B" respectively.

To join them in parallel, connect one 'phone tag of "pair A" to one of the set's telephone terminals, and join the other "pair A" tag to the other telephone terminal. (That is to say, join up the "pair A" 'phones as usual.)

Now take the "pair B" 'phones and insert them in exactly the same way, viz., one tag to one terminal, and the other tag to the other. The two pairs of 'phones are then joined "in parallel."

N.B.—If it is a valve set to which the 'phones are to be connected, make sure that they are joined up the right way round. Each 'phone lead has one "plus" and one "minus" lead, and the set's telephone terminals are (or should be) marked + and - also.

The "positive" tags should go to the terminal marked +, and the "negative" tags to the terminal marked -.

Sometimes the positive tag is not marked +, but is coloured red, whilst the negative is coloured black (or blue) to distinguish it.

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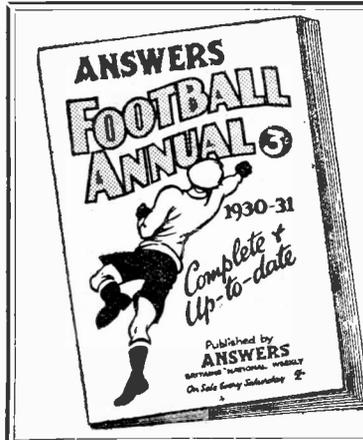
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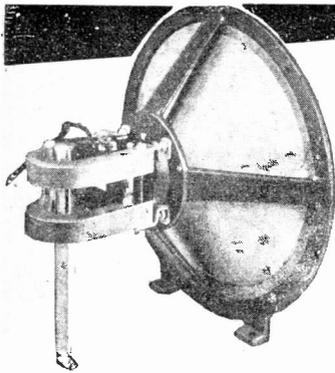
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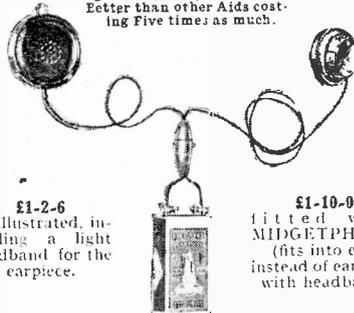


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FOR THE LISTENER.

(Continued from page 585.)

Explain, Please.

I wish you would explain it to me. I have been explaining things to you for months now, and you haven't yet explained a single thing to me!

You didn't even explain how I might spot the winner in the Derby! But surely some of you can explain this. Make it your "one good deed," like a Boy Scout, for your August holiday. And your petitioner will ever pray . . .

Selection.

For I imagine that it would be easier to select among the long-wave stations than among these millions of short-wave ones. And here is another I want explaining.

The other night I wished to hear "Antony and Cleopatra" from London. Frankfurt (390) was in the offing, and Toulouse (385) was as usual taking as much as it could of the air; but I got London and held it quite nicely. All went well for about a quarter of an hour, when, suddenly, out of the blue, a military brass band from somewhere blotted London and everything else off the map!

It came in with an absolute blast, and in a couple of minutes went out again, leaving London and "Antony and Cleopatra" as before. I hadn't touched the dial.

The same thing happened once again in the course of an hour. I gathered from the programmes that it didn't come either from Frankfurt or Toulouse. Then where did that blasting brass band come from? And why did it come and go like that? Like a naughty boy peeping round a corner, pulling bacon at you, and popping back again.

"Antony and Cleopatra."

I was surprised, though I ought not to have been, that this play made such a good broadcast. Indeed, as I listened to it, it almost seemed as if Shakespeare might have written it for the wireless.

Those swift, short scenes, with a kind of cinematograph effect, made admirable radio stuff. The two players taking the parts of Antony and Cleopatra were very good in diction and in dramatic effect.

If other Shakespearean plays can be made as effective as this was, it is likely that the great William will become more popular on the air than in the West End. Mr. James Agate will be consoled.

Ethereal Pockets.

Are there such things. More explanation wanted. Sometimes, when I am listening to the "British Isles," and for no apparent reason, the broadcast ceases suddenly for a minute or so, then picks itself up again. As if the wave had suddenly dropped like an aeroplane in an air-pocket. Why is this?

Rome and Milan.

Naturally, I have no difficulty with the Italian stations, except that of cutting them out on occasions. I have a bad ear for language, and though I know a lot of Italian words I do not always recognise them when spoken.

So I stick mostly to music. It is very good. I have heard three operas this week—"Eva" (Lehar), "Lucia di Lammermoor" (Donizetti), and "Rosmunda" (Trentinaglia).

TECHNICAL NOTES.

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

Testing Speakers and Pick-ups.

We were talking the other day about the reproduction of bass notes by different types of loud-speaker unit, and I am obliged to a reader for a useful hint which I might have thought of at the time. It is simply this: that the low-frequency response of a loud-speaker unit can be very simply tested by means of the "frequency records" which are now obtainable for use on an ordinary gramophone.

By using these standard-frequency records with a good electrical pick-up, it is a very simple matter to test your loud speaker for different frequencies.

Frequency Records.

If the bass notes, say, down to 200 or 150 cycles come out well, you may be sure that both the loud speaker and the pick-up are operating effectively in the lower register; but, incidentally, if these lower frequencies do *not* come out well, it is not necessarily the fault of the loud speaker, but may be wholly or partly due to the electrical pick-up. In such a case, before blaming the loud speaker, it is a good plan to try a different pick-up in the same conditions.

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Alternatively, before blaming the pick-up, you might try the same pick-up with a different loud speaker. By a few simple experiments of this kind you can rapidly obtain quite a lot of valuable information with regard to the characteristics of your different pick-ups and loud-speaker components.

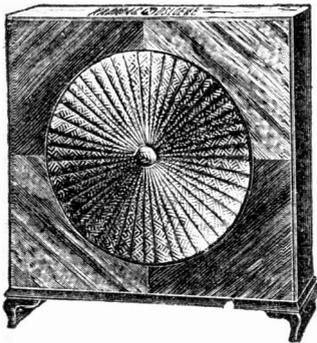
Wave-Traps.

The use of wave-traps has, of course, very greatly increased since the opening of Brookmans Park transmitters, but although wave-traps are comparatively simple devices, both in construction and use, I often hear from readers who do not seem to be finding them very successful.

There are certainly some cases in which even the best of wave-traps will not altogether "do the trick," but these cases are rather exceptional, and usually, if a wave-trap does not fulfil its purpose, the fault lies either with the construction or design of the wave-trap or with the way in which it is operated.

Design and Construction.

So many designs of wave-traps have now been published for the benefit of amateur
(Continued on next page.)



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TECHNICAL NOTES.

(Continued from previous page.)

constructors, especially since Brookmans Park came on the air, that I do not think I need go into the general question of the actual making of the trap.

It may be better to say a few words about the way in which it is used. When you are at a fair distance from the station which is to be cut out, you will generally find that the particular tapping which you use (in a tapped wave-trap, of course), will not make a very great difference to the result, but if the undesired station is comparatively near, the question of the exact tapping becomes much more important.

I therefore strongly recommend that if your wave-trap does not seem to be satisfactory, you should experiment with the different tappings until you find the one which gives the best results.

This should not take very long, and a short time spent in experimenting in this way may mean a great difference to the satisfaction which you obtain from the addition of the wave-trap to your receiver.

As you know, wave-traps are classified broadly into the "acceptor" and "rejector" types, and although there are advantages and disadvantages in both cases, there is no doubt that in some cases the one type will give better results than the other.

Adjusting the Trap.

The tuning in a wave-trap, that is the resonance, is often very sharp, and the efficiency of the trap may depend enormously upon very precise adjustments in the region of the resonance point. Therefore, as I have already said, it pays to get this adjustment as accurate as possible.

I often hear people say that they have tried a wave-trap with their set, but they "do not seem to find that it makes much difference."

With comparatively rare exceptions, wave-traps should certainly make some difference, and in many cases a very great deal of difference, and in the majority of cases where the trap does not seem to be worth while, the trouble lies in its adjustment and operation.

Anyway, the "P.W." Brookmans Rejector is a simple device to operate and definitely does work very efficiently.

Electric Change-Over.

An interesting question has lately arisen in connection with the use of radio appliances connected to the electric mains. In certain parts of the country, the electricity-supply undertakings have changed the voltage and nature of supply, and this, of course, has upset the arrangements of a considerable portion of the radio listeners in the district.

The question now at issue is whether those whose receivers or other radio apparatus have been rendered virtually useless have any claim for compensation from the electric-supply people.

I understand that this question is either to be settled between the representatives of the radio industry and the electric-supply undertakings in questions, or may, in fact, possibly be put to a test case in the courts.

An Important Question.

In certain districts where a change in the nature of the electric supply has been made, (Continued on next page.)

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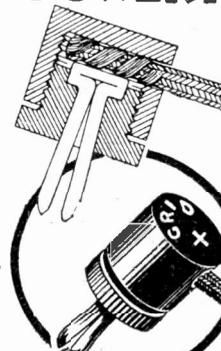
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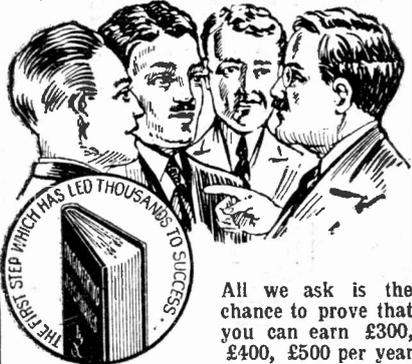
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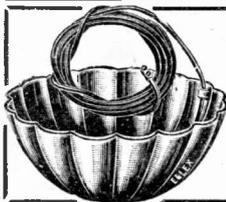
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TECHNICAL NOTES

(Continued from previous page.)

the local municipality has undertaken to readjust matters for listeners free of cost, that is, either to supply them with additional components, or in some other way to put them in the same position as they were before the change-over was made.

This is, of course, a very important matter where any change is made in the electric supply, as the radio listener may have gone to a good deal of expense in providing himself with elaborate apparatus working from the electric mains.

Summer Reception.

I have had a number of letters from readers in the Provinces pointing out that lately they have not been getting as good reception as usual from the London National and Regional Stations. In some cases they are puzzled also by the fact that long-distance reception nevertheless comes in more or less as usual, and want to know why this should be.

It is more or less to be expected during the summer months that reception of the London National and Regional Stations should be subject to fading, particularly for listeners situated in the Provinces a fair distance away from London.

Erratic Reception.

Another type of query which I receive from time to time relates to erratic results with the earth connection. I mentioned another aspect of this matter some little time back.

Experimenters often find that they get better results when the earth lead is disconnected than when it is connected, and as this is apparently so contrary to the instructions in the book, it is naturally rather puzzling.

Of course, it goes without saying that if you get better results with the earth lead disconnected than with it connected (in a circuit which is intended to work with an earth connection), there must be something wrong with the circuit.

Trouble often arises owing to the earth connection not being a satisfactory one (connected to a cold-water pipe or a good earth plate), but even this will not account for the results being better when the earth is disconnected. It would simply mean that the signals obtained were not as good as they should be.

No Reaction.

I have generally found when the disconnecting of the earth leads gives better results that this is due to the fact that with the earth lead connected it is impossible to take proper advantage of reaction. The trouble may be cured sometimes by increasing the number of turns on the reaction coil, or alternatively, by introducing a fixed condenser in series with the aerial lead. The value of this condenser may be between .0001 and .0002 mfd.

If your earth connection is a satisfactory one, I think you will generally find that one or other of these dodges will make all the difference. When the right conditions are obtained there should be a pronounced improvement in the signals obtained when the earth lead is connected.

Moving the Set.

Whilst on this question, I may perhaps mention another query which I have received once or twice, relating to the difference in the operation of the set in different places; a set will, for instance, work quite satisfactorily in one house, whilst, when removed to another house, and connected to another aerial and earth, it will work only poorly.

Here it is clear that the difference must be due to the different aerial and earth system. Leaving out the question of aerial capacity which, if it makes any serious difference, can in any case be allowed for, it is most probable that the trouble is due to an inefficient aerial or earth, possibly both. I need not say anything more about the earth connection, and as regards the aerial it is possible that this may be of poor design, but still more likely that the trouble lies with the insulation.

Tracing Faults.

I am often asked for simple directions for testing over a set to find out whether it is all O.K. It is fairly easy to give a few general directions; these are already known to the experienced radio experimenter, although not perhaps to the newcomer.

But a great deal naturally depends upon the type of receiver, and special or complicated circuits require special directions relating to their particular features.

The following, however, are a few simple rules which may often help you to discover the more usual causes of trouble.

Examine the Valves.

When the valves are all inserted in their sockets, naturally the first thing to do is to switch-on and make sure that all the valves light up. Then try tuning the set, and if you do not seem to receive any signals, it may be that something is wrong with the other connections (other than the filament connections) of one of the valves.

This can be discovered by gently tapping each valve in turn with the finger-nail, when a ringing microphonic noise should be heard from the loud speaker.

The H.F. Stages.

In the case of a set having one or more high-frequency stages, it is possible that there may be some fault in one of these stages. To eliminate the H.F. stages you may connect the aerial lead-in to the grid of the detector valve instead of to the aerial terminal of the set; it should be connected, however, through a small fixed condenser.

If on doing this you find that you get signals, however weak, whereas you did not get them when the aerial lead-in was connected to the aerial terminal, it suggests that the detector valve and subsequent valves are working O.K., but something is wrong with one of the H.F. stages.

Try the Output.

On the other hand there may be something wrong with the final or output valve, and to test this you may disconnect the loud speaker from the plate circuit of the output valve and then connect it across the primary of the transformer of one of the low-frequency amplifying valves (or the anode resistance in the case of R.C. coupling). If this brings in the signals when they were absent before, it seems to show that the last valve is the cause of the trouble.

POWER FOR YOUR SET!

That is the title of a special illustrated section in the AUGUST number of

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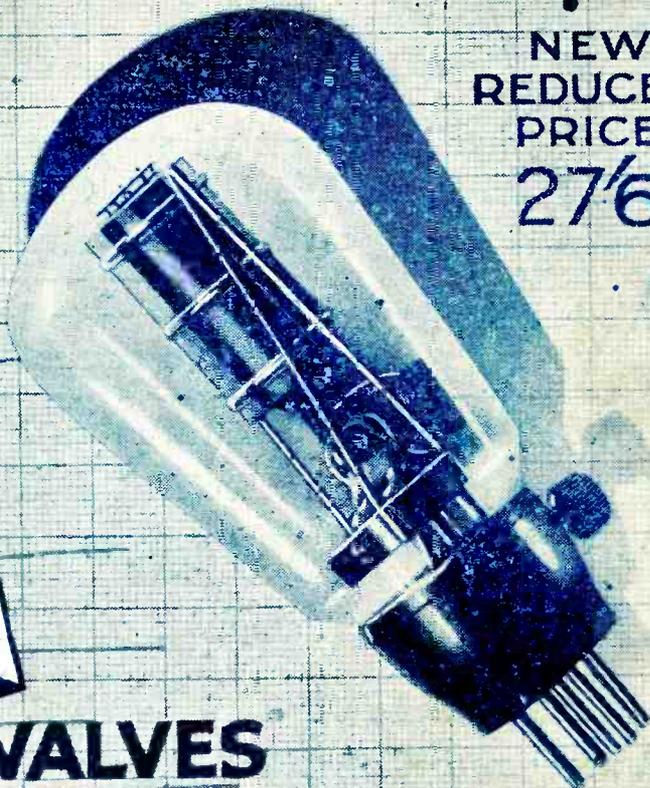
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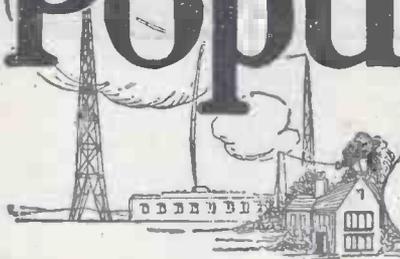
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NO ESCAPE—
 THE "SCOT'S" TWO—
 TOURISTS' TAXES—
 HEEL OF ACHILLES—

RADIO NOTES & NEWS

NEW FRENCH STATION—
 TOPPING UP—
 PLUGGING-IN AND ON—
 MORE THEORY—

Portable Aboard.

TWO adventurous friends of mine went to the Broads for a few weeks' residence on a motor-boat. They issue a note about the portable receiver used as a marine appliance.

Don't take it unless you are prepared to employ a master stevedore constantly to "trim ship." Shift it two inches from metacentre and all the crockery in the cuddy can be heard avalanching! Move the suitcases to get at the petrol, and the craft takes a list to Norwich or Yarmouth. Before one of you goes ashore for "gaspers" or milk, everything must be re-balanced.

The whole thing depends, however, on the relative proportions of boat and receiver. I am writing of a boat which in a good light can be seen to be the larger.

No Escape.

A PROFESSOR at Cornell University, U.S.A., has demonstrated an apparatus which, he says, will enable the deaf to hear with their teeth. He appears to have directed his inventive genius in this direction so that not even the afflicted may escape radio and the talkies.

Nay, he goes further, and claims, doubtless with a fiendish chuckle, that his little plaything will render audible sounds which can hardly be heard by a person with normal ears. I think that he ought to pull himself up and think of the Hereafter!

The "Scot's" Two.

THIS is a new set, details of which have been communicated to us by M.H.M. of Edinburgh. As will be seen, M.H.M.'s claim that "The Economy" Three hasn't an earthly with this, is fully justified. All you need is: "One coil (size immaterial), two valves, one transformer, 0.003 fixed condenser, a 2-meg. grid-leak, 60-volts H.T. and a 10-ft. length of flex stretched across the room."

Our friend naively adds "Of course reception was from the local station only. We are roughly two miles away." The diagram shows that the transformer has a core! Man, ye can't afford a luxury like that! And why be so free with the coil? Look! Make it a wee sma' yin!

To All Concerned.

THIS is a note for J. N. (Durham) and readers in general. Much as I appreciate the bloodhound keenness with which you all follow my Notes, it is not possible for me to discuss jokes

THE PROGRESS OF POPULAR WIRELESS

Largest Circulation of any Wireless Journal

For some time past the displayed headline on our front cover has been "Highest Radio Circulation in the World."

This claim is amply justified by the following net sales certificate just issued by our Auditors for the first six months of the current year.

As the pioneer of popular broadcasting journals, "Popular Wireless" has never looked back, having held the confidence of a large army of regular readers and advertisers.

Below we print a copy of the Certificate we have received from our Auditors:

3, Frederick's Place, Old Jewry, London, E.C.2.
 30th July, 1930.

To the Chairman and Directors of The Amalgamated Press, Ltd., Fleetway House, E.C.4.

Gentlemen,—We have examined the books of the Company, and certify that the average net sales of "Popular Wireless" for the six months ended 30th June, 1930 (after deducting all unsold copies during that period, and exclusive of free and voucher copies), were 110,377 copies per issue.

We are, Gentlemen, Yours faithfully,
 (Signed) Price, Waterhouse and Co.

Our readers will be interested to know that our Autumn and Winter plans are now well in hand, and that we have many interesting features in preparation which will attract wide attention among amateurs during the forthcoming months.

The first issue of the "Popular Wireless" special Exhibition Numbers will be actually on sale September 18th, and the succeeding two issues will also be devoted to a comprehensive and pictorial review of the Exhibition at Olympia.

Readers should keep a look-out for these special numbers, which will prove an invaluable guide to all the leading Stands at Olympia.

POPULAR WIRELESS
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cracked a month ago. The squib either goes bang or is best forgotten! I have most human weaknesses, but I never explain the joke in a joke. However, J. N., between you and me and the "poste"—you are correct.

The G.E.C. Works—and Plays!

THE spirit of Ariel flew to Coventry and hovered over the 150 acres estate full of nice houses and gardens which the G.E.C. rents to its staff. Then it swooped down and entered the works just in time for a demonstration of the "Osram Music Magnet Four," a fine set which is almost capable of building itself.

A run round the works followed, a fascinating experience because everything is done in the modern way. When I recall some of the dingy, ill-lighted, soul-destroying holes in which I spent some of my shining youth I feel that the world is progressing!

Real Welfare.

BUT the most pleasant sight was that of the playing-fields, tennis courts, and golf course, all of which are run by the employees themselves, in their own way, for themselves. Too often I have seen this sort of thing spoiled by managerial interference from behind the arras and I am glad to learn that at Coventry this flaw does not exist: the G.E.C., in common with many other large firms, has grasped the fact that welfare work is doomed to failure, and can be positively harmful, if it robs the subjects of their natural sense of independence as human individuals.

A fine firm and lucky workpeople!

Interesting Event.

ALTHOUGH this is not a society page, in the "social" sense of the word, it seems a fitting place to record the advent of Miss Maria Elettra Helena Marconi, the daughter of the Marchese Marconi and his Marchesa, the former Countess Bezzi-Scali. Congratulations to all three of them.

The little lady is lucky to have such an interesting and distinguished papa, although no doubt she is at the present time far more attracted to her little toes. Her god-mother is Queen Helena of Italy and she was baptised on July 30th at the Odessalehi Palace at Civita Vecchia, with sixty airplanes flying overhead!

(Continued on next page.)

RADIO NOTES AND NEWS.

(Continued from previous page.)

Taxes on Radio Sets of Tourists.

YOU will bear in mind, of course, that the transport of a radio set into certain European countries for a holiday will cost you gold dust. Talk about safe-guarding! These people certainly look after jolly old No. 1.

Spain charges about half-a-crown for every 2½ lb., which she does not hand back when the set is repatriated. And one has to take out a licence! Belgium, 12 francs for every few pounds, and France 22 per cent. on each set plus 6 per cent. if they are valued more than 700 francs and the loudspeaker is worth more than thirty shillings or so.

The Heel of Achilles.

JUST as an example of how pride goeth before a fall I may confess that a few days after boasting how promptly I had renewed my radio licence, I was heavily sat on by a tax collector's sleuth who discovered that my dog licence was about as useful as Old Moore's Almanack for 1927. A fair cop! And I went quietly. Drat that mongrel! He's such a part of the place that we take him for granted!

The Reverse Case.

I WAS, however, luckier than M. Jules Gaillard, who was fined at Liverpool for using his radio set without a licence. According to the report which I received he said that his offence was deliberately committed as a protest against the B.B.C., because he had broadcast for 400 hours and they had not even thanked him. The magistrates thereupon remarked that such a protest was "like not taking out a dog licence because you have been swindled over the dog."

M. Gaillard's complaint is astonishing, but he ought not to forget that he had a splendid advertisement for his orchestra—at the low rate of £2 and £3 3s. costs!

Another French Station.

IT is reported from Paris that a company has been formed for exploiting a radio broadcasting station under the auspices of Branly, the famous scientist, to whom is generally attributed the invention of the coherer.

It is proposed to build the station some sixty miles from Paris, though it will be connected with a studio in Paris. The station as at present planned will be of 12 kw. (antenna) power, and will emit short and ultra-short waves. By the way, I learn that the new Radio Paris is shortly to begin its trials.

This "Topping Up."

A DEADLY silence in answer to my question about what it is you are afraid of in ordinary tap-water, that you so religiously use distilled, is at last broken by J. D. M. (Seaford), who suggests that any calcium carbonates (chalk, etc.) present would be converted to calcium sulphate and "probably be deposited on the plates of the accumulator and thus impede its action." As a theory that is fairish—fairish, friend!—though "probably" rather spoils it. However, I have no doubt that a veneer of calcium sulphate would upset the plates, though you do not mention

what is more important, namely, the neutralisation of some of the acid. But what are the facts?

Why Buy Distilled?

PICKING at random an analysis of ordinary water I found that chalk, etc., was present to the extent of 0.09 gramme per litre. Let us say, therefore, merely for argument's sake, that in "topping up" you use 50 cubic centimetres of water and that you "top up" twice a year. By the end of twelve months you will have put the enormous quantity of 0.009 gramme of calcium carbonate into your cell. In ten years you will have added no less than 0.09 gramme; nine hundredths of a gramme in ten years.

That is, unless you have changed your electrolyte once or twice during that period, in which case you probably have got rid of most of the calcium sulphate, too.

SHORT WAVES.

MONEY'S WORTH.

How to make sure of getting full value for ten shillings a year disbursed.

News comes of an agriculturist who is using his wireless loud-speaker set as a scare-crow, with satisfactory results.—"Birmingham Gazette."

"If we get loud speakers installed everywhere, the sound of the genuine human voice will become quite rare and refreshing by contrast," we read in the "Daily Mirror."

It is rumoured that radio announcers have taken considerable exception to this summary dismissal from the human race.

Gramophone Contest. Should attract a record entry.—"Daily Mirror."

"American multi-millionaire shoots himself while listening-in," runs a headline. Well, we've always considered the English programmes bad enough.

At the last moment one of an orchestra which was going to broadcast from a Continental station fell ill. A substitute was found and the broadcast began. The music was futuristic, but the substitute player struggled bravely along. In an interval, the player next to him whispered:

"The 'Aeroplane Suite' next."
"Oh, my hat!" said the substitute.
"I've just played that one!"
"It doesn't matter," said his friend.
"Listeners will never know the difference."
—"Wireless Weekly."

A scientist states that in a hundred years' time people will be picking up the wireless programmes that are being broadcast to-day. And yet some people still persist in going in for rejuvenation treatment.—"Humorist."

A New Rectifier.

WE have received from its inventor, Mr. Hakon Rosenkilde, of Copenhagen, a letter about a new form of rectifier for which he makes some interesting and important claims. Owing to the patent aspect of the matter he is unable at present to give us a detailed description, but he tells us that it works on an electro-magnetic principle and is everlasting; that is, it has no part which, like the filament of a lamp, is consumable. Mr. Rosenkilde is of opinion that A.C. mains eliminators made on his plan will probably cost about £3; and, in addition, they will involve no renewal expenses.

Some Big Claims.

IT is stated that this new device gives half-wave rectification and is so effective that very little smoothing is required in order to get rid of A.C. hum. It has no

polarity. Connect your accumulator to it for charging and the rectifier looks after the polarity for you.

If these various claims are fully supported by performance it would seem that here is something new, and we await with much interest the publication of the details concerning it. I hope that Mr. Rosenkilde will let us into his secret as soon as it is protected.

Plugging In and On.

H. B. (Dowlais) wants to know how to arrange to have the loud speaker on a plug by means of which the set can be switched on and off, instead of having a switch. The usual stunt is to join the L.S. leads to a plug. The jack must have four contacts, two of which are to be inserted in the filament lead (in place of a switch) so that the insertion of the plug closes these contacts and "makes" the L.T. circuit. The remaining two contacts must be connected, one to H.T. (positive) and one to the plate of the last valve.

A Little Theory.

A CONTRIBUTOR to the "North Western Daily Mail" alleges as follows: "High-frequency currents are not like ordinary electrical currents—they are far more penetrating." Well, well! It is still taught by professors of electrical engineering that H.F. currents are not so penetrating—I use the word because the "N. W. D. M." does, not because it is happily chosen—not so penetrating as direct current; but now the "skin effect" is in danger! No longer are we to believe that the H.F. current in a conductor confines itself to a thin outer layer! Eh?

More Theory.

THIS conclusion would be startling but for the fact that the exponent continues, "A small frame aerial, standing in the middle of a room, will receive currents that have penetrated the house—and perhaps a row of houses—to get at it." This proverb clearly shows that we may stick to the "skin effect" belief undisturbed, because its attacker is not qualified for the job. H.F. currents cannot be trained to bore through rows of houses in search of frame aerials. If the "N. W. D. M.'s" expert thinks that radio communication is effected by means of H.F. bloodhounds or moles, and that H.F. currents are radiated by the B.B.C. he is evidently not clear as to the difference between H.F. currents and electro-magnetic waves.

Ship to Airplane—3,000 Miles.

THE most remarkable "hook-up" to date is the chain of connections by means of which an airplane flying 3,500 ft. above Buenos Aires spoke by wireless telephony to the steamer "Majestic" which was 400 miles from England, bound east. It was a two-way communication! The chain consisted of the Buenos Aires radio station, the Madrid radio station, the Spanish telephone lines, the French Government's land-line and submarine cable, the cable across (or below) the Channel, land-line to Rugby; from Rugby connection was made with the "Majestic" by the Post Office shore-to-ship radio station. A few minutes with an atlas will show you what a wonderful bit of work that was.

ARIEL

THE SET of the FUTURE

by

CAPT. P.P. ECKERSLEY, M.I.E.E.



I HAVE been spending a holiday in France, in all France, from North to South, from East to West. There has been little of wireless to stimulate a thought, little of "shop" to make one say this or that.

I have been lost with astonishment at the exhibitionism of my compatriots abroad. I have also been lost with astonishment at the quality of the wireless sets I have heard, *partout*.

One of the most advertised sets, advertised in England as much as in Europe, gives a rasping, horrible snarl, and the more ambitious home-made (or almost) are incredible. But, honestly, incredible!

Question of Quality.

Why is it, I ask myself, when so much is known about the subject, that everyone who goes into it in a small or big way, seems to have to study it from the beginning experimentally, inflicting his researches on the wretched public?

In my life, at any rate, there are about twenty people whom I know personally and respect technically, who do really understand about quality; what it sounds like and how to get it. In the shops I go into which sell wireless I must say the standard is much higher than it used to be, and much higher, as far as my observation extends, in Britain than in the rest of Europe.

Nevertheless, the standard is comparatively poor. As to private houses, my chief observation in Britain is that unless there is someone fairly keen the set simply does not work. This is particularly true of the old days, and is still true, except where there are mains-driven sets.

Wanted—A Ford of Radio!

It seems then that knowledge of what to do exists, but that that knowledge has as yet had no large-scale application for the general public. This seems even truer abroad than in England, because I have observed also that in Germany the quality—to my ears at any rate—is generally inferior. Price, on the other hand, is far lower than in England.

What is going to be done to market a cheap set having a reasonable performance? Who is going to do for wireless what both Ford and Morris did for motoring? What is a satisfactory performance in a wireless set?

I expect the few, or the many, who read my articles know that I am on the whole

Radio reflections on the part of our cheery Radio-Consultant-in-Chief subsequent to a holiday tour in France.

dissatisfied with an evolution which depends upon distant listening. I have always held that the programme ultimately counts; that a continued interest in wireless comes through what is heard and not in the mechanism by which it is heard.

Thus the imperfections of distant listening as they are more perceptible are more likely to destroy fundamental interest. Variety in listening is certainly a *sine qua non*. Choice of programme seems essential.

That choice must be forthcoming, but differently from to-day. The cheap set of the future must give that choice. How it is to do so remains to be seen. There are very big problems to surmount, as:

(a) Even though the European long-wave stations give a greater possibility for distant listening, they give worthless service in large towns due to electrical appliances.

(b) The set of the future must use the mains, and as the mains extend so will the mains background noise.

(c) Even though Europe may get more and more long-wave stations, there will be no more wave-lengths, and hence no more

choice of programme *per se*, and the use of long waves for the reasons given in (a) and (b) should do no more, in general, than extend local service areas. It will, in fact, not make distant listening more possible.

Thus it looks as if some other way will have to be found to give the needful variety to the "Morris of the Ether." Of course, my Regional Scheme was designed with all these points in mind, and gives a possibility of variety. But it is a possibility only, so far.

The Regional Scheme is, to my mind, so far largely a failure because of the apparent inability of the B.B.C. to attack the root problem of giving us a choice, between programmes. Their policy, if there is one, is to give just the power of selection between two similar things.

Dodging the Duds!

Most people therefore use the Regional Scheme rather as a convenience to avoid items they don't like than as a stimulus to picking the programme they do.

Mr. Compton Mackenzie, who usually has something quite useful to say about broadcasting, now comes out with the startling statement that the greater choice of programmes makes him disinclined to listen. (At least, so I read in my paper that found me "somewhere in France.") Perhaps the continuation of output of books from one author's pen makes one less and less inclined to read that author, but a good library of books should not disincline one to choose and to read.

If, of course, the books are all the same type and all mediocre, even though by different authors, one is driven away from reading. That, I think, must have been the basis of Mr. Mackenzie's thought, as it is of mine. A mere choice of similar things is a

(Continued on page 630.)

"SYNTHETIC" MUSIC



A new musical instrument demonstrated in Berlin, and utilising radio valves. It is said to reproduce the sounds of the human voice and all orchestral instruments with startling realism.

LATEST BROADCASTING NEWS.

ROMANTIC FIND
IN EDINBURGH

THE ST. LEGER—"INGREDIENT X"—PROVINCIAL DIVERSIONS—Mr. SHERRIFF'S APPEAL—FEWER CONDUCTORS—PROGRAMME MOMENTS

WHILE engaged in demolition work in the old Queen's Hall, Edinburgh, which is to become the principal studio of the new Scottish Broadcasting House, some workmen recently found a letter, embedded in the centre of a large ceiling bracket, which turned out to be a really interesting "find."

The letter was addressed "To anyone whom it concerns in the demolition of this building, Queen's Street Hall," and read as follows:

"To whoever finds the pair of pliers that I have lost down this wall, may he have a longer use of them than I have had, and good luck and a long life. Perhaps when this is found I will be an old man, or in my grave. My pipe, a very good-smoking pipe in this age, was dropped down the same place in the opposite side, or east side of building. May you never be without a fill.

(Signed) James Cairns,
Electrician.

Oct. 5, 1903."

If Mr. Cairns, who wrote this letter nearly twenty-seven years ago, is still alive—and the authorities at Scottish Broadcasting House hope he is—he will be interested to learn that "his very good smoking-pipe" has been found. A hearty welcome awaits him if he cares to visit the spot where luck was once so much against him.

The St. Leger.

A running commentary on the St. Leger, which takes place on the Town Moor course at Doncaster, between 2.50 and 3.15 p.m. on Wednesday, September 10th, will be broadcast to National listeners. The commentator has not yet been chosen.

"Ingredient X."

"Ingredient X," a thriller specially written for broadcasting by L. du Garde Peach, and first produced in the London studios a year ago, is to be repeated for London Regional listeners on Monday, September 8th, and again for National listeners on the following night. Since the first broadcast numerous requests have been received from listeners that the play should be repeated.

Provincial "Diversions."

In a recent issue we announced that Birmingham had arranged a "Diversions" programme. Now comes the news that Manchester wants to have a shot on Wednesday, September 3rd, and that Cardiff will try its luck on Tuesday, September 9th. Both programmes will also be heard from the National transmitter.

Mr. Sherriff's Appeal.

Mr. R. C. Sherriff, the author of "Journey's End," is broadcasting an appeal on behalf of the Invalid Children's Aid Association

from the London studio on Sunday, August 31st.

Fewer Conductors.

Instead of having a different conductor for each of the symphony concerts during the season which opens at Queen's Hall on Wednesday, October 22nd, the B.B.C. has decided that every two or three concerts of the series shall be under one direction. This will enable the orchestra to become acquainted with the conducting of a few of the greatest exponents of the baton, and will, it is hoped, lead to greater efficiency and more enjoyment to listeners.

Programme Moments.

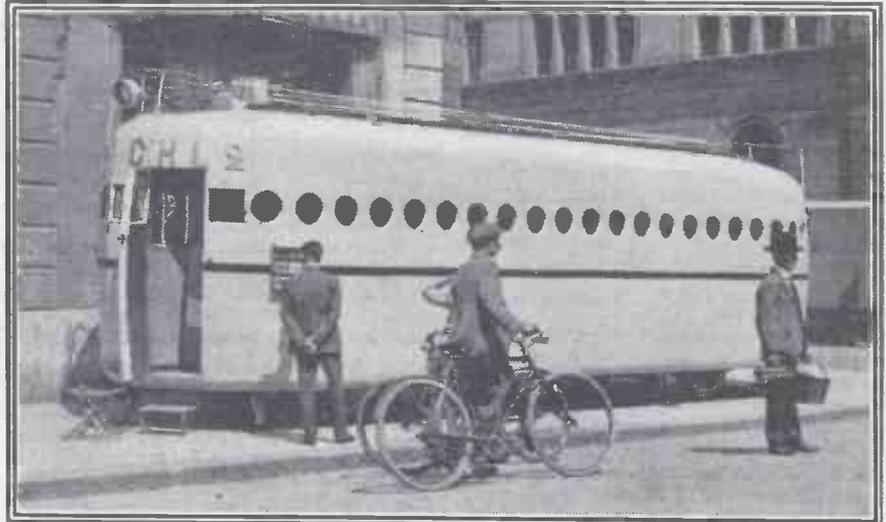
Scenes from the plays of Shakespeare will occupy half an hour of the North Regional programme on Friday evening, August 29th. There are, of course, many to choose from, but those selected will have some special association with the North.

Eye-Witness accounts of all sorts of events have been included in broadcast programmes, but we do not remember hearing one of a Flower Show, such as has been arranged for North Regional listeners during this month.

Mr. A. J. Macself, the well-known horticultural journalist, is going to describe the glories of the Southport Flower Show. The Southport Flower Show is one of the largest of its kind in the country, and certainly holds the premier position in the North of England.

The next talk in that particularly interesting series entitled "Northern Towns," which Mrs. Kate Lovell is giving to listeners in the Northern Region, will be heard on Tuesday, August 26th, Chester being the town selected. Chester is one of the few, if not the only town in England, which can still boast of a medieval wall, along the top of which it is possible to walk completely round the city.

THE LATEST IN PORTABLE SETS?



A curiously-shaped motor-home which has been touring the Continent. All the necessary rooms and conveniences of a modern flat, together with radio installation (note the aerial), are provided.

FOR THE LISTENER

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

By "PHILEMON"

A Concert

LAST night, Belinda and I gave a concert to our neighbours. I think you would have been pleased with the setting. The cottage is such as a child might have designed; with a door in the middle and a window at each side of it.

In front of it is a little square of gravel, with two round flower-beds ablaze with monstrous zinnias. Beyond it a vine-trellis, and then the orchard with peach-trees and walnut-trees and vines growing on pillars. It was seven o'clock, and Sunday night.

Everybody was dressed in their "bits of best." Even Giuseppe, a boy of about ten years and usually very dirty, was spick and span in a white cap such as American sailors wear. After a broiling day a cool

wind from the mountains was blowing.

The audience dotted itself about here and there, on the gravel, on the grass. The father of the family, an old man with one eye, leaned against a tree. Belinda stood on a little stool under the window, where I could easily connect her with the aerial and the earth. She looked very charming with her polished wood.

Birthdays.

By chance Belinda and I had learned that it was Giuseppe's birthday, and we had bought a little present for him, and hidden it. So that the opening of the concert was a great success. For Belinda, assuming the voice of Auntie Sophie, said, "A happy birthday to Giuseppe Constantini."

(Continued on page 630.)



QUALITY QUERIES

NO doubt you have often wondered whether there are any short cuts to determining exactly where, in a set, distortion occurs. Perhaps you have read so much about the use of milliammeters connected in valve anode circuits, that you have come to regard them as more or less infallible distortion testers.

Even should this be the case no great harm will have been done, for undoubtedly the most frequently encountered source of really bad distortion is valve overloading. And this the milliammeter in the anode circuit very quickly shows up by wagging its needle.

Valve Overloading

However, with the more common use of better and bigger valves, and with more attention being paid to H.T. supplies, valve overloading is not now such an overwhelming serious business.



Messrs. Clarke's "Atlas" L.F. Coupling Unit.

At one time, of course, it was so prevalent as to be an almost universal habit! There could have been no ordinary broadcast receiver in use seven years ago in which valve overloading was not present to some

considerable extent. Plenty of H.T., adequate grid bias, and proper valves grace our modern receivers and make sure they are maintained properly, but it is important to remember that distortion can occur at many other points.

Different Kinds of Distortion

Now what do we mean by distortion? It is generally used as a portmanteau word, standing for any departure from a perfection in the handling of the energy variations dealt with by the set.

Actually there is Frequency Distortion, which indicates that some of the frequencies are being dealt with better than others. Terrific frequency distortion is found in even the best of loud speakers where the middle frequencies, corresponding with those notes round about the middle C on the piano, are dealt with far better than either the high

or the low-frequencies.

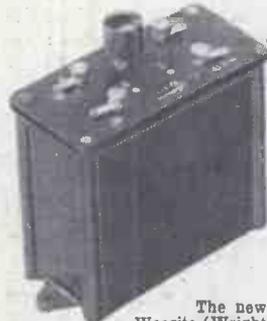
Then there is Amplitude Distortion, such as you can get if you use too much grid bias on a valve, the stronger and weaker impulses then receiving disproportionate treatment. Thirdly, there is Wave-form Distortion, when stray frequencies are introduced.

Now all sorts of things can cause any of these kinds of distortion, and it really is a hopeless job for the ordinary constructor to try to track down everything to its definite source. You want pretty elaborate measuring apparatus, something on the lines of a miniature National Physical Laboratory for such a job.

But what can be done is to adopt that old adage—prevention is better than cure, and to select your circuits and all the necessary components with that end in view.

Many Causes

Distortion can occur through a hundred and one things, and it is possible for such troubles, individually so small as to be



The new Wearite (Wright and Weaire) L.F. Coupling Unit.



The first L.F. Choke to have a nickel-iron core.

Distortion can be caused by any one or more of many quite different things. But most of these troubles are quite easily preventable as is shown
By H. A. R. BAXTER.

negligible, in the aggregate to give rise to effects that, in comparison, render insignificant the worst valve overloading.

It is fairly safe to say that the most critical part of a set from a quality point of view is the low-frequency section. This, you might say, is obvious, but it must never be forgotten that the H.F. part has its very important duties as well.

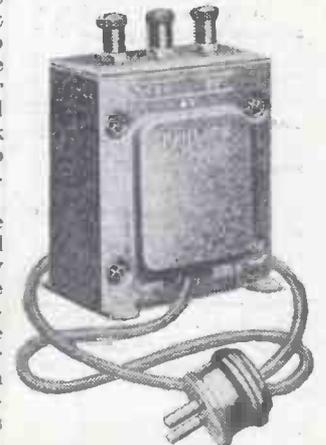
Overall Efficiency

Everybody these days seems to be aiming at a straight line output. Such an ideal is all very well in its way, but its achievement is an empty victory if the loud speaker to which the output is connected is a poor quality instrument.

It is the overall efficiency of the radio receiving outfit that matters. Obviously then it is the best plan to query the loud speaker first and then work back into the amplifier.

And here you will find plenty to engage your attention. There is another and much longer article in this issue dealing fully with L.F. components. If you follow the advice that is given, then you will not find it necessary to do much hunting for any but major and more apparent causes of distortion.

In the meantime never forget the importance of paying strict attention to the details of a radio set. An anode resistance of not quite the right value, a condenser that is leaky, a valve-holder that is not quite up to scratch can combine together to produce the effect of one huge fault.



One of the several fine Philip's Mains Transformers.

THE FUTURE OF BROADCASTING.

A review of some recent pronouncements of importance to everyone interested in the development of the radio in this country.

By N. F. E.

THE question of the future of British Broadcasting is again being raised in the press, especially in the "Morning Post," which recently published a long article giving the views of Mr. George Bernard Shaw, Sir Thomas Beecham, Mr. Charles B. Cochran, and others.

And emphasis has been lent to this revived topic by Sir John Reith's recent speech at the Students' International Summer School at Cambridge.

Mr. Whitley's appointment as Chairman of the Corporation seems to have given rise to the impression that immediate reforms are likely to be made at Savoy Hill, and consequently the views of eminent people on the future improvement of British broadcasting are very much to the fore, plus suggestions as to how the B.B.C. may protect itself against the increasing competition from Continental and other foreign stations.

G. B. S. Is Surprised!

Mr. Shaw, for example, is quoted by the "Morning Post" as saying (*inter alia*):

"On the whole, I am surprised that the B.B.C. do their job so well. If you have ever tried even to get up one concert a year you will know how difficult that is, but to have to organise a concert each day is almost attempting the impossible."

"The problem of finding fresh artists, and especially fresh stars, is almost insuperable. And the obvious result is a terrible repetition. Some of the songs which they continue to give us are terribly worn out."

"I have thought for a long time that they could have given us a higher standard of singer, but, as I have said before, I think there are only six fine singers in Europe, and even to hear those continually would be maddening."

"I am very doubtful as to how to suggest improvements. I do not think that vaudeville, however, should be broadcast at all. The whole secret of a comic scene or a red-nosed comedian is that you can see his red nose and watch him falling over the piece of orange peel. When they broadcast vaudeville the B.B.C. neglect the first and only rule in the theatre about comic scenes. Comic scenes must not be played in the dark, and the B.B.C. are always playing in the dark."

A Huge Post Bag.

"Nor do I see that having an experienced showman on their staff to select programmes would help them. If any showman knew what the public wanted he would be able to retire with untold millions in a couple of years or so. Take Mr. Cochran for instance. What salary would he want for spending the rest of his life at the end of a microphone?"

"I understand that the B.B.C. receives a large number of letters, both of complaint and congratulation, from persons who are supposed to have listened to programmes, but how far that is able to help them I do

not know. I sometimes think it would be a good idea if the public were allowed to oscillate their sets or express their criticisms in some way like that, but then one disgruntled man might spoil the enjoyment of a whole nation."

"On the whole I think they do their very difficult job about as well as it can be expected of them."

Sir Thomas Again!

Sir Thomas Beecham, in expressing his views, is reported to have said that:

"As an artist, I have very little to say about the B.B.C. They mean so very little, if anything at all, in the musical life of the country. It should be clearly understood, what nobody seems to realise here, that the B.B.C. are purveyors of wireless, and that is all."

"They have as yet shown no signs of participating in the musical life of the country. That, in itself, is not to be wondered at. You cannot call the gramophone music, and the wireless is an even poorer substitute than the gramophone. It has no relation to art; for art must consist of real performances. And the public knows this."

HI! THERE! BELOW!



An American aviator taking part in a three-way telephone test between two planes and the ground station. The framework round the cockpit is a machine-gun mounting.

"It is like a musical box, and how can artists be asked to be interested in a musical box? They may say that they cater for the tastes of millions of people, but they give them something like a photograph, while an artist offers a Michael Angelo painting."

"They have nothing to do with the great festivals, the great choral societies, the great symphony orchestras, or even the great amateur work which is going on all over the country. I suppose it can be said that they touch the fringe of music."

"The art of music is performing. If they had wanted to show that they had real musical interests they could have shown it by trying to help, out of their princely income, the real musical effort which is going on all over the country. The Imperial League of Opera is, of course, a case in point, but by no means the only

one. This, of course, would be a Super-National Programme, but not outside their proper scope, I think."

"They have made their point of view quite clear and their function and standpoint ought to be better understood. They are a commercial body, selling wireless. They are not an artistic body, and have made very little attempt to pretend that they are."

Which, of course, is typical of Sir Thomas' views on broadcasting.

Mr. Cochran, the theatrical manager, said he did not pose as a critic of the B.B.C., as he did not know enough about it; but, in his opinion, it has a difficult task which it does well on the whole.

Finally, Sir John Reith said in his recent speech that broadcasting should be conducted as a public service and as nothing else. He did not admit that it was necessary to have personal gain as an incentive to endeavour, and he regarded the presence of commercial motive in any form as most undesirable.

What Sir John Said.

"The system and the constitution in this country are, I consider, exactly what is required," said Sir John. As regards broadcasting as an advertising medium, Sir John said: "The ether should not be at the mercy of money. Fortunately, with the constitution which we have in this country, the interests of the State are safeguarded. If the service is to be run for the benefit of the people, it cannot afford to be at the mercy of those who are in a position to give programmes for their own particular purpose, and without whose money the service could not be maintained."

Sir John believes that entertainment is the primary function of the broadcasting service in this country, but the danger of interpreting the word in its narrow sense must be avoided. Broadcasting must also carry the responsibility of contributing constantly and cumulatively to the intellectual and moral well-being of the community. He claims that broadcasting has already increased the musical appreciation of the country as a whole.

Sir John wound up his speech by discussing the effect of broadcasting on old-established interests. He said the apprehension existed that it would "queer the pitch" of newspaper sales, badly knock concert promoters and the theatre managers, and reduce church congregations.

"Broadcasting Sometimes Colourless."

"I think it has already been established," he said, "that broadcasting will produce no unfavourable reaction on any of these interests. Rather, the reverse might be expected. And if broadcasting is sometimes colourless," he concluded, "it must be remembered that democracy is sometimes rather colourless, too."

Sir John's views expressed again that the best way to give the public what it wants is to reject the express policy of giving the public what it wants. In other words, if the B.B.C. were to set out to give the public what it wanted it would not succeed, which is a paradox, of course; but it is a point of view which Sir John strongly adheres to.

Whether he is right or wrong is a matter of opinion, but that he doesn't really pursue this policy to its logical conclusions is obvious by a glance at the programmes;

THE B.B.C. TODAY

BY THE EDITOR



IN broadcast drama and variety during the past year it can be said with finality that Mr. Val Gielgud has "made good." And probably the chief reason for this success is not any heaven-sent genius or peculiar skill or even aptitude, but rather a clear-cut knowledge of what he wanted, and a determination to get it, whatever the consequences.

Anyway, broadcast drama and variety are now worthy of serious artistic consideration, the B.B.C. brand being infinitely superior to anything of the kind abroad. The principle of anonymity to which Mr. Gielgud nailed his colours has triumphed. The new section of research and experiment has also done well.

Three Valuable Producers.

In Mr. Sieveking and Mr. King-Bull and Mr. Harding are three radio producers of the first rank in originality and technique. Perhaps it is to Mr. Harding that the most credit is due during the past twelve months, which is the period I am reviewing.

