

CAPT. ECKERSLEY ON CONTROLLING VOLUME (See Page 475)

Popular Wireless

Every Thursday
PRICE
3d.

No. 525. Vol. XXI.

INCORPORATING "WIRELESS"

June 25th, 1932.



THIS WEEK :

SCOTLAND CALLING

A visit to the New Falkirk Broadcaster.



TELEVISION TO-DAY



WIRELESS IN WARTIME



THOSE SPORTING BROADCASTS



HINTS FOR "DECADE" BUILDERS



TRIESTE'S TRANSMITTER

Some details of one of Italy's powerful Regionals.

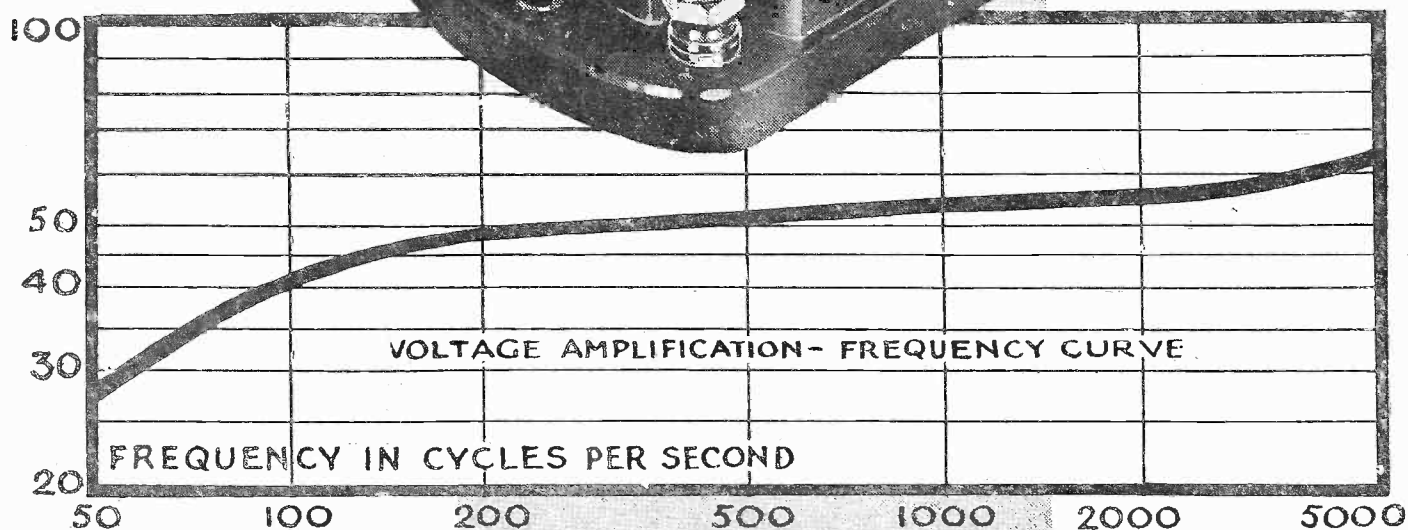
THE WEE STATION. Our cover photograph this week shows the world's tiniest complete broadcasting station, which has the appropriate call-letters WEE. Its diminutive panels, studios, etc., are all working models, and the station's power is 40 milliwatts!

The World's Greatest Suppliers!
KITS!
COMPONENTS!

Eastnor House,
Blackheath, S.E.3.
Phone: Lee Green 5678.
Showrooms: - 159,
Borough High St., S.E.1.

READY RADIO

Advt.



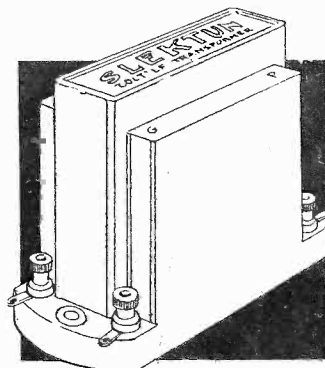
Change over to "Slektun," the new and amazing transformer with a primary inductance 50% greater than other transformers at double the price.

Performance and dependability guaranteed for three years.

SLEKTUN PRODUCTS LTD.
21 Douglas Street, Vauxhall Bridge Road, S.W.1
Lancashire and Cheshire Distributors:
John Moores & Co., Raval St., Salford, Lancs.



The SLEKTUN Coil is both robust and compact. Ratios 2-1, 3-1, 4-1 and 5-1.



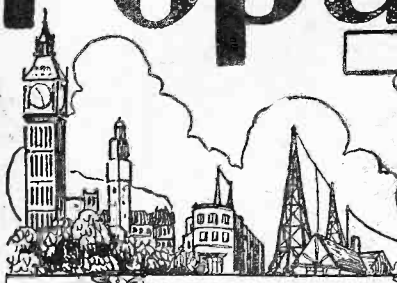
SLEKTUN

L. F. Transformers

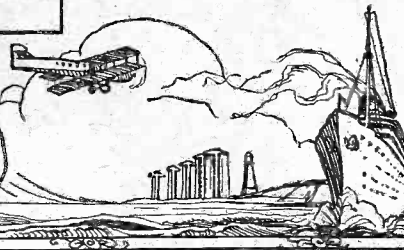
Obtainable from all good Radio dealers.

Popular Wireless

LARGEST NET SALES



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



**A BOUQUET
NOT FORGOTTEN
TROUBLE IN ITALY
A PLEA FOR HENRY**

RADIO NOTES & NEWS

**HEN-DECEIVERS
DOWN THE CHIMNEY
PA'S PORTABLE
DISILLUSIONED**

A Bouquet for the Admiral.

CONGRATULATIONS to Admiral Cardendale on his newly-acquired honour of Knighthood, which he has earned as Controller of the B.B.C.

The gallant Admiral is one of those strenuous workers who, behind the scenes, the footlights and the limelight, gets things done. He also carries great weight internationally in connection with the International Broadcasting Union.

One of these fine days I shall try to get him to join my Anti-pip Brigade.

Radio Really Arrives.

IT was most gratifying to learn that the British Standards Institution has taken a leaf out of the radio book and has produced a set of wiring symbols for the use of architects, contractors, etc. What gives one the greatest pleasure, however, is to know that one of these symbols indicates "Loudspeaker outlet." With this we may say, I think, that domestic radio is now on the map.

Scotland Not Forgotten.

THE B.B.C. is co-operating in the formation of a Scottish National Orchestra for 1933, and by way of helping in a positive way the Scottish Orchestra, it has offered to broadcast, at a fee of £100 each, five concerts of that orchestra during the 1932-33 season. It is hoped that the Glasgow Choral and Orchestral Union will co-operate next year in the Scottish National Orchestra project.

The most enjoyable choral singing I ever heard was performed by a Scottish choir, and I think that the Scots merit a lot of support.

Trouble in Italy.

THE Marchese Luigi Solani, who manages Marconi's Italian business, has been shot at and wounded by an ex-employee. Sorry for Solani; sorry for the ex-employee—in these hard times.

The Marchese, whom I have met on several occasions, is a very handsome and charming

man. He was mixed up in some way with Marconi's wonderful transatlantic experiment in 1901, and has been associated with him ever since.

Programme Note.

DON'T forget the Prince's speech about Dominion Day (July 1st), to be relayed from the Savoy Hotel by the National on June 30th.

Note that a new series called "Encounters" is being planned—something like "Conversations in the Train."

the regiment as it now stands was added to the Army List.

The First Telegram.

AT a ceremony in New York University to celebrate the invention of the electric telegraph it was revealed that the first telegraph message sent by Samuel F. B. Morse, over ten miles of wire at the University in 1838 was, "Attention Universe; by Kingdoms, right wheel!"

Part of Morse's crude equipment was a baby's cradle, which was rocked to make the batteries stop or start. Considering that telegraphy was only just born, and radio not thought of, that message was a bonny bit of bouncing optimism.

A Plea for Henry Hall.

LA. S. (London, N.15) complains that Henry Hall is being handicapped because the microphone used by him is "obviously unsuited" to dance music. "It gives cracked quality; speech is woomfy, and singing is forced," says L.A.S.

Well, well! Henry, if you have cracked quality and woomfy speech, I hope that you will requisition the microphone which is used for the Prince of Wales's speeches.

We all begin to like you, but your "approach" is a teeny weeny bit off-hand. Get some "hail fellow, well met" into your announcements, there's a darlint!

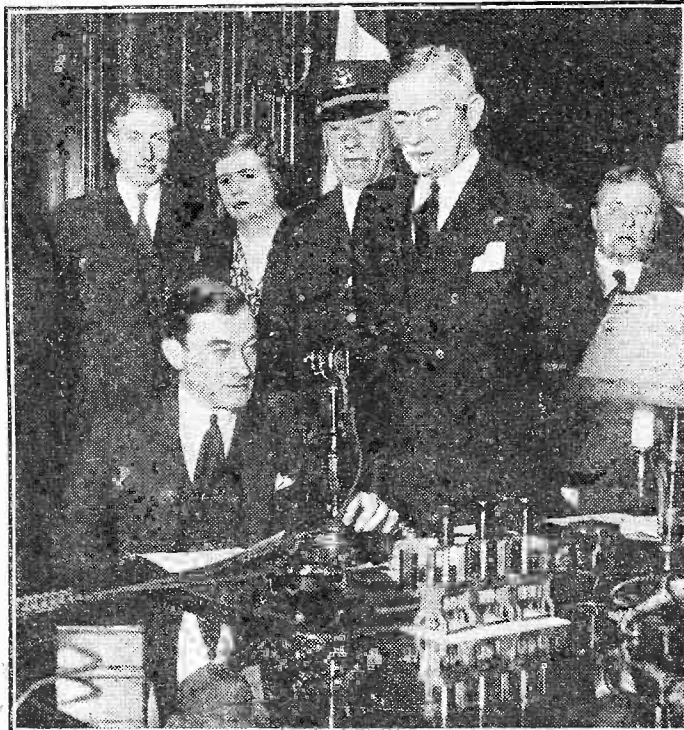
Wireless on Duration Flight.

ABOUT the end of this month the Hon. Mrs. Victor Bruce is to try to beat the duration (re-fuelling) record in the air by staying up for four weeks, during which she will make several long flights instead of going round and round in a circle.

With all this in view, her machine has been equipped with a radio transmitter and receiver, so that she can get navigational and weather information, and also keep in touch with her ground base to arrange about food and fuel. A mobile radio station

(Continued on next page.)

NEW AID FOR NEW YORK POLICE



Seated in the chair is Mr. "Jimmy" Walker, Mayor of New York, officially opening the new police broadcasting system with which it is hoped to combat the gangsters more effectively.

The announcement of the concert by the band of the 2nd Batt. of the North Staffordshire Regiment, to be broadcast from Belfast on June 28th reminds me that this regiment was formed in 1760 for active service in the West Indies. It has since been a regiment of Marines, a Highland Battalion and a Rifle Regiment. In 1824

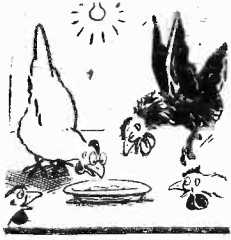
"ARIEL'S" RUNNING COMMENTARY ON RADIO (Continued)

is being installed in a motor van which will be used for following the fliers on the ground.

The aeroplane is to have an electric kettle and an illuminated advertising sign.

Automatic Hen-Deceivers.

THAT device for switching off a radio set while one is abed, which employed an alarm clock, has brought me a note from W. A. W. (Moulton), in reference to a diabolical deceit which he practised upon certain helpless chickens. It is desired to feed the fowls at 10 p.m. in the winter, and the houses are lighted by a 50-volt set.



W. A. W.'s first alarm clock switches

the light on about 9 p.m., and the cacklers, realising that it is breakfast-time, hog all the corn which has been placed for them. At half-past nine clock No. 2 switches the light to "dim," and the fowls, realising that the sun has set, return to the perches. Ten minutes later the clock switches the light off. One crowded hour of glorious life! Night falls on the fowls!

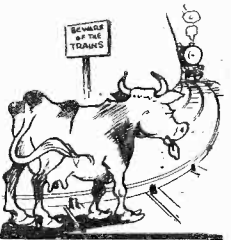
Age-old Aid to Radio.

IT is curious to note how in the ultra-modern American broadcasting studios the primitive language of signs is used, the announcers behaving like deaf and dumb persons having a heated argument; in fact, some of the signs are taken from the deaf-and-dumb alphabet.

As an example, I may mention that a finger placed against the side of the nose means that the programme is running according to plan. I wonder whether the lowering and raising of an eyelid means, "See you outside, Sadie!"

Round the Bend.

ON May 20th, according to a pre-arranged plan, an Imperial Airways liner and the "Flying Scotsman" express "met" somewhere between Newark and Ripon and had a cosy chat by means



of two-way radio-telephony. The train left London at 10 a.m. and the airliner at 11 a.m. "There's a cow on the line just round the bend," the Air might have said. "Garn!" Rails

might have replied. "Where are your landing-wheels? I saw something drop off just now!"

Most Popular Item.

WRITING about B.B.C. programmes, a contributor to an evening paper gave out that the most popular item is the forenoon service. How he knows that I cannot pretend to imagine; perhaps he took a private census. However, it is a surprising statement, though I don't think that the "Daily Mail" census showed that any religious service was *very* popular.

In my view, it is impossible to fix on any

particular class of item as the "star turn." It is best, anyhow, that the programmes be well mixed—like listeners' tastes.

How It Went in Canada.

THE year 1931 showed excellent progress in Canadian radio, there being an increase of 40,000 licences over 1930. The production of sets increased by 70 per cent, and the sales by 25 per cent, these sales amounting to about 286,000 sets.

I understand that the sales increase was due to the rise in demand for A.C. receivers. There was a drop in sales of battery sets and radio-gramophones and it is interesting to learn that of miscellaneous sets, including those for use on cars and motor-boats, only 685 were sold.

Radio as a Film Star.

BEFORE I close my industrial section and pass to more recreative matters, allow me to mention that the New Era Film Company has chosen radio as the first of a series of films which it will "shoot" on the Epics of Industry, illustrating the rapid development of broadcasting and the vitality of the new industry to which it has given birth.

The gramophone company are co-operating in this film, and much of the production will be done at the H.M.V. factories at Hayes and the St. John's Wood recording studios.

"SHORT WAVES"

FOGGED.

Visitor at Sheringham: "What weather does this sea-fog denote?"
Local inhabitant: "I don't know. I didn't hear the wireless to-night."—"I ally Mirror."

"I see they are going to have wireless in coal mines. That's hardly fair, when a chap can't get away from it."—"Pictorial Weekly."

"In these days," says a writer, "it is difficult to think independently."
Especially when Mother wants the wireless on, and father wants it turned off.

"Do you believe in auto-suggestion?"

"I didn't until yesterday."

"How's that?"

"Well for the last three months I've been telling myself that I shall be summoned for not having a wireless licence, and sure enough it came last night."

THOSE WEATHER REPORTS.

"What exactly is the meaning of 'a secondary depression,' moving across Iceland, and all this other meteorologist jargon, which the B.B.C. hands out to us?" asks a correspondent. "Weather, to the ordinary man, means rain, hail, snow, fog or sunshine—but chiefly rain! Why all this camouflage about depressions? The weather supplies enough depression, without the B.B.C. adding to it."

After spending forty years in the bush, an Australian recently visited Hobart and saw for the first time electric light, motor-cars, clocks, the sea and ships.

We understand that news about saxophones, ukuleles, loudspeakers, golf and the telephone has not been broken to him yet.—"Humorist"

Down the Chimney.

ONE of the published accounts of the great new White Star liner "Georgic" tells how the vessel is equipped with a dummy funnel in which the wireless set is housed. It explains that the direction-finding set and its aerial are both in the

funnel, and adds that the funnel screens the ordinary wireless telegraph apparatus from electrical disturbance, but that the open top "permits uninterrupted reception of signals for direction-finding."

Very accommodating of the signals to pop down the chimney, I'm sure—and of the electrical disturbances to stay outside!

Pa's Portable Problem.

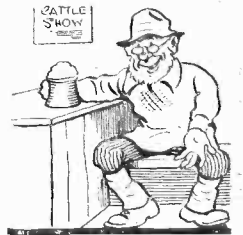
A City acquaintance of mine tells me that he is confronted with a dilemma which so far he has lacked the courage to escape from. It seems that he simply must have a new set. Now, the "family" want a good portable, whereas he favours a radiogram. He says, "When I don't want to use the portable it will be here; when I do want it it will either be miles away with the car or at home with the H.T. battery 'dud'; or if I do want it and it is here in good condition, the B.B.C. will be handing out clotted tripe."

I believe that he has the right idea!

"Ariel" Becoming Disillusioned.

WHENEVER I take my walks abroad during my vacation, I rely upon the Good Fairies (my relatives by adoption) to keep me well supplied with the

genuine yeoman of Old England, where-with to sip ale and converse in country inns. But to my chagrin I begin to find that the country bumpkin is gradually being changed by B.B.C. "talks" into a fearsome person who "knows about wireworms." It is rather disconcerting to hear in the "Drover's Arms" the complete life-history of some pestiferous wriggler, described by a young fellow whose "vather" used to haunt fairy rings by moonlight, etc. Yes! Romance is in extremis.



Grave Allegation Against Dictator.

I AM always ready to "knock" the B.B.C. about its "pips," radio for schools, and other crank products, but I hereby dissociate myself from the recent personal attack on its Director-General, which took the dastardly form of alleging that he was found wandering about Broadcasting House—lost. He couldn't find his way to his little bathroom!

Oh, no, no! Dictators should be made of sterner stuff. As a matter of fact, so a little bird has whispered to me, he had been having another look at the Latin inscription in the entrance hall, and was merely having a walk through the corridors in order to banish his blushes.

Why should the iron man of radio blush? Read the inscription and you will understand!

ARIEL.

SCOTLAND CALLING

SCOTLAND has a magnificent opportunity to make a remarkable individual contribution to British broadcasting. I have just visited the new Scottish Regional transmitters at Falkirk. I have seen the splendidly appointed studios at Edinburgh. I have been informed of the high aim set up by Regional Director Cleghorn Thomson for the future Scottish programmes.

Will the Scottish Regional programme make good?

The future will tell. Let me describe the excellent facilities provided by the engineers for the broadcasting of alternative programmes to Scotland.

A Replica of Other Regionals.

In most respects the Scottish Regional station is a replica of the London and North Regional stations, having two transmitters each of 50 kilowatts power. Improvements have been incorporated, however, the most important being in the aerial system.

There are two masts, each 500 ft. high, set on the hillside (itself 500 ft. above sea level) at Westerglen, midway between Glasgow and Edinburgh and three miles from Falkirk. From the top of each mast three aerial wires drop to insulators anchored in concrete blocks 150 ft. from the base of the mast.

The wires are spaced equidistantly around the mast. They look, in fact, just like guy-wires, but at the bottom they are connected together and led to an aerial transformer house at the foot of the mast, whence the usual overhead feeder lines run on posts to the transmitter building.

Two Masts Only.

Thus the Regional and National aeriels are supported on two masts, compared with three at Moorside Edge and four at Brookmans Park. The economy in cost is considerable and the "umbrella" aeriels at Falkirk

The Scottish Regional Station at Falkirk is the newest product of Capt. Eckersley's "Regional scheme." As will be seen from this account, it embodies the very latest development in engineering and building skill.

From OUR NORTHERN CORRESPONDENT.

are proving equally, if not more efficient.

Another difference compared with the earlier Regional stations is that the transmitter hall is lighted through a big dome in the roof instead of through windows in the walls. This is to prevent dazzle to the engineers when reading meters.

In the engine house Crossley Diesel engines are used instead of the Ruston make previously favoured. The new engines are more compact, though more

powerful than the engines at either Brookmans Park or Moorside Edge.

The water-cooling plant at Falkirk is also different. For valve cooling a supply of distilled water has been sealed in tanks in the basement.

The small loss by evaporation is made up by topping-up the tanks with distilled water manufactured in a small still. For cooling the Diesels, water is pumped direct from the mains.

The transmitters work on the low-power modulation system now standardised by the B.B.C.

"The Last Word."

Falkirk is certainly the very last word in British broadcasting practice. It will give Scotland a service far superior to what it has had in the past, both in power and quality.

And what of the programmes? There will be the National programme, relayed from London over 400 miles of landline and transmitted on 288.5 metres.

And there will be the Scottish Regional programme, on 376.4 metres. "There will be an expansion of the Scottish programmes both in quality and quantity," says the B.B.C. in a booklet about its plans, which is issued to Scottish listeners.

Its Own Orchestra

In music the Scottish Regional programme will offer its own Scottish Studio Orchestra, the Scottish Philharmonic Orchestra, and the Reid Orchestra. In September the B.B.C. will send the Philharmonic Orchestra on a tour of Scottish towns.

For listeners beyond the boundaries of Scotland, who will now be able to receive these Scottish programmes, the feature programmes will probably be of greatest interest.

This is only a very rough outline of plans, but it certainly shows that "Scotland is Calling" in no uncertain voice.

THE LAYOUT AND THE LIGHTING



This excellent view of the transmitter hall shows the floodlighting dome, 30 ft. above the ground, which provides all the illumination for the control engineers without any glare. The floor is made of compressed cork, a new material for this purpose.

TELEVISION TO-DAY

The facts of the experiment at the 1932 Derby, and an explanation of its significance as an indication of television progress.

BY THE TECHNICAL EDITOR.

TELEVISION has been figuring in the programmes of a London cinema, and scenes from the Epsom race course were reproduced on a large screen on "Derby" Day.

But this spectacular achievement must not be allowed to blind us to the fact that television in the home appears to be as far away from practical politics as it did one year, or even ten years ago. For, as far as we are aware, there has been no notable development in the science which renders it probable that the huge snags which exist are likely soon to be overcome.

"Big Screen" Images.

Big screens have been used for television in the past, and we would remind our readers that Sanabria was exhibiting his in a New York theatre at least twelve months ago.

But it is significant that it was *after* this that a notable change of front on the part of certain American journals in their attitude towards television became most marked. Even those who had hitherto been ardent supporters of the "Television is here" theory, began to reveal misgivings in their articles, while to-day it can be truly said that the television publicist has practically no "Press" in the U.S.A. A staggering change from the days when any technician who ventured mild criticism was at once the target of what almost amounted to abuse.

Disillusioned.

We believe the change was due to a reaction against what were felt to be "red herrings." Television "in the home" had been promised in the very near future. It did not come, although the televisionists began big-screen experiments as if the miniature, home outfit had been perfected.

It was a curious, piquant situation and we are able to appreciate it the more as it is now duplicated in some measure in this country.

