POPULAR WIRELESS, April 4th, 1936.
REGISTERED AT THE G.P.O. AS A NEWSPAPER.

JOHN SCOTT-TAGGART CONTRIBUTES TO THIS ISSUE

Popular Wireless & Television Times

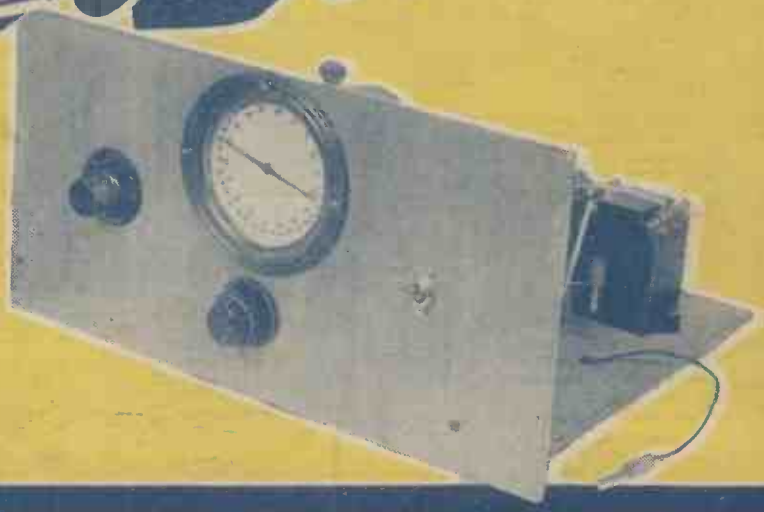
A COMPLETE PETO-SCOTT KIT SET TO BE WON THIS WEEK

EVERY WEDNESDAY PRICE 3D

No. 722.
Vol. XXIX.
April 4th, 1936.

FOR THE NEW TELEVISION PROGRAMMES

The "U.S." Two



ANYONE CAN MAKE IT CHEAPLY AND EASILY

Full Details Inside

POPULAR WIRELESS AND TELEVISION TIMES

Managing Editor: G. V. Dowding Asst. Editors: A. J. Randall, K. D. Rogers

I.W. STATION ?
LOW FINANCE
SPRING TONIC

RADIO NOTES & NEWS

IT'S A DISEASE
RADIO SMUGGLERS
FEVER HEAT

Heard Morocco Lately?

ACCORDING to the latest news from Morocco the Moorish peasantry are finding radio very more-ish.

They have been demanding some new stations. The radio caliph put on his thinking-fez and went into a huddle with the keeper of the purse and the chief engineer.

(By the way, this radio caliph is the sort of chap who, if he says "Go," somebody goeth, at the double !)

The result is that Morocco now has two new stations in action—one at Fez, and the other at Marrakesh. The latter, I might add with a dash of authentic local colour, is erected in the palace of Sisi-Said. The wavelength, at the time of writing, appears to be nomadic.

I.W. Station ?

THERE has been a lot of talk about a station for the Isle of Man, and the main advantages to the island of a commercial station have recently been set out with some precision.

In contrast, there has been very *little* talk about a station for the Isle of Wight, and yet I hear that engineers have been busy there on various sites, including one at Gurnard, overlooking the Solent. They were B.B.C. engineers, moreover, and they were using 75-ft. masts in a manner that left no doubt of their earnest desire to probe the island's radio potentialities.

When the mists have rolled away, we shall be hearing something definite about all this. In the meantime, it's my opinion that the term "luckless wight" may be flatly contradicted one of these fine days.

Low Finance

CHARTERED accountants will, I hope, excuse me for a moment while I rub my eyes over the recently issued monthly trade returns for radio.

As compared with last year, the radio set exports declined from £26,509 to £22,133. Transmitting apparatus dropped from £30,630 to £8,387. Valves fell from £44,342 to £26,080. Accessories and parts shrank from £45,473 to £25,491.

Goodness knows that I am no financial expert, but my working knowledge of ha'penny nap inclines me to the belief that it was not upon this basis that Midas & Croesus Unlimited made both ends meet in Easy Street.

NEXT WEEK

BROADCASTERS ON BICYCLES!
AND
THE PĒZOGRAM

Silencing the Railway

SWEDEN has recently been planning to add to her fine network of electrified main-line railways. Before granting the necessary concessions, however, there was a great to-do about radio interference, with the result that a special clause has been inserted to the effect that radio reception must not be interfered with.

This means that the contractors will have to take no end of trouble with anti-sparking devices, and they say that to comply with the conditions will cost them half a million kroner. Who cares about the kroners, so long as the crooners come through all right ?

Spring Tonic

NEARLY everybody would benefit from a judicious tonic in the spring-time, and the B.B.C. appears to feel that the same applies to broadcasting transmitters. It has been decided to increase London Regional from 50 to 70 kilowatts, and to raise the Scottish Regional from a similar starting point to 70 kilowatts.

Lisburn, Northern Ireland, is running on 100 kilowatts—a hundred-fold increase over its predecessor—and when the North-East Regional starts, it will jump straight off from the 100 mark.

To be in the fashion, Athlone is to increase from 60 to 100, so what with one thing and another, I urge you to gird up your Triple Extractors !

Scotland Yard's Station

ONE of my Camberwell sleuths tells me that nestling among the villas of Grove Park there is a nice little wireless station that is being carefully tended by Scotland Yard while it grows.

The masts are up, the aerial is straining at the guy-ropes, and everything in the garden is okey-doke. Local gossip affirms that tests may be expected within a few weeks, and that these will be elaborate, since Grove Park will have a double duty to perform. It will act as the centre of the new police-wireless scheme covering the whole country, and it will keep in touch with the 500 mobile police patrols in the Metropolitan area. (Yes, they are bringing up the number to 500.)

Adjoining the new station, and adding a nice domestic touch, is the Metropolitan Police Nursing Home.

It's a Disease

THE most truculent influenzal germ that ever spread o'er Europe can hardly have claimed as many victims as the Radio Bug. Since the latter's introduction in a small way to a few enthusiasts it has distributed itself farther and farther afield, until it now numbers its victims

(*Continued on next page.*)

CONTROL ENGINEER AT BARCELONA

Miss Angela Fernandez, whom you see here, has been control engineer at Radio Barcelona for the past six years. This station works on a wavelength of 377·4 metres, the same as that of Lwow, the Polish transmitter.

AIR ROUTES CHANGING OVER TO SHORT WAVES

by the million. The latest figures show that Europe has 27,650,000 listeners, and these, mark you, are only the licensed or properly certified cases.

In addition, we must allow for the free-thinking pirates who dispense with formalities and let not their left hand know that their right hand is tuning-in. You can safely call it 30,000,000, all told, owning wireless sets in Europe alone!

Horticultural Notes

JAPAN, I believe, is the only country with the secret of growing trees *in miniature*. They have oaks, incredibly old, and perfect in every respect, but growing in little flower pots!

Particular interest attaches to the news that the Imperial University is experimenting with the use of ultra-short waves in plant cultivation. The first investigations having been very promising, large-scale experiments are now proceeding. The students are forking in the seeds and the Government is forking out the cash!

Many Inventions

INVENTORS with international aspirations who have no objections to acquiring a wad of French francs may like to know about the P.I.T.F. These initials stand for the Paris International Trade Fair, which opens its doors on May 16th, closes them on June 2nd, and offers 12,000 francs' worth of prize-money to inventors who can get away with it. (The judges' permission is necessary.)

Radio inventions come under Group 1, Section B, a section which includes photography, cinematography and electricity.

Inquiries should be addressed to the P.I.T.F. (Foire de Paris) at 17, Tothill Street, Westminster, S.W.1.

Radio Smugglers

DANISH fishing patrol boats have been so persistently unlucky in catching the trawlers who fished in territorial waters that they suspected that the culprits were getting warnings by wireless. After some patient listening-in the authorities swooped down and arrested some fishermen who had a short-wave set and a guilty look. These worthies have now made acquaintance with a station that they had not bargained for!

In France, also, radio and smuggling are in the news together. The frontier guards at Schoeneck stopped a cartload of straw that was coming in from Germany, prodded it, and struck a superhet! Surprised at this, they investigated further, and found a crop of another dozen or so receivers lurking in the straw.

The carters could give no explanation, for when the first set came to light they had suddenly remembered an urgent appointment on their own side of the frontier, and vanished. So the guards tuned in, the horse ate the straw, and nobody was left "in the cart."

Fever Heat

INFLUENZA, housemaid's knee, and one thing and another do not leave the Austrian doctors much time to puzzle out *why* their patients get stricken all together. But the other day one worthy practitioner gave much thought to an unusual fever which had attacked several of his poorer patients.

They were labourers, and every one complained of the same symptoms—dizziness and high temperature. The doctor cured them all by the good old stop-in-bed-a-couple-of-days method, but he still kept wondering *why* these sturdy sons of toil had felt so ill. Then suddenly the explanation came to him; they had all been working close under the aerial of a high-powered short-wave station, which had evidently "warmed them up."

(Personally I should be inclined to believe this was a tall story, but for the evidence afforded by W. L. S. He basks in short-wave transmissions so often that he can now execute any ordinary aerial repair without benefit of step-ladder!)

MICROPHONE SLIPS

COMMENTATOR: *The dog that won the last race had a lot of punters on him.*

* * *

ANNOUNCER: *The pianist will now play again, and a graceful old piece she is, too.*

* * *

ANNOUNCER: *Those that didn't go down early missed it, and those that did go down couldn't go because the bookings were already full up.*

* * *

ANNOUNCER, explaining that a popular broadcaster is away on holidays, continues: ——*and by now must be happily buried in the bush.*

* * *

ANNOUNCER, concluding the news: *That's all for this morning, listeners; hope to see you all in the near future, if not before.*

* * *

AUNTIE, during Children's Hour: *Did you know Uncle Tom was going to be the bride?*

* * *

ANNOUNCER: *Write in and you'll get a flea—I mean a free—recipe book.*

("Wireless Weekly," Australia.)

Radio on Empire Air Routes

HEIGH-HO, here's a quarter of 1936 gone already! Not only do the bills roll in to remind me, but there comes also news of the radio proposals for 1937 in connection with the equipment of Empire air routes. Plenty doing in the direction-finding line, I see.

In Sudan and southwards towards Rhodesia the medium-wave wireless air stations are to be changed over to short-wave working in the hope of dodging some of the X's. The present medium-wave equipment sometimes nearly *smokes* in the rainy season when the big atmospherics go snorting down 'twixt aerial and earth. I hear that the ground has been extensively surveyed and new routes have been planned by officials who have flown many thousands of miles over Africa on the look-out for good landing-places.

There ought to be some good radio jobs going and some hot flying feats when the new Imperial Airways flying-boats come into full commission next year.

"Hee Thet Heth Yahs"

OUR thanks are due to the "Daily Sketch" for the following extract from a letter to the editor of that journal. Emanating from Wotton Vicarage, Aylesbury, it says:

"The voice that B.B.C.'s o'er England is not an Oxford voice. The authentic Oxford voice says, 'Hee thet heth yahs to yah, let him yah.' I have heard it called 'unctuous' and 'Oxford,' but the correct, indisputable and universally accepted description is The Undertaker's Voice."

Are we all agreed? Yes, I think so!

Fire Brigade to the Rescue

RUGBY radio station had a curious breakdown not long ago. It put the short-distance service to ships in the cart, and stopped the long-distance ship service altogether for a time.

The trouble was the failure of one of the motors that pumps the water used for cooling the huge transmitting valves. It took several hours to transfer another pumping installation, so in the meantime the necessary pressure was provided by the Boys of the Old (Fire) Brigade. It's not often they get a call without a fire, and it's certainly not often that a big transmitting station depends on a fire brigade to keep it cool enough to go on working.

Our Sporting News

THE cricket season in Melbourne prevented broadcasting programmes a few weeks ago, and station 3 A R was compelled to shut down thrice in one evening.

"Big crowds?" sez you. Yes, sir. Millions and billions of *crickets*, due to the dry and hot weather.

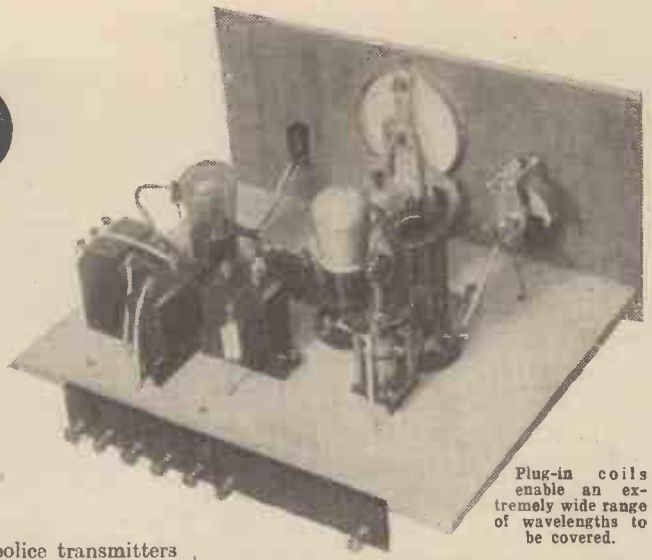
They entered the studios, they settled on masts, they crawled into coils, they squatted on insulators, and they got into the voltmeters.

One detachment, under the leadership of a very active cricket of the Bad Man (or Bradman) type, settled on the input leads so thickly that the power supply was short-circuited!

Later reports from Melbourne indicated that the dry weather continued, and the invaders were not yet All Out. ARIEL.

THE "U.S." TWO

A special, easy-to-build two-valver that will enable you to pick up the sound transmissions of the new ultra-short-wave television service, as well as American police transmissions and other short-wave stations from all parts of the world. It has been designed by our short-wave expert, W. L. S., so needs no further recommendation



Plug-in coils enable an extremely wide range of wavelengths to be covered.

THE ultra-short waves, that fascinating section of the radio spectrum spreading from about 12 metres downwards, have recently come very much into the public eye. A few years ago they were used by no one; the amateur transmitters had proved, in 1928 and '29, that the 10-metre band would serve for long-distance work when conditions were favourable, but once it had faded out, very little use was made of it.

Then the amateurs discovered that 5 metres was a marvellous wave for local work, and a great deal of enthusiasm was stirred up, in which our own Crystal Palace tests in 1933 played no small part.

Below 10 Metres

Next came television, and the knowledge that high-definition systems would have to use very short wavelengths if they were to be accommodated without causing serious interference to other services.

All this excitement culminated in the spectacular "come-back" of the 10-metre band last year, since when it has been an international "DX"-wave. Below 10 metres one can hear American police transmitters and radio-equipped cars, and on 9·5 metres is a new broadcasting station, W 8 X A I, at Rochester, N.Y. This is probably the first of several that will operate below the present 13-metre band. Now as soon as the regular television transmissions commence, there will undoubtedly be a wide demand for a simple receiver on which their accompanying sound transmission can be picked up. Fortunately, this is possible without any particularly elaborate apparatus, and the receiver may be used for many other purposes, if it will cover a wave-range of about 5 to 15 metres.

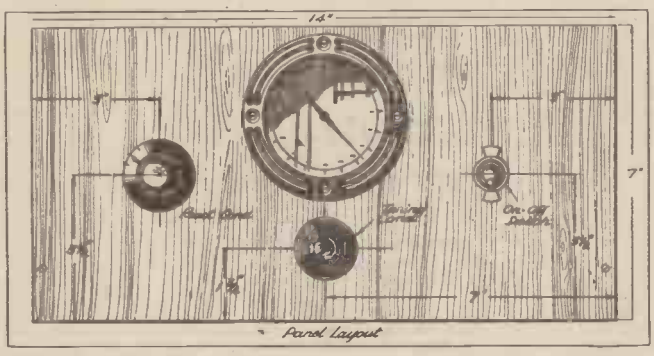
Some keen short-wave enthusiasts may find that they can persuade their ordinary short-wave receivers to get down thus far; others will certainly find difficulties in their path when they start trying! In any case, the television "sound" transmitter will be so powerful that anyone within easy range of London will receive it well.

Straightforward Circuit

I have worked at the problem from the other angle, and this little set has been designed primarily as an ultra-short-wave receiver; but it *will* give perfectly good service on the "ordinary" short waves if that is desired. As a matter of fact, it is somewhat better as an ordinary short-waver for having been designed in this way.

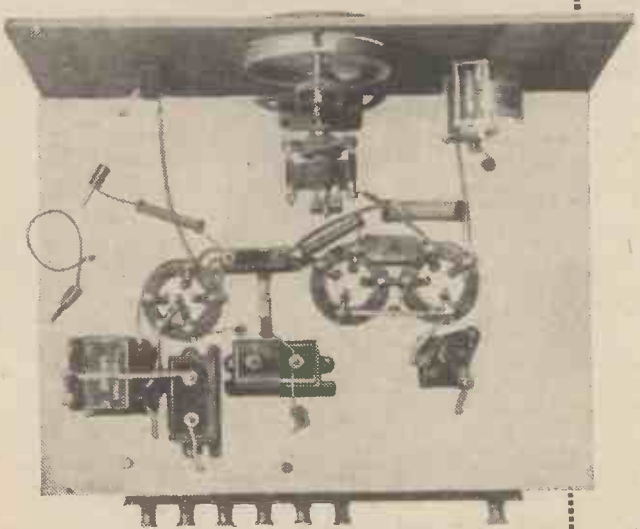
(*Continued on next page.*)

PLAINLY MARKED DIAL—EASY TUNING



The new "Airplane" type dial is used, giving clear reading of tuning positions and easy control.

VERY LITTLE WIRING



The "Metaplex" baseboard enables a number of leads to be taken direct to "chassis" instead of long connections being necessary.

THE PARTS USED IN THE "U.S." TWO

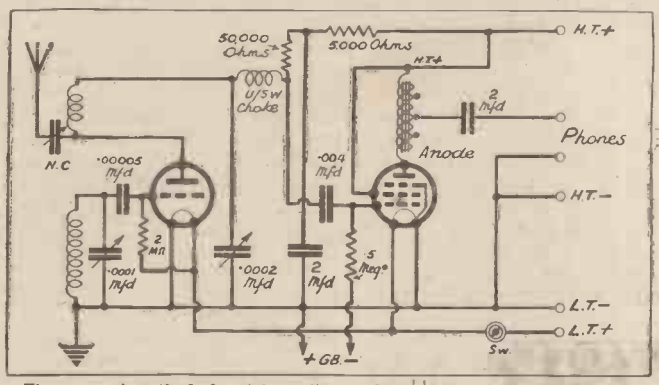
1 Peto-Scott plain wooden panel, 14 in. × 7 in. × 3/16 in.
1 Peto-Scott single "Metaplex" baseboard, 14 in. × 10 in.
1 Eddystone microdenser, ·0001-mfd., Cat. 900.
1 Eddystone ·0002-mfd. slow-motion reaction condenser, Cat. 957.
2 Eddystone four-pin valve holders, Cat. 501.
1 Eddystone five-pin valve holder, Cat. 500.
2 B.T.S. coil formers, four-pin.
1 J.B. "Airplane" slow-motion dial, two-speed model, calibrated in degrees.
1 J.B. neutralising-type condenser.
1 B.T.S. ultra-short-wave choke.
2 T.C.C. 2-mfd. condensers, type 50.
1 T.C.C. ·004-mfd. condenser, type 34.
1 Varley Pentode "Nichoke."
1 Bulgin Q.M.B. switch, type S.80.
1 Erie 2-megohm resistance.
1 Erie ·5-megohm resistance.
1 Erie 50,000-ohm resistance.
1 Erie 5,000-ohm resistance.
1 Dubilier ·00005-mfd. condenser, type 670.
1 Peto-Scott terminal strip, 10 in. × 1½ in.
1 Peto-Scott bracket, for holding rear end of tuning condenser.
7 Terminals, 2 G.B. plugs (G.B.+ and G.B.—), flex, screws, etc.

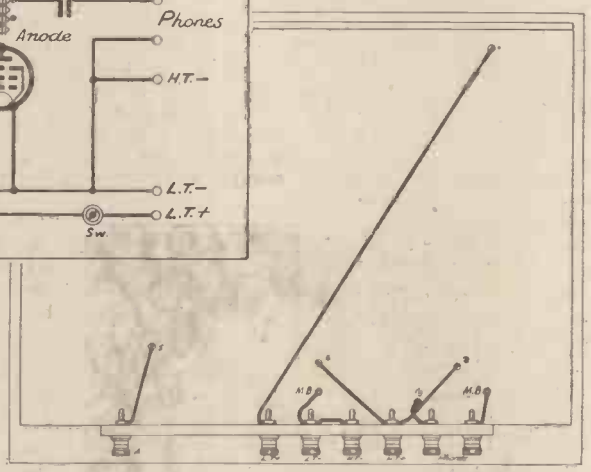
THE "U.S." TWO

(*Continued from previous page.*)

The circuit is pretty straightforward. A triode detector, with the usual series-fed H.T. and throttle-controlled reaction, is resistance-coupled to a pentode output stage. No band-spreading has been used, chiefly because the dial employed has two ratios, the slower of which is about 96 : 1, making fine tuning a perfectly easy matter on the ·0001-mfd. variable condenser.

A MOST EFFECTIVE CIRCUIT





The unusual method of aerial coupling used can be seen from the above circuit of the set. The diagram on the right shows the under-chassis wiring.

The reaction condenser also has a slow-motion control, a point which makes a vast difference to the comfort of the operator.

The layout has been chosen to give the shortest possible wiring in the H.F. portions of the circuit, without unduly cramping the components together.

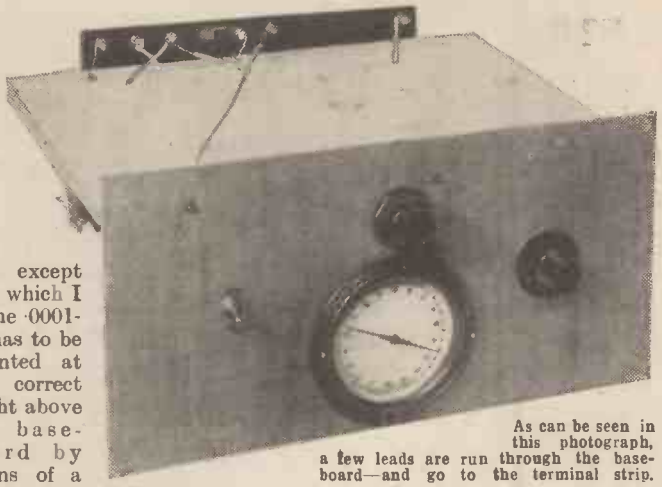
The detector is decoupled by means of a 5,000-ohm resistance and 2-mfd. condenser, only one positive H.T. terminal being provided. The pentode is followed up by an output choke, which is always worth while in receivers of this type.

Special Ultra-Short-Wave Choke

A special ultra-short-wave choke has been used in the reaction circuit of the detector, and this may possibly make operation above 15 metres a little erratic. If the set is regularly to be used for short waves between 15 and 50 metres, an ordinary short-wave choke, or a resistance of 2,000 ohms, should be wired in series with the ultra-short-wave choke, or substituted for it.

An unusual point is the coupling of the aerial to the anode circuit instead of to the grid coil. This makes it much easier to get down to the very short waves, since the tuned circuit, which is the grid coil, has no external load imposed upon it. The aerial is loosely coupled (through a neutralising condenser) to the anode side of the reaction coil, which thus may be regarded as performing, also, the function of an aerial coupling coil.

There is not much that need be said about constructional details, except with regard to the coils, which I will deal with later. The ·0001-mfd. tuning condenser has to be mounted at the correct height above the baseboard by means of a small bracket of some kind. Its spindle is too near the base-board to allow of the use of the proprietary brackets for that purpose; but a small strip of angle-brass, attached either to the spindle, or very firmly to the far end of the condenser, will suffice.



As can be seen in this photograph, a few leads are run through the base-board—and go to the terminal strip.

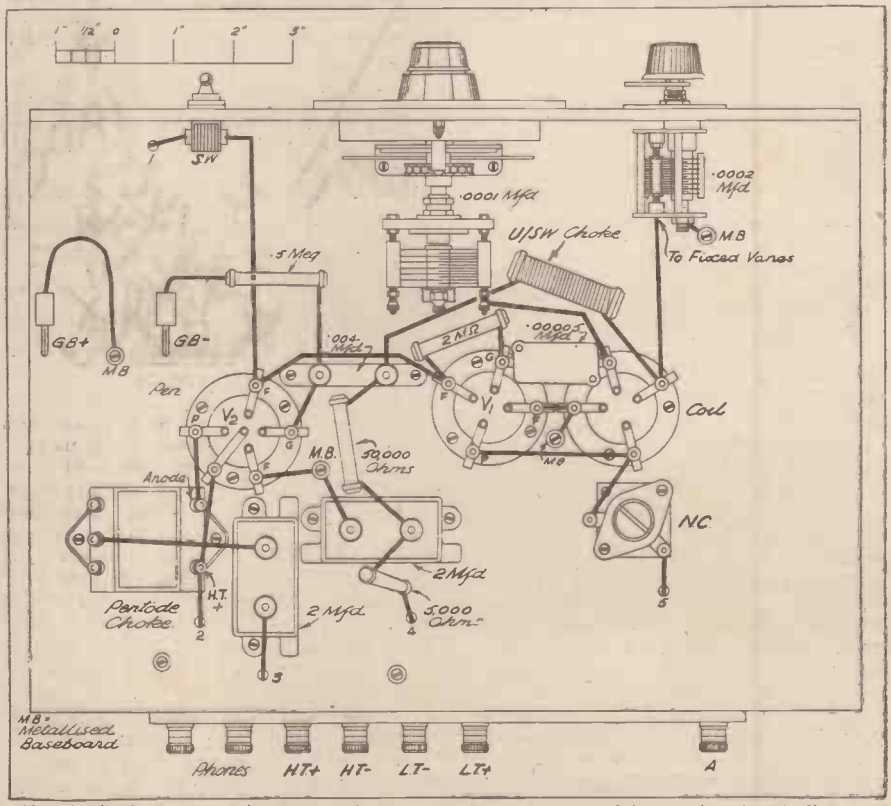
The Dial Fixing Bracket

The dial is fixed rigidly to the baseboard by means of the small bracket provided along its bottom edge.

The baseboard has been raised up slightly from the bottom edge of the panel, and much of the wiring is taken through to the terminal strip underneath. No components, however, are mounted below the board.

(*Continued on page* 106.)

WIRE UP FROM THIS SCALE DIAGRAM



All holes in the baseboard through which wires run are numbered, and the numbers in this diagram correspond with those on the under-chassis diagram shown on this page.

VALVES AND ACCESSORIES

- 1 Cossor 210 H.F.
- 1 Cossor 220 H.P.T.
- 1 2-volt accumulator—Exide.
- 1 120-volt, including grid bias, H.T. battery (all in one battery)—Marconiphone.
- 1 Pair high-resistance 'phones—Ericcson.

THE BROADCASTING REPORT

By Lord Strabolgi

"The crux of the whole broadcasting situation in this country is finance," says Lord Strabolgi, who has carefully followed the progress of radio ever since the inception of the B.B.C. As Commander Kenworthy in the House of Commons he was always a fearless critic of British broadcasting, and since he took his seat in the Upper House he has followed the course of radio with even keener interest. In this article Lord Strabolgi reviews the recently published Ullswater Committee report and discusses it with his well-known lucidity.

IN view of the rapid changes and great developments that have taken place in broadcasting and the approaching use of television the Government appointed a Committee last year to report as to whether the B.B.C. Charter should be renewed, and, if so, on what terms. It will be for Parliament to approve of the Government's action to be taken on this report. The Committee was a strong one, under the chairmanship of Lord Ullswater, formerly Speaker of the House of Commons, who has had great experience of such enquiries; and all its members were Parliamentarians with the exception of Sir William McLintock, the eminent accountant, and Lady Reading, widow of the first Marquis, who has had great experience of public affairs.

The report is a good one. I imagine that the great majority of listeners will only be inclined to criticise it in certain details.

The B.B.C., generally, is praised for its past work and present programmes. It is the Englishman's privilege to grumble, and if he is a listener he is doubly privileged. Yet we have only to compare the programmes of the B.B.C. with the corresponding programmes in other great countries, including the wealthy and technically progressive United States of America, to realise how deserved this general commendation is.

B.B.C. and Government Control

A good deal lies behind the work of this Committee. The B.B.C. has been under double assault, though the general public have not been aware of what has been going on. On the one hand, a determined effort has been made by the advertising interests to capture the B.B.C. and to reorganise it on American lines, with sponsored programmes. On the other hand, the present Government and especially the all-powerful Civil Service have been jealous of broadcasting and its tremendous power for good or for evil. It is known that certain powerful personages in and around Whitehall and Downing Street would like to bring broadcasting more directly under Government control. Both these assaults have been beaten off, though the forces at work have scored a partial success, in regard to television, with the proposal of the *majority* of the Committee that the basis of television would be the sponsored programme. A minority of three objected to this proposal on the perfectly good grounds that the dividing line between television and sound broadcasting will become fainter with technical advances in the future and that the advertising interests, having once got a footing through television, may eventually permeate the whole system.

What I may call the bureaucratic interests have also scored some success in the proposal that there should be a separate Minister for Broadcasting, who should be a "senior and influential" member of the Cabinet. It is not proposed to create a new post, but to place what is called the cultural and policy control of broadcasting under one of the Ministers without departmental responsibility, such as the Lord President of the Council, the Lord Privy Seal, or the Chancellor of the Duchy of Lancaster.

It is proposed that this Minister should answer questions about the B.B.C. in Parliament; the idea being that the Post

LORD STRABOLGI

master-General, who at present answers such questions as the Speaker in his narrow discretion allows, is more concerned with technicalities and has a vested interest in collecting the revenue. This particular proposal will have to be very carefully watched, especially as it is proposed that this Minister would have a veto over programmes. As he will be a member of the Cabinet of the day this is the very sort of political control which I believe the majority of listeners object to. It will be a breach in the independence of the B.B.C.

Already the Government of the day can take complete control of broadcasting in times of national emergency, they being the judges of the occasion; and it is proposed to continue this right. Some elderly busybody may be in a position to make himself a thorough nuisance if this proposal is agreed to.

Rather surprisingly in view of the above, the Committee defend the B.B.C. against the attacks made upon it for allowing controversial matter to go on the air. It is suggested that controversy should continue and the general discretion remain in the hands of the Governors. This is good. Controversy is the spice of life. Subjects on which everyone agrees are not nearly so interesting as those on which there is a clash of honest opinion.

The Sunday Programme Problem

The Committee also had to steer a middle course between the extreme Sabbatarians who object to almost any broadcasting on Sunday, and those who want the Sunday broadcasting completely secularised with practically no difference between Saturdays and Sundays.

The Committee's middle course, which I believe will command general approval, is that there should be a certain amount of good light music on Sunday, but there should be a difference between the programmes on that one day of the week and those given on the other six.

It is recommended that the educational services to the schools should be extended, and the Committee make the excellent suggestion that a wireless receiving apparatus should be regarded as part of the normal equipment of every school in Great Britain.

The growing importance of foreign broadcasting stations transmitting programmes in English, sponsored by advertisers, received close attention. This, in itself, is a highly controversial question. If the B.B.C., in the general interest, avoids the sponsored programme, except within very close and narrow limits, it would obviously be absurd if the near foreign stations which specially cater for British listeners give the sponsored programmes of advertisers without any sort of supervision or control. The remedy, if remedy there be, is in the hands of the Foreign Office through the normal diplomatic channels.

Legislation is Needed

Many sufferers will be grateful to the Committee for drawing special attention to the loudspeaker nuisance. They recommend that the local authorities be armed with stronger powers to deal with this trouble. It is to be hoped that energetic action will be taken and, as legislation is needed, that the matter will be dealt with in Parliament without delay.

The crux of the whole broadcasting situation in this country is finance. The B.B.C. has come to be regarded by needy

(*Continued on page* 108.)

RADIO MYSTERY CIPHERS

By LOUIS C. S. MANSFIELD

Another step forward in the explanation of Secret Service ciphers has been taken this week. See if you can solve this latest problem

WHEN applying the first Secret Service Test with which we have already dealt (issues of March 21st and 28th), it often happens that we are still unable to make head or tail of the message.

In this case we suspect that a reversed progression (or reversed "Cæsarian") key alphabet may have been used.

A reverse key is made up by writing out the alphabet A–Z and then placing under it a reversed alphabet Z–A. Of course, the second one may be made to coincide with any desired letters of the top line. For instance, the letters D, E, F, may be given the equivalents Z, Y, X, as in the one below, or the Z might be placed under J, in which case K, L, M, N, etc., would have the equivalents Y, X, W, V, etc.

Here is one such key:

a b c d e f g h i j k l m n o p q r s t u v w x y z a b c d e f
Z Y X W V U T S R Q P O N M L K J I H G F E D C B A

Ciphered with these equivalents the words "Aerial Tuner" would become: CYLUCR JIPYL.

The deciphering of messages using this reversed form rests on principles similar to those already outlined, but before we can proceed with the purely mechanical methods of solution we have first to transform the code message into a different one.

Transforming the Original Message

If we follow the whole process through step by step we will have a better idea of what actually happens.

Suppose we are faced with this short cipher:

L Y N O L J X O R R O G K.

Our first step is to write out the twenty-six letters A–Z and, immediately underneath, to write them in reversed order, Z–A.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Z Y X W V U T S R Q P O N M L K J I H G F E D C B A

Using *this* alphabet we transform the original cipher.

First we seek out L in the top line. Immediately underneath it we find the letter O, so we write this down as the first symbol of the transformed message. Next we find Y in the top line. Under this we see the letter B, which thus becomes our second symbol. Treating N and O similarly, we find that they become M and L. The complete message is dealt with in this fashion with the following result:

(Original Cipher) L Y N O L J X O R R O G K
(Transformed) O B M L O Q C L I I L T P

To the new form of this crypt we now apply the first Secret Service test with which POPULAR WIRELESS readers are already so familiar. In a vertical column under each letter of the cipher we write a complete alphabet, commencing at that particular letter. Thus under O we write P, Q, R, S, T, and continuing on Y, Z, A, B, C, back to N (the letter which stands before O in the alphabet). Under B we write C, D, E, etc., finishing with A. All the others we treat similarly, and since we have placed a full alphabet under each we now have twenty-six lines on one of which we will find the translation.

Treating this cipher in such a way produces this result:

O B M L O Q C L I I L T P
P C N M P R D M J J M U Q
Q D O N Q S E N K K N V R
R E P O R T F O L L O W S

Here we see that on the third line the crypt has resolved itself into "REPORT FOLLOWS." Sometimes, of course, we do not find the message until we get to the 20th or even the 26th line.

As with the ordinary progression cipher, those using a reversed key might appear in bits with some words on one line and others on other lines.

Here is one such:

I U X K X J V Y E B K X

As before, we transform it with the result:

(Original) I U X K X J V Y E B K X
(Transformed) R F C P C Q E B V Y P C

We now complete our alphabets and find that parts of the message come out on different lines:

R F C P C Q E B V Y P C
S G D Q D R F C W Z Q D
T H E R E S G D X A R E
T H E Y

In this type of cipher also the message might come out back to front, so that the word THERE might appear as EREHT.

Let me remind you of one thing in connection with the cipher problem I have set this week. You will see that it consists of 22 letters and is given in the box in this column. Owing to the space available the box has had to be rather cramped and so it has not been possible to spread the cipher out in one line of letters. In solving it you will have to spread it out in one line.

"P.W." CIPHER No. 9

The immigration authorities are worried over the influx of aliens who, they suspect, are being smuggled into the country along unguarded parts of the coast with the help of some sort of shore organisation.

One night a fast motor cruiser is seen to come close inshore and to flash out the following message with a Morse lamp:

M X Q I T E S P L I W C A I X A
R N A E B G

Send in your solution with your name and address on a postcard to "P.W." Cipher No. 9, Tallis House, 1, John Carpenter Street, London, E.C.4 (Comp.). Your attempt must reach us by Tuesday, April 7th. As usual we are offering a prize of Ten Shillings for the first correct solution opened after the Closing Date. The Editor's decision is final.

The solution to Cipher No. 8 and the name of the prizewinner for Cipher No. 7 are given on page 104.

THE "SENSITIVE S.G. THREE"

An up-to-date battery kit set

THE prize for the winner of this week's competition is a complete kit of parts for constructing the Peto-Scott "Sensitive S.G.3." This is a chassis design of up-to-date type and capable of astonishingly good results.

I have just been reading through the book of words that gives the necessary directions for assembling the kit, and a more detailed account of the simple operations it would be difficult to imagine.

The kit itself is a matter of screwdriver and pliers as regards its assembly, and when completed it provides a set that will provide household radio entertainment for many years to come.

Simple Tuning

The design is one that has been carried out with due regard to the requirements of modern radio reception. It has a dual gang condenser giving single knob tuning and with easy ganging, while the concentric trimmer knob ensures that you tune each and every station in with perfect accuracy. There is no need to worry about whether you have ganged the condenser properly—the trimmer on the front of the set looks after that for you.

The valves used in the S.G.3 are of the latest Hivac type, giving the maximum sensitivity with maximum economy of operation. The H.T. consumption of the set is particularly low, and if desired the receiver can be operated with a mains H.T. unit. As long as 120 volts of H.T. are available for the output valve and the anode of the S.G. valve, and 60 to 72 volts are available for the remaining H.T. tap, the mains unit will be quite suitable. The L.T. supply should be of the usual two-volt variety, and its capacity anything above 20 ampere-hour actual.

When working properly the S.G.3. is capable of bringing in a large number of stations, both on the medium and on the long wavelengths. Reaction has to be used with circumspection, of course, and full details for its use are to be found in the book accompanying the kit.

Someone is sure to ask if in the event of his winning the kit (or for that matter if he buys one) whether he can use his existing valves in it, or whether he can use valves of other makes than those specified by the kit manufacturers. Well, he can, of course, but it is likely to upset the results and the economy of the set if he chooses valves without due regard to their efficiency and to their current consumption. I should keep to the three valves specified and be sure not only of the results but also that the consumption of the set will not be above the most reasonable figure arranged for by Peto-Scott.

A Permanent-Magnet Speaker

As regards the loudspeaker for the set, this should be of the permanent magnet type, such as the Baby type made by Peto-Scott, or one of the popular "Stentorian" W.B. baby speakers.

K. D. R.

STILL LOOKING FOR THE IDEAL STUDIO

AN INTERESTING DESCRIPTION OF THE RESEARCH WORK CARRIED OUT BY THE B.B.C. ENGINEERING STAFF IN ITS ENDEAVOURS TO OBTAIN THE PERFECT BROADCASTING STUDIO. BUT ALTHOUGH THE B.B.C. HAS PROVED THAT IT KNOWS AS MUCH ABOUT STUDIO ACOUSTICS AS ANYONE, ITS RECORDS SHOW THERE IS STILL QUITE A LOT TO LEARN. AND STUDIO DESIGNING IS NO EASY TASK, AS WILL BE REALISED WHEN YOU HAVE READ THIS SPECIAL ARTICLE BY

ALAN HUNTER

WHEN that singular pile of Portland stone known as Broadcasting House arose in Langham Place, we were told—with bated breath—that the twenty-two studios hidden inside the brick tower were the very latest thing in acoustics. Yes, the latest—but not the *last!*

For as soon as the provinces saw what London had achieved they rose with one accord and said: "Hi, Mr. Kirke and your Research men, come along up here and do the same for us!"

And, always willing to oblige, Mr. Kirke and his merry men set to and thought out ways and means of bringing Manchester, Birmingham, Cardiff, and all the rest of them up to date. They went one better than that. They actually improved upon the technique that had been heralded at the "Big House" as what our Gallic neighbours would call the last cry.

How It All Started

Mind if we go back a bit, to see what actually has happened from that first little "two by four" room in the old Marconi House up to the "posh" suite of studios just opened at Maida Vale? It's a good story, so pin back your ears, please!

When they started to broadcast—before, that is to say, the Foundations of Music were thought of!—the only "mike" available was the solid back type, same as used for telephoning. You had to stand not more than one foot away in order to be heard at all. What did studio acoustics matter? They just didn't enter into anyone's calculations. In fact, since most of the sound picked up by the insensitive "mike" was direct sound waves from the performer, the reflected waves from the walls and ceiling could be discounted—and they were.

Then they improved the "mikes." Performers had to stand back several feet. What hit the "mike" was not only the direct sound waves but the waves reflected from every surface in the studio. And that's how acoustics first became a bugbear.

For they quickly found that all sorts of resonances were being produced by these reflections. So then, as you may recall, they draped all the walls to stop the "echo."

Performers complained of "deadness." So did listeners. What was broadcast was nothing like so lively as one would hear in a concert hall. "Ha, ha; some echo is desirable!" said the B.B.C. savants, and so they reduced the drapings as much as possible.

"Bass Blasting" Arrived

Then a real pack of trouble ensued. The studios were still too "dead" to be natural, and yet too "lively" in other ways. High frequencies were deadened, bass frequencies accentuated. And that's how "bass blasting" was added to the already extensive vocabulary of engineers!

While the bass was blasting the engineers were swearing, too. They tried all kinds of dodges. Put tents round the drums and bass instruments—so that the old studios looked sometimes like a Boy Scouts' Jamboree. "Very incomplete success," was the verdict.

Emerged two salient points: (1) Studios must be designed to have a definite degree of "echo"—reverberation time, to be more technical; (2) This reverberation time must also be considered in relation to the frequency range of the performance in the studio.

Bright lads in Research saw what was wanted. A material that would, when built up as a studio "lining," produce the effects already discovered as being essential. But what material? That was the snag. Couldn't find the right "stuff."

Undaunted, Research cast around for a compromise. They found that wood panelling absorbed the low frequencies—would this prevent the "blasting"? They also found that hair felt from ½ in. to 1 in. thick would absorb the higher frequencies.

The American Sabine came to the rescue about this time, with a brainy formula enabling the right areas of wood panelling and felt to be calculated for any given acoustic effect.

The Hidden Felt

What would a studio look like with hair felt and wood panelling stuck all over the place? Horrid, naturally. So when the hair felt, unlovely at the best of times, had been nicely cemented to the walls, they put on ordinary lining and wallpaper to cover it up. They even plastered on distemper and oil paint still more to hide the felt.

Seems incredible in these days. Of course, they completely spoilt what little value there ever was in having felt. Because sound waves, naturally enough, take notice only of the surface—and the surface was wallpaper, paint and distemper—not felt!

Came 1929. "Lads," said Sir Noel Ashbridge, or words to this effect, "you will have to get a new slant on studio design. You have mucked about quite long enough, and we now want twenty-two studios for our new home in the West."

So the lads went into a huddle and spake thus: "We will design studios taking into account these four factors: (1) Value of optimum reverberation time: (2) Variation of reverberation time with frequency; (3) Volume of the studio; and (4) Shape of the studio."

Actually, they put in (3) and (4) just to make it look more imposing, not because they meant to do anything about volume or shape! They did, even then, realise

(*Continued on page* 106.)

RECORDING THE KING'S SPEECH

H.M.V. engineers recording the King's speech during His Majesty's broadcast on March 1st. The profits from the sales of these records are to be given to a charity nominated by the King.

FROM OUR READERS

A COMPLAINT AGAINST LISTENERS

A most unusual letter has reached us from a London reader in which he indicts certain classes of listeners for their behaviour. Certainly one case mentioned is a serious one, and we sincerely hope that other readers have not had similar experiences.

The Editor, POPULAR WIRELESS.

Dear Sir,—Strange as it may seem, my grievance is not against the B.B.C. It refers to a certain type of listener. True, he is in the minority. But his activities are not in the best interests of that vast balance of decent-minded listeners. And as he is likely also to do harm to the wireless trade (and therefore interfere with people's livelihood), it's time something was said about this detestable fellow.

A few weeks ago I overheard one man telling another that he hadn't got a set and was thinking of buying one. His companion replied to the effect that he did once possess a four-valver, but owing to the tricks obviously played upon him by his next-door neighbour, he had got rid of it. Which appeared to put the other man right off the stroke. Probably another few bob off a wireless mechanic's wages. (I'm not in any way connected with the trade myself !)

Then, again, I personally know a family, every one of whom is not only the most inoffensive creature but who does much to help the underdog. These good folk would think no more of interfering with other people's pleasures than of digging through the earth to the Antipodes.

However, a few months ago, on a certain day of the week, a young fellow began to pay a weekly visit to the house next door. With the advent of his arrival, deafening oscillation began to trouble my friends ; so much so that they had to switch off. I was with them myself one evening when I distinctly heard loud laughter and " That's done it ! " through the dividing wall, and the silence that followed !

My friends didn't want the trouble of complaining to the authorities.

I could quote other cases of deliberate interference, but perhaps this short letter will be sufficient to indicate that the type of which I write is threatening to do one of the meanest tricks on earth—taking the bread and butter from the mouths of a man and his babes.

Yours faithfully,
" INDIGNANT."

DROP US A LINE

and you may win a prize of a guinea, given each week for what, in the Editor's opinion, is the most interesting letter. Don't forget that even if you do not win the prize your views on radio topics will be of interest to other readers, and you might get those TWENTY-ONE SHILLINGS. This week we are awarding the prize to Mr. A. E. Rose.

ROUND THE WORLD

The Editor, " Popular Wireless."

Dear Sir,—" Following the News Round the World " is a novel and interesting radio game, very often proving an amusing and, quite frequently, a bewildering diversion. The fact that you may not understand any language other than your own is no obstacle, as the principle disseminators of news broadcast it in English in addition to their own tongue. And many useful foreign words and phrases can be picked up by listening closely to the news being spoken first in English and again in the language of the broadcaster.

On the long and medium wavebands, Droitwich and Rome are two reliable stations that work to a regular news schedule ; and on the short waves Zeesen (Germany), Moscow, Rome, Madrid, Daventry, and a host of stations in the United States, are reliable additions to the list. A few stations the Vatican City and Rio de Janeiro are instances—broadcast news of a more local flavour ; while if you are at all interested in Stock Exchange prices in the Antipodes, Lyndhurst (Australia) obliges at 9.30 a.m. (G.M.T.) each morning.

The news broadcast by the European stations is obviously the " official " version, and the National political bias in each instance is unmistakable. The different various interpretations of the same incidents, and the discrepancies in the relation of " facts," leave one gasping and very often sceptical about the authenticity of any one of them.

The United States provides the most amusing presentations of the news. There the " individual," (about a dozen of them !) viewpoint of the world's news is broadcast, and very entertaining it can be. Incidents which have received scant notice in the European bulletins are dramatised and re-enacted over the air ; and items announced in Europe to be of grave import to the world at large are passed over with scarcely a mention.

Anyone desirous of making a reputation as a weather prophet has only to listen to the weather report from East America, and, almost invariably, a modified version of the same variety of weather is experienced in Britain about five days later.

Yours truly,
A. E. ROSE.

75, Breedon Street, Long Eaton, Notts.

S.W. PRIZES

The Editor, POPULAR WIRELESS.

Dear Sir,—Enclosed you will find a photograph which should create much interest among your vast short-wave readers. It shows the prizes that were awarded to the winning contestants in the I.S.W.C. DX Contest which has just concluded. This was the first and biggest short-wave listening contest ever arranged in this country, especially for English members. It also shows the winning contestant's verifications which were received from 109 short-wave broadcasting stations. The prizes were awarded to those who received the greatest number of short-wave broadcasting stations during the period September 1st to November 30th, 1935.

The winner was F. A. Beane, of Ridgewell, Essex, who receives a " Midwest " 7-valve all-wave receiver. Second prize awarded to S. J. A. Nicholl, of Church Stretton, and is a world Globe on a floor stand. Third prize awarded to C. O. Gray, of Sheffield, and is a world Globe on a table stand. There was also a special prize awarded to the contestant with not more than twelve months' experience on short waves. This prize, in the form of a clock and barometer, was awarded to S. W. Parr, of Plumstead. Twenty-two Certificates of Excellence were also awarded to the runners-up.

Yours faithfully,
A. BEAR.

International Short-Wave Club.

DOES YOUR SET " FALL OFF " ?

The Editor, POPULAR WIRELESS.

Dear Sir,—In reply to the letter written by " C. T.," of Basingstoke, in " Radiotorial " (March 14th), I too have noticed this falling-off of signal-strength, round about 400–550 metres in my case. It seems to be worse when using aperiodically-coupled coils, as I am doing, than when using coils of the aerial-tapping variety, as I have done. I don't think it has anything to do with the locality in which one lives.

To overcome this effect, I constructed a simple " wave-trap," consisting of about 60 turns of 28 D.C.C. wire on a 1-inch former, and tuned with a ·0005-mfd. condenser. When this is set at minimum, all stations above about 300 metres are much improved in strength, though in some cases quality suffers. It will be found that no station can be received under 300 metres with the condenser set at minimum, so for normal reception it is best to have it set at maximum.

If " C. T." tries this, I should be very interested to learn how it works with him.

Yours faithfully,
R. C. SPENCE.

1, Rosebery Road, Clapham Park, S.W.2.

The photo sent in by Mr. A. E. Bear, showing the prizes won by contestants in the recent International Short-Wave Club " DX " Contest.

RAIN " RADIO "

The Editor, " Popular Wireless."

Dear Sir,—Some time last July while a heavy thunderstorm was in progress, I had a very interesting series of happenings take place. I rigged up a temporary spark gap, as I thought there might be a chance of danger. There was no local lightning, so I switched on my set. I heard a sort of " pattering," which was about the same strength as the local station to which I was listening, thus making it very hard to hear what the announcer was saying.

This " pattering " went on for five minutes, and then I heard a crack simultaneously with a report from the loudspeaker. I straightway looked at my spark-gap. The set was functioning properly, and I saw eight sparks within ten minutes, and then the storm and " pattering " passed away.

I had a good mica aerial series condenser, and I suppose the " pattering " was caused by charged rain drops falling on my well-insulated aerial. When the charge on the aerial was great enough it leapt across my gap.

Yours sincerely,
R. WRIGHT.

St. Aaron's, Caerlon, Mon.

MICROPHONY CURED

The Editor, POPULAR WIRELESS.

Dear Sir,—I beg to report an experience I had, and the way I solved my trouble. I purchased a kit of the S.T.700 and built it into a Peto-Scott Table Consolette Cabinet. Before going any further, let me say that it is some set ; it can't be beaten, and I have had just a few sets.

My trouble was a very severe attack of valve microphony, the slightest tap on the table would start the set booming, and this was accentuated when I was using Audio-Reaction. After testing for the culprit, which readily showed itself, I proceeded to cure the trouble. I tried padding, rubber-bands, pads under the valve holder—but no, it did not solve the problem. But *this did*.

From an old inner cycle tube I cut lengths of the same size as the valve. I slipped this over the valve and that cured the worst case of microphony it has been my displeasure to deal with. Further to this I may add I have covered all the valves in my S.T.700. I can now knock the set forcibly without any signs of trouble. I might add that the culprit valve was the first L.F.

In conclusion, a word to set constructors. You want a Good Set ? Well, build the S.T.700, follow the designer's instructions, use his specified components, and I can guarantee you will have THE set, and get what you want—RESULTS.

I am, Yours faithfully,
WILLIAM ATKINS.

83, Lower Sloane Street, Chelsea, London, S.W.1

ON THE SHORT WAVES

THESE " HOT " SETS

What is it that makes a set sufficiently outstanding to justify the term "hot"? This week our short-wave expert, W. L. S., discusses this point.

NOTHING tickles the vanity of a short-wave enthusiast so much as the feeling that he has a " hot-stuff " receiver. Just what this particular brand of apparatus consists of, nobody seems to know ; but the fact remains that certain people imagine that they have got something " hot," while others, just normal cool-blooded people, plod along in their own quiet way.

I have always assumed that a so-called " hot " set is one which will do things that the normal set *won't* do. But from many letters I receive it is obvious that my own " cold " two-valver brings in all the stations that other people's " hot " three-valvers will get ; so there seems to be something wrong somewhere.

A little personal pride in one's own gear is inevitable. It is, as a matter of fact, a

A NEAT CONVERSION

An air-dielectric condenser made up from a solid dielectric type.

thing wholly to be encouraged. But I am forced to the conclusion that our nomenclature has gone all crazy. What else can one say about a state of affairs in which a set that works as it should is called " hot," and the others, not doing a quarter of what they ought to are regarded as normal sets ?

When Care was Rewarded

I once knew a person with a distinctly " hot " single-valver. Its excessive temperature was proved by the fact that it *did*, regularly, bring in things that users of the most expensive superhets in the same locality could never hear. Furthermore, the strength of all signals on this set was equal to that given by the average two-valver, even when the latter used pentode output.

It would be nice to be able to give a list of the qualities that made this set so " hot "—but, unfortunately, there weren't any. It was just a very good, sensibly designed receiver, in which more than ordinary care had been taken over every single detail. In that particular case the owner was amply rewarded for his trouble. In many more he isn't.

From the friendly tone of most of the letters that I receive from you readers, I think you know me well enough to realise that I'm not going to start bragging about my own set. I *don't* call it a " hot " set. I think of it as a very ordinary, efficient, A.C.-operated two-valver.

The fact remains, though, that nearly everyone who listens on it exclaims at the tremendous volume of signals ; at the freedom from hand-capacity ; and at the general controllability of the rig.

" Things I Will Not Tolerate "

Personally, I would not tolerate anything less efficient. Others seem to look upon it as something outstanding, which they could not hope to duplicate without years of experience.

Now why is all this ? What particular trouble have I taken that others have omitted to take ? Honestly, I can't see it at all.

To deal with particular points, I *don't* tolerate great loops in my detector circuit wiring ; I *don't* believe in solid-dielectric reaction condensers ; and I believe in playing about with the detector alone until one gets such strong signals from it that one L.F. stage will make things rather more than comfortable.

But I don't see that this should account for the fact that it gives stronger signals than some people's three- or even four-valve sets. They must have, in their receivers, something so incredibly inefficient that it ought to be removed, lock, stock and barrel.

My own " home-brew " sets, by which I mean those that are *not* for publication, often include weird little components of my own devising. On this page is a picture of a nice little air-dielectric condenser made up from one of the old-fashioned solid-dielectric type. The dielectric was removed, the plates were put together in pairs, and double spacing washers were used between them.

An Unusual Refinement

The other picture shows a " plug-in " H.F. choke of a type that I used in a set for a special job. Yes, I had three interchangeable H.F. chokes which had to be changed at the same time as the coils ! You might call *that* " hotting-up," because it is a refinement to which the average person would not go—and would, in fact, have no need to go.

That leads me on to my definition of what one of these " hot " sets really should be. I think it should be a receiver in which every conceivable refinement that makes for increased efficiency and operating comfort is included, regardless of expense and complication.

How often does one meet them ? Very seldom, I'm afraid. Most of the " hot " sets that one hears about are just unusually good versions of ordinary circuits. I plead guilty, myself, to using the term in that sense before now. It has just been a matter of comparison—of relative temperature, in fact ! After all, cold water from the tap feels warm if one has been previously cuddling a block of ice.

Send in Your Details

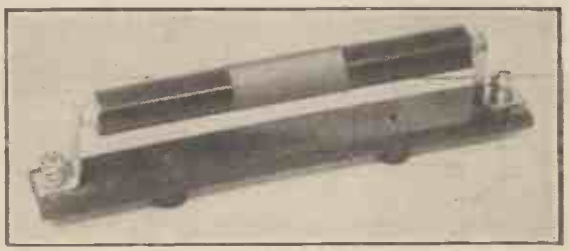
Having laid down a bit of a challenge, I must proceed to take it up myself, and I propose to do some serious work on a battery-operated two-valver that I have. I'm going to introduce every conceivable thing into that set that will give it a little more selectivity, sensitivity and general efficiency. It will probably look like nothing on earth by the time I've finished, and it is liable to contain as many components as the average four-valver, but I'm going to do it, just for amusement.

Readers who imagine that they have outstanding sets in this way might also help me along by telling me all about them. I shall be delighted to hear of their own little wrinkles for squeezing a few more drops out of the bottle, and will certainly make public any ideas that are apt to be generally useful.

