

**HANDS OFF THE B.B.C. ! (SEE PAGE 371)**

# Popular Wireless

No. 629.  
Vol. XXV.  
June 23rd, 1934.

**AND TELEVISION TIMES**

ABOVE  
TWENTY  
THOUSAND  
METRES

★  
TELEVISION  
TROUBLE  
TRACKING

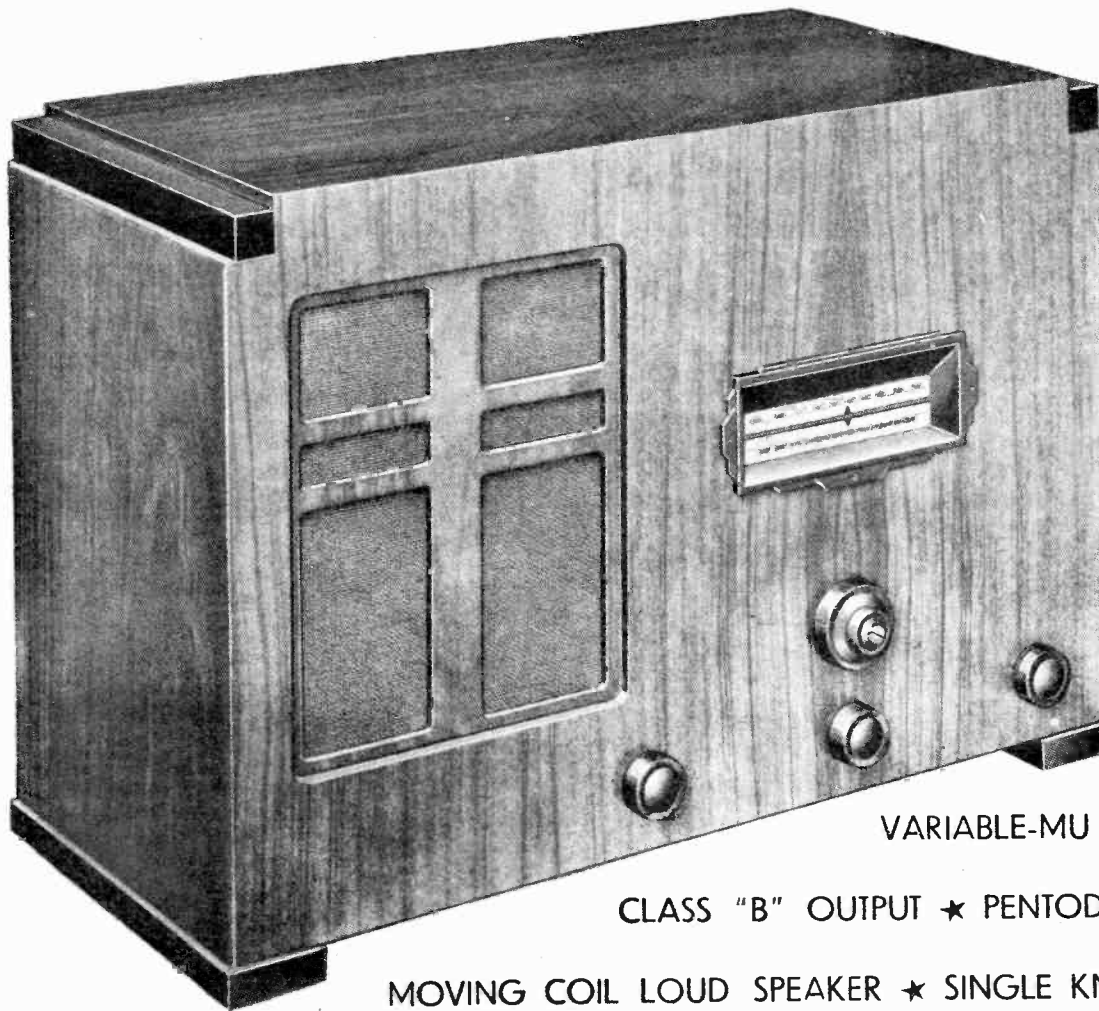
EVERY  
WEDNESDAY  
PRICE **3<sup>d</sup>**

*How to Build*  
**A  
TWO-VALVE  
BATTERY  
SET**



**WHEN YOUR  
MAINS  
ARE  
CHANGED**





VARIABLE-MU S.G. CIRCUIT

CLASS "B" OUTPUT ★ PENTODE DETECTOR

MOVING COIL LOUD SPEAKER ★ SINGLE KNOB TUNING

### SPECIFICATION, MODEL 435B.

Cossor 4-valve Battery-operated Receiver Model 435B with Class "B" Amplification, complete with Cossor Valves as follows: Screened Grid Variable-Mu H.F., H.F. Pentode Detector, Driver and Class "B" Output. Fully screened, super-selective low-loss coils. Single knob moving-pointer tuning with horizontal full-vision scale calibrated in wavelengths. Combination switch for on-off, wavelength change and gramophone pick-up. Selectivity control and volume control. Permanent Magnet Moving Coil Loud Speaker of the latest type. Handsome walnut and brown finish cabinet 20" x 14" x 10", with accommodation for batteries. Terminals for extension loudspeaker.

**£8.15s.**

Hire purchase terms:—16/6 deposit and 11 monthly payments of 16/6 (Exclusive of Batteries).

# COSSOR

## 4-VALVE BATTERY RECEIVER WITH CLASS "B" AMPLIFICATION

Here is something unusual in performance... unusual in economy... unusual in price. The Cossor Model 435B is powerful, modern in design, modern in appearance... a brilliant example of modern radio at reasonable cost.

A Variable-Mu S.G. Circuit gives exceptional range and wide choice of programmes. Fully screened low-loss coils ensure utmost selectivity, whilst for distortionless detection and great amplification, a Pentode Detector is incorporated.

The final touch of perfection is added with a Class "B" Output Stage which gives "mains" volume and true-to-life tone with low H.T. consumption.

Ask your dealer to demonstrate Model 435B and judge for yourself.

To A. C. COSSOR LTD., Melody Dept., Highbury Grove, London, N.5

Please send me a copy of your Leaflet No. L.115.

Name .....

Address .....

P. W. 23/6/34.

L.115

5116

# POPULAR WIRELESS

## THE FIRST AND FOREMOST RADIO WEEKLY FOR THE CONSTRUCTOR & AMATEUR EXPERIMENTER

Scientific Adviser: SIR OLIVER LODGE, F.R.S.  
 Technical Editor: G. V. DOWDING, Associate I.E.E.  
 Assistant Editor: P. ROBERT BIRD.

Managing Editor:  
 N. F. EDWARDS.

Chief Radio Consultant: P. P. ECKERSLEY.  
 Assistant Editor: A. JOHNSON-RANDALL.  
 Chief of Research: K. D. ROGERS.

PARIS NEWS  
 THOSE LAYERS  
 CAIRO CALLING  
 SNAPPY SECONDS

## RADIO NOTES & NEWS

A MILD PROTEST  
 RADIO VILLAINY  
 PICK 'EM OUT  
 CHINESE LESSON

### How We Strike Them.

**B**USINESS took me to Paris last week, and as business in Paris is often expedited by means of a few *chic* dinners my gastronomic performances exceeded the Plimsoll mark—much to my inward discomfiture.

At one cabaret two delightful fools were producing skits on various broadcasting stations, and what do you think that they chose in order to poke fun at our noble selves? Firstly, one of them hit a cushion with a stick once per second, whilst the other kept up an unintelligible gabble. A running commentary on tennis! Secondly, "Good-night, everybody—yooooooh-night!" The audience rocked with laughter.

### No Radio Need Apply.

**H**AVING observed, not without contentment (for I was tired), that my hotel held nothing in the shape of radio sets, I inquired of a white-gloved major-domo whether French hotels offered the use of radio receivers.

He waved the air about all round him, rolled his eyeballs to the ceiling—plaster cupids *sans* plus fours!—and replied: "One speaks not for those others, m'sieu, but zees hotel, she are of the most exquisite."

You can make what you like of that, but I gathered that it was a count of about nine against radio!

### Ariel Wanders to Some Effect.

**O**N another occasion I went to see and hear the famous Mistinguett, she of the heavily insured legs. I hear that the under-writers who have insured those incomparable legs against accident shudder piteously whenever she travels in a taxi!

My admiration was divided between her electrical vivacity and the diabolical cleverness of the production; I suppose that no more than two seconds elapsed between the "numbers"—just time enough to lower and raise the curtain.

The B.B.C. is groping after this technique, but something other than a blow on a gong or a sustained chord by an orchestra has to be found if this marvellous "continuity" is to be reproduced in radio.

### Messages from Mars.

**P.** A. S. (Whitstable) has been thinking about the possibility of our receiving wireless messages from Mars, and, remembering that there are difficulties confronting the long wave which desires to penetrate the various "layers," asks

### ON OTHER PAGES

"Many districts supplied with D.C. are now changing over to A.C. there is no necessity to discard the old D.C. unit."

Page 373

"Sydney (Australia) is very reliable still on Sunday mornings."

Page 378

"Long-wave stations work extremely well, but only on the principle that 'if you want to be heard you've got to speak up'."

Page 385

whether it is not logical to suppose that if Mars tried to get through to us on the lower frequencies we should not receive the messages.

Certainly! The "layers" work equally well in both directions. But why should the Martians use long waves? Can it be that they are ignorant of the theory of the late Oliver Heaviside or the truths discovered by Professor Appleton?

### "WHAT A PROGRAMME!"



Dr. Nevill Hopkins, of America, demonstrates his invention—the Radiovota—whereby listeners can record their opinions on any given programme.

### Radio in the I.F.S.

**L**AST year the Irish Free State had 50,500 licensed listeners, an increase of 17,071 over 1932. For this year a total of 60,000 licences is expected, giving a revenue of £30,000. They have tried the ether-selling business over there and for the financial year 1933-4 the revenue therefrom was £22,000.

### Two New Stations for Egypt.

**L**ESS than a month ago the State Broadcasting Service of Egypt was opened with two new stations at Abu Zabal (near Cairo) and Ras el Tin (near Alexandria). Seventy-five per cent of the programme time will be devoted to transmissions for the native population and the rest to matters of interest to the European residents.

News will be broadcast in Arabic, French and English. Cairo has 20 kw. and a wavelength of 483.9 metres; and Alexandria, a relay station, 250 watts and a wavelength of 267.4 metres.

### The D.F. Competition.

**T**HE Annual Direction-Finding Competition, organised by the Golders Green and Hendon Radio Scientific Society, and one of the most important field events of radio in this country was a great success, being attended by 70 competitors representing 6 radio societies.

The Southall Radio Society alone discovered the hidden transmitter, but Mr. Maurice Child's group won the competition on its accurate bearing readings; Mr. A. Black's group came second; Southall third; and Pye Radio Society fourth. Prize distribution at Regal Cinema, Finchley Road, N.2., on July 7th, at 2 p.m.

### Women Are Queer.

**W**OMEN are so full of their little jokes about the queerness of men that they have no notion of how rummy they themselves are.

I pass over the notorious fact that the most open-handed and unselfish of women hoard and hide the matches as soon as they are married,

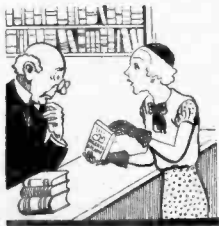
(Continued on next page)

# THE NEVER-SILENT STATIONS OF AMERICA

and will ask you why so many of them, after having read the "Late Night Final,"—and left it in eight separate chunks!—will ask a man to interrupt some entrancing play or talk in order to switch over to the News Bulletin, so that they can hear the same news all over again—whilst they talk about something else.

## Queerer Than That.

THIS theme warms me up. Let us develop it. These lady pals (bless 'em!) flatly refuse to act upon any advice which they may hear via radio about



babies, dressmaking, cooking, knitting, housekeeping or the sacred topic of curtains.

Yet they buy every new periodical publication, such as "The Hussif's Weekly," and try to fold table

napkins to look like those in the picture!

They will not read a book if it is recommended by a broadcaster; they prefer to ask the local librarian: "Should I like this?" (NOTE.—Books about a nice girl called Pansy are certain winners.)

## Snappy Seconds.

A GLASGOW gentleman who claims to be a keen follower of American radio through its short-wave stations writes to a London "daily" in praise of the continuity of the programmes. "At no time," he writes, "are American broadcasting stations silent for more than three seconds. The announcer has always something snappy to say in order to fill the breach."



If that state of affairs existed here, announcers would be shot at openly in the streets as Public Enemies Numbers One to Infinity. Better by far waste the "unforgiving minute" in idle reverie than endure for three seconds the snappiness of announcers.

## Running Commentary Best.

I CHOSE this year for my first attendance at the Derby. Very depressing experience, mitigated only by the friends who accompanied me. I was located not far from the B.B.C. commentator, though his coign of vantage was better than mine. I saw some heads of men and horses flash by, caught a chill, backed a loser for my wife and a "place" for myself.

At home they told me more about the race, the crowds, etc., than I saw myself, and I certainly think that, in this instance, and probably that of the Boat Race, the listeners have the best of it.

## A Day in Mr. Foort's Life.

TALK about a glorious day of crowded life! A little over a month ago Mr. Reginald Foort went to "open" the first "broadcast-designed" organ in Rome,

two days before an engagement to broadcast from Hilversum. He left Rome by air, but at 10,000 feet one of the engines refused duty and he was lucky to get back to Rome. Chartering another plane, he arrived at Hilversum only half an hour before he was due in the studio.

He began his broadcast to the accompaniment of a terrific thunderstorm, and only two minutes after it was over the transmitter was struck by lightning. Then Mr. Foort came home. It seemed that Nature had waited to hear him finish!

## Special Short-Wave News.

HERE is a piece of news which should make all short-wave enthusiasts happy: The International Short-Wave Club (London) has arranged a special world-wide broadcast from E A Q, Madrid, on 30.4 metres.

The transmission will take place on Sunday, July 1st, from 23.00 to 23.30 G.M.T., or, in terms of British Summer Time, on July 2nd, 00.00 to 00.30. Kindly report on this transmission to Mr. A. E. Bear, 10, St. Mary's Place, Rotherhithe, London, S.E.16.

## ON THE AIR NEXT WEEK

### Captain H. B. T. Wakelam

[who, with Colonel Brand, will commentate every day on the principal matches from Wimbledon].

Just over forty years of age, this journalist and B.B.C. star commentator was born in Hereford. Later he played Rugger and hockey for Cambridge (without actually getting a "Blue") and during the War served on five different fronts. On the death of his father he resigned his commission in the Royal Artillery and went into the building trade, but in 1927 the B.B.C. persuaded him to undertake a running commentary on a Rugger match. As well as Rugger, he has actually broadcast soccer, cricket, boxing and the Tidworth Tattoo. With Colonel Brand he is to be found each year at Wimbledon, gradually boiling himself to a fine shade of pink in the terrific heat!

## A Mild Protest.

THE fallacy that sounds can be picked up by radio receivers is, like King Charles the Second, an "unconscionably long time a-dying."

A provincial newspaper on May 22nd published: "Every sound, one supposes, sets up ethereal vibrations that may, for all we know, never be extinguished." And it went on to the usual predictions about our being able to hear for ourselves what Gladstone said in 1879 (or whenever it was), and so forth.

Well, I understand that Latimer and Ridley lit a candle which may never be put out, but physics abhor the notion that sound can exist indefinitely.

## Clearing the Air.

LET us be clear about all this, as becomes radio men. Sound does not exist apart from an ear. What we call "sound" is a sensory impression, and is not a thing of itself, but is the sensation conveyed to the brain by the vibrations of the ear which are set up by alternate compressions and rarefactions of the

substance connecting the ear with a vibrating body. Generally the connecting substance is air.

Now, all "P.W." readers know that one cannot receive air vibrations by the ordinary radio receiver. Therefore the vibrations caused by Gladstone's voice cannot be picked up, even if they still exist—which is to suppose tommyrot—except by an ear of superhuman sensitiveness.

## Radio is the Villain.

I HAVE been looking over my card index—yes, I am a systematic journalist—and am arrested by the preponderance of cards registering the evils which have been laid at the door of radio. (We have recently had a sample of the more tragic side of this matter when a poor chap tried to barge into one of the B.B.C. stations, yelling blue murder.)

However, radio, without a doubt, causes rain, causes drought, sets fire to haystacks, puts out the kitchen stove, heats the blood, causes rheumatism and induces insomnia. Radio, 'tis said, affects even bird life, so that when Bela Bartok's hefty works are broadcast millions of sparrows descend and parade the streets until the air is again tenable!

## Pick 'Em Out Where You Like.

HERE are some listeners that I know. Do you recognise any of the types, or have I been singled out by Fate?

A nephew who listens to Beethoven, Bach & Co., in the dark, whilst lying on his bed, with his eyes shut.



Mrs. G—, who cannot bear to hear Grieg except on Thursdays, and only then if she is dressed in green!

Harry Dogsbody, Yorkshire man,

commercial traveller, likes only "summat wi' summat tiv it."

Aloysius Snakeface, poet and insurance agent: "Give me Keats alone. Spoken by Eenley." He does not mean "Keating's," but he *does* mean Ainley.

## This Week's Chinese Lesson.

"BAN Pic Clients on Air Unless Do-me Goes Up for Plugs." This is thought by Americans to mean,

"A certain firm has notified broadcasting studios that hereafter none of its clients will be allowed to advertise ("plug") films in radio programmes unless the players' remuneration is augmented."

"Chi Nabes Go 4-5 Changes Wkly. As Pic Quantity Hops, Quality Slips." I give this one up. Perhaps it means that a Mr. C. Nabes changes his slips 4 or 5 times a week and picks a lot of hops!



ARIEL.

# HANDS OFF THE B.B.C.!

BRITISH listeners can be divided into three categories. First, there are those who want only entertainment, and the majority of these want music. (The attempt to divide listeners into high-brows, low-brows and middle-brows is unnatural. There are high-brows who want high-brow music, and to be entertained and nothing else; and they come into the first category just like the middle-brows and low-brows.)

## News and Education.

The second category wants to know what is going on in the world. To them the B.B.C. is practically a newspaper. If they are farmers they want crop reports and cattle prices. If they are engaged in the fishing industry they want weather reports and news about the shoals of herring. In this second category are all those who want general news of all kinds connected with sport, politics, business and world affairs.

There is a third category which desires to be educated and to assimilate knowledge as pleasantly as possible. These latter want informative talks on all sorts of subjects, from bee-keeping to archæology; or they want politics explained to them; or they want talks on art or literature of an informative kind.

Among these three categories there is, of course, much overlapping. But the great majority of listeners, in whichever group they may fall, do most emphatically want one thing, and that is a B.B.C. that is impartial and free.

The one thing to which the Briton objects is having somebody else's opinion or interests thrust down his throat, wrapped up like a pill in a sugar coating of entertainment or amusement. That is the objection to the American system of free broadcasting paid for by the advertisers.

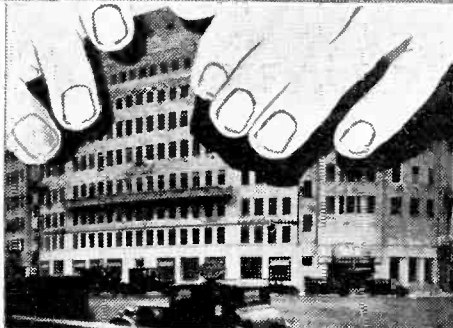
## Completely Controlled Broadcasting.

Admittedly, the immense revenues from advertising in the United States are used for wonderful programmes. Salaries can be paid to musicians, singers, crooners and others which would be impossible under our system; but all the time there is powder in the jam, and the listener is having extolled to him the virtues of somebody's patent medicine or somebody else's coffee essence.