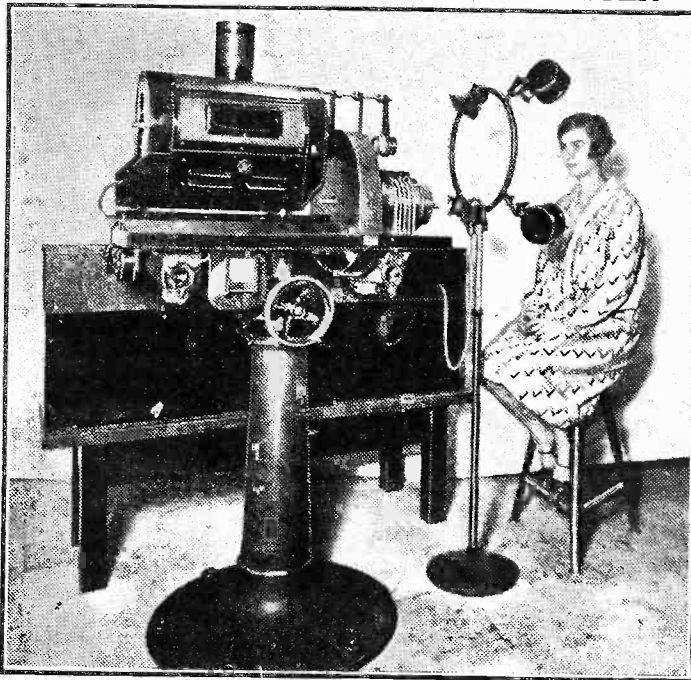
Quite naturally, it would be logical to assume that if a huge picture of admitted crudity and imperfection can be obtained, it should be possible quite easily to receive small pictures of passing effectiveness. In actual fact, this is not the case. However much the "Derby" television pictures had been compressed, they would have fallen very far short of that minimum of pictorial

clearness which has been adjudged essential for "service purposes."

Novelty Not Enough.

The public would look quite a number of times at a streaky collection of almost formless blobs rushing across a flickering screen and labelled "The finishing post at Epsom," or "Bradman running between the wickets" with some interest—so long as they didn't have to purchase complicated and costly apparatus to do so, and had good talkies, or stage acts thrown in to balance it for the price of a theatre seat. But mere novelty obviously cannot in itself make for a lasting form of entertainment. Maybe the 5-and 7-metre experiments which are now being carried out will lead to the discovery of that new develop-

A COMPACT GERMAN TRANSMITTER



Much experimental work is carried out in Germany, in connection with television, and this photograph shows a neat outfit which is typical of their technique in this branch of science.

Are you a short-wave "Fan"?

Do you make your own sets?

Have you a radio-gramophone?

there is sure to be something to interest YOU in

MODERN WIRELESS
(on sale every month at one shilling).

A Special "WORLD'S PROGRAMMES" supplement appears in every number—also

"ON THE SHORT WAVES" by W.L.S., the well-known expert on this fascinating subject.

ment which television needs before it can line itself up with radio telephony as a home entertainment.

That remains to be seen; in the meantime, POPULAR WIRELESS is not now nearly alone in saying television is still in the laboratory stage. A few years ago we evoked world-wide criticism for expressing that opinion, whereas to-day the statement "Television is just round the corner" is a stock joke in the U.S.—the birthplace of most of the television ballyhoo.

However, we eagerly await the time when television will emerge from the incubator, for there is no doubt that it is wanted by the public. And you can be sure we are watching every phase of its development with the greatest of keenness, and will keep POPULAR WIRELESS readers *au fait* with all the news concerning it.

CURING INDUCED HUM

By FRANK BRIGGS.

An easily-applied method of overcoming what may easily be a very complicated trouble.

WHEN wiring present-day houses for electric light it is sometimes the practice to use ordinary rubber-covered wire. This may be quite in order as far as the actual lighting is concerned, but it can be very troublesome when a radio set is installed.

The difficulty is that the wires being unshielded are liable to introduce a certain amount of mains hum into the receiver. This applies whether the instrument is mains or battery-driven, and it is generally more noticeable when the supply in the premises is A.C.

If the house wiring is enclosed in earthed metal tubing, or if lead-covered cable is employed, the trouble does not occur, as all the leads are effectively screened by the earthed metal covering. But if plain rubber-covered cable is used, only those who have experienced the effects can realise what an annoyance it can be from a radio point of view.

Suggestions for You to Try.

Fortunately, there are several fairly easy ways out of the difficulty, and I hope the following tip will prove useful to any reader who is unlucky enough to suffer from the annoyance. I have had my share of it, hence my reason for writing these notes!

The several ways in my mind at the moment are: (1) Enclose the set in a metal cabinet. (2) Dismantle the receiver and cover the baseboard with copper foil. (3) Stand the instrument on a sheet of metal. And in each case it should be remembered that it is essential to earth the screen.

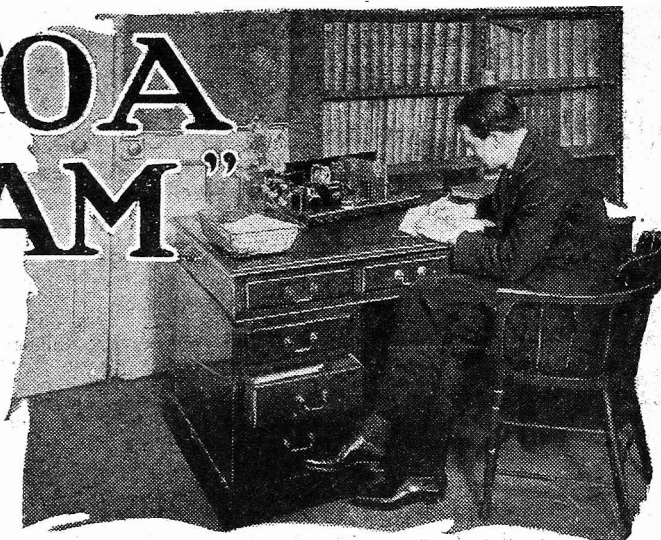
By far the easiest is the last, and as a rule is quite effective. It was the method I employed when first meeting with the trouble, and in my case, at least, proved a complete cure.

In fact, I used a common-or-garden "tin" tray for the purpose, a small place being scraped bare for connecting the earth lead. So, speaking from experience, I feel sure that if you give this little dodge a trial, it will be perfectly successful.

LETTERS TO A YOUNG "HAM"

by ARIEL

"Uncle Ariel's" young nephew is growing up, and this week we hear of him getting into serious trouble through trying to erect an aerial! Some very useful advice on the proper management of fathers is also included in this, "Uncle Ariel's" third letter.



My Dear Young Ham,—I received your nice envelope quite safely, because the postman saw that it was valuable and would not poke it through the letter-slit, preferring to hand it to me personally. This he did on my paying him for the stamp which you did not affix to that beautiful envelope for fear of spoiling it—the envelope, I mean.

He also charged a small fee for his services. It was a pleasant surprise, that envelope. I am hoping to get, by an early post, the letter which you forgot to enclose.

Pater's Point of View.

Still, it was frightfully decent of you, Horace, to think of me—though you might note that *Chizzic* is sometimes spelt *Chiswick*.

Thanks, old boy.

Of course, I know what prompted your kindly thought; you see, I met your father in a—at a business meeting, I should say, and heard *his* version.

It seems that under the pretence of erecting an aerial for the wireless set which you are going to build if you pass the

Oxford Local and Uncle Ariel comes down handsomely, you deliberately hurled yourself through the roof of the greenhouse and squished the largest tomato that the world has ever seen.

Deliberately, mark you, Horace! You tore the pants off your back but were yourself unharmed. You *would*! You *would* be!

So I can guess that the letter which you did not post was intended to bring me in on your side and, by pure accident, to apprise me of your conviction that the "Oxford" is a dead cert, provided that you can scrape through English, French, mathematics, geography and history.

Apart from those small matters, you have every hope of bringing home the bacon.

"What About Your Uncle Gilbert?"

Dash it! Am I your only uncle or am I merely the softest of them?

Why don't you bite your Uncle Ben's ear occasionally, and give me a chance to fatten up my wallet? And what about your Uncle Gilbert! Ask him to give you the fiver which I lent him in 1909, when he had put his shirt—I mean, when he had lost all his week's wages in a—hem—hippodromic fiasco, and was afraid to go home and tell your Auntie Saxifragia about it.

Terrible things; these fiascos, my boy! (I hope and trust that you don't know what "hippodromic" means!)

Well, I can relieve your mind at once by saying that I have calmed the pater's wrath. It was very simple! I just allowed him to beat me at golf and he is now so bemused with visions of the Ryder Cup that the tomato has shrunk to the size of a golf ball.

If a boy were, at some well-chosen moment, to drop in front of his father a

casual remark to the effect that I told him that his father is a "Magician of the Mashie"—as I do now,—that boy would probably find no further difficulty about tomatoes and might even scoop a bob or two out of it.

I merely throw out the hint.

That Sick Radio Man!

By the way, if you could quietly discover where the pater gets that pre-war brandy, I should be interested. I'd like to get some—for a sick friend—but your pa says that there are only a few cases left and he has an option on 'em. You wouldn't like to think of a thir—sick radio man suffering for want of a little medicine, would you, Horry?

Something that "Stinker" Briggs said to me yesterday, when I came across him practising "Yo-Yo" instead of doing his homework, makes me fear that you design to open your serious radio career with a nine-valve superhet, wound for 1 to 7 metres.

Who do you think you are, anyway?

You think that "reaction" is the second knob on the right, and that metres are wavelength units, like ohms, amperes and other units. One day I'll tell you the wavelength of Lwov in nautical miles or furlongs, just to show you that it can be done.

What on earth is the use of your asking me to explain a *decibel* when you can't understand yet that volts are not things which the local radio shop puts into your pa's accumulator for sevenpence a dozen?

An Easy Way Out!

But pray don't let me discourage you. Carry on with the nine-valver; your pocket-money will, I calculate, just about do it in 9 years, not including valves or batteries. Something to look forward to, Horrie!

If nine years seems rather too long—you'll be wanting a television set before that—apologise to the Giant Tomato and then find out about that brandy. You know—the funny black bottles with green seals, that pa keeps hidden.

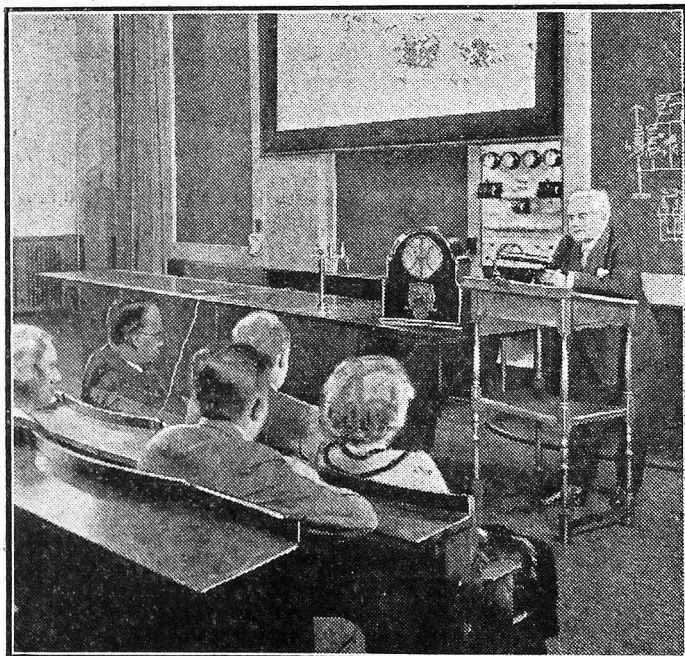
And then, maybe, I'll put you on the rails! No—not *rails*; too much like those footling toy trains. I'll put you on to the proper *waveband*.

Your affectionate,

UNCLE ARIEL.

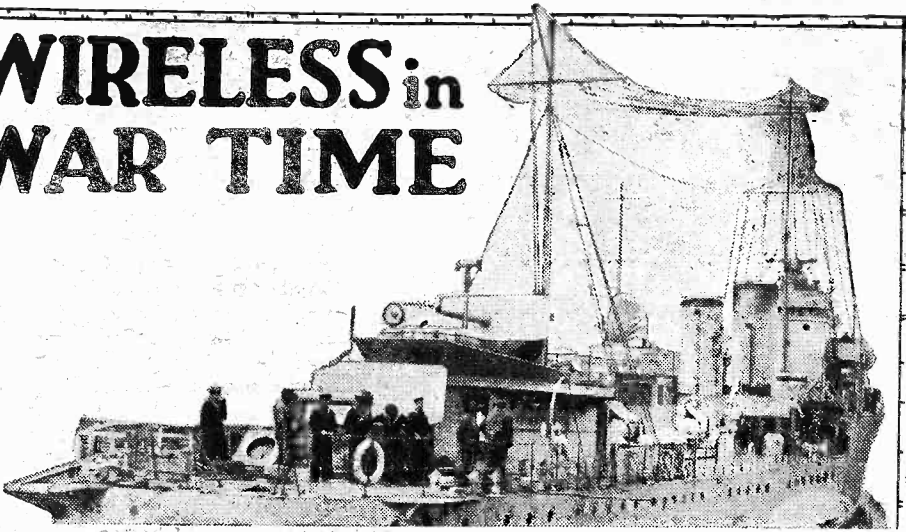
P.S.—The enclosed five bob would buy another tomato-plant—or—well, I leave it to you.

BACK TO SCHOOL FOR SCIENCE



"School days were the happiest time of our life" is the opinion of these listeners if we are to judge by their eagerness to attend the science lessons broadcast from a German station.

WIRELESS in WAR TIME



Extracts from the Diary of a Wireless Operator at Sea 1916-18

AUGUST 6TH, 1917.—I had a look round Sierra Leone this morning and found it very small but very clean. The natives, who are coaling us here, are Kroo boys. West Africa, it will be remembered, is the home, among other things, of the mysterious Ju-Ju, or Magic Fetish.

Questioning one of these Kroo boys about it, he at once manifested extreme uneasiness and rolled his eyes in a most alarming manner. He scratched his black head and then his ribs, and eventually said, "No savvy Ju-Ju, sar, or me fit for die, and me damn bad man to die, sar." And that was all I could learn about Ju-Ju from a coloured gentleman.

Anchored Off Dakar.

AUGUST 15TH.—Anchored in the harbour of Dakar early this morning. It is much warmer to-day, and huge dragon flies, like those in Basra, are swarming all over the ship. Later: Went ashore this evening, but found the town not very lively. There were one or two cafés and an apology for a theatre. Several of us congregated outside one of these cafés.

On the opposite side of the street was stretched out a cinema sheet, and so we had a free show while drinking our beer. I saw one film which I recollected having seen in London something like five years ago. The streets in this place are thickly shaded with palm trees and shrubs which give off the most peculiar odour: but it is very pleasant, especially when walking in the cool of the evening.

Most of the people are natives, and the beggars are few—for a French Settlement—but one little fellow made me laugh because of his queer mixture of French and English. He danced around me, screaming out, "Oh, Monsieur, Monsieur! Donnez moi un sou, Monsieur. Oh, give me a penny, sir, curse your eyes, give me a penny."

An Interesting Yarn.

AUGUST 18TH.—Have just finished "Mr. Britling Sees It Through," a most interesting book by H. G. Wells. By the way, our captain, chief engineer and carpenter were all on a ship that was sunk by the Emden. When Captain Muller came on board, he quite casually remarked to the captain that the British cruiser, the "Yarmouth," would not be able to come

to their help as he knew the crew were playing football in Madras!

This was afterwards found to be quite correct. The crew of the captured ship were given plenty of time to get into the boats and, according to the captain's story, Muller seems to have treated them quite decently.

Awaiting the Escort.

AUGUST 22ND.—We have been waiting a week in Dakar for the arrival of the auxiliary cruiser *Moldavia* (torpedoed six months later, 68 killed). She sailed proudly into the harbour yesterday amidst a great deal of flag dipping, and even a spot of gun-firing by a super-courteous French cruiser.

Amidst the generally satisfactory plaudits of the waiting convoy she dropped anchor.

"Convoy" explains it all. We are one of a collection of some thirty ships now proceeding to England, and the *Moldavia*, as cruiser in charge of the convoy, is hovering around us like a worried hen with a brood of chickens. This ship is the third best and fastest boat of the lot, and yet the first thing we did on leaving harbour was to delay the general start off by breaking down for half an hour.

The chief engineer says it's because we are going too slowly! Being in a convoy is not all honey, especially at night-time, for we must not show any lights. Consequently, it's a matter of pretty good judgment and luck whether you ram or are rammed by the next boat.

We are all armed, mostly with 4.7's and howitzers on the poop; but some of the crews on the other ships are very uneasy, fearing that if a submarine does pop up, some nifty gunner will blaze away and hit one of the convoy, not the

sub. We picked up war warnings to-day reporting submarines off the Azores, and each day brings a new list of positions where they have been sighted. The sea must be alive with the swine. We reckon to be home, with luck, in fourteen days.

We Reduce Speed.

AUGUST 23RD.—More trouble. We are now steaming a bare 4 knots, for a bally Norwegian commenced to lag last night and this morning was right out of sight. The cruiser has gone off to look for her, sending out a stream of flag signals ordering the rest of the convoy to slow down. Last night, too, the leading ship in our column got suddenly nifty and slowed down so suddenly that we narrowly escaped ramming her.

AUGUST 24TH.—To-day we had orders from the *Moldavia* to alter our position. This was greeted by the chief officer with a bitter smile, and a still more bitter allusion to the collection of "duration land sailors" on the *Moldavia* who would probably expect us to form fours and present arms before we got home.

This morning the Norwegian made a gallant attempt to catch up with us. Smoke poured out of her funnels in thick clouds, and a crest of foam licked her dirty iron sides. With wonder we saw that she was gradually overtaking us, His Majesty's Prize Ship, "———",!

At last she got so near that we had to hop forward a bit to avoid a shove from the rear. But the effort, as we feared, was too good to last. About 1 o'clock there came a terrific bang and a cloud of steam hid the poor Norwegian's shame.

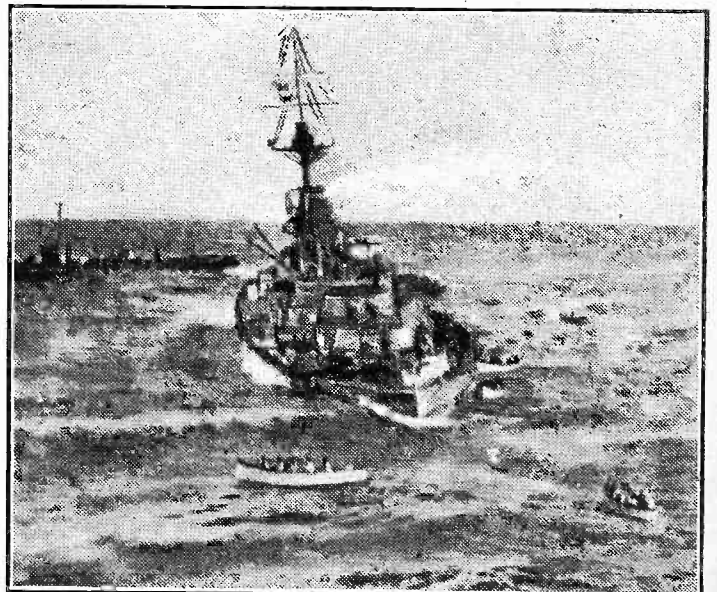
Completely Out of Action.

The *Moldavia* went puffing up, her attitude exactly like that of a worried mother, a kind of "Now, what have you done, you naughty boy?" Well, the naughty boy had burst his boilers or some such silly thing, and we had to leave him.

Submarines reported off the Canary Islands, and very nice, too, especially at the stupid rate we're going!

(To be continued.)

THE SINKING OF THE "AUDACIOUS"



A vivid photograph taken from the crow's nest of one of the rescue ships. It shows the "Audacious" shortly before she sank, and you can see lifeboats from s.s. "Olympic," and from accompanying American destroyers taking off the crew.

CAPT. ECKERSLEY'S QUERY CORNER

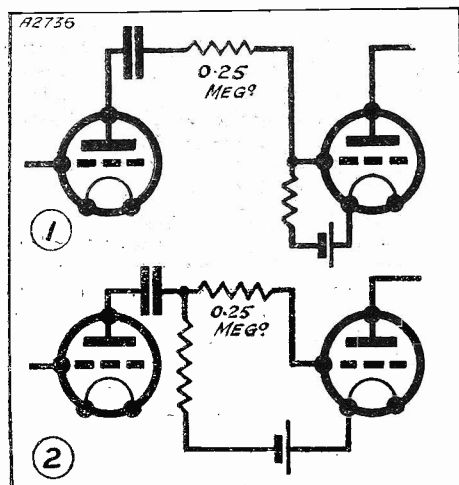
Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

GRID STOPPERS—OVERLOADING—INSULATORS—RECEIVING AERIALS.

How It Should Be Done.

J. J. (Southall).—"In a recent reply to a reader's query regarding the use of a .25-megohm grid leak in series with the grid lead of an L.F. valve to prevent H.F. currents leaking into the L.F. amplifier, I notice that the diagram shows the components connected as follows: grid side of .01-mfd. condenser to one end of .25-megohm grid leak, other end of .25-megohm grid leak to grid of L.F. valve, and one end of the usual grid leak, remaining end of this grid leak to G.B.—

WRONG AND RIGHT



The top diagram shows the wrong way to connect a grid stopper in an R.C.C. circuit, while the bottom one illustrates the correct method.

"Surely the usual grid resistance for the valve should be connected to the junction of the .01-mfd. condenser and the .25-megohm leak and not actually to the grid of the valve, for so far as I can see, the effect obtained with the connections actually shown would be that of the usual potentiometer volume control, except that, of course, this would be a fixed one?"

You are perfectly right. If the usual leak were of the order of .25-megohm half the L.F. voltage (or more) might well be lost. Was I guilty of this? Sorry if I was.

Obviously, the correct connection is as shown in Fig. 2. But of course, you know voltage is only 6 D.B.'s! But perhaps you have not yet come across the D.B.'s maniac.

A Super Power Valve Trouble.

V. C. (Maldon).—"I have a det. and 2 L.F. receiver run from an H.T. eliminator, and irrespective of how I adjust grid bias, a milliammeter in the plate circuit of the last valve still kicks on the loud passages.

"If I use a super-power valve in the last stage the set immediately starts to motor-boat. Surely there must be a solution?"

There may be one or two causes of your trouble. (a) Insufficient power in your eliminator; (b) a wrong impedance in the anode of the last valve.

If it's (a) the kick would be mostly downwards on loud passages; if (b) it could be either way.

Then there may be insufficient H.T., which is another way of saying (a). It's all so difficult without the knowledge of the values which you are using.

As to motor-boating, this is commonly due to a lack of decoupling, but again a lack of eliminator power and insufficient value of smoothing condensers would produce the effects.

1. Does your eliminator give you about 60 m.a. at 200 volts?
2. Have you at least a 6-mfd. condenser across it?
3. Is the penultimate stage decoupled?
4. If you are using a moving coil are you sure the output transformer is right? If a moving-iron speaker and choke feed, is the choke good and big?

* * *

All About Insulators.

W. E. (Ware).—"Is it true that under certain conditions insulators become conductors? For example, when a high voltage is applied to them. Or is there really a definite distinction between insulators and conductors?"

An insulator is really only a poor conductor. For instance, if you take a porcelain insulator with sulphur held in metal caps on top, the ordinary bolt screwed up into its skirts, and then you apply high-frequency (say 1,000 kilocycles) at, say, 20,000 volts with a kilowatt power, in a few minutes the sulphur begins to melt and soon may burst excitingly and damagingly.