Special forms of aerial coupling ; special adjustments of coupling between an H.F. stage and the detector ; special filters for keeping every trace of H.F. out of the L.F. side—these are real " hotting-up " devices. Let us hear about some of them.

Were it not for the fact that my junk-box will be nearly emptied as the result of the " ballot " announced a week or so ago, I would gladly offer some small prizes for the best ideas. Send in your idea, " on trust," and I will see what I can do—and you never know !

AN INTERCHANGEABLE CHOKE



A " plug-in " H.F. choke which W. L. S. used for a special job. Note the simple construction.

Points from the POST-BAG

R. H. (Darwen) is building the "Simplex" Two, but can't get "Metaplex" locally, and apparently doesn't realise that it is a Peto-Scott product. Others, if similarly placed, please note.

B. L. (Dalmuir West) wants me to design a short-wave set suitable for keen cyclists who don't want to carry anything weighing much more than a hundredweight or so about with them. Until the summer, however, he wants to get a straight one- or two-valver going. Turn up a few back numbers, B. L., and you will find descriptions of one or two suitable layouts.

R. H. (Exmouth) wants identification of a station just below 40 metres signing J D P (?) and announcing himself as Tokio. Is it J V P?

Down Among "The Fives"

H. J. B. (Manchester) was very interested in my article on "Below 15 Metres," and says he finds more amusement down there than anywhere else. He finds that his ordinary receiver works quite smoothly on 5 metres, and wonders whether he may expect to get anything on it. I should say so, certainly—and he probably has more chance of hearing DX than he would have with a super-regenerator.

F. R. (Peterborough) wants an H.F. stage for the "B.C.L." Two. Several others want one for the "Simplex" Two. The diagram on this page shows the layout of my own battery S.G. unit, and should help them out. The only thing to watch is that the lead labelled "to set" may only be connected directly to sets which use an adjustable condenser between the grid coil and the aerial terminal. Inductively coupled sets must be equipped with a neut. or pre-set before being coupled on.

F. H. (Birmingham) sends in a circuit for my comments. It is my so-called "hot" one-valver, with the L.F. stage of the "Simplex" Two added to it. He wants to know, among other things, what type of output valve to use. If it is for headphone work I advise an "H.L." type—but don't over-bias it!

Have You Heard Him?

Next there is a crop of letters from readers giving lists of parts that they have, and asking me to devise sets to devour them all up! I can only advise them to keep their eyes open and to watch all the various layouts that I give; surely they will be able to find something suitable, and if they have a few parts left over—well, that shouldn't worry them.

F. B. (Saltburn) logged a station just below D J C, apparently announcing in Dutch. He is very keen to know whether it might have been Tandjong Priok (P K-Y D A) on 49·69 metres. Has anyone else identified this chap? Perhaps they would let me know if they have.

C. R. W. (Weymouth) has a wave-change coil going down to about 12 metres, and wants to know if he can put a condenser in series with his tuning condenser to get down to 10 metres. I'm afraid it's hardly likely. The minimum capacity of modern short-wave condensers is so very small that you can't reduce it much further. The only thing to do is to play with the coil, if possible, and alter a tapping or remove a turn or so.

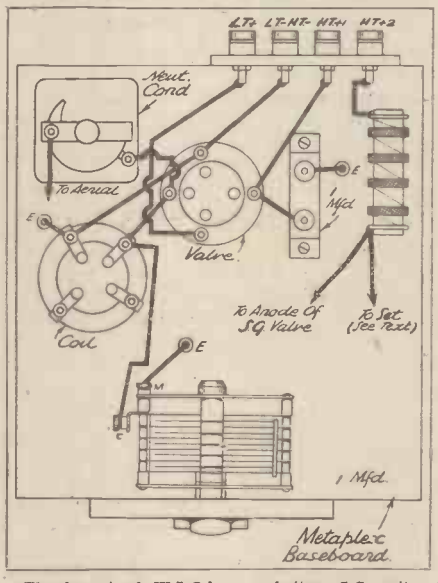
W. S. (Brighton) gives me a mild ticking-off for pandering too much to beginners. Yes, W. S., they've had it all their own way lately, and there's a change coming. Then I shall get my neck wrung by some of *them*, I suppose

A New Bulgarian?

F. W. M. (Exeter) wants to know about a station on about 20 metres signing L Z A. If that's the real call I think it must be in Bulgaria, in which case it's a new one on me.

W. M. S. (Cambridge) suffers from persistent "liveliness" in the 'phone cords, even with choke output. A filter with two H.F. chokes and two condensers, such as I showed recently, ought to cure the worst of these cases. It is obviously due to an unstable detector, since the aerial affects it, so it might just be a question of layout.

A BATTERY S.G. UNIT



The layout of W.L.S.'s own battery S.G. unit. The lead labelled "To Set" should only be joined directly to sets which use an adjustable condenser between the aerial terminal and the grid coil. Other sets need a "neut." or pre-set before being coupled up.

B. J. L. (Pinner) wants the "QSA" and "R" codes cleared up. The QSA system concerns *readability*, and the R system *audibility*. Thus a signal that is only R2 might be QSA5 if there's no background interference. He makes various suggestions for future receivers that he would like to see, and I have made due note of them.

Please keep letters short, readers! There is an awful deluge of them lately, and the long ones, I am afraid, will *never* be answered.

THE "P.W." PRIZES

The Editor, POPULAR WIRELESS.

Dear Sir,—Many thanks for the "Baby" Stentorian awarded to me in your "Advice" competition. It is a little beauty, and tempts me to add a little further advice. It is that your readers should enter your competitions, for such prizes are well worth the winning. Again thanking you.—Yours faithfully,

A. LAMBERTON.

23, Allendale Road, London, S.E.5.

SHORT-WAVE NEWS

MR. JOHN TAYLOR, of "Hollinwood," Ridge End, Marple, Cheshire, has sent me particulars of a new club. Known by the impressive title of "The International 6,000 to 12,500 Mile Broadcast Short-Wave Club," it makes the necessary qualifications fairly clear by the title.

To become a new member you must provide verifications from at least five stations more than 6,000 miles distant. Then, as you accumulate more of them, you may graduate up the honours list! You also have to provide a photograph of yourself and/or your "listening post." Full details from Mr. Taylor on receipt of a stamp.

D. F. (Kingston) wants to know whether there is a radio society in Kingston, Malden, or the surrounding district. I do not know of one myself. Perhaps anyone that does will let him know? His full address is D. Farquharson, "Invercauld," Coome Rise, Coome Lane, Kingston-on-Thames.

Thirty-one Metres Excellent

Coming to recent conditions, G. W. G. (Ipswich) asks me to mention that 31-metre conditions are abnormally good. In the great craze for 10-metre work someone may be apt to overlook that fact. He recently heard W 1 X K and V U B (Bombay) heterodyning each other, with a resultant mixture of jazz and tom-toms.

He says that Lyndhurst (V K 3 L R) is coming over better now in the mornings than at any time since he started transmitting. This probably *is* the best time of the year for 31-metre work. It certainly is one of the best, all the year round, for the reception of the Antipodes.

The 10-metre band has been wonderfully good since a short fade-out during March. At the time of writing New Zealand is very rarely heard, but perhaps that omission will be rectified before you read this. The Australians, when they are on in the early morning, are usually strong and consistent.

Why Brazilians Are Silent

The absence of Brazilian stations on the air is accounted for by the fact that "a small rebellion burst out in a few places," and all amateurs were promptly ordered to close down until further instructions were issued.

"P.W." will shortly be issuing a nice certificate for readers who have succeeded in *verifying* all Continents. The certificate itself will be reproduced in these pages and, at the same time, I will give in full the rules for obtaining same.

I don't like the title, "Verified All Continents Club," particularly, because, in its abbreviated form—the V.A.C. Club—it reminds one of man-made static and vacuum-cleaners. I am thinking of designing a special certificate for presentation to readers who have heard all Continents and never sent a card out at all!

W. L. S.

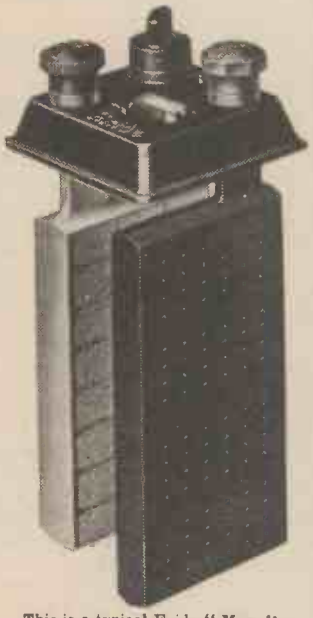
PRACTICAL RADIO AND ELECTRICITY

Continuing his talk on accumulators and their care, Mr. Johnson-Randall gives some further practical advice on getting the best results

THIS week I want to tell you something more about accumulators. I mentioned previously that the capacity of an accumulator depended upon the size and number of plates. Therefore, if you have two cells, one with more plates or larger plates than the other, then the accumulator with the bigger plate area will have the greater capacity.

The capacity of an accumulator is rated in ampere hours.

THE "MASS" TYPE



This is a typical Exide "Mass"-type cell removed from its glass container. Note the thick plates and the wide spacing between them.

You will notice, if you look down a maker's list, that the various types of cell are given as, say, 10 ampere hours, 20 ampere hours, and so on. And, moreover, you will usually find that this capacity rating holds good at a certain rate of discharge. For example, you may see an accumulator listed as having an actual capacity of 60 ampere hours at the 20-hour rate of discharge. This means that if you want to work it under the very best conditions, you should discharge it in 20 hours, i.e. at 3 amperes.

How Long It Will Last

You see, if its actual capacity is 60 ampere hours, and you are going to discharge it in 20 hours, the number of amperes which you must take from it is 60 divided by 20—that is, 3. But, of course, this does not mean you can only discharge the battery at 3 amperes. You can take one or two amperes from it, if you wish, or even less, and with the lower rate of discharge it will last much longer between the charging periods. If you take 2 amperes from a 60-ampere hour battery, it will last approximately 30 hours before it needs re-charging. But, remember, this re-charging is absolutely essential directly the voltage or specific gravity drops to the values stated by the makers.

On the modern motor-car or motor-cycle, re-charging is automatic. That is to say, while the car or motor-cycle is in motion, a small dynamo coupled to the engine or transmission is constantly delivering current to the battery, in order to make good the energy which has been taken from it for lighting purposes, the electric horn, and, in the case of cars, for the self-starter. Motor-car and motor-cycle batteries need very little attention, but they must be periodically "topped up" with pure water to make good any evaporation. This is essential. Neglect of this simple procedure will shorten the life of the battery very considerably.

Mind the Acid

Moreover, if the lights are used a great deal—as in winter-time—and the amount of running in daylight with the lights off—that is, when the full charging rate is available—is small, it is advisable to take the battery out and to have it re-charged at the local charging station. This keeps the battery in good condition.

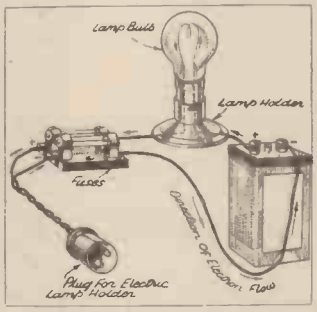
AN "ATLAS" UNIT

One of the "Atlas" mains eliminators with trickle-charger incorporated. This unit, incidentally, is for A.C. mains.

Always see that the tops of all accumulators are dry and clean. Often you will find a layer of moisture, due to the acid spraying out of the vent hole when charging. This moisture should be wiped off, otherwise it will tend to cause a leak between the battery terminals.

Sulphuric acid, which, as I have already told you, is the electrolyte in all accumulators, is a very dangerous substance. The utmost care should be taken to see that it is not spilt on any part of the body, because it can cause nasty burns. It must not come in contact with the eye. If any acid is spilt upon a carpet or fabric, it can be neutralised provided steps are taken immediately. The use of liquid ammonia is one method of neutralising its action. In the absence of a supply of household ammonia, a strong solution of bicarbonate of soda is satisfactory.

TRICKLE CHARGING



A simple trickle charging circuit. The fuses are not essential, but they offer a measure of protection in cases of wrong connection.

I have been fortunate in securing two photographs showing a "Mass" type cell and a cell of the latest "Hycap" type. Both these cells are of the well-known Exide make.

Two Thick Plates

You will notice that in the "Mass" type two thick plates, without separators, are employed, whereas in the "Hycap" type the plates are thinner, and there are more of them. The "Mass" type cells are specially designed for radio work where the current required is very small. For instance, you would use one in a single or two-valve set. The makers state that these particular cells are only suitable when the period between re-charges *exceeds* 14 days.

The "Hycap" cells will give a greater current than the "Mass" type, and can be re-charged at higher rates, thus reducing the length of time required for re-charging. They are specially designed for the modern multi-valve battery set, e.g. the superhet.

In these larger sets, of course, the accumulator has to supply not only the filaments of the valves, but also the current for the small bulb used for illuminating the dial.

One way to ruin an accumulator rapidly is to short-circuit it. Even a momentary short-circuit will often cause a current sufficiently great to produce a buckling of the plates and disintegration of the active material. When this heavy current flows on short-circuit, heat is generated and the plates tend to expand. It is this expansion which causes the damage. Moreover, a short-circuit may cause a fire, especially with the celluloid case type.

Owners of battery sets who use mains eliminators can re-charge their own accumulators by choosing an eliminator incorporating a trickle-charging unit.

"HYCAP" SERIES

The latest Exide "Hycap" G.F.G.4-C cell (24 amp. hours). Compare it with the "Mass" type. Note the decreased thickness of the plates and the increased number. These cells will give a bigger current output and can be recharged more quickly than the "Mass" type.

This means that by a touch of the switch on the eliminator the listener is enabled to utilise the mains for supplying a small current to his battery for re-charging purposes. This current is quite small, and the accumulator can be left on charge

(*Continued on page* 106)

BARRY KENT CALLING!

B.B.C. DANCE ORCHESTRA AND TELEVISION

The Latest News about Broadcasting

HENRY HALL and the B.B.C. Dance Orchestra will be starred in the first programme of the new television service. There has been much discussion as to whether Henry and his Boys should be made up specially for television and should be dressed as for a music-hall or wireless exhibition performance.

Some make-up will be necessary, but for the rest the dance orchestra will be televised under the normal studio conditions as if they were working for the listening audience only. In the early stages of the new television service outside bands will be engaged to relieve some of the strain on Mr. Hall and his B.B.C. Band.

* * *

"The King's Highway"

This is the intriguing title of a discussion which Mr. Moray McLaren is arranging for Wednesday, May 13th, in the Regional network at eight o'clock, for half an hour. The problem of the rights of pedestrians, motorists and cyclists is to be threshed out by convinced advocates of the cause of each. Discussions of this kind if really keen should do a lot for the spread of knowledge about road dangers.

* * *

That Staff Association

Since the Report of the Ullswater Committee recommended the formation of a B.B.C. "Staff Association," if the staff wanted it, there have been several meetings. A powerful element of the staff is anxious to take advantage of the new situation and create the machinery of "collective bargaining" with the administration of the B.B.C. But they have a difficult problem to solve.

Sir John Reith's attitude is well known. He has always been prepared to concede a staff association if there was proof of the demand for it. At the same time he has made it clear that if the staff prefer to take up the method of "collective bargaining" instead of the friendly give-and-take of the present arrangements, they cannot expect more than their strictly legal rights. This means an end to the Christmas bonus, which was a welcome annual gift of the equivalent of a week's pay.

Also there are a lot of other little amenities and privileges that would be washed out. Actually, the staff as a whole would lose by departing from the present system. It will be interesting to watch what happens.

* * *

Theatre Orchestra Moves

Studio accommodation in the B.B.C. is increasingly acute. Maida Vale, now used to capacity, cannot accept any of the new work. St. George's Hall is about to undergo extensive internal alterations to make room for the big cinema organ that has been bought for it. Therefore another outside hall is being sought for the Theatre Orchestra shows.

The Mystery Carpet

Friends round at the "Big House" were laughing the other day about the mystery of the carpet in studio 8A, away up at the top of the building. Apparently, this carpet disappeared suddenly between programmes. The job must have been done by fast workers, because they are supposed to have had only two minutes.

Anyway, it was not there! When the Theatre Orchestra came back from stretching their legs they could hardly believe their eyes. The big carpet was gone. And that was not all. The acoustics were seriously interfered with, and angry listeners were soon ringing up to ask what had gone wrong with the transmission. I understand a special committee is investigating the mystery. Perhaps the ghost the B.B.C. has been hunting has now got his own back.

Hot Talkers

The B.B.C is discovering further difficulty in keeping the studios at a temperature that suits both entertainers and talkers. The former like them hot; the latter complain of the heat. Some regular talkers threaten to decline to enter studios which they find uncomfortably hot. The B.B.C. has decided to try to arrange to keep these sensitive talkers more or less on ice while they are at work.

* * *

Professor Coatman Triumphs

Professor John Coatman, the Chief News Editor of the B.B.C., has made a great place and name for himself since he took over the broadcast news services about eighteen months ago. Gradually and steadily Professor Coatman has extended his influence and power, until now he occupies a unique position in the B.B.C. He is virtually the only independent head of a department. So far as news is concerned apart from B.B.C. policy, it is Mr. Coatman's word that goes.

* * *

Dr. Boult for Boston

Dr. Adrian Boult, of the B.B.C., has received another compliment from the other side of the Atlantic, where he is accepted as one of the the first rank conductors. He is being invited to conduct the Boston Symphony for several months next winter season. It is likely that the invitation will be accepted if by that time the music department has recovered from its impending reorganisation.

* * *

Religions in the B.B.C.

Anti-Catholic bodies are in the habit of attacking the B.B.C. for having Catholics in cardinal jobs. A recent "religious inventory" of members of staff revealed that Catholics are really an almost negligible minority. So far as numbers are concerned, Presbyterians appear to be by far the strongest single sect. Followers of the Church of England come second, then Methodists and other Nonconformists. So far, not a single Christian Scientist, Spiritualist, Malthusian, or Mazdaznanite has been discovered.

* * *

No Communism or Fascism

It is now confirmed that Communism and Fascism are not to be debated on the British wireless. Since the recent "postponement" of the series "The Citizen and His Government," in which Sir Oswald Mosley and Mr. John Strachey were to speak, there have been representations from various interests; but the Board has held its ground, no doubt with the approval of the Government.

* * *

Red Marley Hill Climb

A running commentary of the famous open hill climb is to be broadcast in the Midland Regional programme on April 13th. Red Marley is in Worcestershire and includes a section of one in one-and-a-half, and the climb is made by two competitors at once, which makes it all the more exciting.

HENRY HALL'S NEW 'CELLIST

Henry Hall has introduced a 'cello into his band. The 'cellist is Mr. Stuart Knussen, whom you see above. He is a well-known North Country musician, and hails from Manchester.

THE "CENTURION"

Part II of the special articles on the installation and operation of the great new three-valve receiver which was described in our issue of March 21st.

By JOHN SCOTT-TAGGART, M.I.E.E., F.Inst.P., Fel.I.R.E.

IN the main article and in my last week's contribution the general idea of the working of the "Centurion" has been discussed and it is possible to give explicit instructions now with confidence that they will be understood.

Having built the set, it remains to decide whether you are going to use a Triple Extractor or not. This external gadget is the answer to the prayer of every radio listener who experiences the swamping of the B.B.C.

Its place is between the aerial lead-in and the aerial terminal of the receiver. It may be placed next to the set on the left or, more usually, to the left and just behind the receiver. It can, however, be placed on the window-sill or elsewhere out of the way—but not near metal trays or other metal objects which will reduce its efficiency.

Build the Set First

I always advise a constructor to build the set first and then, having got good results, to build the Triple Extractor if he experiences B.B.C. jamming. The separate Triple Extractor which I devised for the S.T.700 has proved extremely popular and thousands have been built or bought for use with sets other than my own!

I am not sure that I wholly approve of this because I should not like the idea to spread that the Triple Extractor is something that can be added to any set, because it cannot.

The nature of the input circuit is all-important and the Triple Extractor is not suitable for, say, the S.T.300, S.T.400, or S.T.500. It can, however, be used with perfect success in conjunction with S.T.600, and is deliberately designed for use in conjunction with the S.T.700, the 1936 S.T.100 (described recently in "Wireless and Television Review") and the "Centurion." Moreover, I intend to use the Triple Extractor in conjunction with future sets of mine.

Simplicity Plus Selectivity

This is because it has been so thoroughly endorsed by the great body of constructors who have confirmed all my own tests and shown that it represents the Grand Solution of the simplicity plus selectivity problem. Sets will still be offered to you by others, claiming low price and simplicity, but how are you going to deal with the B.B.C.?

Manufacturers, I see, are now attacking the cheap battery set market, offering two-circuit receivers of the "straight" type. This, of course, is a direct invasion of the Press designs' territory. But the fact need worry no designer who is willing—as I have urged he always should be willing—to take advantage of the extra intelligence and operating skill of the wireless amateur. The manufacturer must always make for the masses and so will always be dragged down by the inability to fit an extra control or add a new device.

Triple Extractors, double-reaction, audio-reaction and other developments of mine are so firmly associated with the idea that the constructor has something the others have not got, that Press sets if designed with inventive imagination will always beat the standardised product.

The Terminal Connections

Let us now consider the actual connections to the "Centurion." The H.T. battery (120 volts is required, but a large size is unnecessary as the set is very economical as regards H.T. current) will be placed behind the set. The accumulator may be placed to the right of (or on top of, perhaps) the H.T. battery. The loudspeaker will be placed to the right of the set, preferably so that the sound waves do not impinge on the set.

There are six terminals: A., E., H.T.+1, H.T.+2, L.S.— and L.T.+. These do not seem enough, because we have to provide for L.T. —, H.T. — and L.S. +. Well, we simply use existing terminals. The connection from the minus socket (i.e. zero) of the high-tension battery is taken to the terminal E on the terminal strip of the set. The negative terminal of the accumulator is also connected by a wire to terminal E on the strip. The positive lead of the loudspeaker (if not marked, it is simply the other lead) is connected to the terminal H.T. + 2 on the strip.

The full set of connections to the receiver are therefore as follows:

A.	Aerial wire.
E.	Earth lead.
	Wire from negative of H.T. battery.
	Wire from negative of accumulator.
H.T. + 1.	Wire going to wander-plug inserted at about 72 volts in H.T. battery.
H.T. + 2.	Wire going to 120 volts on H.T. battery.
	One lead from loudspeaker (positive if marked).
L.S. —	One (negative if marked) lead from loudspeaker.
L.T. +	Wire going to positive of accumulator.

Check the G.B. Plugs

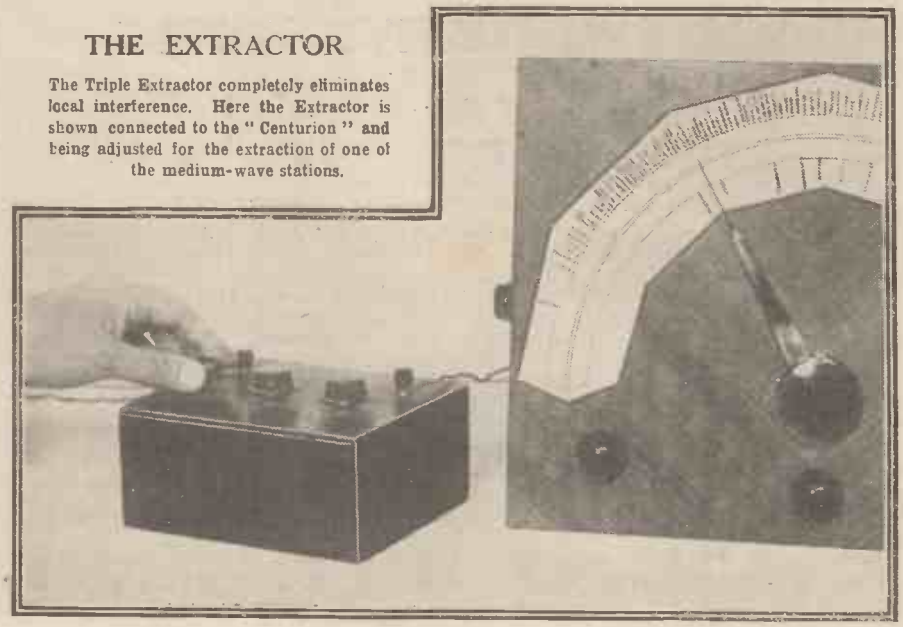
It is extremely important to check the grid-bias plugs. I recently had such a shock on seeing a constructor's set whose sole defect—and what a defect!—was a reversal of the grid-bias plugs that I have suddenly become grid-bias conscious and ask every reader of this to examine his grid-bias connections, no matter what set he is using.

I have always realised the serious results—especially as regards volume and "quality"—of dirty or open grid-bias

(*Continued on page* 105.)

THE EXTRACTOR

The Triple Extractor completely eliminates local interference. Here the Extractor is shown connected to the "Centurion" and being adjusted for the extraction of one of the medium-wave stations.



ABOUT THESE PROGRAMMES

Higham Burlac provides another of his critical articles on B.B.C. broadcasts.

IT is an old saying, generally in connection with politics, that we can "trust the people," meaning ourselves and not a lot of foreign bodies. In my experience this holds good where anything of importance is concerned, such as good taste, common sense, fairness and love of country, for whatever the too-clever-by-half young writers may sneer to the contrary, the British people are as fundamentally clear-sighted, clean-hearted, and mentally well-balanced as they ever were.

So that, this being granted, we need not be surprised at the high level of æsthetic taste which was revealed by those listeners who wrote to the B.B.C. giving their selections of "Six Great Melodies."

And the B.B.C.'s idea of broadcasting a programme entirely composed of such selected pieces deserves a place amongst their happiest inspirations, for the result was forty-five minutes of unalloyed pleasure.

Those "In-Town-To-Nighters"

Having solemnly handed my modest bouquet to the B.B.C., I confess that I doctored it with a little pepper, just to remind them of their admirer. They are continuing to harrow our feelings with their Saturday evening collection of Toms, Dicks, and Harrys of the highways and byways—and we do not like the process.

The disquieting news of the German military re-occupation of the Rhineland was slightly tempered by the broadcast records of bits of Herr Hitler's speech in the Reichstag. Samples of Teutonic calm! Don't say that the B.B.C. have no sense of humour.

I was just about to protest against the ruination of plays by the addition of what is, I suppose, meant to be incidental music introduced for the purpose of creating "atmosphere," when the B.B.C. sprang "The Voysey Inheritance" upon me, with no more than a few bars by a piano and one bang on a gong. I am sure that everybody enjoyed that fine performance all the better on account of the lack of adventitious "effects" Bravo, Barbara Burnham, the producer.

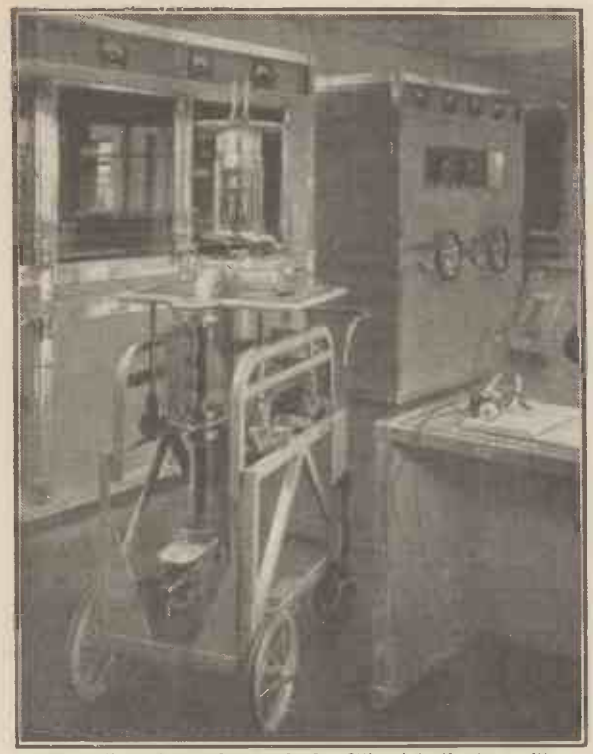
If the B.B.C. are hard up for material for "In Town To-night," why do they not arrange a series of chats by professional men and women. These chats should tell us about the daily life and work (if any) of the speaker, and should be given by a duke, a doctor, a lawyer, a millionaire, a University professor, the chief engineer of a gasworks, a newspaper editor, the head of a "multiple" stores, the manager of a large country estate, an Army captain, a Naval officer, an R.A.F. Wing-Commander, a research chemist, an independent gentleman of considerable income, a woman journalist, a matron of a large hospital, a woman who runs some large business of her own, and a Cabinet Minister's wife. A glimpse into the life of the so-called "idle rich" would be a salutary revelation to many listeners.

Out Kenya Way

Now that the wireless telephone circuit with Kenya Colony is in operation there is reason to hope that some interesting long-distance O.B.'s may be achieved. Some years ago, unless my memory is at fault, the Nairobi Broadcasting Station, 7 L O, attempted to broadcast the roaring of the lions, but it was not their night for roaring; another attempt might be made to let us hear the King of Beasts holding forth on his native heath. Again, what about an eye-witness' account from an aeroplane flying over the plains near Nairobi; where all manner of wild life teems?

I said my piece about the spook-hunt the other week, and now that the Great Glimpse is over, all that remains to be done is to review the proceedings and sum up the results. You will remember that nine men and a dog set out to discover (1) whether a door would be opened, (2) where the draught in the cellar came from, and

(*Continued on page* 105.)



One of the output valves ready for fitting into the transmitter. The valve is carried on a special trolley and is actually wheeled into position.

THE NATIONAL TRANSMITTER

In this third article of his special short series Dr. J. H. T. Roberts deals with the transmitting equipment at Droitwich. The preceding articles on this station appeared in February 29th and March 14th issues.

IN the previous articles on the Droitwich Station I described the site on which the station is located and the various considerations of broadcast "coverage" which led to the selection of the particular position. The general layout of the station was also described, and some reference was made to the supply of electrical energy. I now propose to give you an account of the transmitting arrangements, and I shall follow this with a description of the masts and aerial and earth systems and the general working of the station.

Four Main Supplies

Each transmitter requires the following supplies: (1) Main high-tension supply for the anodes of the water-cooled valves; (2) Auxiliary high-tension supply for the low-power stages of the transmitter; (3) Grid-negative voltages for various valves in the transmitter; (4) Filament-heating supply for all valves.

The long-wave transmitter requires a high-tension supply at 20,000 volts. It may also be necessary to obtain full power output at any voltage down to 15,000. In the medium-wave regional stations already in operation the high-tension supply (12,000 volts) is derived in all cases from motor-generators. The twelve sets of this type which are now in use have given trouble-free service for various periods up to six years. Recent developments in mercury-arc rectifiers, however, made it desirable to examine these alternative means of producing a high-tension supply. In this case the efficiency reaches 95·2 per cent at full load and 94 per cent at half load (as compared with about 86 per cent efficiency with the motor-generators). So you see the gain of nearly 10 per cent over the motor-generators represents a considerable saving. The reliability of the mercury-arc rectifier at its present stage of development is not, however, equal to that of the motor-generator. In fact, certain broadcasting stations abroad employing these mercury-arc rectifiers have suffered — at least temporarily—in this respect.

Whilst the designers of the station were very anxious to use the mercury-arc rectifiers if at all possible, nevertheless they felt that, even with the modern improvements in these rectifiers and giving them every possible chance, it would be early days to rely entirely upon them. The use of the rectifiers was, in fact, partly in the nature of pioneer work and for safeguarding the service of the station motor-generators were also installed. For the National transmitter two mercury-arc rectifier plants were used, each capable of an output of 600 kilowatts at any voltage between 15,000 and 20,000 volts.

As regards the auxiliary high-tension supplies and grid-negative voltages and filament-heating supply, these are all obtained from motor-generator sets installed on the ground floor in the transmitter hall, the sets being in duplicate. The control table for controlling the power inputs to the transmitters is so placed that the engineer on duty has a clear view of both transmitters, most of the motor-generator sets, and all the speech-input equipment. He can therefore take immediate action to cut off power from any part of the plant in the event of trouble. To facilitate this control, some of the more important meters in the transmitters are duplicated on the control table and interlock circuits are arranged to ensure a correct sequence of switching operations and to prevent unintentional paralleling of machines.

The long-wave transmitter is designed to deliver an output of 200 kilowatts of unmodulated high-frequency power to the feeder line. It was designed and manufactured by Marconi's Wireless Telegraph Company to the performance specification, and with the co-operation of the B.B.C., and it employs several new ideas in design and operation.

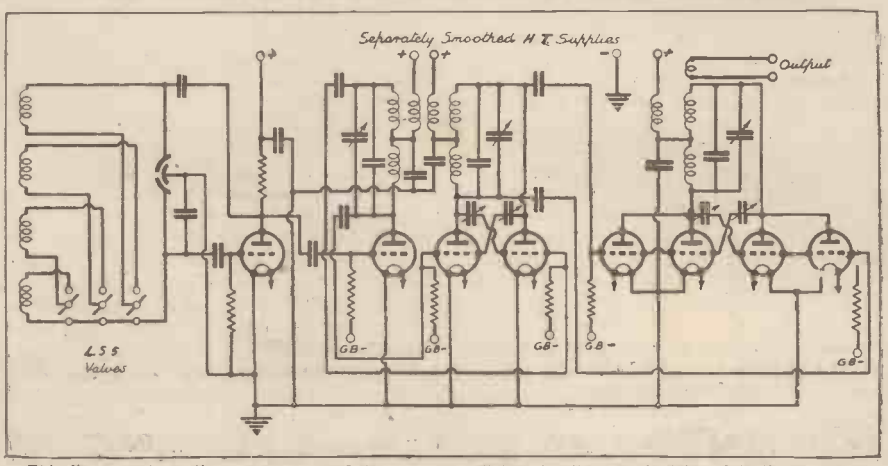
P.O. Cables From Birmingham

The transmitter is divided into four units. Each unit is a two-story structure and consists of an aluminium framework strengthened by steel members and faced with aluminium or glass panels. The door handles are interlocked, making it impossible for power to be supplied if a door is opened. The lower story of each unit contains the larger components and, in particular, the insulating hoses which form part of the valve cooling water system. The upper story contains the valves and the smaller circuit components.

Speech and music are conveyed to the station by means of four cable telephone circuits connected to the control room at the Birmingham studio premises. These circuits are rented from the Post Office on a permanent private-line basis. They form part of a 206-pair multiple-twin, lead-covered, paper-insulated cable between Birmingham and Worcester, the required number of pairs being tapped at a point on the route near to the station. From this point a 19-pair 40-lb. screened cable runs up the private road to the station. The circuits are loaded with 22 m.h. coils every 1·36 miles, giving a nominal cut-off at 8,400 cycles.

(To be continued.)

THE DROITWICH MASTER-OSCILLATOR SYSTEM



This diagram shows the arrangement of the master-oscillator circuit at Droitwich. Note the separate H.T. + feeds to the anodes of the valves.

LEARNING FRENCH THROUGH YOUR RADIO

Continuing our fascinating language series, this week we present Part 10

By S. C. GILLARD, M.A.

Here is Monsieur Michellet, chief announcer at Bordeaux-Lafayette, the well-known French station on 278·6 metres. M. Michellet speaks excellent English and for five years he was a teacher of French in the North of England.

CONTINUING our quest for words, I want to suggest another class of English ADJECTIVE which literally abounds in French. I mean those English ADJECTIVES which end in *-ic* or *-ical*—i.e. romantic, elliptical, etc. TO CONVERT THESE *-IC* or *-ICAL* WORDS INTO PUKKA FRENCH WORDS YOU HAVE ONLY TO SUBSTITUTE THE FRENCH ENDING *-IQUE* FOR THE *-IC* OR *-ICAL*. Simple, isn't it? Even a child could do it. Look at the following selection of words and phrases and see for yourself.

ENGLISH	FRENCH	
electric	électrique	les lampes électriques *leh lah(m)p-seh-lek-treek*
classical	classique	les portraits classiques *leh por-treh klah-seek*
magic	magique	la lune magique *lah lün mah-sheek*
elastic	élastique	une balle élastique (a rubber ball) *ün bal eh-lahs-teek*
comic	comique	une scène comique *ün sehn kom-eek*
sarcastic	sarcastique	une réponse sarcastique (a s. reply) *ün reh-po(n)ss sahr-kahss-teek*
physical	physique	la culture physique *lah kül-tür fee-zeek*
emphatic	emphatique	un refus emphatique *u(ng) re(r)-fü ah(n)-fah-teek*
periodical	périodique	une fièvre périodique (recurrent fever) *ün fe-ayvr peh-re-od-eek*
artistic	artistique	un arrangement artistique *u(ng) ahr-rah(n)sh-mah(ng) ar-teece-teek*
problematical	problématique	une question problématique *ün kess-te'o(ng) prob-leh-mah-teek*
dramatic	dramatique	une émission dramatique *ün eh-me-se'o(ng) drah-mah-teek*
scientific	scientifique	les instruments scientifiques *leh-za(n)-strü-mah(n) se'ah(n)-te-feek*
Sovietic	soviétique	les microphones soviétiques *leh me-kro-fon soh-ve-eh-teek*
political	politique	les opinions politiques *leh zoh-pe-ne'o(ng) pol-e-teek*

Such a list could go on indefinitely. But it is up to you to add to it yourself. Cultivate the collecting habit. It is an interesting and profitable pastime. Begin dipping into French books and newspapers. Here, for instance, is a list of phrases which I got from half a column of a French paper.

les spécialités gastronomiques ; les grands clubs politiques ; la valse chromatique ; les actualités scientifiques ; la revue de la presse humoristique ; la gymnastique rythmique ; la lumière mystique de Big Ben ; la cathédrale gothique ; les meubles antiques ; l'orchestre philharmonique ; les écoles publiques d'Angleterre ; un sketch radiophonique ; la décomposition mécanique ; les collections ethnographiques ; la boutique la plus typique de St. James ; le corps diplomatique ; l'ouverture symphonique ; l'Opéra-Comique ; les ordres classiques ; les compositions allégoriques. Etc., etc.

You will notice that with this type of ADJECTIVE there are only TWO FORMS INSTEAD OF FOUR—i.e. politique (Masc. and Fem. sing.) and politiques (Masc. and Fem. plur.), NEVER FORGET TO MAKE THEM AGREE WITH THE NOUN WHEN IT IS PLURAL. LOOK AT THE PHRASES ABOVE. I HOPE I SHALL NEVER BE GUILTY OF A FALSE CONCORD.

Now for my weekly wireless item to be listened for. This week it is to be RACING RESULTS. LES RÉSULTATS DES COURSES (*leh reh-zül-tah deh koorss*)

MESDAMES ET MESSIEURS : VOICI MAINTENANT LES RÉSULTATS DES COURSES COURUES AUJOURD'HUI À VINCENNES (the results of the races run to-day at Vincennes) (*koorü oh-joord'wee ah va(n)-senn*)

PREMIÈRE COURSE (1st race) (*pre(r)-m'yair koorss*). PRIX DE MONTBRISON (Montbrison Stakes) (*pree de(r) mo(ng)-bree-zo(ng)*)

PREMIER (1st) GALATHÉE
DEUXIÈME (2nd) GIONGES
TROISIÈME (3rd) GAMINE
QUATRIÈME (4th) GUENOLA
DOUZE PARTANTS (12 runners) (*dooz par-tah(n)*)

DEUXIÈME COURSE (2nd race) (*de(r)z-yaim koorss*). PRIX DE CHAROLLES (Charolles Stakes) (*pree de(r) shar-oll*)

PREMIER (1st) GOUTRONNE
DEUXIÈME (2nd) GRAND-MAÎTRE
TROISIÈME (3rd) GLOUTON RUSSE
QUATRIÈME (4th) GALANT SOLDAT
TREIZE PARTANTS (13 runners)

TROISIÈME COURSE (3rd race) (*trwahz-yaim koorss*). PRIX DE PONTIVY (*pree de(r) po(ng)-te-ve*)

Need I go on ? The procedure for all the results is the same, though sometimes the number of runners is not given. There may be six or seven races, and for the 7th and last race I have heard the announcer say :

SEPTIÈME ET DERNIÈRE COURSE (7th and last race). PRIX DE SOMETHING . . . AND SO ON as before.

Now all this should be easy to catch (*saisir*), apart, perhaps, from the names of the horses. After all, they are weird names sometimes and of little interest. Or am I wrong ? Anyhow, as long as you recognise that it is the name of a horse, that's all that matters. BUT YOU MUST LEARN THE FORMULA THAT THE ANNOUNCER USES FOR BROADCASTING THESE RACING RESULTS. It is as regular and constant as our own announcer's "TO-DAY'S RACING AT KEMPTON PARK. THE 1.30 . . ." Etc., etc.

The announcer will, of course, finish off the racing news with the usual MESDAMES ET MESSIEURS : VOUS VENEZ D'ENTENDRE LES RÉSULTATS DES COURSES DE VINCENNES.

The new grammar I want to give you this week is the ADJECTIVE :

TOUT TOUTE TOUS TOUTES (meaning ALL)

The same old FOUR forms, you notice (*too, toot, too, toot*). Just study the following phrases. They explain themselves.

TOUT LE MONDE (all the world—i.e. everybody) (*too le(r) mo(n)d*)

FEMININE OF NOUNS AND ADJECTIVES—(*Continued*)

Masculine words ending with *-x* form their Feminines by changing the *-x* into *-se*.

Examples : époux (*eh-poo*) (spouse), épouse (*eh-pooz*) ; heureux (*er-e(r)*) (happy), heureuse (*er-e(r)z*)

Masculine words ending with *-er* change the *-er* into *-ère*.

Examples : fermier (*fair-m'yeh*) (farmer), fermière (*fair-m'yair*) ; écolier (*eh-kol'yeh*) (scholar), écolière (*eh-kol'yair*) ; cher (*shair*) (dear), chère (*shair*) ; premier (*pre(r)-m'yeh*) (first), première (*pre(r)-m'yair*)

Masculine words ending with *-el, -eil, -ol, -en, -on, -et, -ot, -as*, double the final consonant and add an *e* mute.

Examples : cruel (*krü-el*), cruelle (*krü-el*) ; ancien (*ah(n)-se'ah(n)*) (ancient), ancienne (*ah(n)-se'en*) ; bon (*bo(ng)*) (good), bonne (*bon*) ; sot (*soh*), sotte (*sot*) ; net (*net*) (clear), nette (*net*) ; gras (*grah*) (fat), grasse (*grahss*)

(*A Suivre.*)

TOUTE LA FAMILLE (all the family) (*toot lah fah-me'ye(r)*)

TOUS LES GARÇONS (all the boys) (*too leh gar-so(ng)*)

TOUTES LES MÈRES (all the mothers) (*toot leh mair*)

From these you will see that the GENDER AND NUMBER OF THE NOUN determines which of the FOUR forms is to be used. A good way to remember this is to learn the ADJECTIVE WITH THE ARTICLE, thus :

TOUT LE (*too le(r)*), TOUTE LA (*toot lah*), TOUS LES (*too leh*), TOUTES LES *toot leh*)

Any other combination is WRONG.

Don't you see now how our phrases are growing in length ? For instance, we start off with the French for "the lamp"—la

(*Continued on page* 107.)

"P.W." CIRCUIT SPOTLIGHT No. 9

THE AERODYNE "AEROMAGIC"

Details of an entirely novel receiver

By K. D. ROGERS

THIS week I am going to discuss the circuit of a quite unique receiver—the Aerodyne "Aeromagic" superhet, which employs a most ingenious method of remote control. This control enables the listener to control at a distance not only the volume of his set but also the full station selection. He has, in fact, on the remote control panel, which he can conveniently place on the arm of his chair, a replica of the tuning dial of the set, and on this dial he can see a replica pointer following a path that is exactly the same as that followed at the same time by the tuning scale of the set.

The circuit of the radio section of the set, as can be seen, is not an abnormal one, but the method of utilising the remote control is novel. For the control is electrical and not mechanical in the usually accepted sense of the term. The carrier-wave of the station required is used to stop the motor which is used to turn the tuning condenser on the set, thereby making the receiver a particularly easy one to operate.

The Radio Side of the Set

The wavechange control of the set is on the instrument itself, and has to be set before the remote control is brought into operation, but it is argued that the need for operating the wavechange switch is so comparatively rare that the fact that one has to go to the set to do so is no disadvantage.

The radio circuit of the set is composed of a plain "mixer," followed by one intermediate stage and a double-diode for A.V.C. and signal rectification. The L.F. is fed to a pentode output valve. Iron-cored coils are used for the medium-wave inductances, and the usual type of delayed A.V.C. is employed.

The signal part of the circuit thus accounts for four valves and the rectifier, which latter is used in both signal and remote control sections of the set. The remaining two valves are concerned solely with the remote control apparatus.

These two valves are an intermediate frequency amplifier (V4) and a triode relay valve (V6). The I.F. stage is a "monitoring" stage and controls the impulses transferred to the grid of the relay valve, which latter valve operates the mechanical relays that switch *off* the motor and switch on the loudspeaker. Perhaps in order to understand what happens we had better run over the action of the motor part before going into the matter of the valves.

The motor used for turning the tuning condenser of the set is an A.C. squirrel cage motor with a special throw-out mechanism which operates the instant the motor slows down. This enables a sudden stop to be obtained in the tuning control regardless of the momentum of the motor.

The motor is switched on by the press-button in the remote control unit. It is stopped by the action of the right-hand relay magnetically controlled by the iron-cored inductance in the anode circuit of the relay triode (V6).

At the same time the left-hand relay is operated, and the speaker, which has been shorted, has its circuit opened so that the signals are heard. Unless the speaker were shorted while the actual tuning was in progress you would be able to hear signals before the set was completely in tune to any given station, before the monitoring I.F. valve actuated the valve relay and stopped the motor. This will become clear as we proceed.

The I.F. monitoring valve operates in this manner. In its anode circuit, carefully balanced out for capacity by a special bridge circuit, is a sharply tuned quartz crystal. This crystal is tuned to the middle of the band-pass frequency of the intermediate frequency on which the set operates—that is, to the "trough" between the two sideband frequencies which one always gets with every superhet.

Thus when a station's wavelength is approached the I.F. frequency of the mixer rapidly approaches that of the I.F. transformers. It passes through one of the "sidebands" and then reaches the centre of the "trough" between the sidebands. At this point it is in resonance with the frequency of the crystal, which immediately allows the anode circuit of V4 to resonate and to cause an impulse to be applied to the grid of V6. The sharpness of the crystal circuit ensures that no impulses shall be passed to the relay triode (V6) until the "trough" of the I.F. band-pass is reached, and the station is thus dead in tune.

Special Time Constant Circuit

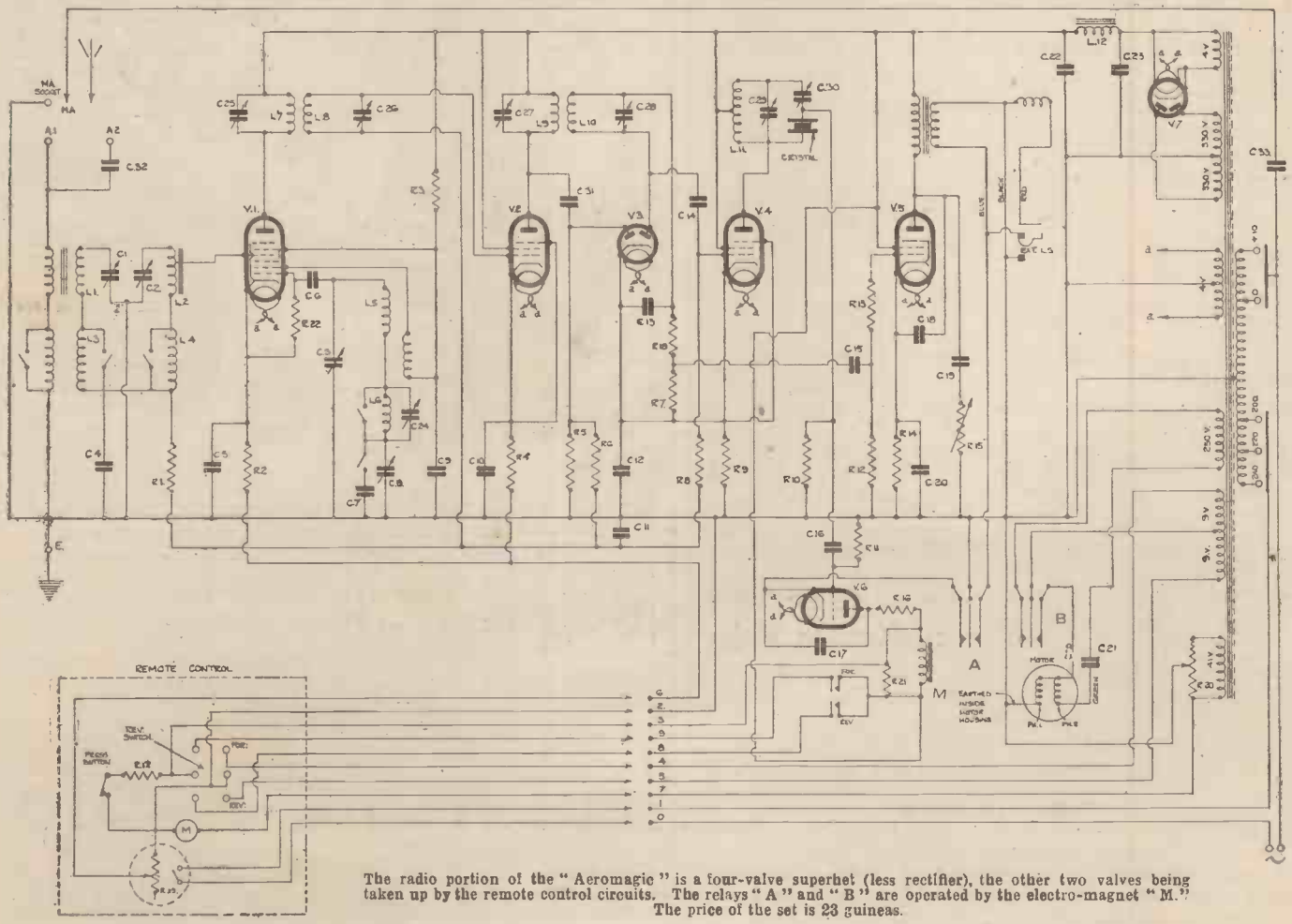
The pulse is quite a short one, but it has the effect of decreasing the valve anode current, and the mechanical relays I have already mentioned are released, the motor stops and the speaker comes into action.

In the grid circuit of the relay valve is a specially arranged time constant circuit, C16 and R11, which imposes a time constant control on the grid of the valve and thus enables the impulse voltage to be retained steadily, thus operating the mechanical relays properly.

Reversal of the motor is obtained by virtue of the switch on the remote control unit, and the way in which the motor is wound. When the tuning button is again pressed the motor starts up again and the relays are pulled across again due to the rise of anode current in the valve V6.

There are two more points of particular interest about the remote control. The first is the method used of enabling stations below any desired volume to be rejected and so ensuring that the tuning motor shall not stop before a station of the desired strength level is reached.

(*Continued on page* 104.)



The radio portion of the "Aeromagic" is a four-valve superhet (less rectifier), the other two valves being taken up by the remote control circuits. The relays "A" and "B" are operated by the electro-magnet "M." The price of the set is 23 guineas.

RANDOM RADIO REFLECTIONS

By Victor King

After describing a new puzzle, our contributor goes on this week to give us some more comments from readers about "Steam Static." Then he breaks away to say a few words about Television. Professor Varrinace is taking a rest this week, but another of his problems and also a new type of brain teaser will appear in the near future.

AN INTRIGUING PUZZLE

SOMETIMES people send me things. Which is very nice. I don't think anything can be more pleasant than an unexpected gift, however small may be its intrinsic value. The wife of one "P.W." reader sent me a raisin pudding all the way from Devonshire a week or two ago. And a jolly good pudding it was, too.

I do not think, however, that the action of Messrs. Wheelwords, of 52, High Holborn, London, W.C.1, in sending me one of their intriguing and original new puzzles was quite as disinterested as that!

However, Editor permitting, I think they deserve a reward for their enterprise and even a printed expression of thanks because their "Wheelword" has provided me with several very pleasant hours of diversion.

It consists of a card having on it four concentrically arranged discs which are notched like cogwheels. On each cog is a letter. There are also other letters arranged in circles. You have to twist the discs round until five-letter words (eighteen of them) are formed all round.

That sounds easy, doesn't it? But I had to twiddle at the thing for a dickens of a time before words formed—and then there were at first only half of them! A fascinating novelty—better than crosswords because you don't have to use a pencil.

It is well worth the shilling at which it is sold through the post by Messrs. Wheelwords and I shouldn't be surprised to see the novelty achieve immense popularity.

EXPERIENCES WITH STEAM

I CERTAINLY hit the bullseye with my paragraph on the subject of "Does Steam Cause Radio Interference?" It has resulted in a large number of extremely interesting letters.

For instance, Mr. P. G. W. Walker, of Harrow, says:

"Over Christmas I was using my short-wave set at home, and was very puzzled to find that whenever one of the L.N.E.R. trains shut off steam about twenty-five yards from my room, the rush of steam from the safety-valve caused loud crackling in the phones."

Back again at Harrow, Mr. Walker finds himself 100 yards from both steam and electric trains, both of which apparently cause crackling.

That's tough, Mr. Walker, but as I don't suppose they'll move the railway, there's not a great deal to be done about it, except to keep your aerial at right-angles to the track. This should help to minimise the interference, anyway.

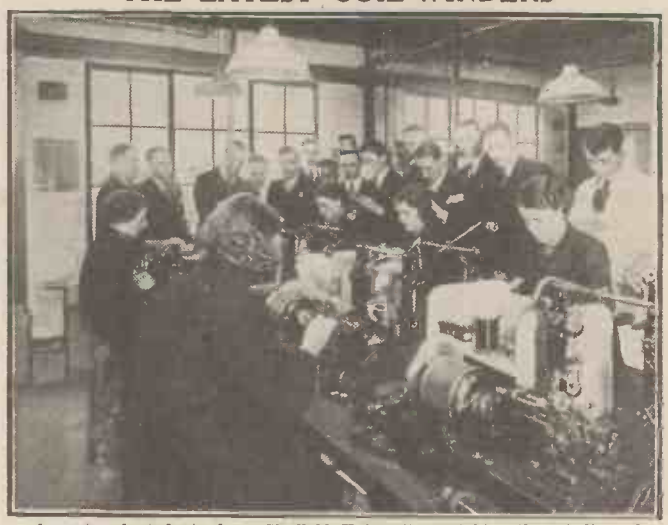
And here is a missive in lighter vein, from Mr. J. Garner, of Hazel Grove, Cheshire:

"About fifteen years ago I was working on the wiring of a new overhead electric crane in a large steel foundry in South Wales. Certain of the resistances were mounted above the controllers, the connecting cables passing through vertical conduits. After these cables had been drawn in, they were left with all ends disconnected and hanging free. I happened to touch the bare end at the bottom of one of these cables whilst with the other hand I held the steel structure work. I received quite a smart shock, and a little beauty of a spark leapt between the cable and my finger. Wondering if I really was seeing and feeling things, I asked a friend to get hold of the cable, making sure that he touched the bare part and also the structure work. Then I awaited developments, which were not long in coming! He jumped all right, as did also another fat little spark! We played about with this puzzling phenomenon for a time wondering whatever could be the cause of it, as we knew there was no electricity supply anywhere near us. Then, immediately underneath us we saw that a steam jib crane driver had elected to stop whilst he did a spot of stoking up! Puzzling phenomenon no longer puzzling."

So that's that! It now only remains for an inventor to use the effect in a good cause. What about a kettle with a self-illuminating neon lamp to show you when it's boiling?

All right, B. L. G. (Liverpool), I know you can see the steam rushing from the spout, but think how pretty a little red neon would look!