At the other extreme the B.B.C. could be simply and solely an organ of propaganda for the Government of the day. That is the system in Germany and Russia.

Nothing goes "on the air" that doesn't suit the book of the Nazis in Germany or the Communists in Russia. Not even the news is given impartially, but is twisted or coloured to suit the views of the dictators who happen to hold power.

We have deliberately chosen to set up the B.B.C. as a public corporation subjected to limited control. Thus it is quite right that talks on foreign affairs should not take



## By The Rt. Hon. LORD STRABOLGI

place which are needlessly offensive to friendly neighbours, and just because the B.B.C. is a public corporation.

I am dealing now with the news and the educational part of the B.B.C. programmes; I am not discussing the merits or demerits of the various schools of musicians. In

upon is that when news is broadcast it shall be a plain statement of true facts, and that when opinions and descriptive accounts come over the wireless they shall be honest opinions and honest descriptions.

Earlier this year there was a curious episode arising out of a talk to be given by a Mr. Ferrie. He was chosen as a working man who would give the point of view of an operative in a motor-car factory.

His MS., sent in beforehand, was very outspoken and did not apparently suit the standpoint of certain persons at Broadcasting House. It was ruthlessly censored, and Mr. Ferrie refused to give the talk, holding up the whole institution of broadcasting in this country to ridicule.

Here, apparently, an attempt was made to prevent what are known as extreme views on the organisation of industry and its effect on the individual from being given by a working man. In my opinion, the mistake made was in trying to damp down such views, because they are held by many thousands of perfectly honest and law-abiding citizens.

## More Alarming.

The correct policy should have been to have a counteracting expression of opinion, giving the other point of view the next week. From the information in my possession the Governors of the B.B.C. realised that they had blundered over the Ferrie broadcast, especially as the original manuscript was published in full in several newspapers and great advertisement given to just such expressions of opinion that somebody at Broadcasting House thought, in his wisdom, he could suppress.

Another episode has occurred that is far more alarming.

A Mr. Felix Greene, one of the staff at Broadcasting House, has been arranging a series of talks by unemployed men, or the wives of unemployed men.

I have not the pleasure of knowing Mr. Greene personally, but he is hardly what could be called an extremist, and I doubt if he is even a Socialist. Indeed, he stood for Parliament at the last election as a candidate in support of the National Government, and was previously on the editorial staff of the Prime Minister's personal newspaper, a weekly bulletin called the "News-Letter."

## The "Time-to-Spare" Series.

Nevertheless, whatever his opinions may have been, Mr. Greene seems to have done his work conscientiously. He has travelled about the country engaging the services of persons suffering from the present curse of unemployment to talk in the "Time-to-Spare" series.

These talks, especially those given by Mr. John Evans, an unemployed mechanic in Birmingham, and Mrs. Pallis, the wife

(Continued on next page.)

## SHOULD LISTENERS BE SPOON-FED?

In Germany and in Italy nothing goes "on the air" that is not approved by Hitler or by Mussolini.

Is Britain heading for a similar radio dictatorship? And are we to hear only news that has been censored, and views that have been approved by the Government?

these talks and in this news it is also right that the religious or moral sensibilities of listeners should not be outraged, and anything in the nature of obscenity or which would be likely to give unnecessary offence is avoided.

What we listeners have a right to insist



LORD STRABOLGI, formerly Lt.-Commander the Hon. J. M. Kenworthy joined the Royal Navy in 1902, and served in the Great War. An all-round athlete, he first entered Parliament in 1919 in the Liberal interest, and later as Labour representative for Central Hull. Entered the Upper House on the death of his father early this year.



## HANDS OFF THE B.B.C.!

(Continued from previous page.)

of an unemployed ship-plate riveter of Sunderland, created a profound sensation.

They showed the difficulties of the family, where the head of the household is out of work for a long period, in making ends meet; how their budget is arranged; what they can provide in the way of food; how the children fare; and what has to be provided for rent, fuel, clothing, etc.

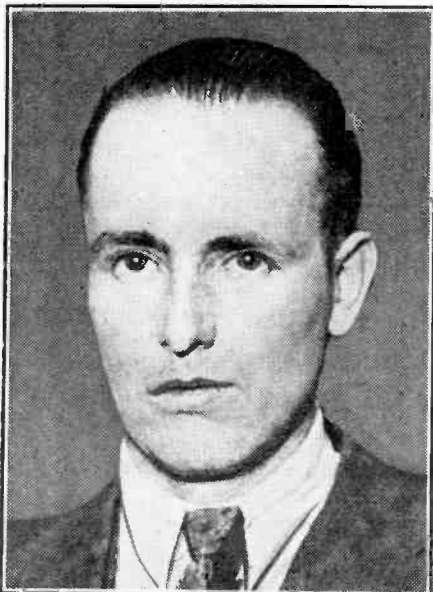
We have about 2,000,000 registered unemployed, and perhaps another 500,000 unregistered unemployed; and these, with their families, constitute a distressed mass of seven or eight million men, women and children. Those more fortunately placed, and either in steady work or enjoying an income sufficient for their needs, have, in most cases, little real knowledge of the plight of the workless and their dependants.

The ordinary decent woman, living in a residential district or a quiet suburb with her busy husband working in his office in the daytime, and travelling back home in the evening, has little means of knowing how impoverished people manage to live, of their trials and tribulations, and especially of the difficulties with which the poor housewives are faced.

### A Shattered impression.

There was a general impression that these workless people were "looked after," that they could manage on the "dole," and that the Public Assistance Committee saw that nobody went in real want. This impression has been shattered by the Talks in question. They roused public opinion as nothing else has yet.

One result has been a shower of gifts and offers to assist on the various Social Service organisations which have been established under Royal Patronage to help the unemployed, and which, in their turn, have been made known by broadcasting.



### THEY SWITCHED HIM OFF!

This is Mr. Ferrie, who recently started to broadcast from London. He was switched off at the opening of his talk as he was protesting against the B.B.C.'s censorship of what he wanted to say.

Another result has been to annoy the present Government. Their attitude has been that the unemployed are well looked after, thanks to their efforts, and that real hardship is rare.

### Possible Government Censorship.

Mr. Hudson, M.P., the Under-Secretary for Labour, actually went to the length of attacking the B.B.C. and declaring that the organiser of the Talks had not been careful about accuracy or to choose really typical cases. This led to a lively controversy which still continues, the B.B.C.'s staff sticking to their guns and declaring that all the facts were accurate, and also maintaining that the unemployed persons, or wives of unemployed men, who had



When Hitler visualised the New Germany, he foresaw that radio would be a potent influence in forming public opinion. So the drastic reform of German broadcasting was one of his first actions when in power. Having tackled the problem of controlled broadcast transmission he turned his attention to the matter of reception, and he has personally approved a standardised and mass-produced receiver to bring his speeches into every German home.



### HITLER AND BROADCASTING

been invited to broadcast were really typical, and not simply isolated hard cases.

The Government is now reported to have the intention of imposing a *real* censorship on *all* the Talks from Broadcasting House, even those dealing with purely domestic matters, and not only the broadcasts on foreign affairs. There is even talk of a Government censor being established in Broadcasting House, just as if we were in the midst of a great war!

It is to be hoped that the strongest resistance will be offered to any such proposal. The next thing will be that the news will be censored, and then the B.B.C. will be in the same situation as its opposite numbers in Germany, Russia or Italy.

### Further Westminster Rumours.

There are also ugly rumours at Westminster that the Government intends to threaten the B.B.C. with a still further curtailment of its revenue, the Treasury taking a larger share of the proceeds of the B.B.C. licences if the administration and staff of the B.B.C. are not more amenable.

The Cabinet is in a position to threaten the B.B.C. in this way, and to make its threat effective by cutting down the receipts. It would be a very objectionable policy to pursue.

There may be something to be said for the Government taking over the whole of the B.B.C. and running it as a Department, like the Post Office or the Board of Trade; but, if so, let that be done openly, and we shall know where we are.

These broadcast Talks by unemployed men and women have offended the present Government. Supposing there were a Labour Government in office and they started to interfere with Talks by bankers or employers and threatened the B.B.C. in the same way? One can imagine the outcry there would be in certain quarters!

My readers will see the principle involved in this latest episode and how important it is. I am quite convinced that the great majority of listeners desire the Government to keep its hands off the B.B.C. altogether, or else, if they must interfere, to make it a Government Department, open to criticism in Parliament and controlled by Parliament, just as any other Department of State is controlled.

## CHECK YOUR EARTH

That water-pipe connection may not be all it appears to be.

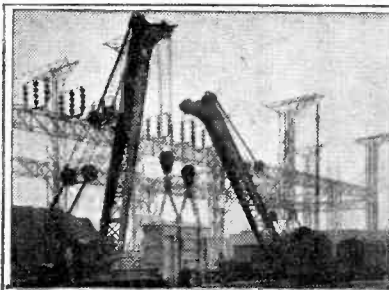
THIS tip is intended for all readers who use the popular water-pipe earth, and, if it makes them spring from their comfortable armchairs and start an immediate tour of investigation, it will have achieved its purpose.

When I first used this type of earth connection, I ran the lead from the room where the set was installed, along a short length of passage and across the kitchen to the scullery, where it was connected to a cold-water pipe, running down through the floor and apparently straight to earth.

The distance from the set to the pipe was about 20 feet, rather too long to be ideal, but the best that could be arranged, and, for a little while, I used it. But the results were poor, far worse than one would expect to be brought about by the use of a 20-foot earth lead.

Then one day when I had occasion to visit the coal cellar, I noticed a pipe running alongside one of the rafters. It looked remarkably like a water-pipe, and a horrid suspicion occurred to me.

Quickly I traced it through the rafters and found my worst fears true. That innocent-looking pipe in the scullery ran more than 30 feet through the cellar and back under the room where the set was before finally entering the ground! J. M.



# When YOUR MAINS ARE CHANGED

**M**ANY districts supplied with D.C. mains are now changing over to A.C., and in the future others will be converted.

This is because the "grid" system will become the universal electricity distributor within a few years. Under this scheme only A.C. current of a certain voltage and frequency will be provided.

In consequence many users of D.C. H.T. units will find that these are useless. In some cases the supply authorities assist these unfortunates to obtain A.C. units or supply suitable conversion units.

If this should not be the case there is no necessity to discard the old D.C. unit. In most instances a rectifier unit can be interposed between the A.C. mains and the D.C. unit.

## A Simple Unit.

Actually a rectifier unit simply consists of a valve or metal rectifier, a mains transformer and one or two fixed condensers. The cost of these parts and a small metal or hardwood case is comparatively small—certainly much less than that of a new A.C. H.T. unit.

The majority of D.C. H.T. units are designed to work from mains of any voltage between 200 and 240 volts. Therefore for all practical purposes it can be assumed that 220 volts D.C. is the output voltage necessary from the A.C. rectifier unit.

The diagram shows a simple converter of the type required. The components are an H.T.12 Westinghouse metal rectifier and a mains transformer.

Mains transformers of this type can be obtained from many of the firms who specialise in mains apparatus. No difficulty should be experienced in obtaining a suitable model.

The D.C. output of this unit is 225 volts 30 milliamps., and it can be used with any D.C. unit rated up to 30 milliamps. If the D.C. unit is intended to supply less than 30 milliamps it will be necessary to connect a shunting resistance, as shown.

## Regulating the Voltage.

The majority of D.C. units are variously rated at 25 milliamps, 18 to 20 milliamps or 12 to 15 milliamps. When a 25-milliamp unit is in use a 50,000-ohms 1-watt shunting resistance will be required, and for 20 milliamps and 15 milliamps a 25,000-ohm 2-watts and 15,000-ohms 3-watts resistances respectively will be suitable.

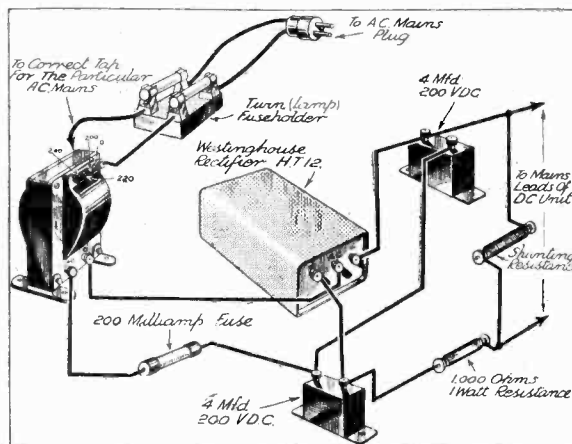
The components should be mounted in a case of metal or hardwood. This need only be a box of suitable size provided with an A.C. mains lead with plug and two

Some really practical hints which show that costly wireless replacements may be quite unnecessary. The method of change-over is made perfectly clear

By C. ROBINSON.

connections, which are attached to the mains input of the D.C. unit.

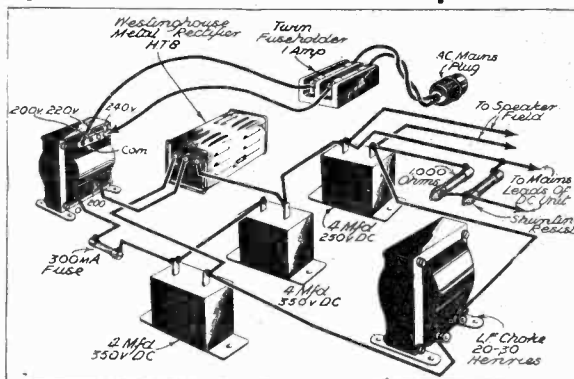
It may be mentioned that the smoothing circuit of the original D.C. unit is usually



## CONVERTING D.C. APPARATUS

With the components shown above you can continue to use your D.C. unit after the mains have been changed to A.C.

Below is a similar method of conversion, providing also for a mains-energised loud-speaker supply.



sufficient to prevent any trace of hum. If this should not be the case the 1,000-ohms resistance in the converter provides a small degree of smoothing.

In obstinate cases of hum the 1,000-ohms resistance can be replaced by an L.F. choke of 1,000-ohms resistance, rated to carry 30 milliamps.

When the output leads of the converter unit are connected to the D.C. unit mains input no signals may be obtained from the set. This is due to the polarity being incorrect, and the connections to the D.C. unit mains leads should be reversed.

Probably, in some cases, energising current for the field winding of a D.C. mains type moving-coil speaker may be required. 7,500 is the usual resistance of a D.C. mains model speaker field, and this requires approximately 30 milliamps at 225 volts.

By using an H.T.8 rectifier sufficient output to energise the speaker field and also to operate the set can be obtained. Naturally, a suitable mains transformer should be used, and several other components will also be required.

## Linking-up the Speaker.

Two 4-mfd. fixed condensers of a type rated at 350 volts D.C. working voltage will be necessary. These will be connected so that the rectifier operates on the "voltage-doubler" system.

An L.F. smoothing choke of 20- to 30-henries inductance and capable of carrying 60 milliamps should be connected in series with the positive output lead of the rectifier. The resistance of the choke should not exceed 500 ohms.

The speaker field should be connected to the smoothed output thus obtained, and a fixed condenser of not less than 4 mfd. should be shunted across the field winding. This may be an electrolytic condenser if desired, and in this case care should be taken that attention is paid to the polarity.

From the speaker field terminals leads should be taken to the mains input terminals of the D.C. H.T. unit. A 1,000-ohms resistance should be inserted in this positive lead, as in the case of the small unit previously described.

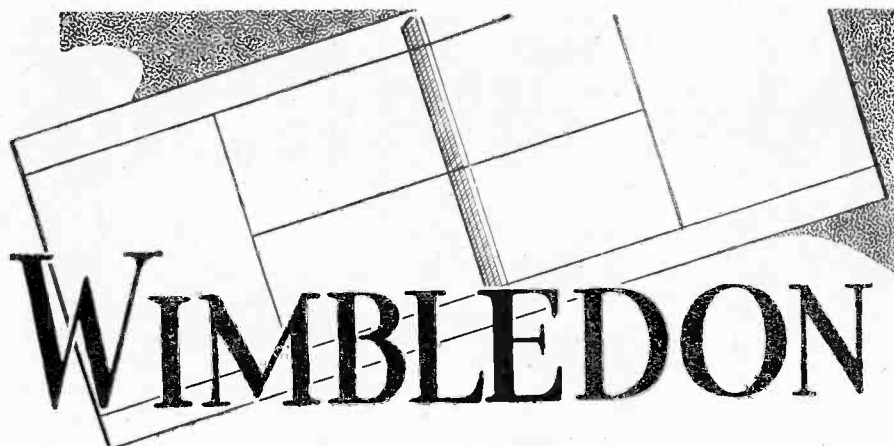
Where the D.C. unit is designed to give a lower output than 30 milliamps a shunting resistance should be provided. This should be of the value already mentioned and is connected in the same way.

## A Valve can be Used.

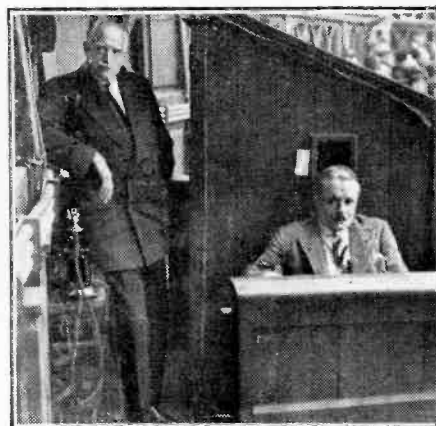
The initial smoothing provided by the choke and condenser prevents any hum due to the field energisation. It also assists in smoothing the H.T. supply to the set.

A rectifying valve may be used instead of a metal rectifier if preferred. It will be necessary to select a valve rated to give the output current required.

The regulation curves of the valve should be consulted in order that the D.C. output given at the required current may be determined. The value of the dropping resistance can easily be calculated.



# WIMBLEDON



Colonel Brand (left) and Captain Wakelam outside the commentators' hut at Wimbledon.

FROM the point of view of physical comfort, the running commentaries on the fortnight's lawn tennis at Wimbledon are the worst tasks the B.B.C. commentators have to perform. Keen watching of tennis stroke by stroke is no easy matter; it is tiring to the eyes, and the commentators' hut on the centre court is hot in the extreme.

America's second string, Miss Helen Jacobs, will have no easy task to retain the tennis laurels for the New World, and it is expected that Britain will probably regain the title in the person of Miss Dorothy Round or Miss Peggy Scriven. There may be another surprise in this contest, of course, for Wimbledon is full of the unexpected; but if either of these players

some very intense struggles should be witnessed and heard.

With Menzel of Czechoslovakia, Von Cramm of Germany, Crawford of Australia (supported by McGrath and Quist), the usually strong contingent that invades us from the United States, and no small attack from Japan, and with Boussus and Merlin from France, the British players will have their work cut out.

Perry and Austin.

But Perry and Austin, with the help of Hare and Hughes as intermediate stumbling blocks for the invaders, should both get very near the finals, and the former should, if his ankle is fit, find a place in the last men's singles match—for the championship—on the final Friday of the meeting.

As you listen to the various commentaries you will picture the combatants, with the ball flying across the net in the ding-dong struggle for supremacy. You will visualise the packed arena, with the sun blazing down relentlessly on the mass of spectators; but as you imagine all these things remember that hottest place of all—the commentator's wooden hut with its perspiring occupants.

## HOW THE B.B.C. HAS ARRANGED FOR LISTENERS TO HEAR IMPORTANT LAWN TENNIS MATCHES DESCRIBED AT THE ALL-ENGLAND CHAMPIONSHIPS THIS YEAR—WITH A NOTE ON THE DAVIS CUP.

But in spite of glaring sun and the stuffy atmosphere of the airless court, Colonel Brand and Captain Wakelam have gallantly performed their duties year by year, giving in most interesting fashion all the phases of play as the giants of the tennis world fight their battles in the annual championships.