If, however, you took that same insulator and put D.C. at 20,000 volts (and a kilowatt) upon it, it would hold up for ever.

Actually the high-frequency made the porcelain conductive, and it was the current passing through the porcelain which heated it and exploded it.

The idea in designing insulators is twofold: (a) to minimise large electric field densities; (b) to make the path between electrodes a surface rather than a through path. Thus you may see large metallic rings on wireless aerial insulators to distribute the field, and you will always see an attempt made to make surfaces very smooth and shiny and to keep them dry by "skirts."



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

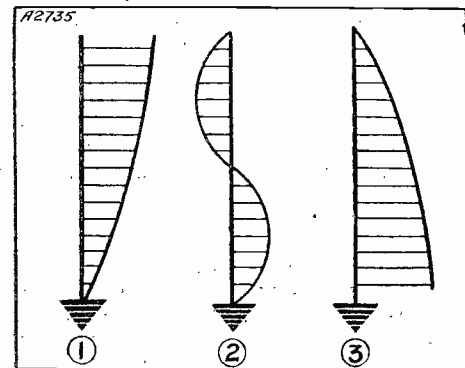
Voltage In Aerials.

T. R. (Chiswick).—"I live at the top of a large block of flats with the result that my set is in effect at the top of the aerial, instead of at the bottom end. I find that with the aerial used as an earth I get better results than when using the aerial proper. Is this normal?"

Anything that actually happens is bound to be normal, said he amazingly! Abnormal is a bad word more properly used by politicians and miracle makers.

It is almost impossible to calculate aerials when the set is high up and is connected to an earthed conductor, etc. etc. I always just mess about to get the best results; I never try to predict them.

POTENTIAL DISTRIBUTION



These three diagrams illustrate Capt. Eckersley's statement that the voltage distribution in different aerials varies tremendously.

You can have the distribution of potential in an aerial like (1), or like (2), or any combination thereof, and the circuit you use to terminate will alter all the conditions and may do as at (3). No. 1 at the top of the aerial will—oh no, there's no saying what may not happen, but it's quite normal to get volts at the top of an aerial as well as at the bottom!

THOSE SPORTING BROADCASTS!

A special contribution to "P.W." by a well-known journalist who for many years was Sporting Editor of one of the leading national dailies. We have no doubt that listeners to the B.B.C.'s sporting broadcasts will find below many points with which they heartily agree.

I SUPPOSE there are few classes of listeners who have not at times been rattled by the way a subject in which they are specially interested has been dealt with by the B.B.C. Certainly the sports enthusiast has in many respects just cause for complaint.

Knowing how ready the B.B.C. is to pay attention to any constructive criticism, I have been wondering lately if the case for what I'd like to term "the man in the street" has ever been put strongly enough to them.

I notice that on the recently appointed Commission to go into the burning question of lotteries, Sir F. S. Jackson, the famous cricketer, will be there to see that the views of the humble supporters of sport are not smothered. It is just such a man who would be of inestimable value when the B.B.C. are discussing or seeking advice on what is most popular with the sporting public.

Casual and Contemptuous.

Let me make it clear that I am not charging the B.B.C. with neglect of sport. The great failing is the casual and sometimes even contemptuous way two particular branches of sport are treated—except when the event lends itself to a certain amount of glorification by the Corporation. I refer specially to Racing and Football.

Of course the B.B.C. scores with its broadcasts of such outstanding events as the Derby, the Grand National, the Cup Final, Rugby Internationals, the Boat Race, and Lawn Tennis at Wimbledon. But even these events have hardly been given the attention they deserve, and the manner and general method of presentation show little, if any, advance year by year.

What is more, such important events as I have mentioned are usually ignored until the day they take place.

Undoubtedly there has been in connection with the "calling over" of racing and football results the greatest dissatisfaction among listeners. There was a time when the starting price of the winner of a race was given, but nowadays this most important part of the race "return" is not "offered," although greatly "wanted."

Standard Speech.

The announcers have varied in their rate of delivery and, after listening recently to the way two meetings were gabbled through—with, incidentally, the times mixed up—I thought it worth while writing to the B.B.C. about the matter.

In reply I was informed that "the general principle is that a standard speech shall be adopted, i.e., that of ordinary news reading."

This, I maintain, shows a sad lack of understanding—in fact, it indicates that racing is a subject foreign to the originator of such a rule. It is evident, too, that the announcers have not been paying attention to "the general principle."

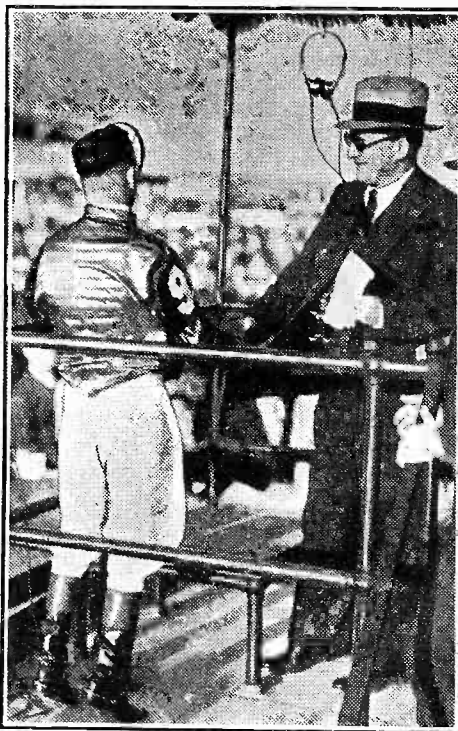
During a recent week, one announcer started with a slight pause between reading

the first, second, and third horses. Obviously he clearly realised that if a listener is ticking off the results—and this is the general method—some allowance must be made for the fact that, say, No. 1 may be in the middle of the list, No. 2 at the top, and No. 3 probably at the bottom.

On the following night the results came through as though the announcer was anxious to beat a record by getting through six races at each of the two meetings with only one pause for breath.

If the B.B.C. want this point driven home, let them ask any of their staff inter-

"ON HIS TOES!"



This is Billy Elliott, the jockey, broadcasting the result of the Californian \$50,000 handicap direct to Australia. He is so small and so anxious that they shall hear every word that he is on tip-toe to the "mike"!

ested in racing—and perhaps outside the Programme Department there may be a few—to sit for an examination at the rate taken by the announcer I have indicated.

It should be added that a marked improvement was noticeable at Epsom and it looked as though serious attention had been given to the protest.

There has always been a lot of feeling among listeners over football results. For a time Rugby had precedence, but it is different now.

Maybe the fact that the newspapers, wisely recognising what readers wanted, put in special radio football charts so that the results could be taken down at once, had a lot to do with this; and here it can be pointed out that football and racing results cannot be placed in the same category.

The League results come in alphabetical order, such as: Aston Villa, Bolton, etc., whereas the placing of horses in a race programme is governed by the weight they are set to carry—a notable exception being the Derby, when many newspapers prefer the names of the runners to be printed in alphabetical order.

Even in football I have known the Soccer results run through at lightning speed, and the Rugby results dwelt on with loving care—even if such a team as the "Old Leysians" is called the "Old Laysians"—greatly to the disgust of all Cambridge men.

A Difficult Task.

There are many items of sports news that one never gets, but I notice that time was found the other night for a list of all the "bumps" made in the Oxford "Eights." They were broadcast in a most enthusiastic manner by the announcer, and one wondered if this particular gentleman was a young Oxford rowing man who distinguished himself by his broadcast of the Boat Race, and whether this item actually got a show on its merits.

Of the events I have mentioned, the Derby and the Grand National are, far and away, the most difficult to tackle.

Mr. Lyle at the Derby this year gave, at the urgent request of listeners, the Draw, and next year I hope he will tell us how the horses are numbered on the race card.

Some folk were no doubt confused, after getting the draw for places at the starting gate, to hear that they were not parading in that order. This point might be made perfectly clear in future.

Mr. Lyle is not above paying attention to suggestions, as was shown by his promise to keep a special eye on Orwell's progress throughout this year's Derby, no matter who was leading.

As for the broadcasting of other sports events, I would suggest that Mr. G. F. Allison's attention is not diverted by questions or side remarks of the gentleman who is really only there to give out "Square X," or whatever number it is, for the benefit of readers of "The Radio Times."

Too Enthusiastic.

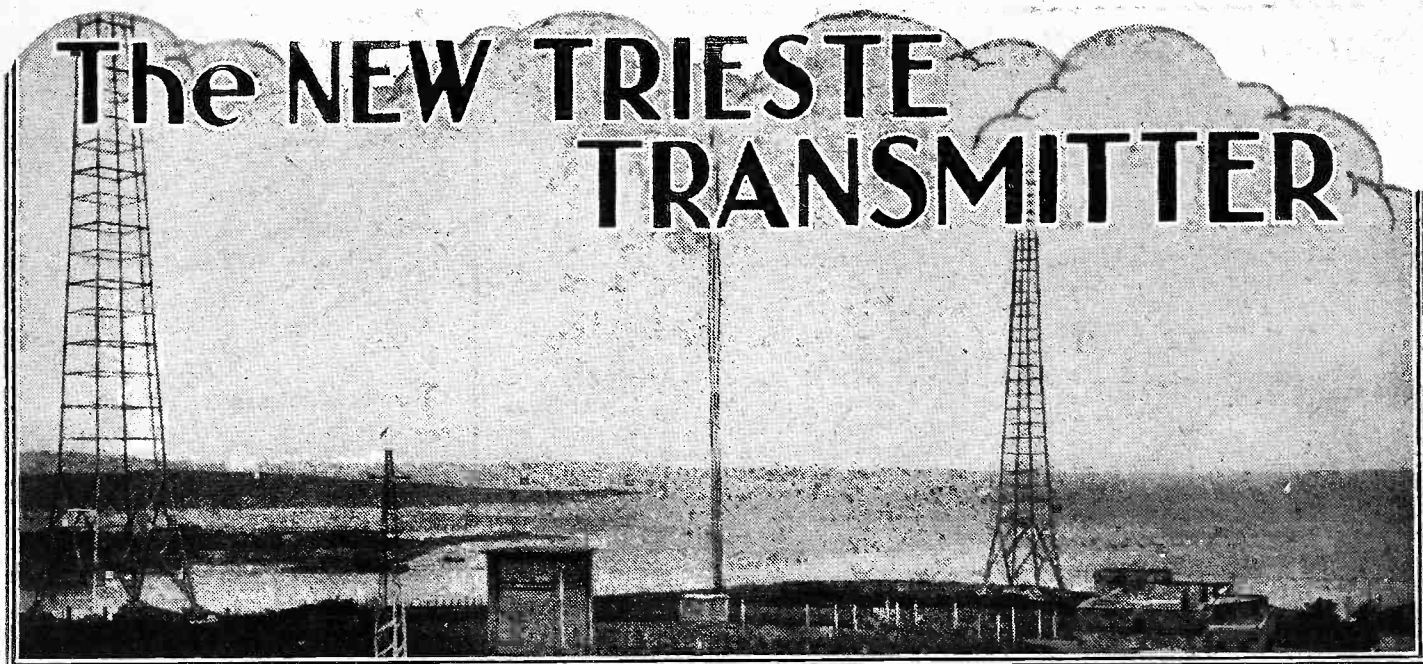
At the Rugby games, Captain Wakelam is frequently so uncertain that the listener gets confused; and the gallant captain might also restrain his impatience at any slight delay.

I am afraid he is just a little too much of an enthusiast. Personally, I prefer the cool, steady story sent out by the Irish commentator.

Bearing in mind that cricket still stands out as our great national game, the B.B.C. will hardly claim that the summer pastime receives full attention. There might well be a few more advisory talks by leading personalities, for the young cricketer is at least as eager for instruction as the gardener.

Golf is brought into prominence now and again by Mr. Bernard Darwin, whose talks must give delight to all who follow the royal and ancient game. Mr. H. M. Abrahams deals with athletics in a way that convinces the listener that there is a man at the microphone who knows his subject from A to Z.

But, taken on the whole, the sports enthusiast does not get anything like what he wants and deserves in the B.B.C.'s programmes to-day.



TRIESTE is, geographically speaking, at the "top" of Italy, and although the average British listener is probably not well acquainted with the "layout" of this part of Europe, Yugoslavia and Hungary are all relatively near this end of the country.

This means that although mention of an Italian station is apt to conjure up visions of Rome and Milan, Trieste is actually a close neighbour to Ljubljana, Zagreb and the Graz, Innsbruck and Klagenfurt relays, all of which I have been visiting.

A Child of Chelmsford.

The Marconi engineer who arranged for me to visit the Trieste station told me that the whole of the transmitter, the panels for power valves, big water-cooled valves and tuning coils, were tested out at Chelmsford. Trieste was, in fact, built in the same "stocks" as the big Warsaw station, also a British product.

The man on the spot said it was a pity I could not have made my visit at the official opening.

A striking thing is the interest which Mussolini and other members of the State take in Italian broadcasting. The Crown Prince and Princess of Italy went to the official opening at the end of last year!

Not Much Top!

Radio Trieste is three miles out of the town of that name. The two aerial masts are 260 feet high, so it is unnecessary to say that they are landmarks for a considerable distance around. There are not many buildings in the immediate neighbourhood of

Radio Trieste is well known to nearly all British listeners, and we feel sure our readers will be interested in this account of a visit to this popular station.

By OUR
SPECIAL CORRESPONDENT.

the aerial, so it is not shielded in any one direction.

An impressive thing about some new stations is the small amount of "top" to the aerial. In the case of the Trieste aerial, for instance, the top length of wire appears small in comparison with the long down lead.

The length of the top is 60 feet. The lead-in is joined to the centre and there are three wires forming the down lead. Stout three-foot diameter hoops separate the three wires. The lead-in, you see, is four times as long as the aerial itself.

There is the usual little transformer house, a small stone building exactly below the aerial lead-in. The lead-in goes into the transformer house via one of the biggest porcelain insulators I have ever seen, and a peep inside revealed an outside in H.F. couplers, an air-dielectric condenser and a couple of high-frequency meters.

A row of telegraph poles extends from the coupling house to the wall of the transmitter hall, and two wires, each of them carrying part of the aerial current, vanish into the transmitter hall through a little window at the top of the wall.

The Feeder Line.

A good many stations have this method of connecting up to the lead-in. The engineer explained that if one wire were used, trailing up to the lead-in point, it would be so long that it would upset the natural wave-length of the aerial and would certainly increase the lowest wave-length at which the transmitter could broadcast. As Trieste is fitted with coupling circuits,

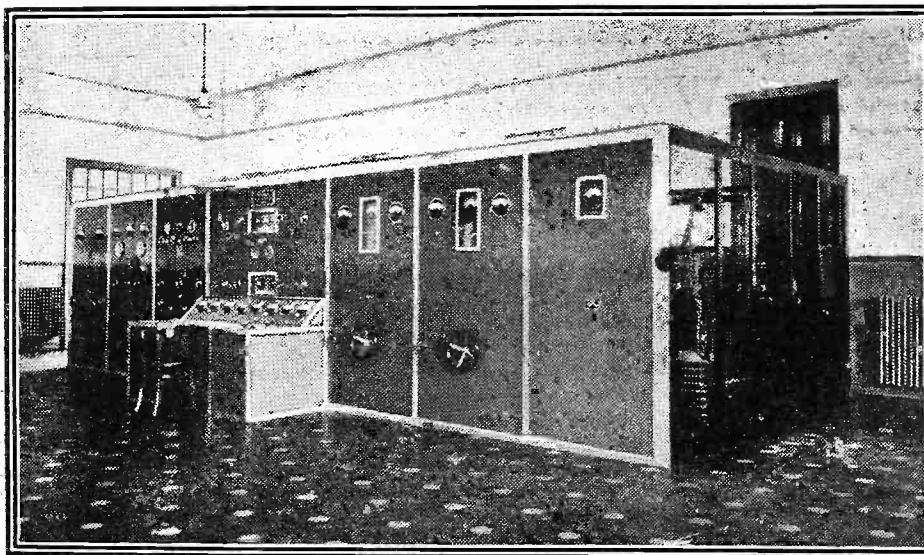
tapped to go down to 200 metres if necessary, this would be a real snag.

The two lines are just the two sides of a closed circuit. At the transmitter end they are connected to the secondary of a gigantic H.F. transformer and at the other end, in the little stone house, they are connected to the primary of a similar transformer, the secondary of which goes straight up to the aerial.

In cases where the two leads have to be very long, the length of the primary or secondary winding, at either end, is

(Continued on next page.)

A "HIGH SPOT" IN ITALIAN BROADCASTING



A view of the apparatus at the Trieste station, which works on a wave-length of 247.7 metres. All the apparatus is of British manufacture, and was taken direct from Chelmsford to the station site in huge crates.

THE NEW TRIESTE TRANSMITTER.

(Continued from previous page.)

reduced. As long as they keep the three circuits in tune the length does not matter.

The transmitter is the standard P.A.14 A. type and from the outside looks very much like part of our 5 S W short-wave transmitter. As far as the inside arrangements go it is a great deal different, and is an improvement on other P.A.14 A.'s at other broadcasting stations.

Crystal Control.

Trieste at present is working on 247.7 metres. A novelty is that it is crystal controlled. Some previous Marconi transmitters have been fitted up with a special kind of master oscillator—a valve in a shielded-off compartment, fed with batteries apart from the rest of the transmitter and fitted up with every gadget to keep it oscillating at a constant frequency. Now at Trieste the engineers are trying crystal control.

The "A" panel of the transmitter has part lined off and in this is a heat insulated box, fitted with a thermostat working on an electric heater. This is just like any other crystal drive.

The crystals are specially ground and by simply retuning the frequency doublers and the three coupling circuits between the water-cooled valves, the wave-length can be shifted from 200 metres up to a maximum of 545 metres.

A new crystal has to be inserted for practically every range because the frequency doublers are tuned each time to a harmonic of the crystal frequency.

Between the crystal and the frequency doublers is a shielded valve—an ordinary power valve, such as you might have in the output stage of your set—across the grid circuit of which the crystal holder is connected.

A Homely Thought.

The last stage of the frequency doublers is connected to a small transmitting valve. The anode is also connected to the output of the last L.F. stage on the amplifier rack connected up to the control room.

In technical terms this small transmitter valve is the first modulated stage. It is in itself a complete transmitter. If an aerial were connected to it signals would be broadcast, but at very low power, of course.

After this, in order to increase the power, come the water-cooled valves. These are just the same water-cooled types as at Brookmans Park. Homely thought!

At present Trieste is run by the Ente

Italiano Audizioni Radiofoniche and takes its programme from its own studio. The engineers hope very shortly to get a balanced landline link through to Milan and other studio centres.

The Day's Work.

The control man comes on duty at 8 o'clock in the morning and the first programme is put out at 8.55. He then has breakfast and comes back at 11.30 for the start of the main morning programme, which is then continuous.

There is a very ingenious indicator system working between the studio and the station control room. Practically everything comes from the studio, but fill-in items, which are done with gramophone records, can be done from the listening room at the transmitter.

When initial programme difficulties have been overcome, the E. I. A. R. official will give over his responsibility to a local man.

OPENING ANOTHER EMPIRE LINK



Mr. Macdonald opening the new public telephone service to South Africa, on which occasion he spoke to General Hertzog, the South African Premier for five minutes. Sir Kingsley Wood, the Postmaster-General, is seen on Mr. Macdonald's left.

TWO USEFUL HINTS

Using old match boxes. Better volume controlling.

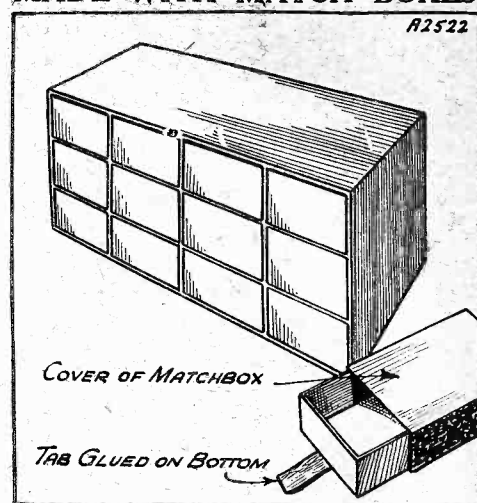
WHEN engaged in experimenting, it does not take long for a host of small oddments to collect, and if some system is not adopted, confusion quickly follows.

I find the best plan is to house these small items in tiny chests of drawers made by gluing together a dozen or so waste matchboxes, as shown in the sketch. A better job is made of the cabinet if pieces of stout cardboard are cut to size and attached to the exterior.

Tidy and Handy.

Each little drawer has a tab of leather cloth attached to the front bottom edge, so that it can be drawn out easily. The name of the contents is written in ink on the front of the drawer. The contents comprise nuts, washers, and terminals both 2BA and 4BA, spring washers, labels, tags of different types, bushes, valve legs and sockets and a host of small articles.

MADE WITH MATCH BOXES



By fastening a number of match boxes together, as here illustrated, a very handy "chest-of-drawers" can be made.

PRE-DETECTOR volume controlling is more or less a necessity on a powerful set that employs one or more stages of H.F. amplification. And one of the most common schemes used is to alter the voltage on the screening grid of the S.G. valve.

This is carried out by means of a potentiometer across the high tension, the slider feeding the screening grid. Unfortunately, if control is carried too far with this scheme, there is likelihood of rectification.

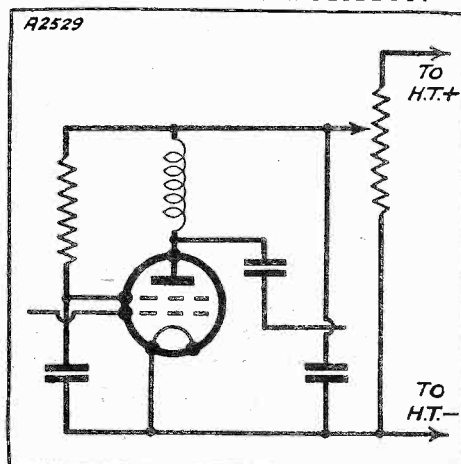
As you are no doubt aware, the right voltage for use on the screening grid depends largely upon that applied to the anode of the valve. Therefore, if the anode voltage were reduced at the same time as the voltage on the screening grid, this method of volume control could be carried much further before rectification set in.

In the diagram a simple scheme that makes this possible is shown. You will see that a potentiometer is used but instead of it supplying the screening grid alone, it supplies the anode of the S.G. as well.

The voltage for the screening grid is dropped through the resistance. The net result is that as the voltage on the potentiometer is lowered the high tension applied to both electrodes is reduced at the same time. Consequently a much better and wider control of volume is available.

A.S.C.

PREVENTS DISTORTION



The potentiometer is arranged to control the anode voltage as well as that applied to the screen. This scheme has several advantages over the usual method where the screen voltage only is varied.



ANTI-MICROPHONIC CONSTRUCTION

THE VALVE THAT PULLS EVERY OUNCE OF ITS WEIGHT

Are you satisfied with the same performance today as two years ago? Of course not! Your demands become more exacting every day; that is why the improved P.M.I.H.L. was marketed.