THE LATEST COIL-WINDERS



A party of students from Sheffield University watching the winding of transformers on the new Kandula machines installed at Mansfield by Whiteley Electrical Radio Co., Ltd., for their famous W.B. "Stentorian" speakers.

TELEVISION IS COMING

DO you feel excited about it? I do, and if *you* don't, maybe it's because it still all seems so much a dream of the future to you.

But it isn't. The television which will definitely be pouring into London's ether before many more months have elapsed will be the real thing, you can take it from me, and I speak "from the book."

Flickerless pictures of good detail comparable with the talkies. I visualise only one technical snag, and that is, that there may in some areas be quite a bit of electrical interference.

And instead of only hearing a motor-car pass to the tune of a bunch of crackles, as we do at present on the ordinary short waves, there will be splotches on the screen. Not so good!

However, here is a chance for our hired legislators to prove their worth. A few bob extra on the cost of a new car (and who should mind paying that?) and such interference would soon be an historical curiosity. But that won't come to pass if the authorities don't get to work.

AN AMBITIOUS SOCIETY

I HAVE been sent a whole wad of literature concerning "The New History Society," an American organisation. "Based on the Universal and Constructive Principles of Baha-U-Llah and Abdul Baha, it is consequently a *free* movement, inter-racial, international, inter-religious. The pledge of membership is "to help in the formation of the NEW HISTORY of the World.'"

Among the many things for which the Society is working are:

A co-operative system of production and distribution of all the wealth and resources of the world.

Free trade throughout the world. Free travelling throughout the world.

The same text-books for all the schools, colleges, universities and other educational institutions to be prepared by cosmic minds under the direction of a World Board of Education.

No, I am not going to laugh at this. One day, it may be in the *very* distant future, a Planned World Order will arrive and broadcasting will have done its bit to bring it about.

And I don't mean the blatant propaganda use of broadcasting for purely national purposes such as we are at present getting in large slices.

This "New History Society" may be a bit before its time, but unless there are active groups focusing on and working in the right direction it will take us all the longer to get there.

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 specialities described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

THE MATCHBOX CURE

P. W. S. (Goole, Yorks).—"Have you ever come across the matchbox cure for crackle? I found it out by accident, and it's a new one on me.

"The set used to crackle softly to itself, like an old hen, but I happened to notice that it did not seem so bad if I pushed the H.F. choke away from the screen close to which it was standing.

"Getting tired of holding them in place, I took a box of matches out of my pocket, jammed it between the two, and left it there. Since then, 'nary a crackle.'

"I don't know what Bryant and May would say about this, but it works like a charm. Can you account for it?"

It seems straightforward enough to us, P. W. S. —just another instance of poor connection. Probably one of the joints to the choke or the screen is "dry," and although it ought to be soldered or screwed down tightly the pressure of the jammed-in matchbox is enough to hold it securely.

ADDING AN H.F. CHOKE

W. D. (Dorchester).—"To get rid of a touch of instability, I want to add extra H.F. choking. Can you tell me how the choke should be wired?

"In the detector circuit there is already one H.F. choke, same make. Do I wire the second choke across this (in parallel) or at one end of it (in series)?

"In the H.F. circuit, where I suspect the trouble, there is no choke, but a resistance instead. So do I wire across this resistance, or in series with it?"

To take advantage of the impedance of an H.F. choke it must always be arranged in series with any other choke or resistance.

Just as two resistances must be arranged in series to get the sum of their resistances, so two inductances (i.e. H.F. chokes) must be joined in series, when the total inductance will be the sum of the separate inductances, providing there is no inter-coupling. But connect a bypass condenser (·0001–·0005 mfd.) from the connection between the two chokes to earth.

RESULT OF COMPETITION No. 7

Published March 14th

The original model of G. T. Kelsey's "AXIS" short-wave set (for the most interesting reason for "The Country I Want to Listen to") has been awarded to:

Mr. H. Berry, 19, Littlemoor Crescent, Newbold, Chesterfield.

DETECTOR'S ANODE CURRENT HALVED WHEN SWITCHED OVER TO "GRAMOPHONE"

E. J. L. (Ilford, Essex).—"I have a three-valve A.C. radiogram, and I find when I switch over to the gramophone the milliamps on the detector valve are cut down by half (milliamps on radio, 6; milliamps on gramophone, 3).

"I shall be very much obliged if you will kindly tell me if this is correct."

When a pick-up is arranged to feed into a detector valve grid circuit it is usual to arrange matters so that the switch-over puts negative bias on the grid of the detector. This negative bias has the effect of reducing the valve's anode current, and might well, in a given instance, result in halving the amount of current flowing, as you state.

The reason for putting negative bias on the grid is to enable the valve to act as an amplifier, pure and simple, instead of as a combined amplifier and detector—which is how it works normally when arranged for leaky grid detection.

If your detector had been working on the anode-bend principle, instead of on the grid-resistance-and-condenser principle, it would have been biased down for detection, and there would have been little change in the opposite direction when switching over to pick-up work. But all leaky-grid detectors take more current than when the valves are arranged with negative bias as L.F. amplifiers. So a decrease on switching over is normal.

LOUDSPEAKER CONNECTIONS

R. D. G. (Littleport, Cambs.).—"I am building the S.T.700 with a specified kit and specified valves except——"

[ED. NOTE.—ALL exceptions *must be* in accordance with particulars given in "P.W.," and approved by the designer.]

"I also have a Milnes M.C. speaker, which has the transformer tappings given in ohms as below:

Terminals for Low Resistance:

Plug and socket A.	1½/3 ohms.
B.	5/6 "
C.	7/10 "
D.	11/15 "

For High Resistance:

	Socket A	Socket B	Socket C	Socket D
Terminals A. & C.T.	450	1,000	2,000	3,500
" B. & C.T.				
" A. & B.	1,800	4,000	8,000	14,000
" A., C.T. & B.	(Approx. total impedance of loudspeaker)			

Now, if the ratio of the transformer were given I have learnt from "P.W." how to match it to the output valve.

(1) Does resistance and impedance of a speaker both mean the same?

(2) Should the 4,000-ohm tappings of my speaker be connected to the P.X.230, which equires an optimum load of 4,000 ohms?

(3) The impedance of the P.X.230 is 1,850 ohms. What has this to do with the above?

(4) If only the impedance of the valve were given, how should I find the correct optimum load value?

"I feel satisfied enough about my Milnes H.T. not to worry about mains. I've had the unit over two years, done all the charging myself, which hasn't cost me a penny over my usual L.T. expenditure, and have not yet changed the electrolyte."

(1) No.

(2) Yes.

(3) It has no immediate bearing on the above. What you need to know is the optimum load.

(4) The optimum load is a difficult thing to calculate, and to work out the figure from valve curves is hardly practicable to the average set-owner, so the best plan is to ascertain the optimum load figure from the maker of the valve in question.

SUPERHET ON STRIKE IN PATCHES

R. H. P. (Chelmsford).—"What do you make of a superhet that goes on strike in patches? The trouble seems to be something to do with batteries, because it never occurs till I have had the H.T. in use some weeks.

"Then the trouble begins. The first sign is that I am unable to get one little patch of wavelengths. Later, this patch grows, or another patch also goes on strike. Sometimes I have only two or three spots on the dial where the set will work, until I get the new battery.

"I have never heard of this patch-work radio before. What is it?"

The oscillator, in all probability. In some circuits the maintenance of a certain minimum H.T. value is particularly essential to steady oscillation all round the dial, and failure to get sufficient H.T. results in patchy oscillation.

This, of course, results in similar patches in reception, such as you have been experiencing.

SOLUTION OF "P.W." CIPHER No. 8

"USE CODE SIX IN ALL MESSAGES"

The Ten Shillings for the first correct solution of Cipher No. 7 examined after the closing date has been awarded to:

Mr. L. E. Snashall, 80, Crofton Road, London, S.E.5.

The correct solution appeared in our March 28th issue.

THE AERODYNE "AEROMAGIC"

(*Continued from page* 102.)

This is done quite simply by taking the static bias control of the variable-mu valves out to a variable resistance in the remote control unit, and variation of this resistance gives complete control over the strength of the station being received as well as over what might be called the pre-selection strength of any station.

By this means weak stations are not allowed to provide sufficient strength to operate the monitoring valve and the triode valve relay system, and until a station of sufficient strength *is* tuned in the tuning of the set will go steadily on. With the set at its most sensitive state, however—i.e. with the volume control at maximum—the tuning motor will stop at every station that is picked up, and will remain there until the button on the remote control is again pressed.

The second point I want to explain is the method adopted for operating the replica tuning scale on the remote control. This is merely a voltmeter with a metre scale, and it is operated by virtue of being tapped across a special winding of the mains transformer. The voltage across the voltmeter is varied by the movement of a slider on a potentiometer connected across the secondary by the tuning motor itself, and once set for the particular mains voltage of the set the voltmeter must always keep in step with the movement of the motor which tunes the main receiver. Thus when the tuning of the set is at the highest point (top of scale) the voltage tapped off for the voltmeter is at its highest. When the motor has moved the tuning to its lowest point, it has also, through its gearing, moved the slider of the voltmeter potentiometer to the lowest voltage, and the reading on the voltmeter has moved to its lowest point. In this way the remote control tuning scale is kept in exact step with the tuning scale connected directly to the tuning condenser on the set.

THE "CENTURION"

(Continued from page 97.)

connections. But I must now, and in future, make special warnings about getting the grid-bias voltages "wrong way round" and perhaps of the wrong value. If you make the output valve grid + 3 volts instead of — 3 volts you might just as well never have built the set.

The fault may arise through fitting the wrong wander-plugs on the wires; the fact that you have the wander-plugs in the right holes will then be no excuse. So always check the leads from components to grid-bias sockets.

The fault may also arise through fitting the grid bias wrong way round in the set. Always look for the positive (+) mark on the grid-bias battery and see that the G.B.+ wander-plug goes into it. The other plugs should be carefully checked. There is always 1½ volts between sockets. but there is no harm in looking at the voltages printed on the side of the battery!

You could do a lot worse than adopt as a theme song, while checking, "Where is my wandering plug to-night?"

The "Centurion" G.B. Battery

There is usually less trouble with the plugs on the H.T. battery for the simple reason that a reversed battery will result in no signals at all; but people still put 120 volts on the screen of their H.F. valve and 72 volts on the output valve. This fault may never be discovered as it only affects results instead of stopping signals. It arises through carelessness or through the wrong fitting of the wander-plugs.

By the way, the grid-bias battery of the "Centurion" is shown shortened in the blue-print; this is done so that you will get a good view of the sockets, some of which would otherwise be obscured by the turret-switch.

I have been asked to advise on the choice of a loudspeaker. This I never do. There is no reason why I should single out one from the many types available. Every firm turns out good models and it is impossible for an engineer to recommend one model when he knows the same firm perhaps produces a better model at a higher price.

The constructor should buy his speaker by ear; he should hear it and decide for himself. I have never yet recommended a specific model of loudspeaker, and never shall; the only exception is where the speaker is part of the set, as in a radio-gramophone.

(To be continued.)

"MYSTERY WEEK-END"

April 18th marks the beginning of a serialised radio "shocker" which is to be broadcast in six weekly instalments in the Northern programme. It is entitled "Mystery Week-End." The serial will deal with mysterious happenings in a lonely mansion on the Cumberland Fells; a mansion to which a number of people, all wearing fabulously valuable jewels, have been invited. The house is cut off from the outer world by an impassable ring of electric current, while within innumerable burglar alarms confront the would-be cracksman; and yet the jewels — all of them — are stolen.

ABOUT THESE PROGRAMMES

(Continued from page 98.)

(3) how it was that somebody's father heard noises which he used to talk to like an old friend. To these ends the B.B.C. lent its craftiest microphones and Mr. Harry Price, the well-known psychic investigator, his best ghost-traps, all nicely baited with starch-powder, cameras, and long-distance thermometers.

Here and there, in all the nasty dark places, hung microphones, remotely connected to listeners, like "cops" on point duty.

Now, the positive results were that they unmasked a ghostly dripping tap, and proved that in an underground cellar the temperature did not remain constant during three hours. This will probably shake modern physics to its foundations. The negative results—quite as thrilling to your spookiest as positive ones—were that none of the other gadgets caught a ghost. This proves, I understand, that not catching a ghost doesn't prove that there was no ghost to catch. You could say the same about a mouse!

So when they have swept up the starch-powder, unlocked the doors, loaded the lorry with all the spook-traps, announcers, and things, Mr. Price and the world will be left with a dripping tap and a not-over-worked thermometer. And the owner of the house and his dog will be left in peace with wind in the cellar, the ever-open door, and haunting can go on as usual. I look forward to hearing that the B.B.C. has decided to go fairy-snaring on the Hog's Back!

THE "U.S." TWO

(*Continued from page 88.*)

Two coils are required for the ultra-short waves, and these may be wound at home on suitable formers as given in the list of components. The smaller, if you wish to cover the 5-metre band, should have 1¼ turns in the grid winding and 1½ for reaction, wound with No. 24 enamelled wire in the slots provided on the formers.

This will cover the 5-metre band right at the bottom of the tuning scale, and will go up to about 10 metres. You may not find the 10-metre band at the top, but in any case I advise you to use a separate coil for covering this wavelength.

The second coil has 2 turns in the grid circuit and 2 for reaction, similarly wound to the former. With this coil the 10-metre band comes in at about 55 degrees on the dial, and the minimum is something just below 8 metres. The television "sound" transmission should just come on the bottom of the dial with this coil, and will be between the centre and the top on the smaller one.

The pin-connections used are the same as those of the standard four-pin Eddystone coils, and are as follows. The top end of the grid coil, which is the upper winding, goes to the grid pin; the bottom of the reaction coil—the lower winding—goes to the anode pin.

Now look at your coil former from the bottom, with the grid pin uppermost. The other end of the grid winding goes to the right-hand filament pin, and the other end of the reaction to the left-hand filament pin. In other words, regarding the grid pin as "north" and the anode as "south," the grid coil is across North and East, and the reaction coil across West and South.

An Important Point

The coil holder, in the set, is wired in such a way that only coils with these connections will function, and *no others should be tried.* Such an experiment might be costly.

For other wavelengths a standard set of Eddystone coils may be used, and these will cover wavelength-ranges of roughly 13–22, 21–40 and 40–75 metres with the ·0001-mfd. tuning condenser.

Actual stations heard on the set that appears in the photographs include W 8 X A I on 9·5 metres (already mentioned); several police cars in Kingston, N.Y., and other towns; an experimental transmission from the Baird station at the Crystal Palace, just below 8 metres; and well over 100 American amateurs in the 10-metre band.

As a final word, I might mention that plenty of H.T. will probably be required to make the detector oscillate satisfactorily over the whole tuning range of the smaller coil. An H.T. battery of 120 volts will be required. Aerial coupling, naturally, should not be too tight, unless an extremely small aerial is used. The best plan is to employ a reasonably large outside aerial and very loose coupling.

STILL LOOKING FOR THE IDEAL STUDIO

(*Continued from page 91.*)

that a solid construction was rather essential.

Give the engineers their due, they had very little data to go on. Experience was the main bulwark. They knew that curtains meant blasting, and that highly decorated studios gave hard and edgy results. So they set about finding a material that would be independent of frequency.

In their famous reverberation chamber the Research men tried every known commercial material. Nearly all of them absorbed more high than low notes—meaning blasting. Then they found the right stuff—ordinary ½-in. building board.

And so when Broadcasting House came to be built all the studios were lined with building board.

What Happened at Maida Vale

Much experience was gained with those twenty-two studios. And many earlier theories were upset in practice. For example, it soon became obvious that a studio designed to be entirely independent of frequency was *not* the ideal. Some extra absorption of the higher frequencies was found necessary in order to avoid harshness.

Roof suspension also came in for extra attention—so that in the revised studios of the provincial centres most of them have what is known as a suspended roof. Nearly all the Regionals have gained from the mistakes made at Broadcasting House.

Maida Vale brings us to the latest attempts to find the ideal studio. The big No. 1 studio has too big a floor space for its height, and so *that* is not ideal. Then there are the two pairs of studios. In one pair of otherwise similar studios the walls and ceiling of one are corrugated—and everyone hates the resulting "dead" effect.

In the other pair of similar studios the walls of one are non-parallel—this being called the "flat-iron" studio. No appreciable improvement has been noticed from this comic shape.

These two "terrible twins" were really designed as a gesture to acoustic developments on the Continent. The B.B.C. has proved, however, that it knows as much about studio acoustics as anyone—but its record shows there is still a lot to learn.

PRACTICAL RADIO AND ELECTRICITY

(*Continued from page 95.*)

during the night, or during other periods when the set is not in use.

This does away with the necessity of having two batteries, that is, one to run the set while the other is being re-charged.

Trickle-charging can also be carried out by utilising the ordinary household lighting circuit, a lamp being joined in series with the accumulator, as shown in the diagram. In this case, of course, the lamp will light in the ordinary way, so that it can still be used for illuminating the room. This method of charging, however, can only be employed on electric-lighting mains of the D.C. (direct current) type, and is quite unsuitable for use with A.C. (alternating current) type.

In addition, the mains have to be connected up to the battery the right way round, otherwise, instead of being charged, the accumulator will receive a reverse current and, consequently, be put completely out of action.

I WAS interested to notice that one of the recommendations made in the recently published Ullswater Committee's report was to the effect that an attempt should be made by the trade in collaboration with the B.B.C. to produce an inexpensive set. My own personal reactions to that suggestion having regard to the present low prices of sets generally is that it is something of a tall order.

Whether such a suggestion could be carried through or not I am not in a position to say. Perhaps if a "community" set at a very low price could be produced, it might do a lot still further to popularise broadcasting. And yet I wonder? Why should one necessarily assume that the section of the community that is at present set-less is unable to rise to present-day prices? After all, there is hardly a set to-day that cannot be obtained on exceptionally generous hire-purchase terms, and surely, where cost is such a vital consideration, the payment out of income system is to be preferred to a cash transaction even if a really low-priced model could be produced.

Lower Prices May Affect Performance

As a matter of fact, I have quite an open mind on the subject, and I am quite prepared to be contradicted. But I have had from time to time so many assurances from different trade quarters that 1936 prices are almost at the lowest level that is economically possible, that I view with some apprehension the prospect of still lower prices.

If what I have been told by the manufacturers is true, then must one assume that any attempt still further to lower prices can only succeed at the expense of performance? If so, then I cannot think that the idea will find favour with the listening public, or should I say with the potential listening public generally.

But if a really low-priced high-performance design can, as a result of this suggested pooling of ideas, be achieved—well, it will be to the credit of all concerned. All the same, I am still inclined to the view that hire-purchase is the poor man's salvation.

It is a controversial point, isn't it? And because of the interest which this suggestion is likely to arouse, I should particularly welcome some of your views on the matter. Do you, or do you not, think that the advent of a really low-priced "community" set would be likely appreciably to increase the popularity of broadcasting? I am most anxious to hear what you "Linkers" think about it, and I will endeavour to answer all of your letters individually. May I hope for a really representative concensus of opinion?

Two Remarkable Designs

My reference above to low prices has reminded me of two very remarkable designs that have just been released by our old friends at Southend, Messrs. E. K. Cole Ltd.

Now, I have no doubt that you are wondering why I should have referred to these new designs as "very remarkable," having regard to the standard of sets generally these days. Well, I will tell you.

In the first case I feel justified in so referring to these new models on account of their technical excellence, and secondly, because they just about take the biscuit for low prices! How else would *you* summarise a really first-class all-electric design for universal mains operation at 8½ guineas and a tip-top battery equivalent at only 6½ guineas?

From the technical details which I have before me of these new sets, I am quite convinced that they are assured of tremendous popularity. Like all Ekco sets, they are "good-lookers" with a vengeance, and if they don't serve to keep the vast Ekco organisation on day and night work in order to keep pace with orders, I will eat my hat (or at any rate, I will think about it!).

But seriously, these new sets are absolute winners, and I am glad to be able to announce that arrangements have been made for a full test report to appear in an early issue of "P.W." That report, when it appears, will tell you all you want to know about the sets technically. I certainly think that these new models are among the finest sets that Ekco have ever produced.

Service with a Capital "S"

Several readers have written in to me recently to ask if I can recommend a reliable firm that is prepared to undertake set repairing, overhauling, modernising, etc., at reasonable charges. The answer is very definitely in the affirmative!

As a matter of fact, in order to be able to give you first-hand information on this subject, I have made it my job personally to investigate the facilities and

(*Continued on next page.*)

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page* 100.)

lampe, a Fem. noun. Qualify it with an ADJECTIVE, and we have:

LA LAMPE ÉLECTRIQUE. Put into the plural, it becomes LES LAMPES ÉLECTRIQUES. Give it a POSSESSIVE ADJECTIVE and we have MES LAMPES ÉLECTRIQUES. A further addition gives us TOUTES MES LAMPES ÉLECTRIQUES (all my electric lamps)

Let us take a second example; this time a Masculine noun:

UN INSTRUMENT. Proceeding as before, we get UN INSTRUMENT SCIENTIFIQUE; DES INSTRUMENTS SCIENTIFIQUES; MES INSTRUMENTS SCIENTIFIQUES; TOUS MES INSTRUMENTS SCIENTIFIQUES.

A Small Test to Try

There is no limit to the number of such phrases you should be able to write now. Here are a few to begin practising on:

All the nation; all the nations; all the concerts; all their programmes of light music; all the press reviews; all the artistes; all our listeners; all the stations; all the radio plays; all the racing results; all the morning; all the evening; all the sporting results; all the runners; etc., etc.

The French for these is:

Toute la nation; toutes les nations; tous les concerts; tous leurs programmes de musique légère; toutes les revues de la presse; tous les artistes; tous nos auditeurs; toutes les stations; toutes les représentations dramatiques; tous les résultats des courses; tout le matin; tout le soir; tous les résultats sportifs; tous les partants.

And finally a small test, a correct copy of which I will give you next week. Note that all the nouns are the same in French except where I put them in brackets.

Translate into French:

The European situation; the national defence (la défense); all the primitive races of the world (le monde); the political decisions; all the Comic Operas; all the Italian troops (les troupes); all our relations; all his dramatic actions; all their electric machines; his automatic pistol (le pistolet); all the aggressive (agressif) forces; the Popular Front; the political situation; the Parisian Federation; the symbolical Swastika (M.); all our progressive efforts; the French Revolution; our English institutions; their expensive creations; the influence of the general civilisation; their primitive legislation; historic reality (la réalité); an English edition; the League (la Société) of Nations; the British (britannique) constitution; all our collective efforts; his massive proportions.

DID YOU SPOT IT?

Often we can learn something from a misprint. There is a first-class one in Part 8 (March 21st issue) to which I must call your attention.

For Mon ami, Louise (My friend, Louise) read MON AMIE, LOUISE. I hope you all spotted this error for yourselves. S. C. G.

THE APRIL WIRELESS IS NOW ON SALE

THE LINK BETWEEN

(*Continued from previous page.*)

service of one of the well-known firms undertaking this class of work, and I must confess that I have been agreeably surprised.

The firm in question—Messrs. Scott Sessions, of Exchange Works, Muswell Hill, London, N.10—undertake all kinds of overhauls, repairs, conversions, etc., with a thoroughness which does them credit, and if you write and state your requirements they will furnish you with an estimate of the cost without any obligation.

I was certainly most impressed with the scope of their service, and I think that the best advice that I can give to those of you who have written to me is that you get into touch with this firm. Their service covers both home-constructed sets and those of commercial manufacture, and although they will undertake practically any kind of work, may I, in fairness to them, ask you not to send them a "dust-bin two" with a request that they will convert it into a modern superhet for about 2s. 11½d.! I am afraid not even Scott Sessions are magicians.

G. T. K.

Your guide to the newest developments in the Wireless Trade.

GOLTONE ALL-WAVE AERIAL

DELIVERIES are due to commence next week of the new Ward & Goldstone "Overseas" all-wave aerial kit. This kit, which, as the name implies, is designed for use in conjunction with all-wave receivers, will cost 21s. and consists of two 30-foot aerial spans, a 50-foot length of twin feeder cable, a special coupling unit astatically wound and having three matching positions, together with the necessary aerial and stand-off insulators.

* * *

MERVYN TELEVISION SETS

Receivers and other apparatus designed specially for new high-definition Television programmes are among the latest products of the Mervyn Sound & Vision Co., Ltd.

There are two receivers. One is an eight-valve vision superhet supplied in chassis form completely assembled and tested. This receiver is entirely A.C. mains operated, particular attention having been given to the provision of well-smoothed H.T. supply. The price is £16 10s. 0d.

The second receiver is a four-valve ultra-short-wave set designed for sound reception and is supplied in chassis form completely assembled and tested. It includes valves and moving-coil loudspeaker and has a three-watt output and single dial control. As in the case of the vision receiver, it is designed for A.C. mains. The price is £9.

Other television equipment includes a double time base kit, a cathode-ray tube H.T. unit, and a control panel for use in conjunction with one of the new three-gun cathode-ray tubes.

The double time base is supplied in chassis form as a kit of parts and is partly assembled. Its price, including valves, relays and mains eliminator is £6 10s. 0d. The H.T. unit is intended for use on A.C. mains and has an output of 3,500 volts. The price is £6.

The control panel, which, as previously stated, has been specially designed for use in conjunction with the three-gun tube, consists of a potential divider with a variable tapping for the shield, variable tapping for the first and second guns, the third gun being taken direct to maximum H.T. The price is £2 8s. 0d.

* * *

ELIMINATING DROITWICH INTERFERENCE

Those who are troubled with interference from Droitwich when listening to other long-wave stations, such as Radio Paris, Luxembourg, etc., will be interested to learn that Lissen Limited are marketing a special filter to cut out this interference. It can be used with almost every type of straight receiver. The price is 5s.

The unit requires no adjustment and is connected in series with the aerial.

THE BROADCASTING REPORT

(*Continued from page* 89.)

Chancellors of the Exchequer—and all Chancellors of the Exchequer are needy—as a milch cow, a source of windfall revenue. Out of every 10s. the listener pays in licence, only 5s. 2d. went last year for sound broadcasting and its development, television, and all the various activities of the Corporation, including the special broadcasts to the Dominions and Colonies, of great Imperial importance, but for which the British listeners have to pay. It was never intended that almost half the revenue from licences should go to one or other of the Government departments. The Post Office makes a paying business of collecting the licences and the renting of land lines, the Exchequer takes a lump sum right away, and on top of this the B.B.C. pays income tax.

I myself am disappointed that the Committee did not make a stronger protest against the B.B.C. paying income tax. It means taxing listeners twice over, and most listeners are not well off. However, the financial proposals should be helpful, and, if they are adopted, the B.B.C. will get 5s. 8d. this year instead of 5s. 2d. and 6s. 5d. in 1937 and the two years following.

These are the principal recommendations of a long and able report. The Governors have made certain objections to the proposals, as was to be expected. It is to be hoped that Parliament will, however, think primarily of the listening public and that the actual recommendations which are favourable to the listeners will not only be adopted by Parliament, but be strengthened and extended.

A FASCINATING BOOK

THOSE readers, and we know they are many in number, who follow the POPULAR WIRELESS and B.B.C. cipher features contributed by Mr. Louis C. S. Mansfield, will be interested to learn that he has written a book on the subject.

Published by Alexander Maclehose & Co. at 2s. 6d., it is entitled "The Solution of Codes and Ciphers."

It is a very readable work and reveals in simple language the details of many methods of coding, and shows how even a so-called "indecipherable" cipher can be "broken down" when you know how to go about it.

Needless to say, this book constitutes a valuable adjunct to the "P.W." series, even although these are, of course, quite complete in themselves.

And we congratulate Mr. Mansfield on the production of a book which is as attractive as his broadcasts and articles, and which should prove as popular.

The facts are again proved by this work that he not only knows his subject intimately but can also impart his knowledge to others in an entertaining manner.

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MISCELLANEOUS ADVERTISEMENTS

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Minimum Charge 3/-

Remittance must accompany order.

Advertisements for these columns are accepted up to first post WEDNESDAY MORNING for the following week's issue. All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.

SOUTHERN RADIO'S WIRELESS BARGAINS. ALL GOODS GUARANTEED NEW AND SENT POST PAID.

SPEAKERS.—Celestion Soundex Permanent Magnet, 11/-. Telsen Speakers Units, 2/9.

LISSEN KITS, ALL NEW, IN SEALED CARTONS AND COMPLETE.—With specified Valves; Lissen Skyscraper 3-valve Battery Kits, 42/- each. (List 77/6).

G.E.C. A.C./D.C. Mains Three-Valve Sets. Complete with three Osram valves, in exquisite Bakelite Cabinet with Osram Moving-Coil Speaker. Ready to plug-in to any mains. Universal voltage. Brand-new in sealed cartons. Fully guaranteed, £3 19s. 6d. each (List £7 15s. 0d.).

HOUSE TELEPHONES. A SPECIAL BARGAIN. BRAND-NEW ONE-HAND TELEPHONES.—Complete on stand, with or without Automatic Dials. (Cost £4 each to Manufacture) 10/- each.

ELIMINATORS.—Regentone 1935 Series. A.C. Mains 200/250 volts, Type W5a, complete with trickle charger, 39/6. W1a (less trickle charger—carries 30 milliamps.), 33/-; W1c (less trickle charger), 30/-. All in sealed cartons.

COILS.—Varley Square Peak Coils, B.P.5, complete, 2/3. Telsen Iron-Core Coils, W.349 midget size, 4/6 each.

MICROPHONES.—ACE P.O. Microphones, complete with Transformer. Can be used with perfect efficiency on any set. 5/- each.

AMERICAN VALVES.—A full-range of valves for all American sets at 7/- per valve.

SOUTHERN RADIO BARGAIN PARCELS.—We are offering the following parcels of mixed components at a fraction of their value. The items comprise up-to-date Radio parts, new and perfect, which are too varied to be advertised individually:

5/- PARCEL.—Contains modern components valued at 20/-, including Resistances, Condensers, Coils, Wire, etc. Circuits of modern Receivers included with each parcel.

SOUTHERN RADIO Branches at 271-275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All Mail Orders to 323, Euston Road, London, N.W.1. **SOUTHERN RADIO,** 323, Euston Road, London, N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

VAUXHALL. J.B. Square Plane Dial and Drive, LARGE Oblong Scale, Bronze, complete with Station Named Scale, 5/-.

VAUXHALL. T.C.C. condensers, 4- or 8-mfd. dry electrolytic, 500-v. working, 2/6; 550-v., 3/-.

VAUXHALL. Polar Midget, 3-gang condensers, straight or superhet, 8/9; Polar full vision, horizontal or Arcuate dial and drives, 4/6.

VAUXHALL. Dubilier condensers, tubular non-inductive, 0·1, 6d., 50-mfd., 50-v. working, 1/6; 50-mfd., 15-v., 1/3; 0·05, 6d., 0·002, 0·0002, 0·001, 0·0001, 4d. each.

VAUXHALL. T.C.C. mica, 0·002, 2,000-volt test, 1/-; 0.0001, 4d.; 0·001, 0·01, 1/-; 1-mfd. Mansbridge, 1/3.

VAUXHALL. Resistances by well-known manufacturers, 1-watt type, 6d. each; all values.

VAUXHALL. Clix valve holders, terminals, 7-pin, 9d.; 5-pin, 7d.; W.B., 5-pin, 4½d.; baseboard mounting, 6d., post paid, 2/6 or over, or C.O.D.

VAUXHALL UTILITIES, 163a, Strand, W.C.2, over Denny's the Booksellers. Temple Bar 9338. Send postcard for lists free.

TELSEN, 12/6 R.G.4 4/1 L.F. Transformers, 2/6 each, carriage paid. All Guaranteed New.—Jackson, 206, Walkden Road, Worsley, nr. Manchester.

A THOUSAND BARGAINS. MAINS TRANSFORMERS, M.C. SPEAKERS, MAINS VALVES, SHORT-WAVE GEAR, CABINETS, Etc.

PREMIER SUPPLY STORES

20-22, HIGH STREET, CLAPHAM, S.W.4. SEND 3d. STAMP FOR CATALOGUE.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.
(Continued)

BANKRUPT BARGAINS. List free. Mullard M.U.35 6v. A.C./D.C. superhets, £5 against your old set. Alba S.G. pentode, battery 3v., M.C., batteries, 67/6. Cossor D.C. 3v. S.G. pentode, M.C., £4 5s. Many others. Large stock components. Write for quotation for requirements.—Butlin, 6, Stanford Avenue, Brighton.

HEADPHONES. Brown, G.E.C., B.T.H., Nesper, Sterling, Siemens, Brunet. 2,000 ohms, 2/6; 4,000 ohms, 5/-. Postages 6d. Crystal sets; G.E.C., Brownie, etc., 5/6. Crystal detectors, complete parts, 1/-. Satisfaction guaranteed.—Kodesh, 56, Barnsbury Street, London, N.1.

ALL goods advertised in last week's issue still available.
WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

G.P.O. Surplus Condensers. 2-mfd. 800v. wkg., 2/3; 4-mfd. ditto, 3/9; 2-mfd. 1,000v. wkg., 3/3; 4-mfd. ditto, 4/9. Postage 4d. or C.O.D.—De-Ware, 364, Fulham Road, S.W.10.

10/- C.O.D. "Miracle" All-world 3-valve Radio. Complete kit, full instructions. America guaranteed. Genuine offer. Meade-Taylor, 87, New Oxford Street, London, W.C.1.

NEW RECEIVERS, COMPONENTS, ACCESSORIES, &c.

ALCO eliminators and chargers. 4 H.T. taps, 120/150 v. 20/30 m.a., 18/-; with charger, 25/-. Charger alone 7/6. ½ amp., 11/-. Westinghouse rectifiers. Year's guarantee. Complete. Lists free. P. & D. Radio, 1, Goodinge Road, N.7.

30/- SHORT-WAVE Converter-Adaptors. Guaranteed. Metal Cabinet. Kits, 20/-.
W.L.S. 4-valver Kit, 20/-. Lists free. — Bennett Television Co., Redhill.

MISCELLANEOUS

LOUDSPEAKERS REPAIRED, 4/-. Blue Spot a Speciality. Transformers and Headphones, 4/-. Eliminators, Mains Transformers and Moving Coils quoted for. 24-Hour Services. Trade Discount. Clerkenwell 9069.—E. Mason, 44, East Road, London, N.1.

WANTED, good modern second-hand Sets, Parts, etc. Spot cash paid. Highest part-exchange allowance in the trade. Bring or send. University Radio, Ltd., 142, Drummond Street, London, N.W.1. Nr. Euston Station (L.M.S.).

HIGHEST part-change allowance. Get my quotation first (by return).
SATISFACTION guaranteed. Timmis, Radio Shop, Buerton, Audlem, Crewe.

SITUATIONS VACANT

INSPECTORS, POST OFFICE ENG. DEPT. Pay £3 15s. rising to £7 per week, with Pension. No experience required. Ages 17-23. For full details apply:
B.I.E.T. (Dept. 568), 17, Stratford Place, W.1.

POST OFFICE ENGINEERING. Excellent openings for youths and men under 30. £4 weekly at age 17 and no experience required. Free details of vacancies, etc., from N.I.E. (Dept. 606), Staple Inn Bldgs., High Holborn, W.C.1.

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GOOD GARDENING

April Number, obtainable from all Newsagents — 6d.

POPULAR WIRELESS, April 11th, 1936.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

BROADCASTERS ON BICYCLES

(EXCLUSIVE ARTICLE ON PAGE 112)

Popular Wireless & Television Times

JOHN SCOTT-TAGGART CONTRIBUTES TO THIS ISSUE

EVERY WEDNESDAY PRICE 3D

No. 723.
Vol. XXIX.
April 11th, 1936.

Also This Week:

HENRY HALL'S "YOUNG LADIES"

By ALAN HUNTER

THE PĒZOGRAM

A highly efficient electrical reproducer—amazingly simple

MODERN TUNING

J. C. Jevons describes the latest technical developments in visual methods

PALESTINE IS NOW ON THE AIR

FRENCH MIKES INVADE LONDON

A FAMOUS SINGER

Our cover photograph this week shows Richard Tauber, world-famous singer and Parlophone artist, listening to one of his latest records on his H.M.V. radiogram.

POPULAR WIRELESS AND TELEVISION TIMES

Editor: G. V. Dowding Asst. Editors: A. J. Randall, K. D. Rogers

UNWELCOME TRAMS STOPPED WORLD'S WORST

RADIO NOTES & NEWS

BLACK FOR L.S. EXCELSIOR.! IT'S A BOY!

Rounding-off Italy's Regionals

THE opening of the new Italian regional station at Bologna this month (planned for April 21st) will see the rounding-off of the Italian regional scheme which has so greatly improved that country's radio in the past couple of years.

I have not heard what wavelength will be used, but the power will be 50 kilowatts, and it is hoped that Marconi himself will be persuaded to perform the opening ceremony. There was a proposal to call the station after him, so if you pick up an announcer styling his station "Radio Marconi" it will be the Bologna transmitter you are listening to. Bologna will be linked for normal programmes with "Milano, Torino" and Co.

Unwelcome Little Strangers

A CERTAIN amount of peeve and pique is spreading among owners of all-wave receivers, who find intruders on the short-wave sections of their new toys. In the neighbourhood of 42 metres there are three intruders who have no right to the wavelengths they have commandeered, and who bawl out on full power with complete disregard for the rightful owners of the wavelengths they use.

One of these miscreants appears to be advertising a drug store, and it is to be feared that if somebody made a mistake with the store's "Poison" bottle there would not be undue lamentation among the unwilling listeners.

The European Licence Lead

THE recently published figures of the number of radio licences in force in Germany on March 1st did not, as I feared, show that Britain had lost the lead she has held so long. But, oh, boy, what a close call!

The respective figures are as follow: Germany, 7,524,010; Great Britain, 7,573,793. That is to say, Britain had a margin of only 49,783 in hand at the beginning of March. Considering how quickly Germany has been overhauling us of late there is but little doubt that when the April 1st figures are made known it is Britain who will be the April Fool.

Radio Stops the Trams

MANY listeners are condemned to live on a tram route near which listening becomes almost intolerable while a tram goes by. They will be interested in the goings-on at Goerlitz, Prussia, where similar conditions prevailed. One listener there played a trump card by complaining that the trams were so noisy that he could not even hear Herr Hitler's microphone speeches.

As a result of this shrewd complaint all the trams in that street have to stop running while the Leader is speaking.

Scotland's Improved Service

MY mail from Scotland contains a number of inquiries about the results to be expected from the new Burghead station; and my eyes are being opened to the deplorable service which some Scottish listeners have been getting hitherto. To them Droitwich, their National transmitter, is a mere geographical name like Tokyo or Tahiti—remote, aloof, over the hills and far away.

Not until Burghead starts roaring will they know what broadcasting should be. The B.B.C. will provide that station with "plenty on the plate," and though I do not know on what wavelength he will spread his 100-kilowatt porridge it will surely be the best radio fare that the Highlands have yet been offered.

World's Worst

WHEN I raised my voice against the suggestion that wireless operating was nowadays merely clerical work, I little guessed that one result would be that Arielette's foreign stamp collection would go ahead in leaps and bounds. Yet so it is, for I am getting letters from places I never heard of, bearing stamps that are chromatically worthy of a national art gallery.

One correspondent (who, lucky chap, is en route to the Panama Canal via Hong Kong and Yokohama) writes from Singapore to say, "When I settle down ashore all I ask is a chicken farm and the S.T.500."

Another cheery soul has found the world's worst station, out Valparaiso way. Listed on 600 metres, this bird works on about 1,300 metres, siestas permitting. This peculiarity could be forgiven him, but the real snag is his Morse—a blend of dot, dash, and rumba.

Short-Wave Blankets

MY recent note on the Short-Wave Mystery which blankets out reception at times has brought me some interesting letters, including one from J. W., of Southampton. He passes on some information which relates these peculiar radio silences to magnetic storms and the aurora.

(*Continued on next page.*)

"I WANT TO SING A TORCH SONG"

Sidney Torch, whose signature tune is given above, is well known for his records and broadcasts, and is now the organist at the recently built Regal Cinema at Edmonton. Here you see him at the console of the organ there.

NEXT WEEK'S PRIZE—A "SENSITY SUPER" KIT

A CHANCE FOR BUDDING RADIO ENGINEERS

This information includes the forecast that another short-wave silent period will take place on or about April 8th. So if you are not going to be busy with Easter preparations it might be a good idea to investigate this blanket business. For further details see W. L. S.

World's Noisiest Fan?

WHEN I say "fan" above, I do not mean the word to bear its usual radio significance—viz., fanatic, or enthusiast. I mean, instead, the artificial breeze-inducer, the rotary draught-dispenser, the bladed aid to coolth; in short, the *electric fan*.

In connection with the recent international conference on electrical interference, experts were asked to study vacuum cleaners, flashing signs, hair-driers, refrigerators, electric irons and other noise-makers, to find the Worst Ever. And the most noisome and pestilential producer of disharmony among the smaller apparatus was found to be a certain small electric fan.

(If the late Danté had been an electrician, that fan would have been his idea of Inferno.)

You will be glad to know that after measuring the row it caused, one of the engineers—a brawny Scot—took the darned thing aside and hit it a crack with a sledge-hammer. He dented the anvil, but, verily, he had his reward in the silence that ensued. We shall never hear *that* one. . . .

Black for Loudspeakers?

DON'T you think that we ought to buy black for our loudspeakers? Listen to the news bulletin any evening and you'll agree that any brighter tint is out of place.

To begin with, there is a request for witnesses of this or that accident to call up the police. Unlucky individuals are also asked to drop everything and hasten hither or thither, to see somebody unluckier still. We learn that ridges of high pressure are moving with fell intent towards us. All this is a fitting prelude to the NEWS. . . .

Dropping his voice to a sympathetic murmur, the announcer commiserates with us upon what is happening abroad, Uncertainty in Paris, trouble in Berlin, perturbation in Poland, vexation in Vienna, and dolorous doings in Danzig.

Then follows the war, strike news, Budget fears . . . and "The following S O S has just been handed in."

I sometimes think that the greatest man in radio was the fellow responsible for the "OFF" position of the switch!

The Water Index

SIR STEPHEN TALLENTS, the B.B.C.'s Public Relations Officer, told a Sheffield audience an interesting fact recently.

He said that the B.B.C. had heard from a water engineer who supplies a city of a quarter of a million people, and this expert can tell when an outstanding broadcast is in progress by the amount of water supplied. He drew up a graph showing the outfall from the city's main reservoir, and it shows a sudden drop when an outstanding broadcast begins, because nobody washes or cooks, or baths the baby at such a time.

On the occasion of the marriage of the Duke and Duchess of Kent, for example, hardly a housewife turned a tap on until the ceremony was ended.

THE CUP FINAL

April 25th will be a red-letter day among football fans and millions of sets will be tuned to the broadcast of the F.A. Cup Final to be held at Wembley Stadium on that day.

The finalists this year are Arsenal and Sheffield United.

Sheffield United are also in the running for promotion into the First Division and it will be a great feat on their part if they should win both the Cup and promotion in same year.

* * *

Although the season will be over, football fans will be able to listen to the international match between England and Belgium at Brussels, on May 9th. The B.B.C. has arranged to send a commentator to Brussels and, through the co-operation of the I.N.R., will broadcast a running commentary on this match.

A good deal of excitement attaches to the visit of an English football team to the Continent. As football originated in the British Isles, all Continental nations take great interest in trying to beat visiting English teams. The atmosphere pervading these encounters is always pleasant, because the Continental team never grouse when they are beaten by an English eleven and the English team gets no kudos for doing so—but should the Continental team prevail, enthusiasm knows no bounds.

"Excelsior"—Up to Date

THE shades of night were falling fast, when through an Alpine village passed, a youth, who bore upon his back, a compact little wireless pack.

He took it to the mountain top, where they were trying hard to stop the loss of life when snowfalls shut the mountaineer in Alpine hut.

Short waves are used; and it's been found this radio scheme is very sound; for when a party's in distress, they now can send an S O S.

All honour to the Alpine Club, who place the radio and grub where helpless souls who have been lost can find it when they need it most.

Chance of a Lifetime

BOYS on the look-out for a wireless career are afforded a fine opportunity by the present expansion of the Royal Air Force. Eight hundred boys will be required in August for training as aircraft apprentices, and another two hundred in September as Boy Entrants. The aircraft apprentices get three years thorough training at a technical school, and then go into the highly skilled trades (including wireless operator mechanic) on the highest rates of pay. Boy entrants also get sound training as wireless operators.

Applicants for apprenticeships must be at least 15 but under 17, on August 1st, 1936; boy entrants, between 15¾ and 17¼ on September 1st. Full particulars from the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, London, W.C.2.

Cubic Radio

WHAT must surely be the smallest transmitter in the world is now undergoing its tests in the N.B.C. laboratories in New York. The officials there, having successfully produced a micro-wave set which can be carried in an overcoat pocket, are turning their attention to a compressed version which weighs less than 1 lb. and is enclosed in a three-inch cube.

The diminutive valve used is of the "acorn" type, and the power is ·0002 kilowatt. Everything is in the cube except a small 90-volt battery and two ten-inch rods which screw in to act as the aerial system. It is reported that a range of several miles has been obtained with one of these pigmies. Engineers say that the main trouble with this kind of station is that you can so easily lose the darned thing!

It's a Boy!

NOTHING new under the sun be blowed—here's a Small Heath listener putting a new one across me! He was expecting to become a Daddie in the small hours of a recent morning, with the doctor upstairs, nurse bustling about, and a general air of "You-get-out-of-here" wherever he went. So what does he do but turn on the radio and find a new short-wave station testing?

His letter is not a clear guide to what happened, for about half way through it he gets a slap on the back—"*It's a boy!*"

Like a sportsman he attempts to finish his letter to me, but the ending is incoherent, and I'm not sure whether the station is "strong and clear" or whether that refers to the vocal première of Young Hopeful upstairs.

It's grand news anyway—we shall have to think about getting a kilo-cycle for the *bambino* born under such happy auspices.

ARIEL.

THE "CENTURION"

Here is the third of the special articles on the installation and operation of our great new three-valver. In it is commenced the description of the handling of the controls

By JOHN SCOTT-TAGGART, M.I.E.E., F.Inst.P., Fel.I.R.E.

A CENTURION was a Roman officer in command of a hundred men. The idea of calling this set the "Centurion" came from the fact that it would command a hundred stations. The dial actually lists more than a hundred because different stations come in better at some times or in different places. For example, the Scandinavian stations become increasingly strong as one goes up the East Coast of England and Scotland.

Generally speaking, a log of 60 stations is obtainable everywhere and without difficulty, but having got those stations you will find others "popping up like corks." And then you will appreciate a dial with full accommodation for all the stations you can get.

The tuning of the set is a very simple matter but calls for a little practice if the best results are to be obtained. A study of the control knobs, their positions and functions is the first essential. Have a look at the accompanying photograph. The wave-change switch on the left puts you on the long waves when the switch is turned clockwise (towards you). When turned away from you the switch puts you on the medium waves.

On the side of the set to the right is the turret switch. When turned fully towards you (anti-clockwise, looking from the side) the set is "off." If you now turn the turret switch knob half-way (away from you, of course) the set will be switched on to High Selectivity.

You use this position when you require maximum selectivity, but signals will not come in as loudly as when the turret switch knob is turned fully round (away from you). This "full-strength" position will, however, give poorer selectivity but you would use it for daylight reception of distant stations, for weak stations and when first trying out the set.

There Are Two Tuned Circuits

When I say that the set gives weaker signals on the High Selectivity half-way position of the turret switch, I do not mean that signals are weak. But you will require to tune accurately and to apply reaction to bring most of the signals up to full loud-speaker strength. This is exactly what I want to make you do, because these are the very conditions for selective reception.

The next two knobs I would like you to study are the main tuning knob (which has the long pointer) and the Aerial Balancer knob. The "Centurion" has two tuned circuits, a so-called aerial circuit and an anode circuit. The latter is the all-important one and is tuned by the main tuning knob. The aerial circuit is tuned by the aerial balancer which, however, has no need to be calibrated or even looked at when tuning it.

Adjusting The Pointer

The procedure is to turn the main tuning pointer till it comes opposite the name of one of your local stations. The aerial balancer will then be turned until you hear your local at its loudest. It will probably be very loud indeed and as the signal will be too strong it will be distorted. You should therefore turn the turret switch half-way (High Selectivity position), and re-tune, applying reaction if necessary.

It is unlikely that the pointer will point exactly at the station name of your local. If it points to the left of the station name, turn the main tuning knob right round to the right and then gently continue turning the knob. This will cause the knob to slip on its shaft to which it is secured by the grub-screw which, however, will permit a little slipping if the knob is forced as directed.

You now go back and tune in the local, and the pointer will probably now point at the station name. Perhaps you have overdone the forcing and the pointer may now point to the *right* of the station name. You now turn the knob completely to the left and force the knob a little to the left.

If, in the first place, the pointer points to the right of the station name, you likewise force the knob to the left.

After one or two trials the pointer can be made to point at the station name. Absolute accuracy is quite unnecessary as the other station names on the dial, although approximately in their right places, will not be exactly correct. This is due chiefly to slight differences in coils and condensers and is the reason for the "dot-lines" which provide an ideal way of achieving absolute accuracy of calibration.

You will find two semi-circular lines between the medium and long-wave station names. These I call the "dot-lines." The upper line is for the medium-wave stations, while the lower line is for the long-wave stations. Having accurately tuned in your local medium-wave station, you put a dot in pencil on the upper dot-line where the pointer crosses the dot-line.

This dot is then joined by a pencil line to the end of the printed name of the station you are receiving. You can always go back now to this station by turning the pointer till it crosses the dot you have made.

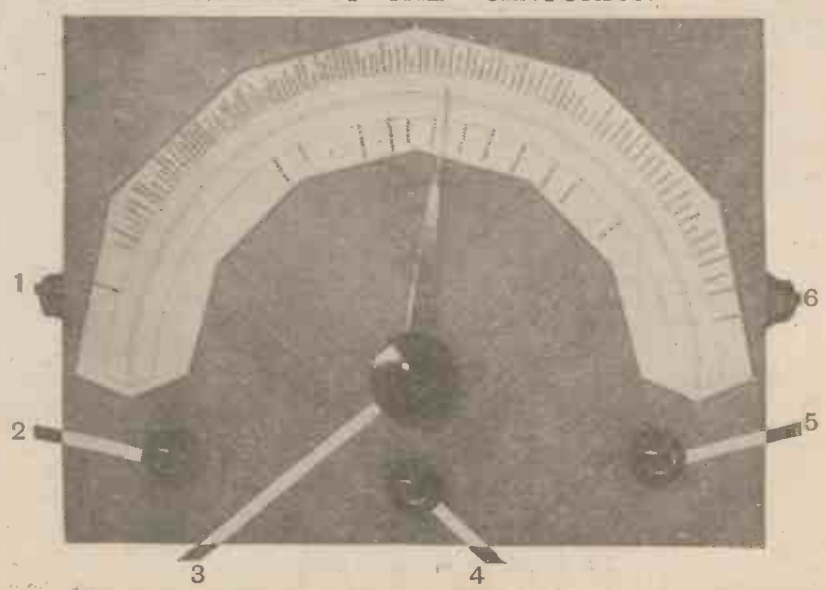
Here I may say that it is better to apply the dots under actual and best receiving conditions which, on account of the brim-full nature of the ether, means under selective conditions, i.e. with turret switch half-way (High Selectivity position) and critical reaction. Moreover, under these conditions the tuning on the main tuning control will be sharpest and the dot may be most accurately placed.

Start Logging At Once

I cannot too strongly urge you to start logging from the moment you start working the set. Get half-a-dozen stations "dotted" and you will find the others falling into place

(*Continued on page* 132.)

CONTROLS OF THE "CENTURION"



The numbered controls of the "Centurion" are: 1, wavechange; 2, aerial balancer; 3, main tuning; 4, reaction; 5, volume control; 6, turret switch.

BROADCASTERS ON BICYCLES

DID YOU KNOW THAT QUITE A NUMBER OF OUR BROADCASTING STARS ARE KEEN CYCLISTS? WE CAN ASSURE YOU THAT THIS IS SO, AND BELOW YOU WILL FIND A DESCRIPTION OF SOME OF THEIR ADVENTURES

By Sam Heppner

HE CYCLES TO THE B.B.C.

Patrick Waddington uses his cycle practically every time he goes out, including journeys to the B.B.C. He finds it convenient in London owing to the readiness with which he can nip in and out of traffic.

"IT was on a bicycle," said Miss Grace Stebbing (fiery critic of the modern girl), who died very recently at ninety-five, "that the young girl from the age of ten, and even less, first began to leave her mother and get out of her control . . ."

In a song publisher's office, a day or two ago, somebody introduced me to a radiantly pretty young woman who, unhandicapped by the questionable virtue of being modern, manages to career round the countryside on a bicycle and conceal its pernicious influence remarkably well. Most of us are familiar with the hollow gape of the drug addict, the chronic unsteadiness of the tippler; but whatever the outward symptoms of habitual bicycling may be, they have evidently spared this ardent young sportswoman as yet. Judge for yourself, for you've probably seen her. If not, it's ten to one that you've heard her; for the young lady in question is Hildegarde, the cabaret artist and radio star.

In the South of France

She indulges in this means of travel mostly in the South of France, and will often cover the hilly run from St. Jean de Luz to Biarritz, sometimes proceeding across the Spanish border, undismayed by frequent spills and the inquisitiveness of gendarmes. But she is not the only radio star who favours this method of transport. You would be surprised at the number who travel on two wheels.

The man who was the youngest cyclist in England forty years ago is now a very great favourite on the air: Walford Hyden. At the age of three and a half he rode a bicycle which his father had made specially for him. Even to-day he has not lost the thrill.

Stainless Stephen, the Sheffield humorist, has often come to a sudden full-stop (exclamation mark) while pursuing this jolly sport and, at the age of fifteen, rode from Sheffield to London, a distance of 172 miles. Two years later he won the Sheffield Road Club Gold Medal by covering 182 miles in twelve hours. Before the war he won several events on Northern roads, and in 1921 began to ride again. He set up a record from Sheffield to Bridlington in 4 hours, 52 minutes; and, later in the year, did 360 miles in the North Road 24-hour event. He may still be seen pedalling furiously down the streets of Sheffield, and at Radiolympia last year he did a slick bit of work by getting Frank Southall to appear in "In Town To-night" immediately after his great London-to-Brighton-and-back record.

Accidents at the Theatre

When Patrick Waddington appeared in the Daly's revival of "The Belle of New York," in 1930, he played the part of the gay young man who, on reaching his majority, sends his birthday-party guests stampeding by careering among them on a bicycle. Every night he made this appearance on a lovely green two-wheeler, and when the show toured and Pat began to work in strange theatres, he crashed twice across the footlights through being unaccustomed to the width of the stage. The first time he fell on the conductor, and the second time it was the poor drummer who suffered. After these accidents he made a point of rehearsing the bicycle act at each fresh theatre on the Monday mornings of arrival in the town.

According to the programme the machine had been "kindly lent" by a certain manufacturing company, which surpassed its original kindness by actually giving the bicycle to Pat at the end of the run.

He put his bicycle in the cellar, and when late for an audition at the B.B.C. one day, it struck him that he could nip in and out of the traffic more rapidly on his bicycle than in a taxi. So he withdrew the bike from its exile and sallied forth merrily in the direction of Broadcasting House. At first he rode only to the B.B.C. on it, but eventually succumbed to its fascination so completely that he began to use it for all purposes.

Upset in Covent Garden

On one occasion he was speeding from the B.B.C. to attend an audition at Drury Lane and, through taking a corner too sharply in Covent Garden, collapsed gracefully in a heap of decaying vegetable produce indigenous to this neighbourhood.

On reaching the theatre all the people at the audition agreed that the presence of half-a-dozen polecats (with, perhaps, a skunk and a ferret thrown in) would have been infinitely preferable to dear Pat's charming society at that time. Half-way through his number he did an elaborate faint in the middle of the stage.

(*Continued on page* 129.)

STAINLESS STEPHEN

Stainless Stephen, that popular broadcasting comedian, has been a keen cyclist since the days of his boyhood. At the age of fifteen he rode from Sheffield to London, a distance of 172 miles.