And this year we shall again have the opportunity of hearing the two voices as they describe into the microphones the chief games on the centre court during the matches of the Wimbledon meeting.

### From All Except 5XX.

Starting on June 25th and lasting till July 7th, important events will be described in the National programmes between 2 p.m. and 6 p.m. every day of play. The Children's Hour on 1,500 metres will not be broken into, otherwise all the stations taking the National programme will relay the matches.

In addition, it is hoped that the inter-zone final of the Davis Cup contest will be relayed from Wimbledon after the championships have been decided.

This year extra interest will be focused on the Wimbledon meeting, due to the fact that Crawford of Australia, the present champion, has several times been beaten during the past year by our No. 1 player, F. J. Perry, and also in the recent Paris meeting by Von Cramm. Rarely has a champion been so "buffeted" during the first year of his championship, and Wimbledon may well hold a surprise in the men's singles this year.

### Will Britain Win?

In the ladies' section we shall not have the pleasure of listening to the relay of Mrs. Helen Wills-Moody defending her title, for she has decided not to play, though she will be in England during the meeting as a spectator.

is up to form, Britain should be fairly sure of the ladies' honours at last. It is long enough since the lady champion was a Briton.

### The Seeded Singles.

Whatever happens, we shall be assured of really exciting incidents, and the relays from the centre court should be particularly interesting this year. With the present system of "seeding" the chief players in each singles event the tennis giants are fairly well separated in the draw, so that

A GIFT horse should not be looked in the mouth. By which I mean a variety hour, when it pops up unexpectedly on a Monday night, no matter how bad it is, should be accepted without a frown. Unfortunately, I can't always behave as I should, not even to gift horses. So I am not going to say nice things about "High Tea"—the recent gift horse. This show never rose above the level of mediocrity.

The orchestra, under Kneale Kelley, played a new March by Eric Coates, called "London Bridge." In my opinion, this doesn't come up to "Knightsbridge." But the B.B.C. may popularise it if they adopt it as a signature tune for something. Doubtless it will improve on acquaintance.

I couldn't regard "The Man Who Could Work Miracles," by H. G. Wells, as a play. It was a sound-picture pure and simple. Robert Chignell, who composed the musical effects, was more in the picture than Wells was. These musical effects were exceedingly clever, especially the subtle variations of the theme that was introduced every time a miracle was performed. These variations were as varied as the miracles themselves.

The highly imaginative nature of the story struck me as being rather silly. But such

## THE LISTENER'S NOTEBOOK

Candid comments on recent radio programmes.

things always do. Still, what is one man's poison is another man's meat, and I dare say many listeners enjoyed the story very much. I must say, however, I did enjoy the acting of the small cast.

Philip Wade played the common little man perfectly, but, unfortunately, the common little man is a little too common on the air.

That's why I didn't enjoy him nearly as much as I did Richard Golden's the Rev. T. Maydig. The Church rarely finds a representative these days in the cast of a radio play, especially of the Rev. T. Maydig type. I just roared with laughter at him, not so much for what he said as for the way he said it. Richard Golden scored a big success. I would love to hear him in a similar rôle in a really good comedy.

The Outside Broadcasts for leisured listeners and the Electric Recordings for the unleisured have been the outstanding features of late. Everybody contrived to listen to Mr. Lyle on Derby Day. Mr. Lyle has never been better than he was this year. His excitement was infectious, though it was well controlled. He missed nothing that was possible to give. Charabancs, etc., obscured his view for a bit of the race, but his running commentary was none the less running for that.

(Continued on page 387.)



# Television Trouble Tracking

By G.P. Kendall, B.Sc.

I AM attempting this week to deal with a very large subject in a very small space, so I must get down to business quickly.

Let me start by explaining that I am not proposing to discuss cases of actual breakdown of television apparatus, but rather those circumstances in which a picture is received which appears to fall short of the results which might reasonably be expected from the apparatus.

This, of course, is a much more difficult matter to deal with, and that is why I think a little practical information may be helpful to my readers.

## A "Soft-Focus" Picture.

We will take first the case of a bright, reasonably steady picture which synchronises easily, but lacks detail. Where there should be detail there is merely a fuzzy blur, the effect being not unlike that which the photographer sometimes calls a "soft-focus" picture.

The most usual cause of this defect is a lack of the higher modulation frequencies, which may be due to a great variety of things. In the case of reception at a considerable distance from the transmitter it is very likely to be the result of the use of over-much reaction in a receiver lacking the necessary power to do the job properly.

Some of the modern ultra-sharp-tuning sets will even offend in this way at any distance and without the use of any appreciable amount of reaction, simply because their band-pass circuits have been designed with too canny an eye on the possibilities of interference from "sideband splash."

I believe I have mentioned this point before, so I will content myself here with reminding the reader that something can usually be done to improve matters by increasing the coupling in the band-pass circuits and so broadening the tuning.

## In the L.F. Amplifier.

Naturally, this will impair selectivity to some extent, and therefore the change should not be made as a permanency. It is usually possible to arrange some sort of small switching or plug-and-socket scheme to bring the altered coupling into action only when required.

The most probable cause of a deficiency in the higher frequencies, however, is to be found in a low-frequency amplifying circuit of imperfect design. Most often, of course, it is a matter of the use of transformers for the inter-valve coupling, but this is a point which I think is now pretty well understood.

It is not so clearly realised that the use of R.C. most definitely does *not* guarantee a good upper-frequency response without

**HOW TO  
DEAL WITH—  
LACK OF DETAIL  
in the picture.**

+ +  
**LIGHT AND DARK  
reversals, or "phase  
displacement."**

+ +  
**PARASITIC  
MARKS  
on the received  
image.**

+ +  
**INTERFERENCE  
and spotty recep-  
tion.**



A remarkably small model of a 30-line Scopophony receiver.

special effort on the part of the designer and constructor. Anode resistances of too high a value, the presence of large bypass condensers, too "good" a choke in the detector-anode circuit or even poor (high-capacity) wiring are some of the most potent destroyers of the higher frequencies which we so badly need even for a 30-line picture.

Then there is the case of a picture in which some of the light and dark details seem to be displaced, usually in a vertical direction. To understand this one fully would involve delving pretty deeply into some rather abstruse theory, so let us just call it "phase displacement" and go on to the most likely causes.

## Not Quite a Negative.

First, however, let us make sure that we can recognise the defect with certainty: it produces a picture which almost looks like a "negative," but the reversal of light and dark is not complete. Instead of

affecting the whole of the picture, as in a true negative, only certain parts are upset.

Here, again, one of the most common causes is our old enemy the L.F. transformer—just one more reason why resistance coupling should be used in a television receiver!

It must be confessed, however, that a rather peculiar form of the trouble can occur even with R.C. In this case it is not present continuously, but only appears in certain types of picture, and seems to result from the use of grid-coupling condensers of too small a capacity, which do something undesirable to the very low frequencies.

## "Cracked" Frequencies.

Something rather similar can happen in the output circuit if the output choke is of low inductance. It is to be remembered that in television we have at times to deal with very low as well as very high frequencies, and if they are not handled properly we are apt to find the result quite prominent: in sound reception, of course, it would merely mean a slight deficiency in bass, with perhaps a scarcely noticeable "cracking" effect on certain low notes, and many listeners would never discover that

anything was amiss.

Now let us consider the question of parasitic markings on the picture, in the form of light or dark patches in places where they don't belong. Defects of this general type, due to incorrect construction or adjustment of discs, drums or screws, I do not propose to discuss, because I have dealt with them quite recently. In any case, they almost always produce light or dark *lines* on the picture, and I am referring here to marks more of the nature of spots or patches.

## Due to A.C. Hum.

If the trouble takes the form of a series of dark marks which travel slowly across the picture area you can be pretty sure that it is due to A.C. hum in your H.T. supply. This, naturally, will only be encountered where the supply is from the mains.

Various forms of interference will make marks of some sort on the picture, but these  
(Continued from page 389.)

**A** LOT is being said about the demand of the wireless trade, through the R.M.A., for the new entertainment broadcasts in the mornings to begin on September 1st instead of on October 1st, as planned by the B.B.C. A decision will not be reached on this request for some time yet. Meanwhile, however, it is likely that the B.B.C. will agree to broadcast special programmes during the mornings, for the third week of November, which is to be a kind of "shopping week," for the benefit of the wireless trade.

#### Opening the Droitwich Station.

It is now certain that the B.B.C. will be unable to open the new Droitwich transmitter in July. As August is hardly a convenient month, the opening will be early in September, when it is expected that the Prime Minister and the Postmaster-General will be the openers.

There will be special trains from various parts, the function being one of a national character. And well may it be. The transmitter will be the most elaborate and the most powerful of its kind in the world, beginning with 150 kw. and sending its signals all over Europe.

#### The 24-Hour Clock.

The Postmaster-General will appoint a special committee to make recommendations about the 24-hour clock after the B.B.C. experiment has gone on for a few weeks more. Despite widespread irritation at the beginning, there are signs that the new method is steadily gaining adherents, and it is by no means certain that the Government committee will advise the abandonment of the experiment.

#### "Member for Broadcasting."

Captain Cunningham-Reid, M.P. for Marylebone, is keenly interested in the B.B.C., and inasmuch as Broadcasting House is in his constituency has some claim to the title of "Member for Broadcasting." But he bases his claim rather on active interest in and understanding of the problems of the B.B.C. Curiously enough, Captain Cunningham-Reid's next-door constituency is that of Captain Ian Fraser, also an enthusiastic broadcasting student and critic.

#### A Talk on Football.

Football in June? Yes, and all the rest of the year, if you like, in Scotland; and so it would be in England if only the opportunity were given.

But if the game itself is not played during the summer it can nevertheless be talked about, and so, on Wednesday, June 27th, Mr. George F. Graham, the Secretary of the Scottish Football Association, is certain to have a tremendous wireless audience when he talks about the great game.

Mr. Graham is a wonderful authority on football, of course. One should expect



Leonard Henry, away from the microphone, enjoys a little gentle gardening.

that, from his twenty-two years' official connection with the Scottish Football Association. He organises the great games

Webster under another name. Alma Vane and Hugh Morton have taken the leading parts in most of the revues and musical plays produced at the Birmingham Studio this year, and a good deal of the music for their shows has been written by Ronald Hill, the Melliush Brothers and Fred Nevill.

The production on June 29th will include items by the Two Jacks, syncopated pianists, and by the Studio Orchestra.

#### Ronald Frankau's Return.

Meanwhile, Ronald Frankau is paying a return visit to the Blue Horizon Country Club at St. Mellons on Thursday, June 28th, when the West Regional microphone is also taking the opportunity of being present. It will be remembered that Ronald broadcast from the Blue Horizon last Boxing Day.

#### "We Three."

Half an hour of songs and sketches, linked together by dialogue and amusing stories, will be given in the North Regional programme on Thursday, June 28th, by a miniature concert party called "We Three," otherwise Joyce Bromhead, Teddy Seymour and Anthony Browne.

#### Magicians' Broadcast.

It is quite in accord with the nature of the proceedings of the Convention of the International Brotherhood of Magicians that a relay from its meeting at the Town Hall, Leamington Spa, on Saturday, June 30th, should be kept secret.

Such tricks as may depend upon visual appeal will be explained by a compère, Mr. Walter W. Kemp, but it will be interesting to know whether one of the demonstrations already announced as part of the Convention—"an attempt by Oswald Rae to locate, blindfolded, a letter which will be sealed and hidden by the Mayor of Leamington a week prior to the meeting"—will be included in the relay.

Can we anticipate a snappy programme?

#### A Birmingham Appointment.

Victor Hely-Hutchinson's appointment as Payton Professor of Music at the University of Birmingham in succession to Sir Granville Bantock will enable the Midland Regional Music Director to return to work with which he was familiar before he joined the staff of the B.B.C. at Savoy Hill in 1926.

Midland listeners will regret his leaving Birmingham. In the short time he has been in charge of the musical activities of the Region he has introduced quite a number of

new ideas that have proved to be of exceptionally good programme value. They may find some little consolation in the fact that "Hutch," as he is affectionately called, is to remain with the B.B.C. until after the summer.

O.H.M.

## THOSE MORNING PROGRAMMES AND OTHER NEWS ABOUT BROADCASTING

in Glasgow which attract crowds of over 100,000 spectators, and he has travelled all over Europe on football business.

#### Maisie Gay Presides.

Maisie Gay, whom so many of us remember with sheer delight for her wonderful stage work, is presiding over an entertainment hour which is being relayed from the village of Box, in Wiltshire, for West Regional listeners on Friday, July 6th.

Maisie is the wife of the proprietor of the Northey Arms Hotel, and there will be no shortage of guests to assist in her show that night.

#### Fifty-Four Not Out.

Since he was transferred from Broadcasting House to Birmingham as Midland Regional producer, Martyn C. Webster has run up the respectable total of fifty-four

### COMING ITEMS WORTH HEARING

**VARIETY.**—A Kentucky Minstrels Show, written and remembered by C. Denier Warren. (National, Wednesday, June 27th.)

**CONCERTS.**—A String Orchestral Concert, relayed from Queen's College, Birmingham. (Midland Regional, Tuesday, June 26th.)

A concert performance of Gounod's "Faust." (Belfast, Tuesday, June 26th.)  
Relay from Harrogate of an Orchestral Concert. (North Regional, Wednesday, June 27th.)

**DRAMA.**—"The Last Horizon," a play by James Hilton and Barbara Burnham, based on the novel by James Hilton. (London Regional, Thursday, June 28th.)  
"Drake," a stirring play by L. du Garde Peach. (West Regional, Thursday, June 28th.)

**CONCERT PARTIES.**—Another of the popular relays from Blackpool. (North Regional, Saturday, June 30th.)

A sparkling relay from a Rothesay Concert Party. (Scottish Regional, Friday, June 29th.)

shows, nearly half of which have included songs with music.

On Friday, June 29th, he is presenting "A Review of Midland Revues," in which the singers are to be Alma Vane, Hugh Morton and Gerald Martin, who it is perhaps not unfair to say is none other than Martyn



I FEEL like celebrating! Reference to a vast pile of log books confirms the fact that June 20th, 1924, was a red-letter day in my radio career, for on that day I received from a benevolent G.P.O. my full transmitting licence, and on the same day I heard my first "Yank" on 100 metres.

Lest anyone reading this should tend to be contemptuous concerning the thrill of "hearing the first Yank," let me assure him that it really meant something in those good old days. The only day that ever rivalled the 20th of June was the 1st of November in the same year, when I heard the first New Zealander, Z 4 A G, on 95 metres.

I think I may justly say, therefore, as far as I am concerned, that ten years of short-wave work have passed. Even though 100 metres may not strike us as "short" to-day, take it from me that it was in 1924. Memories of de-basing staid,

Curiously enough, the very first entry in my receiving log for that wavelength was U-I X A M, the station of Mr. John L. Reinartz, whose name, attached to a circuit, became a household word during the following years.

How much better results some of the newcomers would get nowadays if they had been brought up in the hard school of swing-coil reaction, direct-drive condensers and Dutch valves! One had to work for one's results then. I developed a steady hand that has remained with me ever since.

The remarkable thing is that we ever heard anything at all. And yet, on second thoughts, most of the improvements of the last ten years have been on the side of convenience only. The funny-looking affair in Fig. 2 probably used the same circuit as the set of Fig. 1, except for the absence of capacity-controlled reaction. I remember that my first attempt at ruling out the swinging-coil bogy was to control reaction by means of a variable grid leak.

## TEN YEARS OF DEVELOPMENT

Our short-wave expert, W. L. S., who has been transmitting on the amateur waves for 10 years, has some interesting items to mention in reviewing this period.

But not too much of the first person singular; let me get off my personal reminiscences, or I shall become a regular club bore. In how many readers' minds does this page awake pleasant memories? Look at Fig. 2, which is, I hope, a fair specimen of a 1924 vintage short-waver.

Think of this, you novices—that funny little variable condenser with semicircular plates, when originally bought in 1922, cost 18s. 6d., and then I had to assemble it myself, which took two days! That nice little dial, complete with extension handle, came straight out of a battleship's radio cabin.

### Those Awful Coils.

Those awful-looking coils took hours to make, and the flopping-coil reaction was always coming adrift and falling overboard. But did we worry? And those valve boxes under the set were not installed with the idea of getting a comfortable operating position, as is the case nowadays. No! Four-valve boxes got us down another 10 metres; if used vertically we might have squeezed down another five.

And now look at what we use to-day, in Fig. 1. The short-waver's dream, 1934 version (that is, if he isn't too ambitious)! Nice neat little sets, with metal panels and baseboards, slow-motion dials, compact coils, valves complete with bases (how we should laugh if someone de-based one nowadays!) and supreme ease of control.

### No Bands In Those Days!

What a time I had with it, altering the detector efficiency every time I moved up and down in wavelength! I nearly said "in the band," but there weren't any "bands" then. To listen on short waves one had to stop on everything that one heard

### THE PRESENT-DAY SET

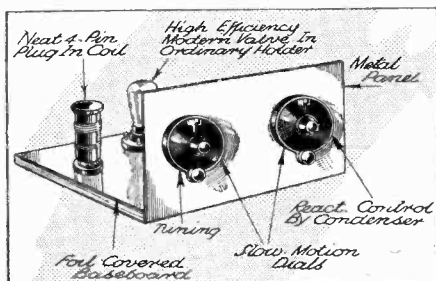


Fig. 1.—Compare this sketch of the present-day type of short-wave receiver with the one illustrated in Fig. 2.

respectable Marconi R's and Mullard Ora's to get down to the then newly discovered short waves confirm that.

On the receiving side I had been hearing American amateurs on 180 metres since the end of 1923, but somehow that never gave me the thrill that I got from the first outburst of the same stations on 100 metres. For one thing, "100" seemed so absolutely improbable then—far more so than does 2½ metres to us now.

### His First Catch Was Reinartz.

One was a super-man if one got a receiver oscillating nicely down there, but to receive Yanks was a feat that put one in an exalted position (even if only for a very short time).

### THIS WAS ONCE THE IDEAL

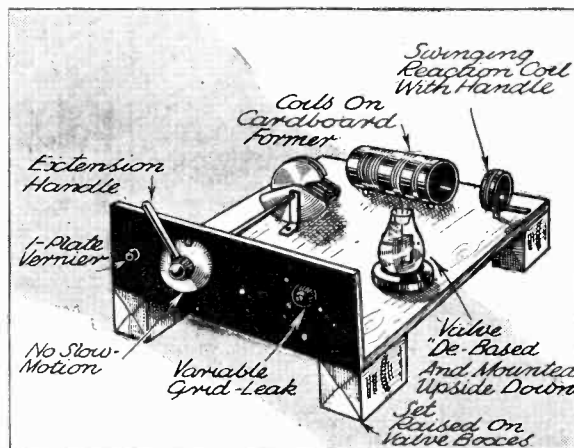


Fig. 2.—"A fair specimen of a 1924 vintage short-waver," is how W. L. S. describes this receiver with its old-fashioned de-based valve.

below 150 metres. We have had ten years of improvement in operating, convenience, appearance and all-round efficiency. Now let's embark on ten years of improvement in design.



ON THE SHORT WAVES (Cont. from previous page).

## WHAT READERS ARE SAYING

IT is unfortunate that there is a permanent "lag" between the time I write these notes and the time they reach my readers; that, naturally, is unavoidable. I must therefore ask readers to pardon the apparent untruth of my remarks when one issue contains the news that X. Y., of Wigan, finds conditions bad, though, in reality, they have been extraordinarily good for two or three days before publication!

At the moment of writing they are very good indeed, and readers' letters bear me out in this statement.