Due to the low anode current of the P.M.I.H.L., the effective inductance of the transformer is maintained at a high value, thus giving a maximum stage gain.

This low anode current also obviates the risk of saturating the transformer and thus ensures good quality.

Price 7/-

MADE IN ENGLAND

OPERATING DATA

Filament Voltage	-	-	-	20V
Filament Current	-	-	-	0.1A
Max. Anode Voltage	-	-	-	150V

CHARACTERISTICS

(At Anode Volts 100; Grid Volts Zero)

Anode Impedance	-	-	20,000 ohms
Amplification Factor	-	-	28
Mutual Conductance	-	-	1.4 mA/V

Mullard

THE · MASTER · VALVE

THE MIRROR OF THE B.B.C.

By O.H.M.

THAT ANNUAL REPORT

AT PORTLAND PLACE—VAUDEVILLE NEWS—THE CONQUEST
OF THE MATTERHORN—GENERAL HIGGINS TO BROADCAST.

I CONFESS that the B.B.C. Annual Report to Parliament, which is tabled as a White Paper by the Postmaster-General, irritates me increasingly.

True, it draws a calculable number of superlative tributes in ponderous newspapers, and a little sarcasm from less serious organs of opinion. True, also, it records the hard facts of magnificent progress. But what a dreadfully soulless document!

It is the official record of what should be the most human organisation in the country! Seriously, the B.B.C. loses a glorious opportunity of developing interest and goodwill by the unimaginative handling of this business of the Annual Report.

It is not much use the B.B.C. pretending that it is not getting more and more like a Government Department when it allows a really wonderful record of positive achievement to be expounded in the style and language of a "dry as dust" Blue Book. Members of Parliament have noticed this anachronism and it will be well if steps are taken to remedy the deficiency before there is intervention in an unwanted direction.

"The Background of Civilisation."

This is the title of a new series of talks which the Central Council for Adult Education, known otherwise as "The Central Elephant," and presided over by the Archbishop of York, is trying to impose on the B.B.C. But the going is not easy, even on the skin of the elephant!

Serious trouble is threatened about the inclusion of Nietzsche as one of the heroes of the series. The battle waxes fiercely.

The protagonists include the redoubtable Miss E. S. Haldane, Professor T. H. Searle, Sir Walford Davies and others, with the sphinx-like Charles Siepmann nursing his own tendencies in a neutral background. All that I can say is that I hope the Central Elephant will go on discussing the subject until it is too late to impose such an appalling series upon the innocent public.

Mr. Whitley at Portland Place.

Mr. Whitley, the Chairman of the B.B.C., has now got his own room at Broadcasting House, and is attending regularly to deal with the business of Broadcasting. I hear that he is taking a keen personal interest in the welfare of staff.

This is a very good thing. It looks as if the £3,000, which is the Chairman's salary is not being taken for granted, but is being worked for as it ought to be.

As Mr. Whitley and Sir John Reith are now intimate personal friends there is not likely to be any friction from the chairman's increasing activity.

Vaudeville News.

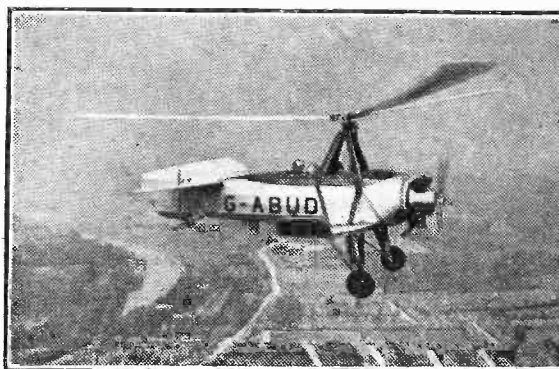
Two dates—Tuesday and Wednesday, July 19th and 20th—have been set aside for the next programme which Philip Ridgeway is arranging for the microphone. Although it bears the old title of the

"Ridgeway Parade," I understand that Mr. Ridgeway intends introducing some brand new items.

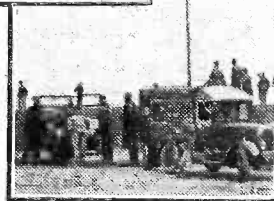
"Flags on the Matterhorn."

The dramatic story of Whympers's historic conquest of one of the most formidable peaks of the world will be told in the broadcasts of a play, "Flags on the Matterhorn," on Tuesday and Wednesday, July 5th and 6th, respectively. This thriller, which promises to be one of the best of the year, will be given first for National

LOOKING DOWN ON LONDON TOWN



Flying high over the roof-tops and fitted with short-wave radio telephony this autogiro is a crowd-controller, which gives invaluable assistance to the police on such occasions as the Derby and the Searchlight Tattoo. The smaller picture shows the police patrol van, which acts as a control station.



listeners and repeated from Regional transmitters.

General Higgins to Broadcast.

A speech by General Higgins, leader of the Salvation Army, is to be relayed as part of the National programme from a lunch to be given in his honour at Fishmongers' Hall, in July.

Mr. Cochran on Himself.

Mr. C. B. Cochran can be relied upon to provide a sensation of some kind every few months, and I should not be at all surprised if we get a few when this super-showman speaks before the microphone next Monday, June 27th, in the "Rungs of the Ladder" series of talks.

His life has been amazingly crowded with "high spots" such as are normally experienced by about twenty average men put together. In fact, I am wondering how he is going to tell listeners in a single

talk all that is worth hearing about himself.

I recall listening to a talk from him about six years ago. Donald Calthrop brought him to the microphone and his subject was a book he had brought out.

Discs.

I hope that listeners will like the novel gramophone programme which is being given to West Regional listeners at 9.15 p.m. on Saturday, July 9th, under the title of "Discs," because if they do Mr. E. R. Appleton, the West Regional Director, intends to arrange a series on similar lines.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent programme tendencies.

NOTE this from a German wireless journal:

"The G— has already often pointed out that punctuality of broadcasts is a matter of common politeness to listeners. But unfortunately, unpunctuality seems to be so naturalised that only a strong decree from 'on high' could have any effect now.

"A few days ago there was a transmission from Hamburg shared by six other stations. It was to begin at 9.10 p.m. Listeners tuned in and listened; for 13 long minutes there was nothing but the monotonous Hamburg interval clock going.

"During this unnecessarily long delay, when most listeners must have switched their sets off, not one of the Hamburg announcers thought it necessary to offer a single word of apology to the waiting listeners.

"At long last, at 9.23 p.m., a voice announced the beginning of the programme just as if nothing untoward had happened.

We consider this gross slackness, and once again express the hope that the authorities responsible for this sort of thing will soon take steps to avoid its recurrence."

I think we can say we get better treatment than this from Broadcasting House. We may occasionally be kept waiting, but we never have to wait for an apology. That always comes immediately.

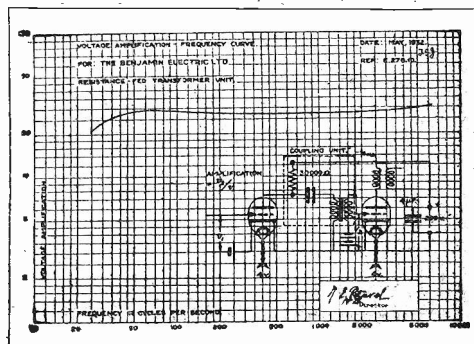
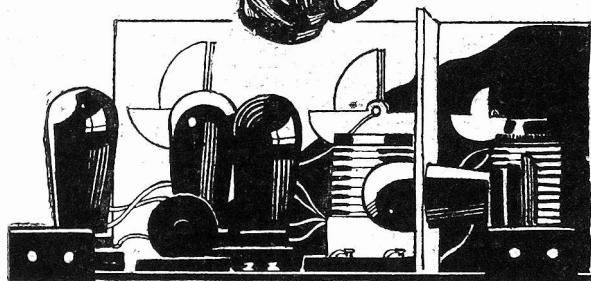
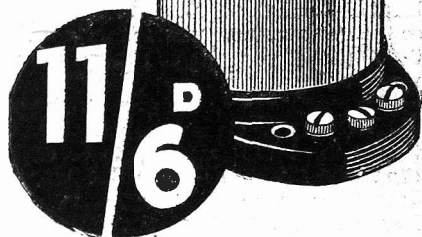
Commenting on the appearance of a German actor in the cast at the Garrick Theatre, Mr. James Agate observed in his talk that he (the actor) was all charm and ability, and a change from the usual English actor, all charm and nice trousers—or something to that effect.

Very amusing, perhaps, and a remark that would get a laugh, but hardly a helpful one to the theatre! It is generally known that the English theatre is at present passing through very bad times.

(Continued on page 486.)

Now! for the BENJAMIN TRANSFEEDA!

(Regd.)



Note from this N.P.L. curve what an exceptionally even amplification is obtained throughout the scale of musical frequencies—a positive proof of excellence in both materials and design.

Get the Distortionless amplification associated only with the most luxurious transformers by fitting the new Benjamin Transfeeda.

In one compact, neat-looking, inexpensive component the Transfeeda gives you—

- (1) a 3:1 L.F. Transformer with special nickel iron core, inductance over 80 Henries.
- (2) a silk-covered, WIRE WOUND RESISTANCE rated to carry $1\frac{1}{2}$ watts; and
- (3) a separate condenser in METAL Case.

The Resistance of 50,000 ohms is tapped at 30,000 ohms to suit various valve impedances. De-coupling provided for. Examine the N.P.L. curve here and see what unapproachable results the Transfeeda will give you.

The British Made Benjamin Transfeeda is the answer to your L.F. amplification problems. Ask your dealer.

THE BENJAMIN ELECTRIC LTD., TARIFF ROAD, TOTTENHAM, N.17

THE MIRROR OF THE B.B.C.

By O.H.M.

THAT ANNUAL REPORT

AT PORTLAND PLACE—VAUDEVILLE NEWS—THE CONQUEST OF THE MATTERHORN—GENERAL HIGGINS TO BROADCAST.

I CONFESS that the B.B.C. Annual Report to Parliament, which is tabled as a White Paper by the Postmaster-General, irritates me increasingly.

True, it draws a calculable number of superlative tributes in ponderous newspapers, and a little sarcasm from less serious organs of opinion. True, also, it records the hard facts of magnificent progress. But what a dreadfully soulless document!

It is the official record of what should be the most human organisation in the country! Seriously, the B.B.C. loses a glorious opportunity of developing interest and goodwill by the unimaginative handling of this business of the Annual Report.

It is not much use the B.B.C. pretending that it is not getting more and more like a Government Department when it allows a really wonderful record of positive achievement to be expounded in the style and language of a "dry as dust" Blue Book. Members of Parliament have noticed this anachronism and it will be well if steps are taken to remedy the deficiency before there is intervention in an unwanted direction.

"The Background of Civilisation."

This is the title of a new series of talks which the Central Council for Adult Education, known otherwise as "The Central Elephant," and presided over by the Archbishop of York, is trying to impose on the B.B.C. But the going is not easy, even on the skin of the elephant!

Serious trouble is threatened about the inclusion of Nietzsche as one of the heroes of the series. The battle waxes fiercely.

The protagonists include the redoubtable Miss E. S. Haldane, Professor T. H. Searle, Sir Walford Davies and others, with the sphinx-like Charles Siepmann nursing his own tendencies in a neutral background. All that I can say is that I hope the Central Elephant will go on discussing the subject until it is too late to impose such an appalling series upon the innocent public.

Mr. Whitley at Portland Place.

Mr. Whitley, the Chairman of the B.B.C., has now got his own room at Broadcasting House, and is attending regularly to deal with the business of Broadcasting. I hear that he is taking a keen personal interest in the welfare of staff.

This is a very good thing. It looks as if the £3,000, which is the Chairman's salary is not being taken for granted, but is being worked for as it ought to be.

As Mr. Whitley and Sir John Reith are now intimate personal friends there is not likely to be any friction from the chairman's increasing activity.

Vaudeville News.

Two dates—Tuesday and Wednesday, July 19th and 20th—have been set aside for the next programme which Philip Ridgeway is arranging for the microphone. Although it bears the old title of the

"Ridgeway Parade," I understand that Mr. Ridgeway intends introducing some brand new items.

"Flags on the Matterhorn."

The dramatic story of Whympier's historic conquest of one of the most formidable peaks of the world will be told in the broadcasts of a play, "Flags on the Matterhorn," on Tuesday and Wednesday, July 5th and 6th respectively. This thriller, which promises to be one of the best of the year, will be given first for National

Listeners and repeated from Regional transmitters.

General Higgins to Broadcast.

A speech by General Higgins, leader of the Salvation Army, is to be relayed as part of the National programme from a lunch to be given in his honour at Fishmongers' Hall, in July.

Mr. Cochran on Himself.

Mr. C. B. Cochran can be relied upon to provide a sensation of some kind every few months, and I should not be at all surprised if we get a few when this super-showman speaks before the microphone next Monday, June 27th, in the "Rungs of the Ladder" series of talks.

His life has been amazingly crowded with "high spots" such as are normally experienced by about twenty average men put together. In fact, I am wondering how he is going to tell listeners in a single talk all that is worth hearing about himself.

I recall listening to a talk from him about six years ago. Donald Calthrop brought him to the microphone and his subject was a book he had brought out.

Dises.

I hope that listeners will like the novel gramophone programme which is being given to West Regional listeners at 9.15 p.m. on Saturday, July 9th, under the title of "Dises," because if they do Mr. E. R. Appleton, the West Regional Director, intends to arrange a series on similar lines.

LOOKING DOWN ON LONDON TOWN



Flying high-over the roof-tops and fitted with short-wave radio telephony this autogiro is a crowd-controller, which gives invaluable assistance to the police on such occasions as the Derby and the Searchlight Tattoo. The smaller picture shows the police patrol van, which acts as a control station.



THE LISTENER'S NOTEBOOK

A rapid review of some of the recent programme tendencies.

NOTE this from a German wireless journal:

"The G— has already often pointed out that punctuality of broadcasts is a matter of common politeness to listeners. But unfortunately, unpunctuality seems to be so naturalised that only a strong decree from 'on high' could have any effect now."

"A few days ago there was a transmission from Hamburg shared by six other stations. It was to begin at 9.10 p.m. Listeners tuned in and listened; for 13 long minutes there was nothing but the monotonous Hamburg interval clock going."

"During this unnecessarily long delay, when most listeners must have switched their sets off, not one of the Hamburg announcers thought it necessary to offer a single word of apology to the waiting listeners."

"At long last, at 9.23 p.m., a voice announced the beginning of the programme just as if nothing untoward had happened."

We consider this gross slackness, and once again express the hope that the authorities responsible for this sort of thing will soon take steps to avoid its recurrence."

I think we can say we get better treatment than this from Broadcasting House. We may occasionally be kept waiting, but we never have to wait for an apology. That always comes immediately.

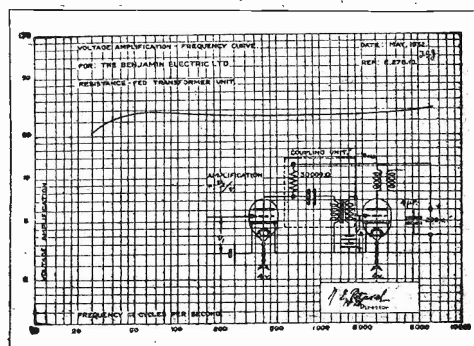
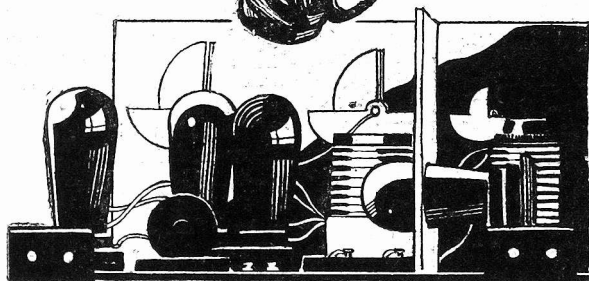
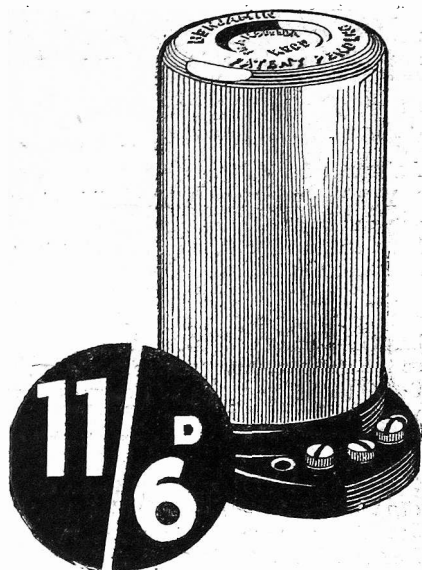
Commenting on the appearance of a German actor in the cast at the Garrick Theatre, Mr. James Agate observed in his talk that he (the actor) was all charm and ability, and a change from the usual English actor, all charm and nice trousers—or something to that effect.

Very amusing, perhaps, and a remark that would get a laugh, but hardly a helpful one to the theatre! It is generally known that the English theatre at present passing through very bad times.

(Continued on page 486.)

Now! for the BENJAMIN TRANSFEEDA!

(Kgd.)



Note from this N.P.L. curve what an exceptionally even amplification is obtained throughout the scale of musical frequencies—a positive proof of excellence in both materials and design.

Get the Distortionless amplification associated only with the most luxurious transformers by fitting the new Benjamin Transfeeda.

In one compact, neat-looking, inexpensive component the Transfeeda gives you—

- (1) a 3:1 L.F. Transformer with special nickel iron core, inductance over 80 Henries.
- (2) a silk-covered, WIRE WOUND RESISTANCE rated to carry $1\frac{1}{2}$ watts; and
- (3) a separate condenser in METAL Case.

The Resistance of 50,000 ohms is tapped at 30,000 ohms to suit various valve impedances. De-coupling provided for. Examine the N.P.L. curve here and see what unapproachable results the Transfeeda will give you.

The British Made Benjamin Transfeeda is the answer to your L.F. amplification problems. Ask your dealer.

THE BENJAMIN ELECTRIC LTD., TARIFF ROAD, TOTTENHAM, N.17

HINTS FOR "DECADE" BUILDERS

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

Some further constructional details are given, and you are shown how the initial adjustments are made in order to bring the set to its highest efficiency in any local conditions. In conclusion, a few practical suggestions are provided regarding indoor and outdoor aerials.

THE Moderator coil is mounted on a small block of wood which, in its turn, is fixed to the baseboard.

The object of this is to bring the Moderator coil more into the field of the medium-wave winding of the dual-range coil than would otherwise be the case.

The exact height of the piece of wood is of no vital importance—that is, speaking in terms of sixteenths of an inch.

But the point to remember is that when the Moderator coil is in the position shown in the original model approximately the tightest practical coupling results.

Optimum Coupling.

This is the condition for maximum power, and anything less will inevitably result in some slight falling-off of volume. A few constructors may have to put up with this in order to deal with very bad local conditions, but they will at least have the satisfaction of knowing they are working down towards an average set's efficiency and not below!

By the way, I trust constructors have realised that most of the information given about the "Decade" in Nos. 522 and 523 of "P.W." applies equally well to the "Decade" With Simplified Tuning.

On the other hand, much which can be said about this instrument is applicable to the former model.

Therefore, to make the most of the space I have at my disposal, I propose to devote the remainder of this article to general "Decade" hints.

Regarding "break through," that annoying interference of long-wave reception by a powerful medium-wave station. You will find that practically any instance of this trouble can immediately be dealt with by that handy little Moderator control. You should understand that on the long waves the Moderator acts as a medium-wave rejector.

Therefore, it can tune out any one medium-wave station just like a wavetrap. Indeed, it is now nothing more or less than a wavetrap.

Wavetrap Action.

So you adjust the Moderator condenser until you find that point when the interfering station disappears.

You can even meet with equanimity, that rare condition where there is break-through from two stations simultaneously. And there are two alternative methods at your command.

These are:

1. An adjustment of the .001-mfd. baseboard condenser in conjunction with a Moderator condenser adjustment.
2. The transformation of the Moderator condenser into a series-aerial condenser.

This transformation, to which I refer as the second alternative, can be carried out without any wiring alteration at all. All

you have to do is to withdraw the Moderator coil plug and leave it hanging disconnected.

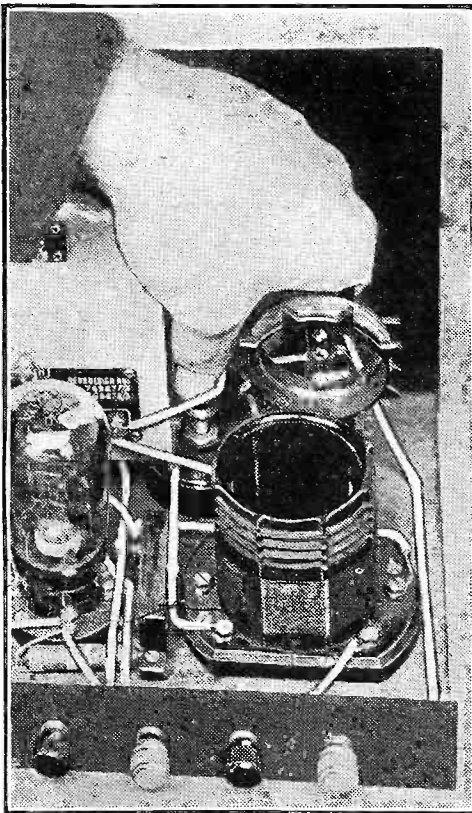
As a matter of fact, this is a tip well worth remembering if you are seeking a super degree of long-wave selectivity quite apart from the question of that specific form of interference known as "break through."

A Series Condenser.

The circuit arrangement which results can easily be seen if you glance at the theoretical circuit of the receiver which was given last week. On disconnecting the Moderator coil by withdrawing its tapping plug, the Moderator condenser is left as the only connection between the aerial and the .001-mfd. baseboard condenser (this is only on long waves, remember). Thus the two condensers are in series, and a much lower minimum capacity is possible.

You cannot make this circuit alteration on medium waves, for the only coupling between the aerial and grid circuit is via the Moderator coil itself, this being inductively coupled to the dual-range coil.

SELECTIVITY SETTINGS



Adjusting the .001-mfd. baseboard condenser. You set this control in accordance with your individual long-wave selectivity requirements, and once you have found an adjustment to your liking you do not have to alter it again. This .001-mfd. condenser can also be used in conjunction with the Moderator condenser to deal with extreme cases of "break through," as is described in the accompanying article.

But you will obtain all the elasticity you need for the most extreme conditions by varying the position of the Moderator coil. You can turn it a little, or drop it nearer to the baseboard, etc.

The vast majority, however, will not need to take drastic steps of this nature and will be able to do all they want to do merely by varying the Moderator condenser as they search for stations with the "Telexor" and reaction.

Automatic Switching.

You can twist the "Telexor" knob as far as you like in either direction, and you can keep on turning in any one direction for as long as you like.