ON THE SHORT WAVES

USING YOUR SPARES

W. L. S. tells you how you may use a number of your existing parts to form an efficient short-wave layout.

FOR some weeks past there has been a sort of vague undercurrent in my correspondence. Every now and then this occurs, and I notice a similarity in several of the letters I receive each week. Now there is no doubt about it.

The question that I am asked more than any other, in various forms, is this: "Will you give me a circuit of a two-valver (or three-valver) in which I can use up the following parts?" And then follows a list of bits and pieces of multifarious types.

Other letters say, "More standard baseboard layouts, please, using four-pin coils this time." If ever there was a case of letting one letter answer another, this is it, and I am therefore coming on to the subject of this "standard baseboard" business once again.

Although it seems hardly any time since I first evolved this simple scheme, I find, to my considerable surprise, that it started in the issue of September 8th, 1934—more than eighteen months ago. Since then, "P.W." has collected a large number of new readers, and most of the issues concerning the standard layouts are now out of print.

The Main Components

In any case, they made provision for the old two-pin plug-in coil, which is now as dead as a doornail for short-wave work. I have accordingly worked out a new arrangement which is, I think, within everyone's capabilities, and it is shown, in single-valve guise, on this page.

The main components on the baseboard are three valveholders, the first of which serves as a coil holder, and the reaction condenser. On the panel are two condensers, a ·0001 with a plain dial, and a ·000015 band-spreader with a slow-motion drive of some kind.

The baseboard is metallised, and many of the earth-return connections are taken direct to the metallising. The unconventional position of the reaction condenser—tucked away at the side—makes for extremely short wiring in the anode circuit, and also gives a very comfortable operating position, once you have become used to it.

Don't take too much notice of the wiring this week, because it is not everyone that wants to build a straightforward single-valver. What I want you to notice is the layout of the parts, and the fact that you may use up any old parts of your own, so long as they are reasonably efficient.

Your band-spreading condenser may be home-made from one of the many "recipes" that I have given from time to time. Your ·0001's may be double-spaced ·0005's; your neut. condenser may be a home-made air-dielectric "trimmer."

The valve holders should be reasonably modern, especially the one intended for use as coil holder. This should on no account be of the "wobbly" type.

Keep Condensers Close Together

Don't space your two tuning condensers out so that they are nice and symmetrical on the front panel. On the contrary, they should be as close together as possible. Symmetrical appearance is as nothing compared with short and direct wiring. Incidentally, the front panel should preferably be of plain wood or bakelite. I do *not* like metal or metallised wood for the job.

Now you can look over the wiring and note the very direct leads in the H.F. circuits. A tag-type grid condenser joins the grid terminals of the valve holder and coil holder. The two anode terminals are directly connected by a short piece of wire.

The low-potential end of the reaction coil goes straight to the reaction condenser, and the low-potential end of the grid coil straight down to earth, in between the valve holders.

An Alternative Scheme

If you're of an ingenious turn of mind, you can even improve upon this by using something of the kind shown on the next page. In that case the two valveholders (or valve and coil) are mounted "back to back," which shortens the leads still more.

When you have handled the number of different short-wave receivers that I have, you will begin to appreciate the enormous difference that the length of these leads makes. It is important on 50 metres, but by the time you get down to 10 metres it is absolutely *vital*.

The set of this week, as it stands on the baseboard, is almost a replica of the one and only single-valver. The circuit is the same; practically the only difference is that it provides for the use of modern coils.

Incidentally, the coil-holder is wired for the use of "Eddystone" coils, or of home-made coils with the same pin-connections. The grid coil goes across the grid pin and one filament pin, and the reaction coil across the anode pin and the other filament pin. You will see which filament-pin is which by referring to the diagram.

Several Circuits to Follow

Obviously, if you have a set of coils with some other connections, you will simply wire up your coil-holder accordingly. Remember, though, that it may be preferable to turn it round in some way, so as to make the grid and anode leads as short as possible.

If some readers are fortunate enough to have a metal box, with a panel about 12 in. by 7 in., and about 8 in. or 9 in. deep, they may mount their components therein, instead of using a baseboard. I am going to give quite a number of circuits, but none of them will involve the shifting of any of the parts shown in this diagram.

An L.F. transformer, or a collection of resistances and condensers, may have to be added for some of the arrangements, but none of the parts now shown will be rehashed or reorganised.

I strongly recommend you to get this single-valver going first of all, and to play about until you get really good signals with it. Then, if you add your L.F. stage in a week or so, you will have a set that really *will* bend your ear-drums, as any short-wave two-valver should do.

But no matter what you add later on in the form of L.F. amplification the whole crux of the set will be the detector stage. That has simply *got* to work efficiently, so get on with it now and make absolutely sure it is working properly before you attempt any additions.

A NEW W.L.S. LAYOUT

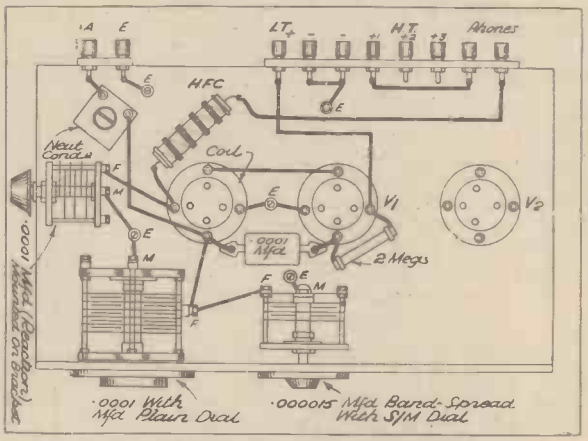


Fig. 1.—A very neat short-wave layout. It is shown here in single-valve guise, ready to have an L.F. stage added to it.

ON THE SHORT WAVES.—*Page 2.*

Points from the POST-BAG

G. W. G. (Ipswich) reports 10-metre conditions really excellent, and the 20-metre band alive until after midnight. The latter is very abnormal; I have been hearing Americans until 2.30 a.m. on 20 metres, and cannot remember it ever having happened before.

D. F. (Staines) recently inquired about the wavelengths of Burnham and Humber. D. W. (Hinchleywood) quotes them as 170·4 metres.

Size of Band-spreaders

W A. G. (Stoke-on-Trent) brings up a query about band-spreaders. What size, and where does one get them? I find ·000015 about the most convenient size, and these are obtainable from Eddystone and Jackson Bros., to mention the first two firms that come to mind.

R. W. (Worksop), who recently queried the identity of certain stations, now supplies the answers himself. X–U O U S is the Soviet motor ship "Emba." Z Z 2 A is an American merchant ship with a "pirate" "ham" on board! X–Z A 1 C is an Albanian amateur—probably the only one in that country.

F. J. W. (Rickmansworth) wants me to describe a good short-wave detector for connecting to the pick-up terminals of a broadcast receiver. I hope to cover this whole subject of coupling to amplifiers in an early issue.

E. W. (Bexleyheath) has built up a single-valve set which brings in quite a few stations (including Americans) *without an aerial*, but which packs up immediately an aerial is connected to it! I should imagine that the neutralising condenser in his aerial circuit is shorting, either internally or on to the baseboard. Have a look at it, E. W.!

"Simplex" Two Praised

J. B. (Stevenson) has made up F. J. F.'s circuit as shown in the March 14th issue, and his comment is "Glory be! It does all that is claimed for it!" He used the "Simplex" Two layout, and is more than pleased with things. Others please note.

W. E. W. (Wotton-under-Edge) raises a query about mains hum. When his set is not oscillating, hum is practically *nil*; but just before and after oscillation point it appears. He is talking about a "battery" set run from a mains unit, so the only thing I can think of is insufficient smoothing. Another choke between the mains unit and the set, with 4 mfd. or so down to earth, ought to put things right.

F. H. (Hall Green) has built the "hot" one-valver recently described, and doesn't find it so hot as it ought to be. He mentions an effect that has me completely beaten. The tuning condenser, he says, refuses to work from 50 degrees to zero with one particular coil; but the band-spread condenser *does* work!

In other words, D J A or G S B can be tuned in on the band-spreader, but it doesn't matter where the main tuning dial is set. I can't understand this at all; it's not a circuit fault, though—of that I'm certain.

R. W. H. (Islington) has built a set, the circuit of which is a combination of several different diagrams that I have published from time to time. It uses a screened-grid detector, resistance-coupled L.F., and resistance-fed transformer-coupled output stage. This happens to be a scheme of which I thoroughly approve, if you *must* use two L.F. stages!

He raises various queries about improving the efficiency of the circuit, but I think that everything is perfectly in order as he shows it, and don't recommend him to try any alterations just yet.

Metal Enclosed Set

The diagram on this page, and to which I have already referred, shows a layout suggested by D. E. P. (Yarmouth) for a detector stage in a metal box. I like the look of it very much. He wants a three-valver with the whole circuit built up on these lines. No promises, but I'll see what I can do.

KEEPING THE LEADS SHORT

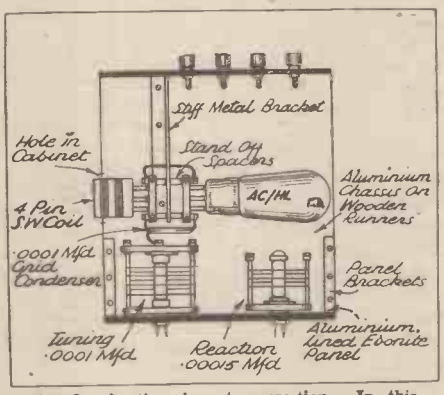


Fig. 2.—Another layout suggestion. In this case the coil and valve holders are mounted back to back.

FLYING-BOAT RADIO

A New Empire Air Development.

WIND resistance is a vital factor on high-speed aircraft. In the Marconi radio equipment for the new Empire flying-boats special steps have been taken to eliminate unnecessary wind resistance.

For instance, the windmill generators have been dispensed with, their place being taken by dynamos coupled directly to two of the four engines on each plane. These charge a 24-volt battery in much the same way as a car electrical system.

The 24-volt battery supplies all the electrical wants of the plane as well as its radio. In the case of the radio, an electric motor, coupled to a dynamo, is driven by this battery.

The dynamo has two outputs of the right voltages for the high-tension and low-tension of the radio equipment. There is another interesting feature about the radio supply.

Small Petrol Engine

A small petrol engine is arranged alongside the electric motor to which it can be coupled when desired by a clutch. Should the aircraft's engines be put out of action at any time, a supply is still available for radio purposes without exhausting the accumulators.

As a matter of fact the latter can be charged by the petrol motor driving the electric motor as a dynamo. Also the petrol motor can be self-started by the electric motor.

There are three aerials provided in all. A permanent one along the top of the machine, the loop aerial, and a normal trailing aerial. The loop aerial enables "homing" as well as ordinary direction finding to be employed.

The transmitting waveranges are 16–75 metres and 600–1,100 metres. In the case of reception the receiver goes up to 2,000 metres.

The aerial wattage of the transmitter is around 60 watts. Telegraphy is used on the short waves and telegraphy or telephony on the long. A. S. C.

SHORT-WAVE NEWS

TEN-METRE amateur work proceeds apace, and "first contacts" are being rapidly cleared up by the more active stations. One can hear almost as many different countries on the band now as one used to hear on 20 metres a few years ago.

The Australians (although there are so few of them active) are very consistent between 9 and 10 a.m. So far it has been a rare event to hear New Zealand, but a recent report suggests that the "Z L's" may be heard on the 10 metres at about 8 *p.m.* The band keeps "open" for Americans until after that hour on good days, so it is well worth listening there, even after dark.

That Fade-out

The Dellinger Effect, or regular fade-out every 54 days, which has already been mentioned in these columns, has definitely been observed in this country by several independent witnesses. It is due to appear again on about the date of publication of this issue, April 8th, and possibly again after a 27-day interval, on May 5th.

The Dellinger Effect takes the form of an almost entire fade-out of all short-wave signals for a period of fifteen minutes or so. Watch out for it.

The R.S.G.B. is drawing attention to the growing menace to the narrow amateur bands from so-called "amateur broadcasting stations" which work within their limits. The three glaring examples, at the moment, are V P 3 M R, Georgetown; E A 8 A B, Tenerife; and C R 6 A A, Angola. These three stations all work in the 40-metre amateur band, which has enough traffic to carry without being crammed with broadcast entertainment!

The stations concerned are presumably licensed as amateurs, so that only their respective Governments have the power to take steps.

A Busy Time

American amateurs have had a busy time recently. The serious floods during March occurred in the middle of the annual A.R.R.L. Contest, but many amateurs could be heard, even on the "DX" wavebands, handling emergency traffic for cities whose power supply had been cut off or interfered with.

The A.R.R.L. has a specially organised network of reliable stations whose power supplies are independent of the local mains, and these amateurs have had many opportunities of doing immensely valuable work.

New amateur prefixes include the following: Mexico, X E (instead of X); St. Helena, Z D 7; Ascension, Z D 8; Greenland, O X; Faroe Islands, O Y; Albania, Z A.

Many English listeners have written telling me that they receive the B.B.C. experimental transmissions on 7 metres. I find them extremely strong and consistent, with even better quality than the medium-wave broadcast.

W. L. S.

HENRY HALL'S "YOUNG LADIES"

By Alan Hunter

Meet some of the latest members of the vocal team in the new augmented B.B.C. Dance Orchestra

TIME has a disconcerting way of flying. Even so, it was something of a shock to me when Henry Hall asked me to attend a little celebration of his *fourth* anniversary as B.B.C. Dance Orchestra leader.

Yes, Henry enters now upon his fifth year. Seems only yesterday we gathered in the Military Band studio for his inaugural show—with all the "boys" nattily attired in light blue uniforms.

Then there were only fourteen instrumentalists and one vocalist. Henry told us he was out for "sweet" music, being convinced that melodious harmony had a much more popular appeal than "hot" cacophony.

Well, Henry's modified his ideas—and who shall blame him? For the whole basis of broadcast dance music has been more than just modified; it has been literally revolutionised. Nowadays, a really useful band for radio must be versatile. It must be, in fact, a sort of variety show with a dance-band *motif*.

And that, I am sure, explains why we were entertained to the strains of a band that now has twenty-one instrumentalists and a whole team of male and female vocalists. Henry has caught the "bigger and better" craze. More power to his microphone!

Great Potentialities

When you realise that Henry now commands a combination that includes six brasses, five saxes, four violins, a viola, a 'cello, a double bass, a piano, a guitar, and, of course, drums, you will see that there is no limit to its potentialities.

Then the vocalists. Henry is most concerned that you should not imagine the team of new vocalists means "one darn croon" after another. For if Henry is to be taken at his word—and, of course, he is—the newcomers will add lustre to the sheer entertaining abilities of the band.

They are a comely lot, these vocalists. Apart from Bert Yarlett, who joins the male side of Henry's vocalism, there are no less than five "Young Ladies."

I took the opportunity of meeting each one—and here, very briefly, are their individual stories:

Let's meet, first of all, Elizabeth Scott. She's a brunette—but that's not all, by any means. "I started off as a German lieder singer," she confided, "but soon fell for the attractions of cabaret work.

"I was in the 'Trocabaret' for some time—as a singing compère. Then I got into the dance-band world by joining Louis Levy's band. A crooner? NO! I'm a straight singer, please emphasise *that!*

"How came I here? Well, I don't quite know myself—it was all so sudden. I came up for an audition to Henry Hall's 'Hour'—and to my intense amazement Mr. Hall asked me if I would like to join his band.

"For about twenty minutes I simply could not answer. I was so surprised, you see. Then, when I could find my tongue, I jumped at such a grand chance. Yes, I love being with the B.B.C. band.

"Oh, and I must tell you I have a second string. I *write!* As a matter of fact I have a serial coming out soon—but that's a secret!"

She is a Crooner

Vivienne Brooks, petite, very dark, vivacious to a degree, then said *her* piece. She IS a crooner—and revels in the fact. I asked her what her definition of a crooner was—but her answer was almost libellously frank, so I'd best not repeat it.

"Now don't tell me I look terribly young—because I've been in this crooning business for three years," she said. "I play the piano, actually, and it was a friend who brought me here for that purpose.

SYNCOPATED SONGS

Vivienne Brooks, petite, vivacious—she is a crooner and revels in the fact.

Elizabeth Scott, brunette and straight singer.

"My particular idea in playing jazz was soon altered when Henry Hall asked me if I could sing. I told him I could syncopate—and here I am."

In just such a happy way Henry found his three "sisters"—Molly, Marie and Mary. They were some of Cochran's Young Ladies when Henry was forging ahead with his plans months ago. Then, you recall, Henry appeared in a film called "Music Hath Charms," accompanied by the rhythmic singing of these "sisters."

So impressed was Henry that he asked them to join his new band as a vocal trio. "But they will be very useful to accompany other singers, for their voices blend together remarkably well," explained Henry to me.

"Yes, I'm Molly," smiled one of the brunettes, so dazzlingly I nearly dropped my notebook. (Query: Do gentlemen *really* prefer blondes?) "Born? Of course I was! Oh, well, in Kent, as a matter of fact. I was meant to be serious—studied singing at the Wigmore Hall and gave recitals.

Played Together in Films

"And then, you know, I became a Young Lady in Cochran's shows. Met my 'sisters' Marie and Mary in a Drury Lane show. We've since done quite a lot of film work together—that's how we met Henry Hall."

Mary is a blonde. (Answer to above query: Well, perhaps they *do!*) Hails from Bournemouth, she tells me. "I, too, was trained as a lieder singer," she confessed without shame. "But I, too, became a Young Lady, and understudied Elizabeth Welch in a Drury Lane production."

Then I managed to corner little Marie—another brunette. "Don't tell me *you* were intended for the concert platform?" I quizzed. "Well, as a matter of fact I was trained as a dancer and a singer," smiled Marie. Done some stage work—understudied Ivy St. Helier, Mary Ellis and Adele Dixon.

Well, there you have thumbnail sketches of Henry's "Young Ladies." I can see the new band in great demand for the television service—for everyone agreed that the new vocalists were easy to look at.

MODERN TUNING

Some kind of visual tuning is very necessary with the present-day highly selective set. Here is a description of two of the latest schemes for providing an accurate indication of when the receiver is properly tuned to a station.

By J. C. JEVONS

THE new "Rotalog" dial goes a long way towards putting the short-wave fan "on velvet," so to speak, in the happy hunting grounds below the 100-metre mark. Of course, one cannot expect to find things quite as cut-and-dried on the short and ultra-shorts as on the medium and long waves, nor does the "DX" man want it quite that way. He rather enjoys the spice of uncertainty, and the thrill of picking up something new. When he does the "Rotalog" tells him where to look for it again.

But even with the ordinary broadcast programmes, tuning is getting to be quite a problem. Not for the listener, of course, because the designer sees to that, though it is taking him all his time to do it.

In these days of ether congestion a set must be highly selective—and have a wide reach—to give the public what it wants. Next it must have A.V.C. to compensate for fading, and "quiet" tuning to shut out background noise. Then it must have at least two—and if it is an all-wave set, three or even four—different waveband settings. All this naturally adds to the designer's difficulties.

All Sorts of Devices

Yet the standard of easy tuning is being kept up at all costs, partly because the public insists upon it, and partly because it helps to give each set a characteristic "touch" of novelty. One has only to look round a selection of this year's models to see what pains each designer takes to use a tuning outfit that is "different" from his rivals. And he goes all out to make it an attractive selling point.

Some sort of visual tuning is, of course, necessary whenever there is automatic volume control. Otherwise one cannot be sure whether or not the circuits are "dead on" to the carrier wave or whether the set is working "off tune," and so producing distortion. The simplest way out of this difficulty is the column-of-light indicator which reaches its maximum height at the critical resonant point, and falls away to a lower level as the tuning-knob is moved off-tune in either direction.

The light is usually produced by a neon or similar glow-lamp, which is arranged to be controlled by the A.V.C. voltage. When one is "searching" for a station the H.F. valves of the set are all working at maximum sensitivity.

Directly a carrier-wave is received the A.V.C. voltage comes into action. It increases with the strength of the incoming carrier-wave, and since it is also applied to the neon lamp, the column of light produced by the latter climbs up until at its highest point we know that the circuits are dead in tune with the received signal.

USING A CATHODE-RAY TUBE

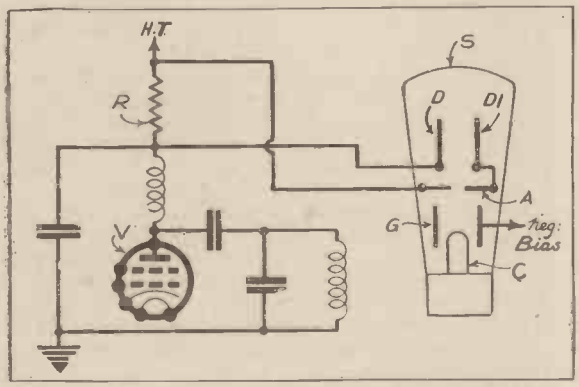


Fig 1.—How a miniature cathode-ray tube can be used instead of a neon lamp as a tuning indicator.

A Simple Device

Fig. 1 shows how a miniature cathode ray tube can be used instead of a neon lamp to serve the same purpose. The "gun" part of the tube, which produces the electron stream, consists of a cathode C, a control grid G, an anode A_1 and a pair of deflecting electrodes D, D_1. As will be seen, the anode and one of the deflecting electrodes D_1 are connected to the upper end, and the second deflecting electrode D to the lower end of a resistance R, which is in the output circuit of a valve V subject to A.V.C. control.

When searching for a station the current through the valve V is comparatively large, because the valve is "all out," doing its best to pick up whatever is about. The potential difference across the resistance R—and therefore across the deflecting electrodes D, D_1—is now at its maximum, so that the spot of light formed by the electron beam on the fluorescent screen S of the cathode-ray tube will be strongly deflected. That is to say, it is thrown back to the "zero" point on the screen.

Directly a signal comes in, however, the A.V.C. biasing voltage starts to curb the sensitivity of the valve V. In other words, it gradually cuts down the D.C. current through the valve until the incoming carrier is at its peak. When this occurs, the voltage drop across the resistance R is at a minimum, and there is practically no difference in voltage across the deflecting electrodes D, D_1. The spot of light therefore moves up to a higher point on the fluorescent screen, where it indicates that the circuits are dead "on tune."

The "Butterfly" Indicator

The latest American idea is to use one of these cathode-ray indicators to produce a rather unusual and attractive effect. As shown in Fig. 2, the fluorescent screen consists of a circular disc, with a centre opening not unlike the pupil of the eye. When searching for a station the space shown by the arrow from A to B, between the pupil and the outer disc, is filled with a greenish fluorescent light, the remainder or shaded part of the segment being left dark. As a signal comes in the edges A and B move in towards each other, until, when the circuits are accurately in tune the shaded area shrinks down to a mere line.

The effect of rotating the tuning-knob slowly over the dial produces a response which can best be compared with the fluttering of a butterfly's wings. The band of "fluid light" expands and contracts in response to each passing carrier-wave, until finally it folds up and stays "put" at the desired station, just as a butterfly folds its wings when it alights on a flower. As the set is fitted with "quiet" tuning, this experiment can be tried out, without extracting raucous sounds from the loud-speaker, so long as the tuning-knob is rotated continuously and slowly.

How It Is Done

The "fluttering" is produced by the change in carrier strength as one tunes across the wave from one sideband through the "peak" to the other sideband. Actually this alters the A.V.C. voltage applied to bias screening electrode set inside the cathode-ray tube. When the bias is negative it diverts the electron stream away from the fluorescent screen, and so forms the comparatively large illuminated area shown at the left-hand side of Fig. 2.

As the incoming carrier increases in strength, the A.V.C. voltage grows too, as already explained. This voltage is arranged to increase the positive bias on the screening electrode until the carrier-wave is at its peak. The circuits are then accurately tuned to the signal, and the screening electrode is at practically the same voltage as the anode of the cathode-ray tube. It therefore no longer deflects the electron stream, but because it lies close to the fluorescent screen it casts a clear-cut ray which forms the thin line shown at the right-hand side of Fig. 2.

VERY INGENIOUS

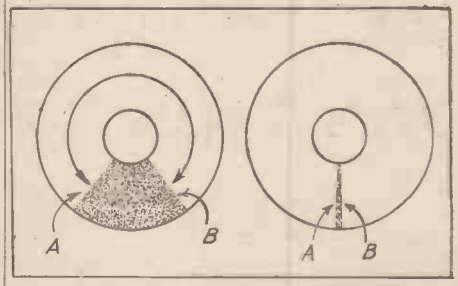


Fig. 2.—The novel scheme referred to by our contributor. When tuning for a station the space A B is filled with greenish light. As the signal comes in the edges A B move towards each other until, when the circuits are in tune, the light strip shrinks down to a mere line.

COMING SHORTLY

AN A.V.C. SUPER WITH VISUAL TUNING

NEW SUPERHET CIRCUIT

SOMEONE has been telling me about a new superheterodyne principle. It sounds good to me. Apparently, the carrier of the station you tune in is used as an essential ingredient in the creation of oscillation for mixing—with itself!

Therefore, when there is no station there is no oscillation and the set seems to be quite dead. And there is an uncanny absence of background as you go from point to point on the dial.

One of the various other advantages claimed is that Morse interference is greatly reduced, if not eliminated, and that ought to be useful on short waves.

ANOTHER MYSTERY

A FRIEND of mine operates two mains sets from the same power point. Also, to this point is connected an ornamental lamp which acts as a pilot light to tell him when the switch at the power point is closed.

The other evening he left the switches on the sets themselves at their "On" positions and turned everything off by clicking over the switch at the power point. Which means that no power should have been flowing from the point at all for either the sets or the lamp.

And as he expected, the sets went dumb and the light went out. But when he clicked over one of the set switches the lamp started to glow dully. Then, when he operated the other set switch similarly, the lamp became quite bright! Though, mind you, the power point switch was still off.

Can you explain this mystery? Being an "expert electrician and radio engineer" I ought to have been able to at once. But the solution eluded me much to the discredit of my reputation!

RANDOM RADIO REFLECTIONS

The steam controversy has aroused enormous interest and readers are still writing in, giving their views, as you will see from this week's jottings by

VICTOR KING

FROM MY POSTBAG

MR. SYDNEY HETHERINGTON, who insists that he is known to his pals as "Syd" (and not Sam, Stan or Steve), has fired in a comment regarding the steam interference controversy.

He suggests that if steam were to be puffed out on to or near an aerial it would cause electricity to be generated in it by means of an electro-thermal effect.

Maybe, Syd, but that wouldn't explain the interference over a distance which now seems to be proved as a fact.

Mr. Bowling, of Leeds, goes even closer to the aerial with his steam and instances the fact that if a fireman plays his hose on a live wire a shock will run down the jet to him.

"Will not steam," says Mr. Bowling, "particularly when under pressure, behave similarly and provide an intermittent earth on the aerial?"

Mr. Nash, of North London, sends a cutting from a newspaper which advances the theory that electrical charges in the atmosphere cause influenza.

Well, I can state positively that electrical charges in our district cause high blood pressure—to those who have to pay 'em!

"PLEASE DON'T DO IT"

ONLY the old hands at this radio game will remember the terrible riot of squeals which nightly pervaded the ether, in the days when practically every valve set had "reaction on the aerial."

Captain Peter Eckersley, then Chief Engineer of the B.B.C., used to come to the microphone almost every three days with a "Please Don't Do It," plea.

Nowadays, what with superhets and S.G. H.F. stages, "oscillation" has nearly disappeared on the medium and long waves.

But it's there on the short waves, and in increasing quantity. I got a packet of it the other night. A wretched short-wave searcher would persist in squealing in and out of the W2XAF programme to which I was endeavouring to listen.

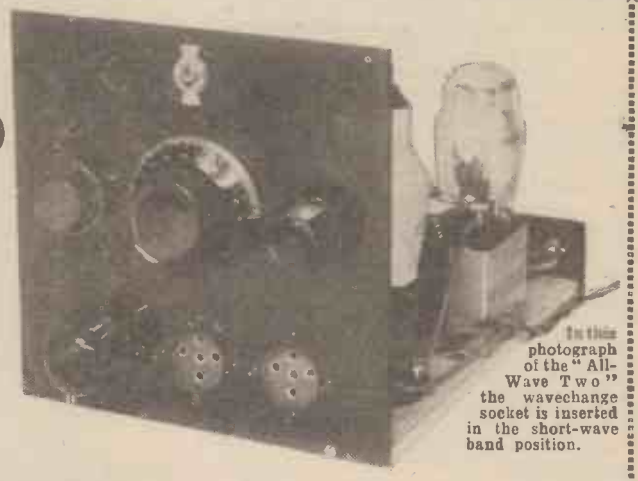
I don't suppose he realised that he was causing interference over a wide area. Maybe he is a reader of these notes. If so, please don't do it. Remember that every ordinary short-wave adaptor or set which comprises a detector with or without L.F. stages following it, causes a widely diffused squeal every time it is tuned to a carrier.

So try to get away from the oscillation condition as quickly as you can when you have located your station, and don't fiddle in and out of oscillation for longer than you can help, or you may be spoiling reception for others.

"P.W." COMPETITION No. 11

WIN THIS SPLENDID ALL-WAVE SET

OUR prize this week is a highly-efficient two-valve receiver covering the short, medium and long waves. Two steep-slope pentodes provide the absolute maximum degree of amplification possible with this type of circuit. Another unique feature is the entirely original method of wavechanging in which the various wavebands are switched in and out by means of a plug which is inserted into one of the three valve sockets on the panel. This splendid prize will be sent to the winner, complete with valves.



In this photograph of the "All-Wave Two" the wavechange socket is inserted in the short-wave band position.

HOW MANY WORDS CAN YOU MAKE?

The first question you will ask is what is it you have to do in order to win the prize? Our competition is a simple one. All that you have to do is to take the word BROADCASTING and make as many different 5-letter words as you can out of the twelve letters available. For instance, BROAD and STING are two obvious words with which to start your list.

A SIMPLE COMPETITION ANYONE CAN TRY

But *please remember*—only *five-letter* words! When you have made as many as you can, write them clearly *in ink* on a postcard—in the form of a list—put your name and address on the card, and post it to "Popular Wireless," Competition No. 11, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.), so that it arrives not later than Saturday, April 18th.

The prize will be given to the reader who sends in the greatest number of words, the letters of which must all appear in the key word "Broadcasting." Only words appearing in black type in the main sections of standard dictionaries will be considered.

Only one entry may be sent in by each reader. No correspondence will be allowed, or responsibility taken for delay or non-delivery or otherwise, and the Editor's decision will be final. Employees of the proprietors of "P.W." must not compete.

REMEMBER!—THE CLOSING DATE IS SATURDAY THE 18th

FROM OUR READERS

WILL U.S. TELEVISION UPSET BRITISH "LOOKERS"?

A reader raises a very interesting point this week in view of the remarkable distances over which the German television transmissions have been received.

The Editor, POPULAR WIRELESS.

Dear Sir,—From my own experience of ultra-short-wave reception, and from what I hear in various short-wave circles, it looks very much as if television transmissions are not going to be as confined to their countries of origin as was at first imagined. The transmissions on ultra-short-waves from Berlin can be heard very strongly over here in the afternoons, while I believe they have also been heard in America.

America is considering starting a service from Radio City, and with the "spread" that is necessary on television wavelengths it looks as if we shall be experiencing some peculiar interference effects when we get Berlin, London and New York all televising at the same time.

Yours faithfully,
Radlett, Herts. G. EVANS.

A SHORT-WAVE HINT

The Editor, "Popular Wireless."

Dear Sir,—I received a guinea from your office a short time ago. Many thanks for same. Also due to letter published by "P.W." I received twenty-odd letters asking for methods for connecting up one-valve S.W. set to mains set P.U. terminals. Would you be kind enough to publish circuit diagrams, because I feel that others may want the same diagrams. Also, I don't feel like answering any more letters. Resistance-capacity coupling or a parafeed transformer is used. It is necessary, of course, that the potentiometer in the set should be not less than 250,000 ohms, except under unusual circumstances. There are many other methods, but those shown are the two most successful circuits.

Yours faithfully,
M. T. PARRY.
"Neavetta," 20, Waverley Road, Bournemouth.

A GUINEA

is paid each week for the best letter sent in by a reader (Mr. R. I. Jenkins gets it this week), and there is no reason why you should not win one. Anyhow, it's worth having a shot at.

If you have had any interesting radio experiences—and who hasn't?—or if you have any opinions of general radio interest to ventilate, send them along to "P.W."

This page is open to readers every week, and from each batch of correspondence we select those letters which we consider to be of the greatest general interest to other readers.

So don't hold back! Remember you may get a guinea

FOR YOUR LETTER

LIGHTHOUSE "BROADCASTS"

The Editor, POPULAR WIRELESS.

Dear Sir,—I wonder if any readers of POPULAR WIRELESS have, in the hours between 7 a.m. and 10 a.m., tuned down to about 180–200 metres and listened to the various lighthouses broadcasting?

As these stations are very weak, the volume control must be at maximum in order to listen. The wireless operators call each other and give news, weather conditions, etc.

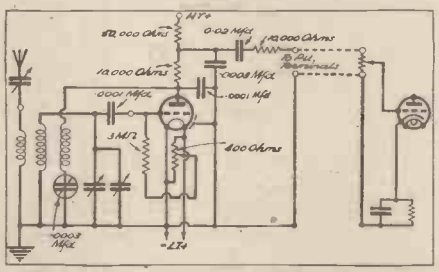
Of course, all the stations have call-signs such as 2 X P, etc. Some of the closing-down signals are very amusing. For instance, I once heard this: "Station 2 X L is closing down inside and out!"

I recommend other listeners to listen to these interesting "broadcasts."

As I am still at school, and do not have much time to spare to listen-in, I can only hear them on Saturdays, etc., but everyone who can listen at the given times should do so.

Yours faithfully,
W. J. WATKINS.
78, High Rd., Woodford Bridge, Essex.

A GOOD SCHEME



This is one of the methods suggested by Mr. Parry for connecting a short-wave set to the pick-up terminals of a mains receiver. Resistance-capacity coupling is used in this case. If there is no potentiometer in the set a grid leak of 1 megohm should be inserted to allow bias to be applied.

A PLEA FOR SUPPRESSORS

The Editor, "Popular Wireless."

Dear Sir,—After reading week by week the varied ideas and thoughts of my fellow readers, I have decided to try, at least, if a little belated, to have my little say. I have been a keen radio fan since my later schooldays (1925). In those days my interest was first aroused by my next-door neighbour, who had a short-waver, home constructed, and many are the Sunday morning dawns we have seen through "chasing Yanks," and with excellent results. Then I persuaded my parents to finance my own efforts. These I have continued up to the present moment with unabated enthusiasm. Through it all "P.W." and Mr. J. S.-T.'s books have been my guiding stars. My keenness for this hobby eventually turned my mind to radio as a livelihood, and at present I am "in the trade." I am employed as service-salesman, and it is from this angle that I wish to continue.

Firstly, there is this suppressor business. I state definitely that suppressors should be fitted to every type of electrical apparatus when manufactured. Anyone who has tried to demonstrate sets, especially mains receivers, knows too well the truth of this statement. In my particular case, to switch on a set is sometimes a positive nightmare. Then it tests salesmanship to get that set into the customer's own home! I now usually fit a demonstration set with noise suppressor plug, but this is not very effective. Now, to cap it all, we have the all-wave sets, and on the short-waveband we have the car and lorry ignition systems playing havoc; and what can we do? Yes, I say make it a law that suppressors must be fitted to all apparatus during manufacture!

Now, on another side, I should like to say something which Mr. Victor King may read and will perhaps cheer him up. In his "Reflections," under the heading "Would You Believe It?" February 22nd issue, he suspects "The black cat next door has brought a jinx down on me!" Personally, I think the jinx is on the set and not him at all! I have had many of the happenings he portrayed, though many of my troubles would probably have been nothing to Mr. King. I don't profess to be anywhere near the level of his ability—yet, watch your laurels, sir! Anyway the manufacturers seem to "manufacture" faults which lead one to suspect that part of the circuit most remote from the actual cause. The best joke on me (and I pass the tip on, as it may save someone the trouble I went to) was caused by a mains set which wouldn't function at all. The defect appeared to be a broken lead or switch. I tested the lead—O.K. Then out came chassis, and switch was O.K.; so it seemed transformer trouble. Transformer windings and resistances were as per instructions. Then I discovered—would you believe it?—the mains adjustment tapping screw was not screwed tight against the brass strip behind it—thus disconnected mains. Being in appropriate tapping on leaving works I hadn't touched it, and this could have been remedied by simply removing back of cabinet!

Well, I will now close, wishing you and "P.W." all the best, and thank you for the many valuable hints and tips I have gathered from your pages.

I remain, Yours, etc.,
R. I. JENKINS.
Crundale Hall, Crundale, Haverfordwest.

P.S.—I have found great help in my study of radio from a course with a well-known college.—R. I. J.

FRENCH BY RADIO

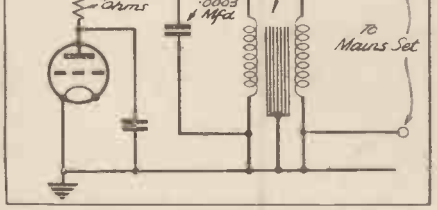
To the Editor, POPULAR WIRELESS.

Dear Sir,—I wonder if many of your readers remember the thrill they experienced when first they heard a human voice via a wireless set? Well, there is one way by which that thrill may be recaptured, and that is to listen to and understand a voice speaking from abroad in a foreign tongue. Undoubtedly, the best way of learning another language is to go and live with those who speak it, which, to most of us, is mere counsel of perfection; but by means of the wireless an extensive vocabulary together with a good accent can be attained. With Mr. Gillard's very ably compiled articles before one a lesson in colloquial French may be taken in any spare half-hour, and one may choose from numerous French stations an announcer who, pro tem, will be an excellent teacher. With the will to learn, your readers will get great assistance from these articles, and soon become possessed of quite a surprising knowledge of French, an acquirement which is not only an educational advantage but also a social asset. Fellow readers will be very profitably spending their spare time should they be listening to a French station in company with Mr. Gillard. In the hope that the French articles may be followed by similar ones in German,

Je vous prie d'agréer, monsieur, mes salutations empressées.

ERNEST T. BLANSHARD.
34, Etherington Road, Hull.

USING PARALLEL-FEED



In this circuit a parallel-feed L.F. transformer is employed instead of R.C. coupling.

PRAISE FOR B.B.C.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having derived much pleasure from readers' letters on the subject of programmes and carefully digesting contents of same, I have come to the conclusion that every listener seems to find some entertainment value in the various items broadcast—although each one puts forward the argument that their particular pet item is good for everybody, and more time should be devoted to it. When considering the small cost to each critic that broadcasting entails they should realise that they are not the only persons to be studied, as everybody is entitled to some entertainment value for the time devoted to listening.

I can only add that the B.B.C. is right in its policy of programmes which it gives us.

Yours faithfully,
W. JOHNSON.
32, Arrow Road, Bow, London, E.3.

The Memoirs of a Radio Journalist

Continuing his personal reminiscences of famous radio stars, Sam Heppner this week devotes his contribution to that famous pair, Eric Maschwitz (alias Holt Marvell) and his wife, Hermione Gingold (alias Mrs. Pullpleasure)

AND, of course, the Maschwitzes!

No chronicle of this sort would be complete without some acknowledgment to that vital, energetic and intensely shrewd pair, Hermione Gingold and Eric Maschwitz, whose relation to the broadcasting world has attained something of a traditional significance. Though young—like the radio itself—they are to the B.B.C. what the Guitrys are to French revue, Henry James to the novel, De Mille to the cinema, and Bernard Shaw to Irish drama. But since, if I continue in this vein, Mr. Cole Porter will either sue me for plagiarism or thank me for a new idea, let me try and recall my original encounter with this illustrious couple.

I met Eric Maschwitz first. It was at a reception given, I think, to welcome M. Rene Clair, the brilliant French picture director, to this country; his newest film, whatever it may have been, had just been given its premier showing. Between gulps of champagne everyone was eagerly extolling this new triumph of screen art, and I remember—with astonishing clearness, considering the circumstances!—being introduced to the rugged, towering figure of Augustus John, Lady Margot Oxford, and then (by someone who divined my partiality for editors) to Eric Maschwitz, who, at that time, occupied the editorial chair of the "Radio Times."

Radio Entertainment—Intensely Personal

I did not meet him again until a year or two ago at St. George's Hall, when he gave me some interesting views on broadcast entertainment. He was then out of journalism, but already held his present position as B.B.C. Director of Variety.

"If you are sitting in a theatre with hundreds of other people," he told me, "you are merely a single member of a huge audience to whom the entertainment is delivered collectively. Now, although radio entertainment reaches an infinitely greater number of people than an ordinary stage show, each listener, having his own little wireless and being isolated from the millions of other listeners, wants to treat everything that comes over the air as if it were addressed personally to him. The main demand of good radio entertainment is that it shall be intensely personal.

"Letters that constantly flow into the B.B.C. indicate how the announcer's 'Good-night! Good-night!' spoken in that quiet, intimate tone, is welcomed by thousands of lonely people in remote parts of the country, who go to bed comforted and reassured.

"That is why Christopher Stone was always such a great favourite with listeners. And A. J. Alan. Their odd, stray comments were not really funny—in the sense that the gags of Billy Bennett or Tommy Handley are funny—but they were so convincingly natural, so spontaneous . . . Listeners waited eagerly for Christopher Stone's broadcasts, because they knew that he would behave just as if he were talking to them personally, as if he would not allow himself to be troubled by the thought—terrifying to anyone else—that his voice was going into thousands of homes. The weary, nonchalant tones were characteristic; they 'stamped' him. And when a voice—which is not really distinct like, say, Stainless Stephen's—becomes so unmistakably familiar as Christopher Stone's, it is bound to endear itself to the public."

Here they are—Eric and Hermione Maschwitz.

Eric Maschwitz has a prodigious reserve of energy. Besides supervising the B.B.C. light entertainment, he finds time (how, neither I nor his wife can say) to write novels, musical comedies, films, song lyrics and any odd radio sketch that emergency may require.

Sitting on an Orange Box

Going down to Radiolympia the year before last I remember seeing him sitting on an upturned orange box in a desolate corner and furiously typing "In Town Tonight" stuff. I went along a couple of days later, and there he was exactly as I had left him! It looked so funny. As if he hadn't budged from the same spot for the whole length of time!

Long ago, before he was associated with the B.B.C., he published a couple of novels and began to get busy on a third, "Husks in May," while staying with friends in a sixteenth-century house in the New Forest. The house was named "Holt Marvell," which means "rest-house" or "halting place," and, as a gesture of gratitude to his hosts, Eric sent his book forth to the world under this name, which he has since used for all professional purposes.

By the way, all wireless material devised by Holt Marvell is *not* paid for.

And there is another false impression which I shall take this opportunity of summarily dismissing.

I have heard lots of people say, 'Oh, yes, it's easy enough for Hermione Gingold to get plenty of radio work with a husband who's a big pot on the B.B.C.!"

A Highly Talented Artist

Well, let me give you the real facts.

Before Eric became Variety Director, Hermione—or Toni, as her friends call her—broadcast considerably more often than she has since. Eric is over-sensitive about these theories so avidly given out by malicious-minded people and, consequently, doles out assignments to his wife very sparingly. In the past, Toni broadcast two or three times every week. Now, however, her name graces the radio programmes very infrequently by comparison. And not even the most prejudiced listener will deny that Toni is a highly talented performer whose gifts are eminently suited for microphone work; she has quite an enchanting voice and a conspicuous flair for characterisation.

(*Continued on page* 130.)

FRENCH MIKES INVADE LONDON

A Paris "Flying Squad" has been busy recording "local colour"

WE were seated in a luxurious room at the Savoy Hotel, overlooking the Embankment and the river. Suddenly the squeal of bagpipes was carried faintly on the breeze.

My companion rushed to the window with a whoop of joy and pointed in ecstasy to a squad of Guardsmen marching stolidly towards the Bank of England, a piper at their head. Then he grabbed hat and coat and fled incontinently down the soft-carpeted corridor in full cry, while I brought up the rear.

Broadcast from Radio-Cité

At the entrance we scrambled into a flaming red motor-van, with a typical Parisian driver at the wheel, and the radio flying squad were off. And now to introduce the cast. My companion was M. Michael Ferry, star radio reporter of the Paris evening newspaper "L'Intransigeant." The red vehicle was an up-to-date recording van sent to London by that paper to obtain interviews on the Rhineland crisis and record "local colour."

I was being shown the works.

Discs were sent back to Paris by air for broadcast from the paper's own station, Radio-Cité.

To continue my narrative. We raced along the Embankment and passed the marching Guards. By that time the piper had ceased playing. M. Ferry was disconsolate, but I advised him to lie in wait for his subjects farther along. We did so. He produced a microphone on the end of a line and waited, Izaak Walton up to date.

A few spectators gathered round and said "Garn!" and less complimentary things to the microphone. A policeman looked on sourly from the opposite side of the road. I "shooed" away the arabs and then by the mercy of Providence as the marchers came along the piper began to play again. M. Ferry made his record, holding the microphone down to catch the tramp of the Guardsmen's feet. A second policeman joined the first and both watched suspiciously

A Great Success

Inside the van M. Ferry's assistant was playing back the new record. Joy! A great success. But now an inspector had arrived to preside over the police conference. So we hastily departed and stood not upon the order of our going.

M. Ferry, whose chief, M. Gautier-Chaumet was indisposed in bed at the hotel, had temporary charge of the expedition. He next conceived the idea of recording the chimes of Big Ben. So we bowled along to Westminster, our driver having that occasional altercation with his passengers which is the delight and speciality of the Parisian chauffeur.

Arriving in the shadow of Big Ben we heard the carillon of Westminster Abbey, and M. Ferry, with fresh transports of enthusiasm, yelled to the driver to wheel "*A droite, à droite.*" He having retorted with suitable vehemence, obeyed. We swung round, pulled up, set the apparatus, produced a microphone—and the bells stopped.

However, while we waited for Big Ben the carillon came into action again and we had more than enough, for it continued while Big Ben was chiming, so that the Empire's best-known broadcaster for once could hardly make itself heard.

Obtaining Interviews

We recorded the changing of the Guard, unemployed Welsh Miners' Choirs, street musicians, and street noises. We tried to enter Hyde Park to take records in the open-air forum, but the police didn't seem to like our van. They wouldn't let us in.

And as for the interviews. What would you say if you were strolling quietly along the pavement and a dapper young Frenchman suddenly popped out of a bright red van, armed with a microphone, and invited you to state your views on Germany's violation of the Rhineland demilitarised zone? A newsvendor, thus confronted, remarked "Hitler's crazy." A cinema attendant was less dogmatic and more fluent. He thought that the friendly relations between the French and British Governments would show a way out of the crisis. Most people appeared to think nothing very noticeable but to favour an eventual compromise.

Groups that gathered round in Leicester Square and Piccadilly were complimentary to the visitors. "*Vive la France,*" they said, whether from conviction or politeness I am not sure.

I said good-bye to my friend M. Ferry. Then I went home and had a dream. I dreamed that the B.B.C. sent a recording van (not a red one, to be sure, but a soberly coloured recording van) to each of the capitals of Europe. The B.B.C. engineers hustled about, showing great enterprise and initiative in recording atmosphere on their little discs. Then they rushed them back to London by air.

I dreamed that. And then I woke up and went round to Broadcasting House to cool my ardour by waiting in the entrance hall.

L. M. G.

THE RADIO BULLETIN

Our complete guide to all the latest activities of the wireless industry.

V.G. RECORDING OUTFITS

GIVEN a suitable recording outfit, anyone can make gramophone records. **The V.G. Manufacturing Company** are specialists in recording equipment, and have sent us details of their latest outfit. This is a recorder which has been designed for attachment to existing radio sets or radio-gramophones, and is available in two types: one, namely T30, is capable of cutting up to 12-in. records and the other, T40, up to 16-in. records.

The makers point out that the device can usually be fitted into the space beside the turntable, being fixed by means of two screws only.

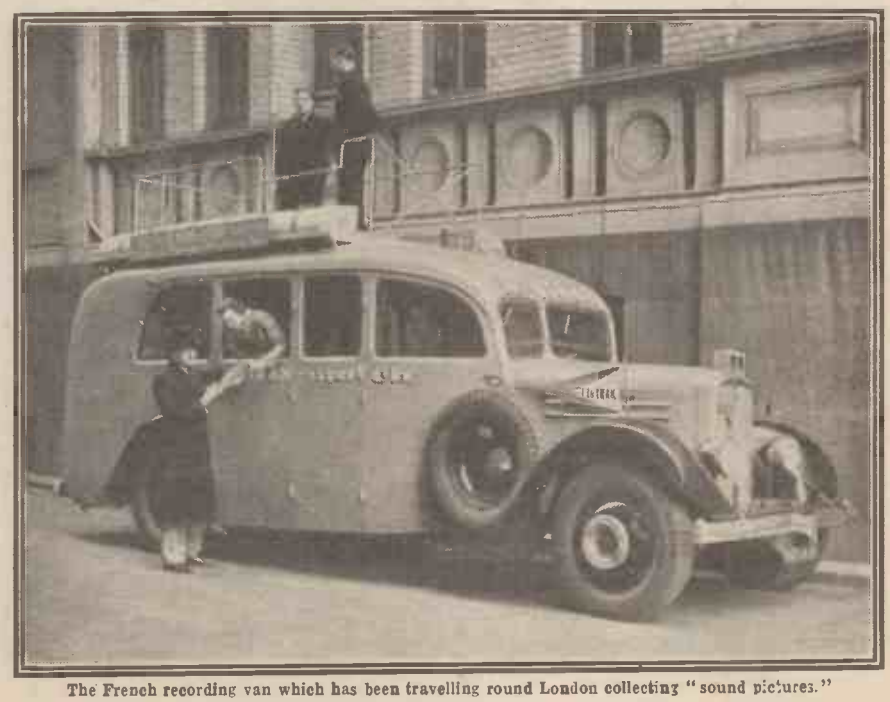
A high-fidelity cutter head of the electro-magnetic type is supplied. This requires approximately two watts input to give average volume on recording, and must be matched to the amplifier by means of an output transformer or choke condenser combination.

The price of the T30 model is £17, complete with cutter head, and the T40 is £25.

Two special motors are also available for use in conjunction with recording outfits. The first (M12) will cut up to 12-in. records and is suitable for home recording. The price is £6.

(*Continued on page* 128.)

A BRIEF REST BETWEEN EXCURSIONS



The French recording van which has been travelling round London collecting "sound pictures."

THE PĒZOGRAM

This week we introduce a highly efficient self-contained electrical reproducer for use on A.C. mains. Amazingly simple in construction, and using one of the very latest types of pick-up, it will provide the finest reproduction from the wide variety of records available.

All complete and ready to play.

Designed and Described by the "P.W." Research Dept.

THE day of the acoustic gramophone is done. In the same way as the valve has completely supplanted the now obsolete crystal, so the modern electrical reproducer has swept aside the ordinary mechanical gramophone. Those who have heard a record played first on a really good acoustic instrument and then on a well-designed electrical type will agree that there is no comparison between the two. The results given by the electrical reproducer are vastly superior. Particularly is this superiority apparent in the bass and the richness of the harmonics. By comparison the acoustic gramophone is hard and unnatural. There is a marked deficiency in the bass, and the absence of harmonics, together with the narrowing down of the frequency range, is brought home to the full by listening to a pianoforte rendering.

This is probably the best type of record to use as a basis of comparison because even the non-musical are sufficiently familiar with the sounds of the piano to appreciate the wide difference between the two examples of record reproduction.

In designing the Pēzogram we have aimed at producing an instrument capable of giving really first-class quality at reasonable cost. Obviously it is essential to choose a pick-up which will reproduce with an absence of undesired resonance effects the full range of frequencies covered by the modern record. Moreover, in order to keep down the size of the amplifier it is desirable to use a pick-up giving high sensitivity.

In this way it is possible to save a valve and so lessen the cost and make the construction more simple.

A Crystal Pick-up

The pick-up we have used is the new B.T.H. Pēzolectric. The basis of this pick-up is a small crystal, the required voltages being produced by the application of pressure to the crystal. This pressure is applied via the usual needle, but the fact that a very light needle-holding device can be used eliminates resonances, and since the voltage across the pick-up is proportionate to the pressure on the crystal, amplitude distortion is reduced to a minimum.

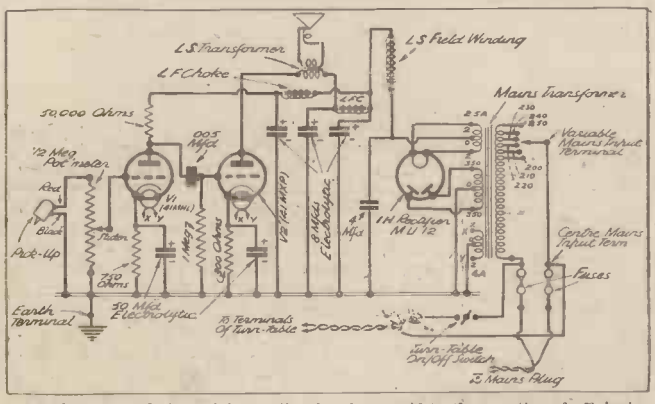
The Pēzolectric pick-up is extraordinarily sensitive, and because of this we have been able to obtain fully adequate output with only two amplifying valves, and without recourse to high magnification stages. This is all to the good, and the extreme simplicity of the amplifier makes both for high quality and a complete absence of instability troubles.

Let us now turn to the circuit which is reproduced on this page.

It will be seen that the pick-up is connected directly across a ½-megohm potentiometer. This potentiometer is the volume control, and it is essential that the value specified should be used with this particular pick-up.

The Pēzolectric pick-up will not function unless it has a resistance connected across it, since its operation is similar to that of a condenser. Hence a resistance across the pick-up is essential in order to provide a path for the bias to the grid of the valve. A value of 500,000 ohms is recommended by the makers as being the most suitable for maximum bass response. A lower value will reduce the bass.

WELL SMOOTHED AND HUM FREE



It will be seen that special attention has been paid to the question of efficient smoothing. The first L.F. valve has its own smoothing choke and the output stage has a separate choke. Both circuits employ speaker field winding to assist in ensuring hum-free working.

The moving arm of the potentiometer is taken direct to the grid of the first amplifying valve, which it will be seen is of the ordinary three-electrode type. This valve is coupled to the output stage by a resistance capacity network, the values of ·005-mfd. and 1 megohm for the coupling condenser and grid resistance respectively having been chosen as being the most suitable for all-round use.

YOU WILL REQUIRE THESE PARTS

1 Wearite mains transformer, T.21B.
1 Bulgin L.F. choke, L.F. 14S.
1 Bulgin L.F. choke, L.F.34S.
2 Dubilier 8-mfd. dry electrolytic condensers, type 9281.
1 T.C.C. 8-mfd. dry electrolytic condenser, type 902.
1 Dublier 50-mfd. electrolytic condenser, type 3003.
1 Dubilier 50-mfd. electrolytic condenser, type 3013.
1 T.M.C.-Hydra 4-mfd. condenser, type 50.
1 Amplion 50,000-ohm resistance.
1 Amplion 750-ohm resistance. (1 watt)
1 Amplion 300-ohm resistance. (1 watt)
1 Erie 1-megohm resistance. (1 watt)
3 W.B. 4/5 pin A.C. valve holders.
1 Dubilier ·005-mfd. condenser, type 670.
1 Peto-Scott triple electrolytic condenser bracket
1 Bulgin twin-fuse holder, type F16.
1 W.B. mains-energised loudspeaker, type EM2, 2,500 ohms field.
1 Bulgin terminal.
1 B.T.H. Pēzolectric pick-up.
1 Simpson turntable, 200/250 volts.
1 Polar 500,000-ohm volume control, graded type.
1 Bulgin on-off switch, type S80.
1 Peto-Scott "Metaplex" baseboard, 12 in. × 10 in.
¾-in. plywood, for speaker baffle, motor board, etc. Peto-Scott (see text next week).
1 Coil B.R.G. "Quikon" connecting wire.
Flex, screened wire, screws, etc.