### Adding an S.G. Stage.

D. R. C. (Eastleigh) finds Sydney very reliable still on Sunday mornings, and also comments on the excellence of W 2 X A D on 19.56 and W 2 X E on 25.36 metres.

J. W. B. (Sheffield) rather sweepingly describes my recent article on "Adding an S.G. Stage" as "the most useful thing that has ever appeared in 'P.W.'!" Shame, J. W. B.! You must have missed a lot. I do think, seriously, though, that several readers would be amazed at the difference such a stage can make, especially in these days of modern high-efficiency valves.

What a thorny path I tread, though! Here's R. E. R. (Middlesbrough) quoting my remarks in April, 1933, when I said: "I have no good words to say for untuned S.G. stages." A lot can happen in a year, R. E. R., and a man who never changes his opinion isn't worth much.

I freely take back all I said in 1933, although at the time I believed it. I find nowadays that an untuned S.G. stage

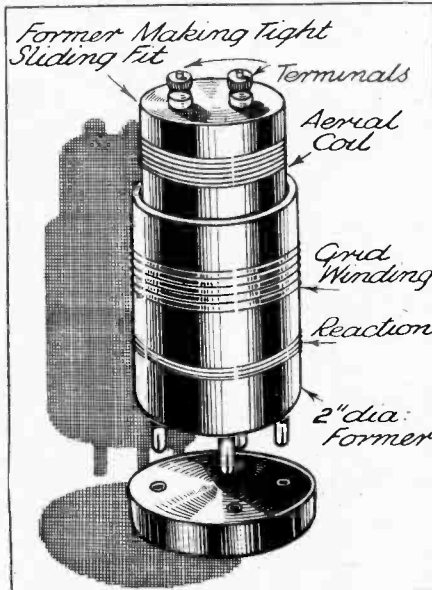
is beneficial, but I still vastly prefer a tuned one for my own use.

Will anyone in the London, N.4, district who is very keen on short waves please make himself known unto Mr. G. Ward, Portland Hotel, Portland Road, N.4? He has recently arrived in London from the North and wants to meet a fellow-enthusiast.

H. H. A. (Middleton), in the course of a six-page letter, brings up the following points: First, the Manchester Chapter of the International Short-Wave Club meets at the Clarion Café, Market Street, on the first Tuesday of every month.

Next, H. H. A. finds conditions best on

## VARIABLE AERIAL COUPLING



A neat way of providing the means to vary the coupling to the aerial.

25 metres from 21.00 till 01.00, on 31 metres from 23.00 till 02.00 and on 49 metres from 23.00 till 07.00.

S. C. I. (Acton) has fitted a metal panel to his set and finds that it has dropped all his dial readings by 20 degrees. I suggest that either he has got his coils too close to the panel or he has forgotten to make a direct connection from both sides of the tuning condenser to his coil. If you leave an "earth return" to find its way back via panel and baseboard instead of giving it a direct lead it will introduce quite a lot of extra inductance into the tuned circuit and will naturally drop the dial readings.

G. A. S. (Greenock) has suddenly developed a keenness for amateur-band listening, and comments on the excellence of the 20-metre band for real D X work. He quotes two hours' listening, during which he heard 97 "hams" at an average strength of R7, as proof.

### A Good Old Four-Valver.

A South African reader, T. M., of Cape Town, sends me in a beautiful log of stations heard on the old "S.G. Four," which his friends all tell him is the best short-waver they have ever heard. I must admit to a glow of honest pride, as I did like that set when I made it, and it still works well.

Nowadays, however, I am afraid my inclination runs in the direction of getting a lot out of one or two valves instead of letting four speak for themselves. I have an open mind on the subject of which of the two schemes is preferable.

The diagram on this page, which is self-explanatory, is a reply to A. H. (Bradford), who wanted a neat way of providing variable aerial coupling that doesn't "flop about" all the time. One can easily find two formers that are a tight fit, and the scheme is quite efficient. **W. L. S.**

HOW would you like a trip to Berlin? It can easily be accomplished, in spirit if not in fact, by listening to the new H.M.V. *Practical Travel Talks in German* records. Six records, all in German, have been produced to assist listeners to learn the language.

The travel records depict, in the form of a conversation in the German language, the adventures of an everyday couple on a visit to Berlin from England. The effects in the background of such things as the departing taxi when the couple start and various incidents en route greatly assist in the understanding of the conversation, while a book that is obtainable with the records enables the English to be followed. (B8163-8.)

### For Lovers of the Opera.

Beniamino Gigli, on whom the mantle of Caruso seems to have fallen, gives us another treat on H.M.V. DA1372, for here he has recorded the famous *La Donna è Mobile* from "Rigoletto" on one side, and another operatic jewel, *E Lucevan le stelle* ("Tosca"), on the other. Gigli records are always worth getting, and this one is particularly fine.

Another excellent vocal recording is that by Columbia of Harold Williams singing *Fairings*, *Jock the Fiddler* and *The Bullad Monger* from Easthope Martin's "Four Songs of the Fair."

His robust, resonant voice always records well, and the popularity of the items chosen cannot be gainsaid. (DB1376.)

The records of the famous "Knightsbridge" movement that has for some time been the signature tune of "In Town To-night" have brought its composer, Eric Coates, to even greater prominence than he enjoyed before. His latest composition, *London Bridge*, recorded on Columbia DB1382, will still further popularise him. On the other side is *Summer Afternoon*, a melody redolent of blue skies and green English lanes.

Two other records that I should like to recommend are Sir Henry Wood and the Queen's Hall Orchestra playing *Chant Sans Paroles* and *Two Songs Without Words* (Mendelssohn) on Columbia DX579, and the Wireless Military Band giving us the overture to *Oberon*. (Col. DX580.) Both are excellent recordings technically and artistically.

And now for some lighter music. Let us first get Henry Hall's new venture in dance rhythm off our chests. It is called *East Wind*, and is accom-

panied on a Columbia record by *Wild Rife*. You should hear it if you want to listen to a side of the B.B.C. Dance Orchestra rarely heard by listeners.

Of quite a different type is Ray Noble's recent composition, *The Very Thought of You*, which he has given us on H.M.V. B6482. This is well up to his usual high standard of melody.

The same number is recorded for Decca by Roy Fox and his Band. It will form a good alternative, and you should hear them both before choosing. (F3966.) Roy Fox is also worthy of note for his *Swallow Tail Coat*, a ridiculous number that I find rather fascinating. The reverse side of the record holds *True*. (Decca F3987.)

## ROUND the RECORDS

Selections and recommendations from the latest gramophone lists.



In my capacity as record reviewer I find it rather bewildering sometimes to try to sort out the best from a whole list of bands which have recorded the same numbers. For having just mentioned *True*, I remember it has been recorded on Brunswick by Guy Lombardo and his Royal Canadians. With it is *Night on the Water*. Don't forget to hear the latter, especially. (01760.)

While on the subject of duplication let me give you a third choice of *The Very Thought of You*—by Ambrose and his Orchestra. (Brunswick 01769.) So there you are—not an easy choice to make between the three.

### Another Spike Hughes Success.

Do you like hot music? Yes? Well, try Spike Hughes' Negro Orchestra playing *Sweet Sue* and *How come you do me like you do?* on Decca F3972.

The record was made in America while Spike was visiting the States last year. It is one of the Hot Rhythm Series, and I like it.

What will they think of next? We have had all sorts of "stunt" recording—Caruso with fresh accompaniments, duets sung by one person with himself, and now we have a cinema-organ duet played by instruments in different picture theatres.

The two organs were five miles apart—at the Ritz, Edgware, and the Orpheum, Golders Green. The organisers wore headphones so that they could listen to the combined effect, and special landlines were used between the theatres and the recording studios in London. The result is a wonderful scientific achievement, and is obtainable on a double-sided Regal-Zonophone record, the piece chosen being Suppé's *Light Cavalry* overture. (MR1274.)

Once again Webster Booth is charming us with his distinctive tenor voice on Regal-Zonophone. As usual, he is backed up by the Fred Hartley Novelty Quintet, and has chosen this time *In Old Madrid*. On the other side is Toselli's *Serenade*. I am quite a fan of this group of musicians, and follow them closely whether on the air or disc. (MR1288.)

This week I have picked out an Edison-Bell Winner record for special notice—it is *Goin' to Heaven on a Mule*, played by Owen Fallon and his Californians. At one shilling it is excellent value, and is doubled on the other side by *Why Do I Dream Those Dreams?* Both numbers are from "Wonder Bar." (W114.)

### Bradman Knocks Up a Good Tune.

A word to cricket enthusiasts now that Test Match time has come. Don't forget Don Bradman can knock up a good tune as well as a good score. He is no mean pianist and has recorded for Columbia.

By the composer of "Charmaine"—if I am not mistaken—that world-famous hit of some years ago, we now have another tuneful waltz called *Arlene*. I have just been listening to it on Brunswick 01749, played by Victor Young and his Orchestra. You have probably heard Henry Hall play it more than once on radio. The other side of the disc contains *A Day Without You*.

And here's a note for those who are worried about the origin of those chimes they give us on the radio as an interval signal. They are the *Whittington Chimes*, rung on the bells of Bow Church, and are provided from a Columbia record. **K. D. R.**

# TELSEN

## provide the

### BEST Transformer FOR EVERY PURPOSE

#### TELSEN 'CLASS B' DRIVER TRANSFORMERS

Made in two ratios to cover the requirements of all 'Class B' valves.

RATIO (overall) 1-1 (primary to half-secondary) 2-1.

RATIO (overall) 1.5-1; (primary to half-secondary) 3-1 **10/6**

#### TELSEN 'CLASS B' OUTPUT TRANSFORMER

Provides correct matching to M.C. speakers having low resistance speech coils. Very large core section, and low primary resistance (200 ohms per half winding).

RATIOS 35-1, 50-1 and 65-1. **10/6**

#### TELSEN 'RADIOGRAND' TRANSFORMERS

Evolved from the results of extensive research, coupled with the soundest engineering principles, every 'Radio-grand' transformer is subjected to rigorous tests to ensure faultless performance and lasting efficiency.

RATIO 3-1 } **7/6**

" 7-1 **10/6**

" 1.75-1 **10/6**

#### TELSEN 'ACE' L.F. TRANSFORMERS

Eminently suitable for use where highest efficiency at low cost is required and where space is limited. Its characteristic will bear comparison with that of much more expensive transformers.

RATIO 3-1 } **5/6**

" 5-1

#### TELSEN 'MULTI-RATIO' OUTPUT TRANSFORMER

For use with M.C. speakers having a low impedance speech coil winding. Its three ratios of 9-1, 15-1 and 22.5-1 allow for correct matching of speakers of widely different characteristics. Suitable for anode currents up to 40 m.a. **10/6**

#### TELSEN (RATIO 1-1) OUTPUT TRANSFORMER

Enables a high-resistance speaker to be connected to the output circuit of a receiver using a triode output valve without passing D.C. through the speaker windings.

For anode currents D.C. **10/6**

#### TELSEN 'D.R.' TRANSFORMERS

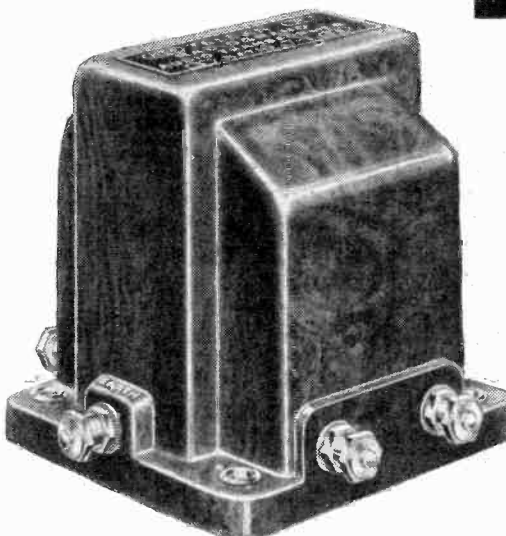
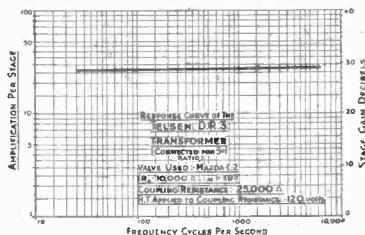
The Parallel-fed Transformers with an absolute straight line characteristic, giving uniform amplification over the entire range of audio frequencies. Designed and constructed on entirely new principles eliminating all possibility of breakdowns and shorted turns. Very high inductance. **8/6**

D.R.3 (Ratio 3-1) D.R.5 (Ratio 5-1)

#### TELSEN 'G.S.' TRANSFORMERS

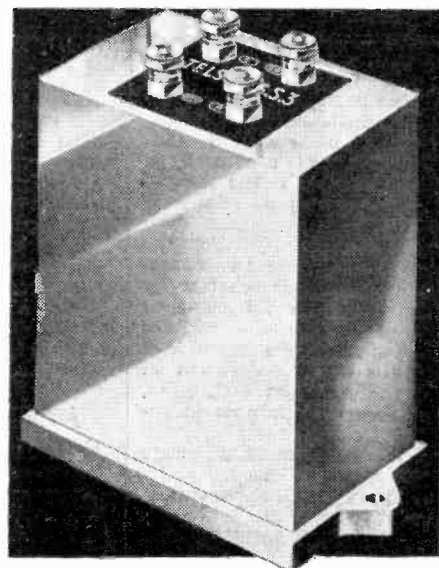
The Directly-fed Transformers based on the same advanced principles. Exceptionally good frequency characteristic. Can be connected directly into the anode circuit of detector valves. **8/6**

G.S.3 (Ratio 3-1) G.S.5 (Ratio 5-1)



TELSEN AUDIOFORMER

Solves the problem of tone compensation created by to-day's demand for super-selectivity. Its fixed compensation restores all the high notes which have been lost through the cutting of the sidebands, without losing amplification, reducing bass response or necessitating an extra L.F. stage or additional components. Ratio 5-1. **11/6**



TELSEN 10-1 INTERVALVE COUPLING UNIT

A filter-fed transformer using a high permeability nickel alloy core, securing a 10-1 voltage step-up while preserving an exceptionally good frequency characteristic. The response is compensated in the higher frequencies for use with a pentode valve giving an amplification greater than anything previously achieved, equal to two ordinary L.F. stages but with better quality of reproduction. **12/6**

#### TELSEN 1-1 INTERVALVE COUPLING UNIT

A modern development of the deservedly popular R.C. unit incorporating a low pass filter feed in its anode circuit, thus preventing "motor-boating", "threshold howl" and other instability due to common couplings in eliminator and battery circuits. Used with an H.L. type valve it gives an amplification of about 20 and a perfect frequency response on a negligible consumption of H.T. current. **7/6**

#### TELSEN R.C. COUPLING UNIT

In handsome bakelite case, similar to above. **4/-**

FOR EVERYTHING IN RADIO

ELECTRIC COMPANY LIMITED, ASTON, BIRMINGHAM

will speak  
Suitable  
up to 40 m.a.  
TELSEN FOR  
announcement of THE TELSENS

**TRICKLE CHARGER.**

An accumulator charger that charges at a low rate of current. It is generally arranged so that it is connected to the accumulator and charges this for the whole period of time that the receiver with which the accumulator is used is out of operation.

The necessary connections are usually made automatically by the switch which switches the set on and off. Thus, when this switch is in the "off" position, the L.T. accumulator receives a charging current which is of such value that the accumulator is just brought up to full capacity and a little to spare before the set is again switched on. That is, working on rough averages. The success of the scheme depends upon the fact that a little overcharging does an accumulator no harm, but that, on the contrary, as the cells are always kept "well up," the battery actually benefits from such treatment.

It will be gathered that trickle chargers are used in conjunction with the mains, and as only a proportionately few listeners now mix their supplies, deriving H.T. from the mains and L.T. from an accumulator, the trickle charger is tending to lose its one-time great popularity.

And in view of the present high efficiency of mains valves of both the A.C. and D.C. types, there seems no purpose in departing from the completely all-electric radio method where there are mains laid on, unless it be to use up old apparatus.

**THERMO COUPLE.**

Two dissimilar metals joined together. When the junction between them is heated electrical energy is generated.

**TRIODE.**

A thermionic valve having three electrodes. The term therefore applies to practically all normal detector and L.F. types.

**TUNED ANODE.**

A method of coupling high-frequency amplifying stages or an H.F. amplifier to a detector circuit. It is very simple to explain. The accompanying diagram shows an H.F. valve to which a detector is linked by means of a tuned anode arrangement.

A complete tuning circuit, comprising a coil and a variable condenser, is inserted in series in the anode circuit of the H.F. valve. It presents a quite easy path to earth through the H.T. battery for all frequencies except the one to which it is tuned.

To this frequency it acts as a barrier—a *rejector circuit*, in fact. (We have dealt with this under its appropriate heading.)

Therefore the H.F. energy

A PAGE FOR  
BEGINNERS

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

# TRICKLE CHARGING & VOLTAGE TESTS

represented by this frequency passes to the grid of the detector valve via the coupling condenser.

**TUNING.**

The adjustment of a circuit so that it responds to the one desired frequency, or to a definite band of frequencies as in the band-pass tuner.

**VALVE.**

The simplest form of thermionic valve is the diode in which there are only the two elements—the cathode or filament and the anode or plate. These are contained in a glass bulb from which the air has been extracted.

The filament comprises a thin wire of special construction designed to emit copious streams

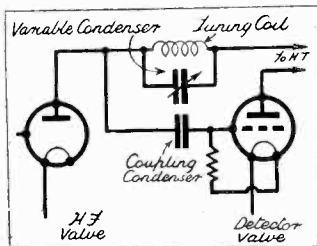
In the three-electrode valve a grid (wire mesh) is inserted between the filament and the anode, and if electrical charges are communicated to this grid the electron stream will be impeded or assisted in accordance with the nature of these charges.

Here we see the basis of the three-electrode valve as an amplifier, for small variations of voltage on the grid cause relatively great changes in the dimensions of the electron stream, and, in consequence, to the current which originates in the H.T. battery and flows in the anode circuit.

The "battery" valve is a valve whose filament is heated by current derived from a battery. In the mains types of valve the current from the mains is used for that purpose.

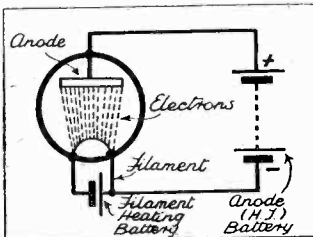
## A VERY POPULAR METHOD

Below is shown a typical tuned anode coupling to the detector.



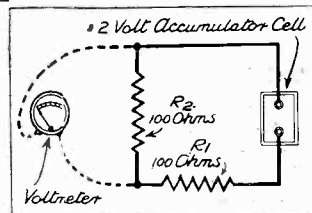
## THE ELECTRON BRIDGE INSIDE THE VALVE

An electron stream, as illustrated above, is definitely a one-way-street, permitting current-flow only in the one direction.



## WHEN THE VOLTMETER MISLEADS

An attempt to measure voltage often defeats its own purpose, as explained.



of electrons when the wire is heated by having current passed through it. The passage of this current sets the electrons in the wire into violent agitation, and when the movement of those near the surface of the metal exceeds a certain velocity they break away and "boil off," as it were, into the space around the wire.

If, by means of an additional battery, the anode is made deficient of electrons in regard to the filament (that is, positive), the electrons emitted from the filament will fly to the anode in order to make up that deficiency.

The filament and anode are then connected by a bridge of electrons, which is the same thing as saying that an electric current flows across from the filament to the anode, for electrons are electrical particles.

In the indirectly-heated type the current passes through a heater, and the heat from this is communicated to the electron-emitting filament by radiation.