Then Mr. King-Bull has come to the front during the same period. Mr. Lance Sieveking holds his ground, but, apart from the "Intimate Snapshots" and the Chinese show, I would not award him marks for peaks this year. There are rumours, however, that Mr. Sieveking has something very big in preparation.

On the whole, I believe the dramatic production side of the work of the B.B.C. is now ideally handled; it is perhaps the only department at Savoy Hill which can be said to have assumed its permanent shape and character.

If there is any criticism I would make, it is that Mr. Gielgud would be well advised to be more tolerant of the provincial stations and encourage their characteristic original efforts.

Education and Talks.

Education goes on apace at the B.B.C. When I last reviewed this work at Savoy Hill a reorganisation and expansion were in hand, and it was not possible to say what new form would emerge. As it turned out, Miss Matheson added adult education to her territory with the aid of Mr. Siepman. Mr. Stobart, with Miss Somerville, is left with the schools, religion, and appeals. To merge adult education into

In this fourth article of a short series in which "P.W." is unveiling the mysteries of Savoy Hill, the questions of Drama, Education and Religion are dealt with.

talks was right, but I am not sure it was done for the right reason.

Talks have improved exactly to the extent in which they have acquired entertainment value. This does not mean that they have lost their educational or informative value; on the contrary, the intention has been far more adequately fulfilled.

If adult education had been merged in talks in order that it might conform to the movement towards greater entertainment value, then the reason would have been the right one. But I suspect that the reason was administrative convenience. Anyway,

A WELL-KNOWN FIGURE



Lord Gainford, Vice-Chairman of the B.B.C.

there they are now all lumped together under Miss Matheson.

But there is an obstacle in the way of the "rationalisation" of the adult education talks. I mean the various committees and bodies comprised under the menacing title of the National Broadcast Adult Council, presided over by the Archbishop of York, and including, of course, all the big guns of the educational trade unions of the country.

Humanisation Required.

This formidable affair seems to be getting rather more than less say at Savoy Hill, and tends to offset the enlightened activities of the staff in charge. There has been the notable encroachment on the main entertainment period of the Regional wavelengths. I mean the long talks about eight o'clock on 5 G B and the London Regional.

The B.B.C. has allowed itself to get far too much in the clutches of the professional educationists. There was a use for these bodies in a mild way some three years or so ago; but once the B.B.C. had gathered in the prestige that was going, the association should have been faded out, politely but firmly.

It will have to go some day, and there will be terrific rows. Meanwhile, my suggestion to the harassed staff of the talks and adult education sections of the B.B.C. is to get on with the humanising of their work, and, if there is a choice of risks to take, take them as against the cranks' committees and not as against the silently suffering public.

The Schools Broadcast.

Education on the ordinary schools side continues on the now familiar lines. Radio is settling down as an acknowledged auxiliary to the elementary and secondary school systems of the country. Much useful work is being accomplished unobtrusively and, I hope, without making too big a hole in the licence revenue. Miss Mary Somerville, the actual executive of this work, is a great help to Mr. Stobart. During the past year Miss Somerville has caught up on Miss Matheson in prestige and influence.

Before I leave this subject of education I would revert to the talks and adult side once again. Here is a suggestion. Let it be laid down arbitrarily that not more than

(Continued on next page.)

THE B.B.C. TO-DAY.

(Continued from previous page.)

10 per cent of main programme time be available for material which has not got the basic qualifications of entertainment value.

Religion has not changed a great deal in broadcasting during the past year. The outstanding part, of course, is the weekday service at 10.15 each morning. This has a vast audience, and confers great benefit on many thousands of sick, infirm, old, and lonely folk. With characteristic self-effacement, the founder of this service has done everything possible to preserve his anonymity. It was perhaps just as well that he succeeded in this for the first eighteen months or so. But lately it has become known that he is the Rev. Hugh Johnson, chief assistant to the Rev. Pat MacCormack, vicar of St. Martin-in-the-Fields.

The Morning Service.

The little book of prayers entitled "This Day," and containing prayers from those selected for the morning broadcast, has run to several editions and, I understand, is again sold out. This is but one sign of the signal social service which Mr. Johnson is rendering by his daily visits to Savoy Hill.

I am paying a good deal of attention to Mr. Johnson because in his success are apparent the secrets of effective religious broadcasting. To begin with, he has a perfect microphone manner; his message is to a million individuals, not an address to a crowd of a million. He is direct, sympathetic without being sloppy, honestly disdainful of cant and humbug, and happily clear of the pitfalls of disabling orthodoxy and intonation.

His service remains short and simple. It is no longer or more complex to-day than it was a year ago. And, above all, it is Hugh Johnson—a word picture of the man. I listen to this service not infrequently; in fact, less and less infrequently. I know business men with none of the ordinary religious predilections or professions who abandon whatever they are engaged on at 10.15 in the morning for the quarter-hour spiritual communion guided by Hugh Johnson. I congratulate Mr. Johnson on his wonderful work and on his unique opportunity of service; I congratulate the B.B.C. on having found Mr. Johnson and on having the sense to give him full freedom of action.

Religious Broadcasts.

Curiously enough, the only other really bright spot in the broadcast religious activities is at the other end of the day. I am referring to the Epilogue, the personal creation of Sir John Reith, who inherited its inspiration from the manse of his father, one of Scotland's greatest preachers and religious leaders of the late nineteenth and early twentieth centuries.

The Epilogue on Sunday nights is a fitting close to the programmes. It is more; it is a message of consolation and hope comparable with the weekday morning services. It may seem ungracious to criticise such a splendid programme item, but I must register a warning about the tendency to lengthen and complicate the Epilogue, and to give it too much intonation in the spoken parts. Let it remain brief, natural, and simple, as in the beginning.

As for the rest of religious broadcasting, St. Martin's relays, as well as those from St. John's, Westminster, the various cathedrals, and indeed practically all the "O.B." services, are as good, if not better, than ever they were.

But the studio services do not hold their own. There is something thin, almost disconcertingly so. There is a deplorable absence of vitality, and also sometimes a touch of "staginess." Studio services are either declining or the other services are getting so much better that studio services suffer by comparison.

Need for Alternatives.

I think the B.B.C. should make every effort either to develop its studio services on the right lines or substitute them entirely by O.B. services. There are far too many bad preachers and bad speakers allowed at studio services.

This comes, I suppose, from the balancing feats of the advisory committee of clergy and ministers. High time this was superseded by the fearless choice of good broadcasters with real messages such as Dick Sheppard and Hugh Johnson.

And just a final word. Appropriate musical alternatives to religious broadcasts would be as good for religion as they would be acceptable to listeners generally.

A POPULAR GOVERNOR



Mrs. Philip Snowden, one of the most active of the B.B.C.'s Board of Governors.

THE "A.P." TWO.

Some further details about the excellent receiver which was described last week.

CONSTRUCTIONALLY you will find the "A.P." Two an easy job. The only points calling for special mention concern the screen.

The screen itself is one of the standard type always used in "P.W." sets, with a row of perforations along the lower edge through which leads can be passed as required. Actually, there is only one such lead in the present receiver, and that is the

one which goes to one filament terminal of the valve socket V₁. This lead must be insulated, whatever kind of wire be used for the rest of the work.

Screen Connections.

The only other lead running through the screen is that secured to the tapping point on the coil L₂ at one end, and the anode of the screened-grid valve at the other, this latter point being the terminal on top of the bulb. This lead should consist of a short piece of flex, and it passes through a hole quite high up in the screen.

Notice very carefully that connection is made to the metal of the screen itself at two places, one being quite close to the panel. This is the lead from the moving vanes of the differential reaction condenser C₃, and it goes to a small screw and nut inserted in one of the perforations in the screen. A similar connection is made to the screen near the terminal strip and between the condensers C₆ and C₇, a point you will quickly identify on the wiring diagram.

The Coils to Use.

The coil sizes should be as follows: Coils L₁ and L₂ are of the "X" type, size No. 60 for the ordinary wave-band, and size No. 250 for long waves. The reaction coil is L₃, and this should be a No. 50 for low waves and a No. 100 for long waves.

The valves should be one of the screened-grid type and one of the H.F. or "special detector" variety for the V₂ socket. They may be of two, four, or six-volt filament rating, and all will be found to work excellently in this circuit.

The H.T. voltages are quite simple, and you will find that, somewhere about 60 or 70 volts or perhaps a little more will ensure good results when applied to terminal H.T. + 1, with some 120 volts on H.T. + 2 and 60 or 70 on H.T. + 3. This latter supplies the detector valve, and accordingly a little adjustment is indicated here to obtain the best reaction effects and the greatest volume on weak signals.

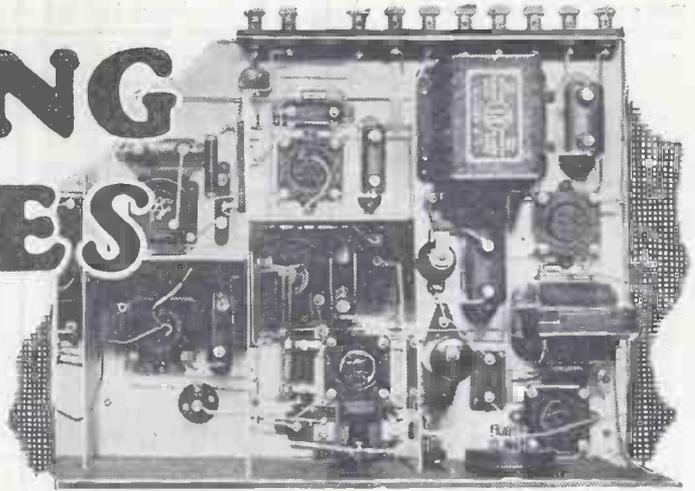
The grid bias on the screened-grid valve will normally consist of a single dry cell, and as this will be of a very small type you will find you can tuck it in between condenser C₅ and the larger one C₆. Alternatively it can be mounted upon the inside of the cabinet at the back or placed upon the baseboard between the coil socket L₁ and the panel. In the latter position you will find it necessary to provide rather longer flex leads to it from the condenser C₅, but this will not impair the efficiency of the receiver in any way.

Concerning the Dials.

By the way, you may wonder why plain dials and not the vernier type are shown on our original receiver. Well, the reason is that although the selectivity of this little receiver is very good, tuning is not critical, because the volume of even the foreign stations is usually so good that it is not necessary to use a great deal of reaction. Consequently it is quite possible to handle it with ordinary plain dials.

This calls for a little delicacy of touch, perhaps, and so the reader may desire to use the slow-motion type of dial, or slow-motion drive condensers. He can naturally do so if he wishes, but he should just be warned that there is no room for vernier dials of the very large type. Something small and compact like the Igranic "Junior" version should be used.

SEPARATING THE STAGES



There is no need for your L.F. stages to howl or "motor-boat." Very often instability is caused by an effect which can be eliminated by the use of simple de-coupling devices. How the valves may easily be "isolated" to ensure freedom from trouble is described in this helpful article.

By A. JOHNSON-RANDALL.

THE efficiency of the modern valve and transformer has brought to light certain troubles which are produced by the source of H.T. supply. In sets of less recent design in which two stages of transformer coupling were used, L.F. howling and its associated troubles did not occur very frequently.

Even if instability was present it could usually be cured by some simple measure, such as reversing the leads to one of the transformer windings.

The vast improvements which have been made in transformer and valve design have increased the magnification per stage enormously, and it is largely this high overall amplification in conjunction with a "coupling" effect in the H.T. circuit which causes L.F. troubles.



The Igranite L.F. choke (type G) is a design in which the windings are sectionalised.

valves on the L.F. side which require a fairly heavy anode current and this fact naturally tends to increase the chances of trouble owing to the possibility of the H.T. supply being "overloaded," unless special care is taken in choosing a suitable heavy duty H.T. battery or mains unit.

Symptoms of Instability.

Readers may not be quite clear as to the meaning of the "coupling" effect referred to previously, and unfortunately it is not possible in a short article of this type to explain fully how the H.T. circuit does produce L.F. instability.

It is interesting to note, however, that the plate circuits of all the valves are joined ("coupled") to a common source of supply, and if the resistance of this portion of the circuit exceeds a certain figure, instability will result unless certain precautions are taken.

Incidentally, the symptoms which indicate L.F. instability are howling, the howl taking the form of a musical note, sometimes a low moan and at others a whistle. Also, there is "motor-boating" which can be recognised by a pop, pop, popping, rather like the exhaust note of a motor-cycle engine. Finally, there is the type of instability which shows itself in the form of violent distortion but no audible howling except, perhaps, when the grid terminal of one of the valves is touched with the finger.

Suitable Values.

Now, it is a comparatively easy matter to arrange matters so that the receiver is immune from instability except in very exceptional cases. The usual procedure is to "separate" the stages, particularly the first and last low-frequency valves by means of "anti-mobo" devices.

An "anti-mobo" device in its most common and widely employed form consists of a resistance and a large condenser. The resistance must be well made, and capable of carrying the anode current for the valve without variation in value.

This is essential, because any small change in resistance value while the current is passing will produce crackling noises in the loud speaker.

A practical value for the "anti-mobo" resistance is between 20,000 and 50,000 ohms. It should not be too high because this would prevent the value from operating at its maximum efficiency.

The condenser must be a large one, and 2 mfd. is the smallest practical size. It is usual to employ a 2 mfd. condenser to start with, the value being increased to 4 mfd. if there is any tendency for the receiver to "motor-boat" or howl.

Since the first and last stages are those which most require "separation," the de-coupling unit is placed in the anode circuit of the detector valve. The resistance is inserted between the H.T. supply and the L.F. transformer primary winding. In other words the H.T., instead of going directly through the primary to the anode of the detector, passes first of all through the resistance and then through the primary winding.

The condenser is joined as follows: One terminal is taken to the junction of the de-coupling resistance and transformer winding, and the other is connected to L.T. negative.

The last, or output stage of the set, can be "separated" by means of a filter choke and condenser. The choke must be of good make, having a low D.C. resistance in order to reduce unnecessary loss of voltage, and its value should be in the neighbourhood of 20 henries.

The choke is connected between the H.T. terminal which supplies the last valve, and the anode of the valve itself.

A lead is then taken from this latter side of the choke to one terminal of a 2 mfd. condenser. The other side of the condenser is joined to one terminal of the speaker, and the remaining side of the speaker is connected to L.T. negative.

If these precautions are taken no receiver should suffer from instability on the L.F. side, unless the H.T. supply is unusually bad. Sometimes the simple resistance and condenser by-pass "anti-mobo" unit proves to be quite effective without the help of an output filter.

The Important Stages.

Apart from its value as a stabilising device, the filter scheme is very useful in other directions and it therefore thoroughly justifies its inclusion in any two-transformer-coupled receiver.

In certain instances it may be worth while to de-couple the intermediate L.F. stage, but generally speaking it is the first



A transformer of compact dimensions adjusted in accordance with the H.T. —The Gecophone "Hi-Flux."

and last stages that are of primary importance.

It should be remembered that the de-coupling resistance cuts down the effective H.T. voltage which is applied to the valve, and its value should be

available. It is useless to use a resistance value so high that the effective voltage is reduced to a figure which will not permit the valve to function satisfactorily.

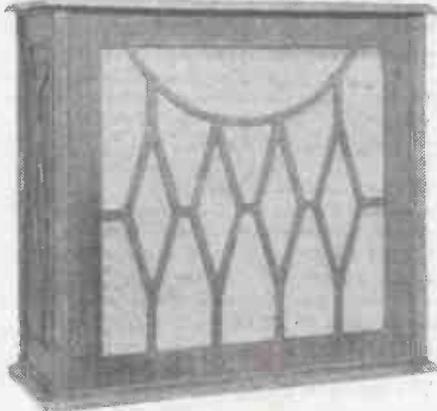
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



A FINE LOUD SPEAKER.

I HAVE just concluded a series of tests with an "Aptus" loud speaker, a product of Moore & Co., of Dale Street, Liverpool. The "Aptus" is of the double-linen diaphragm type, and it really is an excellent proposition. Indeed, I consider it



The "Aptus" Loud speaker.

one of the very best loud speakers outside the moving coil class that I have yet heard.

I am afraid I do not know much about Moore & Co. and they may be quite big or very small manufacturers, but they are certainly producing a fine loud speaker. They have a number of models available, and the speakers are also supplied in complete kits for home assembly from prices ranging from 22s. 6d. upwards. I would certainly advise "P.W." readers to ask their local radio dealers to let them hear "Aptus" speakers in operation.

A NEW MAINS VALVE.

I recently received a Triotron S.N.4 valve. This is a mains valve, with a 4-volt filament, designed to operate as a detector or H.F. valve and for first stage L.F. positions.

It has an impedance of 8,000 ohms and an amplification factor of 22. It is of the indirectly-heated type, and the construction appears to me to be completely sound.

The majority of "P.W." readers no doubt know more about ordinary battery valves than these A.C. types, so a word about characteristics may be as well. The ordinary rules and regulations regarding impedance, etc., do not apply quite as usual.

Generally, the equivalent A.C. valves are of lower impedance.

For instance, this Triotron S.N.4 really is an efficient H.F. detector type, despite what may seem to be a rather low impedance. Also, it is a fine first-stage valve.

FERRANTI PRICE REDUCTIONS.

The Ferranti people tell me that they have been able to effect certain reductions in the prices of their cabinet-type loud speakers. This will be very good news indeed to those "P.W." readers who had intended to purchase such instruments.

R.I. IN THE NORTH.

We hear that Radio Instruments, Ltd., have appointed Messrs. J. D. Morrison and Co., of 10, Whitworth Street West, Manchester, their representatives for all their products throughout the whole North of England, including Newcastle, Yorkshire, Lancashire and North Wales territories.

THE "BROWN BUDGET."

The latest issue of this enterprising house organ is quite in sympathy with the season in which it was produced, and is of a delightful "summery" character. One of the several very readable illustrated articles is entitled "Let's Make Summer Days Radio Days."

A NEW H.T. UNIT.

A comparison between the cost of H.T. derived from dry batteries and that from the A.C. mains is sometimes startling. If you get 300 hours' service with an H.T. battery, you have not done so badly, but the cost of running, for instance, a Tannoy Portable Unit, for supplying H.T. current to a quite big set for 300 hours is a matter of but a few pence, 3d. or 4d.

The Tannoy Portable Unit P.2 is made by Tannoy Products, and it is one of those most useful devices designed mainly for replacing the H.T. battery in a portable set.

A very sound scheme as I have explained before on this page. Although the P.2 has the quality of compactness to a high degree, and can actually be fitted into the H.T. compartment of a portable set, it can, of course, be used with ordinary types of receivers.

It incorporates a Westinghouse Metal Rectifier, and there are

three H.T.appings, one for supplying a screened grid voltage, one variable for the detector, and one giving a maximum H.T. of 120 volts at 15 to 20 milliamps for a power valve.

A special feature of this Tannoy mains unit is that all the components, transformer, chokes, etc., are earthed to the metal casing, which, in turn, is connected to the H.T. negative terminal. The purpose of this is to provide adequate shielding against stray magnetic fields.

The price of the Tannoy portable unit P.2 is £3 15s. complete, and it is suitable

WHEN YOU ARE BUYING—

27.—TERMINALS, PLUGS, ETC.,

You cannot judge the true merits of a wander-plug merely by looking at it. Try it in one or two representative sockets.

However ingenious may be its design, it may fail when given that acid test.

Also see that it enables a flexible lead to be joined easily and neatly to it.

Terminals for mains units and mains sets should always be of the insulated type.

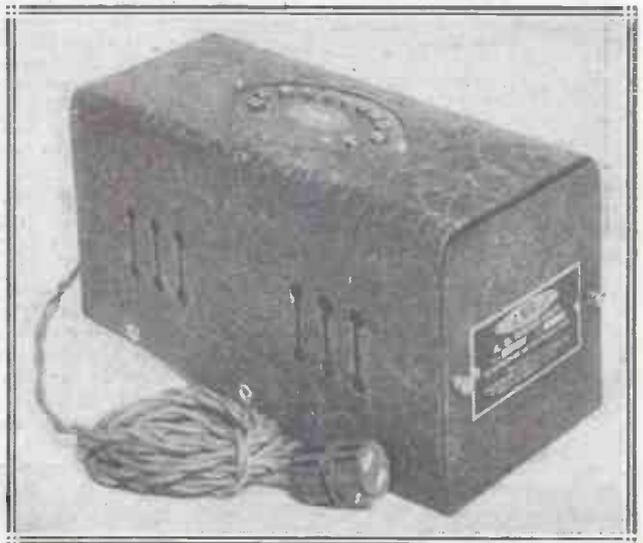
A terminal that will take straight tags as well as ring or hook lead ends is likely to be of more real use than one which is nothing but a milled nut running down a screw.

If you buy indicating terminals see that the lettering is going to be easily visible when the devices are fixed to a set.

for A.C. mains of 200 to 250 volts. I have tested the article and find it quite satisfactory. The outputs are up to specification, and the smoothing is adequate.

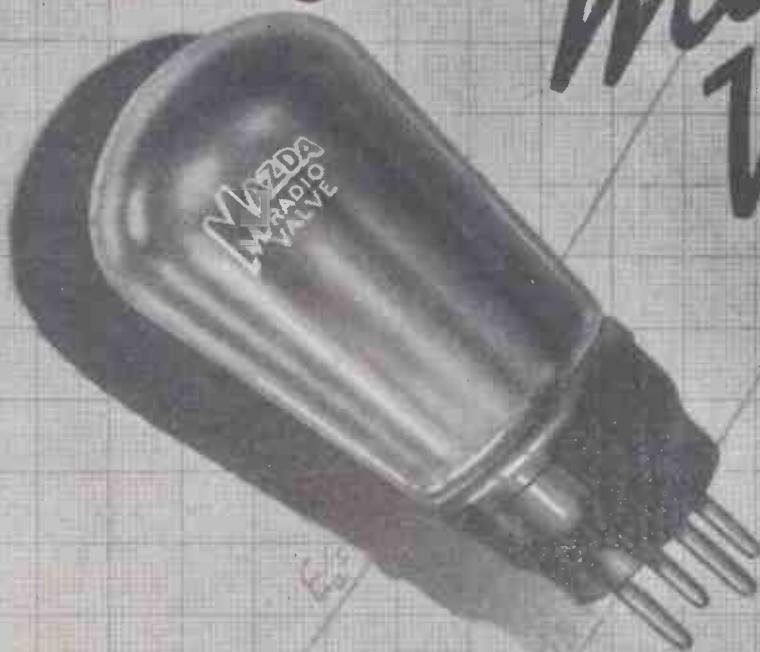
ALL THE ELEMENTS.

Messrs. Kullman & Co., of 110 to 116, Nassau Street, New York, offer to send to any "P.W." reader one or two copies, free and post paid, of a leaflet giving particulars of the 92 elements. In addition to such details as atomic numbers, chemical symbols, atomic weights, melting points, etc., the year of discovery of each element is given.



The P2 Tannoy Mains Unit.

Another Amazing Mazda Valve!



The P.220A
PRICE **13/6**

CHARACTERISTICS

Filament volts	-	-	-	2.0
" amps	-	-	-	0.2
Max. H.T. volts	-	-	-	150
Amplification factor	-	-	-	6.5
Anode A.C. resistance (ohms)	-	-	-	1850
Mutual A.C. conductance (mA/V)	-	-	-	3.5

With Mazda valves in all positions you will find a performance never better than before.

Never before have such fine characteristics been approached by a power valve consuming only 0.2 amps filament current. With its impedance of only 1850 ohms it can accept a very large input and the remarkably high amplification factor of 6.5 gives a good stage gain; A high output may therefore be maintained together with remarkably fine quality.

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IGRANIC QUALITY COMPONENTS

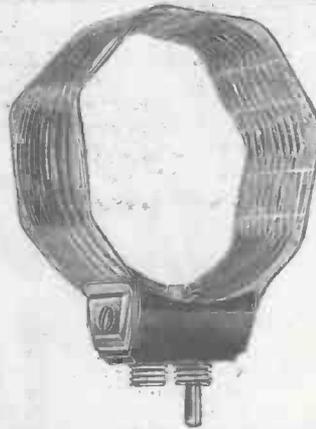
FOR SHORT WAVE RECEPTION



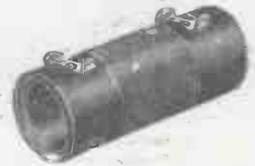
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Essential for short-wave reception. A special micrometer worm-gear drive giving an effective reduction ratio of 500-1. **Price 9/6**

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Prices from 2/6 each.

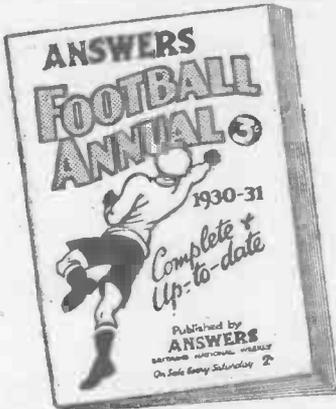


**IGRANIC SHORT WAVE
H.F. CHOKE**

This efficient H.F. Choke is suitable for operation on wavelengths from 10-80 metres. Excludes effectively H.F. currents from circuits where their presence would give rise to troublesome hand-capacity effects, unsatisfactory reaction control and instability.

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4/6 EACH Post 4d.	GPR 2 2		.095	24,000	13.5	H.F. Det.
	GPR 3 2		.095	12,000	9	L.F.
	GPR 4 2		.095	40,000	32	R.C.
	GPR 9 3.5-4		.09	22,000	14.5	H.F. Det.
POWER 7/6 EACH Post 4d.	GPR 10 3.5-4		.09	10,000	9	L.F.
	GPR 11 3.5-4		.09	44,000	41	R.C.
	GPR 17 5-6		.14	20,000	17.5	H.F. Det.
	GPR 18 5-6		.14	11,000	9.5	L.F.
SUPER-POWER 12/6 EACH Post 4d.	GPR 19 5-6		.14	75,000	41	R.C.
	GPR 20 2		.15	6,000	7	Power
	GPR 40 4		.15	6,000	7	"
	GPR 60 6		.15	6,000	7	"
SCREENED GRID 15/- Each Post 4d.	GPR 120 2		.3	3,000	4.5	Super Power
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COUPLING DEVICES



THE valve does the real work in a radio set, and all the other devices are slaves of this lamp. The aerial tuning circuit is adapted to the frequency of the received energy, and passes this on to the H.F. valve for amplification.

The amplified energy is then handed over either to another H.F. valve for further amplification, or to a detector valve, which then develops a low-frequency replica of the broadcasting-studio microphone current.

Standing next to the detector valve is a low-frequency amplifying valve, and there are three commonly-used methods of linking them.

The most popular of all is the L.F. transformer, a very straightforward and easily understood component. Choke-capacity and resistance-capacity couplings are quite familiar systems, but first of all let us deal with the L.F. transformer.

Inside a Transformer.

An iron core, two windings of wire, four terminals, and a case. That is, in brief, the L.F. transformer.

You could make a transformer by winding two small bunches of wire on an iron nail. And the bunches of wire could be side by side or on top of each other. But it would not be a good L.F. transformer for a considerable number of reasons.

First of all, there probably would not be sufficient wire. You may find two or three miles of wire inside a first-class commercial production.

Then, again, the core would compare very badly with the scientifically-designed commercial version. This is not a solid mass of metal, but is composed of a number of sheets of a special alloy metal, and these sheets are known as laminations.



Here is the well-known Cossor L.F. transformer.

An informative and interesting chat about the main components that figure in L.F. stages, illustrated by a carefully prepared selection of photos of dependable L.F. Chokes, Transformers and R.C.C. Units.

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

The reason for dividing the core into layers is so that those parasitic energy-wasters known as Eddy Currents are minimised.

Further, the core is always arranged so that it has what is known as a very good magnetic circuit. You want to confine the developed magnetism to the core and windings, and not let it go spreading off into the surrounding air.



The new Lissen Hypernik L.F. transformer.

a bar across its middle, the windings being accommodated on the bar. But miles of wire and a laminated core do not guarantee a good low-frequency transformer.

There are several other considerations. The primary winding must have a high inductance and the secondary winding a low self-capacity, and neither quality is as easy to obtain as might be thought.

There is another factor which has not yet been mentioned that makes certain compromises necessary. This factor is "step-up" ratio.

Stepping up the Voltage.

An L.F. transformer not only passes the energy on from one valve to another for further amplification, but it also increases the voltage of that energy. A transformer has no amplifying properties of its own, and it increases the voltage at the expense of current, so that the power in watts remains the same, minus a loss occasioned by a certain amount of wastage in the transformer.

Anyway, the voltage goes up at the secondary terminals, and this enables us to

get more out of the amplifying valve because, as you probably know, a valve is a voltage-operated device. The degree to which the anode current of a valve is varied depends upon the voltage or potential differences between its grid and filament.

The voltage step-up in a transformer is obtained by having a larger number of turns of wire in the secondary winding than in the primary, and the step-up effected is directly proportional with the numbers of turns of wire in these windings.

If the secondary has twice the number of turns there will be, for all practical purposes, twice the voltage, and the step-up ratio is one to two. A quite common L.F. transformer ratio is one to four, and this indicates that there is four times the amount of wire in the secondary.

Two Vital Factors.

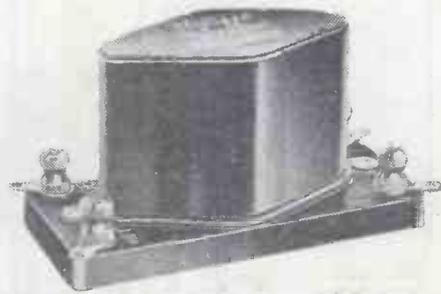
As the amount of wire in the secondary winding is increased, so is its self-capacity, and capacity in a secondary winding is something we want to avoid. Or, at least, we want to keep it as low as possible.

You might say that we could get a higher ratio and a greater voltage step-up by decreasing the number of turns in the primary. But to do this would be to reduce—other things being equal—the inductance of the primary winding, whereas we want a high inductance primary winding. A hundred henries is the sort of thing that we find in a good modern transformer, and such high inductances are obtained and the secondary winding capacity reduced by sectional winding.

By using, instead of ordinary iron, special silicon- and nickel-iron alloys the magnetic qualities of the core can be considerably increased.

The result is that a high inductance primary winding can be obtained with smaller

(Continued on next page.)



An established favourite—the Mullard "Permacore."

ALL ABOUT L.F. CHOKES AND TRANSFORMERS



Varley's new 300 henry L.F. Choke for power detector systems.

amounts of wire, and this means correspondingly smaller secondary windings and lower self-capacity.

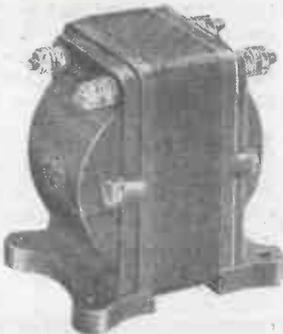
You will see from all the foregoing that

an L.F. transformer is an article that demands scientific design.

Actually, we have only hinted at the complexities accompanying its construction, but we hope that the constructor can at least clearly see that an L.F. transformer is no small-workshop proposition. All the resources of the largest manufacturing concerns are strained to the utmost in the production of low-frequency transformers capable of giving decent performances.

It is most illuminating to make a quick change-over from one transformer to another in a set that is working. The difference between a good transformer and a bad one is quite startling.

Choose your transformers carefully and pay good prices for them, for they are indeed important components.



The well-known B.T.H. L.F. transformer is now marketed by Ediswan Electric.

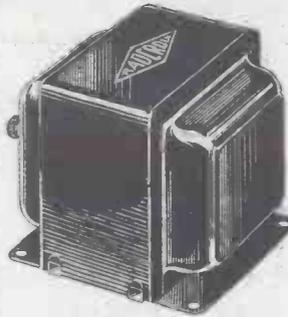
Appearances So Deceptive.

The appearance of an L.F. transformer counts for nothing; indeed, in no other cases are appearances so deceptive. Some of the most polished and handsome-looking L.F. transformers which have passed through our research department have proved the most inefficient.

Also, weight goes for little these days when you have nickel-iron transformers weighing only a fraction of a pound. The safest guide is the reputation of the manufacturer.

Much of the foregoing applies to the L.F. choke. L.F. chokes used for intervalve coupling need to have pretty high inductances and negligible self-capacities. The third requirement is that they should be able comfortably to carry the anode current that flows through the circuits in which they take their places.

A resistance-capacity coupling is similar diagrammatically to choke-capacity coupling except that, instead of an L.F. choke, a resistance is used. This resistance has to contribute neither inductance nor capacity, and the less it has of either of these qualities the better.



The Radcroix L.F. Transformer is sold by the Wholesale Wireless Co.

The Only Barrier.

Anode resistances that are wire wound are frequently specified for the simple reason that wire provides a resistance that does not alter appreciably in value with atmospheric or temperature variations. But it should not be forgotten that there are composition resistances capable of constancy in operation.

Both choke-capacity and resistance-capacity L.F. couplings necessitate the use of fixed condensers, and such fixed condensers need to be somewhat superior in quality to those used in some other positions in a set.

If you refer to a diagram in which "R.C." or choke-capacity coupling is included you will see that the coupling condenser is probably the only barrier against a large proportion of the high-tension voltage being imposed upon the grid of the valve.

It is clear, then, that a coupling condenser must be able to stand up against high voltages without breaking down or developing leakages.

It must have a very high insulation re-

sistance. For this reason it is quite usual to advocate mica condensers for coupling purposes. Mica being reckoned a much superior substance to the paper that figures in some constructions.

Paper Dielectrics.

However, there are some paper condensers that are completely satisfactory for coupling purposes but, again, we must warn readers to place more reliance on reputations than mere printed claims.

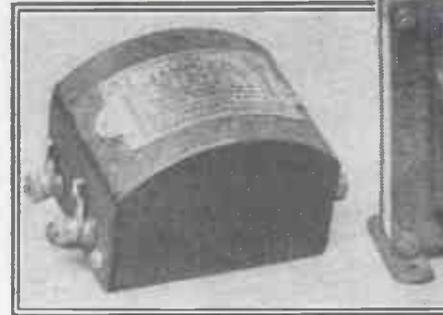
L.F. transformers and L.F. chokes that are used in output arrangements have to fulfil special requirements, and those components which are satisfactory for inter-valve coupling may fail miserably at such points.

We will deal in some detail with the L.F. choke used in this special position—i.e. an output circuit, and practically everything we say in regard to it can be applied to an L.F. transformer so used, in general and its primary winding in particular.

The purpose of an output choke is, broadly speaking, threefold. It takes its place in the anode circuit



An R.C.C. unit, using mica dielectrics, made by The



From left to right you have here, the Lamplugh Whiteley L.F. transformer,

of the last valve and replaces the loud speaker. The L.F. impulses are handed on to the loud speaker through a condenser shunt.

The L.F. choke takes the brunt of the anode current and the loud speaker is saved from its demagnetising, saturating influences. And being as it should, of a lower ohmic resistance than a loud speaker, there is less H.T. voltage drop.

Output Chokes.

Thirdly, it is usually possible more easily to match up the characteristics of the valve with an L.F. choke or the primary of an L.F. transformer than with the magnet or coil windings of a loud speaker.

It is important to note that the inductance of an output choke does not, generally speaking, have to be as great as that of an L.F. choke used in intervalve coupling arrangements. The nearer you get to the end of the set the lower become the impedances of the valves and the lower may become



The "Lewin" L.F. transformer.



Here are (left to right) the Burton L.F. transformer, the Watmel coupling unit, and a Brownie L.F. transformer.

QUALITY COMPONENTS

TRANSFORMERS AND R.C.C. UNITS



the impedances of the external parts of the anode circuit.

But as the impedance of the valve gets less so does the anode current rise until, at the end of the set where you generally find a super-power valve, the anode current may reach 28 to 30 milliamps or even more.

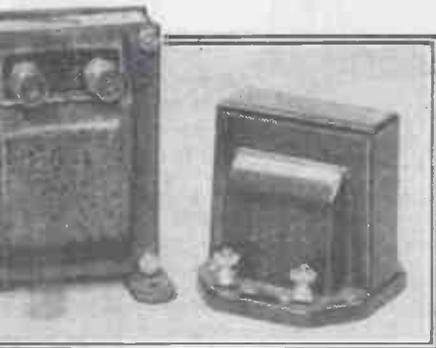
An L.F. choke must be of particularly special design if it is going to be able to handle as much current as this. The

wire must not be excessively thin, and the core must be so constituted that "saturation" is not reached.

Voltage Drop Through Chokes.

At the point of "saturation" or where saturation begins, the inductance of the component begins rapidly to fall off.

An output choke should have a low resistance, 300 ohms or less, whereas an L.F. choke used for inter-valve coupling may have a thousand or two ohm resistance, without occasioning as great an H.F. voltage drop owing to the higher impedance



Golstone (Ward and Goldstone), and Lotus (Garnett, F. Transformers.

of the valve concerned. You can easily work it out yourself, remembering that current times resistance equals voltage.

In the case of a detector valve in whose circuit an L.F. choke may be found, an anode current of only one milliamp or so is all that may be met or even needed. On the other hand, the anode current flowing in the anode circuit of the output valve may be, as we have said before, anything up to 20 or 30 milliamps.

Low self-capacity in an L.F. choke is a vital requirement, for capacity across its terminals will tend to cause a falling-off in high notes.

How Resistances are Made.

Reverting back to inter-valve coupling, we must not forget to mention the vital importance of values. It must always be remembered that no one component has a solo duty to perform. Indeed, the whole success of any circuit will depend upon achieving a correct matching of component parts.

people make this transformer.

It is interesting to note what a large variety of materials and methods have been employed in the manufacture of anode resistances and grid leaks.

In the very early days various paste and compressed powder types of resistances were to be found that were far from being satisfactory.

For some reason it seemed that designers were loth to try other schemes. But they must have explored every possibility of pastes and powders to the utmost.



A filter output choke made by Messrs. A. F. Bulgin.

layers of gold electrolytically deposited on glass and contained in vacuum, and wire-wound types, additionally to carbon and other non-metal varieties.

It is not safe to say that any one scheme is absolutely the best, or that any fails in any particular way.

Current-Carrying Capacity.

There are several different schemes of manufacture, and the vast majority result in satisfactory components.

Remembering the main factors that go to make a satisfactory resistance, it is not hard to confine one's choice to those suitable for particular jobs.

A current-carrying capacity is important in anode resistances, and these should also have negligible self-capacities.

Also all resistances, wherever they figure, should be absolutely impervious to weather and atmospheric changes, and retain their values in face of slightly-changing operating conditions.

Special care must be taken in the choice of variable resistances, more particularly when these have to carry anything in the way of current.

A wire winding in such a case has much

to commend it, although there are two things of vital importance to note. The wire may be thin if it is a resistance of some thousands of ohms, and a rubbing contact, if such is used, must be very carefully designed if it isn't going to wear the wire through in a fairly short time.



This high-ratio Ferranti is the A.F.S.

Variable Resistances.

On the other hand, if the contact is not firm, a poor-running connection may be made, and produce noises.

Constructors should not be prejudiced against variable resistances of the compression type simply because it is well known that earlier specimens failed badly.

Actually there are many compression type variable resistances on the market to-day that are really first-class. These can carry heavy currents where specially designed to do so, and can be used as variable

anode resistances quite safely.

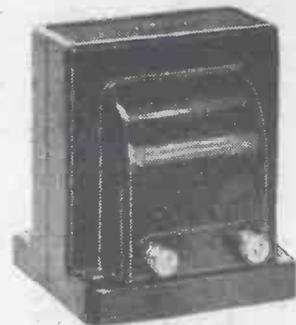
They provide wonderful gradations of resistance, and are reliable and consistent. Particularly does this apply to those that employ special carbon or graphite and mica

mixtures of secret kinds. By the way, don't forget that it often happens that a resistance figuring in an anti-mobo arrangement has to carry just as much current as an anode resistance.

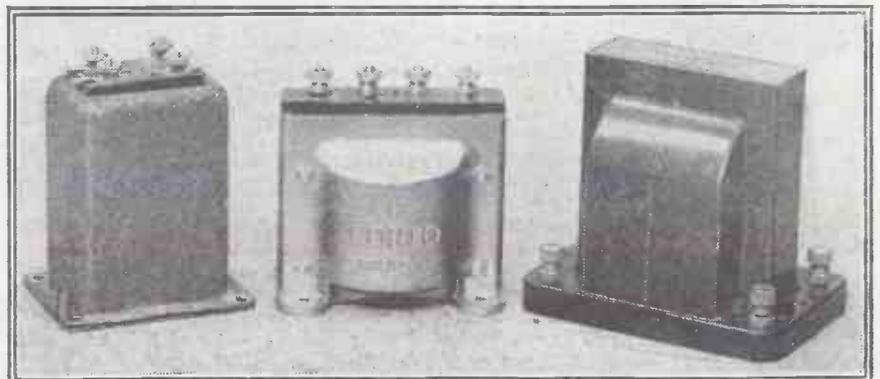
And on the L.F. side this may run into quite a few milliamps.

That reminds me that there are a few points in regard to values that I have not yet dealt with.

(Continued on next page.)



A product of Messrs. Falk and Stadelmann, the Efesca L.F. transformer.



Above, you see (left to right), Pye, Formo, and Brown L.F. transformers.

QUALITY RESULTS!

COUPLING DEVICES.

(Continued from previous page.)

Always adhere closely to the values stipulated in a set design, and remember that if you insert an anti-mobo in a set that does not incorporate one already, you will be dropping the H.T. on the anode of the valve intimately concerned.

Therefore, you should put up the H.T. a little on that valve to get back to your original conditions. If you don't do this your increased stability may be misleading!

You can work out fairly closely the drop occasioned by a resistance by multiplying its ohms by the current passing through it.

Supposing your anode current is about 2 milliamperes and you put in an anti-mobo resistance of 20,000 ohms. You can easily see that you will drop at least some 40 volts, so you should put up your H.T. on that valve to that extent.



A Climax L.F. choke.

It is vital that the material of which the base and case of an R.C.C. unit is made should have absolutely first-class insulating properties, and the same applies to the holders of grid leaks and anode resistances.

Should the material have an appreciable conductance, and by that I mean enable current of an appreciable quantity to pass, the value of the component or components will be badly upset.

Upsetting a Circuit.

Therefore, you see how important it is to pay the strictest of attention to items which ostensibly appear to be rather unimportant.

Perhaps you, with thousands of others, think of, for instance, a grid-leak holder as being of no more real importance electrically, than a grid-leak battery clip. You think of it merely as a mechanical fixing.

But supposing the resistance between the two clips of a grid-leak holder were as low as 2 megohms (two million ohms). Then if a 2 megohm grid leak were held in the holder its effective resistance would be reduced to one megohm because of the parallel path provided by the faulty material of the holder.

And, by the way, we often strike holders that have resistances even lower than 2 megohms, though it is only fair to say that they are not products of the well-known British manufacturers.



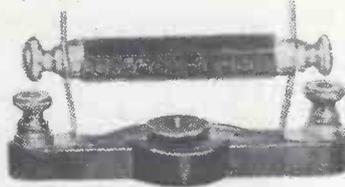
The Brandes L.F. Transformer

You can appreciate

the upset to a circuit when one or more of its grid leaks or anode resistances has its value very badly put out in such a way.

I must not conclude this article without mentioning those special L.F. coupling schemes that certain firms are now producing.

Most of them comprise tapped L.F. chokes, and these are made to act as auto-



A Graham-Farish Anode Resistance.

transformers. An auto-transformer, or auto-coupled transformer, to give it its full title, is a transformer having only the one winding. It is in first essentials an L.F. choke.

But a tapping is taken somewhere between the two ends of the winding. There are, therefore, three terminals.

Auto-Coupled Transformers.

By using two of these, the tapping terminal and a winding-end terminal, you can use a proportion of the one winding as a primary and the whole of the winding as a secondary.

The step-up in voltage will be similar to that which you get in an L.F. transformer, the ratio being that of the turns of wiring between the tapping and the end of the winding and the whole of the winding.

In short, the primary of an auto-transformer is common with a part of the secondary.

The obvious reason why, in the usual way, all L.F. transformers are not of the auto-coupled type is because whereas the secondary has to be a big winding in comparison with the primary, it does not have to carry anything much in the way of current.

It can be and is, therefore, of very thin wire and its resistance is an asset in that it tends to reduce resonance effects. Make it of thick, low-resistance current-carrying wire and you introduce self-capacity, resonance, etc.

But the special coupling units are not merely ordinary tapped L.F. chokes, but for the most part comprise combinations of special tapped chokes and ingenious resistance-capacity shunts. And they do give excellent results.

Regarding R.C.C. Units.

Most R.C.C. units are wired into a circuit just like an L.F. transformer.

You have a small device carrying four terminals that are in fact marked just like most transformers, viz., "A," "Anode" or "P"; "H.T. +"; "G" or "Grid"; "G.B.-" or "Grid Bias."

There are no electrical advantages in

having the components for R.C. coupling nicely fixed up in the one unit.

From the point of view of the results given separate anode resistances, grid leaks and grid condensers can be used just as freely.

Wiring Simplified.

But the complete R.C.C. unit makes for compactness and certainly simplifies wiring for some of the essential circuit connections are, of course, made in the unit itself.

Personally, I prefer an R.C.C. unit that has interchangeable components, so that the anode resistance, or grid condenser, for that matter, can be changed at any time without the necessity of referring to the wiring of the set.

But that is not so important when an amateur builds a set to a published design for the simple reason that the values will be very carefully laid out and variations from them will not be wise.

However, it must be ascertained that the unit carries component parts of exactly the value required for the particular set for which the unit is to be purchased.



Messrs. Ormond make first-class L.F. transformers.

Components "In Team."

Don't be led into accepting one

that has values "near enough." Values in components used in R.C.C. stages are very important indeed.

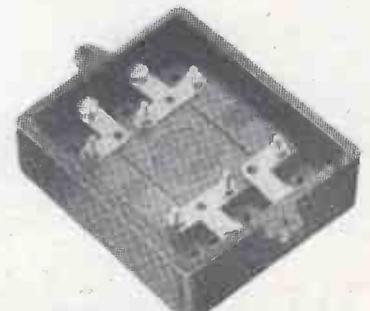
And what must be remembered is that each individual item is working in conjunction with other items, as I have already said.

There is a definite relation between, for instance, the value of the grid leak and that of the grid condenser in an R.C. coupling arrangement.

And you must not alter the value of the one without also altering the value of the other, and only then with a clear insight into the whys and wherefores of the design of amplifier stages.

You see, having altered those two values so that "in a pair" they team up nicely you may have to consider the advisability of rearranging the anode resistance values, changing the valve, altering the H.T., and so on!

The design of a radio set is far from being a haphazard business, and it is up to the constructor to do his bit by using just those items recommended by the designer.



A view of an Edison-Bell R.C.C. Unit.

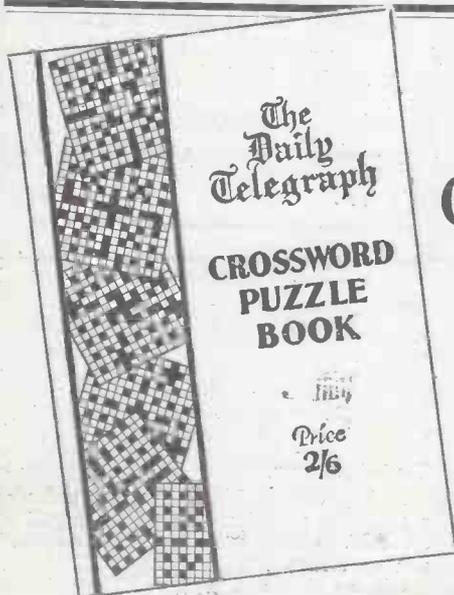


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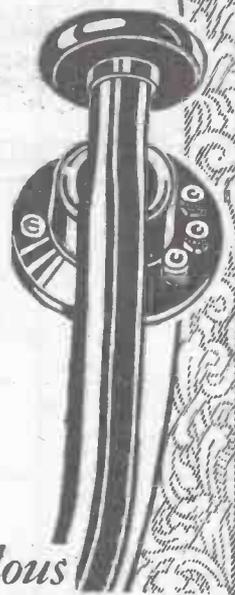
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CAPT. ECKERSLEY'S QUERY CORNER

**A.C. VALVE DETECTOR—THE BEST
AERIAL WIRE—A MAINS PROBLEM—
THE H.F. STOPPER.**

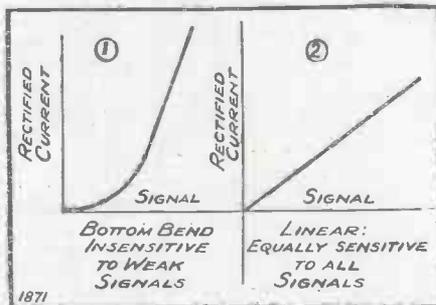
Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

A.C. Valve Detector.

G. C. (Tottenham).—"Is it possible to arrange an indirectly-heated A.C. valve as a detector in such a manner that it can deal with a considerable signal input and yet be very sensitive to weak signals. I understand that the bias would have to be altered to suit the two sets of conditions."

What you are saying is, can I get an indirectly-heated cathode valve which, connected in some way as a detector, has perfectly linear response. Because if you will see my diagrams, one gives a non-

GRID DETECTION BEST



Showing non-linear and linear rectification by a valve detector.

linear bottom bend response, and is insensitive to weak signals. The other, a straight-line detector, is equally sensitive to all intensities of signals (within limits).