VALVES

V.1.	V.2.	Rectifier.
Cossor	Cossor	Marconi or Osram
41 M.H.L.	41.M.X.P.	M.U.12.

The output valve is also a triode, the maximum undistorted output being approximately 2 watts.

The H.T. Supply

Particular attention has been paid to the question of smoothing. In the case of each L.F. valve it will be seen that a separate L.F. choke is connected in series with the H.T. lead to the anode; while the smoothing in the main H.T. circuit is further looked after by the field winding of the loudspeaker. Thus, apart from the main smoothing of the H.T. supply, each valve is independently smoothed, with the result that the background is unusually quiet and free from hum.

(*Continued on next page.*)

THE PĒZOGRAM

(Continued from previous page.)

Although the photograph shows the Pēzogram built into a cabinet, in so far as its construction is concerned it is in two parts—namely, the amplifier, speaker, and power pack, and the motor-board, on which are mounted the pick-up and motor. Hence the constructor can choose a cabinet to suit his own individual taste, and it need not necessarily be of the type illustrated.

There is wide scope in the matter of cabinet design, and it would obviously be unfair to tie the constructor down to one type.

Automatic Speed Control.

Now a few words about the motor. This is the well-known Simpson electric turntable, and is one of the simplest devices that it is possible to obtain.

Actually the motor consists of a simple disc. It is designed for use on alternating current mains, having a frequency of 50 cycles. In these conditions the motor will run quite automatically at the correct speed—namely, 78 revolutions per minute, and no adjustment whatever is needed.

The turntable is started by giving it an initial twist with the finger, and this serves to start the motor which quickly picks up the correct speed and continues to run at this speed while the mains are switched on.

We would point out at this stage that the Simpson motor is not intended for use on mains other than those having a frequency of 50 cycles. This frequency, of course, is almost standard; at any rate, it is that of the majority of electricity supply companies throughout the country.

The beauty of the Simpson motor is that it is exceedingly compact, and there are no moving parts to require attention or to give trouble. Moreover, its simple construction means that it is inexpensive.

In addition to the motor and pick-up, two other components are mounted on the motor board. One of these we have already referred to, namely, the 500,000 - ohm potentiometer. The remaining component is the motor on-off switch.

Screened leads are used between the pick-up and volume control potentiometer, and also between this potentiometer and the grid of the first valve. This does away with any possibility of instability arising through induction from these two leads.

The Earth.

The screening in each case is taken to the metallised baseboard. An earth terminal has been provided so that the metallising can be joined directly to earth. The earth used for the radio receiver will serve quite well, or alternatively some other earth, such as a near-by water-pipe, or a direct connection to an earth tube or plate can be employed if this is more convenient. The amplifier will, of course, function satisfactorily in most cases without an external earth, but by making the chassis and all points connected to it definitely at earth potential the constructor is assured of perfectly stable operation and an absence of any slight ripple effects or other background noises.

As will be seen from the theoretical diagram on the previous page, a full-wave rectifier provides the H.T.

The mains transformer is the well-known Wearite, and is adjustable for A.C. mains having voltages of from 200–250. One of the advantages of this particular transformer is the simple and positive method of adjusting it for the particular mains upon which it is to be used.

The loudspeaker chosen for the "Pēzogram" is the W.B. mains-energised model, type [illegible]. This speaker has an ample handling capacity and will do full justice to the 2 watts output which the amplifier is capable of giving.

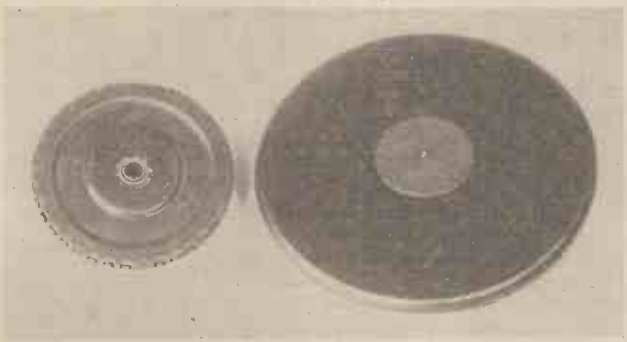
(To be continued.)

The amplifier and its power pack mounted in position. Note the simple nature of the construction.

A VERY SENSITIVE PICK-UP

This is the B.T.H. Pezolectric pick-up used in the Pēzogram. It is highly sensitive and gives excellent reproduction.

THE MOTOR AND TURNTABLE



The Simpson motor which is fitted to the Pēzogram runs at the correct speed of 78 R.P.M. quite automatically. It is unusually compact and requires no attention after it has been installed.

WHAT IS POWER?

Continuing his series on "Practical Radio and Electricity," Mr. Johnson-Randall here gives some valuable practical information in connection with domestic lighting and heating.

WHEN a dynamo generates current which is utilised for lighting lamps and running machinery and electrical devices generally, power is used. Just in the same way as a petrol or steam engine gives out so many horse power, so an electric generator produces the electrical equivalent.

In practical commercial electricity we do not normally consider the voltage and amperage individually, but, of course, these are both important and must often be known.

But, speaking generally, it is the power produced, or consumed, that concerns us most in connection with household lighting, running motors, and so on.

Electrical power is measured in watts, and equals the current in amperes times the volts.

Therefore, if the voltage is 200 and the number of amperes flowing is 5, then the total number of watts would be 1,000. 1,000 watts is called a kilowatt.

Kilowatts and Horsepower.

You often come across the word "kilowatt," particularly in connection with heating devices, such as electric fires. You know, for instance, that if a fire rated at 2 kilowatts is used on 200 volts mains, it takes 10 amperes, because watts divided by voltage gives current. Also, watts divided by amperes gives volts.

Many of you will already know that the mechanical horse power is equal to 33,000 foot pounds of work per minute. In other words, if 33,000 pounds weight is moved vertically a distance of 1 foot in one minute then the total work done is equal to a horse power.

(Continued on page 129.)

BARRY KENT CALLING!

FAMOUS ORGANISTS TO BROADCAST

Our special weekly feature which gives you all the latest news from the "Big House"

THE B.B.C. has wisely decided to seek out the most famous organists in their own lairs. Sir Walter Alcock is to be invited to play on his own instrument in Salisbury Cathedral as soon as the wiring is satisfactory. Others will follow in due course. This decision is taken in some quarters as showing a reversal of the policy of doing most of the organ music from Broadcasting House and St. George's Hall; but I understand that actually there is no change of policy.

* * *

B.B.C. Announcers

The other day, round at the "Big House," I had the chance of looking through a weekly duty sheet for announcers. I found this most interesting. Apparently there are seven announcers on the regular home programme staff. First in seniority comes Mr. A. S. Hibberd, who has now done rather more than his decade at the microphone. Then comes "Freddie" Grisewood, who, by the way, is marked down for an important new job in the near future. Then come the following in order: Mr. Harmon Grisewood, Mr. T. Lidell, Mr. L. Marson, Mr. R. MacDermott, and Mr. J. Esdaile. The work is reasonably spaced out, and there is now nothing like the strain there used to be.

* * *

Programmes in Yiddish

It has now been definitely decided to broadcast two special Yiddish programmes each year. Mr. Eric Maschwitz has concerned himself about protecting the interests of those who want to hear programmes in Yiddish.

* * *

Eugene Goossens

Eugene Goossens will be in England this summer and the B.B.C. is arranging for him to conduct several studio concerts. Mr. Goossens is fresh from new triumphs in the United States.

* * *

Special Summer Talks

Although the B.B.C. broadcasts very few talks in the summer, there will be several special series this year concerning the main subject of fish. First of all the fishing industry will be expounded in all its main aspects. Then there will be snappy chats about fly fishing and all the other kinds of the Waltonian art. The autumn should find the British public really fish-minded.

* * *

From Torquay

Doris Cowen (contralto) will be the solo artist in a concert by the Torquay Municipal Orchestra, conducted by Ernest W. Goss, to be broadcast from the Pavilion, Torquay, on Tuesday, April 14th, in the West Regional programme.

National Ballad Week

In response to the appeal of hard-pressed British music publishers, the B.B.C. has decided to co-operate in a National Ballad week, during which there will be a big drive to encourage the singing of ballads generally. The week will include several specially arranged ballad concerts, and there will be a larger proportion than usual of ballads in appropriate programmes. The date of the week will be announced shortly.

* * *

A Glyndebourne Offer

The organisers of the Glyndebourne Opera Season in Sussex have offered the B.B.C. free broadcasting facilities. There had been negotiations about a subsidy, but the appointment of the outside committee to investigate the relation of broadcasting to opera interrupted these.

The Sussex opera management has surprised the B.B.C. by the new offer. I do not expect it to be accepted. I should think the B.B.C., if they follow their cautious tradition, will repeat a previous offer of moderate payment, and leave it at that. In any event, however, there will be some relays this season.

* * *

A New Revue

On April 18th, in the Midland programme, Martyn C. Webster will produce a radio revue entitled "Song of Spring." Charles Hatton has written the book and lyrics, and the music is by Michael North. A lugubrious reporter is sent out by his news editor to get a "story" about Spring, and after each attempt at catching the right note and the full human interest, returns to the office. There is a surprise twist in the last scene.

Reginald Burston will conduct the Revue Orchestra and B.B.C. Midland Revue Chorus. Several of the artists in the cast are broadcasting for the first time. William Chambers, of Birmingham, has taken important parts in amateur opera, and in June last played "Prince Caramel" in Gilbert's "Princess Toto," which Sir Barry Jackson produced at the Birmingham Repertory Theatre. He began his musical career as a 'cellist. Maurice Westhead has acted at the Little Theatre, Leicester, and has been assistant producer there. He is Deputy County Librarian for Leicestershire.

* * *

Concert Party Shows

Two well-known Northern concert parties, which have been on tour during the winter, return to their summer headquarters for Easter week and they will broadcast to Northern listeners on April 14th. They are the Arcadian Follies from the South Pier, Blackpool, and the "Bouquets," who are to broadcast from the Floral Pavilion, New Brighton.

MAKING A NEW H.M.V. RECORD

Here we see Naughton and Gold, the two popular comedians, making their latest record called "Income Tax" at the H.M.V. studios.

THAT BUZZING NOISE

The story of a fault that wasn't!

WE had finished the construction of a short-wave superhet adaptor, and as it reposed on the table prior to being connected up to the broadcast receiver it was a joy to behold, with its trim upper deck and exceedingly short wiring—a real dream of a set. In fact, we had been dreaming about it for months.

The great moment came when it was connected up. Feverishly I turned the dial, and station after station rolled in without any whistles or interference, and rolled out again in a hair's-breadth. Our short-wave troubles were at an end.

As I turned the dial, however, I became aware of something. It was a high-pitched buzz—yes, of course it's Morse—but it didn't seem to tune at all. Swiftly I swept the dial from 0 deg. to 100 degs., and the blessed sound was just the same at all settings. Obviously, there was something very wrong for this to occur in a superhet.

I looked at my friend's face. It was quite serene. My own, I felt, was very worried-looking. I started to check over the wiring of the adaptor, when suddenly the sound ceased.

"Thank goodness!" said my friend. "The kid next door has stopped blowing his toy trumpet!"

W. N.

Mme. Marguerite Phalippon, the woman announcer at Toulouse-Pyrénées. Note the musical box, which produces the interval signal, in the foreground.

LEARNING FRENCH THROUGH YOUR RADIO

EVERYBODY CAN OBTAIN A GOOD KNOWLEDGE OF FRENCH BY FOLLOWING OUR SPECIAL EASY-WAY SERIES. THIS IS PART 11

By S. C. Gillard, M.A.

WE will correct our last week's test first. La situation européenne; la défense nationale; toutes les races primitives du monde; les décisions politiques; toutes les Opéras comiques; toutes les troupes italiennes; toutes nos relations; toutes ses actions dramatiques; toutes les machines électriques; son pistolet automatique; toutes les forces agressives; le Front populaire; la situation politique; la Fédération parisienne; le Swastika symbolique; tous nos efforts progressifs; la Révolution française; nos institutions anglaises; leurs créations expensives; l'influence de la civilisation générale; leur législation primitive; la réalité historique; une édition anglaise; la Société des Nations; la Constitution britannique; tous nos efforts collectifs; ses proportions massives.

No mistakes, I hope. (Pas de fautes, j'espère) (*pah de(r) foht, shess-pair*)

I think I ought to say a word or two more about FRENCH TIMES. Listening-in the other evening, I heard an announcer say:

MESDAMES ET MESSIEURS: NOTRE ÉMISSION SE REPRENDRA À 19 HEURES, DANS DEUX MINUTES. (Our broadcast will begin again at 19 hours, in two minutes) (*notr eh-me-se'o(ng) se(r) re(r)-prah(n)-drah ah deeze-ne(r)v-err, dah(n) de(r) me-nüt*)

In view of what I have already told you about FRENCH TIMES, you might have expected, instead of 19 heures, SEPT HEURES DU SOIR. But on the Continent the 24-hour-day clock is used. The obvious advantages of this system didn't strike the British public as being quite so obvious when the B.B.C. once introduced, as an experiment, the same system here. However, as the system is used in France we have got to learn it, whether we like it or not.

There is no DU MATIN (a.m.), DE L'APRÈS-MIDI (of the afternoon), DU SOIR (p.m.) in French broadcasting.

From midnight to midnight the numerals 1–24 are used to indicate the hours. From midnight to midday the numerals 1–12 are used exactly as in English. From midday to midnight the numerals 13–24.

Thus, for 1 p.m., we hear on the air 13 h.—i.e. TREIZE HEURES (*trehz-err*); for 2 p.m., we hear 14 h.—i.e. QUATORZE HEURES (*kah-torz-err*); for 5 p.m., we hear 17 h.—i.e. DIX-SEPT HEURES (*dee-set-err*)

SEVEN P.M., the beginning of the evening peak period, is 19 h. (*deeze-ne(r)v-err*)

The quarter-pasts, half-pasts, minutes to and minutes past are no different from what I have already told you.

Here is an announcement I once heard. I give it to you more as a reading test than anything else. I will help you where I think it necessary.

Nous relevons (we call attention) en outre (besides) du concert du 28 août, et des six concerts habituels à 12 heures 45, les belles manifestations (broadcasts) suivantes.

Le 29 acût, à 20 h. 45, depuis (from) le Casino d'Ax-les-Thermes une magnifique soirée (musical evening), au cours de laquelle (in the course of which) seront (will be) interpretées des œuvres de Rossini, de Massenet, etc.

Le 1er septembre, à 20 h., le concert de gala offert par le journal "La Dépêche."

FEMININE OF NOUNS AND ADJECTIVES

(Continued)

Words ending with -el, -eil, -en, -on, double the l or the n and add a mute e to form the Feminine. Thus:

cruel (cruel), cruelle; pareil (like), pareille; chien (dog), chienne; chrétien (Christian), chrétienne; bon (good), bonne; baron (baron), baronne.

Certain Adjectives have an alternative Masculine form, which is used before a noun beginning with a vowel or h mute. It is on this alternative form that the Feminine word is formed. Thus:

Adjective:	beau	nouveau	fou	mou	vieux
Alternative:	bel	nouvel	fol	mol	vieil
Feminine:	belle	nouvelle	folle	molle	vieille

Examples:

un beau garçon — un vieux sergent
mon bel ami — un vieil imbécile
un bel homme — un vieil habit
une belle journée — une vieille femme

(À Suivre.)

Le 2 septembre, à 21 h., depuis le Casino Municipal de Luchon le superbe concert classique, sous la direction du Maître C.

Si l'on ajoute (if one adds) les relais de Paris, le 5 septembre et le 1er octobre, donnés au Théâtre de l'Opéra, les auditeurs les plus difficiles (hard to please) devront se trouver (will sure to find themselves) complètement satisfaits.

Certain expressions above require explanation. For instance, le 28 août, le 1er septembre, le 2 septembre, etc. I mean, of course, the DATES.

TO EXPRESS A DATE CORRECTLY IN FRENCH YOU MUST KNOW THE NUMERALS 1–31 and THE NAMES OF THE TWELVE MONTHS OF THE YEAR.

Here are the months of the year (les mois de l'année (*leh mwah de(r) lan-neh*)

JANVIER (*shah(n)-ve'eh*); FÉVRIER (*feh-vre'eh*); MARS (*mahrss*); AVRIL (*av-ril*); MAI (*meh*); JUIN (*shw-a(n)*); JUILLET (*shwee-eh*); AOÛT (*oo*); SEPTEMBRE (*sep-tah(m)br*); OCTOBRE (*oktobr*); NOVEMBRE (*noh-vah(m)br*); DÉCEMBRE (*deh-sah(m)br*).

Having got hold of these, the next thing to remember is:

1. That the ordinals (i.e. 2nd, 3rd, 4th, etc.) are NEVER used, but always the cardinals (i.e. 2, 3, 4, etc.)

2. That ONE ordinal, however, IS used, namely, le premier (1er), the first.

3. That the PREPOSITION "ON," so popular in English, is ALWAYS OMITTED.

Just look carefully at these examples:

ON FEBRUARY 1st LE PREMIER FÉVRIER
THE FIRST FEBRUARY
ON THE 12th OF MARCH LE DOUZE MARS
THE TWELVE MARCH
ON THE 30th OF SEPTEMBER LE TRENTE SEPTEMBRE THE THIRTY SEPTEMBER

Note that these numerals can also be written in figures, thus:

le 12 avril; le 17 janvier; le 4 septembre; but le 1er juin.

Here is something I want you particularly to notice.

THE 11th OF ANY MONTH IS ALWAYS "LE ONZE," AND NEVER "L'ONZE." ELISION NEVER TAKES PLACE HERE.

Now if you will learn the days of the week (les jours de la semaine) (*leh joor d'lah se(r)-men*), we can begin to write some really long sentences.

DIMANCHE	Sunday	*de-ma(n)sh*
LUNDI	Monday	*lu(n)-dee*
MARDI	Tuesday	*mar-dee*
MERCREDI	Wednesday	*mair-kre(r)-dee*
JEUDI	Thursday	*she(r)-dee*
VENDREDI	Friday	*vah(n)-dre(r)-dee*
SAMEDI	Saturday	*sam-dee*

On Thursday, June 11th, at 8 p.m., we listened to (nous écoutâmes) a concert of classical music given by the Symphonic Orchestra under the direction of Maître X.

Try it first yourselves and then compare your translation with:

Jeudi, le onze juin, à vingt heures, nous écoutâmes un concert de musique classique

(*Continued on page* 131.)

RADIO MYSTERY CIPHERS

By LOUIS C. S. MANSFIELD

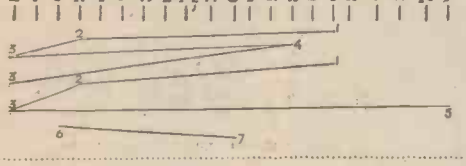
Quite a different style of cipher is chosen this week to test your ingenuity. See if you can solve it and win the Ten Shillings that is awarded for the first correct solution examined after the closing date.

SOME little time ago I mentioned that, during the war, one bright German spy used to transmit his information by means of drawings of English and American butterflies.

The different dots of the wing markings were so placed that they spelt out a message.

The basis of all codes of this nature is what is known as the "Graph" or "Zig-Zag" cipher, and this week I propose to show you how these are dealt with in the Secret Service Cipher Bureau.

HOW IT IS DECODED



In this system the key is made up by writing out the alphabet in any desired order at the top of a sheet of paper called the "key sheet."

Each letter is spaced about one quarter of an inch from the next. A vertical line is then drawn under each from the top to the bottom of the page so that it has twenty-six parallel lines each representing a letter.

The writer then takes a sheet of *transparent* paper and lays it over the key sheet.

This Frequency List Will Help You

(The following is the order of the frequency with which the commonest letters and words generally occur.)

COMMONEST letters: E, T, A, O, N, I, R, S.

INITIAL letters: T, A, O, M, H, W, C.

FINAL letters: E, S, D, N, T, R, Y.

Two-letter words: OF, TO, IN, IT, IS, BY, BE.

Three-letter words: THE, AND, FOR, ARE, BUT.

Other words: THAT, WITH, HAVE, FROM, THESE, THOSE, THERE.

(The above Frequency List represents the average of actual counting of tens of thousands of words and sentences. The order is, however, not to be regarded as absolutely rigid, for it is liable to vary according to the text being dealt with.)

If, now, he were going to write the word "THE," he puts a dot *on the top sheet* in such a position that it coincides with the T-line of the under sheet. Next he places one over the H-line, and a third over the E-line. Finally he joins them together to form a graph.

Of course, only the top sheet is sent to the other party. *He* reads off the message by placing the sheet over a similarly marked key.

The illustration shows a message so coded. Here we can see the top portion of the key protruding slightly and showing the letters and parts of the lines.

If you follow the graph carefully you will see that it spells out the words "THERE THEY GO," the commencing, angular and finishing points each representing a letter.

Since the dots are always placed over their appropriate lines it stands to reason that all dots representing one certain letter must always fall in the same vertical line, and therein lies the weakness of the whole method.

In the illustration the three points representing E and the two representing H bear this out.

If we have to solve such a cipher without the assistance of the key, all we do is to start at the beginning of the graph and assign a number to *every point which falls on the same vertical line*. This converts the whole thing into a figure cipher, which we can solve by the standard means.

The illustration has been numbered in this way, and the resultant figure cipher becomes 1.2.3.4.3, 1.2.3.5, 6.7.

This week's cipher should not give you any trouble if you deal with it in this way.

In the case of the butterfly wings, of course, the dots were not joined together, so all the operative did was to draw his own lines, convert them into figures and then solve them in the usual way.

Solution to Last Week's Problem.

SHOW LAMP TWICE WHEN READY.

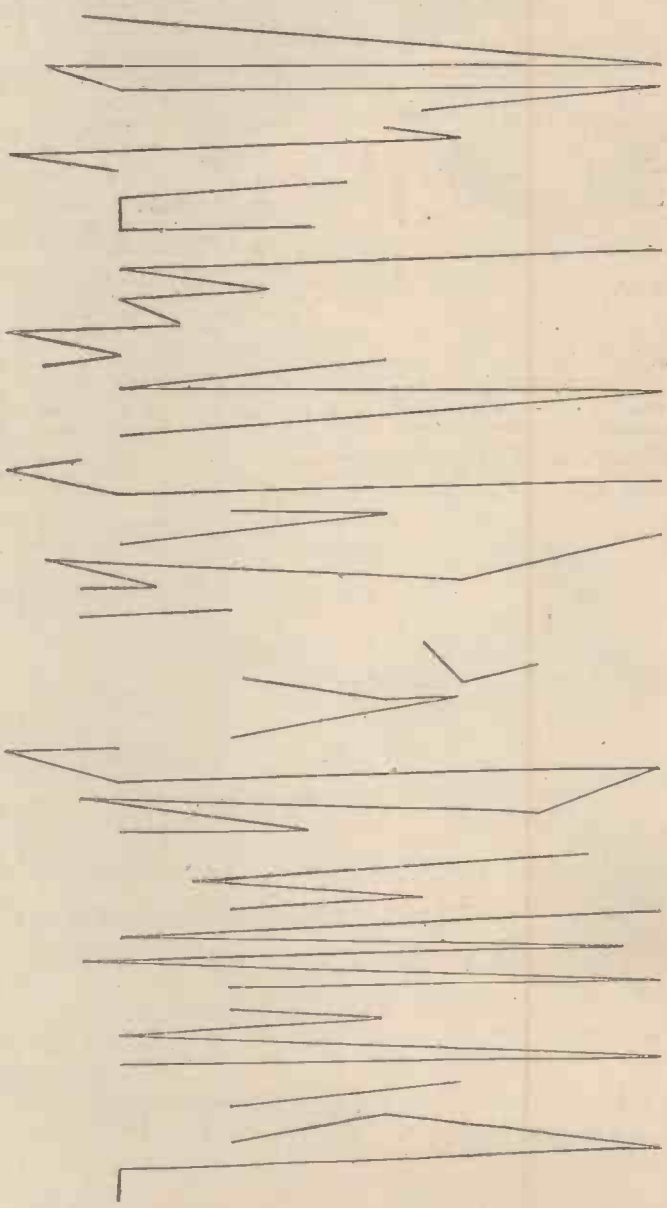
The name of the prize-winner in connection with Cipher No. 8 will be found on page 132.

"P.W." CIPHER No. 10

A gang of enemy spies has been operating freely in the country for some time past!

Secret Service operatives have not been able to locate them! Suddenly the following diagram falls into your hands!

What do you make of it?



A terrible looking puzzle, isn't it? But it is not so very difficult if you follow the scheme of deciphering illustrated in the first column. You will need the frequency list as a guide to the letters represented by the figures into which you will resolve the above lines.

For the first correct solution of this code message opened after the closing date we will pay TEN SHILLINGS. Your attempt may be sent in a sealed envelope if you wish. All attempts must reach us on or before TUESDAY, April 14th. The Editor's decision is final.

Try to solve it, write your translation on the back of a postcard, add your name and address, and post to: "P.W." Cipher No. 10, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.).

"P.W." CIRCUIT SPOTLIGHT No. 10

By K. D. ROGERS

THE LISSEN ALL-WAVER MODEL 8114

THE Lissen superhet all-wave Model 8114 is a six-valve receiver (including rectifier) covering wavebands of 13 to 33, 30–82, 198–556, and 900–2,000 metres. The price of the instrument is 17 guineas. The design is for A.C. operation only.

As regards the circuit the Lissen 8114 is right up to date. It employs variable selectivity in the intermediate stages, visual tuning by means of a neon indicator in the anode H.T. feed of the intermediate frequency valve V3, and a novel method of tuned circuit variation.

On short waves the valve V1 is used as a pre-mixer H.F. amplifier of the fixed variety, no A.V.C. being applied to that valve. The bias is obtained by the tap taken between the resistances R2 and R3 in series with the cathode-earth line. Note that the tap is taken to the coils L1, L2, L3 and L4 only, and that the other coils go to the earth line.

L1 and L2 are aerial coils and L3 and L4 are the tuned-grid coils. They are the short-wave inductances, and V1 is used as a short-wave H.F. amplifier coupled to the mixer valve V2 by a choke-fed, tuned-grid method.

Going back to the grid circuit of V1, you will see that the aerial coupling, when coil L8 is used, is an auto-coupled one, the pure inductive coupling being resumed when L6 is used, L5 being the aerial coil coupled to it. This occurs when the switch is in the long-wave position.

But with L8 and L6 in use the grid return is to the earth line, so that the bias on the grid of V1 is obtained by the full value of the resistances R2 and R3. This is 5,200 ohms, so that the bias is a very big one, quite enough to put the valve pretty well out of action. You will see why in a minute.

When the short waves are used, however, the grid return is to the bottom of R2, so that only 200 ohms is used as the effective bias resistance and the valve is set in a very sensitive state.

Now what is the reason for the increase of bias on medium and long waves? Merely that V1 is not used at all on those bands. Look at the switches S3, S4. When S1 and S2 are in the medium- or long-wave positions (bottom two contacts), S3 is shorting out the anode choke of V1. Therefore, V1 is completely inoperative, and the high bias reduces the H.T. consumption.

With S3 in the lower positions the grid of V2 is disconnected from the anode of V1 (see condenser C29), and is connected only to the coils L9 or L7 according to the exact position of the switch. How does the signal get across to these grid coils?

By virtue of the fact that they are inductively coupled to the grid coils of V1, and so we have on medium and long waves a tuned band-pass arrangement coupling the aerial direct to the grid of the mixer valve V2, the H.F. valve V1 being cut out of circuit altogether.

On short waves V1 comes into action and is coupled to V2 through C29, no inductive coupling between the grid circuit of V1 and that of V2 being present.

V2 is an octode frequency changer and operates in the usual electronic mixing method. Its output is fed through an I.F. transformer to the grid of V3, where the intermediate-frequency signal is amplified before passing on to the double-diode-triode V4. A mechanical adjustment of the intermediate-frequency transformers is possible and this allows their band width to be varied to provide different degrees of selectivity.

Obtaining A.V.C.

An intermediate frequency of 465 kc. is used and A.V.C. is applied to the mixer valve and to the I.F. amplifier V3. This A.V.C. is obtained from the right-hand diode of V4 which has the usual negative bias applied to it by virtue of the cathode resistance (R25) of V4. The signal diode (left-hand one of V4) is unbiased when radio is being used, for then the switch S10 is closed and S9 (pick-up switch) is open. Thus we see that the signal-diode circuit returns direct to the cathode of V4, the diode therefore being at zero bias.

When the pick-up is used, S10 is opened and S9 is closed. This latter connects the pick-up across the series resistances R22 and R23, and the voltage developed is passed "through" C41 to the volume control R24.

This path through C41 and the volume control is the same as that taken by the L.F. impulses from the rectified signal when radio is used, so that the same volume control is used in this set for radio or pick-up. The slider of the control is connected to the triode grid of V4 and the valve thus acts as the first L.F. amplifier. The grid is biased on both radio and gramophone for the grid return is to earth, thus obtaining grid bias by virtue of the cathode resistance R25. The bias is the same as the delay bias for the A.V.C. diode, of course.

Resistance-Coupled L.F.

The rest of the circuit is straightforward. The anode of V4 is resistance-capacity coupled to the grid of V5 (pentode output valve) through a grid stopper R31. The usual impedance equalising scheme is connected across the speaker transformer primary in the form of the condenser C48 and the resistance R32. There is a fixed tone control, or high-note reducer, C50, across the anode and cathode of V5, and this can be placed in or ont of circuit by the switch S11.

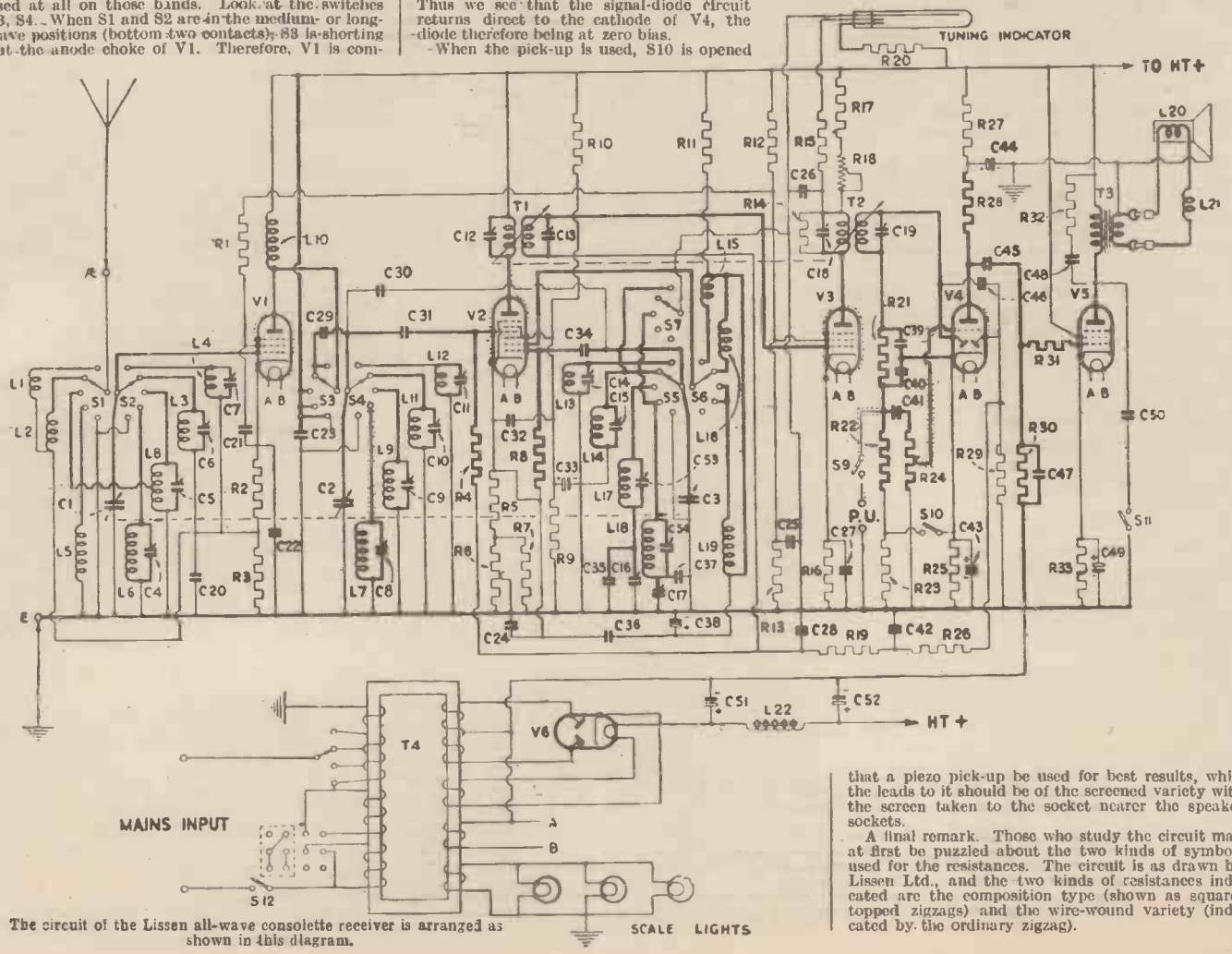
An additional speaker can be used either simultaneously or independently of the speaker incorporated in the Lissen all-waver. The leads from the speaker in the cabinet are fitted with "socketed" plugs. For simultaneous operation the additional speaker lead plugs are inserted in the extension sockets provided on top of the internal speaker plugs.

For independent operation the internal speaker plugs are removed and the external speaker is fitted into the sockets on the chassis. A very useful and simple arrangement.

The external speaker has to be one that can be matched with the speaker in the set, so that it must be either of the universal matching type such as the W.B. or else one with a speech coil impedance of between 2 and 4 ohms. No transformer is required, for the low-resistance side of the external speaker is used.

Pick-up sockets are also provided at the back of the set and the wavechange switch has a "gramophone" setting on it. Two green plugs are provided by Lissen for the pick-up connections and it is recommended that a piezo pick-up be used for best results, while the leads to it should be of the screened variety with the screen taken to the socket nearer the speaker sockets.

A final remark. Those who study the circuit may at first be puzzled about the two kinds of symbols used for the resistances. The circuit is as drawn by Lissen Ltd., and the two kinds of resistances indicated are the composition type (shown as square-topped zigzags) and the wire-wound variety (indicated by the ordinary zigzag).



The circuit of the Lissen all-wave consolette receiver is arranged as shown in this diagram.

PALESTINE IS NOW ON THE AIR

A NEW STATION THAT BROADCASTS IN THREE LANGUAGES

JERUSALEM has now its own broadcasting station, the first to be erected in the Holy Land. The station occupies some twenty acres of ground on a hill 2,900 feet above sea-level just outside the prosperous little town of Ramallah, which lies some ten miles to the north of the Holy City. From the station one has a commanding view of the country. On a clear day the southern side of Mount Carmel can be seen. It is an effective non-interference zone.

The building, specially designed and equipped for radio work, was erected for the Palestine Posts and Telegraphs by Marconi's Wireless Telegraph Co. The large transmitter is installed in the main hall and has a power of 20 kilowatts. The power is taken from the electric mains at Ramallah at 6,600 volts and transformed down to 380-volts, three-phase.

Built by Convicts

A feature of the station, and indeed of the whole neighbourhood, are the two 328-feet steel towers standing just over 820 feet apart. The feet of each tower are mounted on four groups of four porcelain insulators, which bear the total weight of 40 tons between the sixteen of them. It is a remarkable piece of engineering in itself, and the work has been done by convict sailors from the Jerusalem Prison, who are accustomed to clambering to great heights.

The wavelength used is 449·1 metres (668 kilocycles). There is provision made in the large hall for a second transmitter which will be used on another frequency, probably 307 metres, so that two simultaneous programmes may be given.

We in this country shall not hear "Jerusalem calling" very often, owing to the power of the station. The best reception outside Palestine will be at certain times in the late evening. It was thought that Palestine could hardly afford a high-powered transmission system at the present time, and the authorities have concentrated on entertaining Palestinian listeners and not others. All told, a sum of about £35,000 has been spent upon the building and the towers.

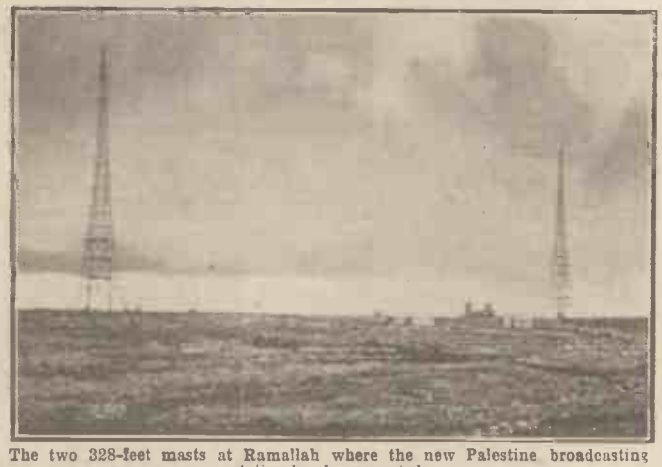
Five Hours a Day

A special Programmes Committee has been formed in Jerusalem, Mr. Bowman, Director of Education, being chairman. Both Arabs and Jews are represented on the committee. It is proposed to use the Jerusalem station for thirty-five hours a week, or five hours a day. At least two hours will be taken up with relays from foreign stations, including Egypt. The rest of the time will be given over to local talent with the purpose of entertaining and instructing Arab, Jewish and English listeners. The time will be almost equally divided among the three languages.

At least a quarter of an hour every day at the beginning of the broadcast will be devoted to children's programmes. An attempt is to be made to make part of the programme attractive to villagers, and the earlier part of the evening programme will consist of broadcasts in Arabic which will include news and announcements suitable for the rural population.

H. J. S.

THE NEW 449·1-METRE STATION



The two 328-feet masts at Ramallah where the new Palestine broadcasting station has been erected.

THE RADIO BULLETIN

(*Continued from page* 120.)

The other model, listed as the M16, is suitable for studio work and cuts up to 16-in. recordings. The price is £14. Both motors are for A.C. operation only and can be supplied to suit any voltage and frequency.

* * *

NEW SICKLES TUNER

Given a complete tuning unit incorporating, in addition to the ganged condenser, coils, trimming condensers, etc., the necessary valve holders for the pre-H.F. and mixer stages, the construction of a superhet is made very simple.

The Sickles "Radio-Heart" tuner is a unit of this type. It covers three wave-bands, including the short waves, the wave ranges extending from 16·5 to 2,140 metres, and consists of a metal chassis upon which are mounted the three-ganged variable condenser, the necessary H.F. coils, trimmers, waveband switch, as well as the two valve holders for the H.F. and mixer stages, and the other essential components such as by-passing condensers and resistances.

This unit is marketed by **R. A. Rothermel, Ltd.**, who inform us that they will shortly be in a position to supply it, aligned and calibrated, ready for use with Standard Telephones & Cables "Brimar" valves.

The price is 5 guineas without valves.

* * *

ALL-WAVE SETS

If the number of all-wave sets on the market is any criterion it would certainly appear that this type of receiver is definitely ousting the normal broadcast set. At any rate, by the time the Show arrives practically every manufacturer in the country will have one or more all-wave receivers in his range.

The Ferguson five-valve all-waver is the latest of which we have received details. There are two models available at the moment—namely, a console and a table model. Both are designed for A.C. mains operation, and tune from 17½ to 2,000 metres.

Tone control, full A.V.C., provision for a gramophone pick-up and an undistorted output of 3½ watts are among the features of this design. The price of the table model is 12½ guineas, and that of the console 16 guineas.

Very shortly an A.C./D.C. version will be available.

* * *

NEW BATTERY PENTODE

Progress in valve design is unceasing. The latest arrival in the valve world is the new **Mullard PM22D.** This is a high sensitivity output pentode for battery sets. Its design is such that it will step up the weakest of signals to a surprising degree, and so enable high magnification to be obtained for an anode consumption at 120 volts of only 3·8 milliamps.

The PM22D has a normal filament voltage of 2, and requires ·3 amps. L.T., and its maximum anode voltage is 150. The price is 13s. 6d.

* * *

FERRANTI CHOKES FOR B.B.C.

No less than **six Ferranti chokes** are numbered among the transmitting equipment of the new **Northern Ireland Regional.** Four of these chokes are of the oil-immersed type, and the other two are air-cooled. The largest of the chokes, iron-cored, weighs no less than one ton, while eight hundredweights of copper are used in the windings.

* * *

G.E.C. IN THE COLONIES

Radio relay stations are becoming very popular in the Colonies for the reception and redistribution of the Empire transmissions sent out by the B.B.C., and short-wave programmes generally.

The G.E.C. have taken a prominent part in the successful installation of these radio relays, and have supplied equipment to Sierra Leone, Accra on the Gold Coast, Nigeria and Hong Kong.

Moreover, **a special G.E.C. receiver unit** is to be put into commission in Palestine for the reception of the Empire and other short-wave transmissions.

Programmes will be picked up and redistributed by the new Jerusalem station.

* * *

AT THE IDEAL HOME EXHIBITION

No fewer than **35 Marconiphone loudspeakers** are in use at the Ideal Home Exhibition which is now being held at Olympia in London. These are placed in groups at various points of vantage in the Exhibition. Six and a half miles of twin wire are needed for connecting up all the apparatus, and the amplifiers used consume over 2½ kilowatts from the mains.

BROADCASTERS ON BICYCLES

(Continued from page 112.)

But he remains undeterred by these misfortunes, and may still be seen riding through the streets of London on the bike.

Another broadcasting man who used to cycle to the B.B.C. every day was Frankie Wilson, Henry Hall's ex-hot-trumpeter.

Now, popular Tommy Handley was a carrier-bicycle salesman before he became a comedian. For one day, at any rate! His employer glibly outlined the sales policy he was to adopt. The bicycle would be taken to the local butcher's shop and propped against the kerb outside. Tommy would then march boldly into the shop and open some irrelevant conversation, until the butcher, spying the carrier-bicycle outside, would lapse into a state of mild hysteria out of sheer admiration.

"What a fine bicycle!" he would say; and Tommy, bringing the glittering new machine into the shop for closer inspection, would proceed thus to effect a sale.

That was the plan, but this is what happened.

"Seized a Chopper"

It had been snowing, and when Tommy entered the shop, after carefully propping his bicycle right in the butcher's line of vision, as instructed, he removed his hat with a respectful flourish. A quantity of snow that had collected in the brim was tossed into the butcher's apron. Enraged, the butcher seized a chopper and, brandishing it towards Tommy, yelled:

"Get out of here! Get out before I do something drastic!"

And Tommy, leaping into the saddle of his beautiful bicycle, pedalled madly down the road. After that, he gave up trying to sell carrier-bicycles, and went into George Edwardes' chorus instead.

The entertainment world has its fair quota of motor-cycle enthusiasts. In fact, the first man in this country to fit a petrol motor to a bicycle was Davy Burnaby. In the old days, Harry Tate seldom missed a race meeting at Herne Hill, and Harry Roy has survived no fewer than six serious motor-cycle accidents. One left him with a perpetual headache for two years.

Composer's Fatal Accident

Even in the world of serious art, the bicycle is not scorned. Yehudi Menuhin, the brilliant young fiddle virtuoso, rides about the countryside on a bike with his young sister, Hepzibah, who provides such magnificent piano accompaniment to his playing. Mention of Yehudi Menuhin recalls one of my favourite works which he recorded some time ago—Ernest Chausson's "Poème." Poor Chausson; one of the most gifted members of the French Nationalist school of composers, he met an untimely end when, at the age of forty-four, he cycled into a wall in 1899.

FREE SEEDS OF GIANT CORNFLOWERS

Are you taking advantage of the Free Gifts for garden lovers now being presented in POPULAR GARDENING? This week's number (now on sale, price 2d.) contains a FREE packet of seeds of the lovely Giant Blue Cornflowers; because of their long-lasting beauty, these brilliant hardy annuals richly deserve this opportunity which POPULAR GARDENING provides for them to find a place in *every* garden.

WHAT IS POWER?

(Continued from page 122.)

Power always involves time. In our electrical equivalent we know that amperes are coulombs per second. You must not think that the mechanical horse-power is tied rigidly to 33,000 foot pounds per minute. It can be stated in other ways so long as the quantities and the time retain their correct proportions.

For example, a weight of 33,000 pounds moved through two feet in one minute would require 2 horse-power of work.

If the same weight took two minutes to be moved a distance of one foot, the total work expended would be ½ horse-power.

The Electrical "Unit"

The electrical horse-power is 746 watts. Therefore, in the ideal generating equipment, that is to say, an apparatus without any losses—or, to put it another way, 100% efficiency throughout—a motor of one horse-power should produce at the terminals of the generator 746 watts. In actual practice this is, of course, quite impossible, since the efficiency of the generator and the method of driving it have to be taken into consideration, and the total output from a generator driven by a one horse-power engine would be less than 746 watts.

You have probably met with the word "unit" as used in connection with electricity supply for ordinary domestic purposes. Your local electricity authorities supply energy at so much per unit. Suppose we imagine that it is 1d.

One unit is equal to one kilowatt hour—i.e. 1,000 watts every one hour. Therefore, a 1-kilowatt electric fire will cost 1d. per hour to run. A 25-watt lamp would cost—at 1d. per unit—1/40th of a 1d. per hour. This will be quite clear when you remember that for one unit of electricity you can get 40 hours of light from your 25-watt lamp.

This knowledge is very useful because you can so easily work out the cost of running vacuum cleaners, electric toasters, irons, and so on, once you know the cost of your electricity supply per unit.

Vacuum cleaners, irons and all other electrical devices used in the home are often marked with their consumption in watts, so it is easy to find out what their running costs are.

HAVE YOU THOUGHT OF THIS?

IT IS WORTH NOTING

WHEN operating an amplifier employing the Q.P.P. method, care should be taken to exclude heterodyne whistles from the Q.P.P. stage, such as the 9-kilocycle heterodyne between two adjacent stations.

The reason for this is that a note of this frequency, while being discernible by the average ear, if not filtered out, is often cloaked by the condensers *after* the Q.P.P. valve, and may give rise to a large increase in anode current, which is continuous because the whistle itself is continuous, and not fluctuating like the speech and music which are coming through at the same time.

Such a state of affairs can easily be overcome by the use of suitable condensers *before* the Q.P.P. stage, such as a ·0005-mfd. across the secondary of the Q.P.P. transformer, or a ·002 across the primary.

W. N.

YOUR RADIOGRAMOPHONE

Useful Aids to Home Entertainment.

By K. D. Rogers

FOR very little expense nowadays you can obtain a great deal of amusement and entertainment from the gramophone section of your radio-gramophone. This is not limited to the playing of gramophone records, for with very little trouble you can use that part of the set for a number of interesting things.

Home-recording is one of them. If you have a powerful receiver you can use one of the various home-recording units that are now available employing valves to provide the power for operating the cutting stylus. The input to the amplifier can be from radio or from some vocal or instrumental item provided by yourself or friends. Excellent results can be obtained after a little practice by using a condenser microphone such as that made by Bulgin, or with some other microphone of good design.

A New Transformer

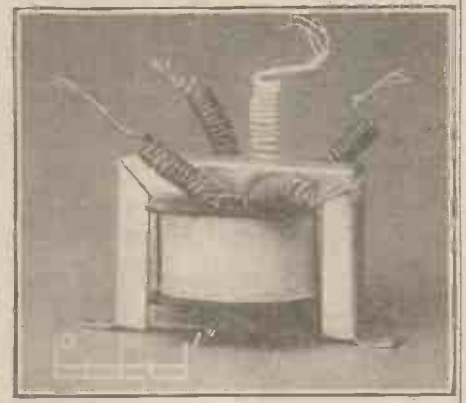
In many cases it is an advantage to use the microphone some distance away from the set, and here, in the case of the ordinary carbon microphone, a local amplifier can be constructed in a very small space if the new Bulgin transformer type L.F.35 is used.

This transformer has been primarily developed for use with microphone buttons and midget microphones such as are used in deaf-aid amplifiers, but may be used with any microphone requiring a step-up transformer of 35 or 70 to one (either ratio is available) and a primary current of not more than 30 m/a. in the first case or 50 m/a. in the case of the higher ratio.

The transformer, which is the smallest I have ever seen, is centre-tapped so that two microphones can be used in push-pull, if desired, a scheme that has the great advantage that the microphone current has no polarising effect on the transformer.

The L.F.35 costs only five shillings and will easily fit into a small amplifier that can be carried in the pocket if desired, or fitted on the microphone stand, with midget valves and small dry batteries for its operation.

COMPACT AND EFFICIENT



The inch scale on this photograph gives you an idea of how small is the new Bulgin microphone transformer.

And what more suitable when using such things as microphones and recording apparatus than a fader unit, so that the "mike" can be faded in and out, making place for some other form of programme, such as the radio, or else for another microphone.

A fader unit is useful in very many cases, and quite a lot of people like to fit means for fading so that they may "go over" from radio to gramophone without any break.

With the Dubilier "Fadover" unit this is easily possible. It is a double log potentiometer with centre point and with the two sections of equal resistance—namely, 250,000 ohms. The circuit I have drawn shows how the unit is used for fading radio and gramophone in and out, but obviously it can be used just as well to fade two microphones or two pick-ups.

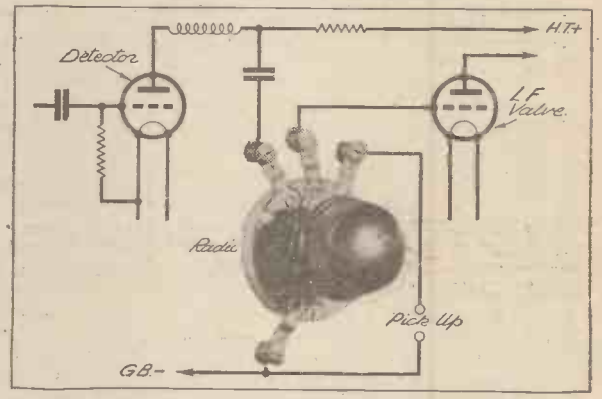
The value of the fader is quite suitable for use with the new piezoelectric pick-ups, which operate quite satisfactory with volume controls of 250,000 ohms, though they are more usually employed with 500,000-ohm resistances. As a matter of fact, I am actually using one of the Dubilier "Fadovers" in an amplifier of mine which has a piezoelectric pick-up. It is quite satisfactory and the cut of bass that is caused by the reduction of the resistance from 500,000 ohms to 250,000 ohms is really advantageous, rather than otherwise.

There is one point about the Dubilier "Fadover" unit that deserves special emphasis and praise. The whole unit is well made, but at the centre point, that is, half-way round the travel of the slider, there is a small "nick" into which the slider drops. It is not enough to upset the action of fading, but it does indicate the midpoint in a very positive way and is most valuable when you are using the component.

It allows you to set the instrument at the "no signal" point with absolute certainty, and this fact is one that is most important if you are going to use the potentiometer for any public address system or for playing records at public gatherings.

The log line that is used is so arranged, of course, that the fading is gradual in each direction from the midpoint. In other words, the log law is reversed on one side, so that in turning the potentiometer from either full clockwise or anti-clockwise setting, one reduces rapidly and then less rapidly until the centre or zero point is reached. The "Fadover" costs 6s. 6d.

USING THE FADER



The Dubilier "Fadover" double 250,000 ohms potentiometer connected for "radio or gramophone."

THE MEMOIRS OF A RADIO JOURNALIST

(*Continued from page* 119.)

Now and then Toni actually has to drop a part when Eric, on consulting the records, discovers that the broadcast will follow too closely on a previous one. "People will talk!" says Eric; and to avoid the fearsome prospect of "people talking," Toni suffers silent martyrdom.

But—to use an expression employed by nineteenth-century patriarchs in taking their wayward sons to task—she has "proved herself" quite outside Broadcasting House by lending an extremely competent hand in productions at the Gate Theatre Club, where, unhampered by the censor's interference, brilliant satires, plays and revues are enacted.

Tremendously Fascinating

Hermione Gingold is one of those girls of whom you frankly avow: "No, she's not pretty; but is she fascinating?" She is. Tremendously. It's a subtle fascination, difficult to communicate in print, but very definite and ever present. Her personality is vibrant and alive; her red, mobile lips seem always about to precipitate some caustic gag—and many of them materialise. She's sensitive and alert, and her mental agility conveys itself somehow when you are near her.

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page* 124.)

donné par l'orchestre symphonique sous la direction de Maître X. (*she(r)-dee le(r) o(r)nz shwa(n) ah va(n)t-err noo-zeh-koo-tahm u(ng) ko(ng)-sair de(r) mü-zeek klah-seek don-neh par lor-kestr sa(n)-fon-eek soo lah de-rek-se'o(ng) de(r) maytr X.*)

Here are a few phrases to begin practising on. Keep repeating them over and over again until your ears are familiar with the sound. You will hear dates and times galore on the air. There is no excuse for you if you fail to master these in record time.

QUEL QUANTIÈME SOMMES-NOUS ? What day of the month is it ?
kel kah(n)t'yaim som-noo ?
LE PREMIER JANVIER The first of January
le(r) pre(r)m'yeh shah(n)-re'eh
LE PREMIER DE L'AN The first of January
le(r) pre(r)m'yeh de(r) lah(n)
LE DEUX FÉVRIER The second of February
le(r) de(r) feh-vre'eh
LE DIX MARS 10th March
le(r) deece marhs
LE VINGT AVRIL 20th April
le(r) va(n)-tav-ril
LE DIX-SEPT MAI 17th May
le(r) dee-set meh
LE DIX-HUIT JUIN 18th June
le(r) dee-zweet shwa(n)
LE TRENTE ET UN JUILLET 31st July
le(r) trah(n)teh-u(ng) shwee-ĕh
LE VINGT-TROIS AOÛT 23rd August
le(r) va(n)-trwah-zoo
LE VINGT ET UN SEPTEMBRE 21st September
le(r) va(n)-teh-u(ng) sep-tah(m)br

And then these :

QUELLE EST LA DATE ? What is the date ?
kel eh lah daht ?
NOUS SOMMES LE TRENTE ET UN OCTOBRE It is the 31st October
noo som le(r) trah(n)teh-u(ng) ok-tobr
LE VINGT-NEUF NOVEMBRE 29th November
le(r) va(n)-ne(r)f noh-vah(m)br
LE VINGT-CINQ DÉCEMBRE 25th December
le(r) va(n)-sa(n)k deh-sah(m)br

Continuing our attack on words, I want you, this week, to collect as many NOUNS and ADJECTIVES as you can which end with -ARY or -AR. If then you substitute the ending -AIRE for the -ARY or -AR you will have a really good French word. Let me set you going with the following :

Honorary (honoraire) ; culinary (culinaire) ; military (militaire) ; primary (primaire) ; elementary (élémentaire) ; secondary (secondaire) ; literary (littéraire) ; the secretary (le secrétaire) ; necessary (nécessaire) ; revolutionary (révolutionnaire) ; contrary (contraire) ; centenary (centenaire) ; imaginary (imaginaire) ; spectacular (spectaculaire) ; popular (populaire) ; vulgar (vulgaire) ; parliamentary (parlementaire) ; circular (circulaire) ; extraordinary (extraordinaire) ; an adversary (un adversaire) ; voluntary (voluntaire) ; mercenary (mercenaire) ; epistolary (épistolaire) ; documentary (documentaire) ; fragmentary (fragmentaire) ; intermediary (intermédiaire) ; etc., etc.

And now will you translate into French ?

All the auxiliary troops ; all the elementary classes (les classes) ; the solitary flower (la fleur) ; all the cheap (popular) seats (les places) ; the general (vulgar) opinion ; a parliamentary expression ; an extraordinary beauty (la beauté) ; a voluntary act (un acte) ; a documentary fragment ; a fragmentary document ; the epistolary art (l'art) ; an intermediary agent (un agent) ; a secondary part (un rôle) ; an imaginary sick man (un malade) ; M. Laval's adversaries ; an opposite (contrary) direction (un sens) ; a culinary effort ; revolutionary tendencies (les tendances) ; a concert of popular music.