There are numerous different types of valves, but the important ones, such as Screen Grids, Power Types, Pentodes, etc., have been discussed separately.

**VOLTMETER.**

An instrument for measuring voltages. It is provided with two terminals or spike connectors, and these are placed across the points between which exists the voltage difference to be measured.

The amount of current flows through the then gives the indication.

But this current

relatively small, or the conditions of the circuit to which the voltmeter is applied may be upset.

This is a point well worth illustrating in detail. Our diagram shows an accumulator cell. There are two resistances in series joined to this cell. We want to measure the voltage existing across the R2 resistance. Knowing the values of these resistances and the voltage of the cell (2 volts), we could easily calculate the current by Ohm's Law.

The total resistance of the two resistances is 200 ohms (for you merely add the individual resistances of resistances in series). Two volts divided by 200 is .01, and that is the current in amperes which would flow.

**A Practical Instance.**

Now, supposing our voltmeter had a resistance of only one hundred ohms. When it was joined across the R2 resistance you would have there two resistances of 100 ohms in parallel, and so the effective resistance would drop to 50 ohms. The resistance in the circuit is therefore decreased to 50 plus the resistance of R1, which has a resistance of 100 ohms, so 150 ohms exists where formerly there was 200 ohms.

Therefore the current would rise to over 13 milliamperes. The circuit conditions have been quite drastically changed by the voltmeter, and it could give only a misleading reading.

If it is a case of merely reading the voltage of an accumulator it does not matter if the resistance of the voltmeter is not particularly high, because the internal resistance of an accumulator is so very low.

But it is a different matter with a mains unit or a mains set, for here resistances are employed to regulate the voltages, and to join a low-resistance voltmeter across part of such a system will obviously upset the conditions.

**The Type to Use.**

So it is particularly desirable that a voltmeter for measuring mains-set voltages should have a very high resistance, or it becomes useless for the task.

In brief, it is necessary that current should flow through a voltmeter in order that it shall be able to indicate by that means how much voltage exists across its terminals: in fact, how much voltage is needed to drive a certain current through its own internal and fixed resistances.

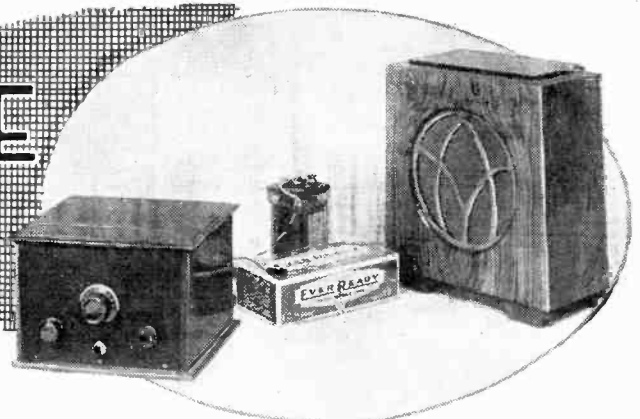
Another desire—that a

instrument which is dead-beat, voltmeter should be used to the reading and swinging to and time before settling.



# How to Build A TWO-VALVE BATTERY SET

A conversation between the designer and prospective set builder, in which the salient features of this first-class design are stated and their application to the individual case made clear.



*AFTER looking in the radio-shop windows, which seem full of mains receivers, superhets and elaborate multi-valvers, I am wondering whether a simple set would be any use at all these days?*

Certainly it would. In fact, a simple set often proves far better than one of the more elaborate and costly receivers, just because it is simple.

## Easy-to-Build and Efficient.

*I had hoped that this was the case, because I do not want to expend a lot of money. In fact, I have been toying with the idea of making the set myself. But, after seeing the chassis of some of the modern receivers, I have my doubts, because, you see, I have never made a set before.*

If that's the position you will be specially interested in the set which I have here—a two-valver of almost stark simplicity which, nevertheless, embodies some of the most up-to-date and efficient apparatus, enabling it to put up a first-class performance on both local-station and long-distance work.

*It certainly looks simple enough for even me, but I*

*don't want to lose anything in the way of results just because I am no expert with tools. What about station separation, for instance? I am told that selectivity is the most important quality in a set these days.*

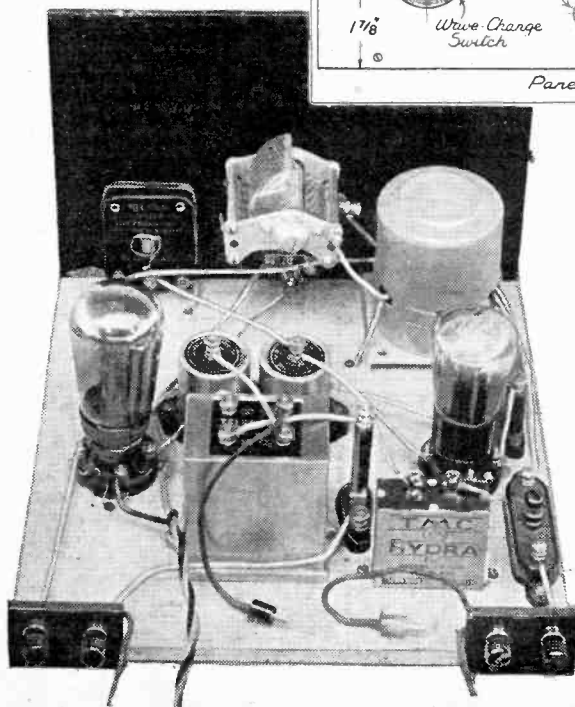
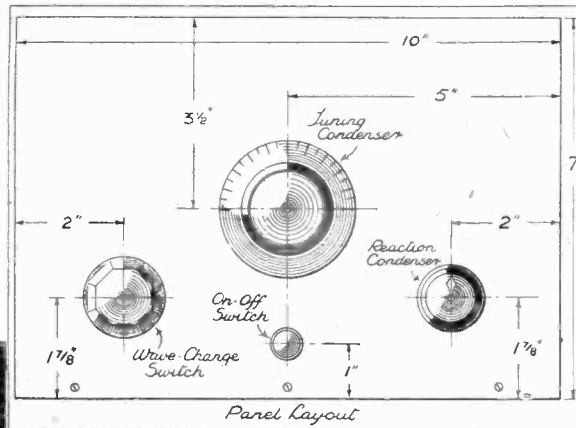
That is true, because a wide variety of programmes, such as is now obtainable, is useless unless each programme stands out in clear relief and free from interference. And that is exactly what this set is able to give you.

*Well, tell me, how do you achieve this selectivity and sensitivity in so straightforward a design?*

Firstly, by using a really up-to-date coil unit of a type that has only recently become available. It is one of the new "iron-

## —AND HERE'S YOUR SHOPPING LIST—

- 1 Polar .0005-mfd. tuning condenser, type S.M.2.
- 1 Colvern Ferrocart aerial coil, type F.5.
- 1 Telsen .0003-mfd. differential reaction condenser, type W.351.
- 1 Telsen screened binocular H.F. choke, type W.340.
- 1 Telsen L.F. transformer, type G.S.3.
- 2 W.B. 4-pin valve holders, small.
- 1 T.M.C. Hydra 2-mfd. fixed condenser, type 25.
- 1 T.C.C. .0003-mfd. fixed condenser, type 34.
- 1 Polar .001-mfd. preset condenser.
- 1 Erie 2-meg. grid leak, 1-watt type.
- 1 Graham Farish 15,000-ohm 1½-watt Ohmite resistance and vertical holder.
- 1 Bulgin 2-pt. push-pull on-off switch, type S.22.
- 1 Clix indicating terminals, type B.
- 1 Peto-Scott "Metaplex" baseboard, 10 in. × 10 in. × ½ in.
- 1 Peto-Scott ebonite panel, 10 in. × 7 in. × ⅛ in.
- 2 Peto-Scott ebonite terminal strips, 2 in. × 1½ in. × ⅛ in.
- 2 Clix accumulator spades.
- 3 Clix wander-plugs.
- 1 Belling & Lee wander fuse.
- 1 Coil B.R.G. "Quikon" connecting wire.
- Screws, flex, etc.
- 1 Peto-Scott cabinet to suit above panel and baseboard.



core" or "Ferrocart" class, and for all its compactness it is a little marvel of efficiency.

Enhancing this are certain special circuit arrangements, the effect of which is to give you clear and easy station separation, despite the simplicity of the tuning and the general straightforwardness of the receiver.

*I gather, then, that the circuit is not just an ordinary one. Can you explain to me which are its special features?*

Yes, and I think the explanation will be perfectly clear if you look at the theoretical circuit diagram. As you see,

## SIMPLICITY

is the keynote of the construction, for anyone can build this set and get excellent results with it. For those who do not buy a kit, with a panel already drilled, the dimensions for this latter are given above.

the aerial is led through a preset condenser (for adjusting the initial selectivity) to the aerial coil's No. 8 terminal; and the first unusual point is that this terminal is also connected to the reaction condenser.

*If the aerial is thus connected to the anode circuit of the valve via the reaction condenser, how are the incoming signals applied to the grid circuit in order that the first valve can play its part?*

You will see there is a route from terminal 8 to earth through the coil windings, and currents flowing along it produce a magnetic field which is strongly linked to the first valve's grid circuit by the adjacent grid winding, the whole coil assembly being designed for specially effective magnetic interlinkage.

You will notice, too, that the coil unit incorporates a switch, so that all the windings may be used for long waves or only one section for the medium wavelengths.

## A Dual-Purpose Winding.

*I gather, then, that the same windings are used for both aerial coil and reaction coupling. Is that correct?*

Exactly; and although the arrangement is decidedly unorthodox it gives remarkably satisfactory results.

(Incidentally, from the practical point of view, there is no complication in the handling of either the tuning or the reaction as a result of this unusual combined connection.)

*What about the preset condenser in the aerial lead? Doesn't adjustment of this somewhat complicate the handling of the set?*

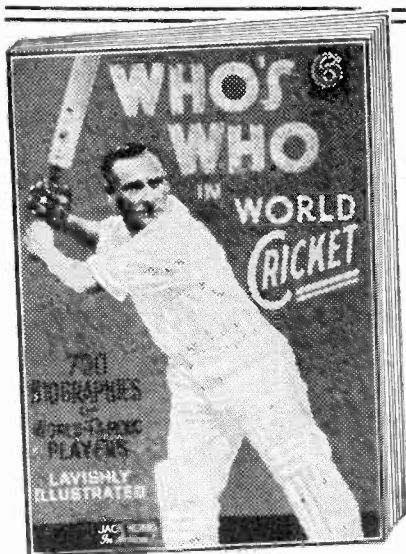
(Continued on next page)





Wherever there are A.C. Mains, there you will find Westinghouse Metal Rectifiers in use. Adopted by set manufacturers and constructors everywhere . . . specified again and again. Why? Because they are *reliable*. 60,000 hours' use at full load, and *no falling off in output*. No other rectifier can show even the smallest approach to such a record.

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



700  
Biographies  
of  
**WORLD  
FAMOUS  
CRICKETERS**  
and  
Numerous  
Photographs

In this splendid book you can get a glimpse into the lives of 700 famous players of to-day and years gone by. They're all here, the men of England, of Australia, of New Zealand, of South Africa, of the West Indies and of India. All their principal records and other interesting sidelights on their careers—all intimately told. There are also numerous photographs, many full page plates and

**A Complete List of Fixtures for the Season**

This is a Test Match year and everyone will be "talking cricket"—get this up-to-date book and be one of the well informed.

**WHO'S WHO IN WORLD CRICKET**

At all Newsagents and Bookstalls - - - - 6d.



## the needle and the poker

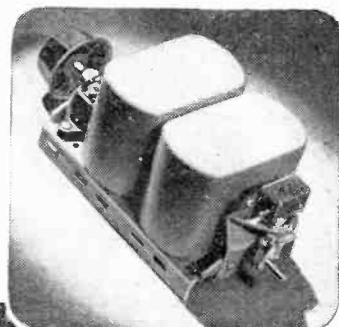
You can't pin point a dot on a map with a poker, can you? You can only get somewhere near it. It's the same story with your set . . . however perfect the rest of your components, inferior coils will rob you of "needle fine" tuning—take all the crispness and the clarity out of your listening, because you can only get "some-where near that station."

Colvernise your set now. Put in Colvern Ferrocart, the finest coils ever made. Put them in and forget them—you'll never have any trouble in their direction. You will be certain that you are getting more accurate, more sensitive tuning—Better, clearer, crisper, more enjoyable Radio.

## COLVERNISE YOUR RADIO

Here are the famous Colvern Ferrocart Coils—chosen by leading experts—recognised as the most perfectly designed coils in the world . . . the coils your set deserves. Get Ferrocart coils to-day, or send for Radio List No. 12, to Colvern Ltd., Romford, Essex.

Made under licence from patentee, Hans Vogt.





# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## THE COLVERN FERROCART COIL

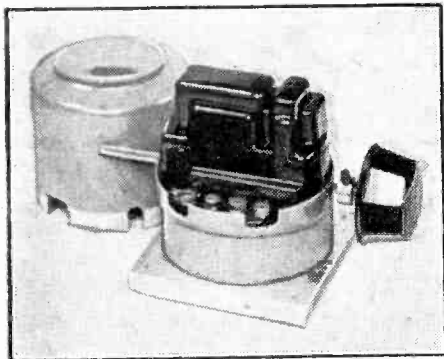
FERROCART coils are those coils which are made in strict accordance with the original specifications of Hans Vogt, the initiator of the "iron age" of radio.

His process involves the construction of a core of "dust iron" (very fine particles of iron) arranged in laminations so that the advantages of both laminating and the use of finely divided metal are obtained.

The purpose of such a construction is, of course, to reduce the losses by eddy currents. If the iron core were a solid mass of iron, the losses at a high frequency would be very considerable.

The Vogt method provides for a fine division of the iron, each particle being so small that it is in truth nothing but a mere speck; and as it is insulated, by the binding material which holds the dust together, from all its neighbours, there is no circuit afforded to the eddy currents.

Further, the iron particles are held on paper layers like butter on a stack of slices of bread, and that still further adds to the efficiency of the construction.



The Colvern type F5 coil embodies a special laminated "dust-iron" core, and is particularly suited to sets of the det. and L.F. type.

Colvern, Ltd., Mawneys Road, Romford, Essex, are the sole licensees in this country for the use of the Vogt patents in so far as the manufacture of components is concerned, and I do not think they could be in better hands, for the quality of Colvern coils is beyond question. Even their own trade rivals would admit that.

If a coil is a bit below standard in its efficiency there is nowhere that this shows up more than in the aerial position of a det.-L.F. type of receiver.

### Exceptional Selectivity.

Now, Colvern have a special Ferrocart coil for such a job. It is styled the Type F5, and it is a revelation as to what can be done by a combination of skill in design and good manufacture.

Also it shows the Ferrocart principle up to great advantage.

The selectivity obtainable is quite exceptional, and there is ample volume to prove that it is not gained at the expense of amplification, but, rather, *with it*.

Further, break-through is negligible.

Altogether, I was most favourably impressed by this Colvern F5 coil, and unhesitatingly recommend it to constructors. Many would find it worth their while to scrap their existing coils in favour of it.

## A NEW BLOCK BATTERY

Perfection as such may or may not be attainable—that is an ethical question which I do not propose to discuss here—but this I will say: Messrs. Block Batteries, Ltd., of By-Pass Road, Barking, Essex, have, for all practical purposes, arrived at what is at least *my* conception of perfection in L.T. accumulator design.

Their "Block" accumulators began as radical departures from the conventional. They saw no reason why their new principles of construction should be embodied in unprepossessing structures.

On the contrary, they successfully aimed at making their products pleasing and practical devices for home use rather than miniature replicas of laboratory or power-station apparatus.

Hence the attractive coloured bakelite casings. Now they have gone a step farther and produced a "Block" having a capacity of 45 ampere hours (intermittent), which is even more unlike the ordinary accumulator.

But not merely in an attempt to be different for the sake of being different.

The great new feature is the placing of the terminals in the front of the accumulator. That immensely facilitates its connection and disconnection, particularly when it is tucked away in the interior of a receiver, as is so often the case.

Even more importantly, the terminals are removed from the acid-creeping area and do not stand exposed at each side of the vent hole, prey to every droplet of solution that sprays up during charging, or to that acid-film residue that always seems to be present, not only in the neglected cell, but in the carefully tended one as well.

### Other Practical Refinements.

Further, the connecting wires do not have to trail over the top of the cell, ready to absorb acid into their insulation.

There is a vent plug in this "Block" accumulator, of course, but it is not a flimsy rubber affair that will wear away quickly or be likely to fall out and be lost. It is a substantial affair of porcelain, has a screw thread and screws securely into its hole.

There will inevitably be a certain amount of acid left on the top even of a "Block" cell, despite fairly careful cleaning, or it may collect



The new "Block" battery is of unique construction. It has one substantial block of active material, the interior of the casing acting as the other electrode.

afterwards, and though the quantity may actually never exceed more than enough to result in a slight dampness, it is nevertheless objectionable having such dampness on exposed surfaces.

But that does not happen with this "Block," for a finishing touch is contributed by a neatly fitting lid which covers the whole recessed top of the cell, including the vent plug, leaving a clean, attractive article which, for all outward indications, might well be a dry cell.

It will be unnecessary for me to say much about the general technical advantages of this now well-known make of battery. Unlike normal types, it has no plates in the ordinarily accepted sense of the term. And, of course, there are no separators to complicate the construction and, perhaps, the chemical actions.

There is just the one substantial block of active material, the interior of the casing acting as the other electrode.

Such things as paste shorts and sulphation hold no terrors with the "Block," and about double the capacity for a given weight and size is achieved.

A charge test of the new "Block" reveals that it is by no means over-rated (electrically), and, judging by my past experiences of this make of accumulator, I have no doubt at all but that it will possess a long and reliable life.

Therefore, although it would undoubtedly sell on its appearance and practical points of construction alone, it has the added asset of being quite outstanding when judged purely as a secondary cell.

I MADE reference in my notes recently to a new battery receiver which was about to be launched by Cossor. I am now in a position to supplement that information with a few technical details of the set in question, and let me say at the outset that, from a cursory examination of the specification before me, it is obvious that my eulogistic observations concerning this new Cossor effort were more than justified.

It is certainly a very fine set—just the thing for which a great number of battery users have been waiting—and the fact that it is to retail at the remarkably low price of £8 15s. makes it all the more attractive.

### True-to-Life Tone.

The new 435 B—as it is called—is a four-valve receiver with advanced features of design and with Class B output. It incorporates a well-designed variable-mu S.G. H.F. stage, and distortionless detection and exceptional amplification are obtained by the use of a pentode detector.

The design of the output stage has been carried out in such a way as to ensure "main-set" volume with true-to-life tone on a modest H.T. consumption—a consideration of vital importance to all battery users. The moving-coil loudspeaker incorporated is of the permanent-magnet type, and it is particularly sensitive.

I am pleased to be able to say that arrange-

## THE LINK BETWEEN

Jottings of interest to buyers

By G. T. KELSEY.

ments have been made for a complete test report of this set to appear in an early issue of "P.W.," but intending purchasers need hardly wait for that. I haven't the slightest hesitation in saying that the name of Cossor is a sufficient guarantee for anyone. I am confident that this is one of those sets that may be purchased with complete disregard for the aspects of performance and reliability, for, knowing the products of Cossor as I do, it just couldn't help giving entire satisfaction!

### An Enterprising Firm.

While on the subject of battery sets, it is opportune to extend good wishes to Northern Batteries, Ltd., on the occasion of their move into new and larger premises.