All that will happen is that you will automatically slip in and out of the wavebands. As the 0-100 numbers are passed so the medium-wavers come in, while on the 0-200 part of the scale you cover the long-wave tuning.

The absence of a stop may at first prove disconcerting to those who have been used to the fixed 180° movements of ordinary condensers, but as they become more acquainted with their "Telexors" the fascination of 360° freedom will grow upon them.

Indeed, there is something very attractive about it as well as its direct simplicity. In fact, it brings quite a new and attractive element into tuning.

Big Aerials Are Best.

To go back to the 180° one-wave and principle, is to find oneself artificially restricted and fettered. Constructors who build "Decades" with Simplified Tuning should make the experiment as a matter of interest. We feel certain they will agree with every word we have said.

Now just a few words about aerials. Mainly through the B.B.C. it is now widely believed that good station-separation is impossible unless you clip your aerial down until it is only twenty or thirty feet long.

This is a fallacy, and to clip down an aerial in that way is to clip down your programme alternative possibilities. With a set such as the "Decade" you can employ a good aerial and still be able to maintain adequate selectivity.

Use a Single Wire.

Nevertheless, there is no good purpose served by having either two or more wires and a great length. Aim at 75 ft. as an ideal, and keep as much of this 75 ft. in the horizontal span as you can—in other words, reduce your lead-in to a minimum.

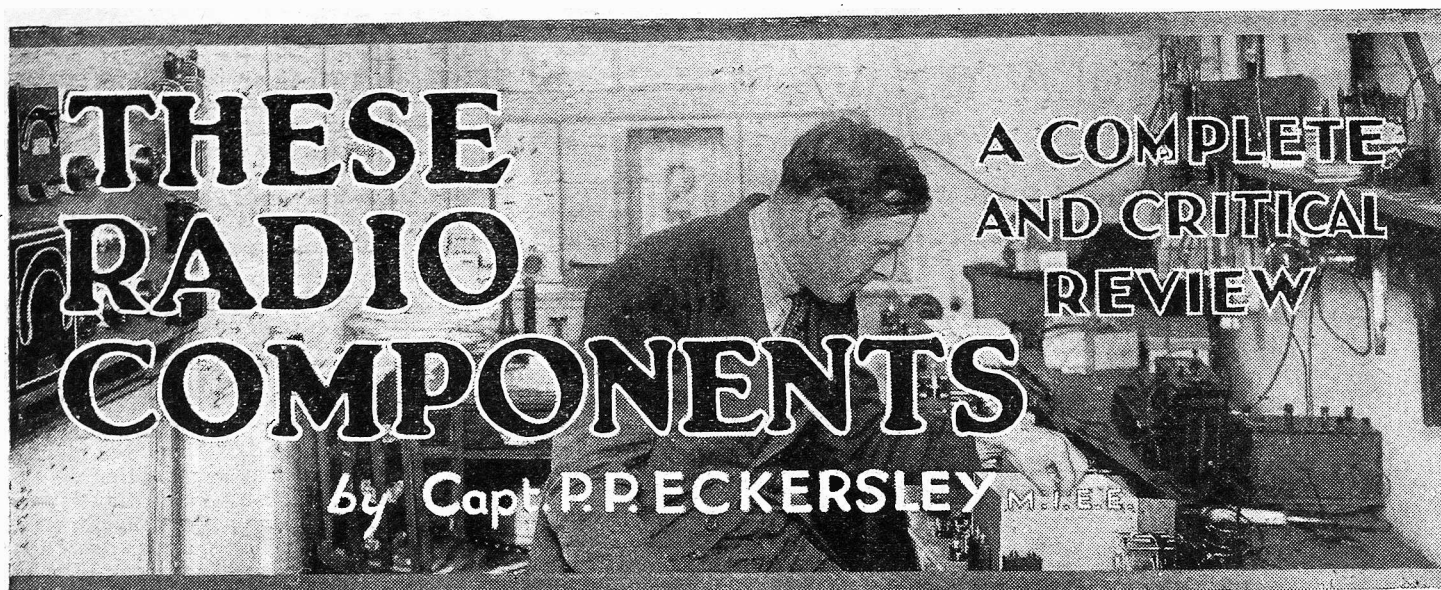
But obtain all the height you can—that is a very important factor.

With a moderately efficient aerial and a good water-pipe or buried earth your "Decade" will accomplish excellent feats of reception so long as its valves and batteries are in good order and it is operated with method.

You can, of course, use an H.T. mains unit if you desire, but see that you get a good unit, for a first-class set deserves high-grade accessories.

The "Decade" Coil.

Before finishing this article there is one other point that is very important, and this concerns the coil for the "Decade" series of sets. In the diagrams and lists of components it has been specified as a type R.M. 3, but the correct coil is the R.M. 3A, the "A" makes quite a bit of difference!



LOTS of people call them potentiometers—lots of people are wrong. A potentiometer means, because its name ends in meter, that it *measures* something; and because the word begins with potent, that it measures a potential.

Now if you take a uniform resistance and connect it across a battery, as in Fig. 1, and you move a slider along it from A to B, then the actual potential between A and C is

VARYING THE VOLTAGE

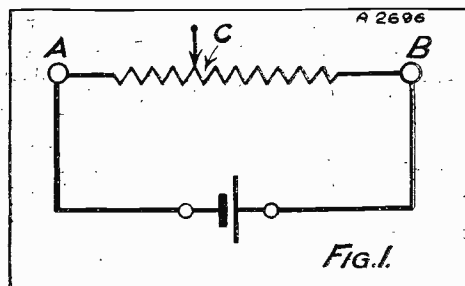


Fig. 1.
If a resistance is connected across a battery as illustrated above, any desired voltage, up to the maximum of the battery, can be tapped off with the slider. Hence its name—a potential divider.

proportional to the physical distance A.C. Thus if you know the battery voltage was 2 volts and you moved the slider quarter way between A and B, then the potential between A and C would be $\frac{1}{4} = 0.5$, and that between B and C 1.5. But this would only be the *open circuit* potential.

Do We Want Uniformity?

If, as in Fig. 2, you took the same uniform resistance and a rather bad moving-iron voltmeter which took a good deal of current, to verify my calculations, you would think you'd found me out in a mis-statement. Because the voltmeter would take current, and while a given current would flow through C and B, a less current would flow through A and C, hence the "drop" in A.C. could *not* be proportional to the position of the slider, strictly speaking.

But in the *low-frequency* side of a valve receiver we work to all intents and purposes into an open circuit, and we may say that in Fig. 3 the voltage is proportional to the setting of the potential divider—*provided the resistance is uniform along its length*. But do we want uniformity of voltage?

POTENTIAL DIVIDERS AND VOLUME CONTROLS.

This week our Radio Consultant discusses many points about potential dividers and the advantage of logarithmic resistance variation when controlling volume.

Do we want to know that voltage given to valve V_2 grid filament circuit is proportional to slider setting? The answer is that we certainly do *not*.

Now if you make a loudspeaker volume louder you do so by applying more voltage to it. Suppose you have a voltage E —a standard—and you increase that voltage twofold, then the loudspeaker takes four times the power. (Because the current is proportional to the voltage divided by resistance. So if you double the volts you double the current. But power is amps times volts, so that doubling volts means doubling current, means quadrupling power.)

About Those Decibels.

If you double the power in a speaker, does it sound twice as loud? Well, what's twice as loud, anyway? No, there's a more scientific way of looking at it than that. We talk about a unit called a "Bell," or more commonly a tenth of that unit, a

decibel, or more shortly still a d.b. Decibels are really the logarithm of the ratio of powers, but we won't worry you more than to say the following.

Increasing The Loudness.

If we increase the power in a loudspeaker by the same number of decibels anywhere within the limits of hearing, then any increment makes the same change of loudness. From 10 decibels to 20 decibels above some given level makes an increase

ON THE L.F. SIDE

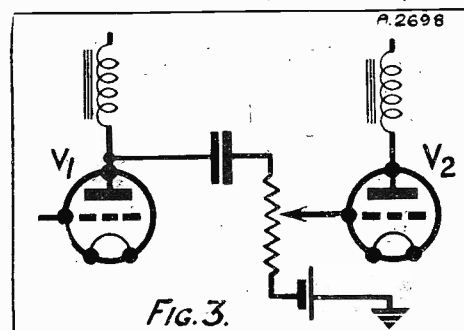


Fig. 3.

When a potential divider is used in this manner as an L.F. volume control there will be no voltage variation due to load. This is because for all practical purposes there is no current flowing in the grid circuit.

of sound exactly the same as from 20 to 30, or 30 to 40, or 40 to 50 decibels, etc., etc.

Now here is a table showing decibels against ratios of power and against ratios of volts to produce those ratios of power.

Ratio of Powers.	Decibels of change.	Ratio of volts to produce d.bs. change.
10,000/1	40	100/1
1,000/1	30	33/1
100/1	20	10/1
10/1	10	3.3/1

So if you had a given standard voltage and you wanted to produce a 10 decibels louder signal, you would have to make a 3.3/1 change in that voltage—*increase it*, that is, to 3.3. If you wanted the volume to increase *as much again*—i.e. if you wanted to go up 10 decibels more (to 20 decibels above your original volume) you would have to increase the voltage ten

(Continued on next page.)

EFFECT OF A LOAD

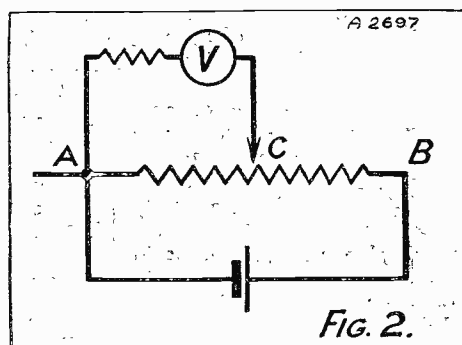


Fig. 2.

If current is taken from a potential divider, the voltage across that section of the resistance which is in use will drop considerably. (This explains why misleading readings are obtained when cheap low-resistance voltmeters are used for testing mains units employing such an arrangement.)

ACCUMULATOR WORRIES

An amusing account of the varied troubles experienced with early types of low-tension accumulators.

By ONE OF OUR READERS.

IN fiction one occasionally comes across the unfortunate gentleman whose hair turns white in a single night. In our early struggles with wireless apparatus, we had an accumulator that behaved in an identical manner. We unfortunately parked it for the night in the back kitchen, where it could watch our water motor and dynamo, in one of its rebellious moods, dealing drastically with another innocent victim.

As White as Snow.

The strain, apparently, was too much for it, and in the morning every plate was white as driven snow: it never recovered from the shock. Of course, there may have been other reasons. In our innocence we had run it for an evening with only the

increasing convexity of the celluloid container was so alarming, that the accumulator became a real pest. Every minute or so one kept peering round the edge of the set in terror lest the wretched affair had burst a seam, and was secretly dropping acid on the carpet. Eventually we installed it as a 4-volt lighting plant in the coal cellar, where it could drip to its heart's content if it felt inclined; naturally it never did.

One of the most annoying troubles is that known as "creeping." A film of acid climbs the stems of the plates, by surface attraction, finally reaching the terminals where it at once commences a vile attack on the brass, particularly at the positive terminal.

If left for any time unattended, the terminal becomes coated, and in bad cases may even be eaten through. The usual remedy is scraping, and the application of vaseline. This is, however, only a palliative once the trouble has become anything like acute. Quite by accident we came across a much better remedy. We had been renewing the plates in a small accumulator, and the pitch had failed to stick to the stem of the positive plate. There was a clear road for the acid to follow and it took it.

Our Cheap Cure.

After a day's use, the positive terminal was heavily coated. The cure was exceedingly simple, and cheap. A tube of "Certo-fix" liquid glue, obtainable at any Woolworths. All we did was to clean up the terminal and clear away the excess acid around the stem with a piece of cotton wool.

A fairly generous application of the glue made a perfectly acid-tight joint between the pitch and the stem of the plate: the glue hardened to a solid mass, in spite of the trace of acid which must still have been present, and after a fortnight's use there

is no sign whatever of acid tending to creep. It seems to be the perfect cure, but as a precaution it would be wise to neutralise any acid on the stem and surrounding case with ammonia.

One of our batteries came to a premature end through

lengthy charging at too high a rate. Scientists talk in puzzled tones of the difficulties of disintegrating matter. All you need is a small accumulator and a really hefty amperage to watch the process taking place before your eyes.

The rate at which the positive plate disintegrates will surprise you!

THESE RADIO COMPONENTS

(Continued from previous page.)

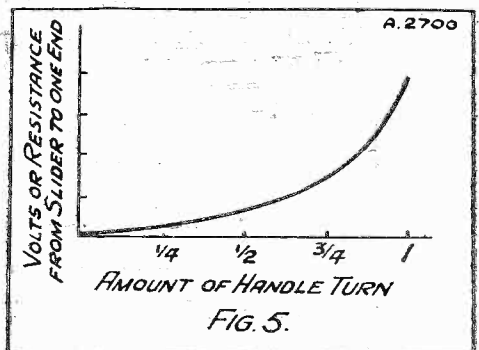
times. For the next ten decibels your voltage is increased 33 times the original and for the next, one hundred times.

Now in Fig. 4 you will see that I have plotted something proportional to the position of the slider if the resistance was uniform against change in volume. Starting at one end it takes only a small turn, O A of the handle to make 10 decibels difference to volume, a bigger turn A B for the next 10 decibels, a bigger one yet B C for the next, and C D only does another 10 decibels still over two-thirds of the travel.

What We Really Want.

So for volume controls we don't want the slider position to be proportional to resistance at all. Take it in four steps then for the first quarter of a turn, the resistance should change from 1 to 3.3 for the next quarter, from 3.3 to 10, next 10 to

A LOGARITHMIC ARRANGEMENT



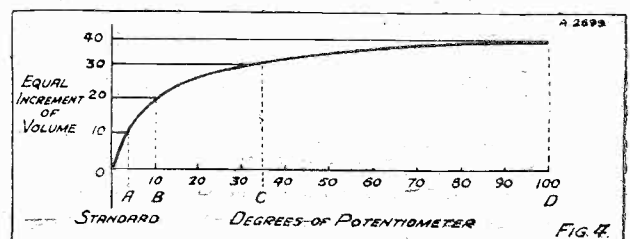
The advantage of a volume control wound on the logarithmic principle is that the variation in volume is proportional to the amount the knob is turned.

33, and finally 33 to 100. In fact, the voltage should be as shown in Fig. 5.

Thus for low-frequency volume controls you want to use "log law" potential dividers of high total resistance (so as not to overload preceding valve), and be sure to connect them round the right way.

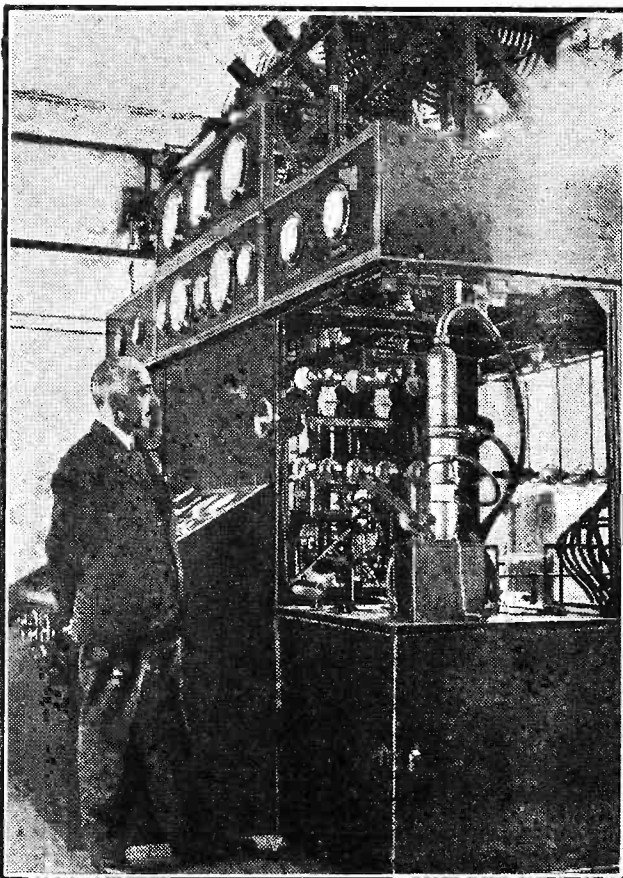
I shall continue with this subject in my next article.

HOW THE VOLUME VARIES



If a volume control is wound like an ordinary resistance, equal adjustments of the knob giving equal variations of resistance, the alterations in volume will be represented by a curve similar to the one shown above.

A FAMOUS FRENCH SCIENTIST



M. Belin, one of France's foremost scientists, and a well-known radio engineer, standing in front of some of his latest apparatus. He has many radio inventions to his credit, particularly in connection with picture transmission.

addition of acid, believing it had arrived fully dry charged, but there is no question that when we left it that night the plates were a nice brown colour, and twelve hours later complete sulphation had taken place. It must be almost a record.

A second accumulator (admittedly cheap) was seized with a tendency to corpulence; in fact, the swelling of the plates and the

EVERYTHING



ELECTRICAL

OVER 1/2 MILLION

HOME CONSTRUCTOR'S KIT SETS

are in use which employ a single stage screen-grid H.F. amplification.

All these sets would be improved by fitting an
OSRAM S.22



Osram S.22

OSRAM
2-volt Valves
with the
WEMBLEY FILAMENT

REDUCED PRICES

		PRICE
S.22	High slope Screen Grid	16/6
S.21	Medium slope Screen Grid	16/6
H.2	High amplification Det. and RC.	7/6
HL.2	The non-microphonic Detector	7/6
LP.2	L.F. and Small Power	8/9
P.2	Super Power	12/6
PT.2	Economy Power Pentode	17/6

The OSRAM S.22, S.21, H.2, HL.2 can be supplied either metallized or clear.

The OSRAM S. 22 has the highest overall amplification of any 2-volt screen-grid valve in the world

1.75 ma/volt, using the wonderful

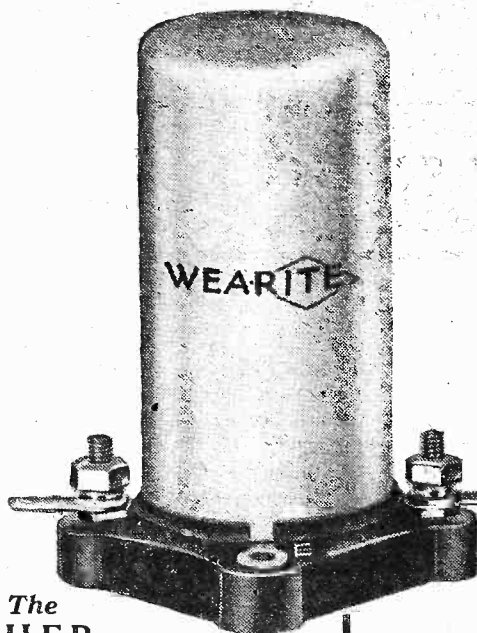
WEMBLEY FILAMENT

Osram Valves

Sold by all
Wireless
Dealers

MADE IN ENGLAND

EXTRA QUALITY WITHOUT EXTRA COST



The
H.F.P.

Write for special
leaflet—If you have
any technical query
let our Service Dept.
know.

Extract from
"WIRELESS WORLD"

Another source of Hum—

"Interaction between
an H.F. Choke in
the detector anode circuit
and the power transformer is a
possible source of hum. A.C.
voltages induced into the circuit will
be communicated to the grid of the
succeeding L.F. valve."

**THE NEW WEARITE
CHOKE SOLVES THIS
PROBLEM.**

NOW!

—A SCREENED H.F. CHOKE

HERE is something new in H.F. Choke practice. Designed on scientific lines, built in a scientific manner it meets a long-standing need of the constructor. This New Wearite Choke—the H.F.P.—is entirely enclosed in an aluminium "pot" which is provided with an earthing point—interaction between it and neighbouring components is eliminated. Tested under various working conditions it is suitable for all wavelengths from 15-2500 metres—and is free from marked resonance peaks—a sound component at the right price - - - **3/6**

WEARITE

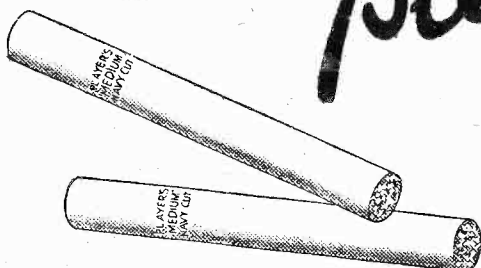
WRIGHT & WEAIRE, LTD.,
740, HIGH ROAD, TOTTENHAM, N.17.

Telephone: Tottenham 3847/8.

**THE MILLIONS WHO
SMOKE THEM
MUST BE RIGHT**

They say

*Players
Please*



The Quality and Quantity Cigarette

NCC 104 B

"POPULAR WIRELESS"

ADVERTISEMENT RATES

Whole Page £40 Quarter Page £10
Half Page £20 Eighth Page £5

Narrow Column Advt. (3 cols. to page) per inch 30/-
Minimum Space accepted - - - half inch 15/-

NO SERIES DISCOUNT. ALL COPY AND BLOCKS MUST BE IN
ADVERTISEMENT COPY SUB- HAND 11 DAYS BEFORE DATE
JECT TO EDITORIAL APPROVAL OF ISSUE TO ENSURE PROOFS

ALL communications respecting ADVERTISING must
be made to:—

JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4.

Telephone: City 7261.

OSBORN

**RADIO CABINETS
MADE BY CRAFTSMEN FOR
PARTICULAR PEOPLE.**



Model
No. 219.

Model No. 219. A
Radio or Radiogram
Cabinet. 5 ft. 9 ins. high,
2 ft. 2 ins. wide, 1 ft.
6 ins. deep. Baffle board
behind Fret 24 ins. x
24 ins. Metallic Fabric
for Fret Front included.
Opening at top and back.
Takes Panel 2 ft. x 5
ins. or smaller. Com-
plete with Motor Board.
Send 3d. in stamps for new 1932 beautifully illus-
trated Catalogue.

CHAS. A. OSBORN
(Dept. P.W.), The Regent Works, Arling-
ton St., London, N.1. Telephone: Clerkenwell
5095. And at 21, Essex Road, Islington, N.1.
Telephone: Clerkenwell 5634.

SOME time ago, when I gave a hint or two on dodging atmospherics, I did not mention one tip which occasionally produces very satisfactory results. This is the deliberate introduction of damping into the aerial-earth system.

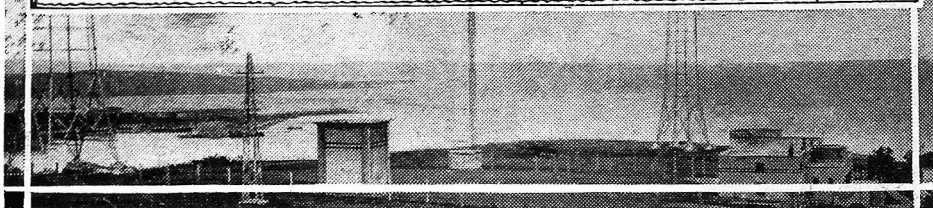
Shock excitation, such as is produced by both atmospherics and powerful spark transmitters at moderate range, causes its greatest effects in circuits that have been made highly efficient by the removal of all possible damping. Conversely, if a circuit is deliberately damped, shock excitation effects can be very greatly reduced.