USING A PICK-UP

Jottings of interest to every radio enthusiast.

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

I SUPPOSE most people use electrical reproduction for their records nowadays, and the number of acoustic sound-boxes must be rapidly sinking to the minority. Not only does electrical reproduction give you much greater volume, if you want it, but there is absolutely no doubt that the quality is—or can be made—much superior.

It is a comparatively simple matter to fit an electric pick-up to a radio receiver. If the pick-up is fairly sensitive you can easily get full load to a powerful output valve with only one low-frequency amplifying stage, if this is efficient. If, however, the pick-up is relatively insensitive, it may be necessary to use two low-frequency stages. And in order to be right in your choice of pick-up, if you use a commercial set you should ask the maker's advice.

Connecting to the Set

The pick-up is connected between the grid of the first low-frequency amplifying valve (or detector) and the necessary tapping of the grid-bias battery — assuming the valves are battery driven. If mains valves are used, then one connection is taken to the common negative lead, whilst the other connection from the pick-up goes to the valve grid, the bias in this case being obtained by means of a resistance which is included in the cathode lead.

If you are using a mains-operated amplifier with a pick-up you may find that you get perfectly good quality of reproduction, but there is a background hum and, curiously enough, you sometimes find that this hum is much louder when the pick-up is being used than when the set is on radio, or, in fact, sometimes there is a hum with the pick-up when there is practically none with the radio.

Shielding the Leads

If you find this to be the case it will probably be due to interference coming in on the pick-up leads. These, as you will note from the above, are in the grid circuit and are consequently very sensitive to interference. They should be as short as

(*Continued on next page.*)

A READER'S APPRECIATION

Dear Sir,—May I thank you for the pleasure that you gave me in seeing my name in print in your issue of a week ago.

The surprise was a very pleasant one and I thank you for your cheque for 10s., which arrived on Saturday.

I have taken a very keen interest in your Cipher and other competitions, and I consider that they have enhanced the value of your interesting paper.

The information which you give in your paper is both sound and useful both to the armchair wireless listener and the practical man.

As an experimenter over a long period of years I must say that I have found your various features of very great interest to myself.

In S.-T. you have a very good man and I am in your debt and his for the " 700," which I have built and which has given me very great pleasure.

Thanking you for the prize.

I am, Yours sincerely,
A. L. LIDDELL.

50, Harcourt Street, Newark.

USING A PICK-UP

(Continued from previous page.)

possible and, if there is still any trouble, they should be screened by using screened wiring. The screened covering of the conductors should be connected to earth. If the use of screened wiring and the connecting of the shield to earth does not reduce the hum sufficiently, it may be that some other parts need to be earthed, for example, the metal framework of the gramophone motor. By taking an earth connection in your hand and placing this in contact with different parts of the set (taking care what you are doing, of course), you will easily find which particular part is the cause of the trouble.

Those Puzzling Terms

Newcomers to radio are often puzzled by some of the fundamental terms such as amplification factor, impedance, anode dissipation, and so on, which are quite familiar to old stagers.

The amplification factor may be defined in this way: if we have a certain voltage applied to the anode of a valve and a certain negative voltage applied to the grid, and we increase the negative grid voltage, then we shall have to increase the anode voltage in order to keep the anode current the same as it was before; the ratio of the change in voltage in the anode circuit to the change in voltage in the grid circuit is the amplification factor of the valve. The amplification factor is usually called the "mu" of the valve, and is the maximum voltage amplification which a valve can give.

Anode and Grid Voltage

It is sometimes described as the ratio of the change of anode voltage to the change of grid voltage which is required to cause the same change in anode current, that is to say, one volt on the grid is worth "mu" volts on the anode. This may seem a bit complicated, but it is really very simple. Suppose an increase of 15 volts on the anode produces a certain increase in the anode current, the grid voltage remaining fixed; now suppose that a reduction of 3 volts bias on the grid causes the same increase in the anode current, the anode voltage remaining fixed.

Then we see that it takes an increase of 15 volts on the anode to produce the same effect as a decrease of 3 volts on the grid. So 3 grid volts is worth 15 anode volts, or 1 grid volt is worth 5 anode volts. The figure 5 is then the amplification factor, and is called "mu." So you see how we get the statement that 1 volt on the grid is worth "mu" volts on the anode.

What Impedance Is

Impedance, another of the terms commonly used, is in a sense another name for what we call resistance. But, inasmuch as we cannot speak of simple resistance in the case of a valve (as it varies according to conditions), we have to use a term which is intended to take account of the fact that the resistance is not a constant quantity. The term impedance is really a generalised term including both resistance and reactance and, properly speaking, means a combination of the two. It is measured exactly like a resistance in ohms, and its value depends upon the frequency of alternating current.

In the case of a valve the impedance can be obtained by dividing the amplification factor by the "slope" of the valve and multiplying the result by 1,000. Supposing the amplification factor is 10 and the slope is 4 milliamperes per volt, then the impedance will be 10 divided by 4, that is, 2½ multiplied by 1,000, which is 2,500 in ohms.

Anode Dissipation

The anode dissipation practically explains itself, since it is the amount of energy which is dissipated in the anode circuit. Energy is calculated in watts, which is voltage multiplied by current, so that the anode dissipation in watts is arrived at by multiplying the anode voltage by the anode current. Usually the anode dissipation figure for a valve as specified by the makers represents the maximum anode watts which it is capable of dissipating without damage to itself.

Suppose, for example, that the maximum anode voltage is 200, and that this produces a current of 25 milliamps when the proper grid bias is applied, then the maximum anode dissipation will be 200 multiplied by 25, that is, 5,000; this is to be divided by 1,000 in order to bring it to watts, since we have taken milliampercs instead of amps. The result in the case in question will be 5 watts.

"P.W." COMPETITION RESULTS

"JUMBLED WORDS" COMPETITION

Owing to the large number of competitors submitting correct solutions together with the longest word made up from the initial letters of the "straightened out" radio terms, the Six Autographed copies of THE BOOK OF PRACTICAL RADIO have, according to custom, been awarded to the following entrants, whose correct efforts were the first to be examined:

Mr. C. P. Brooks, 8, Lucas Green Road, West End, Chobham, Surrey.

Mr. F. J. Crawley, "Dorothea," Eastfield Road, Louth, Lincs.

Mr. H. M. Fish, 33, Cranmore Lane, Aldershot.

Mr. W. G. Howitt, 2, Washdyke Lane, Hucknall, Nottingham.

Mr. G. Hudson, 20 "G," Peabody Estate, Southwark Street, London, S.E.1.

Mr. D. J. Marsh, 81, Addison Road, King's Heath, Birmingham.

Correct Solution:

1. Volt	11. Aerial
2. Accumulator	12. Resistance
3. Insulator	13. Earth
4. Positive	14. Terminal
5. Vane	15. Anode
6. Dial	16. Grid
7. Condenser	17. Battery
8. Inductance	18. Wavelength
9. Valve	19. Heterodyne
10. Reaction	20. Negative

RESULT OF "CIPHERS" CONTEST No. 8

THE PRIZE OF TEN SHILLINGS for the correct solution which was the first to be examined after the closing date has been awarded to:

Mr. T. Baker, 37, Co-operative Street, Ton Pentre, Glam.

The correct solution was given in our issue dated April 4th, 1936.

Eliminating Car Radio Interference

I said something a week or two back about "radio in the car" and a number of readers have asked me various points on this, more particularly as to how the interference from the engine can be avoided. I think I mentioned that there are various suppressor devices on the market specially designed for the purpose of cutting out interference from the magneto, sparking plugs and generator of the engine; but if you wish to make your own you can go quite a long way by the use of fixed resistances, preferably of the non-inductive type, of about 20,000 ohms apiece.

One resistance is connected to each sparking plug terminal, the high-tension lead from the magneto being then connected to the other end of the resistance so that the high-tension current passes through the resistance before reaching the sparking plug.

Watch for "Shorts"

These will need to be securely mounted, because they have to bear the drag of the heavy rubber-insulated high-tension cable, and, needless to say, care must be taken that no part of the resistance touches the iron casting of the engine, otherwise the current which should go through the sparking plug will short-circuit to the engine and that particular cylinder will not function, or will function erratically. Where a coil is used, it is a good plan to put another resistance, of the same value, in the lead from the coil to the distributor.

Interference from Generator

Having done all the above, you may still get interference from the generator of the car; if so, you can connect a condenser between the "live" terminal of the generator (usually the positive, the negative being generally earthed to the chassis), the other terminal of the condenser going to earth, or, if you like, the condenser can be connected direct across the output terminals of the generator. A suitable capacity for this is 0·5 microfarad; needless to say, it should be of good quality, not likely to break down and cause a short-circuit of the generator.

Nowadays the fitting of suppressors is a very simple business if you use commercial types such as are made by Dubilier and by Belling and Lee. Complete kits are available for four- and six-cylinder cars and the resistances have special clips for fitting to standard sparking plugs.

THE "CENTURION"

(Continued from page 111.)

almost automatically. The lines joining station names to the dots may be inclined (which does not matter a bit), and you will be able to see where any desired station will come by drawing an imaginary line from the station name to cut the dot line. You can actually draw a light pencil-line which should be parallel to the other "junction lines" near it. By applying reaction and turning the pointer to the new dot and turning the aerial balancer suitably, the desired station will come in.

(To be continued next week.)

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MISCELLANEOUS ADVERTISEMENTS

3d. per Word

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6/- per line for displayed lines
(12 pt. type)

Minimum Charge 3/-

Remittance must accompany order.

Advertisements for these columns are accepted up to first post WEDNESDAY MORNING for the following week's issue. All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.

SOUTHERN RADIO'S WIRELESS BARGAINS. ALL GOODS GUARANTEED NEW AND SENT POST PAID.

SPEAKERS.—Celestion Soundex Permanent Magnet, 11/-. Telsen Speakers Units, 2/9.

LISSEN KITS, ALL NEW, IN SEALED CARTONS AND COMPLETE.—With specified Valves; Lissen Skyscraper 3-valve Battery Kits, 42/- each (List 77/6).

G.E.C. A.C./D.C. Mains Three-Valve Sets. Complete with three Osram valves, in exquisite Bakelite Cabinet with Osram Moving-Coil Speaker. Ready to plug-in to any mains. Universal voltage. Brand-new in sealed cartons. Fully guaranteed, £3 19s. 6d. each (List £7 15s. 0d.).

HOUSE TELEPHONES. A SPECIAL BARGAIN. BRAND-NEW ONE-HAND TELEPHONES.—Complete on stand, with or without Automatic Dials. (Cost £4 each to Manufacture) 10/- each.

ELIMINATORS.—Regentone 1935 Series. A.C. Mains 200/250 volts, Type W5a, complete with trickle charger, 39/6. W1a (less trickle charger—carries 30 milliamps.), 33/-; W1c (less trickle charger), 30/-. All in sealed cartons.

COILS.—Varley Square Peak Coils, B.P.5, complete, 2/3. Telsen Iron-Core Coils, W.349 midget size, 4/6 each.

MICROPHONES.—ACE P.O. Microphones, complete with Transformer. Can be used with perfect efficiency on any set. 5/- each.

AMERICAN VALVES.—A full-range of valves for all American sets at 7/- per valve.

SOUTHERN RADIO BARGAIN PARCELS.—We are offering the following parcels of mixed components at a fraction of their value. The items comprise up-to-date Radio parts, new and perfect, which are too varied to be advertised individually:

5/- PARCEL.—Contains modern components valued at 20/-, including Resistances, Condensers, Coils, Wire, etc. Circuits of modern Receivers included with each parcel.

SOUTHERN RADIO Branches at 271-275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All Mail Orders to 323, Euston Road, London, N.W.1. **SOUTHERN RADIO**, 323, Euston Road, London, N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

The following unused Set Manufacturers' Surplus. All goods guaranteed perfect; immediate delivery.

ERIE resistors, 1-watt type, 7d.; 2-watt type, 1/2; Marconi 25 pick-ups, 22/6.

MAINS transformers, 350-0-350v., 60 m.a., 4v.-4a., 4v.-2a., 12/6. Eliminators, outputs, 150v., 25 m.a. S.G. and detector. A.C. type with Westinghouse rectifiers, 25/-; D.C. type, 12/6. Collaro gramophone motors, 100-250-v. A.C. 34/-.

CONVERSION Units for converting D.C. Receivers to A.C. Mains operations up to 80 watts, £2 each.

ROTOROHM volume controls with switch, 2/6.

MAGNAVOX speakers, complete with humbucking coils, output transformers, etc., 152 (9-in. cone), 22/5; 154 (7-in. cone), 15/9. All with 2,500 or 6,500-ohm fields. Magnavox PM254, 18/-. Carriage paid, cash with order or C.O.D.

WE can supply complete Kits of specified components for the A.C. S.T.600 at a competitive price.

WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

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MISCELLANEOUS

LOUDSPEAKERS REPAIRED, 4/-. Blue Spot a Speciality. Transformers and Headphones, 4/-. Eliminators, Mains Transformers and Moving Coils quoted for. 24-Hour Services. Trade Discount. Clerkenwell 9069.—E. Mason, 44, East Road, London, N.1.

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CORNFLOWER

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John Carpenter House, Whitefriars, London, E.C.4.

Please insert our/my advertisement in "Popular Wireless" for..... insertions at a charge of £ s. d. per insertion. Remittance hereuith.

Signed.....

Address.....

Date.....

POPULAR WIRELESS, April 18th, 1936.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

UNIQUE OPPORTUNITY FOR READERS (SEE PAGE 140)

Popular Wireless & Television Times

MORE ABOUT THE "CENTURION"
By JOHN SCOTT-TAGGART

EVERY WEDNESDAY PRICE 3D

No. 724.
Vol. XXIX.
April 18th, 1936.

Also This Week:

"I WANT GOOD ACTING, —NOT GADGETS"
Says VAL GIELGUD to ALAN HUNTER

\+ + +

FULL CONSTRUCTIONAL DETAILS OF THE PĒZOGRAM

\+ + +

First Selection of Articles written by Readers

\+ + +

A "Sensity Super" Prize is offered in a simple competition this week

If the glass top of your meter gets broken, a temporary repair for keeping out dust can be made by means of a transparent jam cover and a rubber band.

Editor: G. V. Dowding Asst. Editors: A. J. Randall, A. S. Clark

QUEEN BEES
HISTORIC MISTAKE
2LO's "COME-BACK"

RADIO NOTES & NEWS

THE UNBELIEVER
ONE OF US
NATURAL HISTORY

Swarm of Queen Bees

THE above heading is not intended to challenge the experience of all good apiarists, but it refers to the increase in the number of "Queen Bee" aeroplanes ordered by the Royal Air Force. These aeroplanes are of special interest to you and to me because they are fitted with such complete wireless control that they fly without a pilot on board, climbing, turning and re-turning at the behest of a small wireless transmitter on the ground.

Having nobody on board they make realistic live targets for anti-aircraft gun practice. Before they are fitted with wireless they are known as "Tiger Moths," and an Air Ministry order for a fleet of these machines combined with recent successes with wireless control makes it appear certain that the "Queen Bees" will be swarming soon.

"The Yanks are Coming"

ALTHOUGH I have not done much after-midnight listening lately I hear from plenty who do, and I am interested to note that the coming of the violet and primrose season has not stopped the American medium-wave stations from coming over with a whack.

An Edinburgh reader, S. A. B. G., says he got Philadelphia on about 256 metres, between midnight and three a.m. on March 17th. He wonders if they would send him a QSL card if he wrote; and though some of the U.S. stations do not bother much with reports of reception, I think it would be worth dropping Philadelphia a line in this instance. (The address is 1,622, Chestnut Street, Philadelphia, Pa.).

Another reader—a Bath chap, appropriately signing himself "P.W."—wants to know, "However do they pronounce that awful-looking word Schenectady?" It's easy. They silence the h, and pronounce it Sken-*eck*-ta-dee—with the emphasis on the eck. But don't ask me how they pronounce the neighbouring town of Poughkeepsie.

Historic Mistake

THE velvety silence of a Mexican night was recently shattered into a million fragments by a *caballero* who sallied forth in style, firing his ancient fowling-piece and emitting whoopees that curdled the blood of sleeping compatriots.

Hours and hours afterwards he slunk home again, looking mighty sheepish. And what do you think was the cause of his misplaced nocturnal enthusiasm?

He had turned on his wireless set in the middle of an historical play, just as one of the actors said, "The Governor was shot at midnight——"

This was precisely what our friend had been aiming to do for years, only he hadn't the pluck for it. And it was not till he found all well at Government House, and his hopes of loot had vanished, that he realised he had been fooled by a Mexican radio Scrap-Book!

Where the Short Waves Score

THE tragic floods which recently devastated great areas of the United States, proved again the inestimable value of short-wave wireless.

Incidentally, they gave a warning to American amateurs not to rely too much on the mains for power, for the wholesale destruction of light and power services brought the emergency set—run from batteries—into its own in several instances.

May I say how much I appreciated all the accounts of the disaster that were sent me by friendly readers? Thanks to information received I was able to keep closely in touch with the rescue work, and I heartily agree with correspondents who pay tribute to the U.S. commentators—some of their descriptions were of epic quality.

WIRELESS PLAYS BIG PART IN NEW FILM

A tense radio moment in the film "Ceiling Zero," which is shortly to have its first showing in this country. Pat O'Brien and James Cagney take leading roles.

Confirmation of Approbation

WIRELESS amplifier technique has now come to the aid of the hand-clap, and has put the applause of an audience on a scientific basis.

An instrument called an Applausograph has been invented by the Marconiphone Co., Ltd., for the use of those who have to

NEXT WEEK: ALL ABOUT EUROPE'S POWER INCREASES

PARIS FORGING AHEAD WITH TELEVISION

judge of an audience's reaction by the amount of hand-clapping. The machine records the applause on a roll of graph paper, which is semi-transparent, so that one item's applause can readily be compared with that of another by lying one paper over the other and shining a light through.

The judges of the Beauty Contest organised by the A.B.C. Cinemas in conjunction with Allied Newspapers will have an Applausograph to aid them in their task, and I should like to be there—for scientific reasons, of course !

A Special Announcement

THE life of a would-be announcer in the U.S.A. is not without its problems, as you may gather from the following. When the National Broadcasting Company test a would-be, they try him with French, Italian, German, Spanish and Russian phrases, and then they give him a piece of paper and say, "Read that, distinctly and briskly."

On the paper it says, "*The seething sea ceaseth, and as the seething seas subsideth, many men must munch much mush.*"

Most of the entrants get to the must-munching stage, but the last two words of the test mostly make much mush.

2 L O's "Come-Back"

SOME time this month the old B.B.C. quarters at Savoy Hill will be taken over by the Air Ministry. Already there are six buildings in various parts of London housing the Air Ministry's administrative staff, which numbers some 3,000.

The Savoy Hill premises, however, are not required for any purely administrative "passed-to-you" pundits, but they will house the Technical Section. This is the section that keeps an eye on wireless matters, so nothing could be more fitting than that it should be housed in the original home of the B.B.C.

The Unbeliever

DID I ever tell you this one ? An old lady who was bitterly prejudiced against radio would not even listen to wireless until she was badgered to try it by her children and grandchildren. But at last she consented to a demonstration.

All went well at first, for when they switched on there was a familiar tune beginning. The old lady listened to the end of it, and seemed partly convinced. She then staggered the demonstrator by saying "It wasn't too bad ; *let me hear it again.*"

He explained that was impossible, and offered this, that, and the other reason, but all to no avail. "If it won't play the tune I want, I don't want it," she said, "so take it away." And that was what he had to do —A.V.C., shadow tuning, and all !

One of Us

THE new and important post of Director of Production at the Air Ministry has gone to a man well-known in the radio world—Lieut.-Col. H. A. P. Disney.

Lieut.-Col. Disney was a pilot on active service in the R.F.C. at the age of 21. He has been a staff officer, a Chief Liaison Officer, and a Deputy Assistant Q.M.G. He was mentioned three times in dispatches, and received the Order of the Crown of Italy.

Entering commerce in 1919, he has been associated with the Western Electric Co., Standard Telephones and Cables, Ltd., Kolster Brandes, Ltd., and Standard Radio Relay Services, Ltd.

MICROPHONE SLIPS

LECTURER : *The fashion for the next season is to have as many splits in the skirt as the material will permit.*

* * *

RADIO AUNTIE : . . . *and I am pleased to hear your wife and family are in the hospital to-day.*

* * *

BEAUTY HINT.—*C——'s powders will take all your flesh off in a fortnight.*

* * *

COOKERY TALK.—*And for those listeners whose panties are empty—er—my mistake—er—pantries.*

* * *

BEAUTY TALK.—*This nail polish will give the impression that your nails were manicured in the time of Cleopatra.*

* * *

CHILDREN'S HOUR.—*What would you say, children, if you got up one morning and found your bed had flown away in the night ?*

* * *

ANNOUNCER : *The tobacco leaf in Australia gets mouldy very quick, and is no good commercially. However, it is good for us to smoke our own products.*

("Wireless Weekly," Australia.)

Since 1932 he has been with E. K. Cole, Ltd., so when Sir Philip Sassoon told the House of Commons that he was choosing for the post "a very good business man of special experience," he was right on the bullseye.

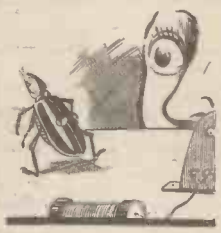
Judgment of Paris

HAVING looked with considerable care into this matter of television programmes, Paris has decided to make a permanent job of it. The experimental plant at the Eiffel Tower which has been in action with a power of one kilowatt is now giving way to a permanent outfit with a power of ten kilowatts.

A new building to house the gear has been erected in the gardens at the foot of the Tower—near the south-eastern pillar—where it attracts considerable interest. In fact, the gendarme in charge is getting positively huffy about people who want to peer inside, instead of at television receivers in their own homes. Behind any superficial irritation, however, there is the gratifying reflection that Paris had its television service on a permanent basis long before London.

Natural History Note

MY recent remarks on radio interference by living creatures like ants and alligators have brought me a tickle-some letter from A. R., a sea-going wireless operator of 1914–18 vintage.



He was on one ship which was so full of cockroaches that he used to amuse himself on watch by shooting them with a home-made catapault, using 4-B.A. nuts as bullets. On one occasion a huge cockroach climbed up the pillars of his emergency-set spark gap, walked along the brass contact rod, and tried to get across the spark gap. So R. A. switched on, pressed the key, and watched a blue flame of astronomical voltage catch the cockroach right amidships.

Instead of going up in smoke the cockroach merely fell off, shook himself, and walked slowly away, with a hole in his back where the spark had gone through. He did not even look shocked !

Those Mumbling Announcers

ANNOUNCERS have to put up with a lot of criticism, but one listener used to write such vitriolic letters about the mistakes made that it got unbearable. He said they mispronounced this, they mumbled that, they mucked up the records they put on, and they stammered and stuttered.

Finally, a long-suffering victim asked, "Who *is* this 'chap, anyway ?" and the subsequent investigation showed that the critic had never taken out a licence.

The magistrate, a victim of acidity, felt like it that morning and fined the accused a mint of money.

The incident was not given out in the news, being of insufficient importance ; but that is why the announcer recently said with such remarkable relish, "Good-night, everybody. GOOD-night."

Pardonable Error

HAVE you heard about the peppery old colonel who bought a wireless set one day and took it back the next in a fire-and-fury temper ? The dealer, trembling like an aspen leaf in a hurricane, finally managed to ask him what was wrong.

The colonel, escaping apoplexy by a hairsbreadth, succeeded in conveying that the cause of his trouble was that he had tuned in somebody giving a talk. This, he felt, should have been impossible. To cut a long story short, the dealer eventually discovered that the root of the trouble was a misunderstanding. He had assured the colonel the day before that the set was crackle-free, but the colonel thought he said cackle !

ARIEL.

How To Build THE PĒZOGRAM

Full constructional details of the special high-quality electrical reproducer which was introduced in last week's issue of "P.W."

Designed and Described by the "P.W." Research Dept.

Here is the amplifier and power supply section completely wired and ready to place in the cabinet.

THE Pēzogram, as we explained in last week's article, consists of two portions: these are the main baseboard upon which are mounted the components for the amplifier, and the power pack. Also, the loudspeaker baffle is fixed to this baseboard by means of two wooden angle brackets. The photograph above shows this part of the equipment.

Then there is the second portion, namely, the motor board, comprising the turntable and its motor, pick-up, volume control, and turntable on-off switch.

So long as the wiring and layout are adhered to the actual design of the cabinet itself is a matter for the constructor to decide. Even the motor board allows of some slight variation in its dimensions, although, of course, these are largely fixed by the turntable and its distance from the pick-up.

The First Point to Consider

There is no latitude here, otherwise the pick-up will be incorrectly tracked. But the positions of the volume control and on-off switch are not so vital.

The first point in the construction is to lay the various parts out on the baseboard and to wire them up in accordance with the wiring given on the next page. This wiring is quite straightforward, but there are one or two features that require a little explanation.

In the first place it will be noticed on looking at the plan view of the wiring that the loudspeaker outline is not shown. There is, of course, no need to show the speaker itself since all that matter are the leads to the field winding and the two leads to the terminals on the input transformer. If we had drawn the speaker in, it would have obscured some of the leads and so made the wiring more difficult to follow. So we have shown the input transformer (marked L.S.Tr.) and the two field-winding leads.

One of these field-winding leads is red and the other is black. The red lead goes to the terminal on the 4-mfd. condenser, the black lead goes direct to the middle 8-mfd. electrolytic condenser, and is joined to the positive terminal on that condenser.

In the case of the loudspeaker input transformer, the terminals needed in the case of the particular valve specified, namely, the Cossor 41M.X.P, are numbers 1 and 2. Terminal 1 is joined to the positive terminal on the 8-mfd. electrolytic condenser nearest the rectifier valve holder. A lead from terminal 1 also goes to the 20-henry L.F. choke.

Don't Change Over the Chokes

Terminal 2 on the input transformer goes direct to the anode terminal of V_2. It will also be noticed that a number of leads are taken direct to the metallised baseboard. These points are marked "MB" and the bared end of the wire should, in each of these cases, be screwed down firmly beneath a brass washer, so that a perfect electrical connection to the metallising on the baseboard is achieved.

Make sure that the two L.F. chokes are placed in their correct positions and connected up correctly. One choke, it will be noted, has a value of 20 henrys, and the other is of the 100-henry type.

The terminal for earthing the metallising is marked "E" in the diagram, and this, of course, is screwed down so as to make good electrical connection with the metallised surface of the baseboard.

No leads are shown going from the two fuses to the mains. But the two points marked "To mains plug," that is, the two ends of the fuses, should have a length of well insulated flex soldered to them and taken to a mains plug of a size suitable for an ordinary wall socket.

Another length of flexible is taken from the mains transformer end of these two fuses. One of these points is marked "To turntable terminal," and the other "To turntable terminal via on-off switch." This means that in the former case a flexible lead is taken direct to one of the motor terminals on the turntable, and in the latter case a lead is taken to the turntable on-off switch. This will be clear on reference to the motor-board wiring diagram.

Just near the valve holder V_1 will be seen a lead marked "To pick-up screening." This lead is joined at one end to the metallising on the baseboard by means of a screw pressing it firmly into contact with the metallised surface, and at the other end the wire is bared for a few inches and twisted round the screening on the screened lead which is joined to the centre terminal on the ½-megohm volume control. This will be clear when it is realised that the wire marked "To MB" in the motor board wiring diagram is the same as that marked "To pick-up screening" in the wiring plan of the chassis.

On V_1 the grid terminal marked "To pick-up volume control" goes via the length of screened wiring to the centre terminal on the ·5 megohm potentiometer.

Two other points in connection with this screening should be borne in mind. The

YOU WILL REQUIRE THESE PARTS

1 Wearite mains transformer, T.21B.
1 Bulgin L.F. choke, L.F. 14S.
1 Bulgin L.F. choke, L.F.34S.
2 Dubilier 8-mfd. dry electrolytic condensers, type 0281.
1 T.C.C. 8-mfd. dry electrolytic condenser, type 902.
1 Dubilier 50-mfd. electrolytic condenser, type 3003.
1 Dubilier 50-mfd. electrolytic condenser, type 3013.
1 T.M.C.-Hydra 4-mfd. condenser, type 50.
1 Amplion 50,000-ohm resistance.
1 Amplion 750-ohm resistance. (1 watt)
1 Amplion 300-ohm resistance. (1 watt)
1 Erie 1-megohm resistance. (1 watt)
3 W.B. 4/5 pin A.C. valve holders.
1 Dubilier ·005-mfd. condenser, type 670.
1 Peto-Scott triple electrolytic condenser bracket.
1 Bulgin twin-fuse holder, type F16.
1 W.B. mains-energised loudspeaker, type EM2, 2,500 ohms field.
1 Bulgin terminal.
1 B.T.H. Pezolectric pick-up.
1 Simpson turntable, 200/250 volts.
1 Polar 500,000-ohm volume control, graded type.
1 Bulgin on-off switch, type S80.
1 Peto-Scott "Metaplex" baseboard, 12 in. × 10 in.
⅜-in. plywood, for speaker baffle, motor board, etc. Peto-Scott (see text).
1 Coil B.R.G. "Quikon" connecting wire
Flex, screened wire, screws, etc.

VALVES

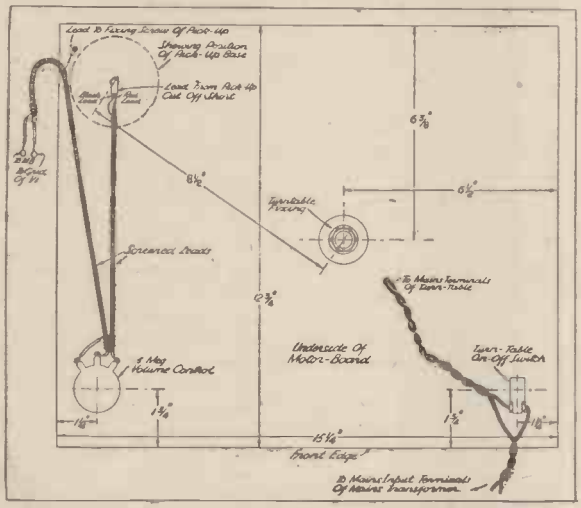
V.1.	V.2.	Rectifier.
Cossor	Cossor	Marconi or Osram
41 M.H.L.	41.M.X.P.	M.U.12.

THE PĒZOGRAM

(Continued from previous page.)

left-hand terminal on the volume control looking at the motor-board wiring diagram is connected to the screening on both of the screened leads.

HOW THE MOTOR BOARD IS WIRED



In wiring up the pick-up and volume control, special care should be taken to ensure that the connections to the shielding on the two screened leads are correctly carried out.

Another lead is also taken from the screening to the fixing screw of the pick-up. This connection earths the pick-up arm.

As far as the pick-up itself is concerned, it is sent out with two leads ready for connecting up. One lead is black and the other is red. In the Pēzogram these leads are cut off short and the black one is joined to the screening on the screened lead going to the right-hand terminal of the volume control.

The red lead goes to the wire proper, thence to the right-hand terminal of the volume control.

The Speaker Mounting

The construction is so simple that there isn't much else to say, except a few words about the loudspeaker mounting. This, as we mentioned previously, consists of a baffle supported by two right-angle wooden brackets. The dimensions of the baffle used are 12 in. long by 15 in. high by ⅜ in. thick. The dimensions for the wooden brackets are not critical so long as they provide a rigid fixing.

We mentioned last week that the Simpson motor is not self-starting. This point should be remembered when the completed amplifier is first switched on. The turntable should be given a clockwise twirl with the finger so as to start it rotating, when it will pick up speed and quickly reach a constant speed of 78 revolutions per minute.

Incidentally, no dimensions are given in the diagram for the position of the rest for the pick-up arm. These dimensions are not critical, and the rest should be placed so that it takes the weight of the pick-up arm just behind the head of the pick-up.

The photograph of the pick-up itself, which appeared last week, will make this quite clear.

Now a few hints about needles, and so on. In the first place you must decide for yourself whether you wish to use a semi-permanent type of needle or the ordinary change-every-time variety. Of the semi-permanent types the H.M.V. High-Fidelity needle gives very good results and will enable you to play sixteen sides (eight records) without changing. The Burmese colour needle is one that provides pleasing reproduction with a marked absence of scratch. This needle, however, should not be used on records that have been played with steel needles, otherwise the point will wear rapidly. The Burmese needle requires changing after each playing (one side).

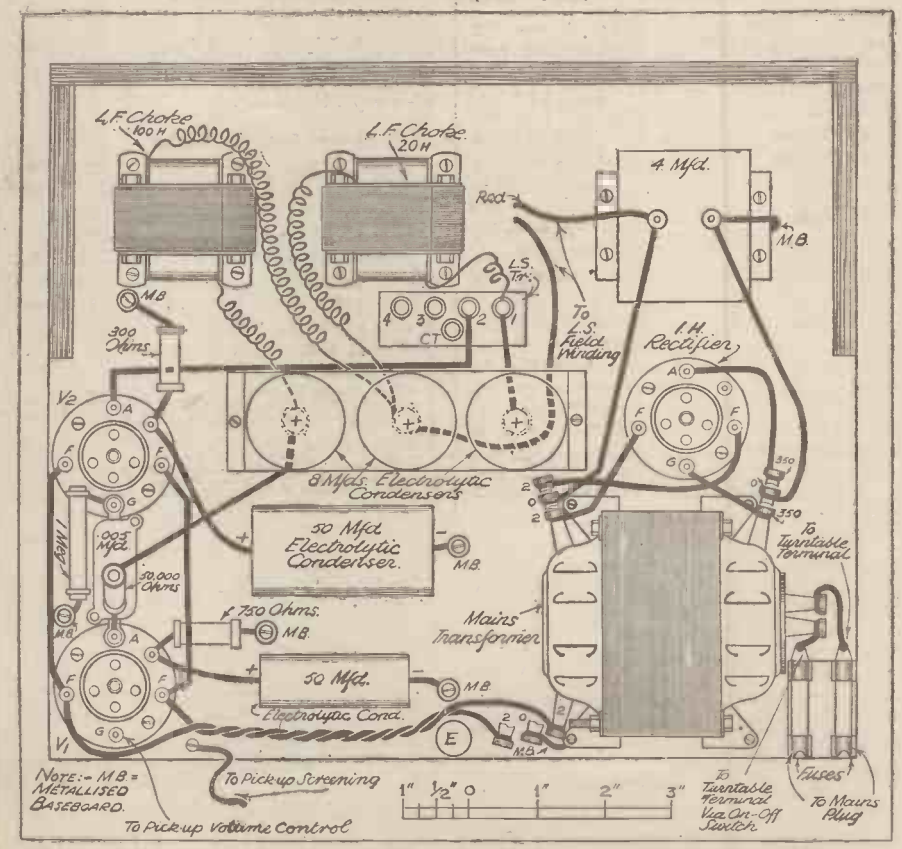
Don't Turn the Needle

By the way, don't turn any needle so as to get a fresh point after each playing. This gives a chisel edge and wears the record very quickly.

Another hint: Don't drop the Pēzolectric pick-up head on the record or turntable. It will probably damage the crystal.

Needle cups are very useful and you can easily fit a couple to your motor board—one for new and the other for used needles. Messrs. A. F. Bulgin offer a wide choice of different and very inexpensive types.

THE AMPLIFIER AND POWER SUPPLY



The main wiring of the Pēzogram is given in this diagram. Note that in the case of the speaker only the leads are shown; the actual outline of the speaker itself has not been drawn in since it would tend to obscure certain wires.

THE RADIO BULLETIN

Your guide to the newest developments in the Wireless Trade.

"HAMCO" RADIO TABLES

RADIO tables of different types and sizes are among the large variety of wood products marketed under the name of "Hamco." These tables are strongly built and are available in white wood, polished wood and solid oak. The tops of them are rendered acid proof—an important point when the set is a battery model.

The prices depend upon the height and finish, and range from 5s. 9d. for a 12-in. model in white wood, to 12s. 9d. for the 24-in. table in solid oak.

* * *

NEW CAR RADIO DEVELOPMENT

Suppressorless car radio is the very latest Philips development. British high-efficiency car engines are liable to suffer in performance from the use of suppressor resistances in the ignition system, and by eliminating this possibility the new Philips receiver should do much to popularise car radio in this country.

Seven valves are employed and the aerial is of the under-car type. It is also tuned, its natural frequency being in the region of the wavelength at which the engine interference occurs. It thus acts as a wavetrap on these frequencies and does not allow ignition noises to pass to the set.

(Please turn to page 156.)

VAL GIELGUD SAYS:

"I WANT GOOD ACTING, NOT GADGETS!"

THE WELL-KNOWN B.B.C. DIRECTOR OF DRAMA IS LOOKING FOR ORIGINAL RADIO PLAYS AND EVIDENTLY MEANS TO GET THEM, AS YOU WILL SEE WHEN YOU READ THIS ACCOUNT OF A RECENT PRESS CONFERENCE AT BROADCASTING HOUSE

BY

ALAN HUNTER

WHEN Val Gielgud, bearded, smiling and utterly suave Director of Drama, went like a Christian of old into the Lion's Den of the latest B.B.C. Press Conference, he knew his piece—and said it.

As a matter of fact, he has said a good deal of it to "P.W." already—but that is perhaps largely because our paper tells you to-day what a good many others realise they *ought* to tell you the day after!

"Acting," said the Drama Chief, "does and must mean more to me—and to you—than the finest gadgets the Effects Dept. can contrive. And because I believe so much that my job is to provide you with radio *entertainment*, I insist on the best possible actors and the best possible plays as the basic ingredients of my schedules."

All the old questions cropped up—and many were answered in anticipation by Val Gielgud's next remarks.

"We are sometimes accused of not encouraging authors to write specially for the microphone—so that in default we have to fall back on adaptations of stage successes.

The Truth

"What is the truth about this matter? You gentlemen of the Press know perfectly well. *Creative writing is a very rare thing.* And the market—the world-wide market—for really creative work is so big that we as a Corporation cannot hope to compete with the other buyers of this scarce material."

A new—i.e. unknown—radio playwright will usually get £30 for a play put on the air. A well-known dramatist will get more—up to perhaps £60. So a well-known contributor to Val Gielgud's drama schedule tells me, anyway. He ought to know!

Still, Val Gielgud does seem to be attempting to grip with this very old problem of finding authors who are willing to turn their attention to original radio plays. He said:

"I have, in the past few months, been in personal contact with authors whose stage plays have been adapted for the microphone—and my proposition that they might try their hands at original microphone work has certainly interested some of them.

Next Autumn we shall hear the fruits of this new "drive" for original radio plays. Denis Johnston, author of "The Moon in the Yellow River," Patrick Hamilton, author of "Rope," T. S. Eliot, author of "Murder in the Cathedral," and James Hilton, author of "Lost Horizon," are among those whom Val Gielgud has drawn into his ever-widening net.

Some Terrible Scripts

Without casting any aspersions on the few successful radio dramatists as such, the Drama Chief gave us a pretty grim picture of the sort of trash that he has to wallow in as the result of the curious delusion among amateur writers that anything's good enough for radio.

"My two play readers have to get through from twenty to thirty scripts a week," he said, adding, with a fearfully satanic smile, "and you can take it from me that only about half of one per cent of these efforts are even faintly readable!"

Well, if *that* doesn't damp the ardour of would-be radio playwrights, nothing will. But, of course, nothing ever does!

I should hasten to add that the standard set up by the Drama Director is not unattainably high. Indeed, one has only to recall some recent "original" plays to realise that.

If scripts go through the mill, would-be radio actors do so in like degree. They are put through a pretty gruelling test at the microphone—but it is all over in about ten minutes.

* * *

And now for a few "Gielgudisms" well worth recording, if only to remind you that the Drama Director is a man of definite views—not to mention experience necessarily denied the rest of us.

"The series 'From the London Theatre' is well worth while, and will carry on right through next Autumn unless someone can give me a pretty good reason why it shouldn't. We know that at least three stage plays have been 'saved' by having excerpts relayed. No, we have no knowledge of any London stage play having been *ruined* by that process!

Best Plays

"Best plays of recent months? I think 'A Bill of Divorcement,' 'Murder in the the Cathedral,' 'The Circle' and 'Henry the Eighth' are about the best broadcast plays I can recall. The failures? Well, 'Brumaire,' 'In Small Print' and 'The Snow Queen' must be included in that category.

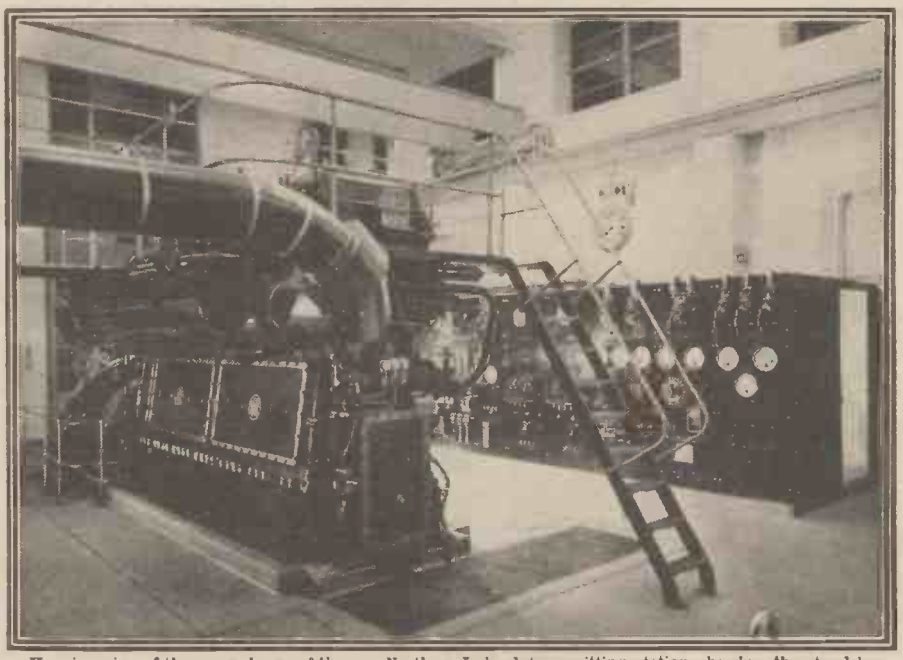
"How do we know when a play has failed? Oh, by letters from listeners, by the criticisms of you gentlemen—and, of course, we have our own opinion. Well, yes, perhaps our own opinion is the most important of all!

"Sound effects? The great secret there is, curiously enough, to know when not to use them! Background music? That, too, is a sound effect—and the same axiom applies.

"Intervals? Difficult, very difficult! I personally believe in the absolutely silent interval. Question is how long should the interval be? I think the objection to the use of a silent interval—namely, that listeners will think the transmitter has broken down!—can be met by the sounding

(*Please turn to page* 149.)

THE POWER HOUSE AT LISBURN



Here is a view of the power house of the new Northern Ireland transmitting station showing the stand-by Diesel generator plant and the power switchboard.

"BREAK-THROUGH"

Here is the first selection to be printed of the articles written by entrants in our Amateur Writers' Contest. Five articles written by five readers who have attempted to break into professional authorship. And this is how we shall choose the winner to whom the prize of the opportunity to contribute a weekly signed article to "P.W." for three months will be awarded. About thirty-five articles entered for the contest will be printed (as space permits) and paid for. The writers of the six considered by the Editor to be the best will be invited to submit further articles. Two or three of these will be printed and paid for, and their writers be asked to submit further contributions. And from these the final winner will be selected. Only by this method of systematic elimination do we feel that a fair decision can be made in view of the high general standard of the hundreds of entries.

OUR RADIO COMEDIANS

By A. E. Jones.

ERIC MASCHWITZ is searching for new radio comedians. A very worthy occupation, except that he contemplates a three-months' world tour for the purpose. What will he bring us? Musical numbers? It would seem hardly necessary to scour the world for music. Cross-talk comedians? I suppose we might be amused by a couple of Hungarians jabbering away in their own language, or a few hilly-billy Abyssinians rendering their latest war songs.

Surely there is sufficient new talent in England to fill the small variety shows which are our present fare.

Of course, when Mr. Maschwitz returns with his unique collection, and when they have all been groomed, educated, auditioned, censored and passed as suitable, they will be no different from the overworked few we hear to-day.

If our variety director were to stay at home and try a greater co-operation with the stage—the vaudeville stage—I feel sure he would find plenty of true English humour. Of course, there is the possibility that the famous Mr. Y. might have to appear by the courtesy of Mr. X. of the A. Theatre, and then there would be outrageous cries against such blatant advertising. But with the enormous resources of the B.B.C. and the intelligence of Mr. Maschwitz it ought not to be so very difficult to find home talent suitable even for the B.B.C.

None of us, I am sure, would deny Mr. Maschwitz a delightful holiday—even at our own expense. It's just the principle of the thing, and that, of course, is the reason for our little grouse.

YOUR RADIO ENJOYMENT

By Louis Peters.

PERHAPS you have never paused to ask yourself the question: "Do I get the maximum enjoyment from my set?"

A large number of people take their radio entertainment too exclusively. One man listens to the classics, another to the dance and humorous features, each having a poor opinion of the choice of the other.

In these days of rapidly spreading knowledge, we cannot too often remind ourselves of the necessity for keeping an open mind. We submit readily to tradition and prejudice, and, truth to tell, most of us resent the suggestion that we need continuous education, however fervently we may subscribe to the idea that "we never finish learning."

Do you make the occasional experiment of listening to an item that appears unpromising at first sight?

If not, you deprive yourself of some interesting and illuminating experiences. The adage that "one man's meat is another man's poison" is really a half-truth in this connection. We cannot be sure of the possibilities of varying our diet unless we try some new dishes.

There are those who can listen with equal enjoyment both to Beethoven and Clapham and Dwyer, but their number should be far greater. The science of humour is as exalted as that of music, and both have some claim on us.

Do not be discouraged by a feeling of disappointment on first acquaintance with the new; patience will be amply repaid by a full realisation of what broadcasting can be.

Believe me, the idea is well worth trying out.

RADIO—EXPRESSION OF A WORLD

By R. Harding.

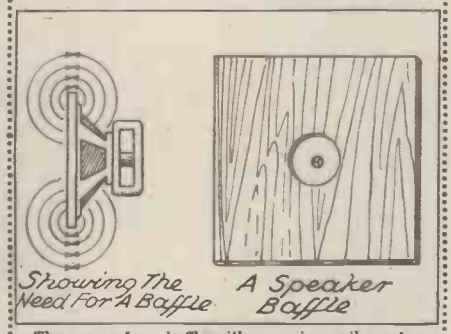
THE rapid growth of the popularity of Radio with its millions of nightly listeners and numerous high-powered broadcasting stations has caused at least one pioneer of Wireless to remark that the Earth has been turned into "a barrel-organ amongst the stars." Listeners possessing radios whose selectivity is not up to the high standard that modern broadcasting demands may feel very inclined to believe whole-heartedly in this statement, particularly so now that the ghost of Luxembourg haunts the ether.

But regarding this statement from a more serious viewpoint, the hundreds of daily broadcasts provide a means for the world to express itself, in its feelings, hopes, trimmphs, sorrows and its various nationalities. No longer, when considered in this light, does any resemblance to a "barrel-organ" exist, but in its place is a bond, which seems to cross continents and mighty oceans and brings the whole world together as one large community.

A very recent example of this expression provided by the Magic Bond of Radio can be found in the part played by Radio during the passing of our late beloved King. Could anyone in this world have failed to have felt a bond of common sympathy spreading to all corners of the globe, when it was announced that our honoured King and Emperor's life was coming peacefully to its close. The steady ticking of the studio "clock" . . . who can ever forget those last few, sad hours?

A whole world mourned, all thoughts turned from everyday routine and pleasure to a King's bedside and to the sorrowing family gathered there. And as the hours slowly ticked away, for the first time in history a world stood still and sought expression in the blessing of Radio.

WHY USE A BAFFLE?



The reason for a baffle with a moving-coil speaker is illustrated here. Without any obstacle to separate the sound waves given off at the front and back surfaces of the speaker there is danger of the low-note sound waves curling round as indicated and neutralising one another. Thus, without a baffle to prevent this, the low notes are not properly produced—being self-cancelled.

ANSWERS OVER THE AIR

By T. Behrens.

THE P.M.G. tells of seven million happy licence-holders. From time to time nearly every one of us feels the call of pen and paper and lets off steam to "P.W.," the men who manufactured our set, or Sir John Reith. Sometimes we receive a reply, and sometimes our replies are of sufficient general interest to be published. Why not broadcast them?

A "Radio Half-hour" each week, devoted to technical and programme replies, would stimulate interest in amateur construction and programme arrangement. The two sides to broadcasting could be discussed alternately.

Transmission of constant-frequency records would enable sets to be tested with the certainty that no errors had been introduced by a faulty pick-up. This would make it possible for distortion introduced at any point between the transmitting aerial and the amplifier output to be detected and corrected.

An occasional lecture would add interest, especially if accompanied by experiments in transmission. For instance, the result of varying the percentage modulation could be illustrated, or the difference between transmission with and without volume contraction and expansion.

Details of amateur activities are of general interest, and examples of the results obtainable from home-made microphones, pick-ups or records might be broadcast. For television, when it comes, we have the home movies.

With a touch of humour, such broadcasts would be entertaining and instructive, bringing the B.B.C. nearer to its listeners and swelling the "amateur ranks."

THE HIGHBROW

By J. Maugham.

JOE LEWIS prides himself on being a highbrow.

Chamber music, symphony concerts, talks on Art, and so forth. Dropping in the other night, I found him listening to a full-blast edition of Beethoven's Fifth Symphony. He was also busy with about half a dozen garden catalogues, writing up his yearly order for seeds.

"Listen!" he said. "Great stuff, Beethoven."

As a matter of fact, I had rather a weakness for the Fifth Symphony, but preferred it at quarter strength.

"You know," Joe said expansively, "the trouble with a lot of chaps like yourself is that you don't realise what a boon wireless is to thousands of folk who otherwise would never have heard Beethoven. Right up to your fireside, just turn on the switch and Stowkowski conducts on your hearth-rug. How d'you like it?"

And while I was thinking of something suitable to say of Beethoven (suitable?) he pitchforked me into a description of the changes I was going to see in his garden this year.

Summer house to be moved right up to the far end where there was more sun. Two small lawns to be converted into flower beds, standard roses in the centre. Roses make such a difference.

By this time Joe's super superhet had been toned down, almost absent-mindedly, but Beethoven was still trying to make himself heard. Snatches came to me all mixed up with begonias, bulbs, and bluebells.

And so Stowkowski played himself out, but Joe was non-stop on gardens.

Later I went home, wondering if wireless was such a boon, after all. Bring Beethoven right to your door. Millions hear him who would never have had the chance.

But the real rub is that these millions who would never have heard the Fifth Symphony hear it now only to ignore it. And I wondered whether it were better not to have heard of Beethoven than to make his music a background to begonias.

No, Joe, the trouble is that wireless is too easy, and for that very reason all that we ask of it is entertainment. And, moreover, entertainment that can be toned down without an apologetic cough, or an "Excuse me, Brother Beethoven"; as a matter of fact, one might say toned down almost absent-mindedly.

ON THE SHORT WAVES

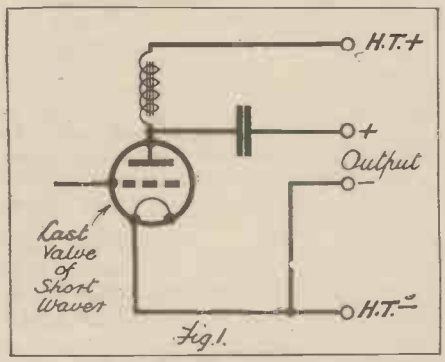
"COUPLING TO THE AMPLIFIER"

W. L. S. discusses the various methods of connecting a short-wave set to an existing L.F. amplifier.

I HAVE often expressed the opinion that while one may like to possess more than one receiver, there is no particular point in building more than one L.F. amplifier. Readers who have to study economy have always backed me up in this statement, and I have recently had a large number of letters asking queries on the subject.

Suppose you run, in one room, a short-wave receiver and a broadcast receiver, and also have a fondness for gramophone reproduction and an occasional experiment with a home-made microphone. One well-built, self-contained L.F. amplifier is sufficient for the whole outfit, providing

CHOKE-FILTER OUTPUT



A simple choke-filter arrangement such as is often used in the last stage of a short-waver.

that the receivers are so built that they may be readily coupled to it.

On the other hand, you may own a commercial broadcast receiver provided with pick-up terminals; and if its L.F. side is of reasonable dimensions and gives really good quality, then you cannot do better than to omit the L.F. on your short-waver and make use of the broadcast set.

Take Care of the H.T.

Difficulties arise at once if the headphone or loudspeaker terminals on your short-waver are provided for a simple direct connection in the anode circuit. If it is a two-valver using this scheme, then one of them is connected to the anode of the last valve and the other to H.T. positive. Any attempt to connect them directly, either to pick-up terminals or to the grid of the first valve of an amplifier, would be liable to have disastrous results, particularly if common batteries are used.

It is always advisable, therefore, if you are contemplating any attempt at coupling into a further amplifier, to take steps to remove the H.T. from the output terminals of the short-waver right away.

Fig. 1 shows the most commonly employed scheme—the simple choke-filter output arrangement. I invariably include it in every short-waver I build (for *myself*, that is!), since it helps the design in many other ways, notably in the freeing of the phone cords from all suspicion of "liveliness."

With such an arrangement it is really incorrect to label the output terminals "plus" and "minus," as I have done in the sketch, since the positive H.T. is now right out of the picture. They should really be called "earthy" and "live." Using the familiar symbols, however, you must note that the negative side is the side which must be connected to the negative pick-up terminal of the broadcast set.

One of the pick-up terminals probably goes directly to the grid of the first L.F.—or, maybe, to an L.F. transformer which couples to the grid. With output connections as shown in Fig 1 you may have to try the leads both ways round before you succeed in getting results, *but*—and this is the important point—you can't damage anything if you connect them the wrong way by mistake.

Another Suggestion

If the L.F. choke is of the impedance usually employed in the output circuit, it probably won't be the most suitable for coupling into further L.F. amplification, If, however, you have a biggish amplifier you won't find the loss a serious business. It is one of quantity rather than quality, and you probably won't worry about it.

Up to now I have been thinking-chiefly about coupling through to the pick-up terminals on a commercial receiver. If you have a home-built amplifier, the two input terminals will probably be connected to the grid of the first valve and to the earth line or chassis. Possibly across the first grid and earth you will have a volume control, in which case the input terminal on the "live" side will go to its slider.

The output arrangement shown in Fig. 2 is admirable for coupling to such an amplifier, and it doesn't matter whether the valve shown in the diagram is the actual short-wave detector or an L.F. stage following it. It is a simple resistance-fed transformer scheme—always nice for short-wave receivers—and again possesses the advantage that it can do no damage if you inadvertently connect it the wrong way about.

There are several combinations of short-wave receiver and L.F. amplifier available, and I expect that readers, between them, will have practically all of them. The commonest, possibly, is that of a single-valve short-waver and a two-valve L.F. amplifier, either as part of a broadcast receiver or as a separate piece of apparatus.

My own short-waver, at the moment, is a two-valver, and for real speaker work I couple it to a single L.F. stage of rather lusty dimensions, which is built integrally with the moving-coil speaker and its own power-pack. It uses a couple of large output triodes in push-pull, and I am thus able to give it the full output of the short-waver without overloading.