This enterprising firm, which is responsible for the Precision Unit Cell H.T. Battery, for H.T. batteries of ordinary type and for other electrical equipment, has taken over a new factory at Birtley, County Durham, covering an area of 3,000 square yards. The plant has been installed on most up-to-date lines, and every-

thing tends to indicate that we may expect great things from this company in the near future. Well, here's wishing them the very best of luck in their new home.

### And Still They Come!

Just as I was thinking of changing the subject, still more news of activity in the battery world has come to hand, and I am therefore going to pass it on while it is "red hot," so to speak.

This time the G.E.C. come into the limelight with an entirely new battery model—the "Battery Compact Three," as it is to be called—and it seems to me that it is going to become tremendously popular. Before I tell you the price, just consider the design for yourself, for by so doing you will be better able to judge the remarkable value-for-money appeal of this new set.

It is an entirely self-contained three-valve receiver with built-in moving-coil speaker (a particularly sensitive one, too), it has compensated volume and selectivity control, automatic grid bias, single-tuning control with illuminated indicator, and a host of other attractive features such as provision for extension speakers, for the connection of a pick-up, etc.

Well, how much? Cheap at 8 guineas? It can be yours complete with batteries and Osram valves for £5 17s. 6d. Can you beat that?

(Continued on page 389.)



With the abandoning of the very long waves for telegraphic radio communication, new channels are being left clear for broadcasting. In this article Mr. T. B. Sanders puts forward the pros and cons for telephony above 20,000 metres, while on the next page P. P. Eckersley comments on the suggestions.

**T**HE original "discovery" of wireless was the outcome of what is generally called "pure" research. The mathematics were formulated by Clerk Maxwell and the practical experimenting was done by Hertz. It is very unlikely that either of these scientists entertained much idea of the possibility of their work being of utilitarian importance.

#### The Dawn of Long Waves.

This was left to Marconi. The brilliant Italian inventor's success was due in large measure to his realisation that the successful commercial exploitation of Hertzian waves would have to take into account the question of wavelength. He quickly appreciated that the waves created by Hertz were what we now call "short," and, in the light of the knowledge then available, short waves

employment of enormous (and expensive) power.

Still, long-wave stations survive. This country owns one at Hillmorton, near Rugby. It works on a wavelength of some 18,000 metres and boasts the stupendous power consumption of 1,500 kw. Rugby's broadcast range is literally world-wide, the present writer having "copied" its signals with ease in the Australian Bight. In short, long-wave stations work extremely well, but only on the principle that "if you want to be heard you've got to speak up."

That, however, is just what's wanted for broadcasting. In many ways broadcasting is a "brute-force-and-ignorance" sort of job. Broadcasters have, generally speaking, one aim in life, and that is to pump into as many listeners' homes as possible as robust a signal as they know how to create. Why, then, do not broadcasters take the tip from Marconi and start "telling the world" on 20,000 metres or so?

At first sight there seems everything in favour of such a project. Financial difficulties could, one supposes, be surmounted by the lesser number of stations required to "cover" large areas.

#### What the Figures Show.

Commerce has largely abandoned long waves, so there ought to be "plenty of room up top." That, however, is where we strike our first "snag." It does not take a mathematical genius to discover the existence of exactly 12,000 metres between wave-

lengths of 8,000 and 20,000 metres. It is, though, necessary to invoke the aid of some maths. to discover that this range of metres embraces surprisingly few kilocycles.

In point of fact, wavelengths of 8,000 and 20,000 metres are represented by frequencies of 37.5 and 15 kc. respectively. On the present inadequate basis of a 9-kc. separation this only allows for the accommodation of two stations!

It looks, then, as if we must await the advent of Mr. H. G. Wells' world state before humanity can avail itself of the advantages of really long long-wave broadcasting.

The inhabitants of Mr. Wells' ideal world will, however, find the satisfactory

reception of their programmes a matter of no little difficulty.

Quite a pretty problem is, for instance, involved in the matter of detector design. Every detector has a condenser associated with it which has to by-pass radio frequencies with ease while presenting a much more difficult barrier to audio frequencies. The grid-leak detector used to-day quite frequently employs a grid condenser of .0001 mfd. capacity.

#### Detector Design.

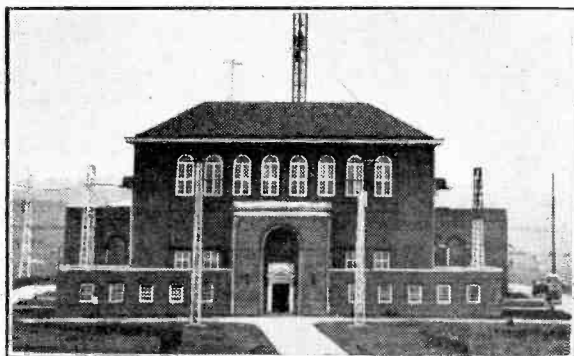
When reception of a wavelength of 2,000 metres (no broadcast transmitter now works on a higher wave) is involved, this represents a "resistance" of some 10,000 ohms. Few transmitters modulate at a higher frequency than 10,000, and to this .0001 mfd. acts as roughly 160,000-ohms "resistance."

To offer 10,000-ohms "resistance" to the passage of a current set up by a 20,000-metre wave the grid condenser would have to be roughly .001 mfd. When, however, this condenser deals with an audio frequency of 10,000 its impedance is some 16,000 ohms, which represents a serious loss of high notes and puts good-quality reproduction out of the question.

A broadcast station working on 30,000 metres would be radiating a constant audio frequency of 10,000 cycles per second. Every time a 10,000-cycle note was sounded in front of the microphone the interesting phenomenon of a station's modulation heterodyning its own carrier-wave would present itself!

It seems, therefore, that salvation from our present wavelength difficulties cannot be looked for among the long waves, and that there must, perforce, be an ever-increasing tendency to use shorter and shorter waves.

#### BRITAIN'S BIGGEST STATION



The world's most famous long-wave station, Rugby, which is used for telephony and telegraphy transmissions.

were comparatively useless for communicating over long distances.

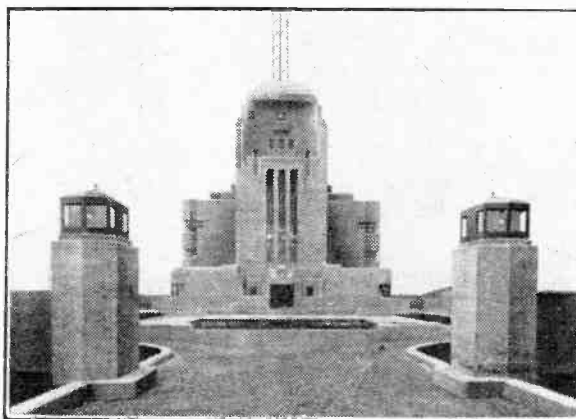
Many of Marconi's early experiments were, therefore, concerned with investigating the range of long waves, and his results seemed to point so conclusively to the superiority of long waves that when commercial wireless "arrived" it was inclined to look with scorn on wavelengths lower than about 8,000 metres.

#### Rugby Heard in Australia.

All this has, of course, been altered. The present-day world-wide ramifications of commercial wireless communication are conducted on short waves below 100 metres. This does not mean that Marconi was mistaken. Actually, the long-wave transmitter still wants a lot of beating in the matter of "delivering the goods" and of reliability.

From the point of view of commerce, however, long waves have a most serious defect. They receive no gratuitous assistance from the Heavenside Layer, and consequently their range is dependent on the

#### SHORT WAVES PREFERRED



The Kootwijk station in Holland favours short waves for its Dutch East Indies communications.

**"ECKERSLEY EXPLAINS"****"ONLY THREE CHANNELS AVAILABLE"**

Says P. P. Eckersley in reply to the article on Ultra-long-wave Broadcasting on the previous page

IT is a curious coincidence that I am asked to write an article commenting upon suggestions to use ultra-long waves for broadcasting when I have, in fact, been working for a year or more on just such problems.

Mr. T. B. Sanders points out that the ultra-long wave was used in the early days of telegraphic communication because it was found that it "got over" better than medium long waves.

"Why," he asks, "now that long waves are obsolescent for telegraphy, being replaced almost entirely by short waves, not use them for broadcasting?" And proceeds to show why they cannot be used.

**Reasons For and Against.**

But some of his reasons against using them are not good reasons against, and some of his reasons for using them are not good reasons for! He rightly points out that kilocycles are not proportional to wavelengths. Suppose we write down the number of channels against frequencies on a 10-kc. separation basis. We have:

Wavelength (Metres).	Frequency (Kc./sec.).
15,000 .. ..	20
10,000 .. ..	30
7,500 .. ..	40

So that in the ultra-long-wave range and before the carrier-wave becomes audible there are, at the most, three channels available for use. But more than three nations might want these channels. So it is suggested that we shall have to wait for the world state to arrive and give the world the three channels for its alternative programmes!

Now, just why is it that long waves have been abandoned for world-wide communications? Mr. Sanders suggests that it is because they get no benefit from the Heaviside Layer. But Mr. Sanders says that he himself has picked up Rugby in the Australian Bight. Then how did the signals get round the (round) earth or world? Waves do not stick to the ground, but they must get round the world somehow. And it is the dear old layer still at it.

**Where Atmospherics Come In.**

No! The real disadvantage of long waves is not that they do not get the benefit of the layer, but that they are terribly interfered with by atmospherics. Certainly it costs more to get a Rugby signal (i.e. a long-wave signal) to the antipodes, as anyone who has compared the giant masts with the baby short-wave masts below them must realise, but I doubt if the actual signal strengths of short and long waves are much different.

In fact, I expect the short-wave signals are of less signal strength since the power used for practical short-wave transmission is so much less than for practical long-wave transmission. The point is that the atmospherics are so much less with the

short waves than the long that the former can be amplified and rendered readable where the others can not.

At the risk of repetition let me say once again that, now that we've got amplifying valves, it is only the ratio of signal to noise which determines whether or not a communication is practicable—it has little to do with the absolute value of the signal.

**How the Valve Helped.**

Before we had valves the short-wave signals were too weak to pick up at all, so we didn't know that they experienced less atmospheric interference! The valve put us in the way of finding new knowledge.

The second point to realise is that broadcasting to be good does depend upon direct-ray transmission. So, even postulating a world state, they would want more than three stations to serve all peoples, because the world is a spherical world and direct rays go straight.

The thing to realise is that in broadcasting we have the following factors which help us to determine what length of wave we ought to use:

(1) The attenuation or falling away of energy is the less the longer the wave, i.e. waves tend to give better direct-ray service, as they are longer.

(2) But, as we have seen, there are very few channels at very long wavelengths,

and, presupposing a world state, one has to have direct-ray service and therefore many stations.

(3) Atmospherics increase with increasing wavelength and are worse in some parts of the world than in others; therefore the longer the wave the more necessary to use higher power.

(4) The cost of the aerial system increases the longer the wave, if that system is to be efficient.

**Detecting Those Low Frequencies.**

All this means is that there are optimum wavelengths to suit different parts of the world and different purposes. For just urban areas a few miles in extent, waves around 200 metres suffice. For "Regions," waves of the order of 600-1,000 metres are best. For continent broadcasting, waves of the order 4,000-5,000 metres and powers up to 10,000 kilowatts would be excellent.

Finally, let me tell Mr. Sanders that there are no insoluble problems in detector design, even though very low frequencies are used. I say this with some confidence because I am developing a technique, not for ether broadcasting, where I modulate and detect frequencies as low as 20 kc./sec., with a resulting quality which compares favourably with that obtainable on the high-carrier frequencies.

A lot of fuss is made about keeping a straight-line-frequency response characteristic when using long waves, i.e. low frequencies. When I was in Australia I was told that one reason why the government would not use long waves was that it was "impossible to transmit the side bands." Apparently the great news about a band-pass circuit (which one knew about around the nineteen hundreds), was not official down under—at least, not in government circles! But band-pass circuits do work—if you know how to design them.

**THE RADIO "PHONOFIDDLE"****A NOVEL USE FOR A GRAMOPHONE PICK-UP**

NOW that all listeners are more or less familiar with the gramophone pick-up, I should like to draw their attention to another use for such a component, and that is its adaptability in place of the usual sound-box in the old "Phonofiddle."

This new departure produces far above the ordinary quality associated with the old instrument.

The tone is superb, and there is the added advantage of real volume to fill any concert hall, according to the power of one's amplifier.

My present violin has an L.F. amplifier specially built for it, consisting of one stage of resistance capacity and one stage of transformer coupling.

This radio "Phonofiddle," however, is intended to be used with any existing straight three-valve set, detector and two L.F. stages.

**Fits Any Set.**

By simply plugging the "Phonofiddle" leads in place of your radiogram, all is ready for the speaker or speakers to pour forth

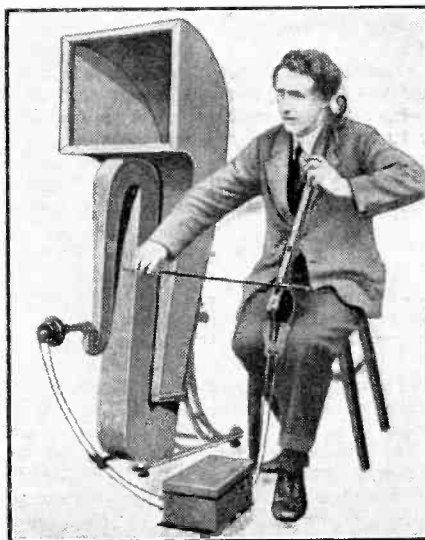
tone, volume and quality never before dreamed of. As a pioneer of Jap and "Phonofiddle" making, it dawned on me to try the use of a pick-up in place of the existing sound-box, and after experimenting with this device for some months

I managed to perfect the violin which I have had in use now for nearly twelve months, and all who have heard it give great praise for its performance.

**Chirgwin Would Have Liked It.**

You remember Chirgwin, the great phonoviolinist? I wonder what he would have thought of this departure. I am almost certain he would have welcomed the opportunity of adapting my new method, and I am almost certain that he would have had several speakers placed throughout the concert hall, thus giving everybody the fullest opportunity of hearing his playing and appreciating his skill in the manipulation of the new musical instrument.

W. S. M.



Mr. W. S. Mitchell using the Phonofiddle which he describes in the accompanying article.



## THE LISTENER'S NOTEBOOK

(Continued from page 374.)

Howard Marshall's eye-witness accounts of the Test Match from Nottingham have been very welcome, too. These accounts have, with the Derby relay, accounted for as many listeners as the rest of a week's broadcasts put together, I should say. I know someone (a cricket fan, obviously) whose only listening has been to Howard Marshall. "And it's well worth the ten-shilling licence," he says. Howard Marshall, as usual, spoke very clearly.

I'm sorry we've heard the last of "In Town To-night" for a bit, although I've never awarded the series quite full marks. Still, I look forward to the time when they come on again. I hope then that they will be a little more ambitious and more characteristic of the spirit of London. May fewer film stars be encouraged to prattle, for they are not characteristic of the spirit of London. And may we not be taken into quite so many film studios or theatre wings next time.

### CLEAR AS A BELL!

... The First Lord of the Admiralty will make presentation of the bell at 14.55, so that, as the Cathedral clock strikes three, six bells may be struck

Official B.B.C. statement.

We want more variety. We want to hear more of the 101 other things that are going on in London—the greater things that inspired the Lord Mayor to talk as he did of the wonderful spirit of the City. You see, I'm a great believer in the possibilities of "In Town To-night," and I am certain a far better and bigger thing could be made of it.

Stainless Stephen is a wonder comedian. A comedian that can change his stuff for every performance should go on for ever. Particularly when it's the sort of stuff he puts over. His jokes are all first class and original, all having to do with "What's On"—Test Match, Derby Day, the Drought, School-Leaving Age, etc., etc. He misses nothing.

I am glad he has cut a lot of that semi-colon, full-stop business out of his patter. It was very amusing once, but it can't go on for ever. One of the worst features of a lot of our variety humorists is that we always know what they are going to say or sing before they start. Not so with Stainless!

C. B.

### ACCUMULATOR CHARGING

A comprehensive and practical book.

A FOURTH edition of "Accumulator Charging, Maintenance and Repair," by W. S. Ibbetson, B.Sc., A.M.I.E.E., M.I. Mar.E. (Pitman, 3s. 6d.), has been published.

It is a first-class handbook, and it deals with the subject in a comprehensive and eminently practical manner.

Radio amateurs who are concerned only with the charging of small single cells from the house supply, and owners of large charging stations alike, will find in it everything they want to know.

There is a chapter on "Generator Methods of Charging" in which the various types of rectifier are discussed and such applications of the accumulator as to radio, motor-cars, country-house and emergency installations and motor-cycles are dealt with.

All the useful formulæ are given, but in addition there are numerous tables that enable the reader, at a glance, to read off the desired information direct.

## HOW TO BUILD A TWO-VALVE BATTERY SET

(Continued from page 382.)

*I think that is all very clear. And now, since I shall certainly build the set, can you tell me how to connect up and adjust when it is completed?*

That, too, is very straightforward. Fix your leads to the set, and then join up the batteries as marked, making sure that the wander-plugs fit securely into the battery sockets. (The grid-bias battery can be placed inside the set, if desired, and the other batteries should be close, to obviate long leads.)

As regards operation, you first tune in your most powerful station, after screwing the baseboard preset down, and then readjust the preset condenser on the baseboard if this proves necessary. (If your

aerial is a big one you may have to turn the preset condenser back a little to do this.)

Then you can search for other stations, using reaction with moderation to strengthen the weaker programmes. (Fuller hints on handling tuning and reaction are frequently being given in our "Radiatorial" columns.)

*You say "using reaction to strengthen the weaker programmes." Does that mean I shall be able to receive foreign stations at full loudspeaker strength?*

Oh, yes—quite a dozen of them, I expect, and possibly more. Certainly you will get more in winter conditions, but summer is the worst time for long-distance reception, especially in daylight. Even so, you should have some daylight foreigners available as alternatives to the B.B.C. programmes, and altogether I think you are going to be delighted with your new set's performance.

## THUNDER STORMS ARE COMING!

# PROTECT YOUR AERIAL WITH

# GARD

## AUTOMATIC LIGHTNING ARRESTER

# £200

## GUARANTEE



# FILT

## PERCOLATIVE EVER-DAMP EARTH



## KEEPS DAMP AND EFFICIENT IN HEAT & DROUGHT

# 2/6

Fit the new GARD Automatic to your aerial lead-in and your aerial is safe from the fiercest lightning flashes. No need to worry with GARD fitted—no need ever to switch off. Forget lightning, enjoy your radio throughout the storm, GARD permanently safeguards your set—your house itself—for the trifling cost of two shillings.

## EVERY GARD IS FLASH-TESTED.

From all Dealers, or post free from sole manufacturers.

# 2/-

PRODUCTS OF GRAHAM FARISH LTD. BROMLEY, KENT.

# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, 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 specialties 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

### LOUDSPEAKER WIRING TO OTHER ROOMS.

Following the details given last week, here are some additional details of extension wiring for extra loudspeakers:

Regarding the wall jacks, these should not be fixed in position until the ends of the wires have been threaded through the appropriate holes in the jacks.

Having got the wires below the floor boards, the rest is comparatively straightforward, for you simply have to run them between the beams and into the other rooms on the same floor. You will find that the walls dividing rooms finish just below the floor-board level, and that below this level all the rooms are really one large room.

In many cases the wiring will be in parallel—that is to say, each of the set's L.S. terminals is directly connected to one side of every loudspeaker.

When doing the wiring under the floor boards try to keep it as far away as possible from gas and electric-light piping.

For your own sake don't try taking up all the floor boards in order to put down the

wiring. You will find that just one here and there will be sufficient.

The ends of the wires in other rooms should be equipped with wall jacks exactly in the manner described last week for the one at the set end.