It has lately been proved that grid-leak detection approaches linearity provided the valves are correctly chosen. The main point is to use the detector as an L.F. amplifier, plenty of volts on the anode and a not-too-high value of grid leak.

Write to valve manufacturers, putting question and answer as on this page, and they will be sure to help you to choose.

N.B.—Remember, plenty of anode voltage and a smallish (relatively) grid resistance.

The Best Aerial Wire.

B. T. S. (Kilmarnock). "I have recently noticed that most peculiar claims are made for some types of aerial wire, such as an improvement in quality, increased pick-up—in fact, the use of such wire makes a crystal set equivalent to a single-valve receiver.

"I am unable to see how any aerial wire can possibly make this difference, and I should be glad to receive an explanation of this."

I am unable to see how any aerial wire composed of an ordinary copper wire and arranged physically in exactly the same way can increase the sensitivity of the set to which it is connected.

It, maybe, is a failing of mine, and I may be ignorant, and without doubt those who claim the advantages you enumerate must have an honest motive, but, as a technician, I fail to see the technical processes which bring about the effect claimed.

I am sorry to expose my ignorance but, always desiring to learn, perhaps you could write to those who claim the superiority, and ask them exactly what it is that happens, and if you would then write and tell me I would be extremely grateful to you.

After all, those discoveries should be given to the scientific world because patents protect the inventors commercially.

A Mains Problem.

V. L. (Tottenham, N. 17).—"Here is an interesting problem I came up against recently.

"I owned a four-valve set incorporating an ordinary neutralised H.F. valve which normally gave me a good degree of selectivity at the above address. Having

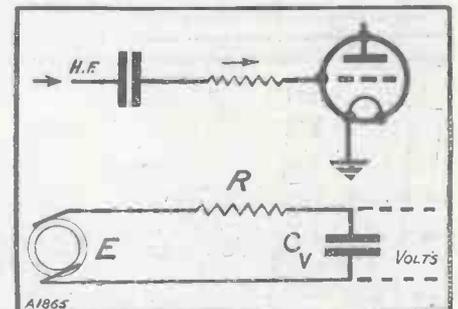
ing A.C. mains available, I decided to change over to directly-heated A.C. valves, and, having done so, found to my dismay that the aerial tuning had become extremely 'flat.'

"I tested all voltages, coils, aerial and earth, and made certain the H.F. valve was properly neutralised, yet the trouble still persists. Can you kindly suggest how I might overcome the difficulty?"

You have changed nothing except the valves. I assume that the magnification obtained is much the same as before and that you are not mistaking greatly increased sensitivity for apparent lack of selectivity, which is one possible explanation.

I reject it because you have given me no evidence that such is the case; but if it is so, reduce the size of your aerial, when apparent selectivity will be restored. But you have done something else; you have tied on to your earth point a great mass of electric wiring.

THE H.F. STOPPER



How the series grid resistance works.

You have, in fact, brought up your mains to the set, and the high frequency may be all over the place because of this. May I suggest putting a pair of air-cored chokes in your incoming mains leads and perhaps a SMALL condenser across as shown?

The H.F. Stopper.

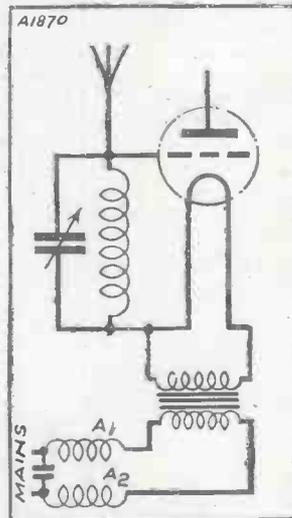
A. T. (Muswell Hill).—"Is the value of a grid leak used in series with the grid of an L.F. valve as an 'H.F. stopper' usually critical?"

Oh, no, it's not critical. The point is that the electrical system can be represented as a voltage applied in series with a resistance to a condenser. (See above.)

We want the resistance R to be of such a high impedance compared with the grid earth capacity of the valve (Cv), that impedance of Cv is negligible compared to R.

If Cv is 10 m-mfds. and the frequency is 10⁶, say, then impedance of Cv is about 15,000 ohms, and R has to be larger than that by, say, five times. But I don't know what the value of Cv is taken to be. At any rate, R is not critical, surely.

CHOKING THE MAINS

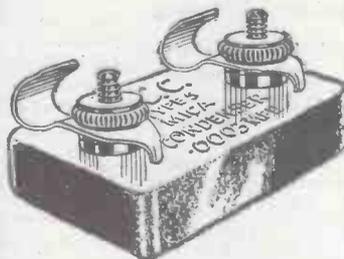


Using H.F. chokes in the mains supply.

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The condenser illustrated is the .0003 mfd. T.C.C. flat mica type 1/3d.

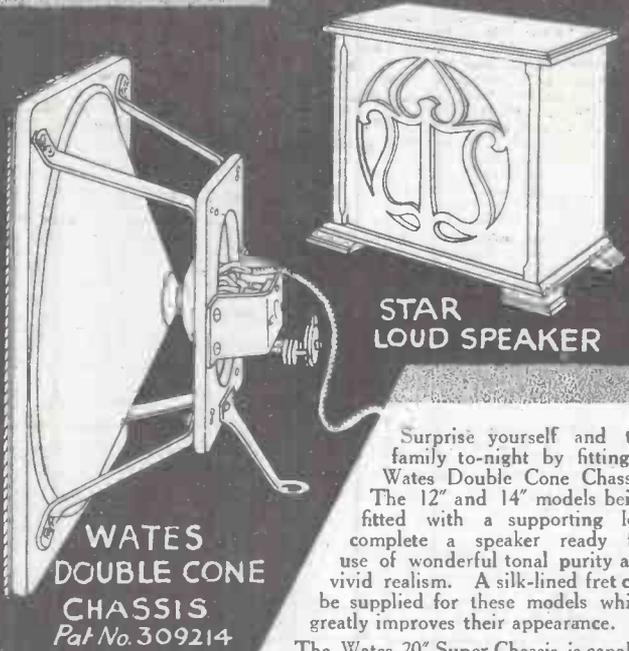
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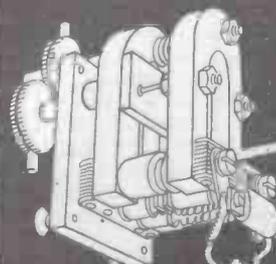
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WATES STAR UNIT

M.B.

THE PERFECT SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have found the "Perfect Set" for local conditions. As I am interested in foreign stations as well as the local, and as the two B.P. Stations come in on a loud speaker worked off a crystal set I required something above the average.

I have made up the "Magic" Three, the "Magic" Four, the "Magic" Two, and the "Magic" H.F. Unit, and given them all a good try-out.

The "Three" with the addition of a "Brookmans Rejector" gave good results on foreign stations, but was really too powerful for local reception, as even with a volume control, it was hard to get really good quality. The only way to get really good quality was to use an indoor aerial about 6 ft. long.

The "Four" is a fine set. Very selective and there is no need to use a wave trap with it. I have got over 60 stations with it at good loud-speaker strength, but the same trouble occurs with the local. I could get both B.P.'s with an inside aerial, 4 ft. long, at full loud-speaker strength.

Then I made the "Two." The quality on the two B.P.'s is superb. I have an old reaction condenser in the aerial lead and mounted on the panel. With this in action there is no need of a wave-trap as the two B.P.'s are quite separate, and it also acts as a most delightful volume control. I have also built in the H.F. unit so that I can switch it on when required, and with this in action I can get all the stations I want. The long-wave stations are so strong that one has to shout to make oneself heard in a large room and the quality almost as good as the locals.

I use a pentode and an output filter with a Regentone mains unit and large cone speaker.

When using the H.F. unit, of course, the condenser in the aerial lead is not required as the set is very selective.

I should like to thank your staff for the very fine sets you turn out.

Now what about a "Magic" Four, with two H.F. stages and plug-in 2-pln coils, with three tuned stages, not ganged? A "Super Magic"!

Yours faithfully,
C. H. N. SMITH.

Ealing, W. 13.

TWO FINE SETS.

To The Editor, POPULAR WIRELESS.

Dear Sir,—I have just made your "Economy" Three, and I wish to congratulate you for same. This set should fill a long-felt want; the volume with 120 volts H.T. is amazing. I have not had an opportunity of testing for selectivity as yet. Can you give me the number of turns required for a coil for 5 X X?

260 X-coil, 75 or 100 for reaction.—Ed.
Whilst on the subject, my colleague wishes to thank you for the "Magic" Three (we make these sets alternatively as they are introduced), also every success to the "Blue" 'un.

Yours faithfully,
F. V. ALMER.

Leicester.

CORRESPONDENCE.

THE PERFECT SET.

TWO FINE SETS.
A VICTOR-KING "MAGIC."
THE "MAGIC" FOUR.

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

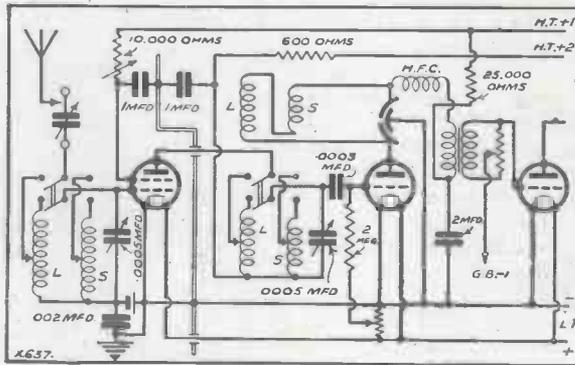
A VICTOR-KING "MAGIC."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have been most pleased with the "Magic Four" ever since I built it—its stability when working from D.C. eliminators, its selectivity and its tremendous volume have been its most pleasing features, and yet there is one drawback as against your "Titan" series, and that is the necessity of changing three coils whenever one wished to change from one wave-band to the other.

I have watched with interest the various ideas for "wave-changing," but I have not liked the idea of eight point switches and six coil holders and coils in the set, and so, until I read about the "Vee-Kay" Four in "Wireless Constructor" July, 1930, I have not done anything to do away with the rather tiresome business of coil changing. I thought it would

A FINE FOUR-VALVER.



Mr. Currie's "Magic" circuit, which includes a Victor King wave-change scheme.

be a good idea to try Mr. King's method on the "Magic" Four, and I am pleased to say that my new "Vee-Kay-Magic" Four comes well up to expectations.

I left the L.F. end of the set as it was, put in the extra coil holder in the H.F. end and used a Wearite D.P.D.T. switch for wave-changing. Then I used the old reaction coil holder for the extra coil in the tuned anode, and made the two neat and ridiculously cheap reaction coils as specified by Mr. King (a hank of 20 turns of No. 26 gauge D.C.C. stuck on to the short-wave coil, and a hank of 50 turns of No. 32 D.S.C. stuck on to the long-wave coil).

These were connected in series and were connected to the plate of the detector valve, the differential reaction condenser and H.F. choke exactly as in the old "Magic" Four. I used a second Wearite D.P.D.T. switch for changing over the anode coils and on the first try-out the results were perfect.

When one thinks that a perfect reaction coil can be made for any of the "Magic" series for a penny, and the coil holder dispensed with, one would think that it is worth while for any set builder to seriously consider this method of sticking his reaction coils on to the "X" coils and fastening two crocodile clips on to the ends of the wire.

He has then a double coil with all the advantages of the two-coil method, and a saving of about 5/-. Also this method of obtaining reaction by two coils in series is so simple that one would have thought that it would have been given more prominence before now.

Yours truly,
DONALD I. CURRIE.

Denbighshire.

THE "MAGIC" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir,—Since my last letter, I gave up the "Magic" Three and have now built the "Magic" Four 1930, and I am glad to inform you that it has turned out better than I expected. The volume is terrific, and this set is fit for a very large hall. I am getting all the S.A. stations at more than I can bear strength.

But, on the short waves, it is simply marvellous; the tuning is very simple and some stations I can tune-in as if I was tuning in the local broadcasting stations. On some it is free from hand-capacity entirely.

In order that you may be able to verify, I mention that on Monday, 19th May, I got G 5 S W broadcasting an International Concert, I got him when he was broadcasting from Brussels, from where he went on to London.

In conclusion, please accept my sincere congratulations for the set and thanks for same.

Yours faithfully,
M. D. BARMANIA.

Umzimkulu, E.G., South Africa.

JUDGING from the steady fall in my correspondence of late, I should imagine that most of the true short-wave enthusiasts are now engaged in the peaceful occupation of sun-bathing on the beach of some distant resort, far from the worries of radio.

Perhaps I may be allowed to tell them that they are not missing anything! The short waves are still dead, and I, personally, am getting all ready to bury the corpse. It hardly seems as if those good conditions that we all expect daily are ever destined to return.

Probably my departure for a fortnight's holiday later on will coincide with a phenomenal improvement—for a fortnight! A New Norwegian.

The remarkable fact is that the high-powered stations are hardly affected at all; but the amateurs, even the "semi-commercial" amateurs, are completely blotted out. V K 2 M E, Sydney, for instance, is still being heard consistently by a number of my correspondents. The "Elettra" on 26 metres, comes next in order, and quite a number mention a new Norwegian broadcasting station on 31 metres.

Rome (3 R O) on about 33 metres, is not attracting quite so much attention as when he first came on, but several readers mention Rome on 80 metres as being a good station on which to test.

SHORT-WAVE NOTES.

By W. L. S.

My stock station for showing non-technical visitors is Zeesen. Quality of reproduction (even on my "hot-stuff" short-waver) is so amazingly good, and strength so great that it never fails to impress the ordinary broadcast listener, who has probably never heard a German station so strongly in his life, even with a set using twice the number of valves.

I have to hand an interesting letter from an amateur in Nigeria. The most striking point in the letter is that he says nothing is ever attempted about 40 metres on account of atmospherics. This alone ought to encourage some of our enterprising firms to make "Overseas Model" receivers. This gentleman uses a "Thomas Model Short-Waver," described in "M.W." some time back, although he has had several other sets at different times.

X's and Wavelength.

As usual, he mentions Huizen as the star station, with runners-up in the persons of Bandceng P L E, Kootwyk, W 2 X A D,

W 8 X K, Rome 3 R O, and G 5 S W quite passable on occasions.

In connection with atmospherics, he says that they are rarely audible below 17 metres, even during a lightning storm. I confirm this from my own recent experiences. Above 25 metres he finds it is almost impossible to work during daylight for months on end, although the noise quiets down after 10 p.m.

Yes, J. F., I confirm all your remarks about G 5 S W, but I think a change is imminent. I think the wave-length used is against the station, in the first place. The 31-metre stations probably get out better simply by virtue of the different wave-length, apart from the question of power or efficiency.

That "Mush."

This atmospheric and "mush" business is very puzzling, even here in London. At certain times of the year when conditions are good enough to warrant one's loss of sleep in the early morning, there is often a queer rushing sound to be heard that is absent at all other times of day. This seems to come in only when conditions are extra good, and I have noticed it repeatedly over a period of several years.

One can, conversely, always tell a bad morning or evening by the complete absence of background.

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and gives
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EDISWAN W.84

THREE NEW CHARTS



Build your own **FERRANTI H.T. SUPPLY UNIT**

The Ferranti H.T. Supply Units are accepted as the standard by which all such apparatus should be judged. They are designed to afford adequate power, silent power—and completely safe power. Constructional charts are available from which it is easily possible to build a unit exactly suited to your needs; a unit which will conform entirely with the requirements of the Institution of Electrical Engineers.

Here are given brief details of the three latest charts. Make your choice—or write to us stating requirements and put an end once and for all to the H.T. battery bugbear.

TYPE No. 1.—Describes a unit for use on A.C. Mains of 200/250-volt 40/100 cycles. Incorporates a Westinghouse Metal Rectifier. Capable of an output of up to 100 milliamps at 200 volts (at lower milliamp outputs the voltage is higher). Designed for use with the most powerful receivers and amplifiers that can be used in the home. The instructions show that by the omission of certain components the unit can be adapted specially for feeding all sets of the Screened Grid Three type.

TYPE No. 2.—This has a similar performance in every way to Type No. 1, except that it employs a Valve Rectifier which is lower in price, but may need replacement from time to time. The output is up to 80 milliamps at 200 volts.

TYPES 7 and 8.—This chart describes two units. One is suitable for three-valve receivers calling for not more than 120 volts, 20 milliamps, and the other is for use with similar receivers having a rather larger Super Power Valve in the output stage. It gives 180 volts, 30 milliamps.

FERRANTI LTD. HOLLINWOOD LANCASHIRE



All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Life, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS.

A "MAGIC" THREE FAULT.

H. G. (Sheffield).—"I have recently made up your 'Magic' Three for a friend of mine, and am somewhat disappointed with the results therefrom. I have taken great pains with the wiring, and have placed the components slightly wider apart than the design as issued in 'P.W.', owing to the fact I had a larger panel and baseboard at my disposal. Results on the long waves are pretty satisfactory and volume on 5 X X excellent.

CAN WE HELP YOU WITH YOUR SET?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

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 free and 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.

Radio Paris and Hilversum are at fair loud-speaker strength. It is on the medium wave-band, however, where the fault lies.

"5 G B, Local, Manchester, are all good speaker strength, but when we try for the foreign stations results are poor. I have used all good parts.

"The coils are made up as detailed in a recent article in 'P.W.', except that I have made them all X coils, tapping them pro rata as for the 60 X size. I made a 75 X; 50 X and a 200 X and have used two C.T. coils, 35 and 100 for reaction, not using the C.T. terminal, of course.

"The aerial condenser is of modern design, fitted with S.M. dial. On tuning with this

condenser, which is O.K. mechanically and electrically, the stations all seem cramped from 0 to 50 degrees, but nothing but morse signals above this reading.

"On my own set (the "Radiano Titan") the stations are all spread evenly over the dial so it makes me think there is something wrong with the aerial or det. end of the set.

"My friend's aerial is about 60 ft. single wire, well insulated, led in direct through the window, the only joint being in the lead-in tube. Earth is a galvanised pole with lead soldered into it.

"The lead-in is only 6 ft. long. Good batteries, etc. Can you throw any light on my trouble?"

("P.S.—The B.P. rejector is a really great device and does all you claim.")

We are afraid that the trouble lies in that home-made tuning coil you are using for the L.1 socket. Are you sure that the number of turns, etc., is correct, and have you got it so arranged that the aerial is tapped at the lower end of the coil and not in towards the top of it?

If the tuning condenser is of .0005 capacity and the stations tend to be all in the first 50 degrees, it is almost certain that the coil is much too big and that some of the turns taken off it would assist in curing the trouble.

We should try the effect of using a bought 60 coil so as to compare it if you can get hold of one, and also of reversing the coil holder connections if necessary.

(The improvement to the anode resistance that you mention would probably make for better control and ease of handling, but it would not affect the placing of the stations on your dial, which is the real trouble. The only thing that is likely to affect this is the reduction of the capacity of the aerial tuning condenser if too big (which seems very unlikely) or a reduction in the number of turns of wire in the coil which is tuned by this condenser.)

IMPROVING SELECTIVITY WITHOUT ALTERING THE SET.

H. J. (Hampstead).—"I wonder if you could help me with the following rather unusual circumstance? The set I am using is a three-valve which belongs to a friend who has gone abroad for twelve months, and who lent me it to use exactly as I like while he is away.

"It has been a great blessing, and was absolutely perfect before the London station went to Brookmans Park, when a certain amount of trouble occurred by getting two programmes mixed up together. However, it was bearable and by altering the tuning I could generally get the one I wanted most.

"Recently, however, I moved to a different address where I find that I am quite unable to separate the two. I have called in the local wireless people and two of them have told me the same tale, namely, that I must alter the set to a more up-to-date circuit.

"As it is not my own set, I am particularly loth to do this, so I come to you as a last resort. Is there any way so that I can get either programme, and hand the set over to my friend exactly as I received it?"

Yes, you can improve the selectivity by external alterations alone, if you are prepared to make a simple modification.

What you will have to do is to undo the aerial from the aerial terminal on the set, and take it to a new little unit, a lead from this unit going to your aerial terminal in place of the direct lead as before. The unit consists of a plug-in coil holder, a plug-in coil size No. 60 or 50, and a variable condenser of about .0005 mfd. maximum capacity to tune this coil.

The condenser can be either of the ordinary tuning type known as an "air" condenser, or one of the small semi-variable condensers that are boxed up and have a screw-down adjustment which enables the capacity to be altered. In addition to these you will need a very small neutralising condenser and a couple of terminals.

Mount the coil holder and the condenser on a board or panel, or in a box in any convenient way, with the neutralising condenser standing close and the two terminals conveniently placed upon the unit. Mark one of the terminals A and the other E.

Now join up the A terminal to one side of the coil holder, to one side of the variable tuning condenser, and to one side of the neutralising condenser. Join the E terminal to the remaining side of the condenser, and to the remaining side of the coil holder.

EASY ALTERATION.

The unit is now ready and all you have to do is to take the aerial lead off the set, place it on the A terminal of the unit. Leave the earth lead joined to the set, but connect it also to the unit's E terminal.

Then take a short piece of flexible wire and run it from the aerial terminal on your set to that side of the neutralising condenser which was left vacant. Set this condenser about half-way round or less, and then tune your new variable (or semi-variable) condenser.

The easiest way to do this is to leave the condenser in the set adjusted to its normal position for tuning, say, the London Regional, and vary the new condenser on the unit until the programme from this station comes in at good strength.

You will find you can then vary the volume by readjusting the neutralising condenser, and after a satisfactory strength has been obtained note the positions of the two variable condensers for the London Regional station, and repeat this procedure for the National Programme. That is to say, first tune the set to receive the National programme with the aerial in its former position, and then transfer the aerial to the unit and tune the unit until the National programme also has been brought in there, noting the condenser setting for this station.

It will be found that when the unit is in use the tuning is not, as before, very wide or non-selective, but is extremely sharp, and, in fact, you may have some little difficulty at first in finding either of the transmissions unless the tuning on the set itself is properly adjusted to that station.

When you have found the respective readings all you have to do is to leave the unit in circuit permanently and to adjust the condensers to their

(Continued on page 628.)

TECHNICAL TWISTERS

No. 22. NEUTRALISING.

CAN YOU FILL IN THE MISSING LETTERS?

Prior to the advent of the S.G. valve, high-frequency amplifying valves were unstable, owing to the between the grid and plate.

The effect was as if a small had been joined between these points, permitting a certain amount of feed-back.

To neutralise this, a small was connected externally between and circuits.

By means of a separate neutralising winding it was provided with impulses which were in pressure but opposite in to those causing the instability.

The missing words (in order) of T. T. No. 21 were: Directional; Rotated; Directions; Maximum; Interference.

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238



AMAZING DELICACY OF TOUCH

that records exact rendering, without scratch, with perfect balance of tone and volume.

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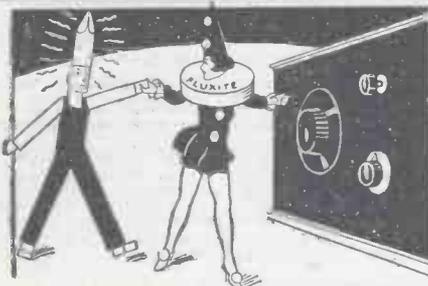
Ask your dealer to let you hear it, then try out your favourite records at home. The difference will astonish you. Obtainable from all good-class dealers or write direct for illustrated literature describing this perfected instrument.

Wates Star Pick-Up, oxidized copper finish, complete with adapter to fit any type of tone arm, 21/-.
Wates Pick-Up Arm, finish to match pick-up, 7/6.

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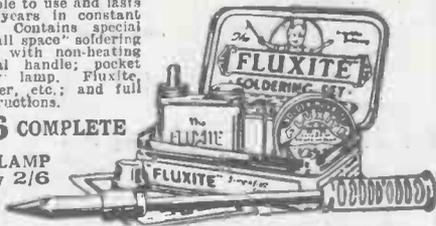
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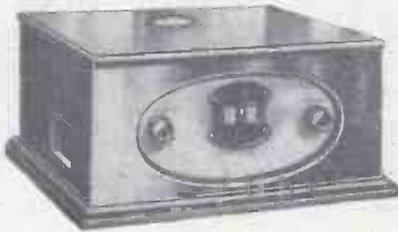
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In appearance, an elegant piece of furniture of which you can be proud—not merely a cabinet.

Running costs practically nil. No batteries needed—all power being taken direct from the electric light mains.

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Lotus Works, Mill Lane, Liverpool.

Causton.

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 626.)

respective readings as required. Probably you will find that with the unit thus installed you can make selectivity so sharp that it is necessary to know the settings for the stations, for it may be quite easy to pass them altogether unless you know where to look for them.

THE "EUROPEAN" THREE.

D. F. T. (Exmouth, Devon).—"I am going to build the 'European' Three, described in July 26th 'P.W.', but should like to use an R.C. stage instead of two transformers, if possible.

"Left over from my old set I have a 'second stage' R.C. unit in good condition. It is marked +, A. G. and L.T. Where should these connections go?"

You should get good results from the arrangement. Mount the unit on the baseboard in place of L.F.T.2. "L.T." on your unit corresponds with G.B. —, "G" with "—G."; "A" with "Plate"; and "+" on the unit corresponds with "H.T. + transformer connection.

WHAT DO YOU THINK ABOUT THIS?

A Lambeth reader of "P.W." worked a home-made loud speaker from a "Magic" Three with such success that another "Magic" Three enthusiast (who lived at Croydon) commissioned a similar loud speaker.

The set, the loud-speaker unit, the chassis, and the L.S. cabinet, etc., were all duplicated, and when finished the second loud speaker worked magnificently on the Lambeth set. But when taken (by 'bus) to Croydon and connected up there, it was insensitive and unsatisfactory. The set to which it was joined was in perfect order, and all connections were O.K. So eventually the new loud speaker was examined again, and it was found that—

Can you guess what was wrong?

N.B.—There is no prize for answering this, but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to the above next week.)

The trouble which was described last week—loss of signals when an S.G. H.F. unit was connected up—proved to be due to a confusion of the valve's connections. (The terminal on the top of the bulb is the plate, or anode, or output terminal, and not the screen. The screen is joined to that pin of the valve which is opposite the grid pin.)

LOUD-SPEAKER CONNECTIONS.

L. N. (Herts.).—"The whole time it has been in action the set has given the utmost satisfaction, and I was particularly pleased with the loud-speaker reproduction, because I had made the instrument myself (the Mural Cone), from the instructions in 'P.W.'"

"Unfortunately, the loud speaker suddenly failed me, so I took it to a friend for an overhaul, and he told me that it was 'de-magnetised' and useless. I cannot make out why it should give out in such a fashion, and should be very glad if you could tell me the reason and how I can put it right."

Your connections between the set and the speaker were wrong. Except in cases where an output filter circuit is used, it is very important that the loud speaker should be connected in circuit the right way round.

Here is the reason. If you look at the diagram from which it was built, or if you examine the set itself, you will see that the plate terminal of its last valve holder is connected to one of the "loud speaker" terminals, the other "loud speaker" terminal going to the H.T. positive on the battery. So all the current from the H.T. battery to the plate has to flow through the loud speaker,

Whenever an electric current is flowing it is accompanied by a magnetic effect, so that by running a current through the loud-speaker windings you are, at the same time, introducing a magnetic action there.

Now the loud speaker itself depends for its action upon a magnetic field around the permanent magnet inside it, and every loud-speaker manufacturer knows that a valve's plate current running through the instrument will either assist this permanent magnetism, or oppose it, according to the direction in which that current is made to flow.

If you examine your loud-speaker terminals you will find that one of them is marked + and the other — or else one has a red terminal and the other a black one, or some other distinguishing mark has been arranged for so that the two can be distinguished.

If the actual terminals of the loud speaker are hidden from sight and, instead, it is provided with a cord, you will find that the two ends of the cord are distinguished from one another in a similar fashion. Probably one is coloured red, or has a red thread running through it, or the tag itself is shaped or coloured or marked, for identification of + and — leads.

Similarly, that loud-speaker terminal on your set, which is connected (internally) to the H.T. + terminal, should be marked with a + sign, and the other loud-speaker terminal (which goes to the plate of the last valve) should be marked with a — sign.

When you connect up your loud-speaker leads the red one (or that which is marked +) should ALWAYS be joined to the + loud-speaker terminal on the set. And the — loud-speaker lead should, of course, go to the — loud-speaker terminal on the set.

When joined in this way, current flowing through the instrument will not be opposing the permanent magnets inside it. If the leads are reversed, your current is continually at variance with the permanent magnets, and in due time they will suffer to such an extent that results will "fall off," and the speaker become relatively insensitive or silent altogether.

It is then said to be "de-magnetised," and this, no doubt, is the trouble with your speaker.

Unfortunately, the trouble is one which can only be put right by a properly-equipped factory, so we should inquire of the makers whether they are prepared to do this for you. Possibly they may recommend you to get it re-magnetised by another firm specialising in this class of work, but in any case the job is one that cannot be undertaken by an amateur.

SHORTING THE SHORT-WAVE CONDENSER.

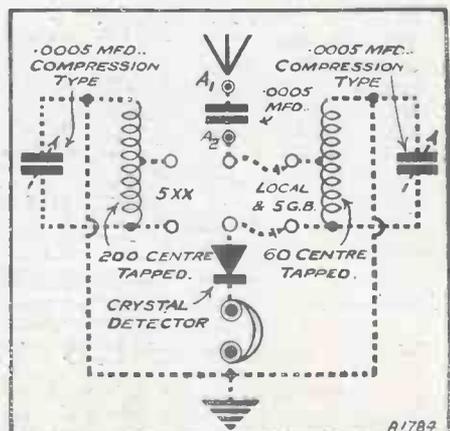
S. W. P. (Paddington, London, W.).—"For the short waves I want to use a .0003 condenser (fixed) in series with the ordinary tuning condenser, to give finer tuning. Would it be O.K. to bring this fixed condenser in and out of circuit by an ordinary on-off switch on the panel?"

The method you suggest is quite satisfactory, provided it is carried out properly.

The leads to the panel must be short and well-spaced, and the switch itself must be one with a good strong contact in the "on" position.

When in the "off" position it must merely open the circuit definitely and cleanly, so, provided you choose a suitable switch and fit it properly, the scheme should give good results.

POPULAR "WIRELETS" No. 16

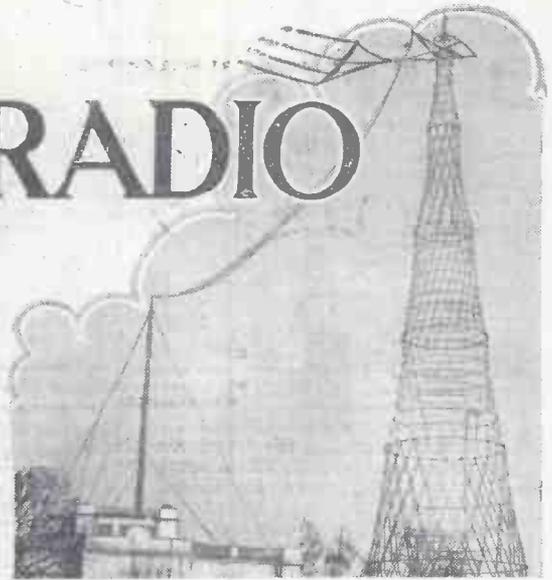


The dotted lines show the connections of last week's "Wirelet" the circuit providing easy wavelength-changing without the necessity of re-tuning after the condensers have once been set.

RUSSIA'S "RED" RADIO

Details of broadcasting in Russia, where talks take up the greater part of the programmes.

From a SPECIAL CORRESPONDENT.



THE Soviet did fairly well out of the Prague wave-length conference—and it meant to do so! Broadcasting is a communistic thing which the heads of the Soviet regard as one of their most dangerous weapons, and they intended to get as many exclusive wave-lengths as they could.

In the end they got only one exclusive wave—Kharkov's 1,304 metres—but they have ten others, all on the long waves: and what a lot of talk is broadcast! Komintern's 40 kilowatt station comes in well, though most of the other Russian stations are difficult to get just now, and broadcasts in many languages (including English) but mostly Russian, of course, are given. One talk follows another.

Behind the Scenes.

What is it, ask those who don't understand the language? Is it educational talk, or dangerous Soviet propaganda? Let me take you behind the scenes of Soviet broadcasting.

Last year there was a rumour that "the Russian stations" were sending out anti-Polish propaganda in order to create a new European trouble, and that a Polish amateur station had been started to jam the Russian transmissions. Two daily papers in this country took up the rumour and said that Russian broadcasting ought to be controlled—or stopped!

Needless to say, there was nothing serious in the rumour. There was a station transmitting the offending talks, but it was proved to be run by a couple of amateurs, financed by a political party of no importance, and the power was only a few watts. Directly the Soviet Government heard of this, strict action was taken. Stirring up radio trouble is not the Soviet's way of going about things, although "red" propaganda without direct reference to any station is broadcast day after day.

Witch-craft!

Now, there is a body known as the Radio Peredacha in Moscow. This arranges programmes and directs the amount of Russian patriotism which shall be broad-

cast. It is more of a Government body than the B.B.C. It is the Soviet's "Publicity Agent."

What dwellers outside Russia fail to understand is that the Soviet is not wishing to convert the world to "Bolshie"-ism. It wants first to bring the whole of Russia into line. That is why there is so much talk on the wireless. It is 75 per cent high-pressure education!

Look up the list of Russia's stations, and you will find Moscow, Kiev, Sverdlovsk, Moscow-Stchelkovo, Leningrad, Tiflis, Rostov, Moscow Popoff, Kharkov, Bakou and Moscow Komintern—eleven altogether; yet there are actually over fifty stations working in Russia, many of them not recognised by the Soviet.

A big difficulty is that Russia is so large, and is peopled largely by village folk. This latter disadvantage is hard to dispel, for the simple peasants are afraid of wireless, and the Soviet has had to send many technical men touring the country to prove, in the outlying districts, that ether-waves don't work witch-craft!

There was a remarkable instance, at the opening of the New Komintern station, of the ignorance of the country folk. A party of farmers in the village of Wiatchka, who were able to hear radio for the first time, were invited to a communal-listening

meeting; but they held a meeting on their own, first of all, and decided that the radio waves were the cause of the bad crops at the beginning of the year. Then they cheerfully burnt down the house where the Soviet test receiver was installed, and chased the Soviet radio officials out of the village!

The Urge to Educate.

Yet the idea of the Soviet is to run radio *by* the people for the people. A strange sight to a foreigner is the costume worn by station officials. Coarse caps, mufflers and leather jerkins are the order of the day, but anyone who has been to Leningrad in the after-Revolution years will know that this is in keeping with the present communistic Soviet ideas.

The capital is a gay city at night, in parts, but the lack of money and the depressing communistic schools and kitchens, which make mere "units" of men and women alike, are reflected in the broadcasting.

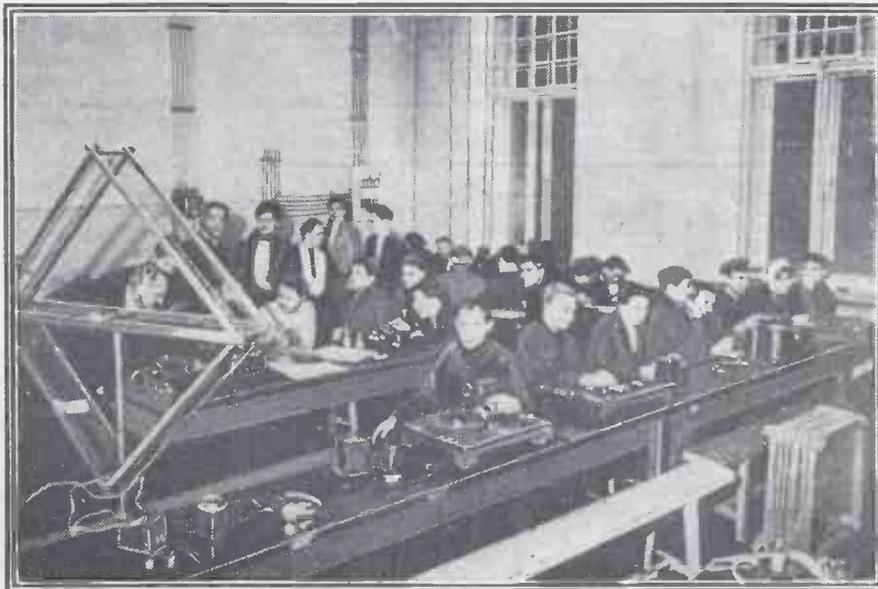
In Russia there is, to-day, an educational "urge," and the average Englishman who understands Russian will not want to listen to the Soviet stations for more than a few minutes. To cover the whole of the country the talks are given in four dialects, and in English, Finnish and Esperanto.

All Talk!

There is a children's hour, as unlike our own as could be imagined, for, again, it is all talk. The little children are, after the Revolution, known as the Young Lenin, and the Young Lenin talks on the wireless are for kiddies up to about ten years of age.

It is harmless "school" talk, and not anti-British propaganda; so we needn't bother!

IN A RADIO INSTITUTE AT MOSCOW



The main use of broadcasting in Russia is for educational purposes, but many of the peasants think it is witch-craft, and therefore practical radio instruction is very necessary.

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fitted with
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(fits into ear)
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Croft Works, Priory Place, Coventry

FOR THE LISTENER.

(Continued from page 608.)

"Go and look under the faggot of sticks in the cowshed."

Everybody laughed, because they thought it was a joke; but nobody, not even Giuseppe, stirred.

Then Belinda (me ventriloquising) said: "Will Giuseppe wipe his nose and go and look under the sticks in the cowshed!" At last they got him to go, and he came back, smiling all over his face, with a small model aeroplane in his hand.

This part of the programme was such a success that we have since learned the birthdays of the whole neighbourhood, from the least unto the greatest! We therefore doubt whether it was really a success after all!

Jazz.

Luckily we got into the tail end of a dance programme from Rome. They liked it. There were six couples. Gravel or grass seemed to make no difference to them.

Personally, I'm not much good at it anyway, and the unevenness of the orchard ground rather cramped my style; but I did my duty like a man, and if I found my buxom partner's toes more often than usual.

These Italians dance with fire. They also hug you. It was a tinny, and not very exciting, band. Heaven knows what would have happened if it had been Jack Payne's!

Sports.

Then we sat down, counting our bruises, to listen to some "sports notes." This is a universal feature in Continental Sunday programmes.

I would have given them a bob all round if I could have heard how the Test Match had gone on Saturday; but apparently the Test Match means nothing to Rome, where Mussolini is safe from challenge by Bradman.

Then I switched them over to Langenberg for a running commentary on the "International Riding Tournament" in German.

I translated for them, but got rather muddled; so I picked up (clever!) Paris and a talk on a "Cycle Tour of France," which was easier. I asked them which language they liked best, after their own; and with one accord they said "Inglese!" I acknowledged the compliment, while Belinda went off into a roar of atmospherics.

THE SET OF THE FUTURE.

(Continued from page 607.)

convenience, and in the end one takes a convenience for granted, whereas a thing of beauty is a joy for ever.

The B.B.C. is going to spend over half a million pounds on the technical equipment of the Regional Scheme, and no one yet has sat down and asked themselves seriously how the technical equipment can be used for the greatest benefit for all.

There are many difficulties delaying the development of the "Morris of the Ether." There is chiefly the fact that the technical man has to compromise in his design because the customer insists on distant listening as he says it assists variety.

Hence bad quality and bad performance; hence the failure to produce something truly right from all points of view. The Regional Scheme could be made to give true variety when the purely local-station cheap set would have a greater appeal. It has not much hope now.

I have proposed, and still believe my proposal merits perhaps more serious consideration than it has received, that a true variety might be given if one wave-length of the Regional Scheme were devoted to the B.B.C. (National), while the other was handed over, with proper guarantees, to private enterprise. I know there are difficulties, but there are always difficulties.

TECHNICAL NOTES.

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

Short-Wave Reliability.

THE importance and reliability of short-wave communication is still further emphasised by the decision to install a short-wave transmitter as a permanent part of the equipment of the League of Nations Broadcasting Station.

You will remember that the question of the establishment of this station has been under discussion for some two or three years past and the matter has been delayed owing to Swiss fears that, in the event of a European war, the neutrality of Switzerland might be involved. I understand that the Radio Suisse Company has actually commenced work in connection with this new station and that both a short-wave and a medium-wave transmitter will be employed.

In this way it will be possible to transmit *communiqués* to all parts of the world. The actual power of the station is still under consideration, but I understand it will be in the region of 50 k.w.

For Broadcast Relays.

The normal purpose of the station will be to transmit its communications to countries which are members of the League, but as this will not occupy a great deal of its time, it will also be used for the relaying of various European broadcasts. In this way the station will make certain European broadcast programmes available to British listeners, whilst on the other hand, certain British programmes will be made through this station available to Europe and other parts of the world.

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

The First Valve.

I wonder how many of you know that the first valve with which Dr. de Forest commenced his experiments (which eventually resulted in the development of the 3-electrode valve) was made with a gas-flame with two wire electrodes inserted into it?

Working, in 1907, with a large spark coil, he noticed that every time a spark occurred across the gap a Welsbach gaslight nearby would flicker. It occurred to him that the wireless waves sent out from the high-tension spark must have some influence on the heated gas within the gas mantle.

He then set to work to make a little spoon-shaped electrode, containing common table salt, which was supported upon a wire and introduced into the flame, whilst above this he placed a small piece of platinum wire to act as another electrode. A battery and receiver were shunted between these two electrodes in the flame.

The effect of the salt was to increase the conductivity of the flame and to improve the valve action.

And the Latest!

Quite fair results were obtained with this curious form of detector, and this gave de Forest the idea of using a bulb filled with gas and a heated filament as the source of heat. From this simple experiment one thing led to another, until eventually the various forms of 3-electrode valve, very similar in general features to those in use to-day, were evolved.

Impedance and Design.

One of the most noticeable features about valve design during the last year or two is the way in which "output" or power valves have been developed with a very low impedance, and yet at the same time having a reasonably high amplification factor. It is a fairly straightforward matter to reduce the impedance of a valve—which is, of course, essential if the valve is to act as a power valve and handle a fairly large amount of power—but to keep up the amplification factor at the same time is another matter, involving very careful design. For instance, if the grid has a close mesh, the valve will usually have a fairly high impedance, and in such a case it is a simple matter to give the valve a high amplification factor.

Mutual Conductance.

For a power valve the great point is to have the impedance as low as possible and yet a reasonably high magnification factor. The mutual conductance of the valve may be taken in popular interpretation as an indication of the general goodness or all-round suitability of the valve for the particular intended purpose and, inasmuch as the mutual conductance depends definitely upon both the impedance and the amplification factor, you will see the importance not only of keeping the impedance down but also of keeping the amplification factor up. Modern power valves often have a mutual conductance of from 2 to 3.

H.T. Consumption.

Of course, the reduced impedance of the valve means a higher H.T. current

(Continued on next page.)

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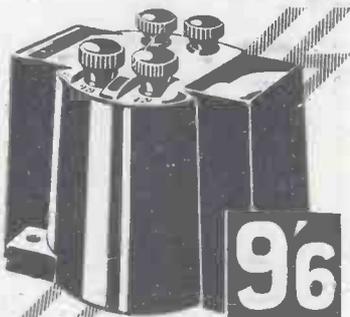
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MOST NEWS

-SUNDAY GRAPHIC-

TECHNICAL NOTES.

(Continued from previous page.)

consumption, and many output valves now consume up to 25 milliamps or even more.

Perhaps I should here refer once more to the importance of the correct value of grid-bias, especially on the output power valve, as this affects very materially the amount of H.T. current consumption. Of course, you can overdo the grid-bias business, and the amount of grid-bias voltage applied should only be sufficient to prevent the flow of grid-current on the loud signals.

Full or Half-Wave ?

The old question as to using half-wave and full-wave rectification continues to crop up from time to time, readers wanting to know whether a full-wave rectifier substituted for the existing half-wave rectifier will give twice as much power.

At first sight it seems obvious that if you have alternating current supply to a rectifier and you rectify both halves of each cycle you must be getting, in the form of d.c., twice as much power as you would if you rectified only one half of each cycle.

In fairly simple conditions, such as the rectification of low-tension alternating-current from a transformer for the purpose of charging a low-tension battery, you will find that this is the case. One of the simplest ways to prove this to yourself is to take a stepdown transformer with a divided secondary, the centre point of the secondary being connected to the battery to be charged and the ammeter being, of course, in series with the battery.

Difference in Current.

The other pole of the ammeter is then connected to the centre electrode of the full-wave rectifier, whilst the remaining two electrodes of the rectifier are connected respectively to the opposite ends of the transformer secondary. This, of course, is the usual arrangement.

If you disconnect one end of the secondary, thereby leaving only the other half of the secondary in operation, you will at once notice that the current indicated on the ammeter drops to roughly half its previous value.

The same argument applies if you use a transformer with a single untapped second-

ary and employ the Gratz formation of rectifiers, which comes to the same thing as the above.

The Power Circuit.

Where people sometimes go wrong in considering this problem is in assuming that the power circuit will operate just as effectively with full-wave rectification as with half-wave.

You must remember that the circuit will have been designed to give the necessary power (and *smoothing*, if it be a circuit in which smoothing is required) with the half-wave rectifier, and merely introducing a full-wave rectifier will almost certainly complicate the conditions and quite possibly not give even such good results as with the half-wave.

The full-wave rectifier will give about twice the current in the proper conditions, but this does not mean to say that there is necessarily any advantage, from the power point of view, in using a full-wave rectifier instead of a half-wave.

You can obtain any desired amount of power just as well with a half-wave rectifier as with a full-wave; it simply means that you have to use a somewhat higher voltage with half-wave than with full-wave.

Perhaps a simple illustration may help to make this clear. If one motor-car has 20 horse-power and another motor car 40 horse-power, the second car may go twice as fast as the first, or may carry twice the load at the same speed, but you cannot be sure what it will do unless you know the various circumstances in which the trial is to be made.

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LISSEN VALVE PRICES UNAFFECTED.

IT was stated in a recent issue of "P.W." that the firm of Lissen was also one of the valve manufacturing concerns which had agreed upon a general price reduction in valves. We are informed, however, that this is not the case, and that Messrs. Lissen's valves will still be sold at the usual prices. Readers will please note this correction, which Messrs. Lissen have requested us to make.

GOOD NEWS **FOR CONSTRUCTORS**

The September issue of the "Wireless Constructor" is now on sale, price 6d., everywhere.

And it is a particularly strong number, constructionally, and one that no real enthusiast can afford to miss. For instance, there is:

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This instrument forms the latest achievement of Percy W. Harris, and that means it is something of exceptional interest. Further, there are details of

THE "CALIMETER"

a remarkably simple and easily made short-wave wavemeter, and

THE "REACTOCRYSTALS"

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Backing up this really fine array of sets there is an article by Noel Ashbridge (Chief Engineer of the B.B.C.), and contributions from other popular technicians dealing with all practical aspects of home-constructed radio.

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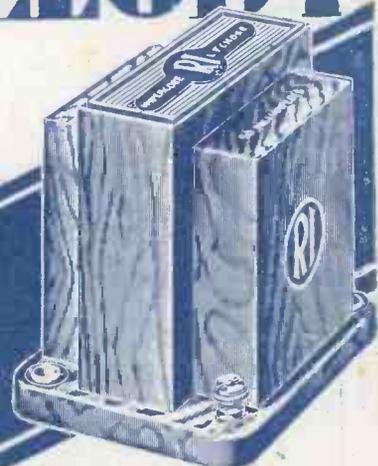
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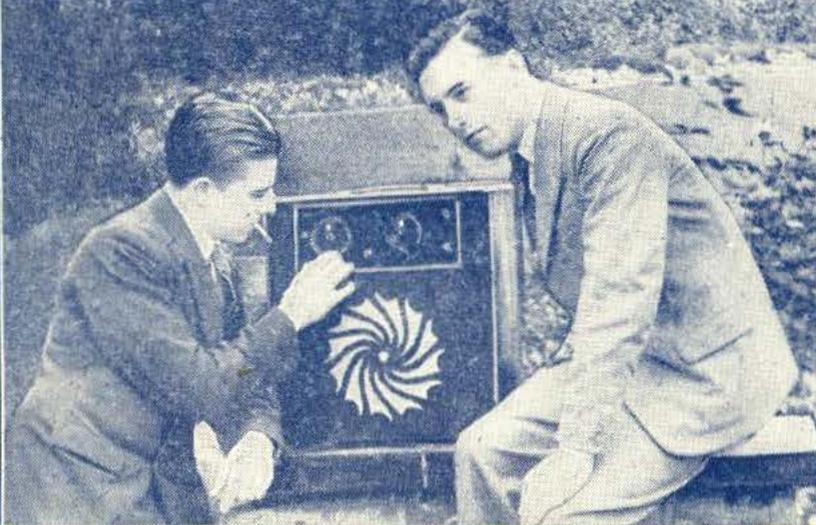
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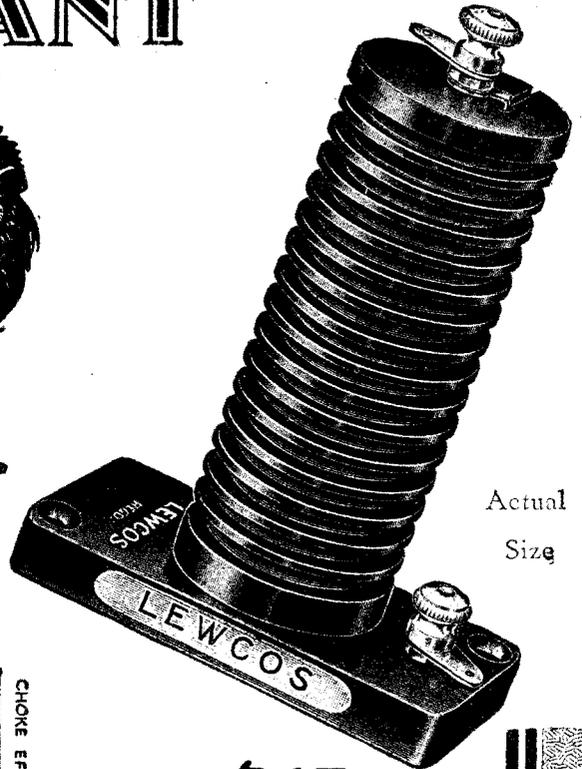
WHAT WE WANT TO KNOW

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

CAPT. ECKERSLEY'S QUERY CORNER.