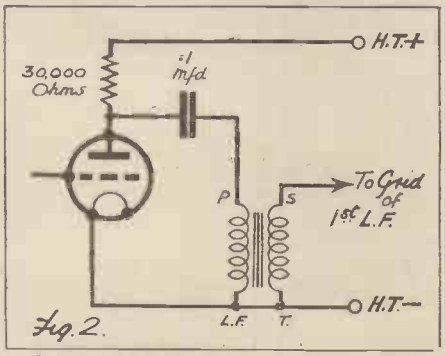
"A Simple R.C. Affair

The broadcast receiver which feeds into this same amplifier already has an L.F. stage, and I *can* feed the short-waver into this, giving three stages of L.F. in all; but the short-waver's output has to be cut down so much to avoid overloading that I prefer to go right to the final push-pull stage.

The L.F. stage in the short-waver itself, by the way, is a simple resistance-coupled affair purposely designed to give only that amount of amplification which makes for headphone comfort. I *could* get heaps more out of it, but I certainly don't want to for 'phone work.

If you have a kind of "general-purpose" two-stage amplifier, it is a very convenient plan to arrange the input side so that it is connected to an ordinary jack. Plugs from the broadcast receiver, pick-up, short-waver, and microphone transformer can then be inserted as the mood takes you.

SHUNT-FEED TRANSFORMER



The parallel-fed transformer scheme shown above can easily be coupled to an existing L.F. amplifier

This does away with complicated switching and "fading" devices, which I know some people rather like to use.

I hope I have cleared up the doubts existing in readers' minds on this important question. I have not dealt with individual queries, but I rather fancy that I have cleared them all up in a general way.

BELOW you will see a reproduction of the new certificate that has been drawn up, and will be awarded to readers of "P.W." who have proved themselves to be proficient in the art of short-wave reception.

How To Get Your Certificate

1. The certificate is to be awarded to readers who have received at least *two* telephony transmissions from each of the six continents of the world—Europe, Asia, Africa, Oceania, North America and South America.

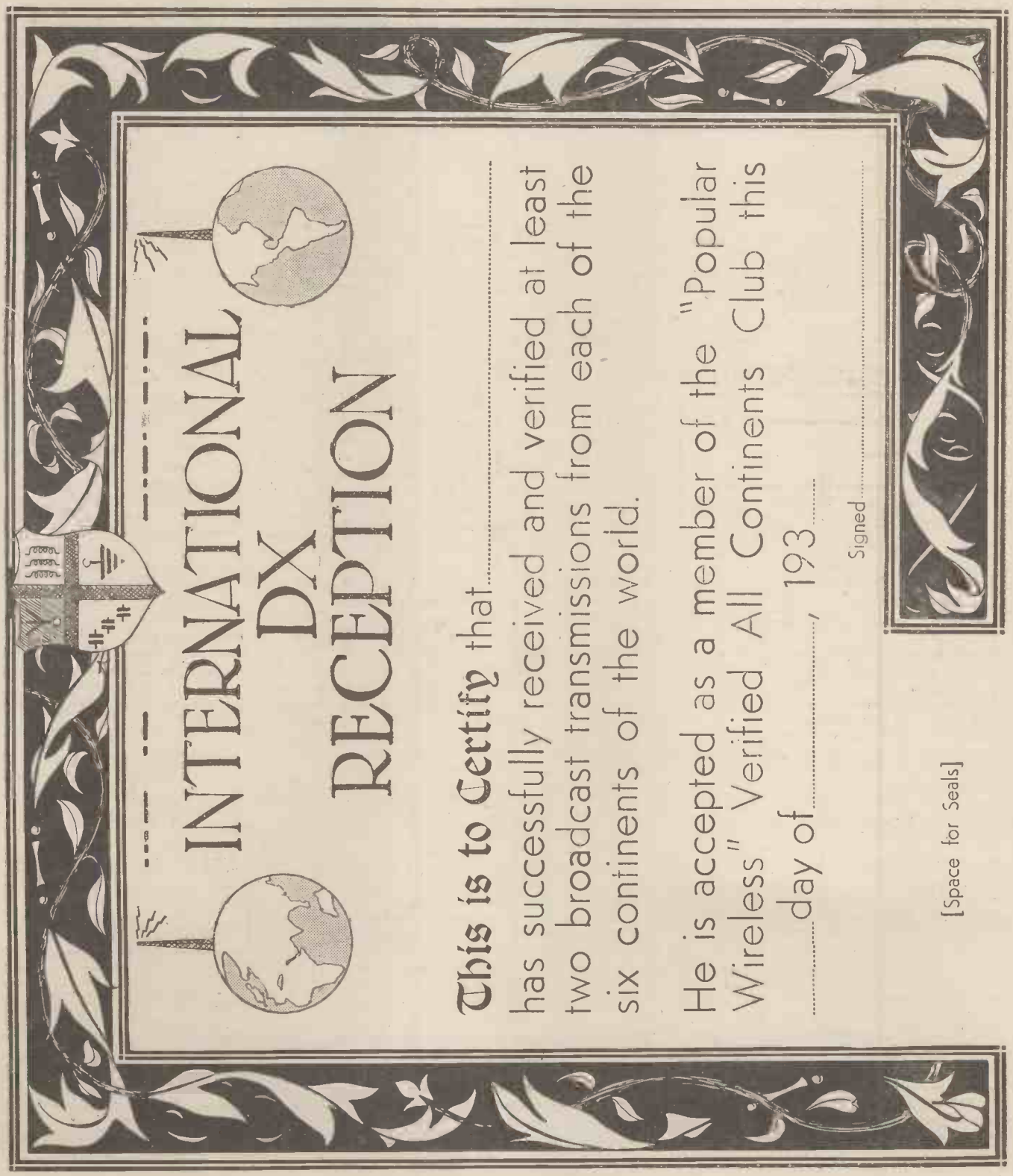
2. Verification cards or letters must be enclosed with the applications, together with a stamped, addressed envelope for their return.

3. For every *further* set of twelve verifications (two from each of the six continents), a special gold seal will be forwarded. This may be stuck in the space provided at the bottom left-hand corner of the certificate.

4. "North America" includes all countries on the American continent north of the Panama Canal, *and* the West Indies. "Oceania" includes Australia, New Zealand, New Guinea, Borneo, Philippine Islands, and the Dutch East Indies, together with all the Pacific Islands except the

(*Please turn to page* 153.)

THE "P.W." INTERNATIONAL DX CERTIFICATE



PRACTICAL RADIO AND ELECTRICITY

In this week's instalment of the special "P.W." series for beginners, Mr. Johnson-Randall goes into the question of magnetism and the various important practical effects produced by it.

PRACTICALLY everyone, I suppose, has at some time or another met the common horseshoe magnet. In many cases it has merely been used for boyhood experiments, such as picking up small steel articles and so on. Perhaps some of you have carried out experiments with a magnet and a small compass. If so, you will remember that when the magnet was brought near to the compass needle it immediately caused the needle to agitate violently.

LINES OF FORCE

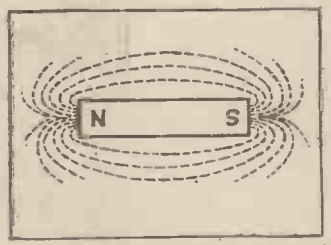


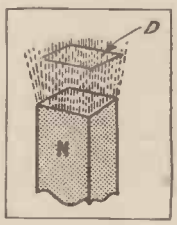
Fig. 1.—Showing how the lines of force from a bar magnet are disposed.

In electricity this property of magnetism is of vital importance. If you took a bar magnet and suspended it from its centre point so that it could move freely, its ends would point in certain definite directions. One end would point to the North pole and the other to the South pole. This, of course, is the principle of the compass.

North and South

The end of the magnet pointing to the North pole is called the North pole of the magnet, and, similarly, the other end is the South pole of the magnet. Hence all magnets have two poles, North and South.

If you took your bar magnet and placed it so that its North pole came near to the North pole of a compass needle, the needle would be deflected away from the magnet. If, on the other hand, you placed the magnet so that its South pole was brought near to the North pole of the compass needle, then the needle would swing round towards the magnet.



FLUX DENSITY

Fig. 2.—The number of lines passing through a given area, such as the square "D," is called the flux density.

There is a law of magnetism which states that like poles repel each other and unlike poles attract. This law is proved by the practical experiment I have just referred to.

Control over a Distance

But the most important thing about these experiments is the fact that the magnet can exert force without actually coming into contact with the object which it is affecting. For example, you would find that the compass needle would feel the influence of the magnet when it was perhaps an inch away; with a powerful magnet the distance would be greater still. The reason is that surrounding every magnet is what is called a magnetic field. From the magnet there are imaginary lines spreading out into space, which influence substances or objects coming within their area. These lines are called magnetic lines of force.

I have drawn a small sketch (Fig. 1) showing how the lines of force are disposed in the case of a simple bar magnet. There are, of course, very many more than are shown in the sketch, but it would be impossible to draw them all.

Now the number of lines of force passing through a given area is known as the flux density. For instance, if a thousand lines of force pass through an area of 1 square centimetre, then the flux density will be 1,000 lines per square centimetre. In electricity it is usual for the metric system to be used because it often simplifies calculations. But there is no reason why we should not state flux density as so many lines per square inch or per square foot. It is merely a matter of convenience.

Made of Steel

Now all permanent magnets—that is to say, those of the bar or horseshoe type—are made of steel. Steel is a very hard material and retains its magnetic properties for a long period. Iron and steel are the only two materials which, for practical purposes, can be considered magnetic. Soft iron is highly magnetic, but it does not retain its magnetism.

An electro-magnet can easily be constructed by winding a large number of turns of wire round a bar of soft iron or, better still, a core consisting of soft iron laminations, and passing an electric current through the coil. The iron core immediately becomes magnetised and remains in this state all the while the current is passing through the wire. But directly the current is switched off the core loses its magnetism.

Soft Iron is Essential

If, instead of soft iron, we were to use steel for the core, it would become permanently magnetised and, therefore, still be a magnet even when the current was switched off. In practice, special laminated soft iron cores, or magnetic alloy cores, are built up, since for commercial purposes it is undesirable for the core to become permanently magnetised. Why this is so you will be able to appreciate later on.

MAGNETIC INDUCTION

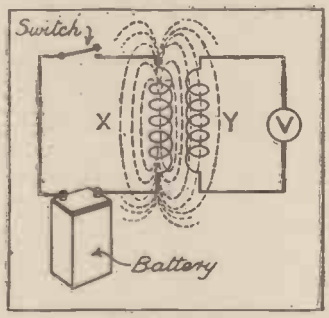


Fig. 3.—When a current is started or stopped by the closing or opening of the switch the magnetic field produced by the coil "X" causes a current to flow in the nearby coil "Y."

But, going back to our magnetic lines of force and leaving magnetism as such for the moment, let us suppose that we have a coil of wire which we can call "X" connected to a battery, with a switch in the circuit to make or break the flow of current through the coil. If we close the switch so that current flows through the coil, a magnetic field will immediately be set up round the coil. Suppose, instead of having a single coil "X," we have two coils "X" and "Y," "Y" being placed close to "X" and having a measuring instrument of some sort connected across its ends.

Coupled Coils

On closing the switch, the magnetic field due to the current passing through "X" will spread out and some of the lines of force will affect the coil "Y" and produce a current in it. The fact that this current exists can be proved by the measuring instrument whose needle will instantly be deflected. This current flow is only momentary. It will only be produced while the magnetic field in "X" is growing. Directly the current through the coil "X" has reached its normal value the field will become stationary, and no current will flow in "Y" until the switch is opened to break the circuit, when the magnetic field will collapse and produce another deflection of the needle of the meter connected across "Y."

This is called magnetic induction, and the coil "Y" is said to be coupled to the coil "X." Here we have the principle of the electric generator. It is this ability of a magnetic field to produce electricity that provides us with the present-day dynamo.

SIMPLE GENERATOR

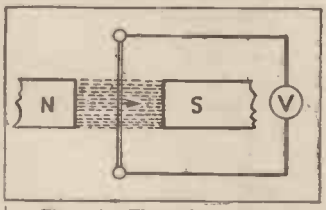


Fig. 4.—Electricity will be generated in the wire connected to the meter "V" when the wire is moved at right angles to the lines of force between the magnetic poles.

"Cutting" the Lines

To take another instance, suppose we had a length of wire joined to a voltmeter and placed between the North and South poles of a magnet, as shown in Fig. 4. There will be magnetic lines of force in the space between the North and South poles. If now we move the piece of wire from the North pole to the South pole, or from the South pole to the North pole along the plane of the paper, that is, parallel with the lines of force, the needle of the meter "V" will not move. If, on the other hand, we move the piece of wire so that it is *cut* by the lines of force—that is, if we move it at right angles to the lines towards us out of the paper, or away from us—the needle of the

VARYING CURRENT

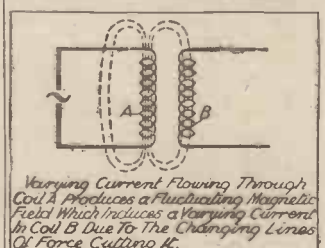


Fig. 5.—A slightly more elaborate scheme than that in Fig. 3. A generator is used to produce a continuously varying current in the coil "A."

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FROM OUR READERS

A SUGGESTION TO THE B.B.C.

An easy method of taking a complete census of listeners' likes and dislikes is suggested by one of our readers this week. It is an idea the B.B.C. might seriously consider

The Editor, POPULAR WIRELESS.

Dear Sir,—At a cost of only a few pounds the B.B.C. could get a census of likes and dislikes, and from those who matter most—listeners of at least a year's standing.

Yearly the Post Office sends wireless owners a card to notify that a new licence is due. They request one to bring the card when renewing the licence. I suggest that the card, one half of one side, should have on it a list of the chief items broadcast in the programmes—variety, bands, talks, operas, ballads, and so on.

The cards, duly filled in, would be collected by the Post Office when the fee is paid for licence. They could be delivered at the B.B.C. in batches. They would be classified and filed away.

Thus, at little cost, a complete census of listeners' likes and dislikes could be gathered in the course of a year.

Hoping this meets with your approval.

Yours truly,
(Master) J. JACKSON.

286, Grace Street,
Byker, Newcastle-on-Tyne 6.

THE GREATEST ATTRACTION

The Editor, POPULAR WIRELESS.

Dear Sir,—Perhaps the greatest attraction of short-wave listening is the simple and inexpensive apparatus needed to be able to listen to stations all over the world. My biggest thrill was when I first heard Sydney on a one-valve home-built receiver, and in due course received a card verifying reception. But just as the simple sets we used for ordinary broadcast reception some years ago are now useless, so it seems to me will these straight receivers be on short waves before long. New stations appear in the already crowded bands allotted to broadcasting—and many outside, where they are jammed by Morse signals; but, worse still, there is a noticeable tendency to use more power. Progress, I suppose; but I for one will find no thrill in short-wave listening when the need for selectivity makes the superhet essential here also. Perhaps we shall find a temporary haven in the ultra-short waves—and where after?

Yours faithfully,
H. ALFORD.

"Sunny Mead," Berrow, Burnham-on-Sea.

THE SHORT-WAVE AERIAL

The Editor, "Popular Wireless."

Dear Sir,—Many short-wave aerials operate at very low efficiency, as compared with their performance on the medium waves.

You can make this test to prove it. First tune in a powerful transmission like the Empire station, or one of the Zeesen stations. Remove the earth, and very likely you will find that it makes no difference whatever. Then remove the aerial. Signals will disappear, but try re-tuning, and you will likely find the station almost as strong as ever. The pick-up on the coil alone is almost as great as with the aerial in position.

I have thought quite a lot about this phenomenon, and it seems to me that the idea of a horizontal aerial is altogether wrong, as far as the short waves are concerned. If we were dealing with the DIRECT ray, then a horizontal aerial, with the free end pointing away from the station, would give the maximum pick-up. But in short-wave listening it is the sky-wave with which we have to reckon, and this may be very steeply inclined.

I do not, of course, know what anyone who is competent to judge would think of the sketches, but they seem to me to get at the truth. At any rate, I have experimented with aerials inclined at from 10 degrees to 45 degrees, and results have certainly reached expectations. This is, I think, the secret of the vertical aerial's success.

Yours faithfully,
W. NIMMONS.

7, Hazelfield Street, Belfast.

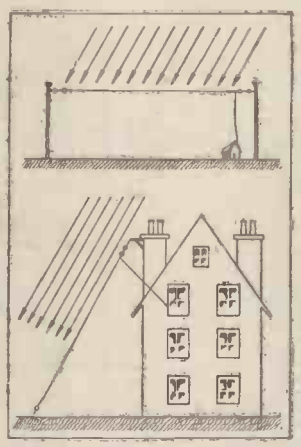
FEWER PROGRAMMES

The Editor, POPULAR WIRELESS.

Dear Sir,—Alan Hunter's article in a recent issue of POPULAR WIRELESS on "More Stations But Fewer Programmes" holds forth a very unattractive prospect for British listeners. Already we are limited, from about 7.30 p.m. to 10 p.m. on the majority of evenings, to *two* programmes only—the "National," from either Droitwich or one of the medium-wave "National" transmitters, and the "Regional" (London) programme S.B. from all the Regionals. Occasionally we do have a little more choice, but even so, two or more Regional stations are often taking the same programme.

As Mr. Hunter says, in the early days of broadcasting we had quite a lot of British programmes to choose from, and I, for one, would not be sorry to be back in the "good old days" of 1925 or so. There does not seem to be any reason why, with a greatly increased income, the B.B.C. should be so niggardly with alternative programmes. (And the Ullswater Committee recommends that a still greater proportion of the licence money be paid to the B.B.C.!) The enormously increased revenue of the B.B.C. is not going in better programmes—it is being paid out to expensive dance bands, and—the other extreme of taste—to the upkeep of elaborate symphony orchestras. Between these two extremes is a vast amount of popular music (in the best sense) which is neglected or left to "lunch-time" orchestras and "fill-ups."

Admittedly some of the extra revenue is being spent on technical improvements, and no one will



THE BEST AERIAL

W. Nimmons suggests that the horizontal aerial is almost at right angles to the sky-wave from a distant transmitter and is, therefore, inefficient. He recommends the sloping type. What do you think?

begrudge this, but the majority of listeners would like to see some of it spent on *more* programmes, giving a wider choice. To give one the choice of a variety entertainment or a symphony concert is ridiculous—most people are by now throughly surfeited with radio variety, and certainly only about one-tenth of 1 per cent wish to listen to symphony concerts.

To turn to the technical aspect, the B.B.C.'s solution to wavelength difficulties, namely, synchronisation, is to be viewed with suspicion. The problems of successful synchronisation have not all been solved yet, whatever the experts may think. It is not just a question of accurate synchronisation. For example: the London, West and North National transmitters are now synchronised on 1,149 kc., and here in Sheffield we are within 30 odd miles of the transmitter. *Yet reliable night reception of the North National is not possible*—a startling statement considering the supposed "service area" of this station. The reason, of course, is the reflection of the "night ray" from the other National transmitters, which arrives out of phase with the ground ray from the North National, and thus causes fading and also frequency distortion. There is no getting away from the fact that synchronisation has, at least in this district, made null and void the utility of the North National transmitter. If this is a sample of synchronisation, Heaven help us if the B.B.C. keep on with their short-sighted policy of "the higher the fewer"!

I am not out to suggest a solution to the wavelength problem, but this I do say, that there are countries in Europe to-day (and this country is *not* an exception) who are using *too many* wavelengths in proportion to their *real* (as distinct from their *imaginary*) needs. I know politics are at the bottom of this question in some cases, but until we have fewer stations in Europe, and less synchronisation of redundant stations, reliable *quality* reception will become more and more impossible, even (as I have shown) of the "locals."

Yours faithfully,
F. W. T. ATKIN.

25, Hayfield Crescent, Fuecheville, Sheffield.

DROP US A LINE

and you may win a prize of a guinea, given each week for what, in the Editor's opinion, is the most interesting letter. Don't forget that even if you do not win a prize your views on radio topics will be of interest to other readers, and you might get those TWENTY-ONE SHILLINGS. This week we are awarding the prize to Mr. F. W. T. ATKIN.

WHY IS IT?

The Editor, "Popular Wireless."

Dear Sir,—As an enthusiastic short-wave listener, I have been interested in reading in "Popular Wireless" of listeners who are hampered by interference from motor-car ignition. It is surprising, however, that although I live in a motor garage and have cars running parallel with the whole length of my aerial, I have never experienced the slightest interference.

I do not know the reason why I should be "passed by" in this manner, but perhaps one of your readers with more knowledge than I have of such things will be able to explain the phenomenon.

In conclusion, I should like to congratulate you upon your fine weekly paper.

Yours faithfully,
K. WILLIS.

16, Chesnut Road, Plumstead, S.E.18.

"DX" TELEVISION?

The Editor, POPULAR WIRELESS.

Dear Sir,—In the article, "The London Television Station," which appeared in "P.W." a few weeks ago, the author mentioned that he would not be surprised to see the range of television stations considerably increased, judging by 5-10-metre reception that is going on at the present day, and with this statement some of the readers will no doubt agree.

Now, for instance, if the television station at the Alexandra Palace had an aerial fitted to do sky-wave transmission, there is no reason why it should not be received a few hundred miles away under present-day circumstances. Perhaps my statement is a little exaggerated, for television has not yet had a chance to prove its use for long-distance reception and entertainment, but no doubt it will be possible, disregarding theory.

Most short-wave fans, I am sure, have seen different articles on the tremendous distance covered by the ultra-short waves; indeed, perhaps some of them have received such signals. Now here is an example of long-distance reception: W 1 C B J, in Derry, N.J., made contact with W 8 C Y E, in Dayton, Ohio, on June 22nd, 1935, signals fading from R7 to R1. The contact lasted fifteen minutes and both transmissions were received by W 8 T Q, in Dayton, Ohio. The distance from Dayton to New Jersey is a good eight hundred miles, and as regards nine and ten metres, stations such as W 2 X A D and W 8 X K are received at times at a steady R6-7; so judging from 5- and 10-metre reception there is some possibility for long-distance reception on 7·6 metres.

I realise, of course, that if there were as much fading on the television wavelength as there is on the lower wavelength (5 metres) entertainment would undoubtedly be unsatisfactory. But still, with such devices as anti-fading aerials, automatic vision controls, and improvements in the transmitting and receiving apparatus there is a very bright future for television.

Yours faithfully,
T. H. SMITH.

7, Brunswick Row, Dundalk, Co. Louth, I.F.S.

He Was Nearly "Bumped Off"

Bert Yarlett—new singer for Henry Hall—had some exciting experiences, as will be seen in this pen picture

By KENNETH BAILY

CANADA'S ROMANTIC TENOR

TWO fast cars drove up alongside a third, trying to push it off the road. The driver of the third caught a glimpse of gunmen in the accosting cars. He accelerated, swerved in and out of a ditch and, to the tune of firing, got away and did not drop below sixty miles for the next half-hour!

The lucky survivor of this hold-up was Bert Yarlett, and he firmly believes that had he not got away you would not now be hearing him singing with Henry Hall.

Bert cannot remember when he started singing. Out in Canada, at his birthplace, his father was a minister. Young Bert was the boy soprano in father's choir. To his silver voice church bazaars and jumble sales were opened.

When his voice broke it developed into a sterling tenor, and he slaved away at singing lessons which laid the foundations for the young man who was to become known to listeners all over America as "Canada's Romantic Tenor."

His voice took him to a Hollywood theatre. It wasn't far to the film studios, and he appeared in "Lady of Scandal" and "Dance Hall," both with Ruth Chatterton.

He played juvenile lead in a Hollywood musical comedy for a year. His ambitions grew, and with them a conscientious desire to improve himself. So he left the show and went to study under Salvadore Cardillo, New York's "ace" music teacher.

His studies finished, he heard the call of his native land, and it soon heard his voice. He commenced broadcasting from C F R B, Canada's most powerful station. They gave him his name.

One of New York's largest hotels made him its resident singer, and he was there eight months, concurrently broadcasting twelve times a week on an N.B.C. network which covered all America.

Then two things happened. Henry Hall visited America and listened-in to Yarlett. Yarlett, through his strenuous work, had a breakdown which sent him for a holiday to England, in the boat following Henry Hall's. Henry remembered his name, put him in his first "Henry Hall's Hour," and topped that contract with the present permanent one.

He Likes England

"So I'm still on holiday, in a way," he laughed. "Before starting with Henry on March 17th I had a look round England. I like it; I like you English. And I believe I'm going to find it harder and harder to go back to America, should I ever want to."

There's one thing he hopes to go back for when he gets his holiday. That's his lady love. He's engaged. For his holiday he would like to slip over on the "Queen Mary," pick up his lady, marry her on the "Queen Mary" on the way back, and buy her a house in London.

Bert is 28, stocky, brown-eyed, dark-haired.

"I like your riding in the Row here," he said. "I've always liked being in the saddle. I like bright colours all over my home, plenty of books to read and, when I can, to get out to an ice rink for a game of ice-hockey."

The one-time choir boy still goes to church every Sunday. He hates to miss it.

As we were leaving Broadcasting House, where I had been chatting to him, pushing through the big doors reminded him of something.

"I was nearly bumped off leaving a theatre in Chicago," he laughed. "Gangsters they were. Can't think now how I gave them the slip."

Sir John Reith's strong, silent commissionaire strolled by, casting us an eagle-eyed look.

"Nice safe spot, London," chuckled Bert.

POWER AND PURITY

Obtaining Realistic Reproduction

By K. D. ROGERS

SO much has been written about radio circuits and their relation to purity of reproduction that one of the most vital points in the chain is liable to be overlooked. It is true that the quality of reproduction depends on the excellence or otherwise of the radio set, but the loudspeaker plays just as important a part. In some respects I think it is even more important.

One reason is that a loudspeaker is an instrument that can not only make or mar the reproduction by virtue of its own characteristics, but it is an instrument that brooks no tampering. It cannot be changed about and altered like a set circuit can unless one is prepared to change the whole instrument and get another.

A certain amount of correction can be applied through the radio or gramophone circuit, but if the fundamental characteristic of the loudspeaker is "out" anywhere it might just as well be scrapped, for really good reproduction with it will be impossible.

Two Important Factors

There are two main qualities that I always look for in a loudspeaker. The first is a good even response curve, free from sudden peaks or troughs that may prove aurally objectionable. Those that appear on paper but which you cannot hear do not matter, of course.

The other requisite is sensitivity. I think that is most important. Usually the more sensitive a speaker is the better it will respond to sudden musical impulses and to transients, and that is why the mains-energised models held sway for so long against the attempts of the P.M. speakers to dislodge them. Nowadays the strengths of the P.M. speaker magnets are so high that the sensitivity of the non-mains types is very little, if any, less than the corresponding mains-energised variety.

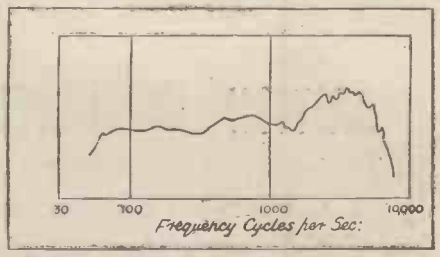
A good illustration of up-to-date speaker design is to be found in the Rola G.12 model. Here we have a large speaker, costing £6 for the P.M., £5 10s. for the D.C., and £7 15s. for the A.C. models.

As regards sensitivity there is little to choose between them, and as regards the characteristics there is nothing to choose. All models have the same response curves, or as near as makes no difference, and the total flux density of the P.M. speaker reaches about 15,000 lines per sq. cm.

A NEW ARRIVAL

The P.M. model of the Rola G.12—an excellent speaker.

HIGH-NOTE COMPENSATION



High-note compensation is a feature of the Rola G.12 speakers as can be seen from this response curve.

I have recently been trying out both the mains and the P.M. models of Rola G.12 speakers. They are certainly excellent, and have an "attack" that is most gratifying. Attack, in case you do not recognise the term, is meant to convey that crispness that one obtains in the reproduction when a speaker gets the high notes "off its chest," and the

(*Please turn to page* 156.)

By JOHN SCOTT-TAGGART, M.I.E.E., F.Inst.P., Fel.I.R.E.

THE "CENTURION"

Here is the fourth article describing the operation and installation of this world-famous receiver. Most detailed instructions are given, and constructors of the "Centurion" who follow the directions are assured of success.

THE knob in the bottom right-hand corner of the panel is the volume control. It is used to vary the loudness of signals and is the only control available for that purpose. Actually it is the aerial coupler, and in addition to varying signal strength it may be used to give improved selectivity on the aerial circuit. As you turn the knob of the volume control to the left (anti-clockwise), signals will weaken but selectivity will improve. If the knob is turned to the right (clockwise), signals will increase in strength but blunten tuning on the aerial balancer knob.

If you have had no previous experience of the use of the aerial balancer (the idea was first incorporated in the S.T.700), you may feel a little at sea for ten minutes. But if you once tune in two or three stations and put down their "dots" you will rapidly see how the aerial balancer works. Suppose you have logged (i.e. "dotted") a station, you simply turn the main pointer to its dot and, having applied some reaction, turn the aerial balancer until the desired station is heard.

But it is possible that as you turn the aerial balancer knob you will hear another station instead of the one you want, whereas if you had gone on turning the knob a little farther you would have got the desired station.

The Aerial Balancer

Why is this? Is it a new effect? No, not at all. It applies to all two-circuit sets. It is due to the aerial circuit being tuned to a strong station which then "barges" into the second circuit even though the latter is not tuned to it.

How, then, do you know when to stop turning the aerial balancer knob? Well, in the first place the knob will have a white dot or mark on it (or you can put one there). When fitting the knob to the spindle with its grub-screw you see that this mark is "pointing" horizontally to the left when the spindle is turned completely to the left (anti-clockwise). You will find that the aerial balancer mark will always point in the same general direction as the main long pointer. Therefore, if you hear a station with the aerial balancer not pointing in the same direction, then you know it is not the station you want.

Unless you have a Triple Extractor in action, it is quite likely you will hear the local stations as you turn the aerial balancer knob, but you would, of course, ignore them as you pass them by. This brings me to the second reason why you do not get the wrong station—namely, common sense based on experience. If your main pointer is set to a German station you would not stop at a French station heard as you tune the aerial balancer.

A third point is that you will not get the wrong station if you make the set selective in the first place. The only disadvantage is that you will have to tune the aerial balancer a little more slowly so as not to miss the desired station. You set the turret switch half-way, apply fairly critical reaction, adjust the main pointer exactly to the "dot" of the desired station.

You now set the volume control well over to the left. You now turn the aerial balancer knob until a station is heard; it is sure to be the desired station, although you *may* get a weak signal from your local.

Having got what you think is the desired station, there is always an infallible test to prove it is that station. You simply turn the main tuning pointer very slightly to each side of the "dot." Signals should be drastically weakened whichever way you turn the pointer. If signals are not weakened (they may even be strengthened), then you are not on the desired station, and the fault lies with the aerial balancer adjustment. You should try again tuning the aerial balancer.

Finding Weak Signals

There is a foolproof method of tuning the aerial balancer which may be used for finding weak signals. You set the main pointer to the dot of the desired station. Increase reaction till the plop is heard, meaning the set is oscillating. Then turn the aerial balancer knob until the easily recognised noise or change of whistle is heard indicating that the aerial balancer circuit is in tune with the second circuit. Now reduce reaction till the set just stops oscillating. The desired station will now be heard. A very slight readjustment of the aerial coupler and of the main pointer will bring the station in with best results. The oscillation, by the way, does not go "up the aerial."

I have written at length on the aerial balancer but actually half an hour's practice will make you perfectly familiar with it. But remember to log stations when you hear them but never log a station unless it is in tune—and by in tune I mean that having logged its "dot," the signals should weaken whichever way the main pointer is moved. Unless weakening occurs on each side, you are not in tune and the dot should be erased with an indiarubber. Because you hear a station it does not mean you are in tune to it.

A Recommended Method

When logging stations, do not start afresh with each one, upsetting all the controls every time. The best way is to select a known logged station and move the main pointer to the next station, advancing the aerial balancer a suitable amount also. You can thus move up the dial, giving the reaction knob a slight turn to the right to keep reaction at a sufficient value.

Never log going *down* the dial—i.e. to lower wavelengths; if you do, you will have constant trouble with the set oscillating owing to your having failed to reduce the reaction.

As on all sets, a final "titivating" of the controls will give the final touch to a station. Of course, operating notes always sound more difficult than the actual handling of the set, and I can assure you that the "Centurion" is easily the simplest of all my popular sets to work.

TUNING-IN A STATION

Note how the aerial balancer knob on the left is being adjusted as well as the main tuning control.

RADIO MYSTERY CIPHERS

By LOUIS C. S. MANSFIELD

This week our Secret Service cipher expert begins his description of a new type of code writing in which he will set a cipher for you to decode next week. In the meantime, however, he has set another of the ordinary substitutional codes. See if you can solve it and win the Ten Shillings prize.

SO far, all the ciphers with which we have dealt have belonged to the Substitutional class in which the letters of the plain text message are replaced or substituted by different letters, figures or symbols.

This week and next week we shall deal with Transpositional ciphers which are so very largely used in actual Secret Service and diplomatic work.

As the name implies, transpositional ciphers are those in which the letters themselves are not changed in any way but are mixed up according to a pre-arranged order. Thus, according to arrangement, the word THERE might be written EREHT, RETEH, HEETR, HERET, etc.

The Simple Transposition System

There are many different methods of making up ciphers of this type, but the commonest is that which is known as the Simple Columnar Transposition system, in which the plain message is written out in columns which are mixed and then strung together into one long line.

For instance, the words "THE BOYS HAVE GONE" might be written in five columns thus:

T H E B O
Y S H A V
E G O N E.

If, in this one, we had arranged to select the columns in their normal order 1, 2, 3, 4, 5, we first write down the letters in column 1, next those in column 2, then those in column 3, and so on, so that the message becomes:

TYEHSGEHOBANOVE.

Of course, writers of secret messages are not restricted to the normal order, and the columns can be mixed in any order desired, each of which presents the cipher in a different way.

Even with such a short message as this, when written in five columns there are no less than 120 different ways of selecting the columns, so that quite a lot of common sense must be brought to bear on its solution by those who do not possess the necessary key.

When faced with a cipher the first step is to determine whether it is a substitutional or a transpositional one, and this we do by making an ordinary frequency count.

It is apparent that if a plain message contains fifty E's it would not matter how we transposed them the count would soon bring them to light. If, on the other hand, we had substituted X for E, then the count would disclose fifty X's.

Consequently, a transpositional cipher will generally disclose a frequency which closely follows the normal order; while in a substitutional cipher there will be a very great divergence, and we might possibly find letters such as Z, J, K, Q or R, etc., displaying the highest frequency. It is this little point which always acts as an unerring indicator to the type of cipher used.

FREQUENCY LIST

(The following is the order of the frequency with which the commonest letters and words generally occur.)

COMMONEST letters: E, T, A, O, N, I, R, S.
INITIAL letters: T, A, O, M, H, W, C.
FINAL letters: E, S, D, N, T, R, Y.
Two-letter words: OF, TO, IN, IT, IS, BY, BE.
Three-letter words: THE, AND, FOR, ARE, BUT.
Other words: THAT, WITH, HAVE, FROM, THESE, THOSE, THERE.

(The above Frequency List represents the average of actual counting of tens of thousands of words and sentences. The order is, however, not to be regarded as absolutely rigid, for it is liable to vary according to the text being dealt with.)

"P.W." CIPHER No. 11

Secret Service operatives have sent word that the enemy is launching another raid on the town with the help of a new air arm.

The High Command asks for further details and receives the following reply. Unfortunately the key has been lost. Can you decode it?

SDD LGDV LZWJW OADD TW XAXLWWF GX LZW OAJWDWKK UGFLJGDDWV SWJGHDSFWK LSCAFY HSJL AF LZW JSAV GF LZW XGJL SFV LZW LGOF

For the first correct solution of this code message opened after the closing date we will pay TEN SHILLINGS. Your attempt may be sent in a sealed envelope if you wish. All attempts must reach us on or before TUESDAY, April 21st. The Editor's decision is final.

Try to solve it, write your translation on the back of a postcard, add your name and address, and post to: "P.W." Cipher No. 11, 1, Tallis House, John Carpenter Street, London, E.C.4. (Comp.).

SOLUTION OF CIPHER No. 10

ORDERS HAVE BEEN RECEIVED HERE OVER THE RADIO TO SAY THAT EVERYONE MUST REPORT THERE AT THREE.

Owing to the early press date—due to the Easter Holidays—of this issue of "Popular Wireless," we regret that we are unable to give the name of the winner of Cipher No. 9 until our next issue.

After having identified the transpositional system our next step is to decide the number of columns into which the original message was divided. The total number of letters in the cipher helps us very largely here, and as a general rule we find that the number of columns and the number of letters in those columns together form a convenient multiple of the total.

For instance, if the total number of letters is 100, they have probably been arranged in ten columns of ten or five of twenty. This is a much more reasonable arrangement than, say, fifty columns of two letters each or two columns of fifty.

In the same way, if there were sixty-three letters all told, the most likely arrangement would be seven columns of nine or nine columns of seven.

Next week we shall see how these cryptograms are solved.

(This week's "P.W." cipher is a substitutional one and can be solved in the ordinary way.)

AS the Columbia people say, "It Had to Come." The famous Stanelli Stag (sorry, Bachelor) Party has been recorded—on FB 1309-10. The "stag" party is probably one of the most popular of recent broadcast programmes, and the first two records of the lively gathering listeners know so well are sure to be ready sellers. On these two records we have the inimitable Norman Long, Stanelli, "Jim Emery," Al and Bob Harvey, Mario de Pietro, and Trevor Watkins.

Renee Houston has made another record, with her husband, Pat Aherne. It is good, but I do not think she has room enough on a record to develop the gags and screamingly funny cross talk that she evinces on the stage. But you should hear the record (FB 1307); it is quite amusing.

The Talkies are bringing more and more great names from the musical world to the screen. The latest arrival is Beniamino Gigli, the famous tenor, who has made a film called "Lullaby." He sings several songs in it and has recorded four of them for H.M.V. They have just been released.

Probably concert-goers will know them fairly well, but they will be introduced for the first time to thousands of film fans. I will not weary you with the list of the titles, but here are the numbers of the two records holding them. Go to your dealers and listen to them: H.M.V. DA 1458 and DA 1459.

From opera to dance music is a long way, but I must give prominence to Jack Hylton's first American records. These are played by the American band which Jack has collected together out there, owing to the fact that the Americans would not allow him to bring his own band into the country when they asked Hylton to go to the States. The records are two of the most popular hits, *The Music Goes Round and Around* and *Lights Out*. On H.M.V. BD 5035.

And talking about H.M.V., I wonder if you know how the famous trade mark originated. May I tell it to you? Thank you!

The idea was originated by the artist, Francis Barraud, A.R.A. In about 1898 his brother died and his dog, Nipper, became very attached to Francis. Barraud had inherited from his brother a small phonograph, using cylindrical records such as are now used on "Dictaphones." And among those cylinders were several containing recordings of his brother's voice.

The Origin of the Trade Mark

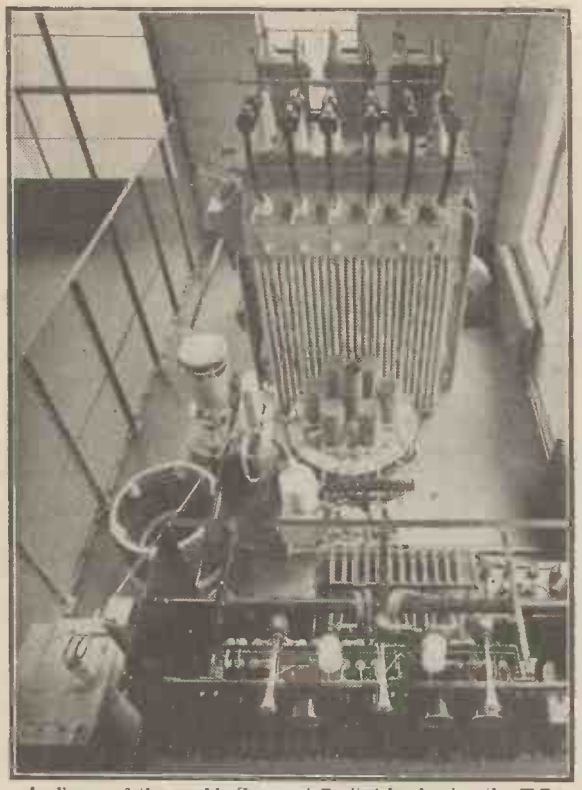
When Barraud played these he noted the extreme interest evinced by the dog, Nipper, and one day Francis conceived the idea of painting a picture of Nipper listening to his late master's voice.

Subsequently, in 1899, it occurred to Francis that the picture might be a good trade mark for one of the manufacturers of the phonographs. So he took it round to the most prominent of them and was disappointed to find that they were not a bit impressed with the picture.

He mentioned his failure to a friend, who suggested that perhaps the picture would look better and more attractive if it had a brass horn on the phonograph instead of the black one shown. Barraud had never seen a brass horn, but on inquiry learned that he might be able to borrow one from a small company in Maiden Lane (off the Strand) called The Gramophone Company.

So on one day in September Barraud came into the little office of the young company and asked for the horn. This somewhat unusual request brought forth the full story in explanation and resulted in the showing of a photograph of the picture to the manager, Mr. William Barry Owen.

(*Please turn to page* 155.)



A glimpse of the machine room at Droitwich, showing the H.T. transformer, mercury-arc rectifier and the switchboard. Note the electric warning horns in the foreground.

THE NATIONAL TRANSMITTER

Dr. J. H. T. Roberts has been writing a short series of articles fully describing the giant B.B.C. station at Droitwich. This is his fourth and last article in the series and in it he deals with the aerial and earth system, the question of the water supply and he problems of modulation and frequency response.

WE have now come to the last part of my description of Britain's greatest station, and I am going to start it with the aerial and earth systems.

Two stayed lattice-steel masts 700 feet high and 600 feet apart are provided for the long-wave and short-wave aerials. Each mast is supported by means of three sets of three stays, the stay-block radius being 80 feet. The stays are broken up at 150-feet intervals by egg-type insulators. The masts are insulated at the base by means of porcelain insulators capable of withstanding a working peak voltage of 7,000 volts (r.m.s.) at 200 kilocycles per second. The weight of each mast is 100 tons, but the load on the base insulators is increased by the stay tension to 150 tons. The size of the concrete base foundation is 14 ft. square at ground level and 7 ft. square at height of 8 ft. 6 in. from the ground—its weight is 90 tons.

The section of the masts is triangular, and each is provided with an electrically operated lift within the structure. The hoisting gear is accommodated on a platform built out from the side of the mast, and the electric supply to the motor is interlocked with the mast earthing switch to ensure that the mast is always earthed when the lift is in operation.

To conform with Air Ministry regulations, the top of each mast is lighted by means of a red light fitting of special design, and there is a similar fitting on a bracket at a height of 350 feet from the ground.

The aerial for the long-wave National transmitter is of the single-wire T-type, having a horizontal top of 550 ft. and a down-lead of 630 ft. The down-lead is anchored through insulators to a steel structure incorporating a spring-loaded tensioning device which ensures that the down-lead tension shall not reach a dangerous figure in high wind.

The earth system is composed of 72 No. 16 S.W.G. copper wires buried in the ground at a depth of approximately 9 ins. The method of laying the earth connection consists in ploughing a series of furrows radiating from the aerial transformer house, inserting the wire, and turning the sods back. Each wire extends to a point 700 feet from the nearest portion of the top hamper of the aerial. An earth system of the type described has been found to have a very low resistance, whilst it has the added advantage that it is relatively simple and not particularly costly to install.

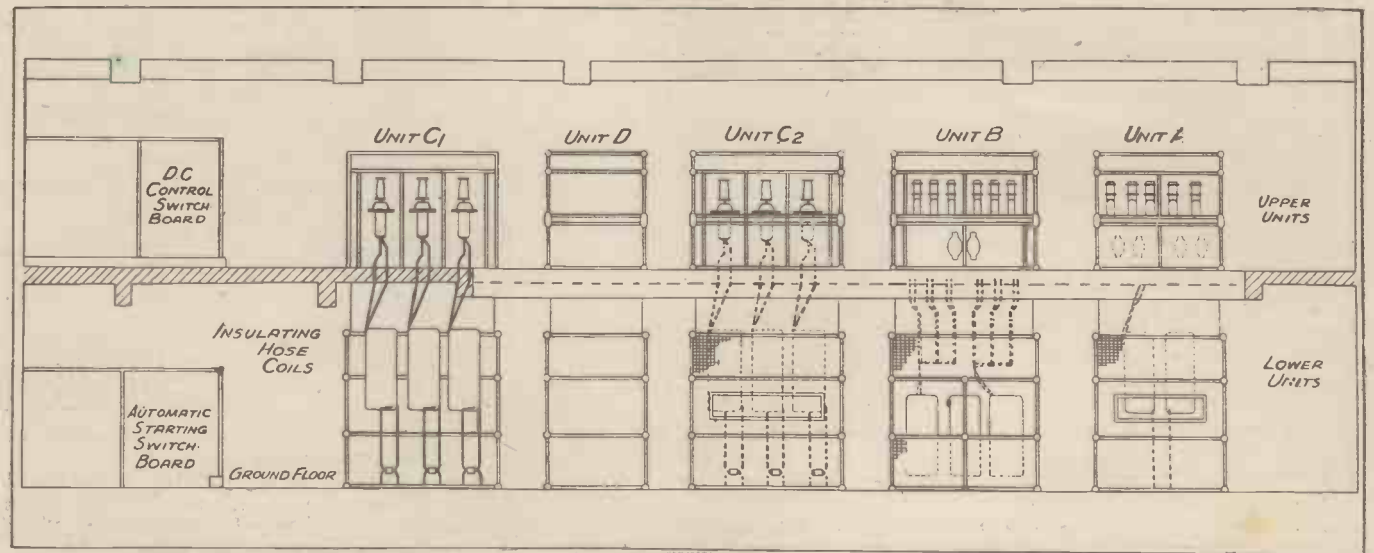
Special Precautions

In spite of the proving of the subsoil previously mentioned, a reinforced-concrete "raft" was constructed under the entire area of the power-house, to spread the load of the engine foundation block, which is 54 ft. × 30 ft. × 9 ft. deep, and weighs 800 tons. This block is entirely separate from the remainder of the floor, and as a further protection against the transmission of vibrations it rests on cork composition pads.

Water is obtained from the mains of the East Worcestershire Water Company. A reservoir, capacity 300,000 gallons, is provided as a safeguard against temporary interruptions or restrictions of the supply. At one end of the reservoir and connected to it is a pond containing the external cooling water of the valve-cooling system. The valves themselves are cooled by distilled water in a closed system constructed of copper pipes.

(*Please turn to page* 156.)

HOW THE VARIOUS CIRCUIT STAGES ARE ARRANGED



The five main units of the Droitwich long-wave station. "A" is a modulation unit, "B" is a high-frequency power amplifier, "C_1" and "C_2" are the two valve sections of the final push-pull modulated H.F. stage, and "D" contains the tuning circuits of C_1 and C_2.

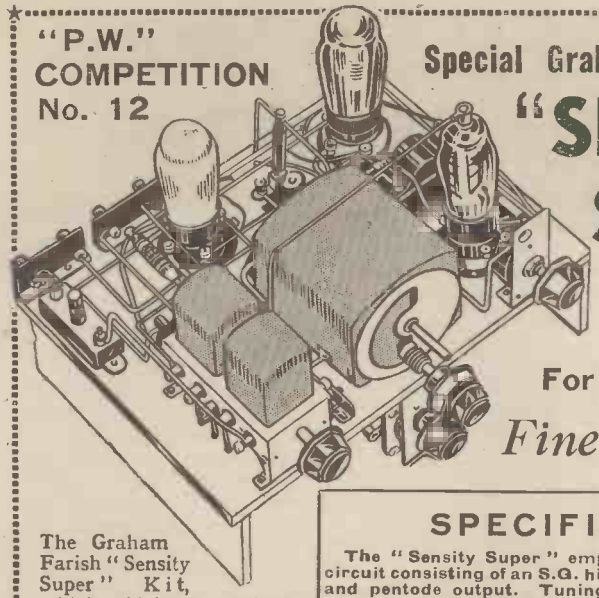
"P.W." COMPETITION No. 12

Special Graham Farish Prize:

"SENSITY SUPER" KIT

For Building This

Fine Modern Set



The Graham Farish "Sensity Super" Kit, which includes valves, enables you to build the receiver illustrated here. Full constructional details and blueprint are included with the parts.

SPECIFICATION

The "Sensity Super" employs a modern three-valve circuit consisting of an S.G. high-frequency valve, detector and pentode output. Tuning is by means of a ganged condenser and iron-cored coils. Quality is ensured by parallel-feeding in the L.F. stage. Simplicity of operation is provided by Mono-Control, a system employing one switch for on-off, wavechange and radiogram change-over.

FREE AND EASY!

Now for it! Don't miss this chance of winning a fine kit of parts from which anyone can build a most successful receiver—one capable of giving excellent reproduction and bringing in a large number of stations. It will only take you a couple of minutes to enter, and the knowledge of radio required is so superficial that everyone has an equally good prospect.

All you have to do is *SIMPLY FILL IN THE FORM* at the bottom of these columns—it's little more than "signing on the dotted line." Just read each question, and then cross out the word "Yes" or the word "No." You thus leave the word which gives what you consider the correct answer to the question in each case.

After the last question—where it says "Because"—you just write a word or so in explanation of your answer to that query, which is a specially interesting one. A full scientific explanation is *not wanted*—merely add a brief clue to your reasons for answering "Yes" or "No."

When you have answered the questions, cut out the coupon and post it, with your name and address in block capitals, to:

POPULAR WIRELESS,
"Do You Know?"
1, Tallis House,
John Carpenter Street,
London, E.C.4 (Comp.).

If you prefer, you can stick the coupon to a postcard to which is added your name and address.

The Prize of the "Sensity Super" Kit will be awarded to the entry which is correct and contains the best reason to Question No. 5.

Only one attempt is allowed to each reader, and the employees of The Amalgamated Press, Ltd., are not allowed to enter. The Editor's decision must be taken as final and legally binding in all matters connected with this competition. No responsibility can be taken for delay or loss in despatch.

Closing Time is SATURDAY, April 25th!

DO YOU KNOW?

1. Can ordinary dry batteries be recharged? **YES. NO.**
2. Is it a good idea to water a buried earth? **YES. NO.**
3. Do wireless waves pass through solid objects such as closed windows? **YES. NO.**
4. Will a radio set work with reversed H.T. connections? **YES. NO.**
5. Can two broadcasting stations use the same wavelength? **YES. NO.**

BECAUSE .....

.....

NAME.....

ADDRESS.....

.....

RANDOM RADIO REFLECTIONS

BY VICTOR KING

Who includes another Professor Varrinace in this week's ramblings.

THOSE N.B.C. CHIMES

PROBABLY like many others, I had often wondered what the N.B.C. chimes signify and how they are produced. If you haven't heard them preceding a W 2 X A D or W 2 X A F programme, you have doubtless encountered them at one end or the other of the "Five Hours Back" B.B.C. relay.

"Dong! Ding! Dang! These Are The N.B.C. stoodios at Raddio City, Noo York."

I used to picture an announcer striking the keys of a piano with one finger, or beating three gongs with a padded hammer.

Actually, however, the chimes are produced mechanically by an instrument having a roller with projecting pins like the drum of a musical box. The pins strike accurately tuned tongues. There are eight of them for each note, one being the fundamental and seven overtones so as to produce a melodious tone.

The notes are G (below middle C), E (above middle C) and middle C. G.E.C., and these are the initials of the General Electric Co.

This chimes signal is not merely a "signature" for the benefit of listeners, but is employed in connection with a system of automatic station linking. The whole coast-to-coast network hangs on the signal, for they claim that only by automatic relay switching can the network of some hundred or so stations be made and unhitched with sufficient slickness.

"Time" means real money on the air in the U.S.A., and the loss of an odd minute or two here and there would soon mount up and spoil the "skedules."

You can't ruthlessly cut off a slice of sponsored programme in the nonchalant manner that our B.B.C. lads seem to delight in—"axing" Will Hay and other items.

RADIO THINGS TO COME.

H. G. WELL'S film, "Things To Come," is right down our street. It is just such a picture as you or I might conceive if we had the flair for that sort of thing.

That is, at least, in regard to all the futuristic electrical and mechanical affairs which figure in it. You know, I do honestly believe that the world of to-morrow will be *our* world. A world run sanely by scientists.

And after all, even those of you who merely read about scientific things in "P.W." and other journals, are on the way towards being scientific thinkers and doers, though, perhaps, in some cases only in a quite small way.

However, you belong to the brotherhood of science and mechanics, and that is why I say again that the world of to-morrow will be *our* world. The only snag is, we shan't be here to enjoy it!

There is some first-class television in "Things To Come," as also there is in Chaplin's "Modern Times," and in "The Tunnel." All the film folk are obviously

(*Please turn to page* 155.)

FRED HORN, the brilliant Chief Engineer of the National Broadcasting Company of America, who has just paid a brief visit to Europe, is now back in the States, reporting to Mr. "Dave" Sarnoff, President of the Radio Corporation of America, on the state of television in Europe.

A few months ago, Mr. Sarnoff stirred up the N.B.C. people on the subject of television, pointing out that at least in publicity both England and Germany had got ahead of the Americans. Mr. Sarnoff promised to find the big money needed, if he was satisfied that they were on the right lines.

Now Mr. Horn is telling Mr. Sarnoff. He is admitting that England has set the pace, but he will claim that there is nothing revolutionary in the television devices over here. In fact, under the patent-exchange arrangement with E.M.I., the American concern has free access to British achievement, and vice versa. I hear Mr. Horn prophesies popular television in five years' time—not before.

* * *

Portable Transmitters

The B.B.C. has applied for Post Office permission to use ultra-short-wave portable transmitters. The Post Office is a little reluctant, but I expect the permission will be forthcoming before long. Then the B.B.C. will be able to make important developments in its Outside Broadcast work. The latest gear is so light and compact that a transmitter can be carried round by the person actually doing a running commentary. This opens up a vast new area of programme interest.

* * *

The Kipling Contract

The arrangement about the broadcasting of extracts from the works of the late Rudyard Kipling, which was first published in this journal, is now complete in its details. The B.B.C. will be at liberty to broadcast 100 extracts during the first twelve months of the arrangement; there is to be no "cutting" or adapting, and a verse or a line will count as one of the "hundred." So the planning of the distribution is a task of importance. It has been entrusted to Mr. Val Gielgud.

* * *

Empire Day, 1936

The Empire Day Programmes this year will be built round the contribution of South Africa where extensive preparations are now in progress. It was actually the turn of India and Ceylon, but they were not ready. Then it should have fallen to the lot of the Irish Free State, but they will have nothing to do with the British Empire. although I believe they have co-operated with the German world broadcasting service.

* * *

Aldershot Tattoo, 1936

Every summer, so far, the B.B.C. has contented itself with an "actuality" broadcast of the Aldershot Tattoo. This means that it has relayed large chunks of the proceedings from Laffan's Plain. This year, however, there will be special "production" and dramatisation, so that the long lapses and intervals may not grow wearisome. Again Mr. Val Gielgud comes to the rescue in his new capacity of feature programme specialist for the B.B.C.

* * *

B.B.C. Governors

It is now fairly certain the Government will implement the recommendation of the Ullswater Committee about increasing the Governors from five to seven. There will be at least five vacancies in all, counting the three Governors due for retirement at the end of 1936.

Lord Selsdon is a hot favourite for the Chairmanship, now that Mr. Ramsay MacDonald is staying on as Lord President of the Council. One of the vacancies is practically certain to be filled by a prominent newspaper man.

BARRY KENT CALLING!

THE N.B.C. AND TELEVISION

The Chief Engineer of the National Broadcasting Company of America has just returned to the States after a visit to Europe. He is now reporting on the progress in television over here.