(You will find full instructions in this connection in the Bulgin catalogue which will be sent free to "P.W." readers on receipt of a 2d. stamp to defray postage.)

Extension wiring from one floor to another with the wires completely hidden can only be done by running them down in the cavity walls themselves—if these are employed—or in between the laths and plaster. That is, assuming that the dividing walls are lath and plaster, for otherwise it means cutting a channel in the actual plaster and filling it in afterwards with Keen's cement. But for this little part of the job you will find that it works out almost as cheap to get your local electrician to do the job for you, and that is much the better way if you have not previously had experience of internal wiring!

Surface wiring, the alternative way of carrying out the extension system, is very straightforward, for it consists of running the wires along picture rails, skirting boards, etc., in the least inconspicuous manner. It may, and probably will, take more wire, but it is much quicker to do.

### CONNECTIONS OF AN OUTPUT TRANSFORMER.

E. S. (Highbury).—"I have just built the 'New Everybody's Three,' and I find it is a good set, but I wish to fit an output transformer ratio 1-1 to act as filter.

"What would be the connections? I have tried several, but cannot get the right one.

"I have the transformer on hand, and my loudspeaker has not got one."

The connections of such a transformer are simplicity itself. All you have to do is to connect one of its windings across the loudspeaker's terminals and its other winding in the plate circuit of the output valve.

If two of its terminals are marked P., connect one of these to each "loudspeaker" terminal on the set. And then the other pair of terminals go to the respective loudspeaker leads.

If there is no marking on the terminals, test them with a dry cell to find out which are the two pairs, and then join one pair to the set's L.S. terminals and the other pair to the loudspeaker's terminals.

### HAS IT HURT THE ACCUMULATOR?

R. S. C. (Radstock).—"Having been one of the unemployed for over two years, I have had to study economy at every turn. And now that I have a two-valve wireless set at last, I am naturally taking every care of it.

"Even so, I had a shock last Friday week, and for a moment I thought I should have to do without wireless again. (Only those who have had to give it up for financial reasons will know how hard that is.)

"What happened was this: I took off the old accumulator, that wanted charging, and stood it down beside the set. I had bought

myself a new length of L.T. flex lead, as the old was getting worn, and I had the new lead connected to the newly charged accumulator that I was going to connect up to the set.

"Somehow, in stooping over the set, my foot touched the new lead, and its two ends that were not connected to the accumulator terminals accidentally touched together. I noticed it by a smell of burning, snatched the two wires apart as soon as I saw what had happened, and found one was so hot that it scorched my hand as I picked it up.

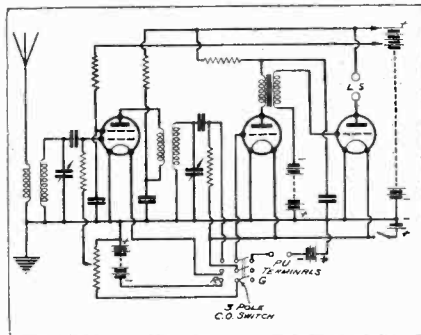
"You can see what I had done. Shorted the accumulator through the length of twin flex, and as the resistance of this must be low it was apparently just as bad as if I had connected a wire right across the L.T.+ and L.T.—terminals.

"Having seen it stated that this sort of treatment would be likely to ruin an accumulator, I was almost too scared to connect up properly, in case I found that the accumulator was done for. However, I *did* connect up, and this is where I got the surprise. The set went perfectly!

"What is more, it is *still* going perfectly. And being very uneasy about the effects of the accident I got an acquaintance who owns a good voltmeter to come round and test the accumulator for me whilst the set was switched on.

"It was then plain to see that the voltage was absolutely O.K.—dead steady on 2. And

### ECONOMICAL S.G. CONNECTIONS



The 3-pole change-over switch shown in this diagram is wired up so that when it is in the central (or "off") position or when over to "radiogram" it automatically disconnects the S.G. valve's grid-bias battery and filament supply leads.

These are economy points of considerable interest and importance to users of the variable-mu type of valve who employ their sets extensively for local and gramophone work, as well as for long-distance reception.

after watching it for a few minutes the owner of the voltmeter said: 'Say what you like, there's nothing wrong with that battery.'

"However, I am still a bit uneasy in my mind, so I should like to know if there is likely to be any damage in the way of shorter life from the accumulator. And whether there is anything I can do to overcome the effect of the accident."

We do not think you have any need to worry any more about the matter. Probably no measurable harm has been done, for the modern good-quality accumulator is far less likely to be damaged by such treatment than is commonly supposed.

We certainly do not expect any loss of useful life, drop in voltage or similar fault to manifest itself as a result of a momentary short. Generally it does no harm at all, so far as can be observed.

Of course, we don't go so far as to approve of a short, for, as you noticed, it is liable to generate excessive heat in the wires carrying the momentarily heavy current. And there is certainly an element of risk of fire in such circumstances.

But we can reassure you about the ill effects done in your case. They are negligible, and provided you continue to look after the battery carefully, charge it regularly and so on, it should give you full and satisfactory service.

But you should learn one useful tip from your

(Continued on next page.)

## ABOUT YOUR CONTROLS

### DIFFERENTIAL REACTION.

The handling of a differential reaction control does not differ from that of a non-differential reaction condenser, both being used to strengthen the volume on distant programmes and to improve selectivity.

On some sets it is found that the usual clockwise movement of the knob results in a decrease, instead of the desired increase, in reaction. The following is a very easy cure for this.

A reversal of the connections to the two outside terminals of the differential reaction condenser will result in the necessary change in the direction of adjustment. The centre (moving vanes) terminal of the differential is not affected, so if all the "outer" wiring is changed over the reaction increase will in future be to the right, as normal.

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

experience. And that is never to leave the two leads attached only to a battery in the way you did.

They should always be connected to the battery last and to the set first. And when disconnecting they should be removed from the battery first.

In other words, disconnect or connect up the battery itself, and not the other end of its leads.

### FITTING A SWITCH FOR THE EXTRA LOUDSPEAKER.

G. M. (Addlestone).—"My set is one of the all-electric, totally enclosed type, with moving-coil loudspeaker of the mains-operated type. On the back it has two sockets, with plugs to take the leads to 'Extra Loudspeaker.'

"At present I have the following arrangement: The set is in the corner of dining-room (front of house), with the aerial arranged round the picture rail of this room.

"In the lounge (back of house) I have a permanent-magnet type of loudspeaker, fed from flex leads which go through and along the separating walls to the terminals marked 'Extra Loudspeaker.' When working both together the results are perfect on both loudspeakers. But sometimes (not very often, as a matter of fact, but perhaps once or twice a week) they want the extra loudspeaker off during the afternoon when the lounge is occupied by visitors, or someone wants to talk in there instead of listening to the wireless. And that is where I think you can help me.

"At present my wife has to go into the dining-room, move out the set from its corner to get at the leads and pull out the plugs there, as there are no plugs for the loudspeaker in the lounge. (This was because we passed the wires direct up into it, and on to the terminals, to prevent the lead showing.)

"I don't want to alter the arrangement in the lounge; but as the set is heavy and awkward to move, I thought you might tell me if it is possible to use a switch instead of having to pull out the plugs on the set every time.

"It would be easy to reach a hand round and move a switch up or down, if this is possible to arrange. In fact, I have a very small on-and-off switch that could be mounted on the case quite easily, if that kind will do. (It is one with a screw-over top; they call them 'tumblers,' I believe.)

"It could be done quite easily if I were sure of how to wire and that the quality of the reproduction would not be spoilt."

In all probability you can use the switch you have on hand merely by "breaking" one of the extra loudspeaker leads with it. So if it is in good working order wire up as follows:

One of the extra loudspeaker leads (it does not matter which one) remains exactly as at present. The other is cut near the plug, the latter being placed in its usual socket again, but with the short wire left attached to it now going to one of the terminals on the switch.

The long cut lead from the distant loudspeaker is then attached to the other switch contact. And when the switch is "On" your original connections are restored via the switch.

When the switch is placed in the "Off" position one lead is broken, and the loudspeaker in the other room consequently goes out of action until the switch contact is restored.

### BIGGER CAPACITY GIVES LOOSER COUPLING

T. L. L. (Newcastle-on-Tyne).—"Experimenting with a band-pass 'hook-up' the other evening, I came across a rather surprising effect, which I have just checked and which seems 'All wrong.'

"The band-pass circuit is the usual pair of coils and ganged .0005-mfd. condenser, the coil's fixed vane connections being the separated pair. The other ends of the coils are connected together and to earth via the band-pass coupling condenser.

"What I noticed was that if this latter

condenser is increased in capacity, the selectivity of the arrangement increases. Should it not work the other way round, with a smaller condenser giving the greater selectivity?"

No. For the arrangement you describe, if the coils are not magnetically coupled together, the only coupling is the reactance of the condenser, which is common to both the band-pass circuits. And the higher this reactance the tighter the coupling.

As a small-capacity condenser will have a much higher reactance than a large one, the latter will give the looser coupling and will increase selectivity.

### A QUESTION OF TIME.

J. W. R. L. (Frensham).—"I see from the 'P.W.' World Radio Atlas and Gazetteer, if the longitude is anything to go by, that Moscow's time is two hours in advance of Greenwich; but, according to the announcements, they use a time three hours ahead. Why is that?"

The case of Moscow is a rather special one, since officially they are two hours ahead of Greenwich; but certain metropolitan areas have a kind of local time, one hour ahead of the surrounding districts, and this accounts for the apparent time discrepancy.

## TELEVISION TROUBLE TRACKING

(Continued from page 375.)

will generally be patches of light, and they are usually quite irregular in shape and location. In very bad cases the best check is by listening, and I'm afraid there is very little practical help I can give here.

Just one point should be mentioned, however, and that takes the form of a reminder that a poor type of driving motor for the disc or drum of your own apparatus can itself cause the trouble.

This type of interference can generally be spotted by the fact that the marks on the picture are more or less in the same places on the picture area, so long as synchronism is maintained. If the picture is allowed to go out of "sync" they begin to move. The usual attention to commutator and brushes will sometimes effect a cure.

Interference of a normal "radio" kind will also make marks on the picture, but these are not, as a rule, of any regular or recognisable variety. A possible exception is to be found in the case of a really bad heterodyne whistle, which causes a series of fine lines or even a sort of gauze mesh to pass over the picture.

Defects of this kind, of course, are only likely to be experienced by those situated at considerable distances from the transmitting station. In any case, there is not much that can be done about them, so I do not propose to consider them in any detail.

## THE LINK BETWEEN

(Continued from page 384.)

Frankly, had it not the name of G.E.C. behind it and pending my own tests, I'm afraid I should have had the greatest doubts about it. But what more can anyone want than the backing of such a famous firm? I haven't yet tested it—no doubt I shall do before very long—but meanwhile, on the strength of the reputation of the manufacturers alone, you may rest assured that it is a winner. The G.E.C. have been too long at the game to turn out anything but the very best possible, and they are one of the few firms from whom I would buy a set without hearing it. Such is my faith in their products.

## PILOT AUTHOR KITS

Exact to Specification

**IMPORTANT** Miscellaneous Components, Parts, Kits, Finished Receivers or Accessories for Cash, C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid (GREAT BRITAIN ONLY).

### "P.W." BATTERY 2

**KIT "A"** Author's Kit of First Specified Components, less Valves and Cabinet. Cash or C.O.D. Carriage Paid, £2/15/0. Yours for 5/- and 11 monthly payments of 5/-.

**KIT "B"** As Kit "A," but with set of specified Valves only. Cash or C.O.D. Carriage Paid, £3/10/9. Or 12 monthly payments of 6/6.

**KIT "C"** As Kit "A," but with set of specified Valves and Peto-Scott Universal Cabinet. Cash or C.O.D. Carriage Paid, £4/5/9. Or 12 monthly payments of 7/9.

### MIDGET PORTABLE

**KIT "A"** Author's Kit of First Specified Components, less Valves and Cabinet. Cash or C.O.D. Carriage Paid, 22/-.

**KIT "B"** As Kit "A," but with set of 2 specified Valves only. Cash or C.O.D. Carriage Paid, £1/16/0, or 8 monthly payments of 5/-.

**KIT "C"** As Kit "A," but with set of 2 specified Valves and polished Oak Cabinet with Frame Aerial (unwound). Cash or C.O.D. Carriage Paid, £2/17/0, or 12 monthly payments of 7/3.

### DUAL-RANGE COIL KITS

As described in "Popular Wireless," May 19th, 1934, issue

	s. d.
1 PETO-SCOTT Screening Chassis	1 0
1 PETO-SCOTT Former, 2 1/2" long x 1 1/2" wide	6
4 PETO-SCOTT Spacing Rings	4
1 PETO-SCOTT Coil Supporting Bracket	3
1 PETO-SCOTT Ebony Baseplate 5 1/2" x 2 1/2"	1 6
2 with 6 Terminal Heads, Screws and 6 B.A. Nuts	9
1 Oz. of 34-gauge Cotton-covered Wire	2
Length of Insulated Sleeving	4 6

(Postage 6d. extra.) CASH 4 6

Orders for 2-Coil Kits, 9/- POST FREE.

### LISSEN KITS

**LISSEN SKYSCRAPER THREE.** Send  
Chassis model with (Lissen) S.G. Detector and Pentode Valves. Cash or C.O.D., 8/3 only  
£4/9/6. Carriage Paid.  
Balance in 11 monthly payments of 8/3.  
**NEW LISSEN SKYSCRAPER FOUR ALL-WAVE CHASSIS MODEL.** Send  
Complete kit comprising all components, including set of Lissen Valves. Cash or C.O.D. 10/3 only  
Carriage Paid, £5/12/6.  
Balance in 11 monthly payments of 10/3.  
**IMPORTANT.**—When ordering state whether required assembled or in kit form.

### 2 BARGAINS ATLAS S.G.3 A.C. SET

LIST PRICE £9/17/6 OUR PRICE £5/19/6 or Yours for 11/6  
Model 334. Variable-Mu S.G., Detector and Power Valves, Westinghouse Rectifier. Full-vision illuminated Wave-length Scale. Sockets for Pick-up and extra Speaker A.C. Mains, 200/250 volts, 40/120 cycles. Complete with Valves, Speaker and Cabinet. Guaranteed BRAND NEW in manufacturer's Sealed Carton. Ready to play. Cash or C.O.D. Carriage Paid.

### HALSON MIDGET SET

LIST PRICE 12 Gns. OUR PRICE £5  
HALSON, BEST OF ALL THE MIDGETS. 4-valve. All-electric A.C. or D.C. Mains, 100 to 250 volts. Moving-coil Speaker. Single knob tuning. 200/550 metres. Size 10 in. by 7 1/2 in. by 6 in. deep. Wonderful one. Super-tet circuit with amazing selectivity. Regional and powerful foreign stations received on ready fitted short aerial. Cash or C.O.D. Carriage Paid, £5. Yours for 10/- Balance in 12 monthly payments of 10/3.

### PETO-SCOTT CO. LTD.

77, P.W.3, CITY ROAD, LONDON, E.C.1.  
Telephone: Clerkenwell 9406/7.  
West End Showrooms: 62, High Holborn, London, W.C.1.  
EST. 1919



# SEEN THE FREE? AvoMinor. COMPETITION

**£1 A WEEK for A YEAR**  
**10/- A WEEK FOR A YEAR**  
**£10 CASH and 25 other Prizes**

Here is a rare chance of replenishing the pocket depleted by income tax. Just your normal and natural interest in radio can win you a welcome windfall of extra cash. Without any cost or difficulty, without being technical, clever or lucky, you can win an easy and acceptable prize in the novel AvoMinor competition.

Ask your nearest radio dealer for full particulars and Free Entry Forms, or if you have any difficulty, write direct.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT Co. Ltd.  
Winder House, Douglas Street, London, S.W.1

## G.P.O. ENGINEERING DEPT.

(No experience required.) Commence £4 per week. Age 17-23. Excellent prospects. Free details of entrance Exam. from  
B. I. E. T. (Dept. 568), 31, Oxford Street, W.1

## RADIO SUPPLIES

Send your list of Radio needs for our quotation. Kits, Parts, Sets, etc. Everything in Radio stocked, prompt delivery, 7 days approval. Catalogue free. Taylex & Standard Wet H.T. replacements stocked.  
P. TAYLOR, 9, GROVE ROAD, BALHAM, S.W.12

**1,000 ELECTRADIX BARGAINS**  
at sacrifice prices in radio components, meters, dynamos, microphones, switches, chargers, valves, etc.  
Send for Sale List "P." It will save you pounds.  
ELECTRADIX RADIOS, 218, Upper Thames Street, London, E.C.4. CENTRAL 4611.

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

## EASY PAYMENTS

**"There's no place like HOLMES."**

The first firm to supply Wireless parts, on easy payments. Nine years advertiser in "Popular Wireless." Thousands of satisfied customers.

	Monthly	Deposit	payments
TELSEN Latest 323 Kit	29/6	4/-	7 of 4/1
TELSEN S.G. 3 Kit	39/6	4/4	9 of 4/4
LISSEN Skyscraper 4 Kit	112/6	10/-	14 of 10/3
EXIDE H.T. Accu. 120-v.	60/-	6/-	9 of 6/8
ATLAS Eliminator C.A.25	59/6	5/-	11 of 5/6
BLUE SPOT 29P.M.	32/6	4/5	7 of 4/5
B.T.H. Pick-up Vol. Con.	21/-	3/10	5 of 3/10
EPOCH 20th C. M.C.	35/-	4/10	7 of 4/10

Parts for any Kit Set. Any make of Speaker.

**New Goods Obtained for Every Order.**

Send us a list of the parts you require and the payments that will suit your convenience, and we will send you a definite quotation. Anything Wireless.

**H. W. HOLMES, 29, FOLEY ST.**  
Great Portland Street, London, W.1.  
Phone: Museum 1414.

## THE LATEST VALVE RELEASES

Details of three exceptionally interesting battery types.

### THE QP.240.

THE High Vacuum Valve Co., Ltd., famous for the popular "Hivac" valves, have added a new model to their range in the form of a Q.P.P. double-pentode assembly. In this valve two battery pentodes are situated in one glass envelope and are matched for use in Q.P.P. circuits.

The result is a valve that will give up to 1.4 watts undistorted output at 150 volts H.T., with a quiescent H.T. current of 8 milliamps. With the normal H.T. employed by the average user, about 120 volts, the quiescent current of the valve is about 5.5 milliamps, the anode passing just under 5 milliamps and the rest being accounted for by the auxiliary grids.

### The Grid-Bias Values.

The bias voltage for the valve is about -19.5 when an H.T. pressure of 150 volts is applied, and -16.5 volts when 125 volts H.T. is employed.

In use the valve behaves perfectly normal, an output load of some 14,000 to 16,000 ohms being required. A 7-pin base is fitted to the valve, and it takes a maximum grid input of 14 volts R.M.S.

With all amplifiers of this nature some form of instability preventer must be used in the circuit. One of the best is a high resistance in series with the centre tap of the secondary of the input transformer and the grid bias, while the makers of the QP.240 recommend a 5,000- or 10,000-ohms resistance in series with the auxiliary grids. On test with our model of the QP.240 this latter did not seem to be necessary, but readers should bear it in mind if they are at all troubled with instability when using Q.P.P. circuits.

It should be realised, however, that such instability is not a reflection on the operation of the valve itself; this is exceedingly good, as shown by our tests, and if all samples of the valve are equally efficient we have no hesitation in recommending it to the attention of readers.

### TWO NEW OSRAM VALVES.

Following on the two "K" class battery valves described a few weeks ago, Osram have added another to the range—the V.S. 24/K. This is a multi-mu screened-grid valve constructed on the same "Catkin" lines as the other of the "K" class, and is only 115 millimetres long and 36 millimetres wide.