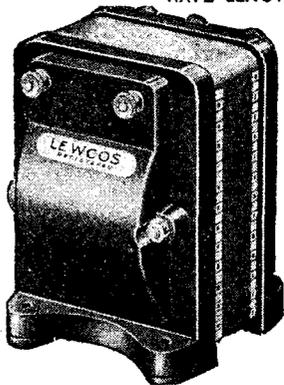
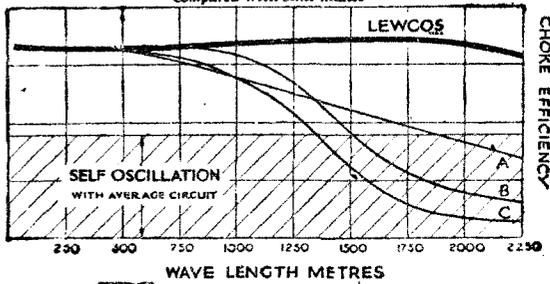
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**MORE RAIN!
 G.B.S. AND B.B.C.
 AMERICAN NEWS.
 A CANDID FRIEND.**

RADIO NOTES & NEWS

**RADIO EXCHANGES.
 FARADAY CENTENARY.
 SPAIN TRIES AGAIN.
 HOW NOT TO EARTH.**

Ruminations on Rain.

STARING, for inspiration, out of the window, I see a dripping garden waved over by angry trees, wind-swept, and general anti-holiday conditions. *Pro*: Good for the lawn, the ducks and the reservoirs. *Con*: Bad for holiday-makers, cricket, cats, postmen. Worse, there are below me two hefty youngsters, one of each sort, robbed of a picnic. To content them to-day will be as easy as teaching a tortoise to use a sextant! I wonder what a woman would do with 'em! What would Any Johnson make of the situation? Radio cannot cope with it—they grew weary of that somewhere about 1926. Shall I take off my collar and start something strenuous, or take the coward's way out—and say Daddy "is awfully busy to-day."

Ariel's Criterion.

THIS woman business is all very fine and large, all due respect being reserved for Miss. A. Johnson and her sisters of the motor car and speed boat. I am far from convinced that women are men's equals in the field of action. For one thing, they don't originate. Quote me no exceptions, prithce, lest I argue proof of the rule. However, when first a woman produces a real advance in radio practice, based on an original idea, I will bump my head thrice upon the macadam and apologise for my present refusal to be rushed off my feet because of one or two clever and charming dare-devils who don't realise their luck.

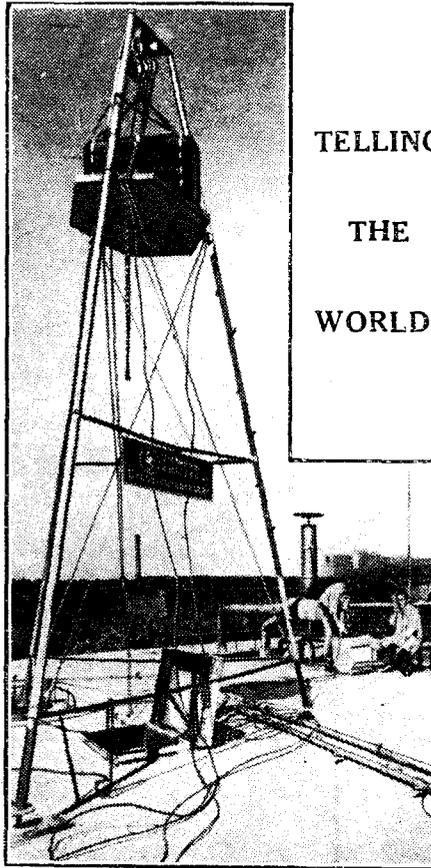
G.B.S. and the B.B.C.

MAYBE you missed your copy of this month's "Modern Wireless" because of your preoccupation with the salt sea waves and all that. Don't do it! Now that you have returned to town and your workaday mind, rush round till you find an odd copy. You will want to read about G. B. Shaw and the B.B.C.! Then for consideration, you are offered details of several new sets, a special section about "power for your set", a lot of short-wave matter, and many miscellaneous articles, all fresh and full of punch. A notable shillingsworth.

Another Chance for Explorers.

IT is quite fashionable nowadays to accompany expeditions all over the world—by radio. If you missed making contact with the Byrd boys in the south, why not try for the Rumanian Arctic

Expedition. This outfit sailed last month for the north, under Dr. K. Dumbrova, and is well equipped with wireless gear. Call sign: X O R C. Waves: 23, 40, and 65 metres, the last mentioned being for communication with the aircraft attached to the expedition. Who will be the first to report X O R C?



A new terror in loud speakers is this giant Siemens, which can be heard telling the world over distances up to 15 miles.

TELLING
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An Objection Met.

THIS being the season of *alfresco* meals, I may perhaps mention appropriately enough that the objection to the taste of the cork of the vacuum flask, which I raised some time ago, has been met, for a Colombo reader has sent me a page of a dealer's list offering vacuum flasks with glass stoppers. Another useful feature of

these improved models is the construction of the lip; odd drips do not get into the casing and thereafter come tumbling into one's drink. Good business.

American News.

LATEST despatch from Mr. Easter. L H R B (Tegucigalpa, Honduras) has raised its power to 2 K.W., and is transmitting on 79.9 metres; should be heard in Europe. Station W 8 X K, operates daily between 4 p.m. and 2 a.m., G.M.T.; and on Weds. and Sats. on two extra transmitters, from 12 noon to 4 p.m. (19.7 m.) and from 9 p.m. to 4 a.m. (48 m.). His usual wave-length is 25.4 m. The Federal Radio Commission has authorised the Mutual Telephone Co. of Hawaii to work on wave-lengths ranging from 11.9 m. to 5.36 m., for two-way radio-telephony amongst the islands of the Hawaiian group.

Something to See.

MAKE a note in advance of the International Exhibition of Inventors which is to take place Oct. 1st-11th, inclusive, at the Central Hall, Westminster, under the auspices of the Institute of Patentees. Everything there will be of interest to active-minded people and it is quite likely, indeed it is hoped, that the exhibition will stimulate not only trade but imagination and inventiveness. If you wish to exhibit some of your own work, apply to The Institute of Patentees Inc., 39, Victoria Street, London, S.W.1.

The Candid Friend.

J. A. L. (Cawood) writes one of those letters which are so artfully composed of compliments and bricks that the sum effect upon one is a sort of shot grey feeling. However, we do genuinely welcome his letter, and shall be glad to have another whenever he has something to say "to the point." He wants more short-wave articles—and other things, and this request has been handed to the editor in hope. Our policy is that although we *may* have a circulation of 2,863,947 weekly (or thereabouts!) that is no reason why we should not try to please everybody.

Have You Yachted?

THIS enquiry does not refer to the Liptonish sort of "yot." It is the latest slogan of select short-wave circles, and the "yot" in question is the yacht
 (Continued on next page.)

RADIO NOTES AND NEWS.

(Continued from previous page.)

"Elettra," that is, Marconi's yacht. The inventor was still busily experimenting with his telephony apparatus as recently as July 28, when J. P. S. was happy enough to pick up the signals on his Screened-Grid Three, a short-waver described by W. L. S. The yacht was then at sea, 50 miles from Rome. This is an item which no keen amateur should miss; no log is complete without a Marconi yacht intercept.

The British Expedition.

BUT supposing that you have already successfully yotted! Well, have you followed up the British Arctic Air Route Expedition which sailed in the "Quest," Shackleton's ship, on July 6th, to investigate an all-British air route across the frozen north to Canada. There will be a short-wave station at each base camp in Greenland. (Mullard's valves, by the way). I haven't the wave-length and call-sign by me at the moment, but I will try to squeeze them in next week.

Radio Exchanges.

WHEN the idea of a radio exchange first began to be put into practice, I used to record in these columns the opening of each new exchange. But the thing ran away from me, and now the Postmaster General tells us that at June 30th last, there were fifty-six exchanges, with a total of 12,172 subscribers who for small weekly payments receive the programmes at loud-speaker strength. I am of opinion that, subject to the vagaries of Town Councils, who have queer notions about aeriels, this system is going to grow enormously.

International Wireless Chart.

TO those who love maps and charts I commend the new international radio chart, which has been issued with the assistance of the Dansk Radio Aktieselskab. It does not register broadcasting stations, but wireless coast stations and wireless beacons and fog-signals all over the world. It measures about 45" x 33" and costs 10s. It was prepared by experts and would be a useful addition to the chart of a club or keen radio "fan." The chart is sold from the office of the Scandinavian Shipping Gazette, Copenhagen, K., Denmark.

"Dagenite."

AT first I thought that the salubrious district of Dagenham had been the scene of the discovery of a new element. But no! "Dagenite" is the name given to the new accumulator by the National Accumulator people.

I make a note of this because it is a good plan to keep an eye lifting for what other folk are using—and I happened to spot that these particular cells were used for the television demonstration at the Coliseum.

The Faraday Celebration.

THE arrangements to celebrate, in September, 1931, the Centenary of Faraday's discovery of electro-magnetic induction, which was the basis of electrical engineering are proceeding steadily under the auspices of the Royal Institution, and the Institution of Electrical Engineers. Faraday came, in 1813, a youth of 22 years, to the R.I. house in Albemarle

Street as assistant to Sir Humphrey Davy, whom he eventually succeeded as Professor of Chemistry. The celebrations are fixed provisionally for September 21st, 22nd and 23rd, 1931, followed by a Faraday Exhibition at the Albert Hall for ten days.

The Famous Diary.

THE most important celebration of all will be the publication, in 6 or 8 volumes, of Faraday's diary of his experimental work. It is hoped that two or more of the volumes will be ready by September, 1931. To book-lovers this will be an event. Even now I can smack my lips over the reading of the great man's daily notes, but I hope that in their laudable anxiety to make a good job of the undertaking the Institution will not arrange for a production which will be costly beyond the general public's pocket. At a few bob a volume there may be some hope for you and me.

SHORT WAVES.

A correspondent declares that he always sleeps with his head beneath the bedclothes. We suppose he hasn't the pluck to go next door and ask his neighbour to switch off the wireless set.—"Humorist."

"All talks on the wireless, political, or otherwise, should be confined to between 2 and 4 p.m., the only period when what pugilists call the 'sleep punch' can be usefully delivered," we read in the "Evening News." This certainly sounds quite an effective "wipe out."

OUTSIDE THE BAN.

Coventry City Council has prohibited noises by gramophone or wireless in public places. Politicians and other nuisances, however, will still be tolerated.—"Birmingham Daily Mail."

Manager of Boiler Factory: "Listen, men, we've stopped the work to tell you the B.B.C. are going to broadcast our noises—so be careful of your language."—"Passing Show."

TELEVISION AND THE THEATRE.

It is reported that Stanley Lupino, in an interview concerning the ultimate future of the theatre, recently said: "There won't be any theatres, but people will sit at home and press buttons and get their theatrical stuff by radio and television. But I won't mind, because, having taken monkey glands by then, I shall probably be too young to go on the stage."

WRONG STATION.

Father was tuning-in the wireless set when suddenly he gave a howl of pain. "Whatever's happened?" asked his wife. "I believe I'm getting lumbago," he replied. His wife sniffed contemptuously. "Whatever's the use of that?" she asked. "You'll never be able to understand what they are saying."—"Answers."

Valve Development.

NOT for a moment is it to be believed that the valve has reached the peak of development. It is revealed that the chief engineer of the De Forest Radio Company has invented a new form in which the grid is caused to rotate by the impact of the electron stream from the filament, something like the Crookes "radiometer," in which four vanes are rotated by light energy.

This new-old idea appears to present interesting possibilities and we shall watch closely for its emergence in the form of a finished instrument, reporting faithfully to our readers. One claim made for the revolving grid device is that it can be used as a frequency changer.

Try the R.A.F.

DURING this time of widespread unemployment it is well to let as many people as possible know that the Royal Air Force requires five hundred lads between the ages of fifteen and seventeen as aircraft apprentices for entry into its Schools of Technical Training at Halton, Bucks, and Cranwell, Lincs. Amongst the jobs available are some for wireless operator-mechanics. A fine chance for handy, healthy fellows who don't quite know what to do. Details from the R.A.F. (Aircraft Apprentices' Depot), Gwydyr House, Whitehall, London, S.W.1.

Spain to Try Again.

ALTHOUGH Spanish stations can be heard, broadcasting in Spain—as we know the business here—is as dead as mutton. It never has lived. But now there is a scheme afoot for reorganising the system in the hope that the gay Dons will become listeners and pay licence fees. A 30-kilowatts station, four 15-kilowatts stations, and a short-waver, form the backbone of the plan.

A Visit of Inspection.

I HAVE recently had the pleasure of visiting at Croydon the new factory of that firm with the royal and imperial initials, R.I. Everything I saw impressed me with the feeling that I was looking at a model lay-out. The works are all on one level, well-lighted and equipped, with plenty of room for expansion. The most important part of the works—i.e. the staff, is excellently cared for; there is even a garage for their private motor-cars! A go-ahead, virile organisation, complete with new electrified sales manager. Good luck to them, and may they succeed in holding up the flag in the export market.

How Not to "Earth."

I AM indebted to S. M. F. (Dover) for three interesting "snaps," a bright letter and an anecdote, part of which I should like to repeat for educational purposes. A friend owned a fine four-valver which ought to have delivered all the goods required, but didn't. Apart from the fact that the valves were being ill-treated (another story!) S. M. F. found that the "earth" lead was 40-ft. long, and made of No. 28 D.C.C. run on insulated hooks all over the house! Inquiry revealed that the local expert who had installed the set believed that an "earth" wire should be as long, as thin and as insulated as possible. No! Keep it short and fat and don't worry about insulation at all.

Another Radio Story.

IT is reported from the U.S.A.—without a blink of an eyelid—that Mr. J. H. Thornton, of Barnegat, N.J., has increased the egg production of his chickens by 15 per cent by installing loud speakers in their houses. This action, says J. H. T., was the result of his observation that the chickens showed "increased animation and cheer" when he was whistling or singing around. Animation, perhaps; but cheer is hard to detect in a domestic fowl, the features being standardised and only slightly mobile! Well, there you are, amigos! America is a wonderful country.

ARIEL.

WHAT WE WANT TO KNOW

by

G.V. DOWDING. ASSOCIATE. I.E.E.



WHY is there still so much mystery in radio? There is no need at all for it. What I mean is this. A firm spends no end of money developing something really good in the way of a radio component or accessory and then, instead of telling the public the real facts about it, they waste their advertising spaces by filling them with colourful generalities.

There are a number of exceptions, of course, there always are in this kaleidoscopic universe, but the fact remains that many manufacturers refuse to credit the radio public with any real seriousness.

Where are They?

Is it because they fear to frighten "laymen" with technicalities? If it is, it is high time a leaf was taken from the book of the motor merchants. Here you find perfect amalgamations of the "technical" and "non-technical." You get all the glowing generalities artfully interspersed with solid mechanical data on which the discerning can base their real judgments.

In radio there is frequently little difference between the announcements of the big, sound concerns and the small fry. Naturally, a proportion of the latter are, in their way, just as sound.

But where are to be seen the fruits of the huge organisations, the big research staffs, and what not that are part and parcel with a number of the larger manufacturers? The fruits may be the actual gear manufactured—but that is not always apparent to the uninitiated.

Pretty Pictures!

Whatever pretty pictures were drawn around a car or motor-cycle of a certain make, and whatever the maker's name and brand it carried, you would not buy it if you were not given technical information as to its horse-power, its petrol consumption, its brake-power, its actual road performance, and so on, would you? But would you buy a piece of radio gear without first acquiring similar information about it? I am sure you would, because if you didn't there is a lot of wireless stuff you would never buy at all—as often so few

A friendly criticism of the present methods of the radio industry—and an interesting suggestion that merits careful consideration.

real details about it are made generally available.

Let me get down to brass tacks and point out some examples.

There are many fine H.T. batteries on the market—I could name a dozen makes right away—but where are the advertisements or leaflets that tell you the actual facts about these batteries? And they are facts that no one need be afraid to publish broadcast. You are informed that such and such a battery gives you silky power, that it improves your results and so on.

There should be none of this fear of technicalities, because listeners would soon manage to grasp the significance of the more important details. Anyway, what advert. copywriter would admit he couldn't teach them very quickly?

Then again what about the loud speaker?—here indeed is a flagrant case. There are heaps of excellent loud speakers being sold, but I am convinced that those makers who have the best ones would do a bigger trade if they came right into the open with performance curves.

Wonderful Tone!

We are told that the "XYZ" loud speaker gives you terrific bass and colossal high notes, is wonderful in tone, etc. But I am positive that a performance chart would be much more convincing even to the most inexpert listener.

Admittedly the frequency characteristic of the best loud speaker in the world would look pretty "dud" compared with that of a L.F. transformer, but is it not possible to present the case for the loud speaker in other ways? Of course it is, and most of the manufacturers must know how to, although goodness knows why they do not act on their knowledge.

Enterprise Needed.

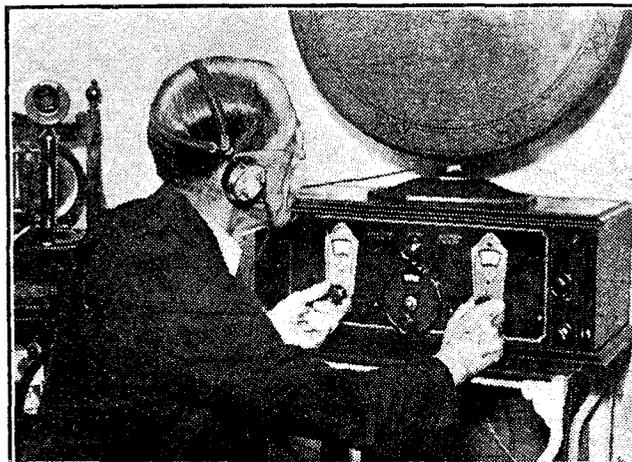
A loud speaker is not a musical instrument that has to play sweet tunes of its own; it is an electrical device the purpose of which is to handle a medley of electrical frequencies as efficiently as it can.

To revert to the motor-car simile once more, if a manufacturer of a motor-car were to keep the horse-power and number and size of cylinders of one of his models absolutely in the dark and shouted that the car had terrific speed, colossal acceleration, etc., he wouldn't get away with it. People would be suspicious—at least, most people would.

But apparently no one worries about a radio component's specification overmuch. However, again I must add that there are exceptions. Indeed, in cases there are very notable exceptions, which only goes to show what can be done.

(Continued on page 652)

THE "DX" DOCTOR



Dr. Fowler, the Health Officer for the district of Columbia, built this four-valve short-waver, and regularly receives programmes on it from Australia, England, Holland, and other distant quarters.

But such statements are mere generalities such as can be said moderately safely about any not-quite-up-to-the-average battery.

What the discriminating purchaser wants to know is how long such a battery might last in various circumstances (a fair approximation being quite permissible), its internal resistance, its maximum life "off load" (its shelf-life—a "dry" battery deteriorates even while it is not in use), etc., etc.

PITY THE POOR ETHER!

Ever since it was first postulated, the ether has been the subject of fierce controversy and contradictory statements. But here is an article showing it in an entirely new light—an object of pity!

By N. F. E.

"THE ether," says Sir John Reith, "should not be put at the mercy of money."

"The ether," says the "Morning Post," "should not be put at the mercy of Party propagandists, who already have ample scope for their activities in the Press and on the platform."

"The ether is overcrowded and no more wave-bands are available for British long-wave broadcasting stations," says an official of the B.B.C., when questioned about the possibility of duplicating 5 X X.

"We must abandon the present hypothesis of the ether," says Professor Einstein. "So-called ether waves are merely the manifestations of the alternating electromagnetic field of force which extends through all space."

What They Say—

And so on. The above extracts are but a few from the many references to the ether which have appeared in the press during the last couple of weeks or so, and they are sufficiently varied to warrant a little comment in this issue of "P.W."

Sir John Reith has ideals about the ether. To him, it is an all-pervading medium, doubtless designed by Providence for the express purpose of enabling nation to speak unto nation—in a style, manner, mode, call it what you will, as specifically ordained by Sir John Reith.

For example, the ether should be used for the propagation of programmes "under the auspices of the State, but not controlled by the State." In other words, in accordance with the principles of the B.B.C.

And one of the chief principles which have been evolved at Savoy Hill—by no less an authority than Sir John Reith himself—is that the public should be given not what they want, but what they ought to have.

Educating the Public.

The policy of "giving the public what it wants" has no place in the scheme of things at Savoy Hill, and with the indispensable aid of the ether the B.B.C., as listeners are well aware, puts this axiom into practice—especially on Sundays, and during "talks" hours.

Our ether, in short, has been commanded by the B.B.C., for a considerable portion of each day, for the purpose of aiding and abetting a stated policy of giving the public something it does not want; or at least, something it is considered it does not want.

If by any chance something gets across which the public *does* want, no doubt the ether squirms uncomfortably and hopes the B.B.C. wont blame it. When unfortunate exceptions to a general rule like this do happen the ether, no doubt, does its best, and gives extra assistance to atmospherics and what not; but the ether is in a delicate position, and we, at least, sympathise with it.

After all, how would *you* like to be at the beck and call of someone who had power to make you carry out orders whether you wanted to or not? Orders which *you* were sometimes blamed for and which, when they were carried out, caused, for example, the "Daily Telegraph to state:

"In mere amusement the standard is not above 'what the public wants,' it is

HOLED IN ONE?



SIR OLIVER LODGE

Our Scientific Adviser—one of the great champions of the ether—is also a firm believer in the good old saying about "All Work and No Play—"

not what anybody ought to want. In the matter of information there seems to be no attempt to distinguish the proper function of broadcasting from that of the printed word. The proper medium for elementary instruction in any subject is reading. Broadcasting is, as yet, a new force, and on the whole it has been in our country wisely and usefully organised. But its functions and its limitations are not yet clearly understood by those who control it."

Now, no self-respecting ether likes to hear things like that about its master. If the worm will turn, why not the ether?

The ether has another justifiable complaint. It not only wastes our time, but it is like one of the old omnibuses during a perpetual rush hour: it is overcrowded.

"Licensed to carry so many passengers," it has to put up with a number far in excess of the normal.

Its guardians, like the 'bus inspectors, never seem to be there when wanted. No wonder the ether feels a bit fed up with the International Bureau, and turns in pathetic bewilderment to old friends like Sir Oliver Lodge and Captain Eekersley, hoping against hope that something will be done about it.

It Doesn't Exist!

After all, the ether has excellent credentials: its character has been vouched for by Hertz and Clerk Maxwell, and even Marconi treated it with consideration when spark gaps jolted it persistently in the stomach, and C.W. was unthought of.

And to cap it all Professor Einstein now turns round and, supporting the late Dr. Steinmetz, practically tells the ether to its face it doesn't exist!

Well, well, what a life!

"When an electro-magnetic field is disturbed by radiations from a transmitting wire it causes vibrations which affect the receiving aerial, and the receiver translates them back to the music or speech which first produced them . . ."

In short, Einstein now contends that the ether-wave theory is merely a form of words designed to enable scientists to find their way out of a difficulty.

Pity the poor ether! Even though it is told it doesn't exist it still gets all the kicks. However, like the old soldier, it refuses to die; perhaps it will just fade away.

HAVE YOU HEARD THEM?

Katowice, Poland, sometimes indicates the industrial nature of its neighbourhood by hammer strokes on an anvil as interval signals.

The Cracow station uses sleigh bells as its interval signal.

The call of the cuckoo has been chosen by Leningrad, Russia, on 1,000 metres, and Ljubljana, Yugo-Slavia, on 575 metres, as a distinctive call-sign.

Instead of sounding a gong or ringing a bell the Wilno (Poland) station sounds a huntsman's horn during pauses in the programme.

A melodious gong struck seven times denotes that you are listening to Stamboul, which works on 1,200 metres.

The nightingale's song used by Turin (Italy) as a call-sign is well known, but it is not usually realised that a gramophone with electrical pick-up is responsible for this.

The loud ticking of a clock or metronome is often the signal by which you can identify stations, as many of the Europeans use this, ticking at a certain specified speed, to help identification by long-distance listeners.

The Rabat (Morocco) station uses a metronome that beats 60 times a minute.

Losing those Low Notes



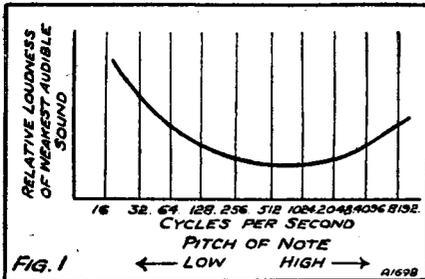
YOU are probably all quite familiar with the main types of distortion encountered in wireless reproduction.

You know, for instance, that if signals are too loud for your receiver, or, in other words, if your valves are too small or are not operated correctly, overloading occurs, and your results acquire a harsh, rasping quality.

Again, if on account of the use of poor transformers or a badly designed circuit, your set does not amplify high notes and low notes to the same extent, your results will be either "woolly" or high pitched.

In addition to the above troubles, however, you have probably experienced what can only be described as an "unnaturalness" about your reproduction. You have felt instinctively that the transmission was

HOW EARS HEAR



As the pitch of a sound becomes lower, the strength must be very much increased before it becomes audible.

all that could be desired and that your own set was behaving perfectly. There was no sign of overloading and no reason to suppose that the very high or very low notes were missing, and yet something was not quite right.

If this is the case, it is highly probable that the trouble is due to the fact that you are not obtaining from your receiver the volume that is most suited to the type of programme to which you are listening.

An Interesting Experiment.

Consider first the case of speech, and try for yourself the following experiment: Read to a friend a short passage from a book in an ordinary conversational voice. Now move fifty or a hundred feet away from him and read again, but this time make your voice louder until your friend hears it at the same strength as before. But (and this is the important part of the experiment) do not shout or raise the pitch of your voice.

By C. E. FIELD, B.Sc.

A thoroughly practical and fascinating account of one of the most vital aspects of radio reception.

You will find, and your friend will confirm the impression, that your voice sounded very low-pitched and boomy.

There you have it! As soon as the voice becomes louder than normal, without being raised in pitch (as in shouting), an impression of boominess is produced.

"That is all very well," you may say, "but making your own voice louder without shouting is an unnatural physical effort, whereas a broadcast transmitter and receiver take a natural voice and magnify it electrically without altering the pitch." That is quite true, but the effect is very largely psychological. You will realise this if you think for a moment of the difference between a conversation as rendered on the stage or on the "talkies."

The Case of the "Talkies."

In the first case, you are quite well aware that the players are shouting (i.e. raising their voices, both in volume and pitch), but if the acting is good, even at the back of the theatre, speech is somewhat what you expect it to be.

In the case of the "talkies," however, the players are not shouting, but talking so loudly that they can be heard all over the theatre, the result, as you know, being a boomy quality to which it takes you some little time to become accustomed.

So much for speech.

When we consider the reproduction of a band or orchestra we have to deal with a very large volume of sound, consisting of music from several instruments, some high-pitched and some low-pitched. Even though the wireless transmitter and your own receiver may be almost perfect, there is another link in the chain which is not perfect, and that is *your own ear*.

Your ear is in some ways like a crystal or anode-bend detector, in that when sounds fall below a certain strength it fails to detect them. This does not apply equally to all sounds, however, for very low tones require to be much stronger before they become audible than do higher tones. We can plot a characteristic curve of a typical ear, just as we can of a valve, showing how the

loudness of the weakest perceptible sound varies according to the pitch of the sound.

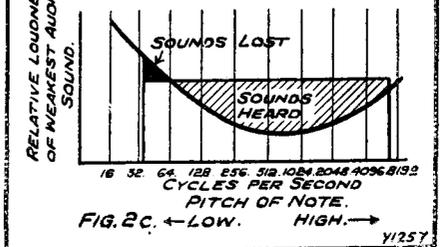
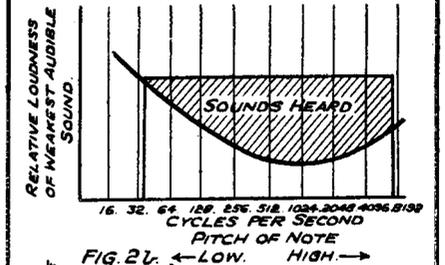
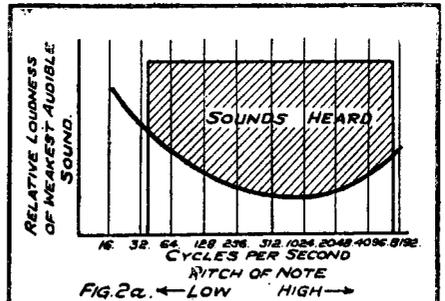
Such a curve is shown in Fig. 1, from which you will see that as the pitch of a sound becomes lower, the strength must be very much increased before it becomes audible.

"The Lowest Sounds Disappear."

Evidently, then, if a complicated sound such as orchestral music is reduced in volume, at a certain point the lowest sounds will commence to disappear, and more and more of these low tones will vanish as the volume is further weakened.

(Continued on next page.)

NOTES THAT VANISH



As the volume is reduced, so certain of the sounds become inaudible.

PRACTICAL POINTERS.

Some Useful Hints and Tips for Home Constructors.

TAPPING A FRAME AERIAL.

IF you do any experimenting with a frame aerial, you will find at some time or another that you wish to make a tap on it. Many frame aerials are, of course, centre tapped, but this tap does not answer all purposes of reaction and inductance variations.

A simple method of making a tap at any point, no matter of what type of wire the aerial is constructed, is provided by an ordinary pin. You will find that it is an easy matter to push it through the insulation and between the strands of the wire, which is almost certain to be flexible.

A flex lead can be twisted round, or soldered to the head end of the pin for making connection to the tapping.

WARE WET GROUND.

IN nearly all portable sets a frame aerial is wound round a frame of some sort just inside the case, and generally this means that when you place the set on the table one side of the frame is parallel with it and barely an inch away.

With a table or other insulator this has no effect whatever, but if you were to replace the table by a sheet of metal joined to earth, it is quite possible that it would cause sufficient damping to stop reaction effects. This would more or less stop the set from giving results because, as you know, there are few portable sets which will work without some reaction.

When you are out of doors with your portable, you probably place it on the ground, and therefore if the ground is damp you may get poor results. Wet ground is a very good conductor, and would have a similar effect to an earthed copper plate.

So if you find results from your portable are not very good with it on the ground, try raising it a foot or so.

TESTING FIXED CONDENSERS.

HERE is a good way to test all your fixed condensers. Connect them momentarily across an H.T. battery of about 60 volts, and then leave them for a couple of minutes. (It is necessary to give them a good dust before starting the test.)

After the two minutes connect a pair of telephones across them, when you should hear a good click, which will be louder on the larger-capacity ones.

Condensers above about 0.3 mfd. should not be discharged with telephones, as they hold a large enough charge to cause damage to the receivers. All you need do with large-capacity condensers is to short them after the two minutes with a piece of copper wire.

A spark, whose size will vary with the capacity, will indicate that they are O.K. You will soon know how loud a click or how large a spark to expect from a given capacity condenser.

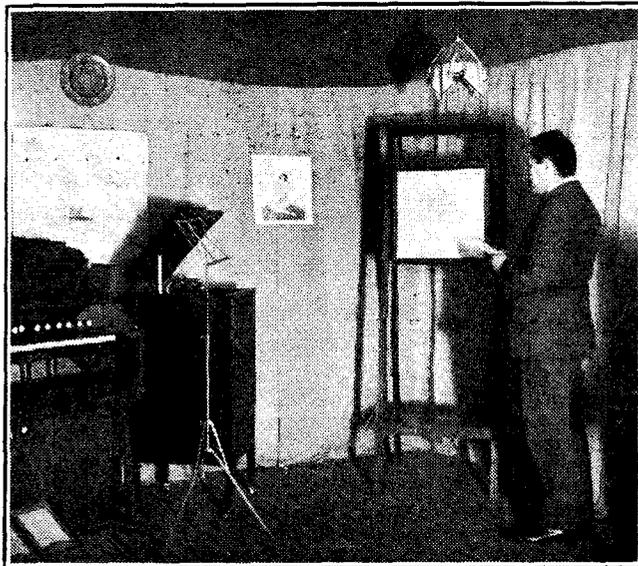
A REAL COMPARISON.

IT is an unfortunate fact that it is impossible to keep the mind completely unbiased. For instance, if you are trying to decide which of two loud speakers is the better, and one is an expensive one of well-known make and the other, say, a cheap foreign one, you will find that you are inclined to feel that the expensive one sounds nicer even against the judgment of your own ears.

Here is a simple tip by which you can make a truer comparison of two, three or more speakers. Arrange them close together and all pointing the same way.

Next connect one side of each together, and join the common lead to one output terminal of the set. To the other sides of the loud speakers connect leads of exactly the same sort of wire and twist them

HILVERSUM'S STUDIO



The studio at Hilversum. Hilversum employs 6.5-kw. power, and operates on a rather low wave-length of 293 metres up to 5.40 p.m. After this a wave-length of 1,071 metres is employed. In the above photo an announcer is broadcasting news.

together until you cannot distinguish which is which.

Now sit with your back to the speakers and connect up each one separately to the other output terminal of the set. You will find it very difficult to tell which is which loud speaker if they are at all alike, and will be able to judge them entirely from what you hear.

The object of sitting with your back to the loud speakers is to overcome any directional effects that might give away which speaker was which. The backwards stunt is surprisingly effective in doing this.

Afterwards it is a very easy matter to find out which speaker was the one which pleased you most.

LOSING THOSE LOW NOTES.

(Continued from previous page.)

In order to obtain a clearer picture of this effect look at Fig. 2. In Fig. 2a is shown the same curve as in Fig. 1, and a rectangle is marked out to represent a uniform loudness at all pitches, which we might, for the sake of illustration, imagine to be the sound received from a loud speaker reproducing an orchestral item.

If the volume is reduced, first a little, and then considerably, we get the conditions shown in Figs. 2b and 2c respectively. A glance at Fig. 2c shows that not only is sound as heard by the ear reduced in volume, but that the lowest tones are absent.

Reducing the volume of orchestral music thus has the effect of raising the pitch, so that in order to obtain the most realistic results the volume must be such that the true pitch of the music is obtained. Obviously the volume which will furnish these results is that which originally comes from the orchestra, or, rather, the volume which would reach your ear if you were listening at a reasonable distance from the concert platform.

Vary the Volume.

It evidently pays, therefore, when receiving an orchestral programme, to obtain the maximum possible volume from your receiver, providing that you do not overload it, and this will generally be louder than the volume which will give you the most pleasing results when listening to speech.

In short, if you really desire to get the best possible quality of reproduction from your set, you require to be able to adjust the volume to suit the programme.

The various means for accomplishing this cannot be considered here, but the ideal is obviously to have a set capable of providing a really loud volume, fitted with a convenient volume control for reducing the signal strength to the most suitable level, according to the type of programme that is being received.

FOR YOUR NOTEBOOK.

All H.T. accumulator contacts must be kept perfectly clean, the insulation must be dry, and the accumulator must be kept properly charged, if H.T. supply coupling effects are to be avoided.

A large set employing a super-power valve may take 20 to 30 milliamps from the H.T. supply, and it is quite useless to expect a small mains unit designed for 15 milliamps supply to work this satisfactorily.

Whatever form of H.T. supply is used, it is generally an advantage to have a separate H.T. plus lead to the different valves or stages in a three-, four-, or five-valve set.

If your L.F. transformer is provided with a terminal marked "earth" or "E," a connection from this point to the filament-earth circuit can be made to improve stability.

THE B.B.C. TODAY

BY THE EDITOR



THE more picturesque public personalities of broadcasting used to be in the ranks of those actually engaged on microphone work. But the persistent application of anonymity has had its effect at the programme end. Public interest is now more concerned with some of the administrative personalities.

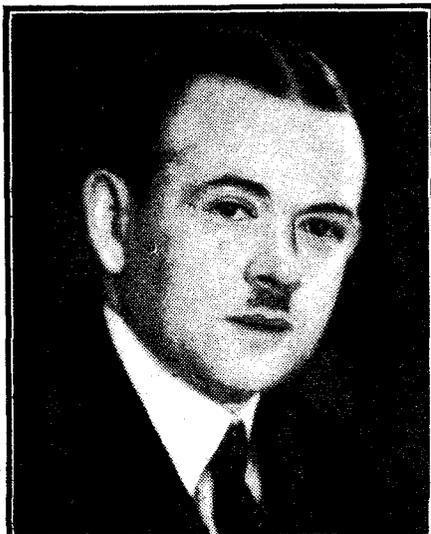
Sir John Reith remains the outstanding figure, intellectually, physically, and administratively. When I last reviewed the personalities of the B.B.C. I paid due tribute to Sir John, but I expressed the hope that he would cultivate some greater measure of toleration and urbanity than had characterised him so far.

Sir John's Idealism.

Although I have not the temerity to claim the credit, I am naturally glad to be able now to record that when I met Sir John at lunch the other day after a long interval, I was captivated by just those qualities of sympathetic understanding which I had accused him of lacking.

I believe that a process of evolution has gone a long way in mellowing and enriching the character and personality of the executive chief of British broadcasting. For

THE INFORMATION CHIEF



Mr. Gladstone Murray is "establishing a reputation for courageous and skilful public service."

This fifth article of a vitally informative and interesting series comprises a review of Savoy Hill's great administrative personalities. The work of Sir John Reith, Mrs. Philip Snowden, Mr. Gladstone Murray, Mr. Noel Ashbridge and Admiral Carpendale in the furtherance of the ideals of British broadcasting is discussed, and an estimate of their success, individually and collectively, is advanced.

one thing, I cannot imagine that there is now any substance in the rumours of Sir John's tyrannous temper and Mussolini methods.

For another thing, I do not believe there is any reasonable chance of Sir John leaving the broadcasting service for many years. He remains, of course, among the first half dozen chief executives of the English-speaking world; but he is much more than this.

He stands for the Christian ethic in no uncertain way, and his high idealism has placed the characteristic stamp on British broadcasting. Now that he is taking a more active interest in imperial affairs, Sir John will become a powerful ally of those who believe that the salvation of Britain is bound up with the development of Greater Britain.

Those Sunday Programmes.

I still have my quarrels with Sir John. For instance, I think he is quite wrong about the Sunday programmes in not tolerating appropriate musical alternatives to religious services. Nor do I hold with the present educational policy of the B.B.C.; these National Councils of adult education and school education and so on have far too much to say about programme matters. But such complaints are not crucial.

The principal new personality of British broadcasting is Mrs. Philip Snowden. To understand Mrs. Snowden and her place in the broadcasting firmament, one must begin with her background. Mrs. Snowden is the embodiment of Yorkshire sincerity, frankness, and unbending strength of character.

Her powerful advocacy has been on the side of all the great progressive movements

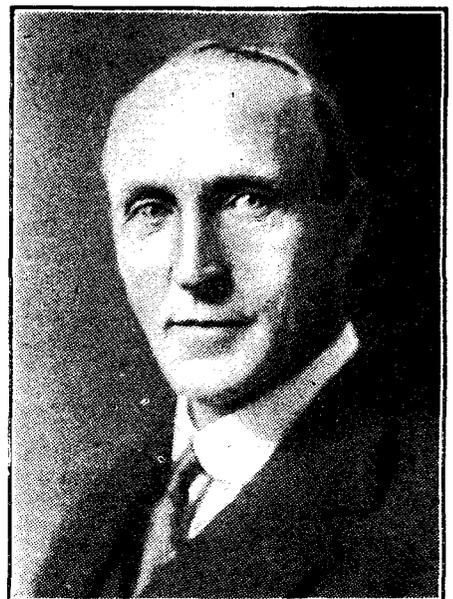
of the past quarter of a century. For peace, international and industrial; for temperance; for democracy; for women's rights; for better and wider education; for music and the arts; for good causes too numerous to recount here, Mrs. Snowden has toiled unremittingly, always with distinction, and usually with marked success.

When she became a member of the Board of Governors of the B.B.C., Mrs. Snowden threw herself wholeheartedly into another field of public service. Realising the tremendous potentialities of broadcasting, she regarded the present organisation of the B.B.C. as a preliminary to a Department of State in which the officials would have the security and advantages of the Civil Service.

A Woman of Ideas.

Mrs. Snowden also has very definite ideas about the development of the musical side of broadcasting. She wants the B.B.C. to take a more definite and constructive lead
(Continued on next page.)

AN ABLE ADMINISTRATOR



"Admiral Carpendale has become a stronger factor for considered counsels and stable development."

THE B.B.C. TO-DAY.

(Continued from previous page.)

in all such movements as the county festivals, and also to encourage the popularisation of opera.

There is, too, the scheme of a National Theatre. I think I would not be far wrong if I said that Mrs. Snowden looks upon the B.B.C. as a potential Ministry of the Arts. Such ability, idealism, and character are obviously a tremendous gain to the B.B.C.

A Popular Personality.

But the collision of temperaments has delayed their being turned to full account. I believe, however, that co-operation between Sir John Reith and Mrs. Philip Snowden will be fostered under the aegis of

finds it useful to obscure by a smoke-screen of gentle cynicism and convincing misanthropy. That the B.B.C. has now embarked on comparatively calmer seas is due in no small measure to Gladstone Murray.

The universal esteem with which he is regarded in Fleet Street, and the steadily augmenting profits from publications revealed in the annual reports of the B.B.C., are proof that he does his ordinary work efficiently. But it is in the things that he does outside his ordinary work that he is of chief value and in which he is establishing a reputation for courageous and skilful public service.

And now I come to Admiral Carpendale, whose very efficiency as a disciplinarian caused me some doubts when last I discussed his place in broadcasting. But here, as in the case of Sir John Reith, there is progress to report.

The gallant admiral has much more to think about now than whether the office-

gramme side as well as on the purely staff side.

Next to Mrs. Philip Snowden, the most interesting new personality at Savoy Hill is Mr. Noel Ashbridge, the new chief engineer. Mr. Ashbridge had the advantage of many years close association with his predecessor, Captain P. P. Eckersley; but, even so, he had a particularly difficult problem in taking over from one who had become a national figure in the job.

But it speaks worlds for Mr. Ashbridge's personality and reserves of character that he set to work quietly and confidently and within a year is as firmly established as was his brilliant predecessor.

A Beneficial Influence.

Mr. Ashbridge is a very sound technician, which, of course, is invaluable now that the regional scheme is being completed under his administration. His technical qualifications are also as catholic as they are thorough. For he is also able to handle the Broadcasting House venture literally "in his stride."

But it would be a hopelessly inadequate account of the new chief engineer that stopped with a recital of his technical qualifications. Behind his self-effacing, quiet demeanour is a very decisive personality, with clear-cut views, and a steady strength of character accustomed to get its way perhaps more by incisive penetration than by frontal attack; but, nevertheless, to get its way.

Mr. Ashbridge is a close student of the programmes, and is aware that as a member of the Control Board of the B.B.C. he shares the responsibility for the content and quality of what his engineers put on the air.

I regard it as extremely fortunate that there should be this influence in the inner counsels of the B.B.C. Mr. Ashbridge is eminently sane, and detached from any specialised interest in programmes.

He would interpret the wishes of the sane "man-in-the-street" rather more faithfully than any of his colleagues, and certainly more exactly than any of the various programme specialists. More power to his elbow!

RADIO ON THE RIVER



A broadcast concert assisting at a picnic on the bank of the Thames at Henley. The famous Temple Island is in the background.

Mr. Whitley, the new Chairman. If this co-operation can be made effective, the broadcasting service will gain tremendously.

I would say that next to Sir John and Mrs. Snowden the other chief personality now at Savoy Hill is my friend Mr. Gladstone Murray. He is both an old and a new personality of broadcasting, but he has come very much to the fore in the past year or so.

Intrigue and strife ebb and flow, but the Information Chief manages to focus in himself the elements of stability and continuity. His success in politics, high or low, is due, I believe, to an astonishing capacity for detachment, and patent disinterestedness.

His sole object is the success of the broadcasting service, an object which he

boys are correctly dressed or the typists are on time. For five years he has been the President of the International Union of Broadcasters, and is now an established figure in the life of Europe.

He is extraordinarily and deservedly popular on the Continent, where it has been discovered that he is not only a typical and picturesque product of the British naval tradition, but also a most conscientious and able administrator as well as a shrewd and effective diplomat.

The New Chief Engineer.

His success on the Continent has had its effect at Savoy Hill. Admiral Carpendale has become a stronger factor for considered counsels and stable development. Moreover, his views are counting on the pro-

NOTEBOOK NOTIONS.

The Bucharest station on 394 metres opens its programme with five minutes of metronome-ticking, at the rate of 160 beats per minute.

The Königswusterhausen station (Zeesen), on 1,635 metres, uses a 40-beats-in-ten-seconds metronome as an interval signal.

Sixty beats per minute is the interval signal for the Belgrade station on 432 metres, and Breslau 325 metres.

There is often very little difference between a circuit used for short waves and that used for ordinary waves, so that a great many ordinary broadcasting sets when fitted with short-wave coils can be operated as short-wavers.

Nearly all novices at short-wave work turn the dials much too quickly until experience proves how easy it is to lose stations altogether in this way.

Short-wave enthusiasts nearly always wear telephones instead of using a loud speaker, so as to make sure that nothing is missed when tuning-in.



CAPT. ECKERSLEY'S QUERY CORNER

OVERLOADING A UNIT?—MORE OVERLOADING—THE MOVING COIL'S FIELD—A CURIOUS G.B. EFFECT.

Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

Overloading a Unit ?

J. N. (Catford).—"I have an A.C. mains unit which was giving very satisfactory results when used in conjunction with a straight two-valve receiver. I have now converted this receiver into a three-valver by adding an extra L.F. stage, and I have placed a super-power valve in the last socket.

"When I attempt to use the mains unit there is now a loud hum, and signals are rather distorted. Could this be due to the fact that the mains unit is now being overloaded?"

Your explanation is correct—almost certainly, I should say. The mains unit constitutes a rectifier which feeds unidirectional pulses of electricity into a condenser. This condenser fills up to the brim and then you can take steady current from it. If, however, the load across the condenser is such that it could never keep full, you become aware of the gulches of electricity feeding into the condenser intermittently. If you want an analogy think of a pump which feeds water into a tank intermittently in gulches. If there is a tap in the bottom of the tank you can get a steady flow of water from the tank even though the pump is putting water into the tank intermittently. But if you turn on the tap so full that the tank never gets full, you will get an intermittent feed. The cure in your case is a mains unit with greater output, which feeds in more electricity per gulch than the present one.

More Overloading.

L. H. (Stamford Hill).—"Can you give me an idea of the type of rectifier valve I should use so as to prevent it overloading when I tune in fully the Brookmans Park transmissions at fifteen miles, assuming I employ an S.G. H.F. stage without volume control and an outdoor aerial?"

Do you not think it is better to cut down the volume coming into the aerial than to be in danger of overloading your detector? Do you not think that a good method of doing this would be to connect variable resistances in series with any of the tuned circuits that happen to be convenient and which are connected in the pre-detector stages? I personally would much prefer this arrangement, and always prefer to think that the different volumes of different stations are adjusted in the pre-detector stages, so as, ideally, always to bring the detector to the same condition. There are

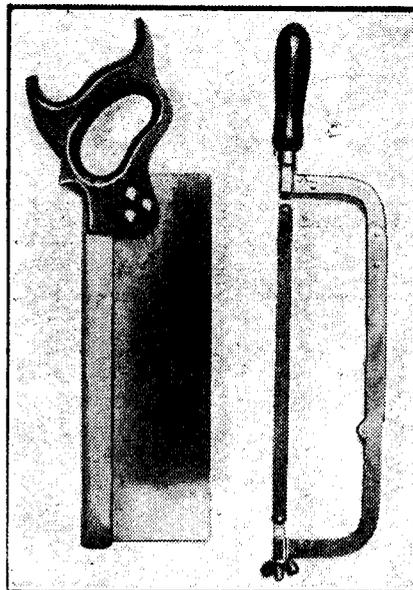
so many ways of cutting down a signal that, provided you have a sensitive set, it should not be difficult to choose one, and the one I suggest is to put a resistance in series with any particular tuned circuit. If this is not enough, have a switch which throws in a potentiometer across a closed circuit; keep a rectified feed meter and always adjust the rectified feed to the same value, unless, of course, the station you are receiving is too weak.

The Moving Coil's Field.