Reducing Atmospherics.

The simplest way of introducing damping is to connect a variable resistance straight across between the aerial and earth terminals and gradually to reduce its value (which, of course, means increasing the damping) until the interference is at a minimum.

Obviously the amount of damping that can be introduced in this way is limited by the strength of the incoming transmission. It is therefore useful only upon stations that are very strongly received. There are, however, a considerable number of these, after dark, at any rate, and experiments

STATIONS WORTH HEARING



Up-to-the-minute information for the long-distance searcher.

show that in some cases the method can be used with considerable success.

The only stations with which it can be used are those which normally require a little volume control. The set which I generally use for long-distance work has two screened-grid high-frequency stages, a grid-leak-and-condenser detector and a power output stage.

This is employed in conjunction with an indoor aerial stretched across the attic. With this set the medium-wave stations requiring the volume control after dark just now are: Langenberg, Prague, Rome, Toulouse, Brno (on certain nights), the Poste Parisien, Hilversum, Heilsberg, Turin, Trieste, Nürnberg (as a rule) and Fécamp.

On the Medium Waves.

Those upon which atmospheric interference is at its worst are the ones below 300 metres, that is Hilversum, Heilsberg, Turin, Trieste, Nürnberg and Fécamp. The

reason, I suggest, is that there is comparatively little damping in the tuned circuits of the set, owing to the fact that the amount of parallel tuning capacity is small.

By means of the variable resistance atmospheric interference can be cut down to a very satisfactory extent before a particular station's

transmission becomes too feeble for one to enjoy its reproduction by the loudspeaker.

The reader who is of an experimental turn of mind will find this a most interesting field. I must, though, point out that he must make sure of avoiding the direct pick-up of undamped wave-trains by seeing that his set is as efficiently screened as possible and by reducing the length of all external leads as much as he can.

Some Good Advice.

Were it not for atmospherics the number of stations receivable with genuine pleasure would be very large indeed. Confine your attention to the most powerful on nights when interference is bad, but when you strike a night of comparative peace in the ether make a careful search and you will probably be surprised by the total of the stations received at full loudspeaker strength that can be added to your log.

R.W.H.

CONDITIONS this month can hardly be said to be dull, but they certainly are freakish. On most nights the regular "stand-by" Americans like W2 X A F and W2 X A D can be received at some sort of strength; and on roughly one night in every three they are excellent. But our eleven-year cycle certainly seems to be making its presence felt this summer.

Do not forget, though, that the "fifteen-month" cycle predicts a good period in the autumn this year. And don't be caught napping after the poor conditions of the summer without a receiver.

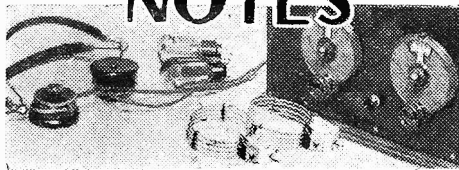
Are You an "H.A.C."?

I have been glancing through some old issues of "P. W." and was rather interested to read, under the heading of "Short-Wave Notes" for February 9th, 1929, these words: "The amateurs have their 'WAC Club' to qualify for which one has to 'WAC' (Work All Continents). Can any broadcast listener claim to belong to the 'HAC Club' by having heard all continents on telephony?" At that time there was no regular broadcast station in South America, so that the "HAC" presented difficulties that do not exist nowadays.

Nairobi, I fancy, was also not regularly on the air in those days, and Rabat certainly wasn't, so that Africa was not easy to "bag" on telephony.

"G. K. M.," a South African reader, has made a short-waver that gives him good

SHORT-WAVE NOTES



By W. L. S.

results when no earth is used; as soon as the latter is tacked on a tremendous hum blots out everything. I should think, "G. K. M.," that the overhead power lines you mention are probably responsible; in any case you won't lose anything by leaving the earth connection out of it.

Concerning the "unearthly yell" to which your set gives vent when you use a pentode, I should suggest that you decouple the H.T. feed to the priming-grid of the valve. Use 20,000 ohms in series with it and increase your H.T. a little, and I think you will find that you have tied things down successfully.

Very Disturbing!

"A. E. B." (Oxhey) has received a letter "in lieu of a QSL" from W A J which is a grim reminder of the "divulgence" clause in our licences. The letter explains that W A J is not a regular short-wave broadcast station, and that it "radiates addressed

programme material between the United States and points abroad."

With frigid politeness the authorities point out that no one except the observers at the point to which their programme is addressed has any right to make use of the programme, and that "the unauthorised divulging of the contents or simply of the existence" is in violation of the secrecy provisions of the International Radio Convention!

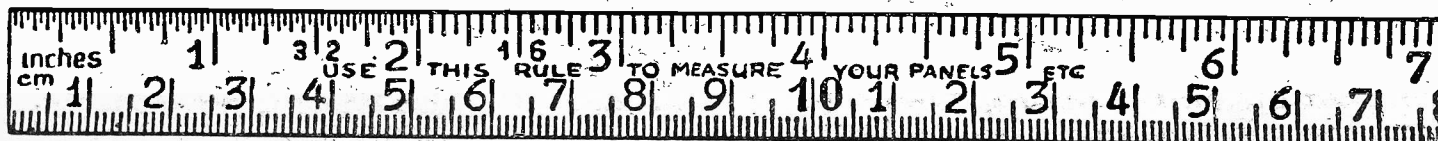
So now we know! If I hear a station like W A J on the air, without knowing whether it is broadcasting or not, I am not allowed even to "divulge its existence"! I must indeed "gang warily."

A Wonderful Log.

"W. W." (Exeter) sends in a beautiful log for the period May 19th-June 3rd, which must have taken him several hours to write out! Analysis shows the most consistently received stations to be W2 X A F, W2 X A D, W8 X K (25.25-metre wave), and (rather unusually) W1 X A Z (31.35 metres).

"W. W." also mentions that he receives the English programmes through an unknown station that relays them on about 65 metres. Does anyone know this one? He also finds Fécamp good on 52 metres.

Incidentally, "W. W.'s" log (broadcast only) for a fortnight occupies six closely written pages, which seems pretty good going. Can anyone rival that?



FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

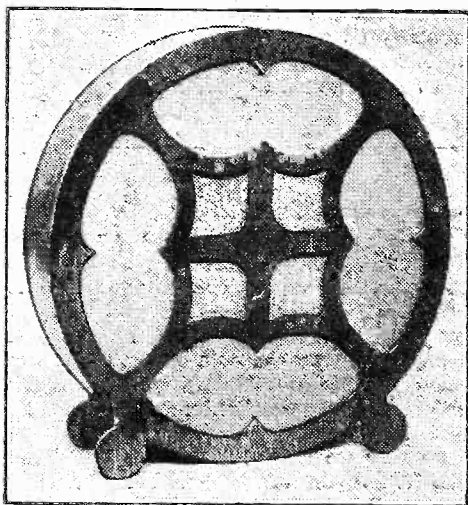


OVERCOMING RESONANCE.

ONE of the most common failings of cabinet-type speakers is due to resonance effects in the cabinet. At times this is so bad as to be quite objectionable.

Especially is this so with the cheaper type of speaker in which no real attempt has been made to meet the trouble.

THE "DONOPHONE" SPEAKER



The instrument is built into an attractive cabinet moulded in a novel style.

But this is certainly not the case with the Donophone speaker I have recently been testing. It has full-size openings on both sides, and while this must inevitably diminish the bass-frequency distribution to some degree, it certainly almost entirely eliminates the box resonance.

And I should say the structure has been very happily planned, for in this regard the Donophone is certainly quite superior to many other speakers in the same price class.

Additionally, it gives a good all-round performance as to its frequency response and is sensitive. At the price of 30s., it is a speaker well worth consideration.

STOPPING BREAK-THROUGH.

Since the introduction of the Regional Scheme "break-through" has become a serious thing, and with the opening of the Scottish Regional many more listeners will encounter it.

You need have no doubts as to whether

or not your set suffers from it, for "break-through" is the interference of a medium-wave station on the long-wave band.

It is due to the aerial circuit on long waves being roughly in tune at medium wavelengths instead of "aperiodic."

A cure is to arrange a "P.W." "Contradyne" adaptation of the existing circuit, i.e. insert a simple

hank-wound coil which is brought into series with the long-wave primary winding or tapping of the tuning coil.

And in this connection it is interesting to note that Messrs. Lissen are marketing what is in effect a Contradyne coil in a compact, neat form.

They call it the Anti-Break-Through Choke, and it is perfectly effective. Sufferers from "break-through" have thus an inexpensive and efficient remedy at hand. Details for using the device are given with it.

AN INDOOR AERIAL.

Modern sets do not necessitate the meticulously efficient outdoor aerials that were once almost essential to good reception. A good indoor aerial is indeed all that is needed in many cases—greater aerial pick-up than is possible with such resulting in an increase in static and general background noises.

There are numerous ways of arranging an indoor aerial, and one of the best I have met is to be found in the Picture-Rail type of the Melbourne Radio Indoor Aerial.

This comprises 12 feet of excellent flexible conductor of braided construction having the colouring of old gold. (At least, I think it is that, as I said once before when describing the self-same material—anyway, I find it very pleasing.)

And, at intervals are picture hooks and stand-off insulators. The cost is 2s. 6d. It is effective in operation and its appearance will no doubt prove to be definitely attractive in the eyes of many.

SOME EXCELLENT NEW COMPONENTS.

I will not attempt to deal this week with all the new components which Messrs. Wright and Weaire are now making, so I have split the range into two batches and will describe the second lot in a future issue. Here is the first collection.

(1) The R.D. Resistance is an answer to the constructor's dream. It comprises a small, sectionised wire-wound resistance of a neat, entirely practical plug-in type. Obtainable in a wide range of values from 50 to

25,000 ohms (current-carrying capacities from 280 to 9 milliamperes), it is designed and made on completely sound lines and conforms with its specification.

The prices of the R.D. resistance vary with the resistance values, and range from 1s. 3d. the 50 to 600 ohms models up to 2s. for 15,000, 20,000 and 25,000 ohm values.

(2) The On-Off Push-Pull Switch costs 1s., and embodies a most original and effective action. Its contacts are reliable and self-cleaning, and it has a clean, easy snap action. In fact, it is as near perfection as can be visualised.

The same efficient construction is to be seen in the new Wearite Wave-Change, Change Over and 4-pole push-pull switches.

PLEASE NOTE.

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

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

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

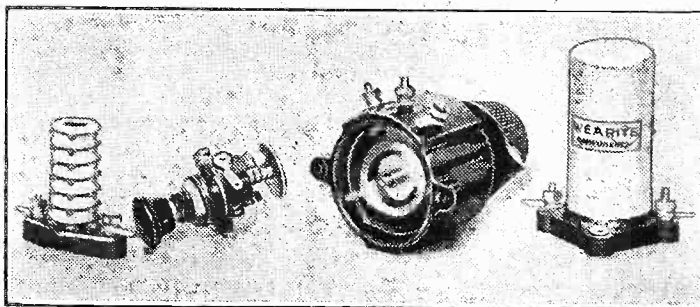
(3) The Volume Control at values from 600 to 50,000 ohms, retails at 4s. 6d., and an attachment for ganging is available at 1s. It has a beautifully smooth action, and this is made possible by means of a small roller which smoothly glides round the wire contact track. Resistance variation is even and flawless.

This component is also obtainable in values of from 50,000 to 100,000 ohms at 5s. 6d.

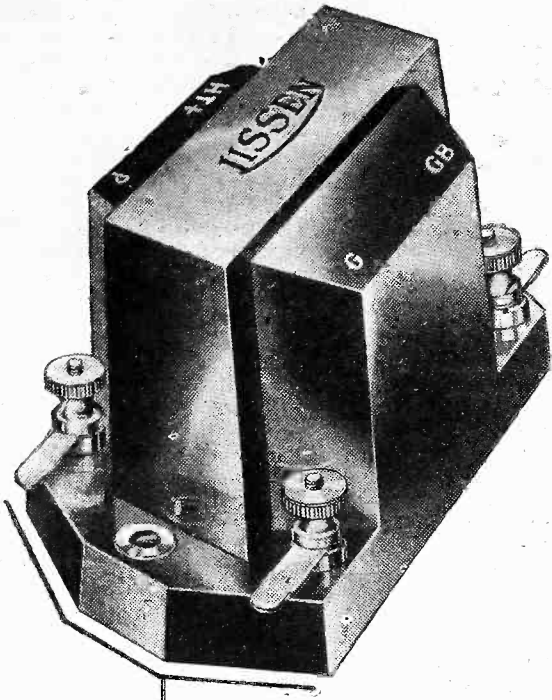
(4) The Screened H.F. Choke is a small component, unusually small, but it is universal in character and we find it adequately operates over the range claimed—15 to 2,500 metres. At 3s. 6d. it is excellent value for money.

I congratulate the makers of these Wearite components for they are doing the industry and the public a good service by producing such high-class gear at such reasonable prices.

FOUR FINE "WEARITE" LINES



Samples of the new resistance, switch, volume control, and H.F. choke now being made by Messrs. Wright and Weaire.



The transformer for the "Decade"

THE HEART
OF A
HUNDRED
RADIO
CIRCUITS

WHY do all the circuit designers specify the Lissen Torex Transformer? Because they know they cannot get any other transformer which gives such even amplification over all audible frequencies at anything like this price—because it makes a big cut in the cost of a receiver without sacrifice of quality—because it is a well-finished, well-designed component that is worthy of inclusion in any set.

The Lissen Torex is a high grade silicon steel core transformer; its moulded bakelite case hermetically seals and completely insulates the windings. Atmospheric moisture cannot penetrate, therefore it never breaks down.

PRICE

5/6

LISSEN TOREX

L.F. TRANSFORMER

LISSEN LIMITED, Worple Rd., ISLEWORTH, MIDDLESEX

Bring Your Music Out of the Instrument

Get rid of that tunnel effect by fitting the Howe Box Baffle. No ordinary loud-speaker cabinet is entirely free from resonance and resonance means distortion, a muffled tone, and unpleasant "boominess."

The Howe Box Baffle eliminates all resonance and is the scientific solution to this difficult problem.

The B.B.C. Year Book says "Actually, the results obtained from a Loudspeaker thus treated are . . . superior to those obtained using a flat baffle."

Any home constructor can fit a Howe Box Baffle. It requires no alteration to your set and no technical knowledge. The Kit contains full instructions and every single item required to construct it. Price, including royalty, 20/- delivered free.

Don't put up with faulty reproduction any longer. Ask your dealer or post this coupon for full particulars to F. McNeill & Co., Ltd., (Radio Dept. 10), 16, Lamb's Passage, Bunhill Row, E.C.1.

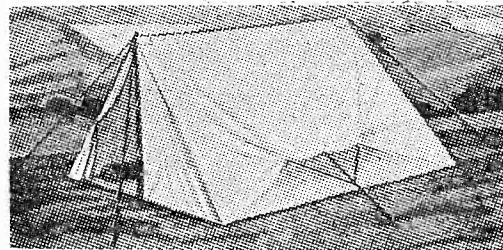
The **Howe**
Box Baffle Kit

"The Doom of Boom"

Not suitable for Portables.

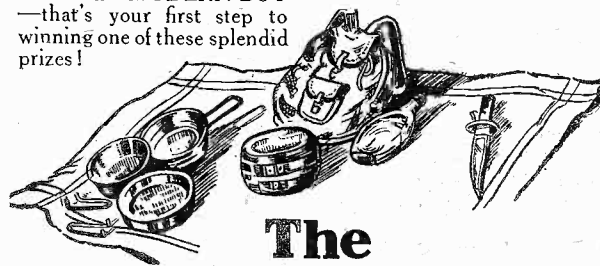
POST THIS FOR FREE BOOKLET
To F. McNeill & Co., Ltd., (Radio Dept. 10),
16, Lamb's Passage, Bunhill Row, E.C.1.
Please send me details of the Howe Box
Baffle Kit.
Name Address

FREE To Readers of MODERN BOY



Grand Camping Outfits

will be given away as prizes in a simple and fascinating competition to readers of MODERN BOY. Each Outfit includes a Tent, Rucksack, Canteen, Sheath Knife, Groundsheet and Flask. You might win one. So get your copy of this week's MODERN BOY—that's your first step to winning one of these splendid prizes!



The MODERN BOY

Buy Your Copy To-day - - - 2d.



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. 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 subjects 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

FINDING THE CURRENT.

C. A. (Luton).—"The makers of the valve kindly give away what they call a 'characteristic curve,' and I have been trying to understand this, without much success. How do I find what my anode current should be for, say, 6 volts grid bias?"

"The power valve I am working on at the moment has a curve with grid volts from 0 to 20 marked along the bottom, and anode current from 0 to 16 marked along the side. There

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try and answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

- (1) Apart from the London area, which county in England has the greatest percentage of licence-holders to population?
- (2) What is the difference between the "actual" and the "ignition" capacity of an accumulator?
- (3) To what frequency does a wavelength of 5 metres correspond?
- (4) Does the thickness of a baffle-board affect reproduction?
- (5) Where is the B.B.C.'s present Empire Station, and where will the new one be?

ANSWERS to the above questions will be found on page 484.

are four actual curves drawn in, one marked E75, the next E100, the next E125, and the fourth E150.

"I take it these are the values (75, 100, etc.) from the H.T. battery. If this is so, how do I work out what anode current I should be taking for certain grid volts?"

The idea behind all graphs of this nature is that the actual curve relates the values along the bottom line to the values along the upright line,

both the necessary measurements being laid off exactly at right angle to the scales. This simply means that the various upright lines and horizontals of the "characteristic curve" can be used to denote grid volts or anode current respectively when they meet on the curve at the same point, and any intermediate values can be indicated by lines running parallel.

The easiest way to understand that statement is to take a piece of square notepaper (or any similar right-angled straight edge), and place it so that one of the corners rests on the voltage line in which you are interested. If, for instance, you are going to employ 150 volts to the plate of the valve in question, slide the corner of your square of notepaper up and down the 150 line, keeping one edge of the paper vertical, and the other exactly horizontal.

Then the value of one scale, where the "straight-edge" touches it, is instantly and obviously related to the value on the other scale, which it touches also.

With the edge of the square of notepaper on, say, 6 volts grid bias, and the point or corner on the 150-volt characteristic curve, you will find that the other scale is cut at (say) 15 millamps. This represents the anode current, at those two voltages.

Move the point of your paper down the curve and it shifts to the left, where it will cut, say, 8 volts grid bias, and 11 millamps. A little further down you get 9 volts grid bias and a fraction over 9 millamps and so on.

In this way you can see how the alteration in grid bias affects the anode current when the voltage on the anode is kept steady. Note too that with amplifying valves it is the long, straight part of the curve that must be used, for if any of the bent parts are used, distortion will be experienced.

As a matter of fact, the effect of the incoming "programme-voltages" on the curve in question is to alter the grid voltage about the mean grid bias point, and thus continually to alter the anode current about a mean or average value. For distortionless amplification it is necessary that equal voltages up and down around the grid bias point should result in equal current variations up and down round the mean anode current.

It sounds rather complicated, but it will be perfectly clear if you work out a few examples with a piece of square notepaper as suggested.

USING TWO ANODE RESISTANCES INSTEAD OF ONE.

D. E. S. (Wolverhampton).—"My set is a three-valver—Detector, resistance coupled to 1st L.F., which is transformer coupled (3 to 1) to power valve. Results quite satisfactory,

though my friends who are 'noise-merchants' and who run three-valvers near me all said it was not as loud as it ought to be.

"It is a bit of an 'old-timer,' having been built in 1928, and the anode resistance (mounted in a strong clip, as there were no such things as spaghetti's then) was marked 150,000 ohms. I also had a second of these same wire-round resistances marked 150,000, left over from a prehistoric set. And I changed over the spare with the other anode resistance to see if it would make any difference.

"There was none to speak of, but when putting it back to try once again I held one resistance with its metal ends touching the metal on the other one—quite by accident. But up came the volume.

"It was decidedly better that way, so, as I could not see any harm in it I tied the two firmly together, (string!) and then poked one into place in the holder with the other making

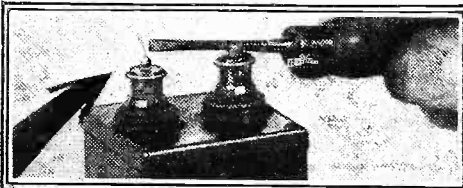
WHAT'S WRONG?

IS IT THE CONDENSER?

A dud condenser is one of the commonest causes of run-down H.T. batteries.

Large condensers (5 mfd. or so) can be tested by charging from D.C. mains or H.T. Battery and after an hour or so's interval testing for a spark, as shown below.

A dud condenser will not hold the charge and show a spark even an hour afterwards.



firm contact at both ends. Results very good.

"What I do not understand is why two resistances should give better results than one in the anode circuit? And have I made the coupling to the next valve stronger by passing more current than before?"

"Or what?"

The effect of connecting one resistance "across" or in parallel with another resistance of equal value, is to reduce the total effective resistance by one-half.

Thus you now have, in effect, a 75,000-ohm anode resistance, instead of 150,000 ohms.

Normally, this reduction of the value of the coupling resistance of an R.C. stage would reduce the coupling by an appreciable amount. But your results are stronger, so evidently there is another factor at work.

In all probability this is the amount of H.T. applied to the detector. You were probably "starving" the plate of current by the use of a 150,000-ohm resistance, and this was causing the valve to work at low efficiency, even with a high-value coupling resistance.

When the lower anode resistance permitted more H.T. to reach the plate of the detector, the overall results (despite the lower value of coupling resistance) were noticeably improved. It may easily happen with a valve that is rather critical of its H.T. voltage.

THE SUNDAY NIGHT TIME SIGNAL.

S. R. (Cleckheaton).—"I wonder if you can help me to identify two stations which I have just logged at the bottom of the tuning dial on medium wavelengths?"

"I cannot say the likely wavelength to

(Continued on next page.)

'P.W.' PANEL No. 77. THE VALVE: AMPLIFICATION FACTOR OR 'MU.'

Before signals are applied to a valve the working voltages ensure that a certain plate current is flowing. If the PLATE voltage is increased this plate current will increase by a certain amount. A similar rise in plate current could instead have been effected by a change in the GRID voltage. And this voltage change would have been much SMALLER, to get the same effect.

The amplification factor or mu (μ) of the valve then is equal to the grid volts required to produce a given anode current change divided into the plate volts required to produce a given current change. Thus if 20 volts on the plate produce the same effect as 2 volts on the grid, the amplification of the valve in question would be $\frac{20}{2} = 10$.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

within a few metres because it is a home-made coil intended to go down lower than its predecessor, on which the bottom station I could tune-in was Trieste.

"In that coil there was a total of 60 turns, but I have rewound, same wire, former, etc., but only 51 turns, and on this Trieste came in at 13 degrees.