It is fitted with the new type of cap, necessitating a clip fastening for the anode lead, and costs 15s. 6d. With an anode potential of 150 volts and screen volts 75, the mutual conductance can be varied between 1.5 and .016 m.a./volt by the application of up to 9 volts negative bias.

### For Diode Rectification.

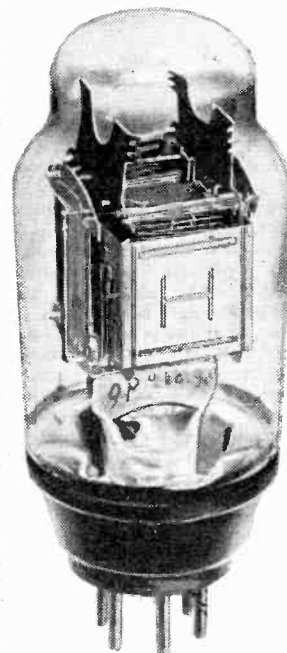
The other battery valve just introduced by Osram is the double-diode triode, type H.D.21. This valve is designed for A.V.C. and other circuits where diode rectification is desired, and is so constructed that

exceptionally complete screening is obtained between the diode and triode portions of the valve.

The two sections are built up on separate filament limbs, each rated to operate at 2 volts 1 amp., and the two limbs are wired in parallel. Owing to the voltage drop through the filament the two diodes are, of course, at slightly different potentials, so that the makers have provided information concerning the capping of the valve.

An ordinary standard 5-pin base is used, and here are the necessary details of connection: Pin No. 1 is the anode; 2 is the diode nearer end of filament connected to No. 3; 3 is the filament and metallising

(where supplied); 4 the filament and diode shield; 5 is the diode nearer the end of fila-



A photograph (taken by a special process which allows the camera to "see through" the gettering of the valve) of the new Hivac QP.240. Note the intricate electrode assembly, and the sturdy construction.

ment connected to No. 4. The top cap goes to the triode-control grid. The positioning of the

pins in relation with the standard 5-pin holder is given with each valve.

Of the triode portion, here are the essential details: The amplification factor is 27 and the impedance is 18,000 ohms, giving a mutual conductance of 1.5 m.a./volt.

## ADDING DECOUPLING

ALTHOUGH decoupling is a well-known and recommended remedy for instability troubles, it is not always an easy matter or a convenient one to disconnect the anode leads of the various circuits inside the receiver to carry out the essential modifications.

Provided the high-tension battery is fitted externally, however, there is no necessity to delve inside the cabinet, because the necessary alterations for decoupling purposes can very easily be effected in the battery cords, as follows:

Let us assume, for instance, that the detector anode circuit requires decoupling and that the H.T. supply lead for this valve is a flexible one connected to H.T. of the L.F. transformer.

First of all, it should be disconnected from the battery socket and joined to one side of a 25,000-ohm resistance and one side of a 2-mfd. condenser. The other side of the resistance is joined to the battery socket, and the remaining terminal on the condenser to H.T.—of the battery. A.Y.

# TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

## Trying Out a Pick-up.

IF you want to try an outside pick-up with a receiver you can do so very simply before making any alterations to the wiring of the set. All you have to do is to connect the pick-up leads, one to the grid terminal of the valve and the other to a tapping of the grid-bias battery, generally  $1\frac{1}{2}$  volts or 3 volts negative. To facilitate connecting the pick-up leads it is a simple plan to fit a crocodile clip on to the end of each lead.

When the grid leak goes to the slider of a potentiometer, then you connect the pick-up leads across the grid leak of the detector and move the slider of the potentiometer down to the negative end.

## Shielded Cable is Best.

It is often a convenience to try things out in this way before upsetting the wiring, and incidentally it is important, when using an outside pick-up, to keep the pick-up leads as short as possible, remembering that they are in the grid circuit and therefore very liable to pick up interference.

When you are making a permanency of the external pick-up it is worth while to use shielded twin cable for the leads; this will get you out of a lot of troubles.

## Avoiding Detector Overloading.

When using a set of the conventional screened-grid-detector-pentode type there is often a difficulty owing to the excessive strength of local stations. This means that the signal delivered to the detector is much too large, with the result that the detector becomes badly overloaded.

A pre-detector volume control can be used, but this may not be capable of cutting down sufficiently the strength of the signal supplied into the detector.

## High-Frequency Volume Control.

A disadvantage of ordinary high-frequency volume control is that if used to any serious extent it is apt to cause distortion. These disadvantages do not apply nearly so much with a multi-mu type of screened-grid valve with volume control, but home-constructor sets fitted with this type of valve are still rather in the minority.

If you are seriously troubled with the excessive strength of the local station you may find it better to fix up an arrangement for cutting out the screened-grid valve on this station. The well-known contra-phase control recently introduced to readers of this paper is a perfect method of doing this.

## That Additional Stage.

I am often asked by readers whether they can fit an additional low-frequency stage to a set which already consists of H.F. detector and pentode.

Many people have the impression that, since such a circuit works so well, it can be still further improved by putting an extra L.F. stage before the pentode.

This, however, is often quite wrong and may only result in very serious distortion. You have to remember that the pentode is a special valve in many ways, and one of the most important things about it is that, owing to its high magnification, it gives out a large volume whilst requiring only a relatively small grid input.

This "taking-in" of a small "signal" is essential to the proper working of a pentode valve, and if you try to push more into it you will only upset it and get overloading. The idea, therefore, of using an additional low-frequency stage before the pentode does not work out in practice except on reception of very distant signals.

## An Alternative Scheme.

You have two alternatives before you: either to use the pentode directly, following the detector in the ordinary way, or, if you particularly want two low-frequency stages, to use an ordinary low-frequency stage after the detector and follow this with a power or a super-power stage for the output, instead of the pentode.

This latter arrangement should give quite satisfactory volume without distortion, although it will not be so economical as the single pentode stage.

If you use the super-power arrangement, by the way, you want to be sure that your mains unit—assuming you use a unit—is able to supply the necessary voltage and current.

## Calculating a Dropping Resistance.

If you are using a home-constructed mains unit and you want to try a new valve it is necessary to know the resistance which should be included in the anode feed in order to get the right voltage for the valve.

You start by knowing the anode voltage and anode current required for the valve, as these are given in the specification sheet supplied by the manufacturers. The next thing you want to know is the maximum voltage output of the mains unit, or, at any rate, the voltage of the tapping which you intend to use.

This may be higher than the voltage which has to be applied to the anode of the valve, and the difference between the voltage of the tapping and the required voltage for the anode gives you the number of volts that have to be "dropped" in the feed resistance.

## Merely Ohm's Law.

It is a simple matter to calculate by Ohm's Law the resistance required. To get this resistance you simply take the voltage which has to be got rid of and divide it by the anode current required for the valve (in milliamps). This result must then be multiplied by 1,000, and that gives you the resistance in ohms required in the mains unit to work the valve satisfactorily.

(Continued on next page.)

## Easy Terms

Strict Privacy Guaranteed

W.B.P.M. 4 MICROLODE MOVING - COIL SPEAKER

SEND FOR IT ON 7 DAYS' TRIAL With Switch-controlled multi-ratio input transformer.

Send only 5/- for 7 days' trial. If approved, balance in 8 monthly payments of 5/3. Cash or C.O.D. Carriage Paid, £2/2/0.

W.B.P.M. 6. Send only 2/6. Balance in 8 monthly payments of 4/3. Cash or C.O.D. Carriage Paid, £1/12/6.

BLUE SPOT "STAR" MOVING-COIL SPEAKER. Complete with universal matching transformer. Send only 5/- for 7 days' trial. If approved, balance in 11 monthly payments of 6/6. Cash or C.O.D. Carriage Paid, £3 10/0.

ATLAS ELIMINATOR

SENT ON 7 DAYS' TRIAL

Model C.A.25. Suitable for all outputs, including Class B and Q.P.P.

Send only 3/6 for 7 days' trial. If approved, balance payable in 11 monthly payments of 5/6 for cash in 7 days £2/19/8. Carriage paid.

3/6 DOWN

Everything Radio CASH—C.O.D.—H.P. Send to us with confidence. WE WERE FIRST WITH RADIO on EASY TERMS IN 1924.

New Times Sales Co.

56, LUDGATE HILL, LONDON, E.C.4.

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality, 5/-.) Transformers and Headphones, 4/- Eliminators, Mains Transformers and Moving Coils quoted for, 24-hour Service. Trade Discount. Clerkenwell 9069. E. MASON, 44 EAST ROAD (nr. Old Street Tube Station), LONDON, N.1.

• H.T. THAT SAVES POUNDS •

Why not end H.T. problems for good with a Standard Wet Battery? Smooth, abundant H.T. year in, year out at half cost of dry H.T. Saves pounds. 120-v. 12,500 m.a. £2, carr. paid. All Standard H.T. Spares. Lists Free. Write—Wet H.T. Battery Co., 26, Lisle St., London, W.C.2.

AMBITIOUS MEN

Can Earn Up To £6 Weekly

at home manufacturing article in constant demand, patent fully protected. No expensive machinery, large capital or experience required. Genuine homework scheme. Commence now, 2d. stamp for particulars.

ENGLAND - RICHARDS CO., Ltd., 4L, KING'S LYNN - NORFOLK.

All applications for advertising Space in POPULAR WIRELESS should be addressed to the Advertising Department, John Carpenter House, John Carpenter Street, London, E.C.4.

ENGINEERS ARE YOU READY?

The bad days are over. The dawn of a new prosperity is brightening the engineering industry. Are you ready to accept one of the thousands of first-class jobs that will be offered? Be advised in time. A few letters after your name will mean all the difference between the "hammer and file brigade" and a first-class post. Our unique Handbook, "ENGINEERING OPPORTUNITIES" explains the easiest way of securing A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., etc. The book also gives details of Home-Study Courses in all branches of Civil, Mech., Elec., Motor, Aero, Radio Engineering, Building, etc., and indicates the advantages of our Employment Department. This Handbook is the most valuable guide you can have in your possession at a time when chances are going to be snapped up or lost to you for good. Think it over and send a postcard for your copy of the Handbook at once—FREE and without obligation. BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 101, Shakespeare House, 29/31, Oxford Street, London, W.1.

## TECHNICAL NOTES

(Continued from previous page.)

The above is fairly straightforward, but there is one very important point which you must not overlook, and that is that the output voltage of the tapping on the mains unit must be tested by means of a voltmeter when the unit is *actually supplying the required current*.

The "regulation" of mains units has a way of being rather bad—that is to say, the output voltage has a way of varying quite a lot with the output current.

You cannot just assume that it will remain the same when current is being taken as it is when it is on open circuit. This latter state of affairs is reasonably true of a high-tension accumulator battery, but is definitely not true of a mains unit, and the variation may be quite considerable. Naturally, the above-mentioned calculation is based on the actual voltage of the tapping *when delivering current*.

### Do You Use Tone Control?

Some people do not really make sufficient use of tone control. This can be used in a variety of ways, and when skilfully and properly employed undoubtedly makes an enormous difference to the quality of reproduction. Tone-control systems almost invariably depend upon cutting down either the high or the low frequencies; if the high frequencies are cut down, then the low frequencies are made relatively or apparently stronger, and *vice versa*.

### For Resistance-Capacity Coupling.

When using a resistance-capacity coupled detector stage a resistance and condenser (in series with one another) may be connected across the anode resistance. A convenient capacity for the condenser is 0.005 mfd., whilst the resistance, which is variable, should have a maximum value of, say, 75,000 ohms. It is important, by the way, not to connect this resistance and condenser unit across any other part of the anode circuit, such as a high-frequency choke, nor should it be connected across the decoupling resistance. By suitably varying the value of the resistance the quality can be adjusted considerably.

### Across the Loudspeaker.

A tone control may be used across the terminals of the loudspeaker—or, of course, across any conductors which are connected directly to the terminals. In this case, again, the fixed condenser and variable resistance are used, the resistance having a maximum value of about 25,000 ohms, and the condenser having preferably a value about twice that previously used—that is, about 0.01 mfd.

In connection with this tone control across the loudspeaker I should mention that this is often very useful when a pentode output stage is used, because, as you know, one of the characteristics of the pentode is that it tends to over-emphasise the higher notes.

### Using a Power Valve.

If you are using a power-valve output instead of a pentode, you may find that instead of cutting down the upper register you want to cut the *lower*, and this can be

done by using a choke instead of a condenser in the above-mentioned arrangement.

In either case the more you reduce the value of the resistance the more you cut the high notes, or the low notes, as the case may be.

### The Method for Output Transformers.

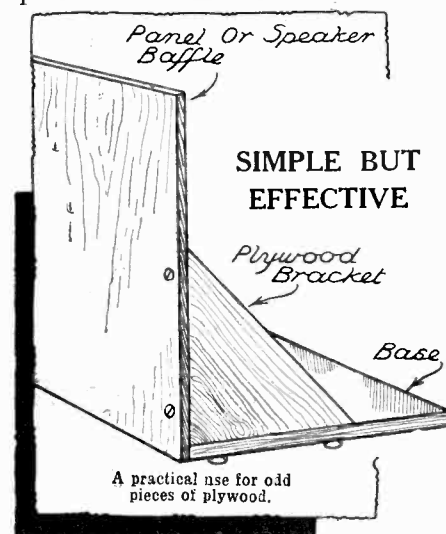
If you are using a moving-coil speaker with the output transformer fitted to it, then the resistance and condenser tone-control arrangement should be connected across the primary of the output transformer. When the transformer forms part and parcel of the moving-coil speaker this is relatively simple; but sometimes the transformer is inside the set, and output terminals are provided for the loudspeaker to be connected to the secondary of the transformer.

In such a case it is, of course, necessary to fit the tone-control arrangement to the set itself, so that it can be connected to the primary, as already mentioned. Here, again, a choke can be used instead of the condenser if you want to cut down the bass-note response.

By the way, when using a choke instead of a condenser for cutting down low frequencies it is just as well to have a *tapped* choke if this is convenient, as then you can try different tapings and get a suitable value to work with the resistance which you are using.

## MAKING PANEL BRACKETS

THE completion of a wireless receiver or cabinet very often leaves the constructor with several odd pieces of plywood of different sizes. These should never be thrown away, but kept in the spares box for future use.



In fact, one useful method of utilising such odd pieces of wood is in the form of panel brackets for fixing either a panel and baseboard or baffle and base, as shown in the diagram.

For whichever of the above purposes the brackets are used, the screws should be driven in from the front of the panel and underside of the baseboard.

A. Y.

## CAR RADIO

Details of the latest receivers.

SO far it cannot be said that car radio has made great strides in this country.

But that there will be an increasing interest in and demand for sets on cars is certain, and there is something which has very recently happened that will provide an enormous fillip to this aspect of radio.

This is that Lissen, Ltd., have decided to enter the car-radio market in a big way. And they have produced a car-radio installation which is bound to attract the keen attention of motorists, particularly those who know enough about radio to judge the merits of radio equipment.

There are numerous problems encountered in car radio which do not exist in connection with domestic sets, but Lissen, Ltd., have dealt with them all in their usual characteristically thorough manner.

Moreover, they have not contented themselves with merely producing a good set and leaving it entirely to others to see to their fitting to cars. Besides compiling detailed fitting instructions for the benefit of those concerned, they are making arrangements to give garage hands the required training in the installation and servicing of the apparatus.

### Three H.F. Stages.

The Lissen car outfit is a fine achievement. It embodies three H.F. stages using iron-cored coils and A.V.C. to ensure a consistent volume level. There is a Class B output for great volume, if desired, and H.T. economy.

It should be mentioned that there are two models available: one is a battery model for 6- or 12-volt systems, which is to retail complete with all accessories at the most reasonable price of 16 guineas; and the other, to sell at 20 guineas, is a generator model, and this, too, can be for either 6- or 12-volt systems.

The set section is contained in a steel waterproof case. Remote tuning and volume control are possible by means of a neat unit that fits on to the steering pillar. The moving-coil loudspeaker is built into a hardwood case with a metal grille.

The whole outfit is very substantially constructed and is obviously able to stand up against the severest vibration and hardest general wear.

### Will Tune to Long Waves.

An important point is that, unlike the average American set, the Lissen car radio is able to tune to long waves as well as medium waves. Among other operating features is the non-dazzle illumination of the wavelength scale on the control unit.

We have heard one of these Lissen Car-Radio Outfits working under adverse conditions, and were greatly impressed by its performance. There was all the volume that could be desired, and the quality of reproduction was quite outstandingly good.

All who are interested in this important Lissen development should write to Lissen, Ltd., at Worple Road, Isleworth, for full particulars.



# IF YOU WANT

Full details for making an efficient and economical battery portable receiver, or instructions for assembling an H.F. Stage that will improve the results from your set \_\_\_\_\_

The latest news about radio matters, concerning both the B.B.C. and technical developments such as loud-speaker mounting and artificial tone adjustment \_\_\_\_\_

The most recent articles from the pen of that popular writer and world-renowned set-designer, John Scott-Taggart, F.Inst.P., A.M.I.E.E. \_\_\_\_\_

Hints and tips that will enable you to get the best out of your set and enjoy your radio to the full \_\_\_\_\_

A collection of bright articles dealing with all aspects of wireless \_\_\_\_\_

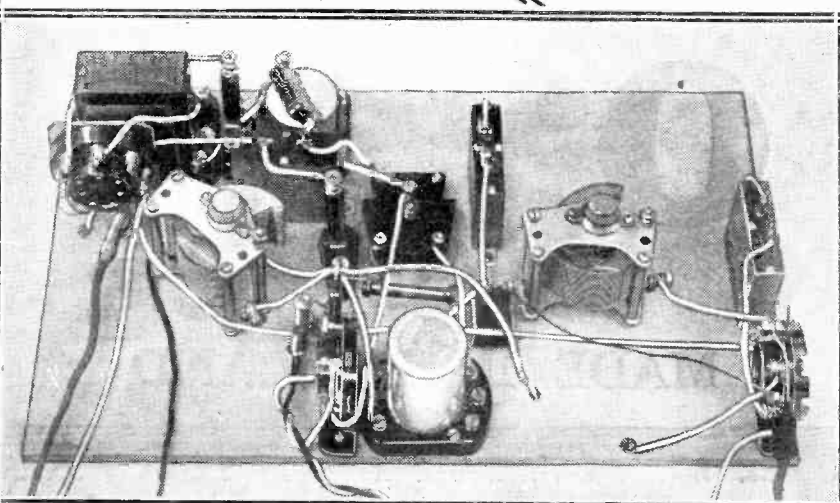
## THEN READ

The JULY Number of

**BRITAIN'S LEADING RADIO MAGAZINE**

# The WIRELESS CONSTRUCTOR

★  
**VICTOR  
KING'S  
1934 PORTABLE**



★  
ON SALE EVERYWHERE

PRICE

★  
**6<sup>D.</sup>**

*Surprising though it may seem, this is the complete "chassis" assembly of the portable described in the July Number.*

# "GOOD NEWS FOR THE BATTERY USER"



The OSRAM  
HD.21 Double Diode  
Triode.

Price 9/- each

*Write for  
further particulars*

## *The NEW* OSRAM HD.21 Double Diode Triode

*The valve for automatic volume control.*

This already famous valve will overcome the difficulty of fading when used in a suitable circuit.

### Nominal Rating

Filament Volts	.. .. .	2.0 max.
Filament Current	.. .. .	0.2 ampere
Anode Volts	.. .. .	150 max.
Amplification Factor	.. .. .	27
Impedance	.. .. .	18,000 ohms.
Mutual Conductance	.. .. .	1.5 m.a./volt.

(Measured at Anode Volts 100, Grid Volts, 0)

# Osram Valves

MADE IN ENGLAND