A. M. V. (Winchester).—"The field of my moving-coil loud speaker is fed from a large 6-volt accumulator. I notice, however, that the instrument still functions

The moving-coil loud speaker works, of course, by putting A.C. currents in a coil which is free to move in a strong magnetic field. The magnetic field is created by passing current through a coil which magnetises an iron circuit; switching off the current from the accumulator weakens, but does not destroy, the field, and so the loud speaker continues to work—but with far less volume. Unfortunately, however, the effect of a weak field is to give a partial distortion, and the designers of the speaker would be careful to work out their quantities so that the necessary movements, eddy current losses, etc., were worked out for a constant field; while the value of this need not be kept absolutely constant, its variation might be deleterious to quality. The suggestion is ingenious, but in practice might not give the best quality throughout the range of volumes.

FOR THE SET BUILDER



Of course you have a hacksaw, like the one on the right, but have you a tenon saw? (left). It's surprising how much better the small wood-work goes when this is used instead of a larger saw.

when the accumulator is disconnected, but the volume is decreased.

"From this it seems to me that a good arrangement of volume control could be effected by adjusting the field current by means of a rheostat in one of the leads from the accumulator to the magnet field. Is there any objection to doing this?"

A Curious G.B. Effect.

H. A. C. (Southampton).—"The last valve of my receiver is of the super-power type, and I usually adjust the grid bias so that the anode current is within the limits stipulated by the makers for the value of H.T. I use.

"Recently, when so adjusting the bias, I carelessly omitted to switch off the filament when I removed the G.B. — plug. Much to my surprise, the milliammeter did not show the violent increase of anode current which should have occurred. Why is this?"

The effect you mention is quite common: when you remove your grid plug you leave the grid completely disconnected. Negative particles of electricity were collected on the grid because your grid-bias battery had charged it negative. If the charge never leaked away that would constitute a negative charge on the grid and would prevent the electron flow from filament to anode. (You could probably find that this is true, because if you caught hold of the grid-bias plug with one hand and put the other on the earth, you would see the current gradually rise because you would be removing the negative charge from the grid.) If you have any leaky components between the grid and earth that also would allow the anode current gradually to rise by leaking away the grid negative charge. You can try all this in practice if you promise to switch off H.T. directly the current gets to a foolishly high value.

LATEST BROADCASTING NEWS.

ANOTHER
CONTINENTAL RELAY.

SIR FREDERICK COWEN'S
MUSIC—NATIONAL ORCHES-
TRA OF WALES—A BACH CAN-
TATA HOLIDAY—BLACK COUN-
TRY COMEDY, ETC.

A MOZART concert, relayed by the Continental land-line system from the Salzburg Festival, will be heard by London listeners on Saturday, August 30. It will be conducted by one of the most distinguished German musicians, Herr Bruno Walter. The programme will include the "Hoffner" Symphony and a Concerto in E flat, for two pianos and orchestra.

Sir Frederick Cowen's Music.

The music of Sir Frederick Cowen, the eminent Midland composer, will figure largely in a concert to be given in the Birmingham studio on Saturday, September 6.

Part of his "Scandinavian Symphony," a work inspired by Sir Frederick's several visits to Norway and Sweden, will be included, and also a pianoforte concerto, written for Paderewski and played by him thirty years ago, will be heard.

The concerto will be played on September 6 by Winifred Browne, who has made a name for herself by broadcasting pianoforte concertos which are rarely heard by listeners.

National Orchestra of Wales.

The National Orchestra of Wales returns from holiday on Sunday, August 31, when with Kate Winter (soprano) as singer, they will be heard in a string orchestral programme from the Cardiff studio.

Other concerts during the same week will be given by the orchestra as follows: Monday, Sept. 1, Museum Concert; Tuesday, Sept. 2, Afternoon concert in the studio with Bernard Ross (baritone); Wednesday, Sept. 3, Symphony Concert at the Museum (1.15 p.m.), a Light Orchestral Programme from the studios (4 p.m.), and a programme of excerpts from English Light Opera with Mai Ramsay (7.45 p.m.); Saturday, Sept. 6, Museum Concert at 12 noon.

A Bach Cantata Holiday.

The Bach cantatas which have been suspended during the summer holidays, are to be resumed on Sunday, August 31. Some would say it is a pity the B.B.C. remembered!

Black Country Comedy.

A play by a Staffordshire doctor and playwright will be performed in the Birmingham studios for Midland Regional listeners on Monday, September 1. Its author is Dr. F. G. Layton, and the play, a Black Country comedy is said to be founded on a true story of life among the people where he has his practice. Dr. Layton calls the play "The Invalid."

"Through the Looking Glass."

Two performances of Lewis Carroll's "Through the Looking Glass," specially

adapted for the microphone by Cecil Lewis, will be given in the London studios on Monday and Tuesday, September 15th and 16th. The first performance will begin at 8 p.m., but the second is to start at 6.40 p.m.—a most unusual time for serious radio drama to be heard. The reason for this is to give children an opportunity of hearing the performance.

Talk Features.

Major Walter Elliot, M.P., who is no stranger to the microphone, is to open a series of twelve talks, the aim of which is to give a comprehensive picture of Africa from all aspects, and which is one of several new series arranged for the autumn. Equally interesting is a series entitled "International Conversations," which will consist of debates between an Englishman and a

foreigner, and a description of how people of other nations look at England.

The foreigners so far selected represent America, France, Germany, Italy, Turkey and Russia. "Science and Religion" is the title of yet another series of talks to which many well-known personalities will contribute.

Old Favourites.

Albert Townsend and Miss Grace Field, two artists whose first appearances before the microphone goes back to the days before there was any B.B.C., when they took part in Captain Eckersley's experimental transmissions from Writtle, in Essex, are taking part in the Midland Regional programmes on Thursday, September 4th. Miss Field is now soprano soloist at the Church of the Messiah, Birmingham.

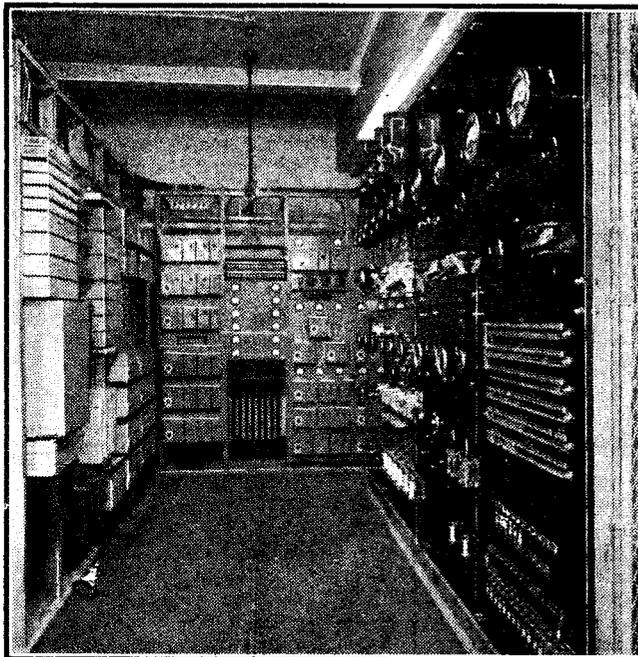
Cockles and Cockling.

An antiquarian, who has devoted many years of study and inquiry to that somewhat despised shellfish, the cockle, is visiting the Cardiff studio on Thursday, August 28th, to tell listeners all about his discoveries.

He is Mr. George Eyre Evans, the Hon. Secretary of the Carmarthenshire Antiquarian Society, whose research work reveals that there are no fewer than 200 living species of the cockle, one of which is sold in large quantities in some towns round the coast.

The title of Mr. Evans' talk is "Cockles and Cockling," and he will deal particularly with the village of Llansaint, where the husbands do the housework and mind the babies, while their wives go cockling on the Ferryside.

BEHIND THE SCENES AT 2ZY



This is not a power-house, but a view of the apparatus room at the B.B.C.'s Manchester Station.

FOR THE LISTENER

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

By "PHILEMON."

The Proms.

BY the time these Notes appear, the new Promenade Concert season will have opened. The advance programme has reached me, and it is full of attractive items.

Most attractive of all will be the appearance of the new B.B.C. Symphony Orchestra which has been organised and trained, and will be conducted by Sir Henry Wood. It is not yet quite at its full strength, but may be expected to give a good account of itself, and in time should take its place high in the first flight of the great orchestras of the world.

We shall meet with old friends among the vocalists; and Arthur Catterall will be there! Few parts of the B.B.C. programmes

give more widespread pleasure than the Symphony Concerts; and it is pleasing to note that, although old and favourite music will dominate, new works are to be presented, notably a new Concerto by John Ireland with Helen Parkin at the piano.

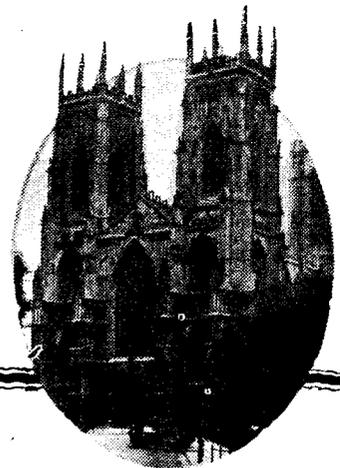
Alice in Wonderland.

I hear that there is to be a revival of the Radio version of this immortal fantasy towards the end of September.

When I told Belinda about it, "And I will be the Red Queen!" she cried, I said that Athene Seyler, who made a hit in that part on the first production, would not be likely to stand down for her. "Tweedle-

(Continued on page 650.)

Broadcasting York Minster



An intimate inside view of the complicated control work which is necessary when a broadcast from the famous cathedral is taking place—work which makes all the difference between a well-balanced broadcast and a failure.

By OUR CORRESPONDENT.

I HAVE just spent a bewildering morning in the B.B.C.'s most extraordinary control-room.

The paraphernalia of broadcasting seems completely out of place in the venerable room near the minster organ (so near that its panelled walls shiver audibly in resonance with certain of the bass notes).

York has such a genius for elaborate ceremonial that a broadcast from the minster generally involves almost as much fading and cross-fading of microphones as a complicated radio play.

The last time I was at York was on Military Sunday. It was half an hour before the broadcast was due to commence when I introduced myself to the three engineers in the vestry.

"I suppose that now you have nailed all those terrific echoes which used to distract you here, and now that the minster is permanently wired with microphone circuits, a broadcast from here is just a matter of routine?"

That Echo.

"Well, not quite," he replied. "It's one of the worst places for echo. These massed bands, you know. They are playing in the minster to-day right under the great tower, and the resonance. . . We had a test last night (the bands very kindly came along), and at first the resonance of some instruments was extraordinary. We spent a long time shifting them about until we got the right balance."

I was impressed then, and several times later, by the

close collaboration between the B.B.C., the military forces, and the minster authorities.

A bell rang. One of the engineers spoke into a telephone and then reported that the lines were through to Leeds.

"We have two land lines from here to Leeds," explained the "O.C." to me. "One for 'music' and the other for 'control.' From Leeds the broadcast is distributed to the various stations on the usual land-line circuits."

The Microphone Tests.

"Ask Leeds if they want atmosphere," he added to the man at the 'phone.

"Atmosphere?" I queried.

STATELY AGE AND MODERN SCIENCE



In a little room, hidden by the architectural grandeur of our forefathers, sits the broadcast engineer, surrounded by amplifiers, switches, telephones, etc., looking after the very heart of the system which links cathedral and broadcast station.

"Crowd noises in the building before the service," explained the O.C.

With ten minutes to go he and his mates made a final test of all the microphones (getting an engineer in London to listen on each of them in turn) and it was arranged on the telephone that the announcer at Savoy Hill should make his announcement at 9.47 a.m. and that all stations should "come over" at 9.49.

Last-Minute Trouble.

At 9.43 an engineer noticed that the "music" line had become noisy. So had the other. The fault was reported to Leeds.

At 9.45 the lines were still noisy. The engineers looked distressed.

At 9.46 "London" reported that from his end the lines "sounded" quiet. The relief of this news was immediately followed by the tension and suspense of "going over."

Through the vestry door I could see the vast audience which packed the great minster. They waited patiently for the service or ceremonial (call it which you like) to begin. But they did not know that really they were waiting for a young man in a little room in London 200 miles away to say his piece.

The engineer-in-charge had seated himself at the "mixer"—the boxes containing microphone potentiometers. Eight large knobs, one of which was a spare, faced him.

He made sure that they were all at the "off" position except one—the one controlling the microphone suspended over the massed bands. Engineer No. 2 sat at the telephone. No. 3 stood at the door.

"Over!" cried No. 2.

The Relay Commentes.

No. 3 walked into the aisle outside the vestry where he could see the bandmaster. He made a signal. Immediately the music crashed out up to the vast roof throbbing and re-echoing and out from the aerials of a score of transmitting stations up and down the land.

My watch showed 9.50.

The second band piece was Rawlinson's "Maid of Orleans" overture. "Watch this carefully for blasting," said the O.C. There came a thunderclap of drums and a blare of trumpets. Swiftly the "mike" control was turned back a bit.

After the preliminary band music the service proper commenced and then the engineer at the "mixer" really got busy.

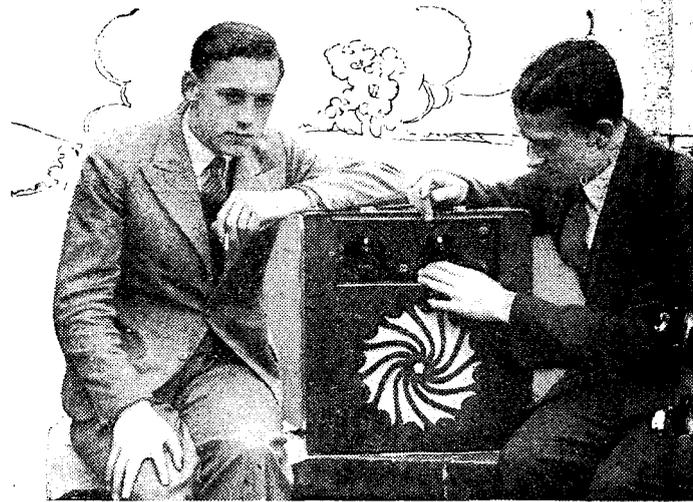
WE have been receiving requests for some time now for a portable set design of a really ambitious kind, giving a superlative performance and requiring no external accessories of any sort, more particularly no aerial and earth.

Our correspondents mostly seemed to require such a set for convenient home use rather than as a true outdoor receiver, and

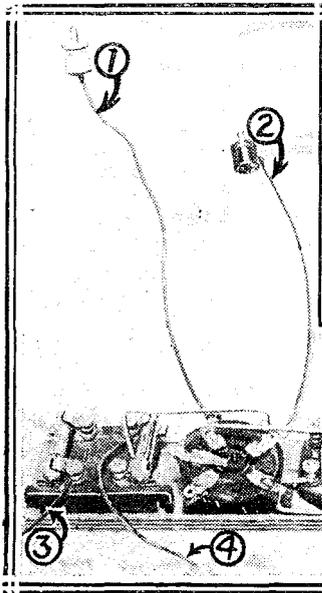
gives a fine performance on its built-in frame aerials, and is elaborate and no small job of work to undertake.

Its sensitivity and selectivity are both exceptionally good, and it is an extremely attractive proposition, but that just makes us all the more anxious to make it quite clear that it is essentially a set for the more advanced constructor. We do not want the inexperienced reader to be tempted by its many and obvious attractions into attempting a task calling for greater constructional skill than he has yet had time to acquire.

It is a set specially intended for the constructor who has had a certain amount of



This fine "all-in" set was evolved by going to the speaker are inside the cabinet, but you get simply to choose from. Readers have often asked "F



The lead marked (1) is for L.T. + and (2) is for L.T. neg. (3) is H.T. - 3, and (4) and (5) are G.B. - 1 and G.B. - 2 respectively. H.T. + 4 is marked (6), and (7) indicates the L.S. leads.

so did not mind whether we gave them what they wanted during the holiday season or not. Moreover, they were emphatic that they were not afraid of tackling something elaborate, so long as it gave the results they craved.

Truly, Some Set!

Here, then, is our response. We have taken our inquirers at their word, and produced for them a set which is truly "all in,"

experience, particularly with screened grid valves, and who feels that he can turn out a job which is 100 per cent correct, and knows how to adjust it and get it working properly.

This may sound rather a strange way to write about a set which we have praised so whole-heartedly, but it is only part of our settled policy of trying to make perfectly clear the exact application of every set we design. Only by helping our readers to

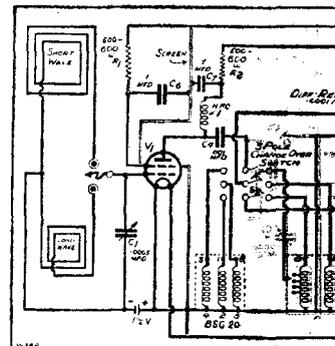
choose just the right set to suit them can we serve their interests best.

Now, the fact is that the more advanced type of portable is really a set in a class by itself. It is an instrument which will stand no liberties, and demands that it be made up with extremely careful attention to every constructional detail.

A SLICK-LOOK

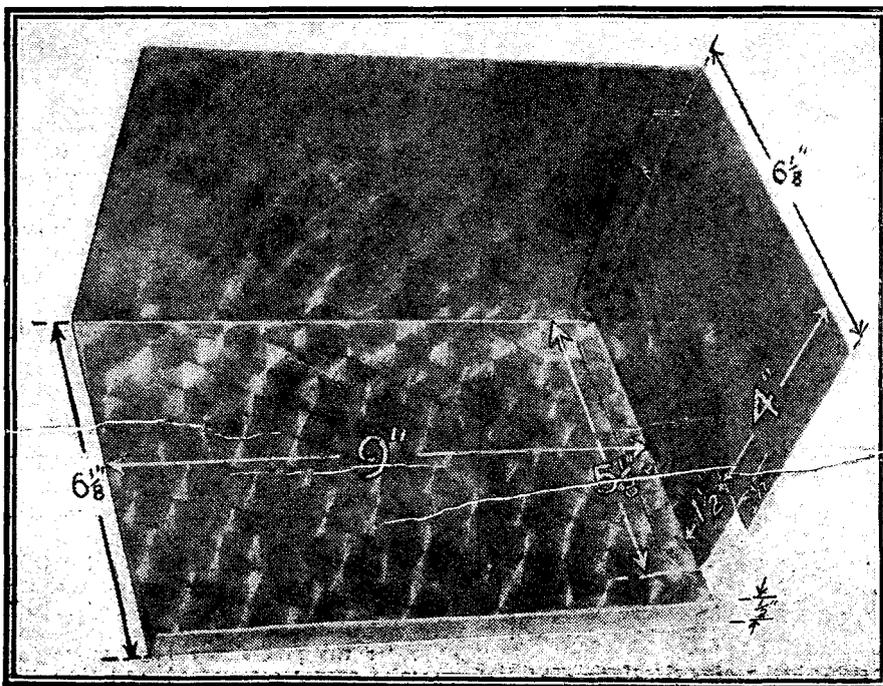
For one thing, it has not the powerful help of the large pick-up of energy of an outside aerial. It depends upon the very much smaller pick-up of a frame aerial, and so a very slight lowering of its efficiency due to imperfect workmanship, unsuitable components, or what not, may make all the difference.

Again, it lacks the soothing influ-



Note the simplicity of the frame aerial; one coil unit to the other. Differentiable refinement is the output

"SEEN ON THE SCREEN"



All the necessary screen dimensions are shown on this illustration.

THE PARTS YOU N

- 1 "Favourite" type cabinet with 5 1/2-in. baseboard (Camco).
- 1 14 x 7 ins. panel.
- 2 .0005-mfd. variable condensers (Lotus or other compact type, e.g., Formo).
- 2 Small vernier dials (Igranic Junior, or similar type).
- 1 .0001, .00013 or .00015-mfd. differential reaction condenser (Lissen or Lotus, Ready Radio, etc.).
- 1 L.T. switch (Igranic or Lissen, Lotus, Benjamin, Bulgin, etc.).
- 1 Double-pole change-over switch (Wearite, small type).
- 2 1-mfd. condensers (Lissen, etc.).
- 1 2-mfd. condenser (T.C.C. or
- Lissen, Dubliner
- 2 600 or 500 (Ready Radio
- Paroussi, Wear
- 3 Horizontal type (W.B. or B...
- etc.).
- 1 Ordinary valve type necessarily Lotus, Formo,
- 2 H.F. chokes (L...
- or Lissen, Eng...
- etc.).
- 1 .0003 mfd. (T.C.C.) or L...
- lard, Ediswan,
- 2 .001-mfd. fix (T.C.C.), or L...

THE SET THAT WILL

The "MERCURY" FOUR

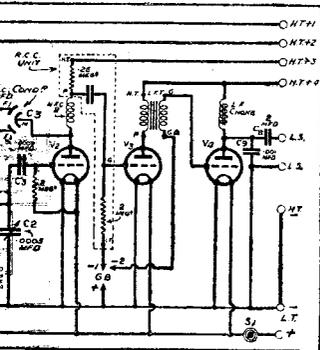
Designed and Described By
The "P.W." RESEARCH DEPT.

l-out" for efficiency. Aerial, batteries and loud
magnificent volume and plenty of programmes
"P.W." for a hot portable 4-valver—this is IT!

ence of an earth connection, and so its stability can
only be ensured by careful attention to matters of
screening and lay-out. This is rendered particularly
important by the way everything must be compressed
to get it into a reasonable sized cabinet.

There, we have said enough to make it pretty

WIRING CIRCUIT



switching, and the easy change from
reaction is embodied, and another valu-
able feature for the loud speaker.

NEED TO BUILD IT.

, etc.).
ohm resistances
and Climax, or
ite, Bulgin, etc.).
e valve holders
Junit, Paroussi,
holder (small
here). (W.B., or
Benjamin, etc.)
ees and Wearite,
n, Ready Radio,

- 1 2-meg. grid leak and holder (Dubilier, or Lissen, etc.).
 - 1 B.S.G. 20 coil (Lewcos).
 - 1 R.C. unit, anode resistance $\frac{1}{2}$ meg., grid leak 1 or 2 meg. (Lissen, etc.).
 - 1 L.F. transformer (Lotus, or other very small type, e.g., R.I. Hypermite, Lissen Hypernik, Varley Nicore, Igranic J., etc.).
 - 1 Output filter choke (R.I. Hypercore, or other very compact type).
- Materials for coil and frame windings (see text), piece of wood 15 by about 2 ins. for amplifier baseboard, sundry plugs and sockets, loud speaker assembly (see text), screens, etc.

iked condenser
n, Dubilier, Mul-
Paranti, etc.).
ed to condensers
m, etc.).

transmissions with the great-
est of ease, with quite a large
space between them, and it
brought in the Midland
Regional at excellent volume
with only just a trifle of re-
action. (It could be heard
at moderate strength on the
speaker with no reaction at
all.)

The strength of the local
programmes (about 15 miles)
was so great as to overload
the last valve heavily.

It was
necess-
ary to
cut the
volume
d o w n .
and to

do so sufficiently
we found we had to
turn the set so that
the frame aerial was
nearly at right angles
to the direction of
maximum strength.

Punch from Paris

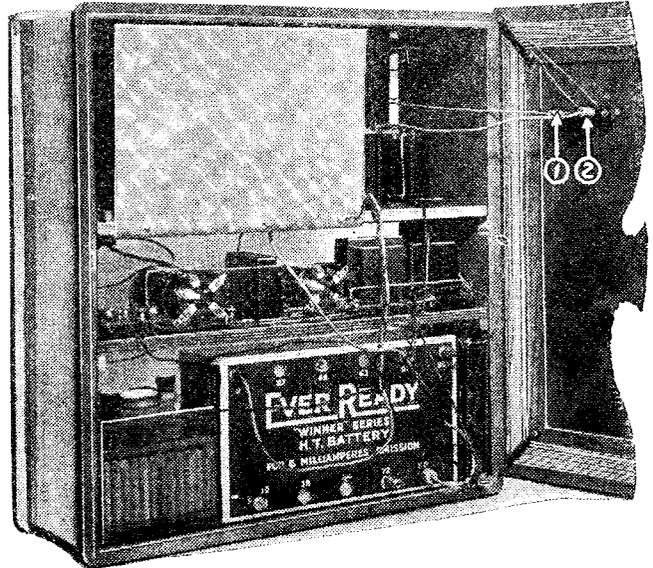
The reader will
understand, of course,
that in common with
all frame aerial sets,
this receiver must be
turned about in various
directions to get the
maximum volume from
the different stations.

On going over to
long waves by shifting
the plug controlling the
frame aerials and mov-
ing the wave-change
switch 5 X X came in
at excellent volume
with very little reaction. On tuning with
a little more care and using a moderate
amount of reaction, Radio-Paris was picked
up, and likewise gave loud-speaker strength
quite sufficient to be enjoyable.

Selectivity was extremely good on both
wave-bands, and tuning was consequently
very sharp on the dials. Indeed, just a
little practice is required to get the knack of
running them in step before searching can
be accomplished successfully.

Sharp Tuning

It is not really difficult, but we think it as
well to mention the point for the benefit of
those readers who have been accustomed to
the relatively broad tuning of the average
set working on an outside aerial. They
might otherwise be inclined to imagine there

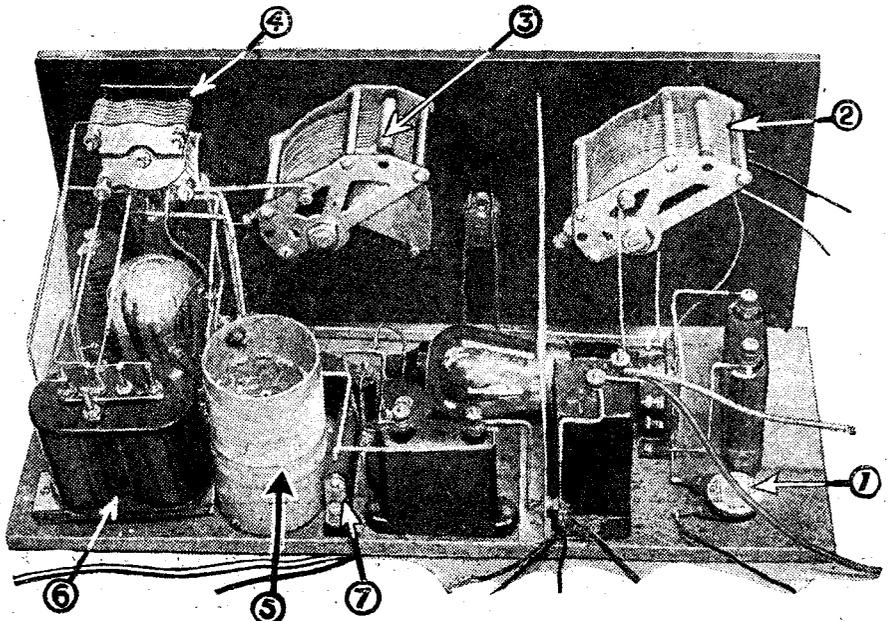


This shows the general arrangement of the interior—a triumph of compact efficiency.

was something wrong on finding that quite
close tuning was needed before they could
hear even the local station!

A little practice will show you how to
handle the dials, and then you will discover
(Continued on next page.)

HOW THE POWER IS PACKED IN



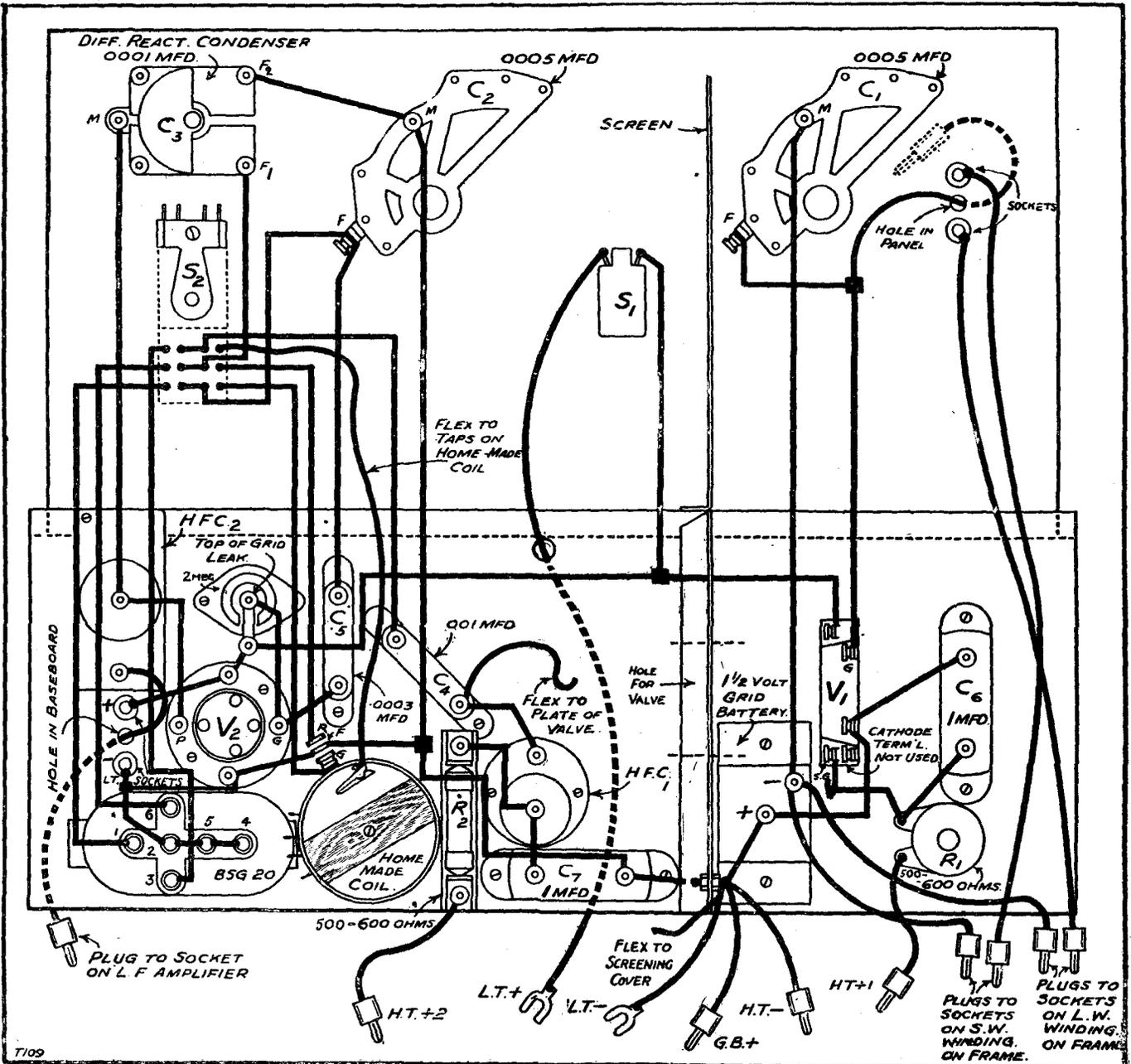
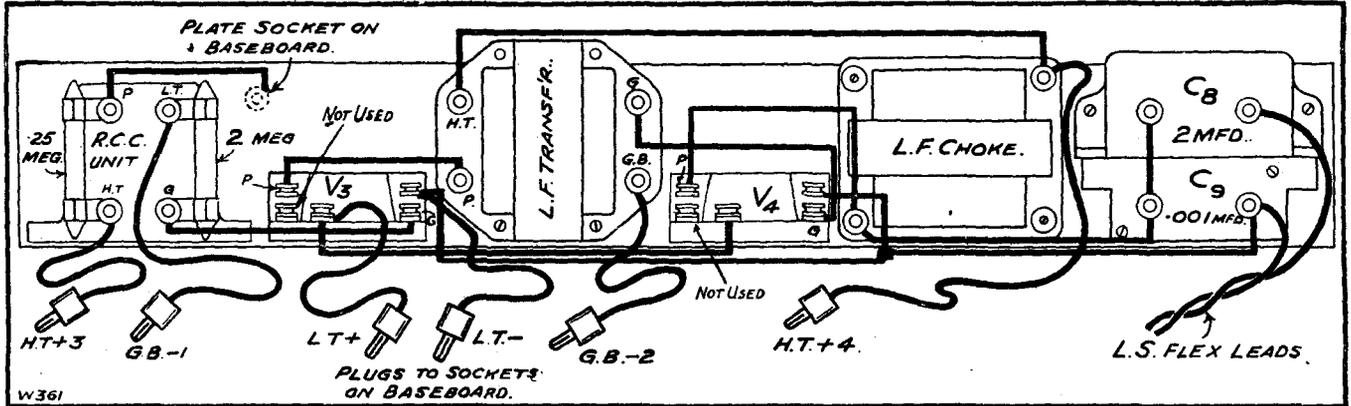
Compare this with the wiring diagram overleaf. (1) is the S.G.'s resistance, R_1 , and (2), (3) and (4) the aerial tuning, H.F. tuning and reaction condensers respectively. (5) is the home-made coil, and (6) the B.S.G.20 coil. The decoupling resistance R_2 is shown at (7).

STAGGER YOUR PALS!

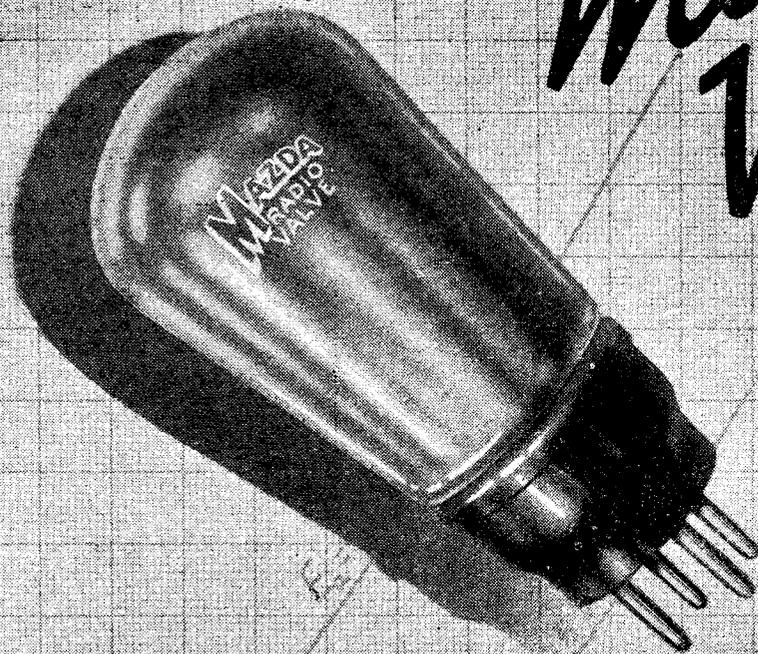
THE "MERCURY" FOUR.
 (Continued from previous page).

that it is even possible to tune-in the foreigners quickly and easily, in which the differential control of reaction is a great help. Actually, you will discover the set will bring in quite a lot of foreign stations on the speaker after dark.

We have now given you a general idea of the set's capabilities and characteristics and there we must stop. A receiver like this calls for pretty detailed treatment and this we shall be continuing in our next issue.



Another Amazing Mazda Valve!



The P.220A
PRICE **13/6**

CHARACTERISTICS

Filament volts	-	-	-	2.0
" amps	-	-	-	0.2
Max. H.T. volts	-	-	-	150
Amplification factor	-	-	-	6.5
Anode A.C. resistance (ohms)	-	-	-	1850
Mutual A.C. conductance (mA/V)	-	-	-	3.5

With Mazda valves in all positions you will give a performance many times better than before.

Never before have such fine characteristics been approached by a power valve consuming only 0.2 amps filament current. With its impedance of only 1850 ohms it can accept a very large input and the remarkably high amplification factor of 6.5 gives a good stage gain. A high output may therefore be maintained together with remarkably fine quality.

The AMAZING MAZDA RADIO VALVES



THE EDISON SWAN ELECTRIC CO., LTD.
Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Business of The British Thomson-Houston Co., Ltd.

Radio Division
1a, Newman Street, Oxford Street, W.1
Showrooms in all the Principal Towns

EDISWAN

v.67

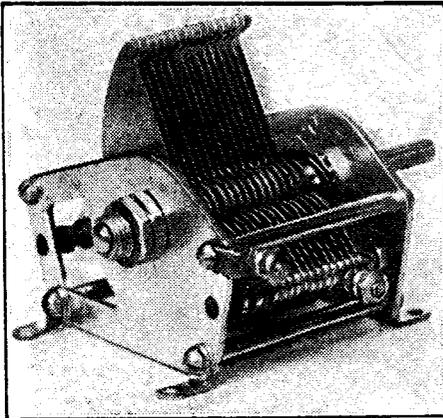
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



POLAR UNIVERSAL CONDENSER.

THE new Polar Universal Condenser is so designed that it can be used singly in the usual way, or ganged in two or three units, and the single hole fixing is duplicated at both ends so that it can be attached to screens.



The latest Polar Component.

It is one of the trimmest and yet most robust condensers that I have come across. It is made of hard brass throughout, and you will find it a difficult job to make the moving vanes bend over to the fixed vanes, even if you tried to do so.

Nevertheless, it is not cumbersome, and has clean lines and is very nicely finished.

It can be fixed down to a baseboard by means of four screws in addition, or as well as single hole panel mounting. There are ball bearings, and the movement is well up to Polar standard, which is saying a lot.

There is an extremely small amount of solid insulating material in the structure, so that its dielectric losses are practically nil.

Altogether it is an excellent production. It is quite apparent that Messrs. Wingrove and Rogers are still manufacturing "to form"!

The price of the single Universal Condenser is 7s. 6d. for the .0005 mfd. and 7s. for the .0003 mfd.

WONDERFUL VALVE CHARACTERISTICS.

If valves continue to improve at the same rate as they have been improving this last few years, the future has some marvels in store for us! At present there is no sign at all of a slackening—indeed, the pace seems to be growing faster.

For instance, I have just received one of

the new Osram P.X.4 valves. The P.X.4 was a very good valve, but with its new characteristics I do not know of another valve in its class that can touch it.

It is an output power valve with a 4-volt filament taking .6 amperes. It only needs 200 volts on the plate. It has an amplification factor of 3.5, and the extraordinarily low impedance of 1,050 ohms. Its mutual conductance is 3.3.

It is, of course, primarily designed for use in A.C. sets, the filament being directly heated. But it can be operated in a D.C. outfit, the filament current being supplied by a 4-volt accumulator.

And in this connection it is obvious that the P.X.4 is ideal for D.C. mains, as with these voltages above about 200 are seldom available. It enables the D.C. enthusiast to get results comparable with those given by the L.S.5A type of valve, a valve which necessitates an H.T. voltage of some 400.

Naturally the P.X.4 demands a fairly high anode current, and even with about 30 volts grid bias some 50 milliamps will be recorded when 200 volts are used. However, you get full repayment in the way of undistorted power.

On test we found the new P.X.4 just as excellent as its characteristics would indicate. It enabled a large moving-coil loud speaker to be operated at robust volume with a margin of power to spare. The P.X.4 costs 25s.

PILOT RADIO COMPONENTS.

I recently spent an hour or two testing a bunch of American components. From a patriotic point of view, I can only hope that this particular bunch represents the best that America can do. If they are merely of ordinary American standard, then all I can say is that the British manufacturer must pull himself together!

But I do not think they are because they are Pilot Radio components, and the name Pilot is of world-wide eminence.

These Pilot components were sent to me for examination by Thos. A. Rowley, Ltd., of Birmingham. These people are the sole distributors for Gt. Britain of Pilot Radio gear.

I like particularly the Pilot Knob Type

Switch which is of the quick action variety, and is capable of handling three amperes at 220 volts. It is a quite small one-hole-panel mounting component, and it is provided with a large insulating knob. The easy turn of this knob is accompanied by that most excellent snap action which represents my ideal in switches.

Then there is the Pilot Volugrad, a potentiometer device full of good points. And the Pilot L.F. transformer is a component that speaks for itself in a set! If it is not better than any British transformer it is certainly superior to many.

When you are Buying—

(28) A KIT OF PARTS.

Make sure that it really is the bargain it is claimed to be and that all the components are of good quality.

You are quite safe with kit suppliers of known reputation, but a kit that is proffered by an unknown concern or a local supplier may be full of concealed snags.

Little items of vital importance may be represented by absolute junk.

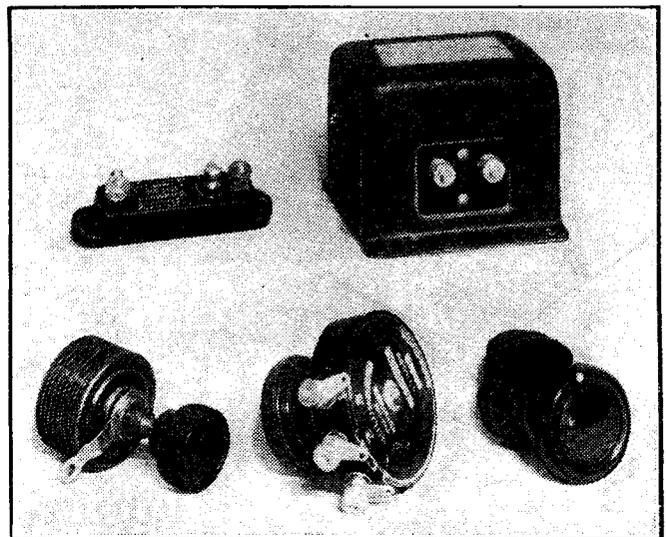
Also, the panel drilling might prove a very roughly-carried-out job. (The big kit people drill their panels by the dozen at a time, and use "jigs" to ensure absolute accuracy.)

The above applies to kits of parts for "P.W." and other such designs; the special kit-sets due to various manufacturers are generally only sold in special sealed cartons to ensure that the parts are not replaced.

FOR CONE LOUD SPEAKER.

Messrs. J. H. Weedon, Ltd., of East Ham, recently sent me a sample of their self-centre extension rod which is designed expressly for double linen or single-cone loud speakers.

The retail price is 1s. 6d. Its use obviates the usual stretching rods, while a small ball-socket movement enables exact centring to be obtained. It is a very ingenious, though a quite simple and easily-used article.



The Pilot components referred to are included in this group. The Quick-Action Switch is at the extreme right, and the Volugrad is to be seen in the centre at the bottom.

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from previous page.)

one will have faded in, just as strongly, although previously it may have been inaudible. Apart from such true fading, there are many things like a swinging aerial or faulty battery connections which cause in-and-out effects that have been termed fading, though this term is really incorrect. The true fading is that due to conditions over which we have no control.

WHAT DO YOU THINK ABOUT THIS ?

A Yarmouth reader of "P.W." had an H.T.-from-the-mains set which suddenly developed a puzzling fault. Normally very quiet and crackle-free, it suddenly took to crackling loudly as soon as anyone in the house went to bed!

For most of the evening it would run perfectly, but as soon as the first of the family (usually grandma) went to roost it crackled and spluttered until everyone else was glad to go. Of course, as soon as this peculiarity was noticed the cause was easy to find. But could you have said

WHAT WAS WRONG ?

N.B.—There is no prize for answering this, but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to the above next week.)

The trouble which was described last week was found to be due to an accidental knock which had bent the loud-speaker's driving-rod a little, and thus spoilt results.

FOR THE LISTENER.

(Continued from page 642.)

dum, then," she said. "Or Tweedledee," I said; and a silence seemed to fall between us.

She is rather touchy on her powers of acting, is Belinda, since the other evening when she gave a complete English programme here to our neighbours all by herself, impersonating in the space of one hour Tommy Handley, Mabel Constanduros, Sir Oliver Lodge, Dr. Cyril Burt, and Mr. Farrar.

Budapest.

I have tried several times to get Budapest, but without any luck. Last night, however, it walked in all by itself and held Belinda's undivided attention for the whole evening.

A Military Brass Band was playing selections from the works of Kalman. I don't know Kalman, but it was one of the finest military bands I have ever heard.

Dan Godfrey must take second place for one in a way. The swing and blare of it!

I have always understood that the Hungarians are not particularly good fighters, but that their uniforms are all right. So is their military band. The "March of the Hussars" out-Sousa'd Sousa.

Afterwards there was some Tzigane music from one of the Budapest cafes. I should like to go to Budapest. It must be a very gay place to live in.

With the possible exception of Germany these continental programmes have nowhere near the educational value ours have; but their entertainment value is much, higher. Budapest began with a Literary

Talk, which I missed, and which, being in Magyar, I shouldn't have understood; but afterwards, for almost three solid hours, it was pure entertainment.

Noise Effects.

They do not need a special Studio for "noise effects" on the Continent. One station serves the purpose of another.

I was listening the other day to Hermann Kessler, from Berlin, telling the story of his life; and in the background, most appropriately, Berne was transmitting Chimes from the Cathedral at Basle.

And always, for us in this place, there are the storms in the mountains, which would satisfy even the heart of Lance Sieveking!

Vernon Bartlett.

Belinda and I were distressed to hear of the retirement of Mr. Vernon Bartlett. Belinda said that, with the exception of Mr. Farrar, she thought he had the nicest voice of all.

"How he has thrilled me," she said, "when he has been speaking of the politics of Poland and Ruritania!" "You mean Roumania," I said. "No, I don't," she said, "I mean his voice."

She began to cry softly. While she was crying, I recalled Mr. Bartlett's wisdom, his steadying and restraining hand, his refusal to be chivvied by anybody, his unerring instinct in spotting the permanent among the impermanences of passing politics.

"I don't think I can ever speak again," whimpered Belinda. "If you talk like that," I said, "I will tune you in to Toulouse!" That brought her round.

An easily made H.T. Eliminator

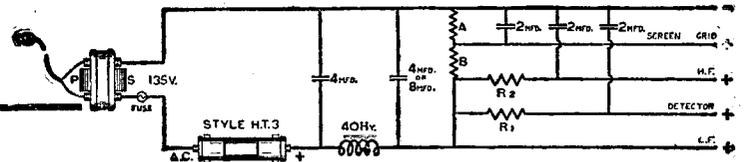
Suitable for most of the popular 3-valve receivers, requiring not more than 20 m.a. at 120 volts,

USING THE TYPE H.T.3



METAL RECTIFIER Price 21/-

The Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Road, London, N.1.



- NO VALVES.
- NO CHEMICALS.
- NO MOVING PARTS.

Full details are given in "The All-Metal Way 1930," our new 32-page book which shows you how to run your set entirely from your A.C. mains. Send 2d. stamps with your name and address to:—

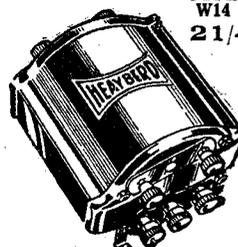
BRITAIN'S LEADING RADIO JOURNAL

The Average Weekly NET SALES of POPULAR WIRELESS for the six months ending JUNE 30th, were

110,377

Eliminate Trouble!

TYPE W14 21/-

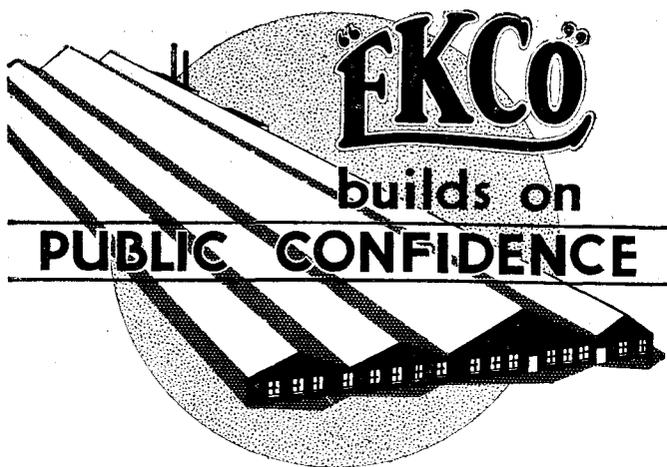


Trouble sometimes occurs in a radio battery during a programme that you specially wish to hear. Don't be let down like this. Build an eliminator that will give steady current—free from all trouble—by specifying Heayberd Transformer as the important link-up.



POWER TRANSFORMERS

F. C. HEAYBERD & CO. 10, Finsbury Street, E.C. Phone: Clerkenwell 7218.



At Southend - on - Sea now stands the most modern electric radio factory in Europe.

Built by the pioneers of British All-Electric Radio. Built, as all "Ekco" products are, up to a standard and not down to a price. Backed by British Capital, British Labour and British Brains. Behind it an organisation that has experienced and overcome the thousand-and-one pitfalls common to All-Electric Radio. Making over 80% of the total sales of Electric Radio Devices in the British Isles. Specialising solely in the application of electric power to radio.

In buying "EKCO" products, you are assured of the absence of batteries and accumulators with their attendant worries and continual expense; instead, you will enjoy continuous smooth reception, volume to order, constant voltage output at really negligible running costs.

Al we ask is that you insist on an "EKCO" Demonstration before you make your final choice. Close at hand, you will find an "EKCO" dealer who will gladly demonstrate his first choice in electric radio—"EKCO."

Send to-day for the "EKCO" free literature and details of Easy Payments!

E. K. COLE, LTD.,
DEPT. A,



"EKCO" WORKS,
SOUTHEND-ON-SEA

Plug-in-

that's all!



ALL-ELECTRIC RADIO

The Valve with the Long Arm!

CONSISTENT LONG RANGE

MARCONI MS₄ GIVES
DEPENDABLE AMPLIFICATION

Whether the station comes in at the top or the bottom of the scale, on the long or medium broadcast wavebands, it will be at its clearest and steadiest with Marconi MS₄. So low is the inter-electrode capacity that full advantage can be obtained from the high magnification factor of 550 in any standard circuit. No neutralising or extra screening is called for—Marconi MS₄ is the reliable choice for all-round performance.