"There were several other stations below this, and the two which interested me particularly were right at the bottom of the dial between 0 and 5 degrees. (I want to know these so that I can tell how low my tuning goes, and what new stations to look for in these lower degrees.)

"One of these was playing gramophone records, and speaking in French as well, I believe, as in English. But the other station, which was weaker, also appeared to be butting in with English announcements. The time was 11 p.m. (Sunday), and judge of my astonishment when the weaker station suddenly put out the familiar 'six pips' of the Greenwich time-

HOW ARE YOUR RESULTS NOW?

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

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

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

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

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

signal. As no B.B.C. stations were working at that hour on Sunday, I am wondering if it was a test, or who it could be?"

In all probability the station giving gramophone records was "Radio Normandie," the French station at Fécamp.

It is supposed to employ 10 kw. on a wavelength of 223 metres.

Immediately above it, on 224.4 metres, is Cork, and this was the station you heard giving the six pips at 11 p.m. Cork relays the Dublin programme, and Dublin is connected with Greenwich, just as the B.B.C. stations are.

But Dublin and Cork close later on Sundays, and generally give a news bulletin and time signal before closing down.

THE SELECTIVITY CONDENSER OF THE "ECKERSLEY" THREE.

W. J. S. (Stratford, London, E.15).—"I built the 'Eckersley' Three about two months ago. The only fault I find with it is the inconvenience of having to get inside the set to alter the series condenser.

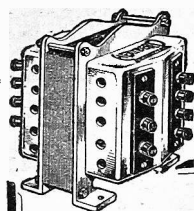
"I wondered if an aerial coupler could be used instead, if so, what would its maximum capacity be?"

A .0003-mfd. variable condenser, (solid dielectric type), could be mounted on the panel and wired up in place of the .0003 compression type.

If the leads are kept short and well spaced, you would probably find it worked as well as the original arrangement favoured by Capt. Eckersley.

CARBORUNDUM AS A DETECTOR.

P. C. (Reading).—"I propose to use a carborundum crystal which I understand never needs readjusting. The trouble in fitting this
(Continued on next page.)



NEW!

TRANSFORMERS

The new Mains Transformers, introduced by Heayberd for use with the latest Westinghouse Rectifiers, are proving extremely popular with Amateur Constructors wishing to build their own Mains Units. Send 3d. stamps now for new List 964, describing fully, with circuit diagrams, the models detailed below.

Secondary Tappings		Capacity	Rectifier	Rectified Output
W. 33	{ 240 v. 200 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 9 A.C. valves Power valve	{ 300 v., 60 ma.	
W. 34	{ 150 v. 550 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 10 A.C. valves Power valve	{ 200 v., 100 ma.	
W. 35	{ 300 v. 550 ma. 4 v. 5 amps. 4 v. 1 amp.	H.T. 11 A.C. valves Power valve	{ 500 v., 120 ma.	
Prices: W.33 35/-, W.34 45/-, W.35 65/-				

Prices: W. 33 35/-, W. 34 45/-, W. 35 65/-

HEAYBERD

MONARCH OF THE MAINS.

10, FINSBURY STREET, LONDON, E.C.2
(One minute from Moorgate Underground Station).

GENUINE BARGAIN. Full-size, up-to-date British-made Fountain Pens, beautifully engraved with 14-ct. Iridium-tipped nibs, lever self-filling device, and safety cap, at 3/- each, usual price 6/6. 3-doz. lots at 16/-. Sent on approval, cash or C.O.D. Cannot be repeated.—**Brookman Rapid Radio Service, 77, Hockley Street, Birmingham.**

The Goods as Advertised! From TWO to TWO THOUSAND metres, we can solve your Radio Problems, including Amateur Transmission! Whatever your difficulty, write us. Charges: 3/- per query, four or more 2/6 each, including diagrams.

RADIO TECHNICAL AGENCY, DEPT. P.W.
2, Westgate Chambers, Newport, Mon.

"ENGINEERING OPPORTUNITIES." This is a book you must not miss. It contains brilliant articles by Prof. A. M. LOW, our Employment Supdt., etc., shows how to pass A.M.I.Mech.E., A.M.I.C.E., A.M.I.A.E., I.E.E., M.I.M.T., Matric., G.P.O., and all other Exams, and outlines over 100 Home-Study Courses in all branches of Engineering. Send for your copy to-day. FREE and without obligation. We alone guarantee—"NO PASS—NO FEE." **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 401, Shakespeare House, 29, Oxford Street, London, W.1.**

EXACT TUNERS

250 to 2,000 metres. Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.

THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

THE PICTURE PAPER WITH THE MOST NEWS
SUNDAY GRAPHIC
and Sunday News

PILOT AUTHOR'S KITS

Exact to Specification

CASH—C.O.D.—H.P.—Immediate Delivery.

The DECADE

KIT "A" Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **£3-9-5**

or 12 monthly payments of 6/5
KIT-BITS Selected C.O.D. Lines—Post Charges Paid on Orders value over 10/-

Set of Specified Valves	£1 6 0
Specified Peto-Scott Cabinet	15 0
Colvern Dual Range Coil, R.M.3A	8 6
Lissen .0005 Variable Condenser with Formo Slow-motion Dial	9 0
Moderator Coil	2 6

COSMIC III KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **70/-**

or 12 monthly payments of 6/5
Specified Valves, £16:0
Specified Cabinet, 17/6

COSMIC III STAR KIT "A"

Author's Kit with Ready Drilled Panel less valves and cabinet

CASH or C.O.D. **87/6**

or 12 monthly payments of 8/-
Specified Valves, £16:0
Specified Cabinet, 17/6

EASIWAY ITEMS

JUST RELEASED

COSSOR MELODY MAKER ... Model 335 ...

Complete with valves, speaker and cabinet. Employs Cossor Variable-Mu S.G. H.F. stage, Detector and Power Valves. Cash Price **£7-17-6** Send **14/6**
Balance in 11 monthly payments of 14/6. Only.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price **£2/12/6** Send **4/10**
Balance in 11 monthly payments of 4/10. Only

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER. With 3-ratio input transformer. This speaker will handle up to 5 watts. Cash Price **£1/15/0** Send **6/6**
Balance in 5 monthly payments of 6/6. Only

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price **£2/5/0** Send **4/2**
Balance in 11 monthly payments of 4/2. Only

R & A CHALLENGER PERMANENT MAGNET MOVING-COIL SPEAKER. With special Ferranti multi-ratio input transformer. Cash Price **£1/15/0** Send **6/6**
Balance in 5 monthly payments of 6/6. Only

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price **£2/17/6** Send **5/4**
Balance in 11 monthly payments of 5/4. Only

BLUE SPOT SPEAKER UNIT AND CHASSIS, TYPE 100U. Cash Price **£1/19/6** Send **5/5**
Balance in 7 monthly payments of 5/5. Only

ATLAS ELIMINATOR, TYPE A.C.244. 3 Tappings, S.G., Detector and Power. Output: 120v. at 20 m/a. Cash Price **£2/19/6** Send **5/6**
Balance in 11 monthly payments of 5/6. Only

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1.

Dear Sirs, Please send me CASH/C.O.D./H.P.

for which I enclose £.....s.....d.
CASH/H.P. Deposit.

NAME.....

ADDRESS.....

P.W.25/6/32

West-end Showroom: 62, High Holborn, London, W.C.1.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

up is that I am not quite sure about the pressure to apply to it, although I understand it can be a good strong contact.

"Also, I am very uncertain about the battery which should be used with it. Could you give me the connections for this, when joined to an ordinary plug-in coil and condenser tuning circuit?"

"If you will give the detector side of the leads which go to the tuning circuit that will be sufficient, as I understand everything except the unusual detector connections."

A carborundum crystal in contact with a steel point or plate should make an excellent crystal set.

The pressure may be quite considerable, say, up to 1 lb. or more, and once set with correct voltage applied by the small battery, the set will remain sensitive and without the slightest need for adjustment of any kind.

THE ANSWERS

TO THE QUESTIONS ASKED ON PAGE 482
ARE GIVEN BELOW:

- (1) Hertfordshire, with 15%.
- (2) The "actual" capacity is that for **CONTINUOUS** discharge, as distinct from intermittent discharge. In the latter case the accumulator "recovers" during the pauses between use, and its intermittent-discharge capacity (or "ignition" capacity) is about double its actual capacity.
- (3) Sixty thousand kilocycles per second.
- (4) Yes, noticeably. The baffle-board should not be less than about $\frac{1}{4}$ in. thick.
- (5) At Chelmsford, Essex. The new one is being built at Daventry.

DID YOU KNOW THEM ALL?

To get the correct voltage required by the carborundum you can use an ordinary 1½-volt bell battery, and a 1,000-ohm potentiometer (or thereabouts). There will also be required a fair-sized by-pass condenser, such as .001 mfd., the steel contact and carborundum crystal, and, of course, a pair of telephones.

The connections will be as follows:

The earth side of the tuned circuit will go to one telephone terminal. The remaining telephone terminal will go to the carborundum detector.

The steel contact side of the detector will go to the slider of the potentiometer and also to one side of the by-pass condenser (.001 mfd.). The remaining side of this by-pass condenser will go to the other end of the tuning circuit, and will go also to the negative terminal of the battery and to one end of the potentiometer.

The other end contact of the potentiometer should be joined to an ordinary on-off switch. The remaining side of this switch should go to the positive terminal of the bell battery.

This completes the connections. If you do not get good results at the first attempt, try the effect of reversing the leads to the terminals of the dry battery.

TECHNICAL BRIEFS

A few short paragraphs which contain valuable information for the set-builder presented in a concise manner.

Constructors of portable sets in doubt about the number of turns required for frame aerials of various sizes should remember that the best rough-and-ready rule is to use 75 feet of wire, with the usual small spacing between turns, for the medium wavelengths. (The number of turns will then, of course, depend on the size of the frame.)

A useful guide in determining the number of turns required for the long-wave frame aerial is to wind on 240 feet.

An often unsuspected cause of microphonic howling is the vibration of variable condenser vanes.

One rather puzzling form of distortion is caused by a faulty output choke in which some of the turns are shorting.

The ill-effects of the high internal resistance of a battery are well known and guarded against by decoupling, but it is often forgotten that these are greatly increased by corrosion of the terminals.

A PORTABLE POINT.

Portable sets which show a tendency to howl on account of microphonic vibration from the loudspeaker may often be cured by placing over the valve a valve box lined with some cotton-wool.

A faulty by-pass condenser or a broken lead to a decoupling condenser may set up motor-boating troubles difficult to trace.

When looking for interference, it is often recommended that the aerial should be removed in order to find whether the interference is coming into the set from outside or is present in the receiver. The earth wire should be removed at the same time as the aerial as it sometimes happens that such external interference is brought to the set via the earth.

One of the most difficult forms of interference to overcome is that of electric signs at cross-roads.

A good method of testing a potentiometer for a fault is to connect a suitable voltage battery across it and then join a voltmeter between the slider and one end of the resistance. (A smooth variation as the slider is moved along the potentiometer indicates that the instrument is O.K.)



45

Including Transformer and Baffle Board.

The **PRICE** was **MADE** for **YOU..**

—but the only consideration that governed the design of the **MoToR MINOR** was a fixed determination to produce a Moving Coil Loudspeaker that would positively defy comparison in sensitivity, tone quality, and value. Only the best components could achieve this object, so only the best were used. Only comparison can convince you, so compare before you choose. Your choice will surely be a

MoToR MINOR

Permanent Magnet MOVING COIL

BRITISH MADE

Overall Diameter, 9½".
Overall Depth, 4½".
Cone Diameter, 7".

D.C. Resistance: 10 ohms.
Impedance of Speech-coil: 5 ohms.
Approx. Coil Gap: 1 mm.
Transformer Tappings: 25:1, 20:1, 15:1.

Available also in handsome walnut cabinet

The **CHESTER 75/-**

Write for free descriptive pamphlet.

TEKADE RADIO & ELECTRIC LTD.
147, Farringdon Road, London, E.C.1

WESTINGHOUSE

"THESE RADIO COMPONENTS"



—RECTIFIERS

An A.C. eliminator is no better than its rectifier. Therefore, make certain that the rectifier incorporated in YOUR eliminator is reliable, has a long life and high efficiency, and will give a constant and adequate voltage... make certain that it is a **WESTINGHOUSE METAL RECTIFIER**.

Capt. P. P. ECKERSLEY, M.I.E.E., "P.W.'s" Chief Radio Consultant, says:—

"It seems to me their use is highly desirable because they do not want replacing... these metal rectifiers are really reliable... Metal rectifier costs are higher than valve rectifiers, but the metal lasts 'last for ever,' and the thermionic certainly do not. In years to come I should think that everyone will use **METAL rectifiers**."

Why not start now, by sending 3d. in stamps for a copy of "The All-Metal Way"? It contains full particulars of these reliable rectifiers, and gives circuits for building suitable eliminators. Please mark your application "Dept. P.W."

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.,
82, YORK ROAD, KING'S CROSS, LONDON, N.1

READERS' REMARKS

Some representative letters from "P.W." set builders.

THE "S.Q. STAR."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have finished building the "S.Q. Star," and have tried it out thoroughly. I have made several "P.W." sets before, and dismantled that magnificent set, the "New Coil" Five in favour of it, and it is all you say about it. I have put everything of the best into it, and use a Blue Spot 29R speaker, and the results are truly wonderful, clear, sweet music, without mush and a lot of squeals, and also selectivity.

I should like to congratulate you on the splendid results and design of a magnificent and up-to-date receiver.

Good luck to the good old POPULAR WIRELESS.

Yours sincerely,
Middleton, Leeds. LEWIS BERRY.

THE "ECKERSLEY" TUNER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have made the "Eckersley" Tuner, and I am very pleased with results. It is fitted in the "Comet," and has had three weeks' trial before I would write and let you know what a thing Captain Eckersley invented for the public. It took me a few hours of work to find out different things, and I found them, so would you mind thanking Captain P. P. Eckersley for his wonderful invention. So cheerio, and all the best to "P.W."!

Yours respectfully,
South Bermondsey. P. J. HOBBS.

HIS FIRST THREE-VALVER.

The Editor, POPULAR WIRELESS.

Dear Sir,—I think I must thank "P.W." for the wonderful "Comet" Three circuit.

I have had no experience with valve sets yet I found the making of the "Comet" Three was a simple matter.

I have tuned in 44 stations, all at good loudspeaker strength. Those on the long waves are: Huizen, Radio-Paris, Königswusterhausen, Daventry National, Eiffel Tower, Warsaw, Kalunborg, and Croydon.

Medium waves are: Brussels No. 1, Milan, Langenberg, North Regional, Beromünster, Rome, Sottens, Mid-Regional, Frankfurt, Toulouse, Muhlacker, London Regional, Strasbourg, Brussels No. 2, Breslau, Göteborg, Cardiff, Bordeaux-Lafayette, North National, Hilversum, Turin, Bratislava, Heilsberg, Moravska-Ostrava, Nürnberg, Bordeaux-sud-ouest, Cologne, Cork, Helsinki, Königsberg, and Fécamp.

Yours faithfully,
FREDERICK SMITH.

Upper Norwood, S.E.19.

WONDERFUL "SUPER-QUAD STAR."

The Editor, POPULAR WIRELESS.

Dear Sir,—I should like to compliment the staff of "P.W." for such a magnificent receiver as the "S.Q. Star," appearing in your journal in last December.

Having constructed the set, same was tried out on Sunday, using a 12-ft. indoor aerial, 120 volts H.T., and large Blue Spot speaker. From the outset it was obvious that, notwithstanding its inexpensiveness and paramount simplicity of construction, it ranks very high indeed among the superhet. type, for I experienced not the slightest trouble from background, harmonics, etc.

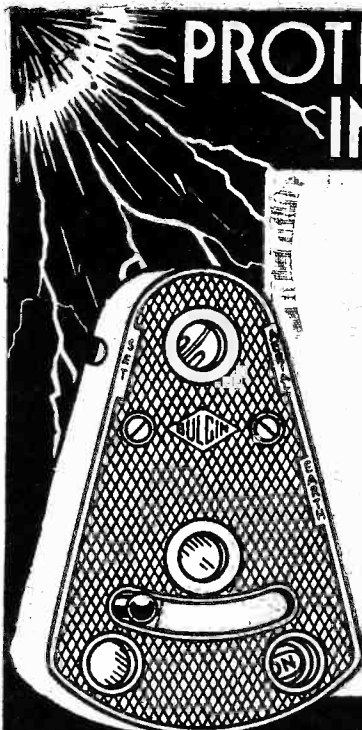
The selectivity is truly startling, station after station being dismissed and all the time no suspicion of overlap. Every station of note in Europe seems to come in at full loudspeaker strength, and, to quote one example, Toulouse at 8 kw. absolutely crashed in, necessitating the use of volume control.

In a nutshell the "Super-Quad" has a performance only matched by the most expensive of factory productions, and transcends any receiver I have yet tested as regards super knife-edge selectivity.

Wishing "P.W." all success in the future.

Yours faithfully,
London, S.E.15. F. VINGOE.

PROTECTS YOUR HOME INSURES YOUR SET



A genuine lightning switch incorporating the 4 UNEXCELLED FEATURES enumerated.

£100 INSURANCE GUARANTEE

Free Insurance Policy against damage to your set by lightning, given with every Bulgin Lightning Switch.

Note the Exclusive Features and Price.

EXCLUSIVE FEATURES:

1. Fuse in circuit when set is in operation.
2. Discharge gap.
3. Indicator denoting "ON" or "OFF" spring.
4. Quick make and brake action. (A unique feature never before incorporated in a lightning switch. SELF CLEANING CONTACTS under control of a powerful control lever.)

NOTE THESE WONDERFUL FEATURES AND THE PRICE

Now obtainable from all dealers.

Send 2d. Postage for 75-pp. Catalogue and Manual.

A. F. BULGIN & Co., Ltd., Abbey Road, Barking, Essex

Telephones: Grange Road 3266-7.

London Showrooms: 9, 10, 11, Cursitor Street, E.C.4.

Telephone: Holborn 2072.

BULGIN

PAT. The Choice of Critics PEND.

LIGHTNING SWITCH

2/6

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Specialty, 5/-)
Transformers 4/-, Headphones 4/-, all repairs magnetised free. Eliminator Repairs quoted for. 24 Hours Service. Discount for Trade. Clerkenwell 9069.

E. MASON, 44, EAST ROAD, LONDON, N.1.

300 ohms to 5 megs

1/6

HOLDER 6"

BETTER THAN WIRE WOUND

OHMITE

RESISTANCE

WEEDON POWER LINK RADIO CO.

New service to their many clients. Transformers, Loud Speakers, Pick-ups, any make or item, repaired as new. 3/6. Articles returned to you C.O.D. Post. Eliminator repairs quoted for. Supervised by specialists. Note new address: 185, Earlham Grove, Forest Gate, London, E.7.

FREE A Luxury Wireless Set

or components of equivalent value

Wonderful offer to introduce the Radialaddin Club. Write, enclosing 14d. stamp for particulars.

Radialaddin Club (Dept. P.W.), 47/48 Berners Street, London, W.1. Museum 1821.

SUMMER SALE!!!

ELECTRADIX BARGAINS

1,000 Wonderful Radio and Electrical Bargains at Rock Bottom Prices.

SEND FOR NEW LIST.

ELECTRADIX RADIOS,
218, Upper Thames St., London, E.C.4.

WE invite readers to support our Advertisers—care being taken to accept only announcements of reputable firms!



3-prong Spring Grip

BELLING-LEE WANDER PLUG.
Stays "put," even in portables under vibration.
Side-entry: the whole flex gripped—copper, rubber and braiding. Loaded without tools.
Resilient hard drawn spring wire prongs (not soft brass).
Grips every battery socket; each plug tested in sockets smaller and larger than any known H.T. battery socket.
Write for complete list of Radio Connections.

12 PERMANENT INDICATIONS

BELLING-LEE
FOR EVERY RADIO CONNECTION

New Times Sales Co

EVERYTHING RADIO EASIEST TERMS

JUST RELEASED!

COSSOR MELODY MAKER

Model 335. Complete with valves, Speaker and Cabinet. Employs Cossor Variable-Mu S.G., H.F. stage Detector and Power. Cash Price £17/6. With 14/6 order
Balance in 11 monthly payments of 14/6.

SUPER V.3 KIT ("Radio for the Million") for Send mains, including valves, cabinet, speaker and A.C. mains equipment. Cash Price £15/11/3. With 28/6 order
Balance in 11 monthly payments of 28/6.

COSSOR ALL-ELECTRIC MELODY MAKER, Type 235. Complete with Valves and Cabinet. Cash Price £9/9/6. With 17/4 order
Balance in 11 monthly payments of 17/4.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3. Complete with 3-ratio input transformer. Cash Price £12/12/6. With 4/10 order
Balance in 11 monthly payments of 4/10.

R & A "100" PERMANENT MAGNET MOVING-COIL SPEAKER. Complete with multi-ratio input transformer. Cash Price £22/17/6. With 5/4 order
Balance in 11 monthly payments of 5/4.

BLUE SPOT SPEAKER AND CHASSIS, TYPE 100U. Cash Price £1/19/6. With 5/5 order
Balance in 7 monthly payments of 5/5.

W.B. PERMANENT MAGNET MOVING-COIL SPEAKER, Type P.M.4. Complete with Transformer. Cash Price £2/2/0. With 5/9 order
Balance in 7 monthly payments of 5/9.

R & A CHALLENGER

PERMANENT MAGNET MOVING-COIL SPEAKER With special Ferranti multi-ratio input transformer. Will operate from a 2-valve set up to a power amplifier. Cash Price £1/15/-. With 6/6 order
Balance in 5 monthly payments of 6/6.

CELESTION P.P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, with impregnated diaphragm and dual-impedance input transformer. Cash Price £2/7/6. With 6/6 order
Balance in 7 monthly payments of 6/6.

ULTRA IMP PERMANENT MAGNET MOVING-COIL SPEAKER, with input transformer. Cash Price £2/15/0. With 5/- order
Balance in 11 monthly payments of 5/-.

BLUE SPOT PERMANENT MAGNET MOVING-COIL SPEAKER R.100, with input transformer. Cash Price £3/15/0. With 6/11 order
Balance in 11 monthly payments of 6/11.

CELESTION MOVING-COIL SPEAKER R.P.M.12. Complete with step-down transformer. Cash Price £7/0/0. With 12/10 order
Balance in 11 monthly payments of 12/10.

ATLAS A.C. 188 ALL-MAINS UNIT. Two variable and one fixed tapplings. Trickle charges 2, 4, or 6 v. at 5 amp. Cash Price £6/0/0. With 11/- order
Balance in 11 monthly payments of 11/-.

ATLAS A.C. ELIMINATOR, TYPE A.C.244. Three tapplings S.G., detector, and power. Output, 120 volts at 20 m.a. Cash Price £2/19/6. With 5/6 order
Balance in 11 monthly payments of 5/6.

EPOCH J.1 PERMANENT MAGNET MOVING-COIL SPEAKER with 3-ratio input transformer. Cash Price £2/5/0. With 4/2 order
Balance in 11 monthly payments of 4/2.