Note also the generous spacing of the electrodes which allows for rapid radiation of the cathode heat, thus avoiding excessive temperature rise and emission from the grid. This feature is a definite step to longer life and freedom from "backlash."

Marconi MS₄ is designed for operation entirely from A.C. Mains. In battery-driven receivers use Marconi S₂₁₅ two-volt, S₄₁₀ four-volt, S₆₁₀ six-volt.

And they are ALL BRITISH.
For the best results in A.C. Mains Circuits use with Marconi MS₄:

- Marconi MH₄—High magnification.
- " MHL₄ — General purpose.
- " ML₄ — L.F. and Power.
- " PX₄—Super Power.
- " PT₄₂₅ — Pentode.

CHARACTERISTICS

Mag. factor ... 550
Impedance ...
500,000 ohms
Fil. volts ... 4'0
Fil. amps. ... 1'0

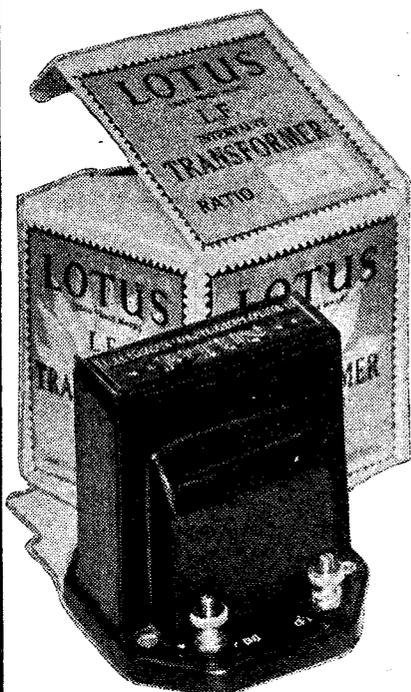


The Amazing
**MARCONI
MS₄**

THE MARCONIPHONE COMPANY LIMITED
Radio House, Tottenham Court Road, W.1

Fit the Lotus L.F. Transformer

and note the improvement in your set.



Whether you are building a new set or merely overhauling your old one, the installation of a Lotus L.F. Inter-valve Transformer will double its efficiency.

Housed in a black bakelite moulded case, the Lotus Transformer is both compact and efficient. It embodies all the accuracy and careful finish which are expected from Lotus components.

Available in ratios of 3-1 and 5-1

Price **12/6**

Full particulars on request

LOTUS

L.F. TRANSFORMER

GARNETT, WHITELEY & CO., Ltd.
LOTUS WORKS, MILL LANE, LIVERPOOL

Causton

WHAT WE WANT TO KNOW.

(Continued from page 635.)

Take the case of valves. Nearly every valve advertisement gives you all the relevant technical details concerning the particular types advertised. And these details generally show absolutely the technical efficiencies of the articles.

Given the impedance, amplification factor and filament details and you have pretty well the whole story. You are then in a position to judge for yourself just how modestly—or otherwise—the rest of the “dope” is framed up.

Now and then you get frequency curves for L.F. transformers and, although these do not tell the whole story, they go a fair way into it.

What an Opportunity!

By the way, one concern is prepared to guarantee every one of its L.F. transformers to be within 5 per cent of its published specification (a fairly full specification at that). But I have not noticed that they impress this fact on possible purchasers. What an opportunity missed! How many other makers would go to such limits?

You see it is quite evident that much of the widely-advertised apparatus really is good stuff—it must be, for it has achieved

NEXT WEEK

**SPECIAL
BATTERY NUMBER
ORDER YOUR COPY NOW.**

popularity and has stood the test of time. And the shoddy gear stands but little chance of securing a continued success even if, by cunning booming, it gets pushed into some prominence for a short period.

Therefore it is all the more pity that greater endeavours to present “cast-iron” cases for the first-class products are not made.

One of these days the radio industry will appoint some central committee to frame a system of classification, or a method of standardising specifications and performance charts and formulae. America has taken steps of this kind and tentative attempts have been made on similar lines in this country.

Here is a Suggestion.

When the industry sees that it will benefit itself as much as it will protect the “consumer” by doing such a job properly, real progress will be made.

If it is considered that fine technical distinctions such as are drawn by the N.P.L. might prove embarrassing, here is a suggestion. What about a National Radio Institute that would issue graded certificates yearly for all the various products? The public would soon learn that any wireless article carrying the current year's brand A, say, of the Institute conformed to some pretty high standard set by the industry as a whole.

The Institute's services being open to all, those goods not bearing its brand could be regarded with justifiable suspicion.

Anyway, that is my suggestion.

TECHNICAL NOTES.

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

Frames for Portables.

WITH regard to the use of frame aerials in portable sets, I often receive enquiries from listeners who want to take advantage of the well-known directional properties of the frame aerial, but who are in doubt as to whether this type of aerial will work with their ordinary receiver.

It is not at all easy to say off-hand whether a frame aerial will work with any type of receiver: it depends a good deal, of course, upon the receiver itself and also to some extent on local conditions as well as upon the size and design of the frame aerial which you propose to use.

Detector Operation.

There are one or two general rules which, however, may be borne in mind. One is that the frame aerial brings in a very much smaller amount of signal energy than the outdoor type of aerial and, therefore, if it is to be effective, some amount of high-frequency amplification is necessary.

I should say that at least one stage of screened-grid H.F. amplification will be necessary in most cases to bring up the signals from the frame aerial to a sufficient intensity for proper operation of the detector. At the same time it is very desirable to have a power valve in the output stage.

Special Purposes.

Apart from the advantage of being able to dispense with an outside aerial and with an earth connection, the frame or loop aerial is sometimes very convenient when you wish to cut out interfering stations or, indeed, to cut out other types of interference especially from local sources.

Although beginners often seem to be very much intrigued with the idea of using a frame aerial, I do not in general recommend this type of aerial, as the number of cases in which it is really satisfactory is comparatively limited. I think it is much better to recommend the average experimenter or listener to use a fair outdoor aerial and good earth connection.

Pentode Peculiarities.

Those of you who use pentode valves in the output stage have no doubt discovered how important it is to find just the right type of loud speaker to suit the receiver. Of course, this applies to all receivers, but it seems to be particularly important where the pentode is used.

Probably you may have found, especially if the output transformer primary impedance is rather on the low side, that the lower frequencies in the register tend to be less reproduced than the upper. This is a fairly common fault in many radio components, and consequently you have to do what you can to counterbalance the effect by introducing a component which gives extra prominence to the lower frequencies—or, should I say, less prominence to the upper frequencies.

The moving-coil loud speaker generally favours the low frequencies rather than the

(Continued on page 654.)

ONLY SIXPENCE!

That is the very modest price of the "Wireless Constructor," and a glance through the September issue

NOW ON SALE

reveals that this latest number really is exceptional value for money. There are details of

THE "GRAMO" AMPLIFIER

By PERCY W. HARRIS, M.I.R.E.

An excellent article by the Chief Engineer of the B.B.C., entitled

DISTORTION IN THE ETHER

A full description of Victor King's latest receiver,

THE "EXPLORER" TWO

Constructional details of

THE "REACTOCRYSTALS"

a device of particular interest to crystal enthusiasts

And a whole horde of other attractive features, including "Using A.C. Valves," "Panel-Control Problems," "With Pick-Up and Speaker," "The Calimeter" (full details), "Professor Goop's New Aerial," "Safeguarding the Set," etc., etc.

THE WIRELESS CONSTRUCTOR

ON SALE EVERYWHERE.

SEPT. ISSUE. Price 6d.

Always ask your dealer for Dario. It is a guarantee of all that is supreme in Radio Valves and you are perfectly safe in buying Dario at all times.

The following notice to the Trade proves Dario worth.

INDEMNITY BY IMPEX ELECTRICAL LTD.

Messrs. The Mullard Radio Valve Co., Ltd. have recently published notices in the trade press intimating that they intend to take legal proceedings against retailers and others who may infringe certain Letters Patent owned by them, amongst which are Letters Patent No. 283,941.

We are satisfied that the construction of our well-known Dario Valves is not such as to constitute an infringement of Letters Patent No. 283,941, and we desire to give notice to our trade friends that we undertake hereby to indemnify any person who may be sued for infringement of Letters Patent No. 283,941 by the sale of our Dario Valves in respect of any costs and damages which may be awarded against him provided that our Solicitors, Messrs. Philip Conway, Thomas and Co., of 80, Rochester Row, Westminster, London, S.W.1 shall have the conduct of any action brought to recover such damages.

For the purpose of enabling any retailer conveniently to avail himself of the benefit of this indemnity we are depositing with our Bankers in England in the joint names of ourselves and our Solicitors a large sum of money to be utilised for the purpose of making this indemnity effective.

In future, should any claim be made against any customer of ours for infringement of Letters Patent No. 283,941 by the sale of our Dario Valves, the document containing the claim should be sent immediately, unanswered, to our Solicitors at the above address in order to obtain the benefit of this indemnity and relief from the trouble of conducting legal proceedings.



Best way to all Stations

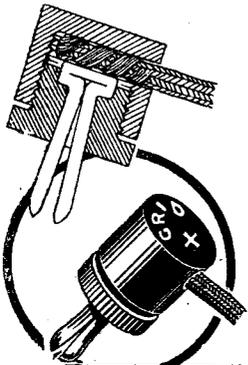
Ask your dealer or write for Free Folder to:

IMPEX ELECTRICAL LTD.

(Dept. B), 538, HIGH ROAD, LEYTONSTONE, E.11.

Telephone: Wanslead 2722.

The Secret of its PERFECT CONTACT.



The Powerful grip of the Belling-Lee Wander Plug and its adaptability to any size battery socket are due to the long prongs made of special spring metal.
15 Engravings, side entry. Wire, rubber and braiding firmly gripped.

Write for Belling-Lee Handbook—
"Radio Connections."
Price 3d.

7-way Battery Cord with Belling-Lee Wander Plugs and Spade Terminals for Orgola and other sets 5/9

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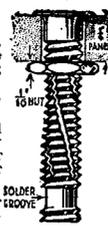
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TECHNICAL NOTES.

(Continued from page 652.)

upper, and consequently, if you use a suitable moving-coil speaker with your pentode output stage, you should generally get satisfactory results.

A Headphone Problem.

I have been asked whether it is practicable to introduce headphone receivers directly into the anode circuit of the output stage of a receiver when a D.C. mains unit is being employed. In the particular case in question my correspondent wants to receive distant stations which he cannot obtain on his loud speaker, and therefore he proposes to put his telephones direct into the anode circuit.

So far as reception is concerned, this scheme is quite O.K., but there may be a serious danger in it, inasmuch as the mains are connected to the receiver *via* the eliminator.

It is, therefore, very important to use an output filter circuit, or some equivalent, so that the telephones are not directly connected into the anode circuit, a condenser being introduced in series with each of the telephone leads. In this case (assuming the condensers are satisfactory) the danger is overcome.

The Earth Condenser.

In the same connection I should mention that it is a good plan—in fact, very important—to put a large fixed condenser in series with the earth-lead in a case of this sort, as it is possible that the positive pole of the electric mains may be earthed; the danger thereby created is overcome by the use of the earth-lead condenser.

R.C. Amplifiers.

Referring to my remarks some little time back, on resistance-capacity-coupled amplification, there was a point which I ought perhaps to have mentioned, and of which I am reminded by a reader; this relates to the use of a particular type of coupling-condenser for the purpose.

As you know, it is very desirable to use mica condensers for coupling in an R.C. amplifier, not paper condensers. Paper condensers are usually made of layers of tinfoil separated by layers of wax-impregnated paper. In the present-day type of paper condenser, great precautions are taken in manufacture and a high degree of efficiency and reliability obtained.

The paper type of condenser is particularly suitable for large-capacity condensers, inasmuch as it enables several microfarads to be compressed within quite a small cubic space. This type of condenser is much used for mains smoothing and suchlike purposes.

Neutralising the G.B.

But for the R.C. coupling condensers, not only is there often a fairly high voltage across the condenser, but the slightest leak will have its effect upon the grid of the valve and may completely neutralise the effect of the grid bias. In fact, the grid may even become positively charged—which, of course, will mean serious distortion.

A mica condenser (mica sheets are used as insulation instead of paper sheets) is more expensive than a paper condenser

(Continued on next page.)

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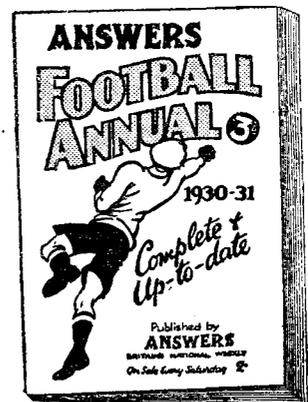
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TECHNICAL NOTES.

(Continued from previous page.)

but the mica is very much more reliable as an insulator. In view of the importance of avoiding even the slightest leak in R.C. coupling condensers, it is well worth while to use the mica type, and this type is invariably used for the purpose.

Crystal Set Selectivity.

There are apparently quite a large number of listeners who still swear allegiance to the crystal receiver. Since the introduction of the Brookmans Park station, crystal users, whilst often getting excellent reception from this station, find it difficult to cut it out and to tune in 5 G B, and I am often asked whether it is possible to improve the selectivity of a crystal set so as to overcome this difficulty and enable the latter station to be tuned in without Brookmans Park.

Unfortunately, it is not an easy matter to increase the selectivity of an ordinary crystal receiver, sufficiently for the purpose in question, and the advice I would give you in such cases is to go a step further and to fit up a single-valve receiver—using, of course, a tapped coil in the aerial circuit and employing reaction.

With this type of circuit it should be comparatively easy to cut out Brookmans Park and tune in 5 G B as well as other stations at good headphone strength, without any background from the local station. If the operation is not sufficiently selective, you may employ a simple device specially designed for cutting out Brookmans Park, such as the "Brookmans Rejector," which was described in "Popular Wireless" some little time back.

Question of Signal Energy.

One of the principal reasons against attempting to increase the selectivity of a crystal set beyond certain limits is the fact that the volume is apt to be reduced in the process and, inasmuch as a crystal set relies entirely upon the incoming signal-energy without amplification, it is obvious that you cannot afford any reductions in signal strength.

A valve set is always so much more manageable, because what you lose on the swings you can easily make up on the roundabouts.

Amplifier Stability.

Those of you who use an electrical gramophone pick-up will find that the L.F. amplifying circuit in some circumstances tends to become unstable and howling and whistling noises may cause a good deal of trouble. This is often particularly the case if you increase the filament current to the valves beyond a certain limit or if you endeavour to force up the volume.

Of course, the circuit should be stabilised and this depends largely upon the values of the H.T. and grid-bias voltages and also, as already mentioned, upon the filament current. At the same time, quite apart from this, the addition of a suitable earth connection will often make all the difference to the stability of the amplifier.

Earthing Important.

One of the simplest ways to make an earth connection is to the negative side of the low-tension battery. I should mention

(Continued on next page.)

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FOR YEARS

TECHNICAL NOTES.

(Continued from previous page.)

here, however, that if a D.C. mains unit is employed with the amplifier (as is very frequently the case) the earth connection should be made *via* a series fixed condenser of fairly large capacity, say 2 microfarads.

In the Grid Circuit.

Another point to remember is that the pick-up is connected directly or indirectly to the grid of the first valve; that is, it is directly or indirectly in the grid circuit and consequently the leads between the pick-up and the valve should be kept as short as possible.

It is often an advantage also to run an earth wire along to the frame of the pick-up itself, or at any rate to the metal part of the pick-up arm or holder. Some experimenters object to earthing the pick-up itself, on the ground that this tends to reduce the sensitivity, but I think you will

TECHNICAL TWISTERS

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In radio we are concerned with both and frequencies.

Last week's missing words (in order) were Capacity; Condenser; Condenser, Grid, Plate; Equal, Phase.

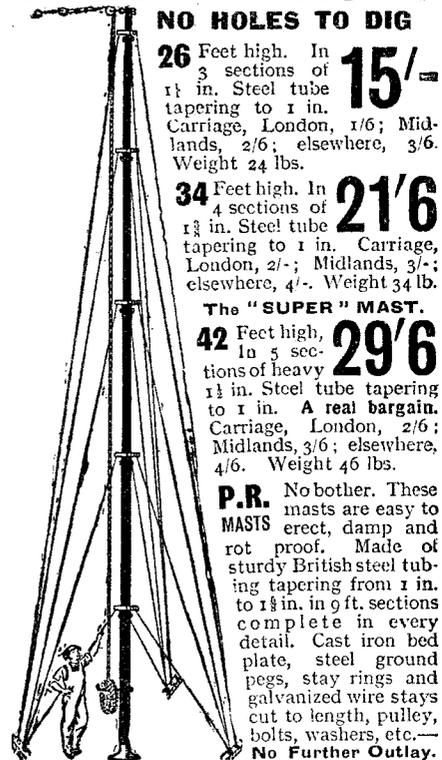
generally find that any alleged effect upon the sensitivity is much more than counter-balanced by the stabilising effect of the earth connection.

Capacity Effects.

The effect of hand-capacity will often be noticed when you put your hand forward to take hold of the pick-up to remove it or place it in position. If the movement of the hand in the vicinity of the pick-up causes whistling noises, or has a marked effect upon the loudness of the reproduction, you may be sure that there is instability in the amplifying circuit, which can be cured by proceeding along the lines indicated above.

You must remember that instability does not always show itself by a definite howl or other noise. It may just simply introduce distortion, and therefore every step should be taken to keep it down.

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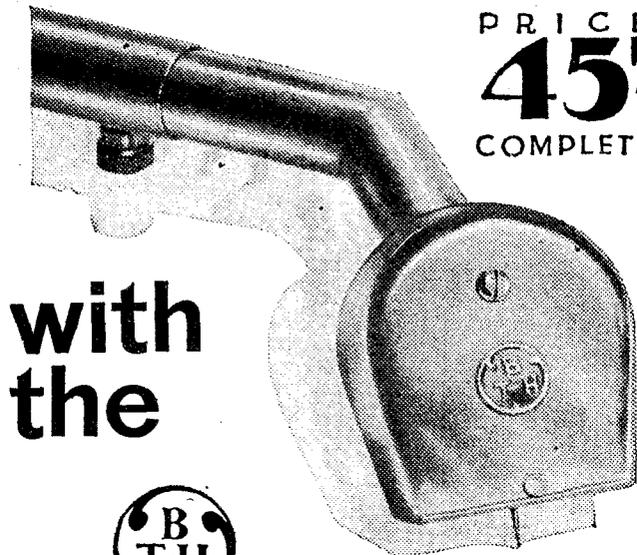
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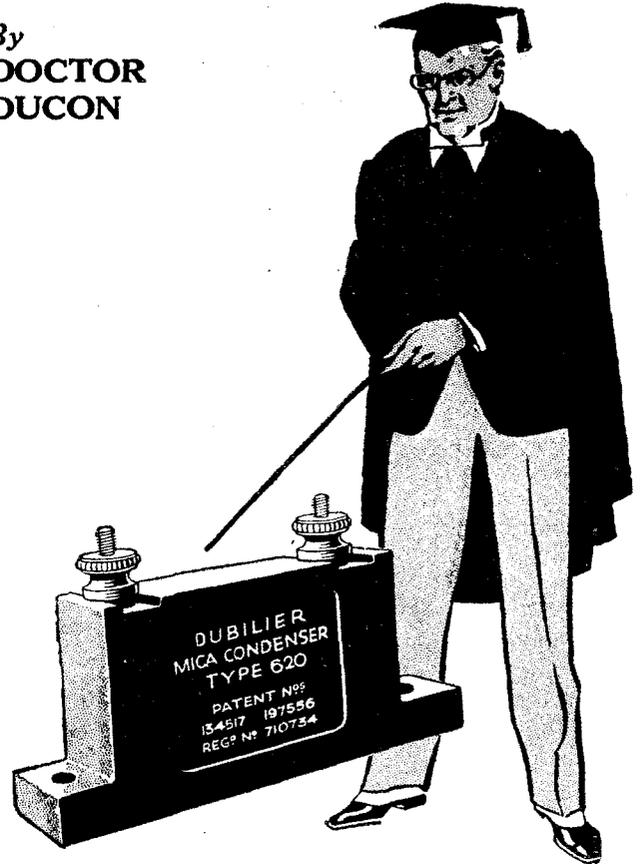
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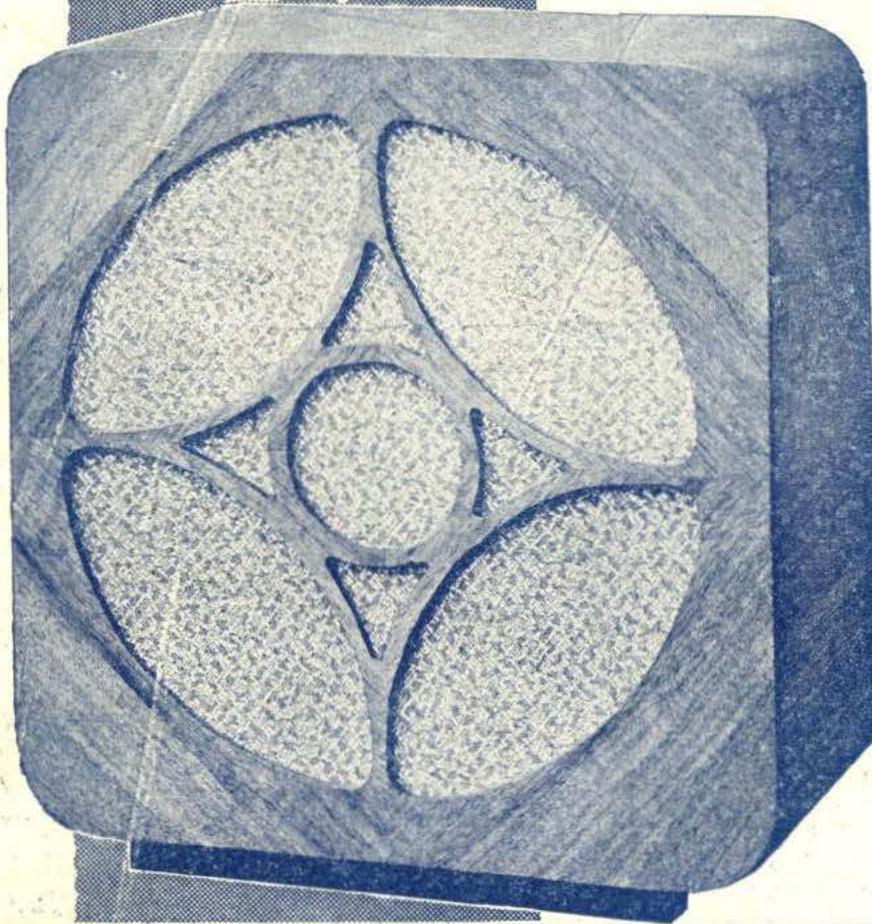
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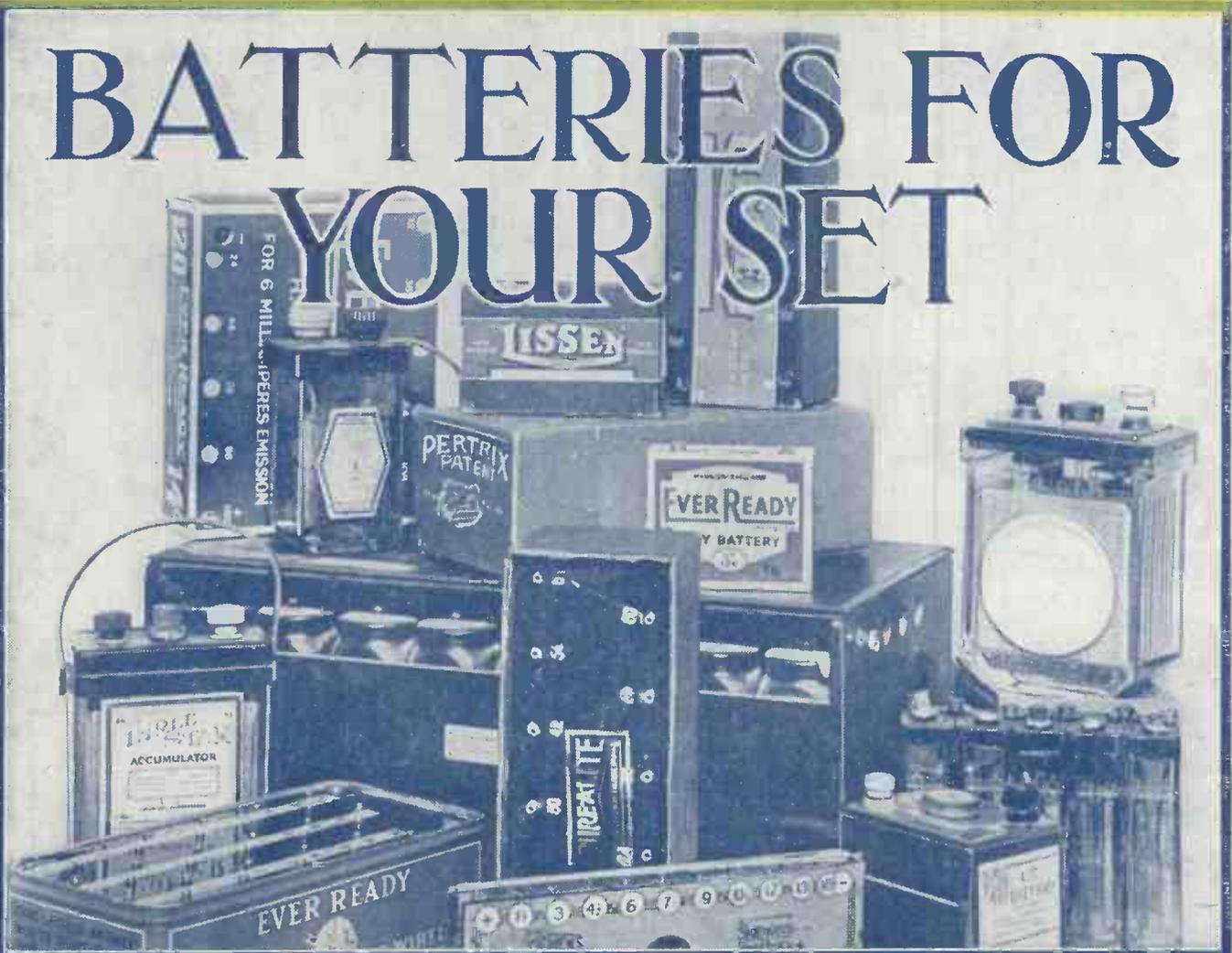
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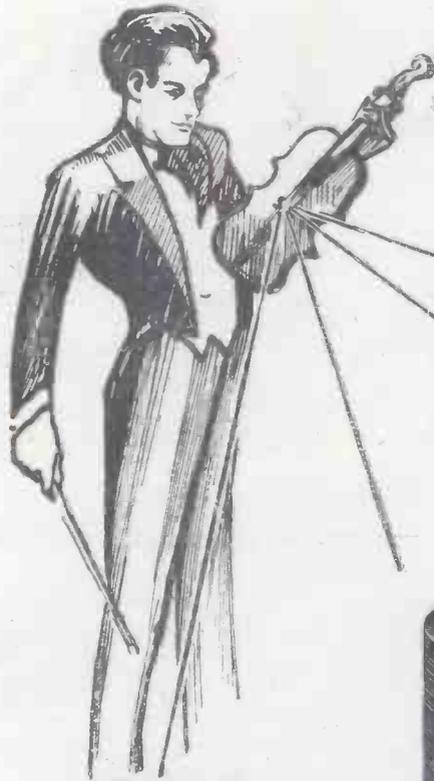
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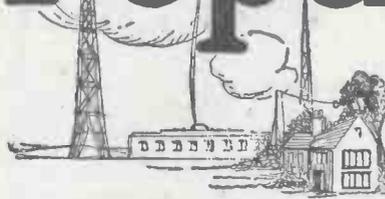
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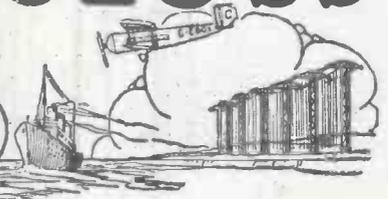
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RADIO NOTES & NEWS

KING OF DIE-HARDS.
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THE RING COMPLETE.

A Seaside Interlude.

AFTER writing this week's Notes and News I am going to shake the dust of London from my shoes to make room for the sand of the seashore. Even now the greater part of my wardrobe is seized and I can scarcely find a hankie. The little "Ariels" are shaking with excitement and watching the barometer like a skipper in a typhoon! If any "P.W." reader spots me at Sandown or Bognor Regis and utters the words "Valve Bart." to me, I will present him with One Guinea—in ha'pennies, if possible! He may know me by my fancy vests and my trick of absentmindedly trying to tune-in on the knobs of the cruet bottles.

Hoity Toity!

IT seems only yesterday that the little feminine "Ariel, Jun.," had a head almost as big as the rest of her and was much plagued with what she called 'Pots. Now she is in her last year at school (does any male reader know what a "jimmer" is? They wear 'em!) and having been bewitched by her reading about the French Revolution, has become quite a little aristocrat! When I mildly suggested taking a portable away with us, this young party coldly replied, "Well, I shouldn't! People will think we do that sort of thing!" I choked into my *mouchoir*. Well, well! She doesn't get it from me. I am bourgeoisie enough to like a pipe and a tankard, a story book, a song and a dog; an old suit and a garden to fool about in, a smack at a ball—and apple dumplings.

Better Late Than Never.

BUT I must cease this over-the-fence gossip and tackle the job that awaits, namely, getting my correspondence pile down. Oh, by the way! Our Culinary Assistant came home t'other evening and said that her young man had made "a new wireless." She added that he was now able to receive "The Grand National and the Original"! Now—letters. P. T. L. (Norwich) thinks that I don't know how to spell "aerial." It must have been the printer's fault in the first instance. Anyhow, "Ariel" saves ink! F. G. (Dartford) announces the discovery of a station at Nairobi. Good man! Battle of Hastings, 1066!

More Belated Replies.

L. J. B. (Brockley) inquires whether in my opinion, "atmospherics" will ever be eliminated. No, sir! But to a large extent counteracted. They are to

radio its natural pest. "Jansie" (Wick) wants to know why I do not write more of interest to Scottish readers. I was brought up in the belief that everything south of the Border interests a Scot. T. B. L. (Newbury, Berks) asks what loud speaker I recommend. A softly-spoken one, friend. To ascend from the playful to the financial, I recommend any or all advertised in "P.W." D. M. (Regent's Park, N.W.) cannot learn Morse. Never mind! Charles Lamb couldn't learn music!

cially that all L.S. curves should be shown compared with our own standard curve for the best L.S. we know. Passed to Chief for consideration!

Radio in the U.S.A.

DON'T they seem to be more *intense* in America than ourselves? In work or play they "go the limit." None of the "sweet reasonableness" or philosophic calm which loses our battles but wins our wars and keeps us steady in rough waters. In radio it is the same. They go radio mad and now envy us the B.B.C., the fruit of our un-hurried research and cool thinking. Now the amateur transmitters of the U.S.A., an army of over 2,000, are being brought into the radio division of the Naval Reserve. They will be organised into a complete U.S.A.-wide network of emergency communications.

Anti-Radio Artistes.

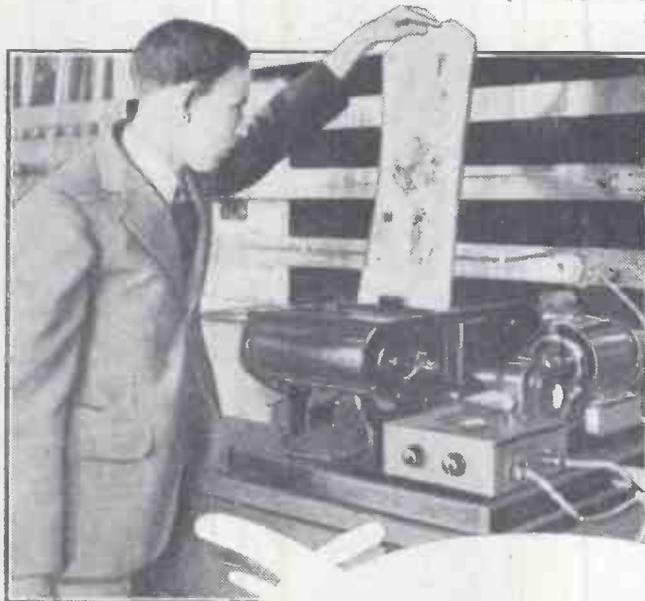
IT is said that owing to Chaliapin's refusal to sing at the Colon Opera House, Buenos Aires, if his voice were broadcast, a curious programme was the result, for, it being impossible to cancel the arrangements to broadcast the opera, the transmission duly took place, but every

time Chaliapin sang a note it had to be cut out. This meant that about 80 per cent of the performance was lost to the listeners. Well, for a couple of obstinate sticklers, Chaliapin and Kreisler are the blue ribbons of the anti-radio brigade. I could respect their whim a little if only they refused to be gramophoned. But do they? Not so's you'd notice!

King of Diehards.

BUT the monarch of the diehards surely must have been the late Mr. R. M. Smythe of New York City, of whom it
 (Continued on next page.)

SOUTHERN CROSS "PUTS IT ACROSS"!



When Kingsford Smith hopped across America in the Southern Cross, New York was so interested that they tuned-in a picture of the arrival 45 minutes after it happened at Oakland. Short waves, of course!

"Howling" Records.

C. C. S. (Birkenhead), who evidently takes his radio seriously, complains that the only "howling" tone gramophone records available are a set of fifteen, costing 8s. 6d. each. A bit prohibitive certainly. What he wants is one record of a tone rising through the whole range of frequencies, with a voice announcing when each piano note is reached. He suggests 5s. as the price. I wish him luck, though I do not think the possible value of the sales would justify it. C. C. S. also suggests that we publish curves for everything we test; espe-

NOTES AND NEWS.

(Continued from previous page.)

is related that he carried on his business for forty years without a telephone. He sued the New York Telephone Co. in an attempt to make them publish his name in the telephone directory, with the notice, "No telephone." He lost. His business has now been incorporated and a public announcement made to the effect that a telephone has been installed.

Cricket Item.

I LEARN that in between whiles Mr. Oldfield, the Australian wicket-keeper, has put in a lot of time looking for a portable to suit his taste and the long-distance requirements of reception in Australia. His choice fell on a Dunham 4-valve S.G. set, a model of which he put through its paces at a friend's house before making his selection.

The British Arctic Expedition.

NO doubt before these notes are published the "Quest" will have dumped the expedition amongst the chilly scenery of Greenland. Morse readers should look out for the expedition's radio signals. The main base is to be at Angmagsalik, where one wireless set will be installed. Call-signal, G K N; wave-length 29.27 metres, C.W. telegraphy. The other and smaller station will be set up somewhere in the ice-pack; its call-signal, etc., have so far eluded me, but readers who pick up G K N will no doubt soon find out all about it.

A Maintenance Scheme.

AMONGST the inducements offered by the Radio Association to would-be members is what is described as "free maintenance for your radio set." A local representative of the Association will call and make any necessary adjustments to the set if it breaks down, four times free in one year; extra visits, half-a-crown. I am sorry to observe that this Association has instituted what it terms "the degrees of Fellow (F.R.A.) and Associate (A.Rad.A.)," thus ape-ing certain learned societies and institutions whose degrees are important and recognised as certificates of a certain standard of scientific learning.

Referred Back.

J. A. (W. Hartlepool) kindly sings a song of praise in behalf of our "Magic" Four, on which he gets so many stations that he is positively embarrassed! Thank you, sir! Spread the good news throughout Co. Durham, please, and let some of it leak into Northumberland. J. A., however, adds this tip: "If you want to shorten your aerial, put a conducting wire from aerial to earth wire outside your window, before it enters house." Now, my dear J. A., you know that one must not "earth" the aerial under any circumstances except thunderstorms. Chop a piece off it, or put a condenser "in series" with it, but don't earth it. Do you really mean to say that you are receiving signals on an "earthed" aerial?

Two Appeals.

THE prizewinners this week are two letters, one from the U.S.A. and another from Kampola. First (from Boston, U.S.A.): "Had Welsh grand-

parents. Can schedule local broadcast Lloyd George if you can put him on the air on September 1st." Certainly! We own Mr. George. Next, from Kampola, Africa: "Dear sir, sir (or maddim) what is chippiest valve on London stog 'chance? Sending me one only I send thee money (cash) garantid of British Cancul by check." The number of valves sold by the Stock Exchange is pitifully small. Why these ebony subjects of H.M. the King, and our fellow-cits. in Africa, think "P.W." is a seller of radio apparatus is a perennial puzzle to "Ariel."

Mars Again.

COMMUNICATION with Mars is rapidly becoming established as the giant gooseberry or sea-serpent of radio. Rotarian F. Sargent has been running off the rails in a luncheon talk at the Stockton

SHORT WAVES.

The best way to appreciate singing, says a musician, is to shut the eyes. Especially if there happens to be a television screen in front of you.

"What is the best method of silencing distortions in a loud speaker?" asks a correspondent in a contemporary. Has he tried a coal-hammer?—"Punch."

"What's the scandal at the broadcasting studio?" "The whispering tenor wants more hush-money."—"Wireless Weekly."

"At one time it used to be feared that even the possession of a wireless receiving set would render a house more liable to be struck," we read in the "Yorkshire Herald." We suppose there must be a limit even to what lightning will stand.

ANOTHER HOWLER.

"Negative is the opposite to affirmative, and is therefore positive. Batteries have both of these, and are marked in algebra to show which is which and which is not, to avoid confusion."

As a last request, a negro convicted of murder at Sing Sing was allowed to listen to an entire radio programme broadcast from New York. After that the unfortunate fellow was probably very glad to die.—"Judge."

Wireless is now being blamed for "that Mondayish feeling," and the opinion has been expressed that it is because of the dreary Sunday evening programmes. In that case, Friday evening programmes must be exceptionally good—at any rate, judging by the delighted expressions one sees when it comes to pay time on Saturday.

and Thornaby Rotary Club. On two points I suggest he think again. He is reported to have said that Marconi has received signals on a wave-length "much longer" than any used on this planet.

I doubt whether Marconi ever said or implied that. A signal presupposes a deliberate attempt to communicate intelligence—and Marconi could not presuppose any such thing. That he may have heard some sounds I would not deny; the ether is full of "strays."

What Are They—If Any?

THE Rotarian (so says the "Northern Evening Despatch") remarked in conclusion that any attempt to transmit (to Mars) presupposed human life. No, not human life, but intelligent beings, living on the surface of the planet, aware of and interested in our "Earth," possessed of the means to perceive electro-magnetic

waves, directly or indirectly, and capable of construing the meaning of our signals.

But surely even the primary assumption of Martian life has no supporting evidence. Even the so-called canals may be natural features of the landscape and not public works constructed by Martian trade unionists.

Jewels Rich and Rare.

I MAKE a collection of Sir John Reith's notable sayings. Not (let it be said) because I am attempting any amateur Boswellising; merely for the unhalloved joy of speculating upon what he feels like when he realises that his *dicta* are received also by thinking people who are free from the compelling influence of his personality.

Addressing the International Summer School at Cambridge last month he said, of the existing broadcasting service: "The system and the constitution in this country are, I consider, exactly what is required." In a word, Mr. Whitley—keep off! Again: "The best way to give the public what it wants is to reject the express policy of giving the public what it wants." Fine, for students of paradox, but ordinary men and women, such as call spades spades, won't applaud very heartily.

Abuse of Broadcasting.

IT is all very fine to broadcast descriptions of "wanted" people, finger-prints, dirty weather reports, chamber music, nightingales having fits, and all kinds of charming items like those, but to go and use nature's great gift of radio for the purpose of dragging a fellow back to his job in the middle of his holiday is the last word in cruelty. Some time ago Mr. F. W. Foster, a hospital assistant, was the victim. Next time he should go to the seaside in blue goggles, ginger whiskers, and the name of Emanuel Thoop, and let the S.O.S. pass over.

Interference with Broadcasting.

AT the recent World Power Conference (nothing to do with Kultur or Kaiser) the question of interference with radio had a rightful place on the agenda, and our interests as listeners were all watched over by M. Brailard, President of the Technical Commission of the Union Internationale de Radiodiffusion, who laid stress upon the importance of stopping the disturbances at their source. This received the approval of the majority, but on the other hand a suggestion was put forward to the effect that if the power of the transmitters was increased we might use less sensitive receivers. Another suggestion was that ultra-short waves should be used for broadcasting. No! Stop the interference as much as possible, say all of us.

The Ring Complete.

THE death of Siegfried Wagner, the son of the immortal composer, completes what I may call the Siegfried Ring. In order to celebrate his birth and to pay a pretty compliment to his mother, his father specially composed the "Siegfried Idyll," and had it performed, for the first time in history, outside the lady's room, the musicians sitting on the stairs. The baby Siegfried lived to conduct his father's works and achieve a sort of reflected fame. Now he has gone, not many months after his mother—and the Siegfried idyll is over.

ARIEL.



EMPIRE RADIO

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

WHEN I was in the B.B.C. there was considerable criticism of my attitude towards "Empire" wireless. I am a technician and my attitude attempts to be factual. I want to get on with a job quickly, but I hate to get on to jobs that have no real end and no obvious way to get on.

I thus preached the Regional Scheme service, and have always opposed television service, because the one gives an immediate realisable benefit; the other is a casual amusement for a few technicians, and is in the development stage. It is not helped forward by "putting it on the air."

Two Services.

It was very hard to judge the potentialities of the "Empire" station at the time the project was mooted; it is still very difficult to find an expression at once to point to its usefulness.

My apparent discouragement of the scheme as first mooted was prompted by my knowledge that any short-wave broadcasting service to isolated listeners not equipped with elaborate receivers was fortuitous and dependent upon uncontrollable factors, and that in any case the permanent radiation of our programmes in terms of special "wireless" links in the dominions was, when analysed, of little permanent value.

I did, however, believe that an experimental short-wave service should be put into action to see how far my theoretical prognostications were proved or disproved in fact.

There are, as I indicate above, two very definite functions to be performed by a short-wave station: (1) to give a broadcasting service to the lonely listener; (2) to link up Empire broadcasting systems one to another.

What Happens.

There is the "lonely listener" service and the interlinking of broadcasting systems service. Thus a man may live in the vicinity of Melbourne and hear a British programme relayed by the Melbourne station, or he may live in the centre of Australia, looking after ten million sheep, and want to receive 5 S W direct.

I argued a few years ago that the service to the lonely listener was of necessity so poor as to be romantic, but not reliable. This is perfectly true; the point is that even

Our Radio Consultant-in-chief has a few interesting words to say about a particularly topical subject.

the romantic aspects seem to have a relatively lasting value, a value perhaps greater than I imagined.

Let us consider this lonely listener a little more closely. What does he get? He has a two-valve set, let us say, and manages somehow (how does he, incidentally?) to supply it with high-tension and low-tension current.

LONDON CALLING!



Britons abroad will soon be able to hear the bells of St. Paul's and River Thames noises for, as you see, the E.B.C. engineers have fitted a microphone on a nearby warehouse.

If he lives in South Africa the timing of the programmes is near about right for normal habits; in Australia, India, China and Canada, things are very trying; in East Africa there is quite enough time difference to make listening quite unrelated to occupation; one attends to midnight lambing in Australasia to hear a 10.30 a.m. weather forecast for local shipping, and eats breakfast to a London supper jazz band!

Then, of course, there are seasons when one hears nothing. 5 S W can only radiate one wave-length, and so this is chosen as the best for a compromise for a world service, and only in rare cases satisfies any particular district, season and time. There is, inevitably, fading and some bad times of atmospheric roar.

Will Romance Last?

But maddeningly invariable as the service may seem to us, pampered by millivolts per meter in their tens and twenties, it is nevertheless something, and a remittance man watching Alafafa on a coral beach in the lonely outlying posts of Empire is grateful for one note of a saxophone a week.

One is perplexed in advance to assess proper relative weights to the intangibles, but there seems to be evidence that the lonely listener actually finds the service worth while.

How long he persists we do not know; how long romance will loom larger than real service we cannot tell; what we must feel is that wireless is doing real good when it cheers and amuses a lonely person far from any possibilities of recreation. (Incidentally, why do such people not read books and more books? But that brings up big issues, and is outside the scope of this article).

Wave-length Difficulty.

Service to the lonely listener can, of course, be improved. The wave-length difficulty is solved by erecting many stations each using a wave-length proper to a world region, a time of the year and a time of day.

The time question is not so easily solved. One suggestion is to "record" each and every programme as it is made and repeat it over the short-wave system via appropriate channels at appropriate times.

Thus Australia might be a day late, but that, for the lonely listener, does not matter.

On the other hand, *is it inconceivable that*

(Continued on page 682.)

LATEST BROADCASTING NEWS.

EMPIRE
TRADE BROADCASTS.

B.B.C. AT WIRELESS EXHIBITION — FORTHCOMING FEATURES — LOST WELSH CUSTOMS—A BURNS CONCERT.

AS forecast exclusively in POPULAR WIRELESS, the B.B.C., after giving up all hope of securing any political party agreement, has gone ahead on its own and arranged the broadcasting of all the main points of view on Empire Trade in the autumn.

It is understood that Lord Beaverbrook will kick off on October 18th or 19th, and that he will be followed by Sir Arthur Salter and Sir Basil Blackett, amongst others. Government circles have not been disguising their displeasure at the independent action of the B.B.C., and an attempt may still be made to kill the series.

B.B.C. at Wireless Exhibition.

This year's Wireless Exhibition will, it is hoped, include a rather more imposing display by the B.B.C. than has been the case for some years—in fact, back to the days when performances were given in a specially constructed studio, through the glass sides of which visitors were able to see an actual broadcast taking place.

Instead of the rather crude models which convey so little of the work, and particularly the engineering side of the activities at Savoy Hill, there will actually be on view various types of apparatus used for broadcasting, such as the portable gear used by the engineers in line testing, and water-cooled valves, and other apparatus, most of which has been brought into service only since the construction of the Regional Station.

Visitors will also be able to see the amplifier which has to supply the inputs to the loud speakers used at the Exhibition and, by way of contrast, the original Marconi House transmitter, which is now at Brookmans Park, in what it is hoped will one day be a museum for old "junk."

Forthcoming Features.

The B.B.C. is already planning its programmes for 1931, and listeners will be interested to learn that in the early part of next year another performance of Beethoven's 9th Symphony is to be given by the National Chorus at one of the Corporation's Symphony Concerts. It will be remembered that the National Chorus gave this Choral Finale at a Promenade Concert in October last year.

Captain Eckersley, formerly Chief Engineer of the B.B.C., whose appearances before the microphone were always among the most enjoyable parts of the programmes, is to broadcast, for the first time since he left the service of the Corporation, during the evening programme on Tuesday, September 23rd. Captain Eckersley is giving the talk as the first of a new series on "Careers," his subject being Electrical Engineering.

Mr. Philip Ridgeway, whose period vaudeville programmes provided a really bright spot in the broadcasting fare some time ago, has been commissioned to arrange a new series of light programmes during the autumn. The first, entitled "The Ridgeway Parade," will be broadcast to National listeners on Wednesday, September 10th, and to London Regional listeners three days later.

Negotiations are taking place for broadcasting excerpts from Andre Charlot's revue "Masquerade," which opens at the new

Cambridge Theatre in Seven Dials on Thursday, September 4th, but the date of the possible broadcast is, of course, not yet fixed.

Lost Welsh Customs.

More than usual interest attaches to a talk entitled "Lost Welsh Customs," which Mr. D. Rhys Phillips is giving from Cardiff on Thursday, September 11th.

Mr. Phillips has apparently devoted a good deal of research work to discovering customs, which are in danger of dying out, such as for instance, the disuse of ringing the Curfew in districts where its continuance has been "perpetually endowed."

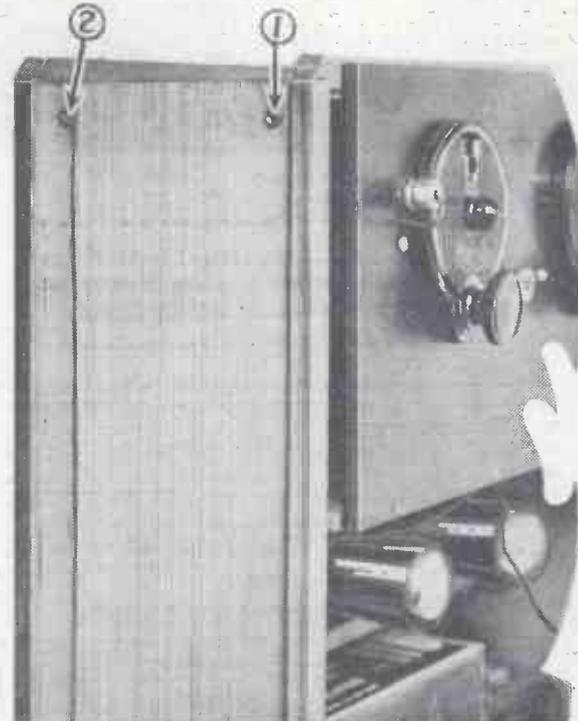
Perhaps this talk will induce somebody to sit up and take notice of many things which our American cousins would give millions of dollars to claim as their own.

A Burns Concert.

Burns enthusiasts and all who claim to be Scotsmen will welcome the announcement that an half-hour excerpt from a Burns Concert, which is to take place in connection with the Annual Conference of the Burns' Federation at Greenock, will be relayed from the local Town Hall on Saturday, September 13th.

Delegates to the Conference include people from America, as well as from all parts of the United Kingdom, and the proceedings of the Conference will include a speech by Sir Joseph Dobbie, President of the Burns' Federation, songs by the Excelsior Male Voice Quartette and Crué Davidson (contralto), and also music by the Glasgow Caledonian Strathspey and Reel Society's Orchestra.

THE "MERCURY" FOUR



The figures (1) and (2) denote the two sockets mounted in the wood-work and connected to the ends of the long-wave frame aerial winding (see page 662).

FOR THE LISTENER

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

By "PHILEMON."

Salzburg.

BELINDA and I, in our quiet way, shared the joy of Europe in listening to the broadcast of the Mozart Serenades from Salzburg. It was one of the easiest, as well as one of the best, times we have had.

No fewer than thirteen stations were broadcasting the same programme. At every point of the dial we ran into Salzburg. All roads, that night, led to Salzburg.

If at any point we picked up three stations at once, the chances were they were all Serenading. It was a united Europe. For one glorious hour there was a true League of Nations honouring the maker of lovely music.

It is hard to imagine that any orchestra could have rendered it better than the Vienna Philharmonic. Outside the cottage the rain was pattering upon the leaves of the

vines and the tall maize. The night sky was full of distant lightning; there was no thunder; and, inside, our little company sat around, some on chairs, some on the floor, in charmed silence, listening.

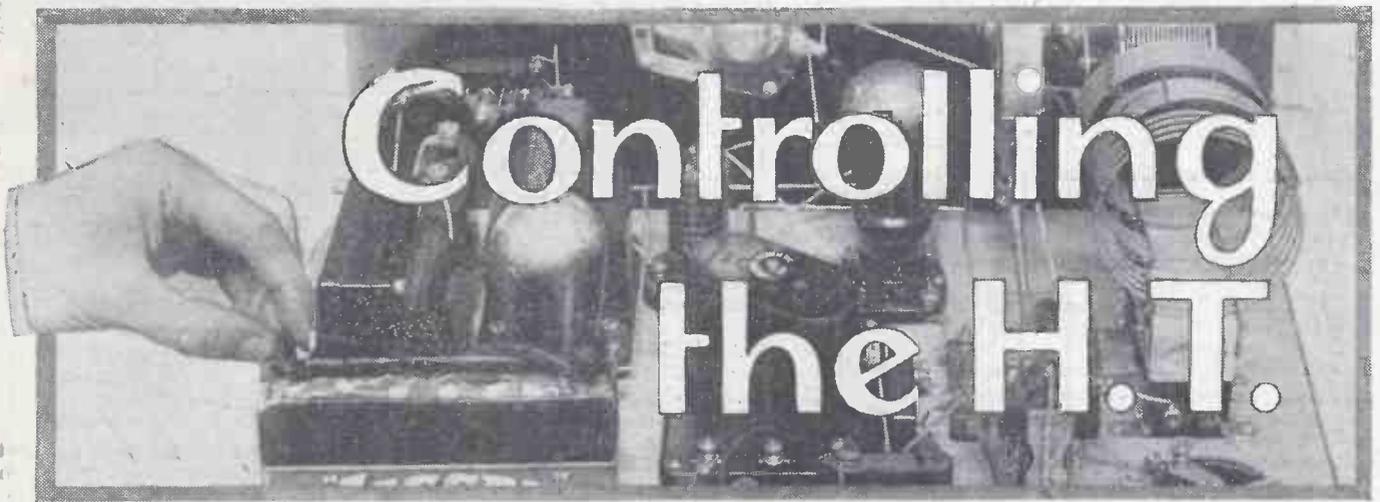
Interludes.

It was not, for us, quite a continuous performance. That queer trick was in evidence, the sudden fading-out of the waves as if they had dropped into an air pocket and been lost for a moment.

In one of these interludes we heard the announcer in London telling the world that Hobbs, having scored a century for Surrey, was within 16 runs of the record aggregate held for so long, and now on the point of being lost, by the great "W.G."

And several times Rome intruded.

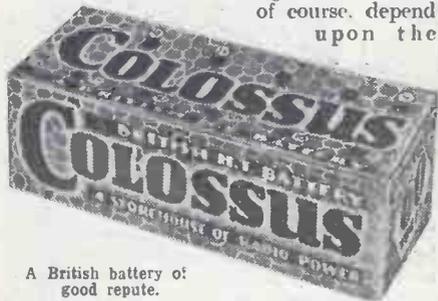
(Continued on page 680.)



NO matter what type of valve you consider, the more negative bias that is applied to the grid, the less will be the anode current. This may make it seem, at first, that the ideal is to apply a tremendous negative bias to all grids and get a very small H.T. consumption.

Unfortunately, it is by no means so easy as this, the grid bias has to be the right value and no more, otherwise results will suffer as badly as if too little were used.

The right amount will, of course, depend upon the



A British battery of good repute.

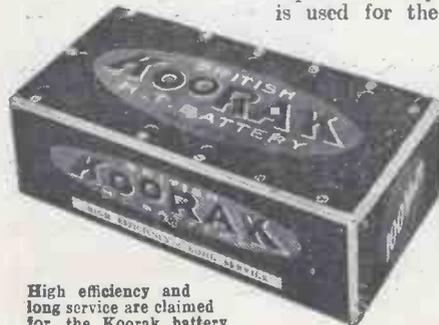
type of valve and its position in the circuit in which it is used.

With ordinary three-electrode H.F. valves, the grid return may conveniently be taken direct to L.T. negative. In the case of S.G. valves, however, if this is done, then H.T. consumption may be surprisingly high.

Bias for S.G. Valves.

For this reason a negative bias of $1\frac{1}{2}$ to $4\frac{1}{2}$ volts should be used with them. The best value should be found by trial, and it should be as high as possible so long as sensitivity is not impaired.

In most sets you will find the H.F. grid bias already inserted, and you will note that a separate battery is used for the



High efficiency and long service are claimed for the Koorak battery.

* * * * *

Grid volts play a very large part in enabling you to get long life and complete satisfaction from your H.T. batteries. Here are some vital pointers about this important matter.

By A. S. CLARK.

* * * * *

purpose. This is a point which should always be observed.

Detector valves do not take much H.T., and the question of grid return with them is settled by the particular circuit arrangement utilised. In "leaky-grid" rectification it will probably be to L.T. positive, whilst for anode-bend detection a certain amount of negative potential will be necessary. In some cases, particularly with short-wave receivers, a potentiometer may be provided, so that the detector valve grid-potential can be gradually varied.

L.F. and Power Stages.

Now we come to the L.F. and output valves, and it is here that the H.T. consumption needs the most controlling. Ordinary L.F. stages between the detector and last valves will not often require more than $4\frac{1}{2}$ volts negative bias.



"Ten Times Tested" is the claim of the makers of this battery.

Here, again, as with H.F. valves, the value may be found by trial. The power valve, however, is a vastly different matter. It is not much use adjusting the bias on it by trial unless you have some idea at what value to start.

The bias may sometimes be given by the manufacturers for various H.T. voltages. If it is not, it can be read from the characteristic curves in the usual manner, or a milliammeter in the output circuit can be used to indicate when the bias is right.

In any case there is one very important point to remember, and that is that it is advisable always to switch the set off before making a change in the grid-bias voltage. If this is not done it is possible that the H.T. current may rise to a very large value while the grid circuit is "open."

Should this happen, not only is it very bad for the H.T. batteries, but the valve itself may also be harmed.



A neat 100-volt H.T. battery.

When the valve in an L.F. or output stage is being worked properly, no current is taken from the grid-bias battery. It is often assumed in consequence, that the grid-bias battery will last for ever.

A Precautionary Measure.

This is not the case, for even if the battery were not connected in the set at all, it would still gradually run down. Therefore test the voltage of your G.-B. battery occasionally, or make a practice of buying a new one every six months or so.



An H.T. battery made by one of the leading firms in the battery business.

THE "MERCURY" FOUR.

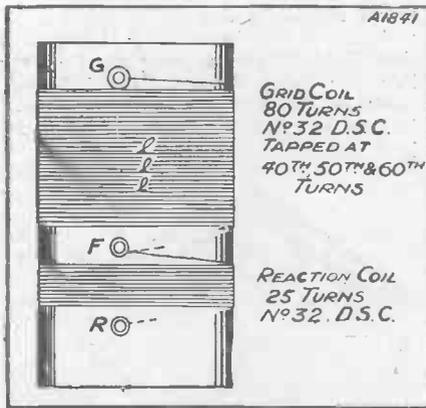
Some further constructional details for making the fine set described last week.
By THE "P.W." RESEARCH DEPARTMENT.

WE gave you a general description of the "Mercury" last week, and now we can start to go into details a little.

A look over the circuit diagram will show you the main features of the receiver. First, you will observe that there are two frame aerial windings, one or other being selected by means of the plug and two sockets on the panel (upper socket, high waves, lower socket, low waves).

The short-wave frame is wound on the back door of the case, on four little moulded corner supports obtained from Messrs. Bulgin. It has 12 turns, of No. 24 D.C.C.

CONCERNING THE COIL



Be sure that your windings are wound in the right direction.

wire, arranged with 2 turns in the first and second slots, and one turn per slot thereafter (10 slots in all).

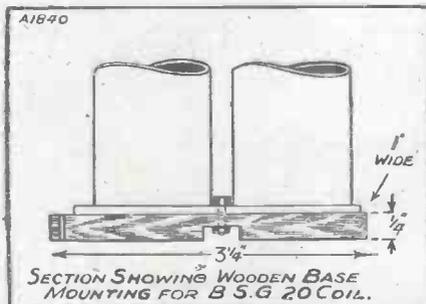
The ends of the windings are taken to two small sockets mounted in a little strip of ebonite fixed to the door, and into these flex leads from the set are plugged.

Long-Wave Windings.

The long-wave frame is wound round the body of the inner (detachable) wooden framework in which the set is built.

The winding consists of 56 turns of the same wire as before, wound with a slight space (about equal to the thickness of the wire) between each turn and its neighbour. As before, the ends are taken

FOR LONG WAVES



The method of securing the L.W. coil.

to two small sockets, mounted this time in the wooden framework, as you will see in one of the photos. By the way, the direction of these aerial windings is quite immaterial; likewise the connections to their ends.

Just note that a little grid bias (a single dry cell of any small type) is provided for the H.F. valve, to keep down its anode current, and then observe how the H.F. intervalve coupling circuits are arranged. They are of the parallel-feed type, and a three-pole change-over switch does the wave-changing.

For the lower wave-band it brings in a special coil unit which you must wind for yourself. Details of the windings of this coil you will find in a diagram reproduced here, and they are carried on a former (Pirtoid) 2 in. in diameter by about 3 1/2 in. long. Note carefully that the windings are in the same direction, and the fact that the upper end of the reaction winding and the lower end of the grid winding both go to the little terminal marked F.

Coupling Adjustments.

The grid coil, you will note, is tapped, and a flex lead ending in a tapping clip comes from the switch to engage with these points. The idea is to use the 60-turn tap if you can, but if this makes the set unstable with your particular valves, then come down to the 50-turn point, and so on.

On turning the switch over the long-wave coil comes in, and this is a standard Lewcos "B.S.G. 20" unit. It is not placed in a socket, but is turned upside down, and wires are soldered directly to its pins.

The method of mounting is made pretty clear by a special sketch, and you will see that a little strip of wood is used. The coil is secured to this with a nut run on to the projecting screw, which you will see when you remove the knob on top of the unit, and then the assembly is screwed down to the baseboard.

The receiver proper is built in quite the normal way on a panel and baseboard fitting into the upper part of the cabinet. This section embraces the H.F. and detector circuits, and here are located all the tuning and H.F. amplifying arrangements, and the various controls.

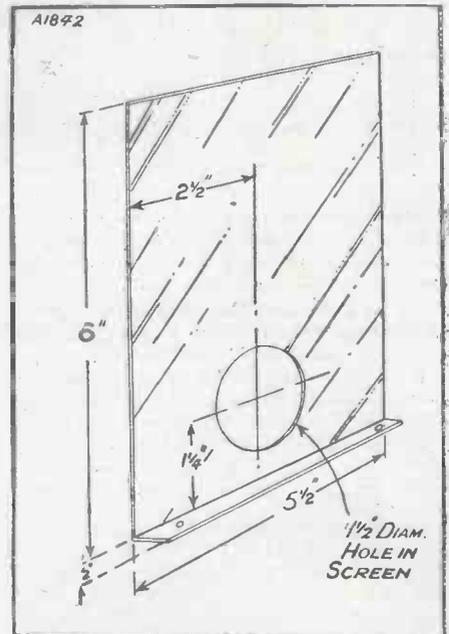
Now let us look at the screening arrangements. First, observe that there is a vertical screen through a hole in which the S.G. valve is placed in a horizontal position. This valve is therefore to be provided with

a horizontal type holder, as likewise are the two L.F. valves, about which more later. Many makes of these holders are of the "universal" 5-pin type, intended to take A.C. valves, as well as the battery type.

If you use these (we did in the original receiver), just identify the filament, "G" and "P" points and ignore the fifth terminal.

The completion of the screening is provided by two further arrangements. First,

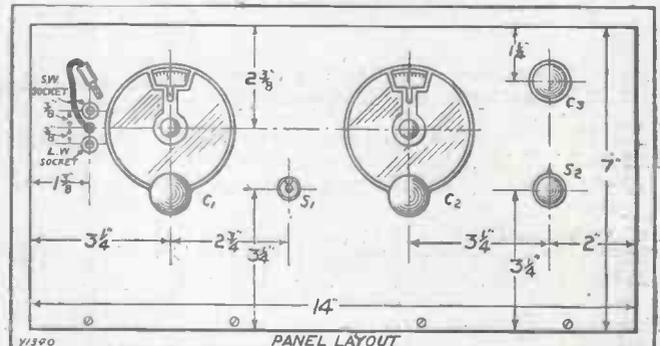
SCREENING THE H.F.



The position and dimensions of the hole through which the S.G. valve goes.

the upper surface of the baseboard to the left of the above-mentioned vertical screen (as you look at the wiring diagram) is covered with a sheet of copper foil. (Take

ON THE PANEL



S₁ puts the set on or off, S₂ being the wave-change switch, with the reaction condenser above it.

a look at all the components which are to be mounted on this, and see that they have no dangerous metal points underneath which may touch this copper sheet.)

The rest of the screening is a matter of a box-like arrangement made of thin aluminium or copper sheet to enclose all the set to the detector side of the screen through which the S.G. valve is mounted.

Further notes on assembly and use will appear in "Radiatorial" next week.

Making Your Accumulator Last Longer



TH**ERE** is one important, but often neglected, item in a set's equipment which amply repays the user for a little regular attention.

It is sometimes loosely called the "juice box," but its correct name is accumulator or L.T. battery. Its function is to supply a perfectly steady current for the valve filaments, and unless it carries out this duty at all times the receiver will not give the results of which it is capable.

Choosing a Suitable Size.

Now the first procedure is to make sure that the accumulator is of adequate capacity, and is capable of standing up to the current demand of the valves for a reasonable period without requiring recharging.

The minimum size for normal use should be about 20 ampere-hours (actual) because with a one-valve set employing a 1-amp. valve such a battery should last for approximately 200 hours between each charging period.

In the case of a two-valve set employing the same type of valves, this period would

be halved, so perhaps it is as well to increase the size of the L.T. battery to 30 ampere-hours for two-valve receivers unless there are convenient charging facilities.

This scheme also permits the addition of an extra amplifying valve without the necessity of purchasing a new accumulator.

Give these suggestions because a

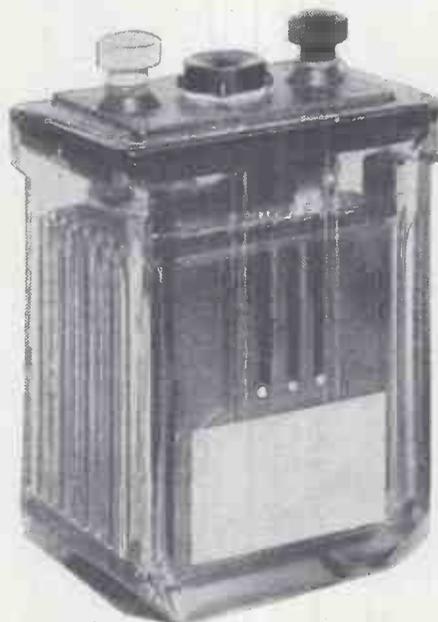
accumulator which is of insufficient capacity will obviously be overloaded, and in consequence be working under unfavourable conditions. The life of such a battery will

* * * * *

Do not neglect your L.T. battery. That it will amply repay you for a little regular attention is shown in this helpful article.

By A. JOHNSON-RANDALL.

* * * * *



The Smith accumulator has three coloured floats which indicate the degree of discharge. There is no excuse here for leaving the battery in a run-down state.

be short, and it is much more economical to choose the right type in the first instance.

It is essential to give a new battery a good "start in life." An accumulator normally leaves the factory in an uncharged state, and after purchase it requires an initial charge before it can be put into use.

The First Charge.

Upon the battery container you will see the makers' instructions regarding the specific gravity of the acid to be employed, and you have two alternatives.

The first is to go to a chemist or electrician and to obtain a quantity of the acid "broken down" to the correct specific gravity. You can then fill the battery yourself in preparation for the initial charge.

Alternatively, you can take the accumu-

lator to a good charging station and let them do the job for you. Provided you have a reputable radio dealer in your locality, this procedure is probably more satisfactory—at any rate, it saves you the trouble of having to handle the acid.

After the first charge it is advisable to work the battery only for about one-half of its normal period. The second charge will then place the accumulator in first-class order and with a little periodical attention a long life is assured.

Sulphation is Detrimental.

A battery should never be left for any time in a discharged condition. Directly it runs down, have it recharged. If you fail to follow out this procedure, sulphation will take place, and the life of the battery will be shortened very considerably. Moreover, the effective area of the plates is reduced and the accumulator will need charging more frequently.

You will notice that there is a tendency for the level of the acid to fall below the top of the plates. This is normally caused by the evaporation of the water in the acid solution, and this evaporation should be made up by replenishing the battery with distilled water, which can be obtained from any chemist.

Loss of acid only occurs through "spraying" when the accumulator is gassing on charge or by spilling. In this case the electrolyte must be kept at its proper level by the addition of acid of the correct specific gravity.



With portable sets it is essential to have a battery of the unspillable type. The Electro has a semi-solid electrolyte which completely obviates any danger of spilling.



The carrier for this "Three Star" accumulator enables the condition of the plates and the level of the acid to be easily seen.

"FINEST SET IN THE WORLD"

The Editor, POPULAR WIRELESS.

Dear Sir,—I hope you are not tired of receiving praise of the "Magic" Three, but I am going to chance it. I built the "Magic" Three on November 8th last, and have given it a thorough test on all waves and can honestly say that it is the finest set that I have ever built (I have built twenty-seven of all kinds), and here is a report on results.

Medium waves: Moravská-Ostrava, Barcelona, Bratislava, Turin, Bordeaux-Lafayette, Breslau, Posen, Louvain, Brno, Barcelona E A J I, London Regional, Stuttgart, Algiers, Seville, Hamburg, Toulouse, Genoa, Frankfurt, Bucharest, Bern, Kathnic, Rabat, San Sebastian, Berlin, Madrid, Khar'kov, Beograd, Rome, Moscow, Salamanca, Zurich, Lyons, Langenburg, Midland Regional, Prague, Milan, Vienna, Munich, Budapest, and Njubjama.

The stations in Italics come in at terrific volume on a pleated diaphragm loud speaker. I have not made a mistake with the London Regional. We have danced in the room to his music on the loud speaker.

Long waves: Leningrad, Moscow-Popoff, Novosivirsk, Stamboul, Khar'kov, Motala, Warsaw, Eiffel Tower, Moscow Kontinern, Davenport 5 X X, Konigs-wusterhausen, Radio Paris, Kaunas, and Angora.

Short waves: PLE, PCK, PHI, HS1PJ, K1XR, W8XE, G5SW, W3XAL, 7LO, W3XAB (31.35 m.), W8XE, Zuesen, PCJ, W2XAF, 3LO, W2XAC, W2XE, W3XAL 49.18 m., W6XAL. On March 20th, at 4 p.m. G.M.T., I heard 3RO Rome testing, speech was R9, with slight distortion owing to SUW About Zabal, on 25.17m. working, and a French broadcaster testing on 25.13 m. 3LO was jammed exactly between the two. I heard the announcer say that the record he was going to play had some bad patches in it, the record, "I lift my finger, etc." was very good. At 4.7 p.m. he closed down, and said "Good-night, children."

Here are some commercial stations that I have picked up with the set: PPW, PCV, PCL, DIO, DHO, RKY, WKU, PLJ, WIK, WQP, WIY, JNA, GLL, PCU, LSS, WTU, WEX, WAJ, HJO, WHK, WSR, FXB, OKB, FXB, GZQ, UOX, FTN, GBU, CNO, JAN, OQL, FQE, NIX, FER, GBR, CTA, PBN, GLY, GBH, GLQ, GKT, PLO, GLW, FER, YBB, OKA, CNR, LSZ, FALT, PCM, YVE, VQG, WTI, OXA, OXY, HSG, XGA, OXE, GBN, DIS, UOR, EAG, EAM, OXZ, EAN, IDM, PZA, KAZ, ISI, FZO, NAZ, WEF, XDA, XOM, FRV, GZO, LGN, KCW, WND, WEL, JNG, JNI, LSD, VWZ, WOD, WIL, VGC, CMA, PAA, GBL, WSE, PGT, NAA, G2AO, WUA, WCC, WWB, GLZC, DDA, GLYZ, GLX, FBJ, HTT, FXC, RFS, ORU, IDX, FTF, FTU, GFA, WEM, PJZ, FKA, MRJ, C8F, Q3L, WIR, WJZ, FHT, WEB, GHC, GFW, KBB, FVA, FJI, FAJ, etc.

I have logged 480 amateurs and 36 countries. An example from each: G6WN, W4CX, F8DA.

CORRESPONDENCE.

"FINEST SET IN THE WORLD."

A GROUSER'S GROUSE—A PLEA FROM PENANG.

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

ON4HP, D4JL, VE1BR, PY2AH, EAR08 EU6KAG, SP3DX, Y11AC, VK2NO, ZL2BE, CT2AD, 11MM, J1TK, SM6WL, OZ7BY, PAODF, PK1BH, HAF3AP, UOGK, CV5BL, AR8UPM, OK1FX, VU2DR, VTVVZ, OH2TD, ZS5D, UN7CC, VS1IP, RX1AA, KAIDZ, CN8RU, X, etc.

Am sorry to have bored you with such details, but as I am so pleased with the performance of the set I thought that a report from Egypt would be O.K. I have told plenty of people here in Cairo about the "Magic" Three, and those who have built it have told me that they were delighted with it, also one chap has built your "Magic" One, and following details want some believing unless actually on the spot to prove it. He can get 5GB and London Regional at R5 to R7 with it, and most of the strong Continental stations.

As I shall be in England shortly I regret that I have to pack up the old "Magic" Three and try my luck with it there. Thanking you for the finest set in the World.

I am, Yours sincerely,
A. F. WHITE (Lt.-Sergt. R. Signals).

Cairo, Egypt.

"A GROUSER'S GROUSE."

The Editor, POPULAR WIRELESS.

Dear Sir,—It was with interest I read your article on "A Grouser's Grouse," in "P.W." recently.

Having been a reader of this excellent paper ever since your 35s. Crystal Set was first described, you will, of course, realise that it would be impossible for me to have stood still in Radio knowledge.

To some extent I agree with your Edinburgh reader, but, of course, appreciate—one cannot fail to do so—the wonderful improvement in radio components, especially transformers and valves, but, getting down to rock bottom, i.e., the circuit used, I really think we have to some extent been standing still.

SHORT-WAVE NOTES.

By W. L. S.

MANY months of boredom having told me, I must confess that I have not been doing much listening of late. I have, however, been active in other ways, chief of which is the construction of a new "super" receiver. This is being done in very leisurely fashion, and although I have been three weeks over it already, I am sorry to say that it is not yet half finished!

Various L.T.'s.

I am not seriously altering the present circuit (screened-grid, detector and L.F.), but am building the whole thing in one metal box, and, in a spirit of hope, using five-pin valve-holders and taking out the filament connections separately from the cathodes. This has the advantage that I can start off with ordinary valves, replace them with indirectly-heated valves working from D.C., and finally, with a burst of optimism, use raw A.C. on the heaters.

I am beginning to wonder whether I have been wise all this time to stick to my method of getting easy tuning on the short-wave amateur wave-lengths. I expect most readers will remember that I used a very small variable condenser (of the order of .00002) with a slow-motion dial, and run an ordinary .0001 reaction condenser in parallel with it. The latter is then set at the desired value and the band is spread out over

practically the whole scale of the smaller one.

The results from this are very nice as far as ease of operation is concerned. Efficiency, however, is admittedly another tale. Time after time I have found that the best short-wave receivers are those with a very high L/C ratio. From this it appears that one ought to make a really "thoroughbred" amateur band receiver using the smaller condenser only, and carefully getting the inductance value right (even to a quarter of a turn) so that the whole band is covered.

Covering the Bands.

Then, of course, the receiver is hardly suitable for logging short-wave broadcast, but one could use a parallel condenser with a switch to cut it out of circuit.

The coils would have to be chosen so that one started at 20.8 metres, went up to 21.4 with the small condenser, and then up to about 30 with the larger one. The next coil would be exclusively for broadcast and would have to cover something like 28-41

metres, and the third would start off with the 40-metre amateur band, covering about 41-42.5 metres with the small condenser, and going up over 55 metres with the other. Rather a complicated piece of jugglery, you think? I am afraid it is, but it should be worth while.

One of the finest things "P.W." did for wireless was the Unidyne Receiver, this I built, and for results I've never excelled on a one-valve set. To think without H.T. one could roam the Continent. I had a first-class Unidyne valve, and this I am sorry to say was not British but German. Why has this circuit faded away? What about an A.C.-heated cathode H.T.-less screened-grid four-valve set for modern readers?

Still moving forward with your paper, I built a three-valve Trinadyne receiver. Here, again, my modern 1030 four-valve screened-grid set has never equalled the performance of the Trinadyne. And I honestly believe, and all people that heard my Trinadyne set will agree, the purity was equal, if not superior to, my present set. Selectivity was also good.

You say that the improvement in a June set may not warrant the scrapping of a set made in May. Here I agree; but you go on to say a very small improvement in layout or variation in a design of a coil helps. But from the amateur constructor's point of view I disagree, such improvements are not advantageous to amateurs, but are only realised by men that are out to improve such as scientists, wireless engineers, and your own staff.

Best wishes for the continued popularity of POPULAR WIRELESS.

I remain,
A Constant Reader,
H. F. W. JEFFREYS.

Birmingham,

A PLEA FROM PENANG.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am a regular reader of "P.W.," the contents of which I found to be packed with a mixture of valuable informations in connection with wireless that makes reading interesting and instructive.

Regarding the publicity side of "P.W.," the advertisements have been well displayed and the readers are being kept in touch with the latest developments and improvements in the manufacture of components and etc. Such informations are of importance to us here. I congratulate the "P.W." staff on the manner the works are being carried out and thanks to Mr. "Pentode" and other contributors for their very interesting articles.

Regarding reception, here we have no local broadcasting stations. The only scraps of programmes we are obliged to content with are the foreign transmissions on short-waves, the nearest of which is hundreds of miles away.

For the benefit of "P.W." readers especially in this part of the world and as well as for those in other corners who may suffer from the same fate as ours, would the "P.W." be generous enough to devote an article to short-wave receivers? Such an article will be met with a world-wide appreciation and will be to our as well as to your mutual advantage.

Wishing the "P.W." every success,
Yours faithfully,
M. IBRAHIM.

Penang, Straits Settlements.

New Stations Heard.

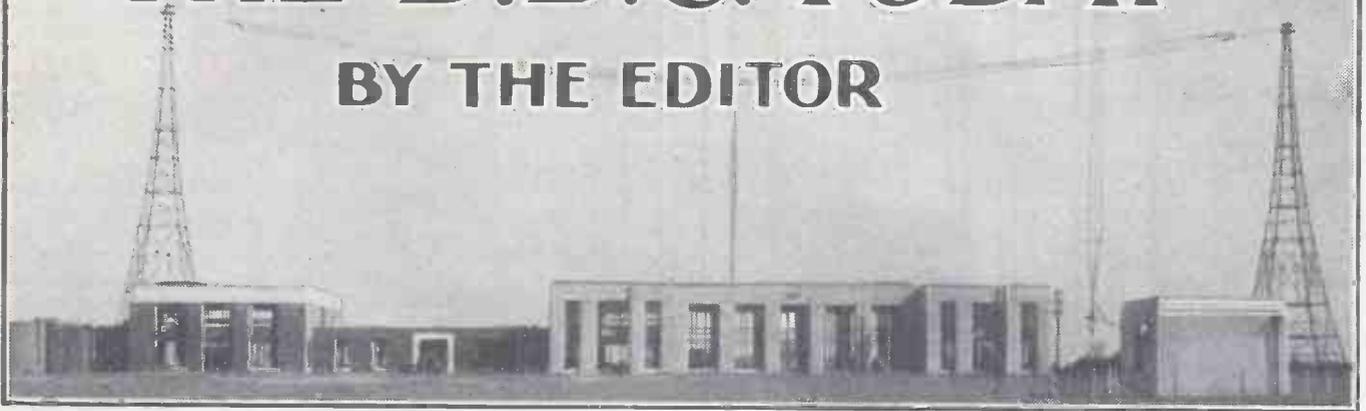
Speaking of the amateur bands, while "hams" all over the world are mourning the demise of the 20-metre wave as far as workable "DX" is concerned, the 40-metre wave is coming into its own once more. The New Zealanders have been coming over well in the early mornings lately on this wave, and late at night one can usually hear a number of interesting people. Some nights the whole of the American continent seems to be active, and others one can only hear Florida, Porto Rico, and the Virgin Islands.

I am reminded of a mistake I made a few weeks back, when I gave P X M G as a station at Mahu River, Brazil. I was confusing him with P X B D. P X M G is located in Rio.

Two new stations recently heard are V I Y B (Barbados) and V Q 5 N T A (Uganda). It is gratifying to see the large number of active stations in British Possessions all over the world. They are springing up almost daily.

THE B.B.C. TODAY

BY THE EDITOR



TO get at the real meaning and possibilities of Mr. Whitley's appointment to the chairmanship of the B.B.C. in succession to the Earl of Clarendon, it is necessary to review the various constitutional tendencies of British broadcasting.

The B.B.C. began as an ordinary business concern—an amalgamation of wireless companies for the specific purpose of providing programmes that would make people buy and maintain wireless receiving apparatus. The Board was wise in leaving the business largely to Sir J. C. W. Reith, who developed it as a public service.

Old B.B.C. Best.

As things have turned out, there is no doubt at all that the first constitution of broadcasting was by far the best. There seemed to be more independence, resilience, and originality under the old B.B.C. But its very success spelt its doom. Vested

SIR GORDON NAIRNE



Finance is adequately represented on the Board of Governors of the B.B.C. by Sir Gordon Nairne, Bart., who is a governor of the Bank of England.

* * * * *

In this final article of a vitally important and immensely interesting survey of British broadcasting, the subject of Mr. Whitley's recent appointment is discussed in detail, and some new facts regarding the reasons that probably influenced his choice are revealed. In concluding these articles the Editor outlines some suggestions for improving our broadcasting service—suggestions of a completely constructive and practical character.

* * * * *

interests demanded some control over the innovation.

Government departments became alarmed at this new force outside their charmed circle. So the Crawford Committee of 1925 recommended what was meant to be the nationalisation of radio in Britain. True, the existing staff and organisation were to be taken over as a going concern; but there was to be superimposed in place of the Board of business men under the Company, a group of governors representing the State and responsible in a vague kind of way to Parliament.

The governors were hedged round with ambiguous conditions, and left to work out their own destinies, but not without some little compensation, the chairman taking £3,000, the vice-chairman £1,000, and each of the other three £700 per annum.

After Three and a Half Years.

The Corporation, as distinct from the Company, took over at the beginning of 1927, and has now been at work about three and a half years.

For the first year there was practically no change recognisable. As long as the governors were prepared to act on the model of the old board of directors, assuming responsibility for the revision of higher policy only, all was well.

But there were paragraphs in the Charter of the Corporation, and passages in the parliamentary explanations of the post-master-general which said without qualification that the governors were to be full-timers, prepared to work at their jobs, and not merely assume responsibility for the achievements and mistakes of the staff.

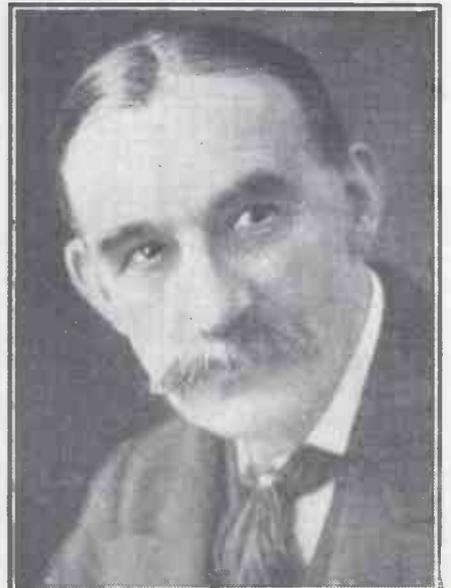
Sooner or later, the governors would be bound to begin some sort of intervention that would upset the existing state of affairs. It is common knowledge, of course, that Mrs. Philip Snowden was the governor to insist on earning her money in the sense of the Charter explanation. The difficulties and controversy which ensued have been wrongly interpreted as primarily personal. They were nothing of the sort, although, of course, the personal factor would obtrude with the exacerbation of the trouble.

A Government Concern.

The conflict was one of essential principles in administration. On the one hand was the conception and system of efficient private enterprise devoted to the service of the State; on the other hand, was the Charter idea of the B.B.C. becoming a government department. It is probable that the Conservative government which set up the B.B.C. under the Charter had no

(Continued on next page.)

MR. MONTAGUE RENDALL



Mr. Rendall represents education, for he was at one time Headmaster of Winchester.

THE B.B.C. TO-DAY.

(Continued from previous page.)

very clear idea of the future tendency. It may, indeed, have hoped that the Charter and governors would merely perpetuate the anomalous state that had been evolved by Sir John Reith.

Definite Ideas.

There is reason for believing, however, that the Labour government had more definite ideas on the subject. They did not disapprove of the Charter, which was, after all, a non-party matter; but they wished to underline its socialistic characteristics, which had been ignored in most respects.

For one thing, they favoured the incorporation of the staff into the civil service. For another thing, they were anxious that more use be made of the educational possibilities of broadcasting, particularly in non-partisan political subjects.

There was, of course, always present the significance of the fact that in the absence of a strong Socialist press, broadcasting was

But the congestion of intrigue behind the scenes was terrific. The subject certainly assumed Cabinet importance. Would there be an inquiry to overhaul the Charter and Licence in order to satisfy Socialist opinion? Or would the P.M.G. be specially instructed to take action to bring Savoy Hill more into line with what the government considered it should be?

And so on. And then an unexpected development altered the situation completely. Lord Clarendon, the chairman, accepted the governor-generalship of the Union of South Africa, thereby giving up his B.B.C. post. However much the B.B.C. may have regretted the premature departure of the first chairman under the Corporation, there cannot be much doubt that the government was not altogether displeased.

Mr. Whitley Arrives.

Not that there was any reflection on the administration of Lord Clarendon; but rather that his promotion was a heaven-sent opportunity to avoid any inquiry or challenge to the constitution of broadcasting. There was much competition for the vacant post, and many prominent names were freely canvassed. Ultimately the choice fell upon Mr. Whitley—an

on his doing the former; all other opinion expects him to do the latter. No doubt he is already the target of a good deal of interested advocacy one way and the other.

I cannot, of course, give any indication of what the new chairman intends; but I can indicate what I, as an independent and friendly critic of broadcasting would like to see him do.

In the first place, no obstacle should be allowed to prevent the smooth working of the administrative machine; executive authority and initiative should be fully safeguarded.

Secondly, there should be more taking the public into the confidence of the governors than has been the case in the past. It would be wrong for the governors to assume or perform any executive functions; but they should be available for public explanation and advocacy of B.B.C. policy. So far as the staff are concerned, I believe they are fairly well treated now, but while not making them civil servants, I would recommend their being given some more definite guarantee of tenure and pension than they now receive.

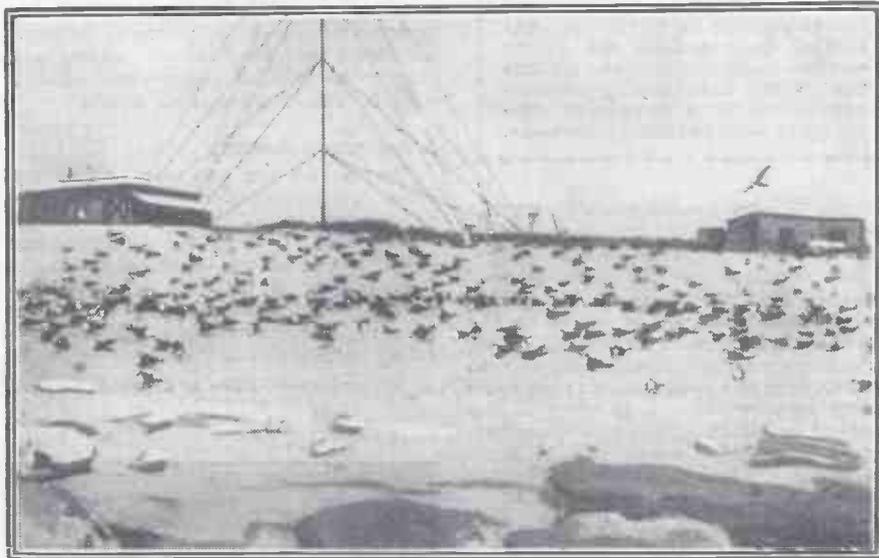
Humanise Broadcasting.

It should be remembered that broadcasting does not qualify people for other work. Those who have spent seven or eight years of their lives working efficiently for the B.B.C. should not be turned out lightly even with contraction of staff.

And my fourth point would be to introduce a rather more human element into the B.B.C. There seems to me now to be a little too much formality and stiffness. Without the loss of any dignity or efficiency, the service would benefit enormously by the infusion of the personal factor. Let's get away from the tyranny and anonymity and standardisation in voices and broadcasters generally.

My fifth point perhaps should have come first; it is important enough. I mean that it should be laid down by the Board that under the Regional scheme there should be alternatives to practically everything; a minimum of two properly contrasted services for every listener was what was promised and what should be provided. Unless such a definite ruling is made, we shall be in danger of slipping back into the old rut of over-abundant "S.B.'s."

THE WORLD'S LONELIEST RADIO STATION



Two hundred and fifty miles off the east coast of Australia, buried in the Pacific, is Willis Island, on which is probably the loneliest radio outpost in the world. This station has the job of giving warning of approaching cyclones. Three men live on the island for months at a stretch, with no other company than that of the wild bird and animal life. There are plenty of birds, as this photograph shows.

the sole means whereby Socialist views might reach the masses of the people. Then, curiously enough, there was another current of opinion running in co-operative circles where the commercialising of broadcasting began to find favour. The argument was that if there were "freedom of the ether," Labour and co-ops. could have their own stations.

Many Dangers.

Towards the end of 1929, as POPULAR WIRELESS exclusively proclaimed, there were many dangers in the path of the B.B.C. Growing friction within and political threats without. It speaks worlds for the capacity and devotion of the permanent staff that the service went on steadily improving, and, so far as the average listener was concerned, nothing might have been amiss.

appointment which, in all the circumstances, was particularly skilful and appropriate.

The ex-speaker, enjoying the unique authority and prestige of a great public servant, respected by all shades of political opinion, could be counted upon, first of all, to make peace in the inner counsels of the B.B.C. Thereafter, he could be counted upon to take careful stock and then to determine to what extent, if at all, the constitution of broadcasting required interim amendment. This appointment at once silenced the voices of political criticism.

What will Mr. Whitley do about the main issue? Will he acquiesce in encouraging the Civil Service form of evolution for the B.B.C.? Or will he follow most constitutional precedents and allow the B.B.C. to grow naturally along its own lines, however anomalous? Most Labour opinion depends

HERE AND THERE.

Thirty-six beats in ten seconds is the speed of the metronome that is used at Berlin on 418 metres.

Although the light type of soldering iron heats up very easily, it also cools down quickly, so that the larger type is much better.

A neutralised valve takes much less H.T. current than a screened grid valve does.

Even the faintest short-wave carrier wave is worth investigating, as after reaction has been slackened off it often resolves itself into a clear programme.

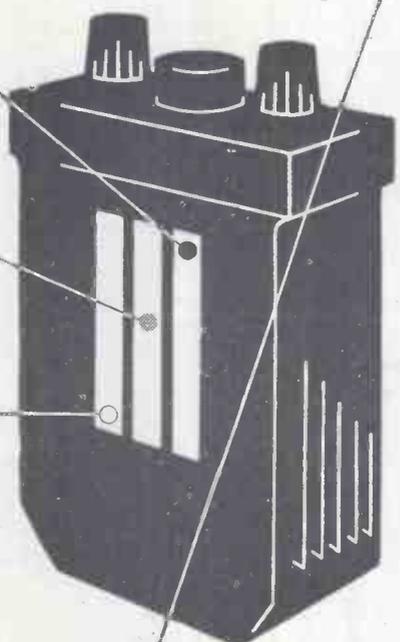
Usually American broadcasting sets are easier to handle than European models, because the latter cover long waves as well as short, while the American stations are all on the one wave-band.

AN ACCUMULATOR THAT THINKS!

RED down
Save sorrow
Recharge
tomorrow

The charge
is lean
When falls the
GREEN

To charge
me right
Bring up the
WHITE



An example of Dagenite prices L. A. Type L. T. Accumulator 2 Volt—12 ampere hour capacity—4/6. With "Tell Tale" 6/- H.T. 10 Volt units from 5/- Send for free catalogue No R. 151 showing all types, to National Accumulator Co., Ltd., 93 Gt Portland St., London. W.1

A wonderful new invention is here! National have built an accumulator that will think for you. Three little floats—red, green, white—show you just what is happening inside. Warn you in plenty of time that recharging is due. Cut out all guesswork. Keep every programme smooth and clear. Lengthen the Accumulator's life. Only National 'Dagenite' Wireless Accumulators have this marvellous device. Now—in time for the coming winter—get an all-British 'Dagenite'—made by National.

Also branches at Glasgow, Manchester and Northampton.

USE NATIONAL ACCUMULATORS

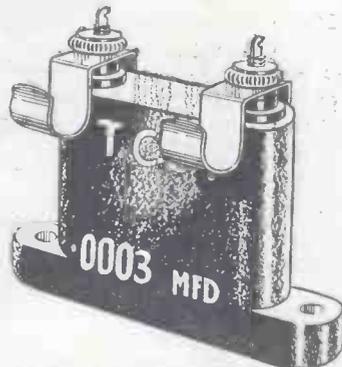
THE DAGENITE SERIES FOR CAR AND RADIO

TESTS OF TIME

Big Ben stands for...

... reliability and accuracy all the world over. It is a standard by which time itself is judged.

T.C.C. too, is a standard—a standard by which other condensers are judged—a standard of accuracy, reliability and dependability. The letters T.C.C. are an assurance of good service—recommended by experimenters, scientists and amateurs alike—the famous “condenser in the green case.” So, remember this, when next you ask for a condenser.



Illustrated above is a .0003 mfd. T.C.C. Upright Type Mica Condenser. Price 1/6 each. Other capacities in this type are made from .0001 mfd. to .25 mfd. Prices 1/6 to 18/-.

BIG BEN

ADVERT OF THE TELEGRAPH CONDENSER Co. Ltd. N. ACTON, W.3

5646

THIS IS WHAT YOU'VE WAITED FOR!



RADIO EXHIBITION OLYMPIA, STAND NO. 67

PRICE £6-15-0

Speech Transformer 15/- extra.

A new R.K. with permanent magnet designed to work—and work well—without the application of extra power. This new model, which is so easy to install (just connect it to your set, whether mains or battery driven), still upholds the reputation for tone and quality which the other R.K. models have held for four years.

The price is exceptionally reasonable when the remarkably fine reproduction is compared with that of other speakers and therefore offers excellent value for money. There are three other R.K. Reproducers—the Senior with built-in rectifier for use with A.C. mains, price £11 10s., and the Standard Senior, price £7 7s., and Junior Model, price £6 6s., all of which are obtainable through your radio dealer.

Ask your dealer for particulars of hire purchase terms.

THE NEW PERMANENT MAGNET REPRODUCERS



THE EDISON SWAN ELECTRIC CO., LTD.
Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Business of The British Thomson-Houston Co., Ltd.

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1a Newman Street, Oxford Street, W.1
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EDISWAN

W.89



CHOOSING RADIO BATTERIES

DURING the course of three or four years the average amateur spends much more on buying H.T. batteries than he does on accumulators for supplying low tension. But I think most of us will agree that the accumulator is the greater nuisance.

Having bought an H.T. battery and connected it to the set, apart from an occasional voltage test, it gives no trouble at all, until, after some months, it begins to run down, and the question of replacement arises.

Leclanchés for L.T.

But as well as the necessity of periodical tests, the accumulator also requires periodical charging and topping up and cleaning. However, if the mains are not available for supplying L.T. an accumulator is generally regarded as being essential, that is, at least, for larger sets.

An alternative that is well worth considering in the case of smaller receivers is the primary battery, and this can take the form of either a dry battery, similar in all respects except in size to an H.T. battery, although, of course, only the two or three cells are needed, or a wet type of Leclanché cell.

These really are propositions well worth considering, but only, as I have said, in the case of smaller sets. Where the total current required for the filaments of the valves is not above, say, half an ampere, a primary cell may even prove to be an economical proposition. Certainly this may well be so where a two-valver employing only two .1 valves is concerned.

But, personally, I should always plump

This entirely practical battery-buyer's guide tells you exactly what to look out for when you venture forth to select new batteries for your set. Armed with such knowledge you should be able to get exactly what you want at the lowest possible prices.

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

Complete batteries can be purchased in stout wooden cases. Naturally they are fairly large and fairly heavy, but they will give good service up to six months or even longer with very little voltage variation. And after that new elements can be obtained at quite reasonable prices to bring the batteries up to scratch again. Batteries of this kind should prove of considerable interest to country listeners, and I often wonder why they are not more widely used.

There is a further alternative to the accumulator, and that is the thermopile, a device which generates electricity on the application of heat in the form of either a gas flame or oil burner.

Victor King's Idea.

But in my opinion it is a somewhat clumsy device, and not likely to prove an economical proposition. The more you delve into the whole problem of L.T. the more one realises the fact that the accumulator, troublesome though it may seem from some points of view, is going to be with us for a long while yet.

Even if you have the mains, despite its disadvantages, there is a lot to be said for the use of a small accumulator, trickle charged, and I think it was Mr. Victor King who once said that it will be a bad day when the radio set becomes as simple an article as the mechanical gramophone.

His idea is, I believe, that it is a good thing to have something like an accumulator that requires periodical maintenance, that will focus the listener's attention on his set every now and then, so that he is never tempted to regard his outfit merely as a music producer and nothing else.

(Continued on next page.)



Ever Ready make all kinds of radio batteries, including H.T., L.T., and G.B. types.

for the "wet" type. The ordinary Leclanché, such as is used for supplying current for house bells, will not do the job properly, and there are several firms that market wet type Leclanché batteries specially designed for radio purposes.

Another Alternative.

You want two cells to supply one or two two-volt valves, and as the pressure developed by such a battery will be three volts a filament rheostat is necessary. Where anything above about a quarter of an amp. is required, it is a good plan to have paralleled cells.

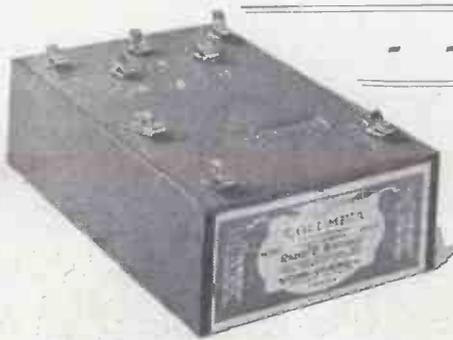


The Pertrix batteries for all radio purposes have achieved wide popularity.



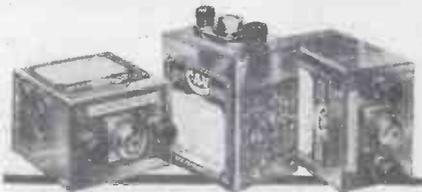
The Lissen people are ever widening their fine range. Above you see one of their H.T. accumulator units.

PRACTICAL HINTS AND TIPS ON



Columbia H.T. batteries are particularly compact, as their cells are not of the usual tubular construction.