ANY ITEMS ADVERTISED IN THIS JOURNAL SENT C.O.D. IF VALUE OVER 10/- SENT ALL C.O.D. CHARGES PAID.

TO NEW TIMES SALES CO.

56 Ludgate Hill, London, E.C.4

Please send me (a) Free 1932 Catalogue

(b).....for which I enclose

first payment of £.....s.....d.....

Name.....

Address.....

.....P.W. 25/6/32

THE LISTENER'S NOTEBOOK

(Continued from page 472.)

It seems to me rather ungrateful on the part of the B.B.C. so to treat the theatre, seeing to what extent it is indebted to it. For does it not in its own radio drama employ all the forms of the theatre; and its traditions, besides absorbing into its programmes all the machinery? Mr. Agate might remember this, and in future think twice before having his little joke.

I was shown over a garden the other day and the owner with obvious pride referred to it as a "Middleton." "I have carried out his instructions to the letter," he said.

"Well, it does you credit," I replied. "Does *him*, you mean," replied my friend. "And now," went on the amateur gardener, "I must begin lifting my bulbs. I've always let 'em stay where they are, but Mr. Middleton says 'No!' He told me all this last Monday."

I wonder how many more Middleton gardens there are. A good number, I guess.

It was something new for the B.B.C. to include in an entracte an excerpt from a play coming a week later. The idea isn't new, of course, as it has been long practised at the cinemas. A case of more borrowing!

Commander Stoker's story of the forcing of the passage of the Dardanelles was one long thrill. It was a good story ideally told and with remarkable vividness.

His best descriptive passages were those relating how enemy craft passed and re-passed over the A E 2 as she lay snugly on the bottom, her hazardous course through the minefields, and her contact with impedimenta of various kinds, all real sources of danger to her. The closing sentence of the story, too, was just perfect.

Music Hall No. 3 maintained the standard set by its predecessor No. 2. We played the eavesdropper again, and the studio audience seemed more formidable than ever.

Despite these irritations, the programme left the impression that John Tilley is *some* raconteur, that Jenny Howard is a girl with a future, that Nosmo King well deserves his popularity (by the way, I would like to know the significance of his reference to Thorpe Road, Peterborough—what's Wigan done?), that G. H. Elliott has lost none of his former glory, though through the loud-speaker he sounds more like a Swiss yodeller than a coon, that José Collins is very ordinary, probably because she is unseen, that Terence McGovern & Co. make all tunes sound alike on that terrible instrument, the accordian, and finally, that Will Eyfe is a trifle too phlegmatic for my liking—his patter is very funny, of course.

The studio audience wasn't so discriminating as I, however, and seemed to enjoy them all equally.

Though I usually welcome variety, I would like the Roosters better if they stuck entirely to army stuff, as this is always certain of a good reception. The fact is that while they are, in my opinion, the premier exponents of the "Old Bill" type of comedy, their efforts at anything else seem to lack the same lustre.

TECHNICAL NOTES

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

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

Dual-Range Coils.

WITH some types of dual-range coil you will find that the effectiveness of the medium wavelength section of the coil is interfered with by the long wavelength part. The long waveband winding may be disconnected from circuit or may be shorted and when the above-mentioned trouble occurs it is because the long wavelength part is nevertheless tuning to a medium wavelength; this wavelength depends upon the self-capacity of the coil and upon its inductance and is naturally influenced by the other capacities in the circuit.

When conditions are as mentioned above you will find that for a part of the medium wavelength band you will require a good deal more reaction than usual and, in fact, if the efficiency of the medium wavelengths is very seriously interfered with by the long wavelength part of the coil, it may be impossible to get the circuit to oscillate at all over some part of the tuning range, no matter how much reaction is used.

A Common Fault.

You will naturally want to know how to overcome the trouble when it is present, but it is not always quite easy to get rid of it, especially in commercially-manufactured coils. One thing you can do, however, is to short-circuit the long wavelength part when not in use (unless this has already been provided for in the coil).

Another thing you can do, which is very useful sometimes, is to add a fixed condenser across the long wavelength part, so as to alter the tuning completely and so get rid of the trouble that way.

It is very important to have the coils as efficient as possible, because otherwise not only will you get poor signal strength and more difficult tuning, but also the tuning will be broad.

About Tuning Dials.

With the improvements which have been made from time to time in the selectivity of receivers we have had to use better and better types of tuning dial. Some of the slow-motion or vernier dials now on the market are very good, but I am sorry to say that there are a good many which, although they look very nice, cannot really be relied upon in use.

It is very aggravating to have a slow-motion dial which slips, or has backlash, or is stiff and jerky in operation so that it cannot be accurately and smoothly adjusted to within a fraction of a degree. Not long ago I came across a set with a dial of this kind and it was just like playing hide-and-seek with the station I was trying to tune in. This sort of thing, of course, is ridiculous and there is no excuse for it at all.

Now that the super-heterodyne is coming back into popularity so much, the need for (Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

razor-edge tuning is greater than ever. Sometimes a station will be received at full strength and disappear again, all within a fraction of a degree, so it goes without saying that nothing else than the very best will do in the way of tuning adjustments.

Standards of Selectivity.

Although we hear a good deal about selectivity, I should say that one of the chief faults with the great majority of receiving sets to-day is insufficient selectivity. The need for selectivity has increased very much during the past few years and goes on increasing, so that the standards by which we judged a receiver even as recently as three years ago will not do for the present day.

The tuning curve with many receivers is very poor and although reaction is used this really does not make up in every sense for a poor tuning curve.

The fact is that with the great magnification now obtainable—for instance, a couple of screen-grid H.F. stages and a large amount of L.F. amplification—requires much greater selectivity than is usually provided.

High Resistance Coils.

There are various reasons why selectivity is not as sharp as it might be. For one thing, fairly high resistance coils are often used to facilitate ganging and for another thing tuning is often far from accurate over the range, either owing to a fault in the tuning condenser or to wrong adjustment by the operator of the set.

I have mentioned before the advantages of the super-heterodyne in this direction and there is no doubt in my opinion that the super-heterodyne is destined to come very much into popular favour again. Not only has it many advantages in use, but it is also easy and cheap to build and can be operated with ease.

A six-valve super-het. may be built up to cost no more, or little more than a decent three-valve set. It is capable of giving excellent quality and as regards the building of the set, this is quite as easy as—if not even easier than—the building of some three- or four-valve sets of the ordinary type.

Powerful local stations can be tuned in and out within a couple of degrees (sometimes much less), and scores of distant stations brought in at full loudspeaker strength with very good quality.

A Popular Type of Set.

A good many people still use the det. and 2 L.F. type of set, and with this quite good results can be obtained if a proper tuner is used, but care has to be taken to avoid distortion. If the set is arranged for receiving a number of distant stations the local stations are apt to be very loud and so some sort of volume control, becomes necessary, especially where the two L.F. stages are transformer coupled.

A suitable volume control consists of an adjustable resistance across the primary of the first transformer. This resistance may have a total value of, say, 100,000 ohms, and it enables the volume to be varied from the maximum down to almost zero.

By the way, when using two transformer-coupled stages in this way it is generally

(Continued on next page.)

POPULAR

For many reasons besides price

The J.B. "POPULAR" LOG CONDENSER—a typical J.B. product in its sound design, high electrical efficiency, and thorough finish.

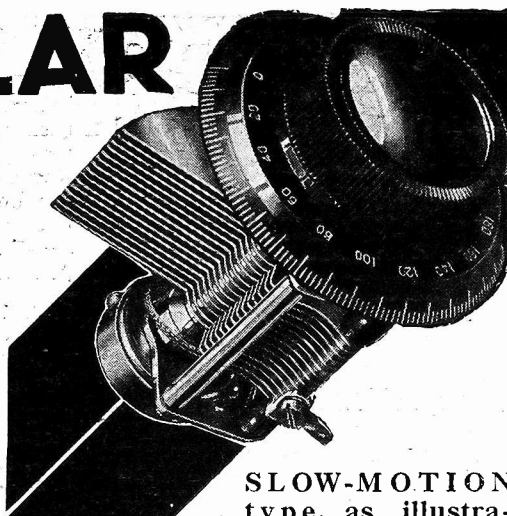
Two models—plain or slow-motion—with rigid brass frames, vanes of extra heavy gauge brass, and end-plates highly finished in nickel-plate.

High-grade ebonite insulation. The slow-motion has a ratio of 35 to 1 and is smooth, silent, and sure in action.



PRECISION INSTRUMENTS

Advertisement of Jackson Bros., 72 St. Thomas' Street, London, S.E.1. Telephone: Hob 1837.



SLOW-MOTION type, as illustrated, with 3-in. dial and knob.

•0005, 8/6 •0003, 8/3
•00025, 8/- •00015, 8/-

PLAIN TYPE (without dials)

•0005, 6/- •0003, 5/9
•00025, 5/6 •00015, 5/6
4-in. dial, 1/6 extra.

Write for illustrated Catalogue.

For Manufacturers & Constructors.

OSTAR-GANZ
UNIVERSAL MAINS VALVES

One valve for both the A.C. & D.C. mains sets with heater voltage up to 250. No mains transformers. No breaking-down resistance.

G.P., Det. and Power Valves ..	17/6
Super Power Valves ..	18/-
Rectifying—50 M.A. ..	14/6
125 M.A. ..	15/6

Full details from: EUGEN FORBAT,
Sole Representative for Gt. Britain,
c/o Nivalight, Ltd., 1, Rosebery Avenue, E.C.2.

Sensational! Revolutionary!

UNIVERSAL
ALL MAINS KIT

This Kit can be used for either A.C. or D.C. at will without any alteration with Ostar Universal High Voltage Valves and all-British Components.

Complete, ready for assembling, with 2 Valves and Rectifier .. £6-0-0

When ordering please state voltage only.
Full particulars from: EUGEN FORBAT,
c/o Nivalight, Ltd., 1, Rosebery Avenue, E.C.2.
Tel. Number: Clerk. 1825.

Make

The DAILY SKETCH

YOUR Picture Paper

PLEASE be sure to mention
"POPULAR WIRELESS"
when communicating with
Advertisers. THANKS!

A TRIUMPH OF
TECHNIQUE,
QUALITY,
& ECONOMYGOODMANS
"DREADNOUGHT"
P.M. MOVING COIL
REPRODUCER

39/6

COMPLETE WITH MULTI-RATIO O.P. TRANSFORMER

● To see a Goodmans "Dreadnought" Permanent Magnet Moving Coil is to realise that here is a quality production. To hear it is to know that such care in manufacture is worth while. Equipped with a powerful magnet, it has a remarkably wide frequency range, is extremely sensitive, and free from resonances. Its low price, scientific construction and remarkable performance, are the culmination of 7 years' manufacture of moving coils.

From your Dealer or direct from P.M. Dept.,
GOODMANS, 69, St. John Street, LONDON, E.C.1.
Ask for free descriptive literature.

THE LONDON RADIO SUPPLY COMPANY

FOR
QUICK EASY PAYMENT SERVICE

We supply all good quality Radio Receivers, components and accessories on deferred terms. Large stocks are carried and orders are executed promptly. Send list of requirements and a quotation will be sent by return of post. Price list free on request.

NEW EPOCH A2 PERMANENT MAGNET MOVING COIL UNIT. Cash Price £3/3/0. With 5/9 order
And 11 monthly payments of 5/9.

HEAYBERD A.C. ELIMINATOR KIT. C 150, With 6/6 order
output 25 M/A. Cash Price £3/10/0.

And 11 monthly payments of 7/-.
ATLAS ELIMINATOR, A.C. 244. 3 H.T. Tappings. 20 M/A output. Cash Price £2/19/6. With 5/- order

And 11 monthly payments of 5/6.

ORMOND PERM. MAGNET MOVING COIL UNIT. Cash Price £3/5/0. With 5/- order
And 11 monthly payments of 6/-.

MARCONIPHONE PICK-UP AND TONE-ARM, still the finest pick-up available. Cash Price £2/5/0. With 5/- order

And 9 monthly payments of 5/-.

NEW R & A "CHALLENGER" PERM. MAGNET MOVING COIL UNIT. Cash Price £1/15/0. With 5/- order

And 6 monthly payments of 5/8.

SET OF THREE NEW VALVES, MULLARD or COSSOR. S.G., Detector and Super Power. Cash Price £1/15/6. With 5/6 order
And 6 monthly payments of 5/8.

12 EXIDE HIGH-TENSION ACCUMULATORS (120 volts W.H. to super-capacity, 5,000 milliamps). The cheapest form of high-tension supply where electric light mains not available. Cash Price £3/15/0. With 6/6 order
And 11 monthly payments of 7/-.

NEW W.B. PM4 PERM. MAG. MOVING COIL UNIT. Cash Price £2/2/0. With 5/6 order
And 7 monthly payments of 5/9.

To avoid delay will customers kindly send deposit with order.

THE LONDON RADIO SUPPLY COMPANY

(Established 1925)

11, Oat Lane, Noble St., London, E.C.2

'Phone: National 1977

GARD your WIRELESS SET from LIGHTNING!



Don't switch off—fix a Graham-Farish "GARD" between aerial and earth and listen through the worst of storms. A Graham-Farish "GARD" gives complete protection from lightning and does not affect reception. Beware of imitations. Buy only the Graham-Farish "GARD" (spelt G A R D). From all Radio dealers or post free from—Graham Farish, Ltd., 181, Masons Hill, Bromley, Kent.

GET A GARD LIGHTNING ARRESTER

16 POST FREE

REMEMBER!

"POPULAR WIRELESS" has the largest sale of any WEEKLY WIRELESS JOURNAL

TECHNICAL NOTES

(Continued from previous page.)

better to use fairly low-ratio components because otherwise you may get too much magnification, with consequent bad quality. Another point to remember is that a decoupling condenser and resistance should be put in the anode feed to the detector and also in the second stage; in the latter position, however, it is not always necessary.

Contact Resistance.

In a variable resistance unit, such as a rheostat or potentiometer, unless the contact between the slider and the resistance element is very good, you get what is called "contact resistance"—that is, the resistance set up between the two metallic members at the actual point of contact.

Now, contact resistance is bad for two reasons: for one thing it may be comparable to the total resistance in circuit (it may, in fact, in some cases be large compared to that resistance); and, for another thing, it varies enormously from point to point and from time to time. It is obviously very unsatisfactory to have a resistance in the circuit which is liable to vary in this way, as this will upset the stability and adjustment of the whole circuit.

It is really surprising how often one finds bad contacts in rheostats and potentiometers. Generally I have found that the contact is good at one part of the resistance element and bad at another. Naturally, the makers of the unit do not want to have the spring bearing too heavily on the contact point, as this will cause wear and stiffness in operation. The result is that they often err in the opposite direction, making the bearing spring much too light, so that the troubles mentioned above take place.

Smooth Operation.

In some rheostats the slider is divided into three or four separate fingers or tongues, each of which bears independently upon the element. The pressure of each of the fingers is quite light, and if bad contact occurs in one it will most probably be a place where a good contact is obtained by another, so that on an average a good contact is obtained all the way round the element. This arrangement is a great improvement, and not only gives satisfactory results electrically, but is very smooth working in operation.

The Pentode Stage.

I was talking about pentode valves in these Notes a week or two back, and I forgot to say that readers often ask me what sort of loudspeaker should be used when a pentode valve is used in the last stage.

As you probably know, a moving-coil instrument is generally considered particularly suitable for working with a pentode output stage, probably because the moving-coil speaker generally has a fairly uniform impedance as compared with other types of speaker. But all speakers vary to a greater or less extent in their response to different frequencies, and consequently for best results some sort of correction is desirable.

A filter can be used to reduce the impedance of the speaker at higher frequencies—as I have described before in these Notes—which improves the tone; it consists of a condenser and resistance in series across the loudspeaker or the output.

Using a Corrector.

With a pentode output, however, it seems more appropriate to put in a filter circuit or corrector at an earlier stage in the low-frequency amplifier, so that the extra voltages which the corrector circuit is designed to reduce shall be cut down *before* instead of *after* being handled by the pentode valve.

The pentode should be loaded with an external impedance which bears the proper relationship to the impedance of the valve, exactly as with ordinary three-electrode valves, except that the load in the case of a pentode is generally between about 8,000 and 12,000 ohms; whereas with an ordinary valve you will find that best results are obtained when the load is about twice the impedance of the valve itself.

Usually when a pentode is used it is placed directly following the detector, because the comparatively weak output from the detector is as a rule sufficient to load the pentode fully, whereas if intermediate low-frequency stages of amplification are introduced the pentode is apt to become overloaded.

Pentodes For Power Detection.

Turning to another use of the pentode which I have mentioned a little time back, it can be employed as a power detector, the speaker being connected directly to it. In this case the anode current sometimes

NEXT WEEK

Full constructional details of

THE "B.P." BOOSTER

A simple "add-on" unit that

**INCREASES
POWER & SELECTIVITY**

becomes very considerable, and a good choke is desirable so as to deal with the relatively large H.T. current.

When a pentode is used in a mains set, instead of ordinary three-electrode power valves, you will sometimes find that the A.C. hum is rather more difficult to get rid of, partly owing to the extra sensitivity of the pentode and partly perhaps to the greater current consumption.

Remember that in addition to the current flowing to the anode there is also quite an appreciable current going to the auxiliary grid, and these two put together will probably be distinctly greater than the H.T. current consumed by an ordinary three-electrode power valve. If a small mains unit is used the smoothing may not be able to cope adequately with this extra current.

Ideas Wanted.

I think one of the most important things which will have to be looked to if home recording is to be really successful as a home entertainment is the question of the power of the gramophone to drive the recording disc. I have experimented quite a good deal with different home-recording outfits, and I came to the conclusion that it is by no means every gramophone upon which they can be got to work properly.

The WIRELESS CONSTRUCTOR

Another fine selection of articles by
JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.

IN THE JULY NUMBER.

NOW ON SALE 6d.

The MYSTERY of the METAL RECTIFIER

Some "inside" information of these useful components.

FROM MY ARMCHAIR

One of the most popular "S.T." features ever published.

HINTS FOR "S.T.300" USERS

Everyone interested in this set should read these tips.

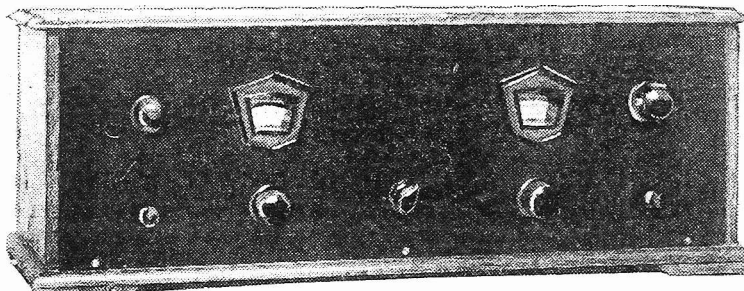
ALSO FULL DETAILS FOR BUILDING

The "FLEXIDYNE"

— AN ORIGINAL AND —
POWERFUL BAND-PASS DESIGN

By VICTOR KING

In this fine four-valver, Victor King has excelled himself! For the "Flexidyne" has a "Range" switch on the panel — and when you push it in, you have a one-knob tuning set for family use; pull out the switch and you have a highly-selective long-distance four!



You simply must read about this remarkable set and examine the clear diagrams that make its construction so extremely fascinating and simple.

Among the other contents of this remarkable sixpennyworth are:—

The Editor's Chat
"On the Grid"

The Month on Short Waves
The "Localiser"

All Britain Endorses Progressive Design Work

Pick-up Hints and Tips

B.B.C. News

This "Portable" Problem

A Practical Man's Corner

The Valve Made Readable

Queer Queries

As We Find Them

Round the Dials

With Pick-up and Speaker

Our News Bulletin

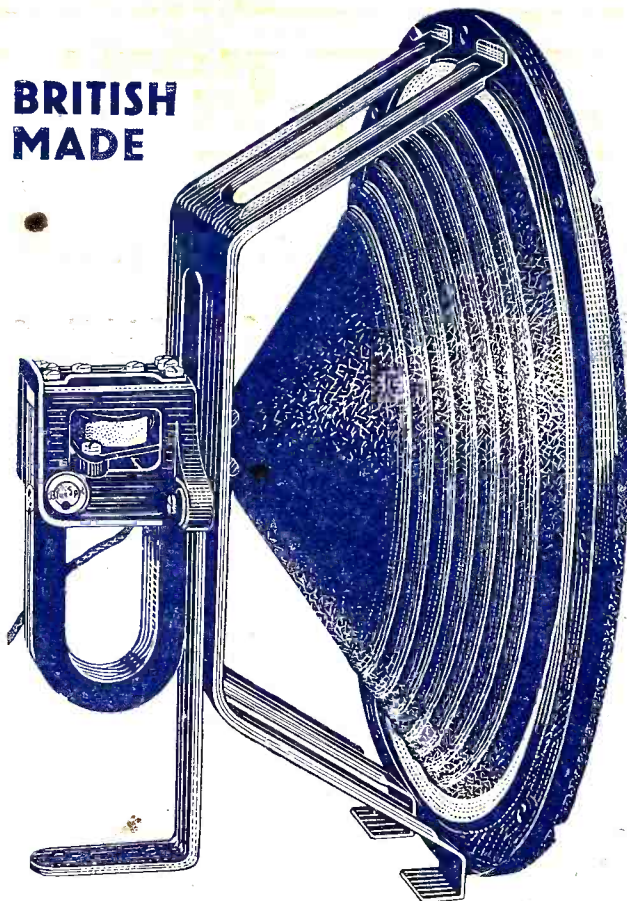
Where to see "S.T.300's" and "Cosmics"

YOU CANNOT AFFORD TO MISS THE JULY

WIRELESS CONSTRUCTOR

NOW ON SALE, PRICE 6d.

**BRITISH
MADE**



MOVING COIL PERFORMANCE *for the* SMALL RECEIVER

**BLUE SPOT
100U-39'6**

Gives Moving Coil Performance

BLUE SPOT PICK-UP

You simply can't believe that music so beautiful can be had from gramophone records until you hear them played through a Blue Spot Pick-up.

*Price complete with self contained
volume control*



63/-

IF you are running a small set with a dry battery H.T. supply here is your chance to get Moving Coil performance with very little outlay and no structural alteration.

Blue Spot 100U is designed to work satisfactorily on very small inputs. In consequence it may be used with battery-operated receivers with every confidence as well as all mains sets.

Its performance is remarkable. It has all the sensitivity and richness of tone that distinguishes the *good* (and expensive) Moving Coil speaker. It gives the finest rendering of the difficult bass notes without detracting from the clear high notes of the treble.

For the man who wants a really good top notch speaker 100U provides good Moving Coil quality at economy price.

Send for Catalogue No. P.W. 40U.

ALL BLUE SPOT PRODUCTS ARE NOW OBTAINABLE BY INSTALMENTS.



THE BRITISH BLUE SPOT COMPANY LTD

BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBURY AVENUE · LONDON · E.C.1

Telephone: Clerkenwell 3570. Telegrams: "Bluspot, Isling, London."
Distributors for Northern England, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield;
22, St. Mary's Parsonage, Manchester; 37, 38, 39, Clyde Place, Glasgow.