There is a lot to be said for this point of view, although I do not go the whole way with it. However, we are getting rather a long way off our immediate



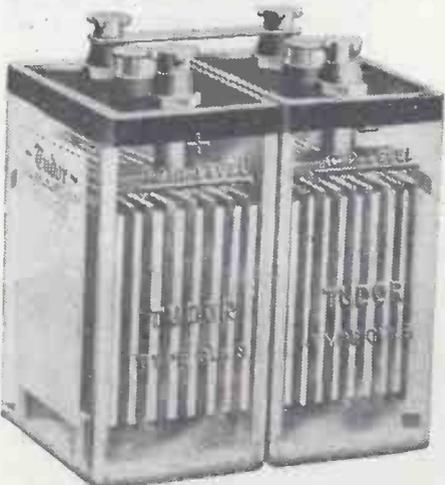
The C.A.V. unspillable accumulator can be stood on its side quite safely.

subject of batteries, and in this article I do not propose to deal with the use of batteries so much as their selection. Let us start with the accumulator.



A reasonably priced H.T. battery that has stood up to thorough testing.

The first thing one has to do when one goes about buying such an article is to determine exactly what sort one requires for the job. I do not think it is a good principle to buy the largest capacity one



The "Tudor" seems to incorporate those points the author considers vitally advantageous.

can afford. I always aim to buy a battery that will last just over the month for every charge.

I find it convenient to get my accumulators charged regularly every month, for it is an interval of time that is easily remembered. Also, the beginning of the month especially always seems to bring with it many other things that have to be done.

One does not want to buy an accumulator that will last more than one month per



It was a good day for radio enthusiasts when the famous condenser people decided to turn their expert attention to batteries.

charge, for, as another article in this issue of "P.W." will tell you, regular charging is essential for the good health of the battery. One should work out, approximately, how many hours of listening, or hours of accumulator use, are likely to happen in a month.

I do not suppose many people listen for longer than an average of three hours per



A battery that should put "pep" into a set!

day over the whole of the month, so a hundred hours ought to cover such a period, although a very keen amateur, who does a great deal of experimenting, may impose a greater demand on L.T. than that.

Always Allow Margins.

However, he can always keep a log for a few weeks in order to arrive at a fairly accurate calculation.

The next thing to do is to find out how much L.T. current the set takes. You will get a close enough figure if you add the rated consumptions of the valves together.

Supposing the set in question is a four valver, employing three valves rated at .1 amp. and one at .25. This gives you a total of .55 amperes. To get at the ampere-hour consumption of that set over 100 hours multiply the hundred by .55. The answer is 55.

Thus, you see, our four-valver will need an accumulator capable of an output of 55 ampere hours. That is not a usual rating, but 60 ampere hours is to be found in all accumulator catalogues, and the extra five is a nice little margin.

By the way, you should never work down to the last ounce of an accumulator. And in a paper calculation one must always



These batteries carry a name well known for reliable and inexpensive radio gear.

allow for practical discrepancies: in this particular instance the valves may be taking just a little over their specifications.



Messrs. A. H. Hunt's excellent contribution to the radio power facilities available to the public.

The voltage your accumulator should give depends, of course, upon the voltage rating of the valves. Nowadays battery valves are almost completely confined to two- and six-volt ratings. (Four volts is a common rating for mains valves.)

Remember This.

Having determined the ampere-hour capacity required, make sure that you buy an accumulator that is rated at the needed figure for an output of a continuous nature approximating the consumption of your set.

That sounds a little involved: let me explain it in detail. The example we have taken shows an accumulator of sixty ampere-hours is required. That is to say, an accumulator which will give .55 amperes for a period of 100 hours with a few hours of service to spare as a margin.

It is unlikely that you will come across an accumulator that



A product of one of the... in the



Tungstone H.T.s accumulators interchangeable cells, these can be paralleled

YOUR SET DESERVES THE BEST

THE SELECTION OF BATTERIES



greatest electrical concerns country.

has its ampere-hour capacity rating based on an output of exactly 55 amperes.

A. Variable Factor.

You see, the capacity of an accumulator varies with its output. An accumulator that is rated as having a capacity of 60 ampere-hours should, theoretically, give you one ampere of current for sixty hours; two amperes of current for thirty hours or sixty amperes for one hour, or in fact any current for any number of hours the sum of which is sixty.



Particularly dependable batteries that sell at reasonable prices.

But in actual practice we find that the capacity of an accumulator will vary with its output. Generally speaking, the smaller the current you take away from an accumu-



The Marconi-Phone Co. has 19-volt grid bias batteries (additionally to all kinds of H.T. etc.), which are very useful for the bigger sets.

lator, the longer it will last per charge and that is the reason for the two ratings that you come up against in accumulators, that is, "Ignition" and "Actual."

The ignition rating refers to the capacity of an accumulator to give small currents at intermittent bursts, as in running the ignition coil of a motor-car. The actual capacity of an accumulator is its capacity to supply current of a heavier character for a continuous period.

Misleading Description.

The ignition capacity is generally twice that of the actual capacity.

But actual capacity can vary as with the current taken, although it is only fair to say that the capacity ratings of all the better-known accumulators

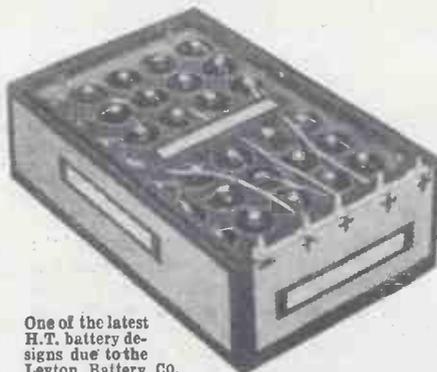
are calculated at currents far in excess of that which any ordinary radio receiver requires in the way of L.T.

Nevertheless, you want to be careful that you are not caught by an ignition rating which is given as unqualified "capacity" on some batteries of obscure origin. "Capacity 100 Ampere-Hours" may look nice in large black letters when seen on a neat, compact battery, but if it is calculated on an ignition basis then, for radio purposes, that capacity is only fifty ampere-hours at most.



The "Young," a new accumulator for which striking claims are made.

Most batteries of good make have their outputs founded on at least their maximum charging currents. Thus, if you see an accumulator bearing a good name labelled "six volts; twenty amps; charging rate, half an amp" you can be fairly certain that

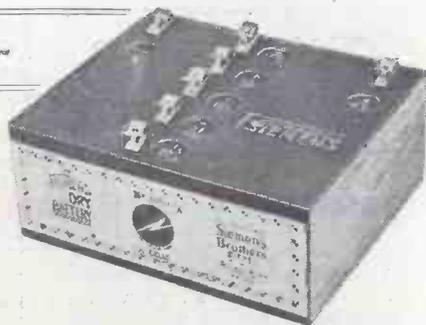


One of the latest H.T. battery designs due to the Leyton Battery Co.

you will get twenty ampere-hours capacity at least, if not a little more, at anything up to half an ampere

Before we leave this question of capacity let me remind you that the hours of actual service an accumulator will give you are approximately its ampere-hour capacity divided by the current taken from it.

To vary our figures a little, a battery of 30 ampere hours capacity



The name of Siemens is almost a "household" word where batteries are concerned. Shortly a new range of "Full-o-Powers" is to be introduced to the public.

should deliver half an ampere of current for an aggregate period of 60 hours; but I must not forget to point out that it is unwise to work only by the book, and that



Ripaults' H.T. batteries are well-known to radio enthusiasts.

frequent reference to the voltmeter and hydrometer is distinctly advisable. Nothing harms an accumulator more than to run it down too far.



A product of the British Battery Company.

Having decided upon the voltage and capacity of the accumulator that you need, the next thing to do is to decide upon the actual make. Accumulators are always improving, although you might think that
(Continued on next page.)



accumulators have very easily made a scheme whereby they are easy charging.



A NI-Fe H.T. battery unit. NI-Fe batteries use an alkali solution instead of sulphuric acid.

STAVAILABLE BATTERIES

CHOOSING RADIO BATTERIES.

(Continued from previous page)

they have remained more or less in a stable position during the past three or four years.

This is far from being the case; the improvements are not of a revolutionary character, they are more improvements in detail, although details which work out very importantly during the life of the battery.

Transparent Cases.

When I am buying an accumulator, this is what I do.

I go to some store which I know holds a pretty big stock of all varieties, and I have them line up, on the counter, representatives of all the makes available.

I generally narrow my choice down to those which have glass cases, for I find that even the best of celluloid is apt to get yellow, sometimes cracks and is liable to impart impurities to the electrolyte.

I have rather a liking for lead cases but prefer the transparency of glass which enables one to see the condition of the plates and also easily to ascertain the level of the acid solution. I do not worry much about examining the plates themselves because I know of no real indication as to their merit that is apparent by looking at



"A.D." cells (Le Carbone) use a special air depolarising scheme instead of the usual chemicals.

them through glass, at least, that is when they are in new condition.

The plates must always be taken on trust, although if the manufacturer is well-known, one need have no qualms in doing that. I always examine the terminals with great care, for I have found in the past that many accumulators have lives limited to the lives of their terminals.

Regarding the Terminals.

I know that even brass terminals can be kept in perfectly good condition for years if they are frequently wiped and greased, but even the most conscientious of us are likely to neglect such tasks, especially during the summer months. It wants only a week or two of neglect of such a nature in order for acid to do its nasty work on such metals as brass and an accumulator terminal that corrodes and binds up is a most awkward item to deal with. Often the reward of a little gentle persuasion is the complete wrecking of the terminal, and that generally means the end of the life of the accumulator as a useful accessory.

The ideal is large terminals of a non-corrosive character. I like those batteries that have terminals brightly coloured red



A particularly robust cell for small consumption valves.

and black and not just merely marked with + and - signs, which are hard to see when a battery is stowed away in some odd corner.

But when accumulator terminals are coloured it is distinctly advisable that they should be of a non-interchangeable type. That is, they should have different-sized threads so that the red terminal can never be screwed on to the negative side, and vice versa.

The next point of importance, in my opinion, is the vent plug; I think a screw type is the better because those that merely push in, unless they go in a fair way and are of fair size, seem to be easily knocked out and lost, especially during the visit of the battery to the charging station. Also, I like a large vent for the reason that it provides you with a large aperture through which distilled water can be poured for topping up.

Where Space is Wanted.

Another point of real importance is that each cell should have its top cleanly finished off and free from odd ridges and depressions for these make it hard to wipe it absolutely free from any acid solution that may have sprayed up or got spilled over it.

That reminds me of another point: always give a good mark to a cell that has its top composed of some really hard material and not soft pitch or other such filling.

Separators for the plates are not often seen these days, and for that I think we may be grateful. I do not think you want anything else inside the cell besides the plates and the acid solution. I know it



The Standard Battery Co. makes this fine wet H.T. battery, which can provide enough H.T. current for a large multi-valver.

militates against the compactness of the cell, but I also think it is a good idea to have plenty of space above and below the plates inside the case of the cell.

When there is a fair amount of space above the plates, considerable gassing can occur during charging and the cell can be pushed about quite a bit without any acid solution being spilled through the vent, while, if there is a nice space below the plates, sediment can be accommodated without tending to stick between the plates and so short-circuit them.

One has a much easier job when one buys an H.T. battery. Here we get very broad classifications of capacity. These are "ordinary," "double," and "triple." These terms are quite self-explanatory. They are intended to mean exactly what they say.

The life of an H.T. battery is determined by two things, the size of its electrodes and the moisture-retaining capabilities of its paste. When an accumulator is discharged it is possible to put it back to its original condition by sending current through it.

But the discharging of a dry battery is accompanied by the eating away of the zinc that forms one of the elements of the cells, and you cannot replenish the zinc without dismantling the case. Also, if the paste substance, which more or less corresponds to the acid solution in the accumulator, dries up, the chemical activities that are part and parcel of the operation of the cell, cease.

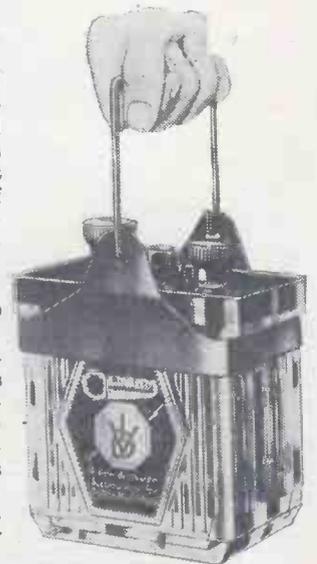
After Two Years!

Fortunately, chemists have evolved paste which retains its moist condition for a surprisingly long time.

As a matter of fact, I have just examined the paste in an H.T. battery manufactured by a very well-known firm, and I find it in excellent condition, although the battery was actually manufactured over two years ago.

It is difficult to lay down any hard and fast rules regarding the H.T. battery capacity that you want for a particular set. To generalise, I think it is nearly always worth while to buy one of the heavier kinds, whatever the set.

While a grid-bias battery need never be of the heavy-capacity variety, it should be of good make so that you can depend upon it to give a year or so of service without drying up. The life of a grid-bias battery can also be reckoned as the life of its paste, and this, as I have already indicated, may be as much as two years if its manufacturers know how to go about their job.



Oldham radio accumulators are provided with simple but extremely practical carriers.



TUNGSRAM A.C. Valves for mains-operated sets. They are the best A.C. Valves you can buy. Their first cost is less. They cost less to run, and they have a long life. And their performance: long range, selectivity, volume, and perfect tone. For better, more economical radio, use Tungsrām A.C. Valves.



A.C. VALVES

INDIRECTLY-HEATED VALVES, 9/6. 4 v. A.C. POWER VALVES, 8/-.

Tungsrām Photo Electric Cells, Nava E, £2:17:6. Nava R, £3:3:0.

TUNGSRAM ELECTRIC LAMP WORKS (Great Britain) LTD.,
Radio Dept., Commerce House, 72, OXFORD ST., W.1.

(Makers of the famous Electric Lamps.)

VP10

FACTORIES IN AUSTRIA, CZECHO-SLOVAKIA, ITALY, HUNGARY, POLAND. BRANCHES IN BELFAST, BIRMINGHAM, BRISTOL, CARDIFF, GLASGOW, LEEDS, MANCHESTER, NEWCASTLE, NOTTINGHAM, SOUTHAMPTON.



CAPT. ECKERSLEY'S QUERY CORNER

"QUALITY" RECEPTION—INCREASING SELECTIVITY—THE BROOKMANS PARK TRANSMITTERS.

Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

"Quality" Reception.

H. T. B. (Wanstead).—"I have recently purchased a very high-grade 'quality' receiver which operates a moving-coil loud speaker. The results in general are a revelation, being in my opinion as near to perfection as there is any need to go.

"The only criticism I can make is with regard to the reproduction of the announcer's voice. Whenever an announcement is made it is accompanied by a distressing rushing noise, and the 'volume' of the voice can only be described as 'gigantic.' It is, in fact, at the same 'loudness' level as a full orchestra."

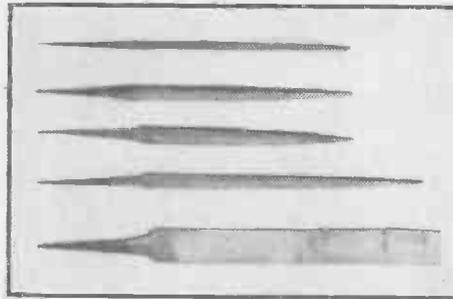
Here is a case that makes me chortle. For years and years I have pointed out that the only way to receive broadcasting is to handle the receiver as a musical instrument and, above all things, to have a volume control. I expect your set, as a matter of fact, has a volume control, but it must be used.

Thus when you reproduce an orchestra at full blast you are getting an intensity of sound which approximates to that you would be experiencing if you had a seat in the Queen's Hall and the orchestra were playing there. But if you magnified the voice of the announcer to the strength of the Queen's Hall orchestra you not only bring on microphone hiss (which you describe as a rushing sound), but you magnify the announcer's voice out of all proportion to naturalness.

You cannot actually get perfect quality speech until the reproduction is the same volume as the original. A man shouting is natural because he is shouting, but if he is talking in a normal voice and you magnify that voice twenty times, you are bound to get unnaturalness; hence the necessity to use a volume control for reproducing the man's voice at the loudness at which he is presumably speaking.

If the volume control is on the set you will need to be jumping up and sitting down again fairly frequently (especially during those ballad concerts), but if you devise a remote volume control which has a wire leading from your set to your comfortable armchair you can indulge in lazy listening. I have done this for years, and would not be without it for anything.

FOR THE SET BUILDER



You can do a lot with one flat file, but if your tool box contains round, square, and three-cornered files, there is no job too awkward to tackle.

Increasing Selectivity.

G. M. S. (Brighton).—"Is there any means of increasing the selectivity of a set (Det. and 2 L.F.) without reducing sensitivity? I have no wish to employ wave-traps or rejectors, but do not mind using more than one tuned circuit if the sensitivity of the detector valve is not impaired.

"My present tuning system consists of an X coil tuned by a .0005 mfd. variable condenser, the aerial being joined either direct or via a .002 mfd. fixed condenser to one of theappings on the coil. Reaction is on the differential control principle."

In my opinion it would be difficult to get a greater selectivity without loss of sensitivity by juggling circuits. It might be worth while to try a coupled circuit, of course, and, if tried, use connections as in Fig. 1, not as in Fig. 2.

But I believe you may find your best remedy in just cutting down the aerial size—just that and nothing more.

It's rather a long story to tell you why this should be, so many factors enter into the matter, but it's worth while trying, and I bet two to one on success, which means I don't guarantee success. But cutting down the aerial may not mean less sensitivity, and it will certainly mean a gain in selectivity.

The Brookmans Park Transmitters.

T. H. (Catford). "I recently passed the B.B.C. Regional transmitter at Brookmans Park, and was very surprised to notice the relatively small distance between the two aerials.

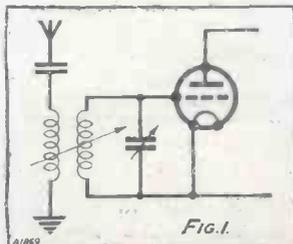
"Do not these two aerials both act as receiving aerials, and each receive (by shock excitation) the transmission from the other? This seems a reasonable supposition, and I am wondering what (if any) precautions are taken to overcome the effect."

This has been given a good deal of thought and quite definite thought, particularly by the writer of your answer. I was told when I proposed the Regional Scheme that it was a dream and would never be realised practically.

But consider! You are assuming that currents of frequency N_2 will be induced in an aerial tuned to a frequency N_1 by a neighbouring aerial tuned to a frequency N_2 , and that the former will re-radiate currents of frequency N_2 . But this aerial is tuned to a frequency N_1 , and radiates currents of frequency N_1 very powerfully.

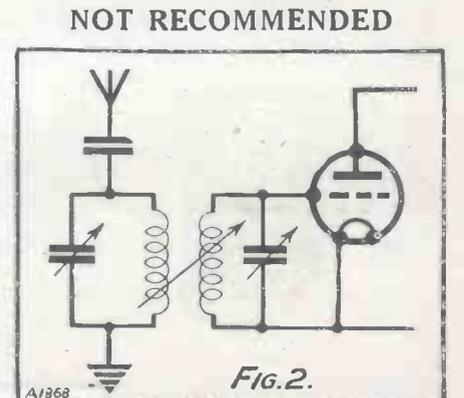
It is a mere question of magnitudes therefore. Will the aerial tuned to a frequency N_1 re-radiate currents of frequency N_2 when there is a powerful inducing element nearby sending waves of frequency N_2 ? Doubtless, if the aerials were very close together, yes. But we have spaced the aerials sufficiently far apart to make the effects negligible.

It's just a question of magnitudes, and in fact the magnitudes are such that the effect, undoubtedly existent in practice, is negligible.



AERIAL AND GRID COILS

If you use a separate aerial coil the condenser should be in series with it.



NOT RECOMMENDED
Tuning your aerial circuit by a parallel condenser is not advised.

When buying Valves -Remember!



The Lightship at the Nore.

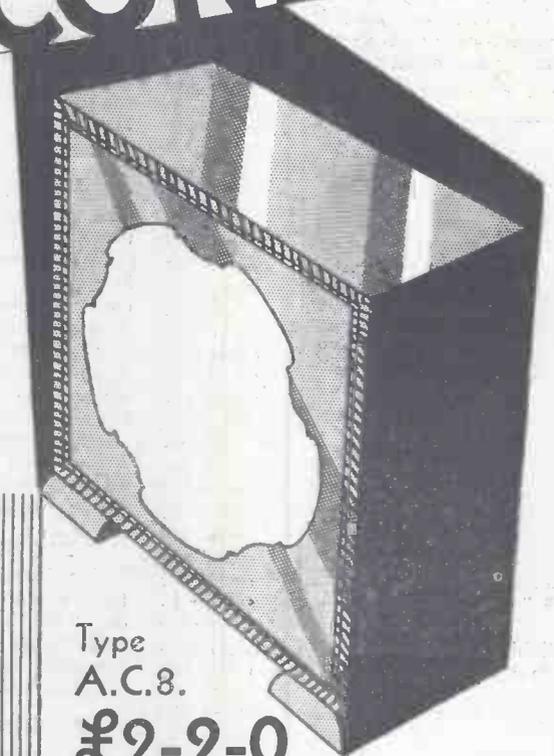
**Trinity House Lightships
and Beacon Stations
and such authorities as the Metro-
politan Police—Imperial Airways—
Empiradio Beam Wireless—Croydon
Control Tower—the B.B.C.—all**

USE

MARCONI VALVES



AMPLION TWO-GUINEA CONE



Type
A.C.8.

£2-2-0

One of Amplion's latest models at a really moderate price which brings it within the means of everyone. This sturdy little cone speaker is supplied in a neat cabinet of original design, with an attractive shaded finish. It is capable of giving really excellent reproduction, together with very considerable volume. Size of cabinet 12½" wide x 13½" high x 6½" deep.

Catalogues from Graham Amplion Ltd., 26 Savile Row, London, W.1.

AMPLION

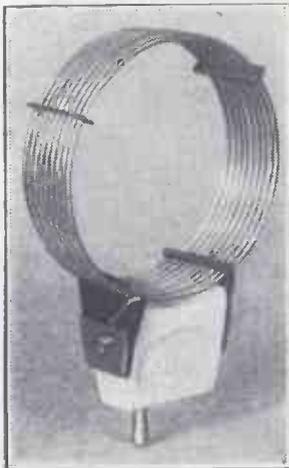
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



EFFICIENT SHORT-WAVE COILS.

MANY receivers are designed these days to go down to the short waves, but constructors are going to be confronted with bitter disappointment if they do not pick their short-wave coils carefully. As I have frequently said of late, there is not much in the way of radio gear knocking about these



An "Atlas" short-wave coil.

days that is really "dud," but a surprising proportion of the poorer gear is to be found in that offered to short-wave enthusiasts.

However, on the other hand, there are some excellent short-wave coils

available, and among these I have no hesitation whatever in placing Messrs. Clarke's "Atlas" plug-ins.

These are every bit as efficient as the best I have ever come across, and much better than most others. The reasons for their efficiency are not far to seek.

Their thick wire windings are air spaced and held in place on porcelain bases with a minimum of solid dielectric. The plugs and sockets fit into holders snugly, without that inclination towards looseness and bad contact that tends to mar otherwise good designs.

Finally, Clarke's "Atlas" short-wave coils are nicely made and are robust in construction, and do not fall to pieces after even a fair amount of rough use.

If it were my habit to give points to the various radio components and accessories that are reviewed, I would feel greatly tempted to give these particular coils 100 out of a possible 100.

USEFUL CHARGING DEVICE.

Those "P.W." readers who are so fortunate as to possess motor-cars should be interested in a new product due to Ward & Goldstone, Ltd. This is the Goltone

"Indispenso" Car Radio Charger. It enables you to charge your radio accumulators from the car electrical equipment either when the car is running or stationary.

It comprises a small lamp resistance and a polarity indicator mounted on a neat base. There are flexible leads for connection to the accumulator to be charged, and a further flexible is provided with a two-pin adapter for fitting into the socket that is to be found on the dashboard of many cars.

The price of this complete outfit is 9s. 6d., with full instructions for its use. For 10s. 6d. a similar outfit is available that has additional spring-clip attachments enabling the outfit to be connected either to a dashboard socket or to the car accumulator.

The charging rate depends, of course, upon the bulb, and that which is provided charges at a little below 2 amperes. By changing the bulb the charging rate can, of course, be altered.

This "Indispenso" Car Radio Charger is a perfectly sound idea. Providing the car accumulator is, as it should be, kept in good condition and well up to scratch generally, it does no harm whatever to it if it is made to give a small charging current for a radio accumulator when the car is stationary, while when the car is running, the charging is practically clear gain.

Interested readers would be well advised to write to Messrs. Ward & Goldstone for full details of this attractive device.

THE G.E.C. OSRAM BULLETIN.

The latest number of this interesting trade organ gives full details of the "Southern Cross" wireless set, which was equipped with Osram valves. There is also the continuation of an important article entitled "The Advance in Valve Manufacture."

A FIRST-CLASS LOUD SPEAKER.

The Mullard Pure Music Speaker Unit is really a complete loud speaker all ready to fit into a portable set, or a cabinet receiver or, alternatively, it can be fixed into a loud-speaker cabinet or on to a baffle-board.

It is surprisingly compact and weighs only 25 ounces. As you can see by the photograph of the instrument which is reproduced on this page, there is a metal chassis on which are mounted the driving-movement and cone. A special feature is that three terminals are provided for the winding, and these allow a choice to be made between three impedances, so that practically any output valve can be matched.

The movement is of the balanced armature type and is, indeed, identical to that fitted into the Mullard Pure Music "H" type of loud speaker. In that it is claimed that the "H" gives the closest approach to perfect reproduction that has yet been obtained by any speaker other than the most expensive moving-coil model, some

pretty strong clue is given as to the capabilities of the Mullard Pure Music Speaker Unit.

And remembering that this costs only £1 18s. 6d. complete, one would have to look a long way for anything approaching it in real value. I must say I was considerably impressed by the results it gave. They were far and away ahead of those given by the majority of loud speakers costing anything up to twice the price.

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.

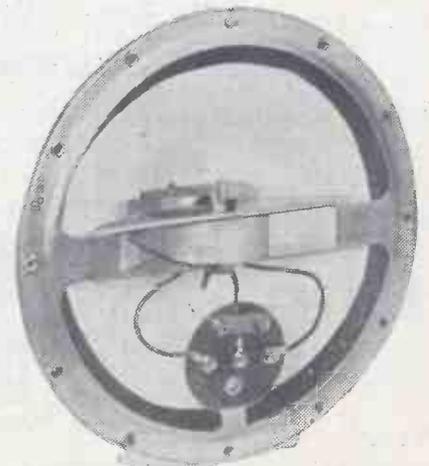
We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

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

With a fairly large baffle you really do get an impressive representation of the lower notes while, in general, reproduction is virile and clear-cut. A valuable advantage is that the movement winding is able to carry up to 25 milliamps without the slightest risk of damage occurring, so an output transformer or choke condenser is not essential.

TANNOY MAINS UNITS.

A slip on somebody's part resulted in my report of the Tannoy P2 unit a week or two ago being illustrated by a photo of a Tannoy 12C unit. There is not much difference in the size of these two units, but, whereas the P2 employs a Westinghouse metal rectifier, the 12C has an efficient chemical rectifier. However, readers will have an opportunity of comparing the appearances of the two Tannoy units, for my report on the 12C will be accompanied by a photo of both of them. The 12C is at the moment undergoing its tests and standing up well to them.



This is the Mullard Pure Music Unit. Note how the movement is built into the concave side of the cone and that there are three terminals providing alternative impedances.



A
good item
on any
programme

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It's the
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THE MAN WHO TRANSFERRED

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The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS.

CUTTING OUT NOISES.

M. S. (Tiverton).—"I get loud regular humming and scraping noises, which I am told is electrical interference. I should like to alter the set (an American) to cut this out, or to put in extra screening or something, but unfortunately I am a complete novice at wireless, and should value any hints you can give on cutting out interference of this kind."

It is impossible to cover this subject in the form of brief question and answer, so we think the best plan would be for you to write to the B.B.C.

For the benefit of listeners, the B.B.C. run a special department dealing with interference problems and the methods of overcoming them, and if you give them full details they will do all they can to help you out of your trouble.

CAN WE HELP YOU WITH YOUR SET?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

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

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A postcard will do. On receipt of this an Application Form will be sent to you free and 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.

USING TWO-VOLT VALVES WITH SIX-VOLT ACCUMULATOR.

F. J. (Norwich).—"My set uses four six-volt valves, but unfortunately I burnt out the detector valve. Instead of buying a new one to replace it I should like to use a two-volt of the same type which I have on hand.

"How can I tell what filament resistance

is necessary to run it off a six-volt accumulator?"

The value of the resistance required to run a two-volt valve from a six-volt accumulator can easily be calculated by a slight modification of the ordinary Ohms law formula.

Ohms law says that if the pressure in volts is divided by the current in amps, the answer will be the resistance in ohms; in other words, $R = \frac{V}{C}$.

For our purpose we can retain the equation, but modify the meaning of the symbols a little. If we call C the current consumption of the two-volt valve, and if we subtract the voltage at which the valve should operate from the voltage of the accumulator and call this figure V, then the required resistance in ohms will be equivalent to V divided by C, and we can proceed as above.

You will see that the current taken by a two-volt valve is an important factor in getting the figure we want. You do not mention your valve's current, so we will work out an example.

Supposing that we are using a two-volt valve rated at 1 amp. filament current. Now that valve should take 1 ampere when connected to the two-volt accumulator. What resistance R will be necessary if a 6-volt accumulator is used?

From the formula above it will be seen that to find R it is necessary to divide C into V. C is 1 and V is the difference between six volts and two volts, i.e. four volts.

It will thus be seen that 1 goes into four volts 40 times, so the filament resistance required in the circumstances is one having 40 ohms.

Other examples may be worked out in the same way, all that is necessary to apply the formula being to know the voltage of the supply, the voltage at which the valve in question is supposed to be worked, and the exact filament current it takes at that voltage. But do not forget that V is not the six-volt accumulator, nor the two-volt, but is the difference between these two.

SWITCHING OFF WHEN USING MAINS APPARATUS.

D. T. L. (London, S.W.).—"Is it really necessary to switch off when changing over the valves in an all-from-the-mains set, when the earth, L.T. battery, etc., are connected to the earthed main?"

Too much emphasis cannot be laid on the fact that it is dangerous to open or expose the live parts of electrical apparatus while it is connected to the supply mains.

When it is necessary to touch such wiring or to change valves, both poles of the supply should be disconnected.

In their recommendations for installing electrical equipment in buildings, the Institution of Electrical Engineers point out that the neutral conductor of a public electrical supply system may be connected to earth only when energy is supplied to a distinct system, and that at other points the neutral conductor must be efficiently insulated.

Further, the supply authorities may disconnect the earth connection for testing, or for locating a fault, and in the case of direct-current three-wire system they may connect the neutral conductor to earth through a fuse, automatic circuit-breaker, and/or a resistance.

In fact, under certain conditions or during certain periods, there may be a potential difference of from 260 to 250 volts between the neutral conductor and the earth, and greater voltages at the "H.T." points. Therefore, even when the L.T., etc., is connected to the earthed main, you must switch off before handling the mains apparatus.

WHAT DO YOU THINK ABOUT THIS?

This week's "poser" would not have troubled anyone with experience of set-wiring, but it was a great puzzle to the Marlborough schoolboy to whom it occurred.

In making his first one-valve set he was specially careful over every wire, obeying the instructions implicitly. (Ordinary one-valve set, plug-in coils.) But when finished it worked very disappointingly.

Only two stations could be heard, and reaction was useless—in fact it seemed to make the set worse. The coil-sizes were right, though the make was different from that named by the set-designer.

Could you have said WHAT WAS WRONG?

N.B.—There is no prize for answering this, but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to the above next week.)

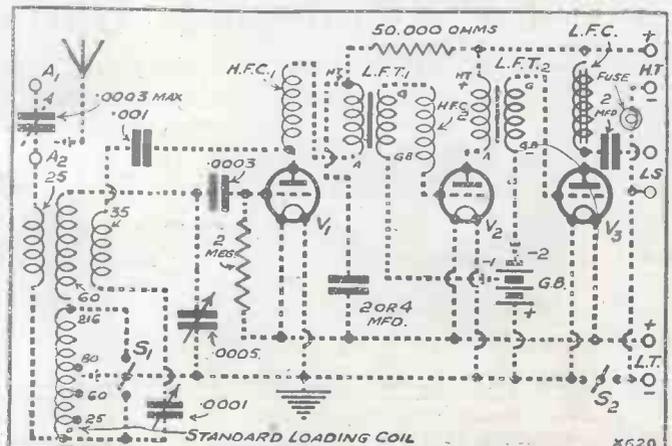
The cause of the crackles described last week was a faulty upstairs switch that an electrician soon put right. It crackled only when in the "On" position, so most of the evening was crackle-free.

MOVING-COIL QUALITY.

G. I. W. (Paddington).—"On two occasions lately I have heard instances where results were decidedly worse when a moving coil is used rather than when the better-class cone loud speaker, driven from a balanced armature unit, is employed with baffle.

(Continued on page 680.)

POPULAR "WIRELETS" No. 17



The dotted lines show how the "components" given last week should be connected to give an all-wave 3-valver, with easy change of wave-length by means of S₁.



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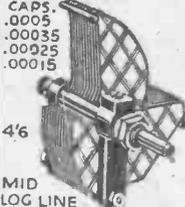


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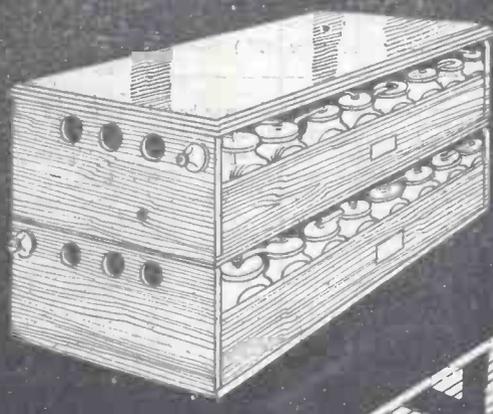


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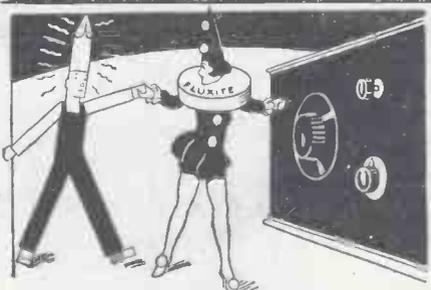
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ALL MECHANICS WILL HAVE

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—IT SIMPLIFIES ALL SOLDERING

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 678.)

"In one case a low-pitched hum was heard which was distinctly noticeable with a moving coil and not with the unit. And in the other case there was a tendency to 'wooliness' and almost a suggestion of instability with the M.C., and not with the cone.

"As the apparatus and the eliminator were exactly the same, it would appear that the moving coil upset the apparatus slightly. How is that?"

There are several distinct possibilities of trouble occurring when using a moving coil as against the ordinary type of loud speaker.

In the first place, the moving coil requires to have its pot windings energised, and though the current necessary for this is being taken direct from the mains, it sometimes happens that certain chokes, etc., are included in the common circuit. If a greater current flows through these, it reduces their efficiency, and thus a hum might be more noticeable when a moving coil is used than when another type of L.S. is employed.

A second possibility is that the sensitivity of the moving coil may be greater than that of the other speaker.

In this case the hum would be suppressed by the cone, and might give the impression that the M.C. speaker was the cause of the hum.

THE A.C. SAFE-POWER SENIOR.

In the "more about" article on the above set it was stated (on page 584, "P.W." No. 427), that "Connections are made to the actual metal of the base itself at two points, and you must be careful not to forget these."

Actually, the wiring diagram on page 570 ("P.W." No. 426), shows three places marked "to metal chassis." The wiring diagram is right, as shown, and on page 584 the "two points" should have read "three."

FOR THE LISTENER.

(Continued from page 669.)

Puccini seemed determined not to allow Mozart to have it all his own way. Or perhaps it was Mussolini, rather jealous that the eye of Europe was not upon his country for the moment.

They were broadcasting "Madame Butterfly" from Rome. On another occasion, we should have enjoyed it; for the name part was being magnificently sung, and there was a glorious tenor voice. But, that night, we resented it, and listened perforce with frowning brows, and sighed with relief when the Serenade came again on the air.

Encore.

Belinda, who is rather tired of having her voice torn asunder, so that part of it is speaking in Vienna, and another part in

NEXT WEEK.

SPECIAL MAINS NUMBER.

ON SALE SEPT. 4th.

Brussels, and another part in Milan, all at the same time, thoroughly enjoyed the Salzburg broadcast. Her idea is that there should be more of these simultaneous programmes, one every night in fact.

She thinks that it would do more for the Peace of Europe than all the Naval Conferences if, for example, Gillie Potter or Albert Sandler could have the "air" to themselves for an hour once a week.

As for Mr.—but I have warned her that,

with respect to this gentleman, she carries her heart too much on her sleeve! Perhaps the B.B.C., or the international committee at Geneva, will make a note of this.

The Long Wave.

At last I have got signals on the long wave. The miracle happened last night, when the Salzburg programme was over. Somebody advised me to put a condenser in Belinda's aerial lead.

I went into a neighbouring town, armed with an Italian dictionary, and succeeded in buying a condenser. It was a ".001 mfd." What that means I have no idea.

The figure part of it looks as if it might refer to my bank balance. I have, with great difficulty, deciphered the meaning of ".001 mfd.," which I take to be "miles from Dublin," or Daventry perhaps.

Belinda and I didn't quite know how to put it in her aerial lead. But we applied to the local blacksmith who put it "in series" in the lead, and soldered the wires.

It didn't make the slightest bit of difference. So, when the Mozart programme was over, that would be just after half-past ten, we broke the soldering, and just tied the condenser on to the aerial lead, and let it hang there, like a brown bat clinging with its claws to a twig.

It was then that the miracle happened. For at eleven o'clock precisely, Jack Payne and his Band came through on the long wave, bright and perky, and we cleared the floor, and danced more merrily, I think, than ever we have danced before!

Now, what exactly had that condenser done? Belinda doesn't know, and I'm blest if I do!

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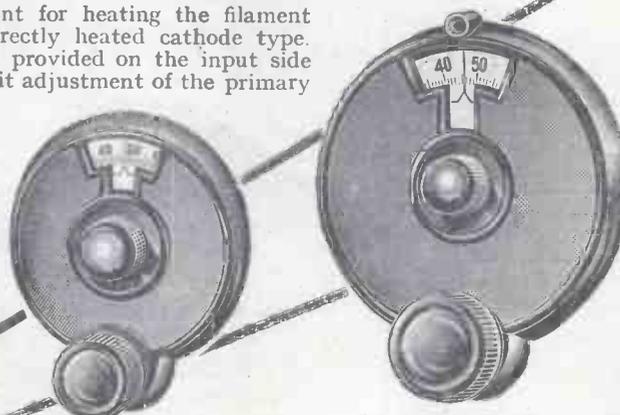
Designed to supply current for heating the filament of A.C. valves of the indirectly heated cathode type. Five terminal positions are provided on the input side of the transformer to permit adjustment of the primary to suit mains voltages of 100-250 volts. The output of the secondary, which is centre-tapped, is 4 volts across the outer two terminals.

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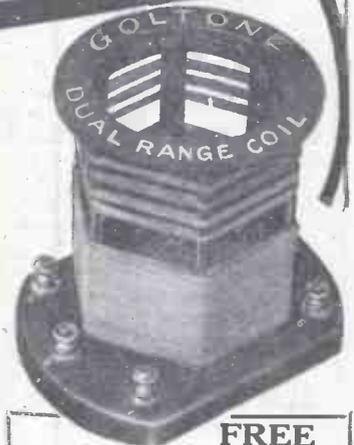
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I have made up some three-valve sets in my time with different Tuners and Coils but your Coil beats the lot for smoothness and selectivity.

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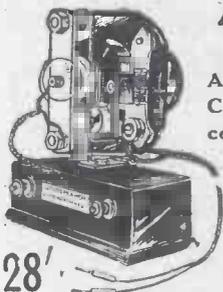
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Make

THE DAILY SKETCH

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EMPIRE BROADCASTING.

(Continued from page 659.)

having spent a great deal of money on the service that the programmes should be specially constructed for the service for which they are designed?

I mean, can it really be suggested that our programmes are tremendously interesting to the lonely listener? You must not take this to be a criticism of B.B.C. programmes; even if they were good the lonely listener wouldn't like them.

The reception of short waves cannot, in general, do justice to symphony, chamber music, talks, relying for their subtlety upon intonation, asides, etc.

The lonely listener wants topicality, indicated in noise and general effect (yes, I know about Big Ben), he wants jazz and restaurant music as a stimulant to nostalgia. Can you blame him? We find our amusements away from wireless; our serious thinking is done elsewhere, too. He (the lonely listener) has nothing to look for but amusement.

NEXT WEEK

SPECIAL MAINS NUMBER

ORDER YOUR COPY NOW.

I had the pleasure of dining with Captain Round the other night. It was he who suggested that the Empire station required special programmes, and that there is an easy way to do so by throwing the service open to private enterprise programmes.

He said we should write this article together. I feel, in effect, we begin here, and I heartily endorse his suggestion. Look what it means!

It means, in effect, special programmes for the lonely listener, designed for his special needs, and it means a wide publicity for British goods; it means that it is competitive with Dutch and American services of a similar kind.

It means—why it means such a lot that I must leave you for a week. Read next week's article, then, where we will set Captain Round's suggestions out in full, wrapped up in a resumé, summarised with a conclusion and clearly set forth in the bulk thereof!

SOME VITAL ITEMS.

A condenser which has to bear the full pressure of D.C. mains should have been tested by having at least double the mains voltage applied to it.

Piano transmissions are an extremely valuable test for quality because they give a very large initial amplitude for a comparatively low average value of modulation.

In order to get the best possible results from a screened-grid valve it is important to take every care that the correct voltages are used on both its plate and screen.

TECHNICAL NOTES.

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

I AM often asked why it is that some types of mains unit do not give a pure D.C. supply, free from hum, ripple, crackling noises, or other forms of interference. Readers having units of this kind are often rather disappointed with results, and wonder whether the unit which they have purchased is of an inferior type.

I should explain, before going further, that it is quite possible that a mains H.T. unit, even if of a good make, may not give perfect results in certain cases because electric mains vary very much, and there may, indeed, be local conditions which it is impossible for the designer of the mains unit to allow for.

Commercial Requirements.

He is bound to design the unit so that it may be manufactured at an economic price, and it would be a serious commercial error on his part to add so much "smoothing" to the unit as to take care of extreme and exceptional cases. Provided the unit fulfils the requirements of, say, 90 to 95 per cent of cases, the odd percentage must be looked after in some other way.

If your D.C. mains prove to be particularly bad, owing to high-frequencies from sparking commutators and such-like electrical machinery being carried over them, it may be necessary for you to use, additional and external to your mains unit, a simple form of high-frequency filter, and in some cases a low-frequency filter also will be needed.

A high-frequency filter, of course, consists essentially of a pair of H.F. chokes (of standard commercial type) inserted one into each lead with a pair of fairly high-capacity condensers in series shunted across the leads, the centre connection of the condensers being connected direct to earth.

For the low-frequency filter an L.F. choke of fairly high inductance (up to 40 henries) may be inserted into one of the mains leads and a couple of 2-microfarad condensers in parallel shunted across the leads. It is important that the L.F. choke should have a comparatively low ohmic resistance, not more than a few hundred ohms.

Using Two Filters.

The filter, whether of the H.F. or L.F. type, is simply introduced between the electric supply and the plug to which the electric supply was previously connected, so that the "juice" passes from the mains through the filter before reaching the mains unit. If it is necessary to use both the L.F. and the H.F. filters, these may be connected together in "series," so to speak, so that the current from the mains passes first through the one and then through the other, and so into the mains unit.

A Radio Invention.

Yet another addition has been made to the numerous uses of radio in the service of mankind by the invention of Dr. Alexander, the well-known United States radio scientist, of an automatic indicator which

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

tells the pilot of an aeroplane or airship his height above the ground.

Many attempts have been made to achieve this important object, but hitherto it has been necessary for the pilot or navigator to make periodical tests. By the use of Dr. Alexanderson's device, however, the height is indicated automatically by means of a series of green, yellow, and red lights which indicate respectively heights above 250 ft., 100 ft., and 50 ft.

The method used in the Alexanderson "height-meter" is really quite simple, and depends on a phenomenon known in other branches of physics called "stationary-wave" reflection.

Stationary Waves.

If a source of high-pitched sound, such as a very shrill whistle, is placed at a distance of a few feet away from a wall, the sound-waves reflected from the wall will interfere with the direct waves from the source, and in certain circumstances you will get so-called "stationary waves," in which the nodes and loops are at definite fixed positions.

The positions of these nodes and loops can easily be determined by means of an appropriate detector; in the case of high-pitched sound, this detector may be a special type of sensitive gas flame.

This is roughly the principle upon which the Alexanderson device depends, except that, of course, the waves are short radio-waves and the detector is a radio instrument.

"Sounding."

A somewhat similar principle was also developed during the war, and is still in use, whereby ships can determine the depth of water by sending out high-pitched sound waves and receiving the echo of the same upon a suitable detector. This method of sounding is very much more rapid and convenient than the old-fashioned method.

Choosing a Portable.

In view of the greatly increasing popularity of portable receivers—now that it is possible to get a portable receiver that is of some real use—it may be useful to give you one or two hints on the more important points to look out for in making a choice of a portable set.

There are few things easier than to give a good demonstration (either of a portable or any other type of receiver) when the set is under definite and advantageous conditions. What you want to be quite sure about is that it is going to give equally good results in *your* conditions, whatever they may be, and however they may vary, and also that its performance is going to stand up over a considerable period of time.

This question of time is very important, because any change which occurs in the operation of the portable receiver, over, say, a month or two, will almost certainly be due to nothing more or less serious than changes in battery voltage. You may think this is a comparatively unimportant point, but you must bear in mind that, owing to the very limited space available for the batteries in a completely self-

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

contained portable receiver, you are obliged to use batteries of rather limited capacity. This means that the designer of the receiver should take special care to keep the L.T. and H.T. current consumption as low as possible, so as to give the low-capacity batteries a good run for their money before they become run down. Therefore, it is very important to find out what is the actual capacity of the batteries and what is the current consumption, or if you like to combine the two inquiries into one—which is really what you want to know—how long the set will operate before the L.T. battery requires recharging and the H.T. renewing.

Oscillation.
Quite apart from the cost and inconvenience of renewing the batteries, there is another extremely important point which relates to the actual operation of the set itself. If the circuit is one in which the H.F. stages are apt to go into oscillation on the slightest pretext you will never be out of trouble, because even in the best circumstances the voltages of your batteries will be gradually changing, and this will lead to endless oscillation and "unmanageability" of the receiver.

It is a good point to try tuning through the complete range of both high and low wave-lengths without using the reaction. If everything is O.K., it ought to be possible for you to run through the entire range without any sign of oscillation or without bringing in carrier-waves.

Selectivity.
Selectivity is an important point, and in view of the new high-power stations you want to make quite certain that the receiver will cut out a nearby powerful station and bring in a desired distant one at the same time.

It is also a good plan to make sure that the set is capable of operating with an ordinary aerial and earth connected to it. In this way you may use it at home as a semi-portable set and get, of course, much greater distance or stronger signals.

Finally, as a last refinement, it is a good plan to go in for a portable which can be used also with a mains supply unit. In this case it covers the entire range of your requirements.

A Queer Effect.
I have a query from a reader which raises a point which may perhaps be of interest to others. He found that on a certain evening he was able to receive the National Programme without the use of the aerial coil; he naturally made many subsequent attempts to repeat this performance, but was unable to do so. He wants to know why it is that he should be able to dispense with the aerial coil on one occasion and not again subsequently.

The explanation of this apparently queer effect is almost certainly that on the occasion when the aerial coil was not in use the transmission in question was received via some receiving set in the neighbourhood which may perhaps have been working very close to the oscillation point. Of course, the neighbouring set in question must have been receiving the National Programme at the time.

Probably these exact circumstances did not occur again, and consequently my correspondent was not able to repeat the experiment.

Incidentally, he says the quality of the reception when received in this way was not equal to what he gets when using his receiver with the proper aerial coils in the usual way. That is, of course, exactly what might have been expected if the theory which I have put forward were the correct one.

High-Capacity Condensers.
The electrolytic type of condenser, of which great things were heard a year or two back, does not seem to have made the progress—in this country at any rate—which was at first expected. You will remember that the electrolytic condenser employs an electrolyte, as its name implies (which may be either in liquid or in paste form), and gives an enormously high capacity for a given dimensional size.

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With a given voltage, if the resistance is increased the current

For convenience in measuring small currents the ampere is divided into thousandths (. . . . -amps.) or into millionths (. . . . -amps)

Last week's missing words (in order) were Second; Alternating; Cyclé; Frequency; High; Low.

It is believed that this extremely high capacity is due to the formation of an insulating skin or layer against the electrodes, which skin, although not of unusually large area, is exceedingly thin. Remembering that the electrostatic capacity between two conducting plates increases as the distance between them decreases, you will realise that if the conducting layers are at an excessively small distance apart the electrostatic capacity may be very large.

Self-Healing.
In the United States the electrostatic condenser appears to have made a good deal more headway than over here, and several different types of electrolytic condenser are on the market and regularly advertised. Apart from the outstanding advantage of high capacity and small volume, it is claimed that the condensers are also self-healing, so that in the event of a breakdown the condenser resumes its normal condition when the overload voltage is removed.

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