Staff Association News

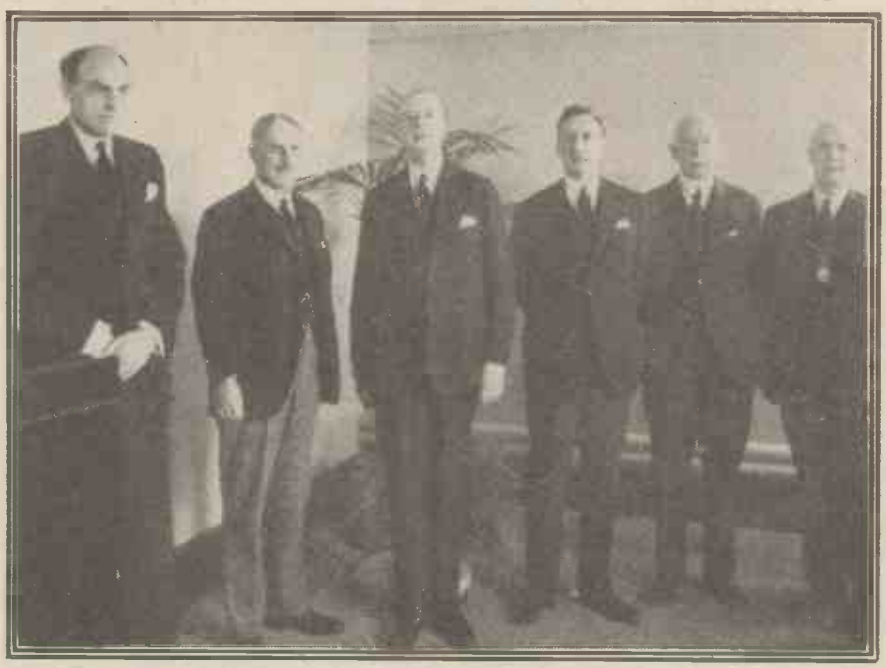
As I forecast, nothing has come of the referendum of B.B.C. staff on the subject of a staff association or trade union of employees to deal collectively with Sir John Reith and the Board of Governors. Hardly anyone was prepared to exchange the certainty of the present direct appeal procedure for the uncertainty of complicated committee rule and the publicising of private affairs and difficulties.

* * *

B.B.C. Bans

There are always some bans either being applied or discussed at the B.B.C. I hear that Fascism and Christian Science are the last two forbidden topics. They follow close on the heels of the Oxford Group and Spiritualism, which were ruled out in February. The Christian Scientists are being left out of a series on Faith Healing. This decision has caused some surprise, but I understand that there has been no official protest from the organisers of Christian Science. Fascists are not going to take their banishment from the microphone so meekly. But the exact nature of their plans is not disclosed.

AT THE NORTHERN IRELAND OPENING CEREMONY



This historic photograph was taken on the occasion of the opening of the new Northern Ireland transmitter at Lisburn by His Grace the Governor of Northern Ireland, the Duke of Abercorn, K.G., K.P. Left to right: Sir John Reith, Director-General of the B.B.C.; Mr. R. C. Norman, Chairman of the Board of Governors of the B.B.C.; His Grace the Governor; Mr. G. L. Marshall, Northern Ireland Regional Director; Viscount Craigavon, the Prime Minister; and the Lord Mayor of Belfast.

"I WANT GOOD ACTING"

(*Continued from page* 137.)

of a gong at the end and beginning of each act.

"Ideal length for a radio play? I feel perfectly certain that it should be between three-quarters of an hour and one hour—no more. But what are we to do with stage adaptations? Impossible, often, to condense them into such a short period. Lately I have been getting stage plays into an hour and a quarter—which I think represents about the lowest possible limit. And some plays must be given an hour and a half, or even longer if justice is to be done.

"Television? I confess that we are waiting until there is a television service. Then I shall turn over my producing staff one by one to study the new medium. And then, perhaps, we shall see!"

* * *

Val Gielgud was in good form. I myself, as a mute recorder of these notes, confess that some of the questions put to the Drama Chief induced in me a morbid desire to scream. It speaks volumes for Val Gielgud's urbanity that, subjected as he was to a barrage of perfectly puerile questions, he remained his suave, smiling self.

"P.W." CIRCUIT SPOTLIGHT No. 11

By K. D. ROGERS

THE PHILIPS ALL-WAVE MODEL 575A

THE circuit of the Philips all-wave six-valver is a bit terrifying at first glance, but a short study of the diagram soon shows that it is merely the coil-switching arrangements that give it the complicated appearance, and that the actual vitals of the set are not so bad as they seem at first sight.

In order to help you to understand what is happening I will now give a brief description of the controls. This is what they are. The centre knob is a combined wavechange and gramophone switch. On the left the large knob is the selectivity and tone control while the small knob is the combined volume control and on-off switch. The small knob on the right is the tuning control and the large knob the noise suppressor. At the back is fitted a round black switch. This gives either ordinary or mains aerial (see A and B on the diagram). The other back control enables the internal speaker to be switched in or out.

And now for the circuit itself. At the outset I should say that I have followed the layout as provided by Philips themselves, but have included only those reference numbers that are required for the elucidation of the circuit. I have kept to the actual lettering and figuring used by Philips so that explains why there are gaps in the sequence, and why many of the components are not labelled.

The H.F. and oscillator circuits can be divided into three sections, corresponding with the three wavebands covered by the set (16–50 m., 200–570 m., and 750–2,000 m.), and each waveband is tuned by separate coils.

On the short waves the coil S32 is switched in the aerial circuit. This coil is inductively coupled to S33, which with C8 and C26 forms a tuned circuit trimmed by C54. The signal from this circuit goes to V1, and thence after amplification to S34, coupled to the circuit S35, C9, C55. This is coupled via the resistance R27 and condenser C32 to the control grid of the octode mixer valve V2.

The Mixer Circuit

The oscillator grid is tuned in the usual way by C10 and S36, trimmed by C56, S37 being coupled to it to form the anode circuit.

The output of V2 is fed to the first I.F. transformer S24, which is tuned to 115 kc. by the condenser C20.

On medium and long waves a similar series of circuit is used, being switched in and out as required. In the oscillator circuits we have additional condensers for trimming and for padding. On the medium waves there are the trimmer C18, and the series padding condensers, C33 and C65; while on long waves the oscillator grid circuit contains not only the main coil and tuning condenser but also the trimmer C19, and a parallel padder, C44, and the series padding condensers C34 and C66.

On the medium- and long-wave bands the condenser C25 is used in parallel with R8 across the aerial coils to reduce resonance effects due to the influence of different types of aerials, and so to maintain constant sensitivity. The use of R27 in the grid circuit of V2 is to prevent self-oscillation on the short waves.

Variable Selectivity

Variable coupling is provided for the first I.F. transformer, and is controllable from the panel, allowing the selectivity to be varied between a band width of 8 to 16 kilocycles. In the aerial is a tuned filter to stop interference on the I.F. frequency, and consists of a condenser and S31.

The left-hand diode of V4 is that used for the signal rectifier, and the L.F. component is passed via R12 and C60 to the volume control R14, and through the condenser C39 and the stopper resistance R38 to the grid of the triode portion of V4.

That is the L.F. path in its simplest form, actually the circuit is much more complicated, for the L.F. voltages are developed across a whole network of resistances and condensers between the top of R14 and the cathode of V4. These resistances include R18, R42 and R31.

The resistances and condensers R12, C60, R40 and C58 are tone corrector circuits. The first emphasising to increase the higher notes, and the latter to preserve the lower tones.

Visual tuning is indicated by the meter in series with R19 in the anode circuits of V1 and V2. Both these valves are controlled by the A.V.C. from the right-hand diode of V4. Quiet A.V.C. is used, and this part of the set constitutes two circuits. Silent tuning is operated by the right-hand knob on the cabinet, and works like this. The first anode of the diode portion of V4, which forms the detector (left-hand diode) is negative in respect of the cathode, due to the difference of voltage that occurs owing to the voltage developed across R15 by the cathode current, and also the voltage across R4 in the cathode circuits of V1 and V4. These predetermined voltages prevent the rectification of signals which have a lower voltage than that of the predetermined voltage.

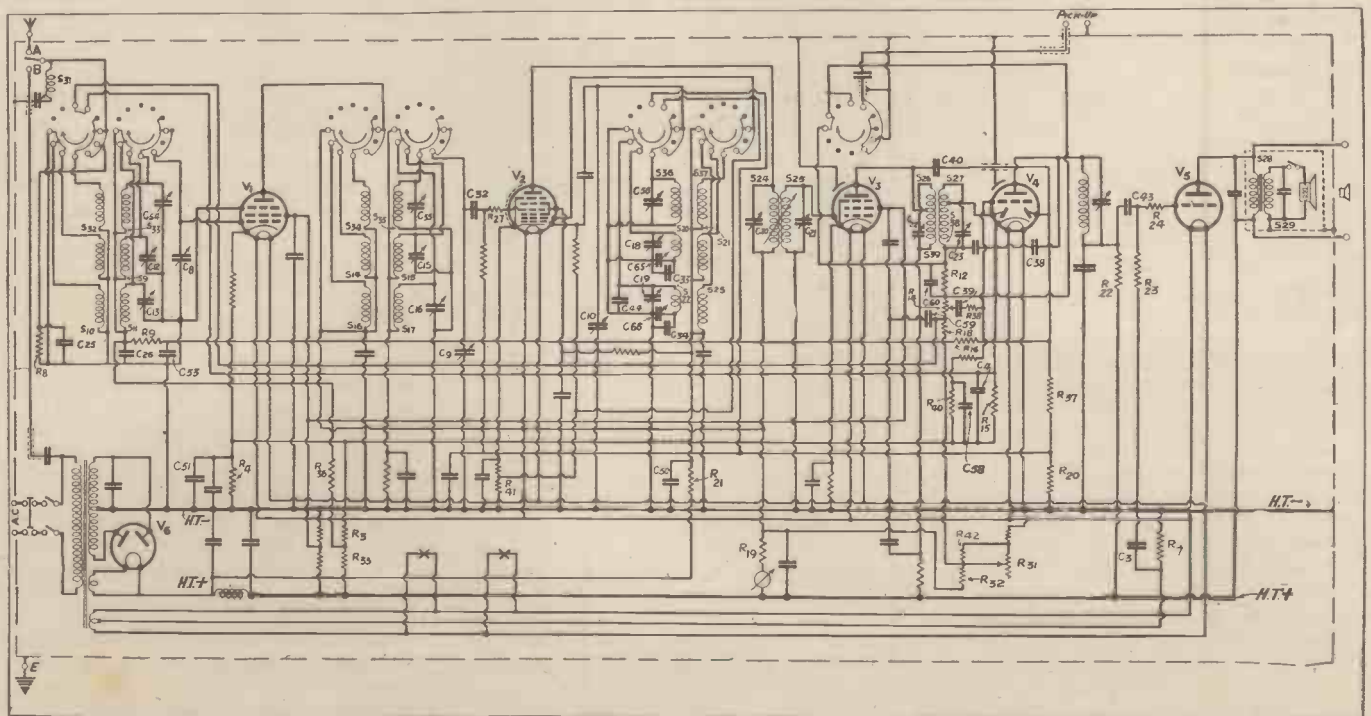
The suppression voltage is enough to limit the reception to the most powerful stations, but means are provided for the voltage to be nullified by a panel adjustment to bring the set up to almost any desired degree of sensitivity. Moreover, it allows the distortion that would occur due to the reception of a station that is a borderline one (strength only about equal to the suppression voltage) to be distortionless by the reduction of a certain amount of the suppression voltage.

This nullification is carried out by the application of a controllable amount of positive voltage on the signal diode taken from the potentiometer circuit R42, R31, R32 and R19. The position of the slider on R31 enables a variable potential to be obtained, and this can be controlled to fix the sensitivity of the set at any desired amount. Thus you can keep the set only moderately sensitive until the desired wavelength has been reached on the tuning scale, and then the sensitivity can be brought up to bring in the required station. By this means noise during tuning is eliminated.

Resistance-Coupled L.F.

The rest of the circuit is pretty straightforward. Resistance coupling is between V4 and V5, and the A.V.C. from the diode of V4 (right-hand one) is taken in the usual way to V1 and V2. It is not applied to V3 (the I.F. valve), which is biased statically by its cathode resistance.

Only a proportion of the A.V.C. voltage from V4 is used on V2 control grid. The whole voltage is applied, but a counter-acting voltage is also applied from the cathode resistance R41, for it will be seen that the grid return of V2 is made via R20 to the junction point between R41 and another resistance in series with it between the cathode of V2 and the earth line. The earth itself is connected to the chassis, shown in the diagram as a dotted line.



The circuit of the 575A which employs six valves, having between them twenty-seven electrodes. The set is an all-wave A.C. consolette model, costing 18 guineas

LEARNING FRENCH THROUGH YOUR RADIO

Everybody can learn this vitally useful language by following the special "P.W." easy-way series. Part 12 takes you another stride forward

By S. C. GILLARD, M.A.

HERE is the fair copy of last week's test.

Toutes les troupes auxiliaires ; toutes les classes élémentaires ; la fleur solitaire ; toutes les places populaires ; l'opinion vulgaire ; une expression parlementaire ; une beauté extraordinaire ; un acte volontaire ; un fragment documentaire ; un document fragmentaire ; l'art épistolaire ; un agent intermédiaire ; un rôle secondaire ; un malade imaginaire ; les adversaires de M. Laval ; un sens contraire ; un effort culinaire ; des tendances révolutionnaires ; un concert de musique populaire.

J'espère qu'il n'y a pas trop de fautes. (I hope there aren't too many mistakes) (*shess-pair keel ne'ah pah troh de(r) foht*)

This week I want to deal with another kind of ADJECTIVE—THE DEMONSTRATIVE ADJECTIVE (L'ADJECTIF DÉMONSTRATIF).

THE DEMONSTRATIVE ADJECTIVE—meaning THIS, as in THIS man—is :

Masc. Sing.	Fem. Sing.	Plural
CE (*se(r)*)	CETTE (*set*)	(both genders)
CET (*set*)		CES (*seh*)

You notice that there are TWO FORMS for the Masculine Singular, CE and CET. CE is used before a Masc. Sing. noun beginning with a consonant or an h which is aspirated (une h aspirée), thus :

CE garçon (this boy) ; CE programme (this programme) ; CE concert (this c.) ; CE héros (this hero), etc.

CET is used before a Masc. Sing. noun beginning with a vowel or an h mute (une h muette), thus :

CET enfant (this child) ; CET orchestre (this orchestra) ; CET endroit (this place) ; CET homme (this man), etc.

CETTE is used before ALL Feminine Sing. nouns, thus :

CETTE femme (this lady) ; CETTE chronique (this chronicle) ; CETTE station (this station) ; CETTE causerie (this talk), etc.

The plural form CES is used before Plural nouns of both genders, thus :

CES chansons (these songs) ; CES concerts (these concerts) ; CES émissions (these broadcasts) ; CES directeurs (these directors) ; CES danses (these dances).

Look at the following words and phrases and see how the ADJECTIVE CE—CET—CETTE—CES is used.

CETTE émission religieuse ; CES extraits de films ; CET enregistrement ; CES danses paysannes ; CE gramo-concert ; CES informations sportives ; CETTE heure scolaire ; CETTE leçon de culture physique ; CE premier mouvement ; CETTE musique de chambre ; CET orchestre à cordes ; CETTE œuvre lyrique ; CE tenor célèbre ; CE théâtre radiophonique ; etc., etc.

A VOICE YOU OFTEN HEAR

No doubt most of you will have heard the voice of Monsieur Velut (above) speaking from Lyon (P.T.T.). He and M. Guillot, whose photograph appeared in our March 21st issue, are the two announcers at the station. And by now you should be in a position to understand what they say.

All this, I am sure, is easy to understand.

Now for my weekly wireless item. This week it is to be a WEATHER FORECAST, called in French LES PRÉVISIONS MÉTÉOROLOGIQUES (*leh preh-ve-ze'o(ng) meh-teh-o-ro-lo-sheek*). By the way, it doesn't sound as long as it looks here when the announcer says it. Listen for it, and you will agree. CES PRÉVISIONS MÉTÉOROLOGIQUES are supplied by the OFFICE NATIONAL MÉTÉOROLOGIQUE, which the announcer briefly refers to as the O.N.M.

I give you now a WEATHER REPORT and a FORECAST which was actually broadcast. You will probably find it a bit difficult. But never mind. Use it as a reading test for the present and keep it for reference.

MESDAMES ET MESSIEURS: VOICI MAINTENANT LES PRÉVISIONS MÉTÉOROLOGIQUES COMMUNIQUÉES PAR L'O.N.M. (*par loh-en-em*)

Le 28 décembre, 1935, à 0800 h. Ciel, brumeux le matin, ½ à ¾ couvert se couvrant avec quelques pluies ou bruines. Vent du secteur Sud-Ouest modéré. Température maximum : 6°.

Le 28 décembre, 1935, à 1200 h. Ciel ¾ couvert ou couvert brumeux. Quelques chutes de bruines. Vent variable faible. Température en faible baisse. Maximum : 5°.

Bulletin du 28 décembre à 18. heures.

VOICI LES PRÉVISIONS RÉGIONALES POUR LA JOURNÉE DU 29 DÉCEMBRE, 1935 :

Passage sur le Massif-Central et le Sud d'un système nuageux lié à une zone de baisse barométrique. Ailleurs persistance du temps actuel.

VOICI LE TEMPS PROBABLE POUR LES RÉGIONS : NORD, BRETAGNE, NORD-OUEST, PARISIENNE, NORD-EST, OUEST, CENTRE ET EST.

Même situation. Ciel brumeux, ¾ couvert avec chutes éparses de bruine. Vent modéré du Sud-Ouest.

LE MINIMUM DE TEMPÉRATURE SERA : sans changement sur celui de la nuit précédente.

VOICI LE TEMPS PROBABLE POUR LE MASSIF-CENTRAL ET LA RÉGION SUD :

Temps médiocre. Ciel ¾ couvert ou couvert. Quelques chutes de pluie intermittente. Un peu de neige sur les hauteurs. Vent de S.E. passant à S.W. modéré.

LE MINIMUM DE TEMPÉRATURE SERA : sans changement sur celui de la nuit précédente.

VOICI LE TEMPS PROBABLE POUR LES RÉGIONS : SUD-OUEST ET SUD-EST :

Assez beau temps. Ciel ½ couvert avec éclaircies. Vent du secteur S. modéré.

LE MINIMUM DE TEMPÉRATURE SERA : sans changement sur celui de la nuit précédente.

(*Please turn to page* 154.)

Feminine of Nouns and Adjectives

(*Continued*)

Nouns and Adjectives ending in -eur. These words form their FEMININES in FOUR different ways :

1. Those which have the force of a COMPARATIVE follow the general rule and add an -e. Thus : majeur, majeure ; mineur, mineure ; meilleur, meilleure ; supérieur, supérieure ; intérieur, intérieure ; extérieur, extérieure.

2. Those which are derived from the PRESENT PARTICIPLE of a verb change -eur into -euse. Thus : liseur, liseuse (a reader, derived from the verb "lire," meaning "to read") ; menteur, menteuse (a liar, from "mentir," meaning "to tell a lie") ; danseur, danseuse (a dancer, from "danser," meaning "to dance") ; flatteur, flatteuse (a flatterer, from "flatter," meaning "to flatter").

3. Some words change -eur into -eresse. Thus : pécheur, pécheresse (sinner) ; vengeur, vengeresse (avenger) ; enchanteur, enchanteresse (enchanter)

4. Some words ending with -teur change -teur into -trice. Thus : acteur, actrice (actor) ; protecteur, protectrice (protector) ; directeur, directrice (director).

(*À Suivre.*)

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

WILL IT DO FOR A POCKET WIRELESS SET?

G. R. (Matfield, Nr. Paddock Wood, Kent).—"Could you please supply me with the following information?

"I have in my possession a Marconi valve with which I should like to have a shot at making a pocket wireless, it being a small affair. On it there is 'Marconi W.T. Co., Ltd.'; opposite this on the bulb is 'V24,' and I thought perhaps it may need a different filament voltage and anode voltage than the ordinary battery valve. It has not got a base with four pins, but at each *end* it has metal, like on the end of a grid leak, for the filament. The other electrodes connected to the same things are opposite one another, near one end of the valve."

The "V24" valve was developed during the war of 1914–18, and is therefore more suited to a museum than for use in a modern receiver.

You would find it quite unsatisfactory as compared with an up-to-date valve. The high filament voltage required (6 volts) and the large current necessary at that voltage put such a valve right out of court so far as use in a modern portable receiver is concerned.

The "V24," moreover, was not a high-magnification valve, and when used as a detector it was employed in an anode-bend circuit much less sensitive than the ordinary one-valve set's grid-leak method of detection. In its day, however, the "V24" was a wonder, and such a valve is well worth keeping for its historic interest.

CURIOUS CRACKLES

A great many readers have been interested enough in the above subject to write about the experience of A. S. (Boston), which was described in "Radiotorial of our February 15th issue.

Although some corrrespondents appeared to be quite familiar with the possibilities of crackles from a silk petticoat, as described, others appeared to think that A. S. was leg-pulling in describing such an effect. (One sceptic, J. E. H. of Derby, went so far as to suggest that a pair of corsets wrapped round a wireless set might make a good frame aerial!)

The most curious crackle that has been reported in this correspondence was described on a postcard by a Southampton reader who gives only his initials E. S., He says, "Can beat the curious crackle caused by a petticoat. I used to get a crackle regularly, but *only when my car was not standing in the garage* (about 12 ft. from the set).

"Quite seriously, we noticed this scores of times, and could never account for it. But it is a fact that the set used to crackle quite a lot when the car was out, but not a sound of crackle if the car was in. The trouble disappeared altogether when the garage was enlarged for two cars."

Probably other readers, noting that E. S. reports this on a postcard without giving an address, will think it could not be true. But we have known of more puzzling cases where, unlike this one, there seemed no possible explanation of the noises.

We say "unlike this one" because old hands will have spotted a possible explanation for crackles occurring only when the garage was not occupied by the car. For the benefit of others who have not had experience of this kind of thing, we give the following possible causes.

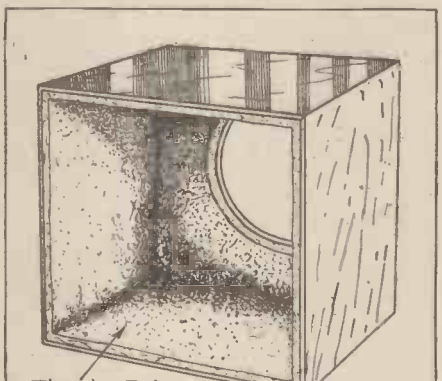
(a) If the crackles were due to electric-light wiring, metal conduits, etc., it is possible that the slight movement of these which caused the crackling sounds could be affected by the weight of the car in close proximity. A metal pipe that might shake or be moved imperceptibly by traffic passing, or other cause, might well be held too securely to move when a heavy car was imposing a load on the structure containing or adjoining the wiring.

(b) Apart from the heavy weight on the garage, there is the possibility of altered conditions when the car was out; for example, it might have been the practice to keep the garage doors shut when the car was in, but open while it was out. If the doors touched a drainpipe, or gutter, they might shake it or hold it steady accordingly: and this might then affect the set, especially if the earth wire were close to or touching the pipe in question.

Ingenious fault-tracers may amuse themselves by thinking of other ways in which a car's presence could stop crackles. But everyone who has possessed "a noisy floorboard" which caused crackles when walked on will readily admit that the above explanations are quite feasible.

Very loud crackles can be set up by very small shakings and movements. And it is not unreasonable to suppose that a car, weighing perhaps the best part of a ton, should have some effect in determining whether or not such movements took place in this particular instance.

IMPROVING QUALITY



A very good method of reducing the resonance effects due to a loudspeaker cabinet is to line the whole of it with thick felt. This procedure often results in a marked improvement in quality. Try it if your reproduction sounds "boxy."

SHOULD THE LOUDSPEAKER HAVE A TONGUE?

W. F. (King's Lynn).—"I do not know whether I have hit on something new, but I reasoned it out like this:

"If the hole in the cabinet is the mouth of the loudspeaker, then the sloping sides of the cone are like the throat. Fastened to the back of the speaker's throat is the moving coil, which corresponds to the moving vocal cords.

"Looked at in this way, where is the tongue? Does it not seem clear that if the loudspeaker had a tongue we should get rid of that thick utterance and 'plum-in-the-mouth' kind of reception?"

Honestly, W. F., we cannot say it does seem clear to us; but we imagine you can certainly claim to have hit on something new.

Unfortunately for your theory, however, the radio trade judges by results, and not by analogies or superficial resemblances.

If you can demonstrate that improved loudspeaker reproduction is possible by adding a tongue we shall be pleased to give the idea all the support in our power. In the absence of any demonstration we incline to the view that a tongue in the "mouth" of a loudspeaker would have about as much chance of improving the realism as a set of big artificial teeth mounted across the opening, or a black moustache painted on the cabinet above it!

DIAL LIGHTS ON THE NEW "UNIVERSAL" THREE

W. J. C. (Christchurch, Hants.).—"I am making the above set and should be glad if you will send me particulars of the wiring of 'dial light' or lights. I have not seen it mentioned in 'P.W.'

"There is supplied with the condenser two brackets for two lamps, and as the scale is set rather far back, I should like to have one light at least, if not both.

"I should be glad if you will send me instructions for the wiring and the correct lamps to use. I have got the same components as per the list."

It is not difficult to add the dial lights, since there are only the two connections on each, and each pair needs only to be taken to a break in the heater circuit wiring.

Whatever valves you may be using, the rule is to get for the dial screw-in bulbs which are rated to carry twice the current flowing in the heater circuit; and you should choose the lowest available voltage, since there will be plenty of illumination with this, and the lower the voltage the less the effect on the set. (It will be negligible with 2-volters.) A convenient place to break the heater circuit is between an "H" socket and the heater wire going to this.

CIRCUIT S O S's.

We have pleasure in publishing the following extract from a letter from Mr. A. C. Derrick, 57, Gores Marsh Road, Ashton, Bristol:

"Having the components on hand I was constructing that good old circuit, the "Magic Four," as published in "P.W." issue No. 411, dated April 19th, 1930. But unfortunately the wiring diagram got burnt, and I am now at a loss as to wiring up.

"Failing the back number (out of print), would you kindly insert in 'Radiotorial' a request for that issue, as I am sure there is a copy on hand somewhere. I will gladly compensate anyone for their trouble in sending it to me, as I have bought the valves, etc., for the 'Magic.'"

Another request for help in obtaining a back number now out of print comes from Mr. T. J. Dixon, 59, Townsend Street, Dublin. He is needing the S.T.500 issue, and the blueprint of that set.

Kindly readers who live near either of these addresses may like to respond; but in general it is better not to send by post, unless a postcard is sent first. This is desirable because we have known of a request like the above resulting in *hundreds* of copies of "P.W." arriving, and it may then be impossible to acknowledge or return them all.

SAFE ANCHORAGE FOR A TALL MAST.

G. F. (Gravesend, Kent).—"For a long time I have been waiting to see if you would mention my trouble in your paper. But all your readers seem to have perfect aerials—at least, they never ask about anything so low-brow as a mere mast. Yet the mast is my trouble.

"I can arrange to get up a forty-footer if only I can fix it firmly by stays which *must* slope at a sharp angle. The end of my garden tapers in, and what with other posts, etc., there is only one place where I could stand a tall mast.

The snag is that if I arrange it there the main stays will have to be placed within

RADIOTORIAL QUESTIONS & ANSWERS

(*Continued from previous page.*)

fifteen feet of the foot of the mast. And there is no wall or other absolutely firm fixture that I can anchor it to.

"I have thought of stout posts, but even these will pull out in wet weather when the strain comes on them. How would you suggest anchoring the wire stays in such a case?

"Perhaps I ought to say that I had one fright with a mast heeling over—it might have killed somebody—so I do not want to take any risk with this. I know a shortish mast would solve the difficulty, but surely there is some way in which I can firmly anchor a tall one, even in restricted space?"

Yes, G. F., there is a way to anchor firmly; and fortunately it is quite easy, even if you have not had much experience at this kind of work.

As you say, the ordinary post, however well driven in, is apt to pull out or loosen when the ground gets soft. So instead of using an above-ground post, which will be affected by rain, etc., we advise a buried "anchor."

Dig a hole several feet long, and three feet or more deep. Fix the end of your wire stay round the middle of a shortish post, and then bury the post in a horizontal position.

In this manner the whole post is held securely below ground—not just one end of it, as before—and wet and soggy ground conditions will merely tend to hold it tighter in position, instead of loosening it. If you adopt this procedure we feel sure that you will have no further trouble due to the mast heeling over.

SUPPLYING SIX VOLTS FOR LOUDSPEAKER FIELD.

W. W. T. (Gillingham, Dorset).—"I have a B.T.H. loudspeaker, type R.K.; can you tell me the best way of supplying the field volts, which are six volts?

"I am a regular reader of 'P.W.' and the proud owner of an S.T.600 battery set. Our mains are 230 volts A.C."

With mains in the house the most straightforward course is to employ a metal rectifier of the L.T. variety, which will give the necessary six volts output and the rather large current that such loudspeakers require.

The input voltage to rectifiers of this kind is generally nearly double the output voltage—say 11 volts in this instance. To obtain this from your mains you will need, in addition to the rectifier, a transformer having this voltage output. You will probably need a large reservoir condenser across the rectifier output, one of the 1,500-mfd. or 2,000-mfd. 12-volt electrolytics being suitable.

The apparatus is therefore very simple and easy to fit and maintain, consisting as it does merely of the loudspeaker field winding, the L.T. rectifier which feeds this, and the condenser, and the transformer which is joined between the mains and the rectifier.

Full particulars and diagram can be obtained from one of the firms specialising in such apparatus—e.g. Heayberds or Westinghouse Brake and Saxby Signal Co. Ltd.

FOR YOUR GARDEN

FREE Seeds of the lovely Clarkia, one of the most delightful hardy annuals, are presented with this week's POPULAR GARDENING (now on sale, 2d.). A glorious display can be obtained from these seeds; they are simply sown on finely raked ground. The flowers are of various pretty colours. This issue contains information on a number of seasonable aspects of garden culture, and suggests work that is advisable at this time of year among flowers, fruit and vegetables.

Result of "P.W." Competition No. 9.

The Marconiphone Set—Model 237 Mains Receiver—for the most effectively stated replies to answers in the questionnaire on wireless programmes, has been awarded to: Mr. A. E. Rose, 75, Breedon Street, Long Eaton, Notts. Mr. Rose's replies will be given in our next issue.

THE "P.W." DX CERTIFICATE

(*Continued from page* 140.)

Hawaiian group, which are included in North America.

These four rules appear to cover the entire affair, and I do not want to impose any more complicated set of regulations than these. Please read them carefully, and save both yourself and the "P.W." staff much time and trouble by doing so.

Please note, especially, that *telephony* transmissions only are accepted. This, of course, includes amateur stations and commercial stations, but since the latter do not usually send verifications they are more or less ruled out of the question.

Really Worth Having

You may think that the conditions are stringent, but they have been made so purposely, so that the certificate may be something really worth having, and not a mere piece of paper that anyone can hang on his wall after handling a short-wave receiver for a few weeks.

If the number of applicants for the certificates does not prove to be too great, I will publish the names and addresses week by week. If, on the other hand, it runs into scores or hundreds at once, I shall certainly *not* do so!

Set Details Welcomed

Purely as a matter of interest, I should be glad if, when you send in your "veri's" you would state also the receiver on which the work has been done. There are no special bonuses for small or cheap receivers, but I should like to see which of the broad types of short-wavers appear to be doing the best work.

That is all for the present, and I am awaiting the first rush! **W. L. S.**

PRACTICAL RADIO AND ELECTRICITY

(*Continued from page* 141.)

meter "V" will immediately show a deflection, thus proving that a current is flowing along the wire and round the circuit in which the meter is connected. This brings us to another electrical fact. And it is this. That a current is only produced in a wire or circuit by a magnetic field when the wire is actually cutting the lines of force.

And another point is that the greater the number of lines of force cut by the wire, the greater the current induced in it.

Primary and Secondary Coils

We need not have magnets to produce a current flow by induction. We saw that we could do the same thing momentarily in the case of the two coils "X" and "Y" when we switched the battery on and off. If we could replace this switch and battery with some means of producing a continually changing current through the coil, then the lines of force caused by this current would also be changed in sympathy.

Hence, if another coil is coupled to the first coil, this rapid cutting of lines of force through the turns of the second coil would produce a current flow in that winding, which would continue all the while our source of varying current supply was switched on. (See Fig. 5.)

Incidentally, it is usual to call the first coil the primary and the second coil the secondary ("X" and "Y" respectively in Fig. 4).

This is, of course, the principle of the Transformer used in radio and commercial electricity.

AT the invitation of the Marconiphone Company Limited I was recently privileged to make an extensive tour of the vast battery section of their factories at Hayes, Middlesex. It was, I think, one of the most illuminating experiences I have had for many years, for although I very naturally presumed that adequate steps would be taken to ensure that all batteries bearing the Marconiphone trade mark would live up to their reputation, I must confess that I had no idea that the testing procedure was so elaborate.

As a matter of fact, I particularly welcomed this opportunity of acquiring some first-hand information concerning battery production, for apart from the interest which attaches to the subject from the point of view of a great number of "P.W." readers, prior to my recent visit I had been rather under the impression that too little attention was given to the all-important question of batteries by manufacturers generally.

But if my experiences at Hayes may be taken as criterion, I must in fairness admit that my impressions

G.T.K. AT HAYES

Mr. G. T. Kelsey testing some of the batteries at the Marconiphone works.

were far from being right. In fact, I am prepared to go farther and say that as far as Marconiphone are concerned, I think the requirements of battery users are attended to in a way which does the firm great credit.

I do not need to remind you that the most vital consideration with any battery is the length of its useful life, and on account of the fact that a battery very slowly deteriorates even before it reaches the listener who is going to use it, it is obviously of the greatest importance that it should not be kept in stock for any length of time.

As a result of the remarkable co-ordination of all departments concerned with Marconiphone batteries at Hayes, the entire stock, which runs into many thousands of batteries, *is completely turned over in five days!* To be able to claim that no battery leaving the works is more than five days old is, in my estimation, an achievement of the very highest order, and I cannot help thinking that this amazing fact is in no small way connected with the remarkable length of life which the average Marconiphone battery, properly used, will give.

Not that that is all. In order still further to safeguard the interests of the listener (and, incidentally, the reputation of Marconiphone batteries), no less than ten per cent. of the total stocks, picked absolutely at random, are subjected to a very convincing life test and the performance of each individual battery is faithfully recorded automatically on a chart. Just think, ten per cent. of the total stock scrapped—for that is what this life test amounts to—in the interests of reliability! Does not that create confidence?

The batch that I saw being put through their paces had already undergone the equivalent of eight weeks' use in an ordinary set, and without exception their voltages were very high having regard to the discharges to which they had been subjected.

As an interesting climax to my illuminating tour, I was invited to go round the stores picking batteries out at random and testing them myself. This I did, and of the seven or eight which I selected, not one failed to show a voltage in excess of that at which it was rated.

I welcome this opportunity of bringing these facts to the notice of my "Link" friends, for I sincerely believe that any firm that takes such elaborate precautions to ensure long life and reliability in the batteries for which they are responsible is deserving of widespread publicity. No wonder the Marconiphone battery slogan is "More hours per shilling!"

G. T. K.

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page* 151.)

VOICI MAINTENANT QUELQUES MINIMA DU 28 DÉCEMBRE, 1935 :

Brest, Bayonne : 8° ; Le Havre, Rennes : 3° ; Tours, Nantes, Rochefort, St-Raphael : 2° ; Valenciennes, Calais St-Inglevert, Perpignan, Marseille-Marignane : 1° ; Paris St-Maur, Bordeaux, Toulouse, Lyon : 0° ; Dijon, Nancy : 1° ; Besançon : 2° ; Clermont-Ferrand : 3° ; Strasbourg 4°. Voici enfin le maximum du 28 à Paris St-Maur : 3°.

Let me extract a few weather words and phrases from the above bulletin which, with others, you must try and memorise.

Température en baisse—temperature lower
tah(m)-peh-rah-tür ah(n) behss
Température stationnaire—temperature stationary
stah-se-o(ng)-nair
T. en faible baisse—temperature slightly lower
ah(n) feh-bl behss
T. hausse de deux degrés—temperature higher by 2°
ohss de(r) de(rr) de(r)-greh
T. sera sans grand changement—no great change in temperature
s'rah sah(n) grah(n) shah(n)sh'mah(n)
orageux—stormy
or-ah-she(r)
couvert—overcast
koo-vair
avec éclaircies—with patches of blue sky
ah-vek eh-klair-see
quelques chutes de pluie intermittente—occasional showers
kel-ke(r) shüt de(r) plwee a(n)-tair-mit-tah(n)t
quelques averses de pluies ou de neige—some rain or snow
kel-ke(r) zah-vairss de(r) plwee oo de(r) nehsh
vent faible—wind mild
vah(n) feh-bl
vent variable—wind variable
vah(n) var-e-ahbl
beau temps—fine weather
boh tah(m)
nuageux—cloudy
nwah-she(r)
peu nuageux—clear sky
pe(r) nwah-she(r)
brumeux le matin—misty in the morning
brü-me(r) le(r) mah-ta(n)
avec brumes et bruines—mist and fine rain
ah-vek brüm eh brween
vent nord—wind northerly
vah(n) nor
le sud-ouest—south-west
süd-west
sud-est—south-east
süd-est
un système nuageux—a cloudy condition
sis-tehm nwah-she(r)
une zone de baisse barométrique—a belt of low pressure
zohn de(r) behss bah-roh-meh-treek
le temps actuel—the present weather
tah(m) zahk-twel
chutes éparses de bruine—intermittent fall of fine rain
shüt eh-pah-z de(r) brween
vent modéré—wind moderate
vah(n) mod-eh-reh
la nuit précédente—the previous night
nwee preh-seh-dah(n)t
assez beau temps—fairly good weather
ass-eh-boh-tah(m)
se couvrant—becoming overcast
se(r) koo-vrah(n)

S. C. Gillard, M.A., will contribute another instalment of this fascinating language series to next week's "P.W."

DON'T MISS YOUR COPY

RANDOM RADIO REFLECTIONS

(*Continued from page* 148.)

quite certain that television will be as common as the telephone is now in the "Brave New World."

"Things To Come" shows three-dimensional television, and in one scene you see it on a screen as high as Nelson's monument in the public square of a city.

There is also a complete wrist-watch size radio transmitter and receiver worn by one of the artists. This produced a laugh from the audience, but it wasn't supposed to be funny!

A BOUQUET FROM BASRAH

THE Editor has passed on to me a letter from Mr. Albert Daubney, whose address at the time of writing was SS. "Arabistan," Basrah, Iraq.

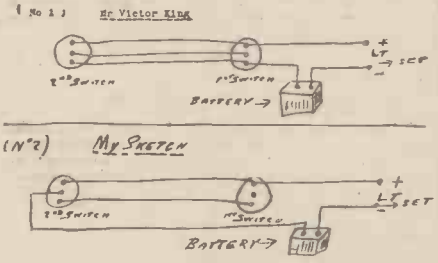
Albert is a nasty fellow.

He starts his letter thuswise:

"It is with glee that I am writing to you, as I think I have caught Mr. Victor King 'dropping a brick,' as he calls it. In POPULAR WIRELESS of January the 18th, 1936, under 'Random Radio Reflections,' he gives a sketch of two-way switching, and the way it is shown it cannot work. I give a copy of his sketch and also a sketch of how it ought to be. No doubt many other readers have also sent in about it before this. But this is the first chance that I have had, as I had left England before there was any time to read the paper. I have read many of his papers and this is the first time that I have been able to find a fault in them."

With a hearty, good-humoured, tolerant laugh, and with even greater glee, I point out that my sketch is quite correct and Albert's is how it ought *not* to be!

CORRECT AND INCORRECT



Here are the two sketches sent in by Mr. Daubney.

In fact, friend Albert's number one switch is nothing but a mere passenger. It can't do a thing. It can neither switch off when the other switch is "on" nor "on" when the other switch is "off."

However, I forgive you, Albert, but was it nice to write to the Editor like that? I mean to say, he might have "axed" me forthwith. Cut me dead, liquidated me, shown me the W.P.B., and so on and so forth.

THE PROFESSOR GETS TIED UP

"TELEVISION," says Professor Varrinace, in his monumental classic, "All You Should Know About Radio," "is an electrical-optical science. The processes involved transform variations of light intensity into electrical fluctuations.

"Actually, the only difference between light and electrical variations lies in their frequencies. The television machine overcomes this difference. It changes the very high light vibrations into vibrations such as can be handled by means of electrical circuits.

"It is a curious thought that if we could produce electricity of an extremely high frequency, it would not be electricity at all but would exist as light.

"Television constitutes the bridge between the two. The scanning disc rotates and breaks the picture into small sections, each section being an element of given light intensity.

"If there be 100 holes in the disc and the disc rotates at a speed of 50 times per second, the picture will be broken into 5,000 sections. And these are made to actuate a photo-electrical cell, and thus is fluctuating electricity developed."

Professor, you've said a mouthful. My own criticism of your witty observations can be found on next page. But before turning to that, readers may care to frame their own.

BOTTLING TELEVISION

DURING July of this year the London television service will be in full swing, according to the authorities. But the transmissions will last for only one hour, during the time when the shops will be open and desirous of giving demonstrations to customers.

What will be very much needed is some method of bottling television pictures in the same kind of way as sound is "bottled" on a gramophone record or on a steel tape by the Marconi-Stille machine which the B.B.C. uses.

You can record low definition television easily enough, but the high definition stuff is a different proposition.

So here is opportunity for an inventor. Fame and a comfortable fortune await the man who can devise a simple, practical system. Go to it, lads, and show the world what a "P.W." reader can do when he really gets down to it.

ROUND THE RECORDS

(*Continued from page* 146.)

Naturally Mr. Owen asked to see the original. As it was in the hands of another phonograph firm at the time this was impossible, but eventually the picture was turned down again and Barraud brought it to Mr. Owen as requested, with the suggestion that he could easily paint out the cylindrical type of phonograph and paint in the flat disc type as made by The Gramophone Company. This was agreed to and in a short time the picture was in the hands of The Gramophone Company. It now hangs in a special recess over the fireplace in the board-room of the company's head offices at Hayes, and close examination reveals in relief the marks of the brush outlining the old wax cylinder phonograph.

The picture, and its trade mark title, "His Master's Voice," instantly became popular, and for over a quarter of a century now the famous listening dog, with his head on one side intently gazing down the brass trumpet of the gramophone, has announced the origin of manufacture of gramophones, sound boxes, pick-ups, needles, records, and wireless receivers.

Nipper himself is dead; he died a few years after his portrait was taken up by The Gramophone Company, but his fame goes on, and probably there is not a country that is not familiar with the picture of the little fox terrier.

And now, in conclusion, I want to give you the names of a few records that I think you ought to hear. They form a mixed bag, but each in its class is worth hearing. *Love Is a Dancing Thing* and *The Simple Things of Life* (sweet dance music), by Maurice Winnick and his Orchestra—Parlophone F 372. *Eeny Meeny Miney Mo* and *Solitude* (contrasting numbers), Jack Hylton—H.M.V. BD 5035. *A Beautiful Lady in Blue* and *Moon Over Miami* (sweet music), Maurice Winnick—Parlophone F 394. *Spreadin' Rhythm Around* and *High Rhythm and Low Moanin'* (hot music), The Krakajax, who at the moment are playing at the San Marco—Parlophone F 396. (If you are not a hot dance music fan I won't guarantee you will like it.) *That's What You Think* and *Anything That's Part of You* (Len Bermon, one-time Henry Hall's drummer-vocalist)—Parlophone F 404. *Don't Mention Love To Me* (vocal), by Ginger Rogers, on Decca F 5838. *Follow The Sun* selection (piano duets), Reginald Foresythe and Arthur Young—Decca F 5879.

K. D. R.

THE NATIONAL TRANSMITTER

(*Continued from page* 147.)

The design of the power house plant follows established practice and does not call for detailed description. The engines are of the six-cylinder solid-injection type, running at a speed of 375 r.p.m.

The mercury arc rectifier equipment, manufactured by the British Thomson-Houston Company Limited, is of the steel tank type, and receives power at 415 volts 3-phase 50 cycles. The rating and voltage ranges were specified as follows: 600 kilowatts at 15,000–20,000 volts. An essential feature of the equipment is that D.C. short-circuits, such as may occur in the event of a flash-arc in a transmitting valve, are quickly suppressed by applying negative voltage to the grids of the rectifiers.

Ensuring Good Quality

In the main amplifier each C.A.T.14 valve is provided with an individual D.C. filament motor generator having an output of 37 volts 650 amps. at 725 r.p.m.

THE PROFESSOR.

(See Previous Page)

OUR "learned" friend is right off the track in coupling light and electricity in that way, and his generalisations about "television processes" are all absurdly wrong. A definite error is that a 100-hole scanning disc rotating 50 times per second breaks the picture into "5,000 sections." It analyses the picture in one-fiftieth second into 100 "lines." Get it?—V. K.

The major consideration governing the design of the long-wave transmitter was the necessity of ensuring a linearity and frequency response comparable with, or better than, that obtained from the regional transmitters already in service in the medium waveband. In addition, the projected output power of 150 kw. on a frequency of 200 kilocycles per sec. (1,500 m.) necessitated special consideration of the system of modulation to be adopted. The preliminary experimental work was based on the following considerations:

While the modulation of a carrier-frequency at a low power level (say, of the order of 100 watts) avoids the majority of the difficulties attendant upon the design and operation of high-power modulator valves, speech transformers, or chokes, these advantages may be outweighed, in the case of transmitters of high output power operating on long wavelengths, by the difficulty which exists in maintaining an adequate linearity and frequency response in the succeeding stages of high-frequency amplification

Side-Band Cut-Off

While it is admitted that it is possible to produce a satisfactory transmitter of 150-kw. carrier output, modulated at a low-power level, consideration shows that in order to prevent serious side-band cut-off, particularly at the relatively long wavelengths, the circuits of the modulated high-frequency stages would have to be of a complicated design and would, moreover, be critical to adjust. Conversely, if the foregoing difficulties were avoided by anode-voltage modulation of the final amplifier, even greater difficulties would be encountered in the design of iron-core inductances or transformers capable of handling such large amounts of energy without the introduction of serious distortion.

Series Modulation Employed

After careful investigation and consideration of experimental work by the Research Department of Marconi's Wireless Telegraph Co., it was decided to avoid the difficulties mentioned above by modulating the penultimate amplifier by means of series-connected modulators. This well-known but seldom-used arrangement avoids the use of iron-core apparatus in any of the low-frequency circuits and, moreover, it reduces the number of amplifying stages subject to modulation to one only.

An additional advantage associated with series-connected modulators, suspected during preliminary considerations, and proved during subsequent experiments, is the reduction of distortion, combined with more faithful reproduction of transient waveforms, compared with that obtained from choke-connected modulators.

Now you know just a very little bit about all the work and the careful thought, experiment and preliminary trials which have gone to the making of the eminently successful National transmitter which serves you so faithfully from Droitwich.

You will appreciate the remark which I made at the opening of the first Article when I said that this station made broadcasting history. Those of you who want more details should consult the original paper by Sir Noel Ashbridge and Messrs. Bishop & Maclarty, which is a masterpiece of lucid technical description, and which is to be found in the Journal of the Institution of Electrical Engineers, Volume 77, No. 466.

THE RADIO BULLETIN

(*Continued from page* 136.)

The receiver is very economical and is, of course, run off the car battery, the total consumption being slightly less than that of an ordinary head lamp.

The makers state that no fewer than 65 stations have been brought in under normal working conditions.

The price is 17 guineas.

* * *

G.E.C. ALL-WAVE DESIGNS

This is the age of all-wave radio. Each week we have further new designs to add to the ever-increasing band of manufacturers marketing sets of this type. **G.E.C.** have produced **three models** for use on A.C. mains and covering from 16 metres upwards.

The first model has a European stations dial, covering wavelengths of 16–98, 200–550, and 800–2,000 metres.

The second set has an Overseas dial covering similar wavelengths, and the third model an Overseas dial covering continuously wavelengths from 16–550 metres.

An 8-valve (including rectifier) chassis is employed in each model.

* * *

BRUNSWICK, TOO

There is a new **Brunswick** all-waver which is available in two models, namely, a console and the normal table designs.

A superheterodyne circuit is used, and the pre-mixer high-frequency stage operates on all three wavebands. There are seven valves altogether and nine tuned circuits. The wavebands are 16–49, 175–550, and 1,000–2,000 metres. Both the console and table models are designed for A.C. mains only and the undistorted output is 3½ watts.

The console costs 22 guineas and the table model 18 guineas.

* * *

R. C. & S. MODELS

The 1936 **R. C. & S.** [Richard Cooper & Sons (Wolverhampton), Ltd.] range of radio receivers includes models for both the battery and mains user.

There are **three all-mains models,** one a table instrument utilising a five-valve (including rectifier) superhet circuit. This model is priced at 11½ guineas.

There is also a radiogram incorporating the same chassis as the table model and giving an undistorted output of 3½ watts. A Garard electric motor and pick-up are fitted, together with a Rola matched 9-in. moving-coil speaker. The price is 17 guineas.

The third mains design employs a four-valve straight circuit comprising three pentodes and rectifier. A Droitwich filter for use in swamp areas is fitted. The price is eight guineas.

For the battery user there is a three-valve set with a similar specification to the mains four, that is to say, three pentodes are used. The price of this model, complete with batteries, is £6 19s. 6d.

POWER AND PURITY

(*Continued from page* 144.)

violin strings sound what they really are, with the slight "edge" on the tone that one obtains from the motion of the bow across the strings. Cymbals, too, give the sharp crash that they should, and on the whole the speaker sounds "lively" and ready to reproduce every little variation in tone that comes from the orchestra.

To compensate somewhat for the usual loss in high-note efficiency that one experiences in modern set design, due to the need for keeping within the 9-kc. channel, and especially noticeable in superhets, Rola have made the G.12 speakers with a tendency to lift in the high-note register by quite a large amount round about 2,500 cycles, the lift lasting to about 4,000 cycles. You can see what I mean by the curve on page 144.

At the bass end there is a commendable flat portion before the speaker cuts off, but in practice there seems to be a resonance peak round about 80 to 90 cycles, due apparently to the material used in the diaphragm.

It is a peak, however, that is more likely to prove valuable in everyday use than the reverse, for few amplifiers do not commence to fall off soon after one passes below 100 cycles, and a "lift" in the speaker adds "body" to the reproduction.

Will Carry A Large Input

The G.12 speakers will carry a very large input power without the slightest sign of distress, and are designed not only for home use, but also for public address work. I have, in fact, used them with every success for providing music in a large hall.

Following their well-known policy of making an individual transformer to suit each individual purpose, Messrs. Rola supply a whole host of input transformers for their speakers, so that it is the easiest thing in the world to get accurate matching between the output valve and the speaker. This is most important, of course, for no matter how good a speaker may be its reproduction will be ruined if it is not properly matched to the output valve with which it is being used.

The Rola G.12 speakers are excellent pieces of work—electrically, acoustically and mechanically. They are strong, sensitive, and have very fine response curves, and I can honestly recommend them to readers of this journal.

Finally, do not be misled by their size. They have full 12-inch diaphragms, and will carry very large inputs; but they are as suitable for household purposes as they are for public address work. Their sensitivity makes them perfectly suitable for use with a small set as with large amplifiers, and there is no reason to suppose that because you may not be able to give the G.12 a large input you will lose the benefit of good reproduction.

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All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

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(Continued)

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POPULAR WIRELESS, April 25th, 1936. REGISTERED AT THE G.P.O. AS A NEWSPAPER

IMPORTANT B.B.C. CHANGES FORESHADOWED (SEE PAGE 165)

Popular Wireless & Television Times

EUROPE'S STARTLING POWER INCREASES
FULL TABULATED DETAILS

EVERY WEDNESDAY PRICE 3D

No. 725.
Vol. XXIX.
April 25th, 1936.

Also This Week:

AMATEUR RADIO TO THE RESCUE
A Dramatic Account of the Assistance Rendered by Amateur Radio in the Great American Floods, and Other Emergencies.

THE "PLUS H.F." BATTERY FOUR
—AN OUTSTANDING SET YOU CAN BUILD

"I must have some of that," says Billy, as Norman Long charges the tankard. Billy, incidentally, is Norman's most enthusiastic fan and hears all his broadcasts on the Ekco set seen in this photograph.

POPULAR WIRELESS AND TELEVISION TIMES

Editor: G. V. Dowding Asst. Editors: A. J. Randall, A. S. Clark

NEWS IN BRIEF
ICE PATROLS
RADIO IN IRAQ

RADIO NOTES & NEWS

IN TURN
CAREERS FOR BOYS
ONE CROWDED HOUR

News Items In Brief

SINCE August, 1933, when at Herr Hitler's suggestion the People's Receiver was placed on the market in Germany, over 2,000,000 of these simplified sets have been made. About 1,900,000 have been sold. They are intended for local-station reception only.

I doubt if this type of set would ever achieve popularity here. Not many listeners would be content with the reception of the "locals" only.

* * *

The producer of "In Town Tonight" programmes, Mr. William Hanson, is making good progress after a recent operation.

* * *

What is said to be the biggest-ever order for radio equipment for an air line has been given to the Marconi Co. by the Air Ministry and Imperial Airways. It is for equipment to direct the new flying boats to the Cape.

Another War Mystery Solved

SOME months ago I recounted how a London soldier got into touch with an ex-enemy by means of radio. This month has seen another instance, in which an aged Scottish mother heard details of her son's death in 1917 through a broadcast from Cologne.

A German soldier told listeners how he found a lance-corporal of the Black Watch after one of the attacks on Passchendaele, and how the Scot tried to give a dying message which his foe did not understand. The German, however, saved a postcard on which appeared the name Lance-Corporal Dowie, 4/5 Black Watch. This name was mentioned in Cologne's appeal to trace the owner's relatives, and now Mrs. Dowie has been informed of how her son died. It is 19 years ago since he was reported missing.

Money for the Week's Good Cause

UNDER the will of Mr. W. F. G. Campbell, of Uckfield, Sussex, the B.B.C. was left a sum of £2,000 to be devoted to the weekly "good cause."

Such a windfall was very welcome, but its unusual terms presented the B.B.C. and the lawyers with a problem, so the bequest is to be dealt with by the Charity Organisation Society, by means of a trust vested in the Charity Commission.

Every six months the proceeds of the bequest will be transferred to the B.B.C., enabling them to allocate £1 to each of the weekly appeals.

FILM STAR LISTENS-IN

Miss Leonora Corbett, who is starring in the new film, "Living Dangerously," tunes in a programme on her Cossor set.

The Menace of the Ice

AN inconspicuous paragraph in a shipping paper states that the U.S. coast-guard vessels "Champlain" and "Pontchartrain" have been detailed for the 1936 Atlantic Ice Patrol.

Behind that laconic statement lies a drama of devotion to duty. The story began with the tragedy to the "Titanic," ripped by an iceberg on her maiden voyage. The terrible loss of life on that occasion led to the formation of the Atlantic Ice Patrol.

The patrol searches for ice that threatens to drift across the shipping lanes. Icebergs are located, followed and destroyed by explosives, and wireless warnings are sent out to vessels in the vicinity.

Every year, on the anniversary of the "Titanic" disaster, one of the patrol vessels goes to the scene, halts, holds a memorial service, and then proceeds with the dangerous work of warning shipping against the menace of the ice. Spare a thought for the wireless men of the Ice Patrol, who make a living by seeking drifting death.

Radio In Iraq

THE young King of Iraq, who is said to be so keen on radio that he has twenty-five different sets in use, is a monarch of principle. His principle appears to be a noble one: "Do unto others——"

To enable the people of Iraq to listen in, he has decided to erect a station at Chiftlig, some twelve miles from Bagdad. Parliament has been asked to get a move on so that the station may be started this year.

Prime Minister Massim Pasha Hashimi is another enthusiast; a committee is already working on the programme for the opening ceremony. Massim Pasha Hashimi is in the chair, and attractive rumours are in the air.

Tribute to Lisburn

UP till now I have refrained from more than passing references to the new North Ireland station, because I wanted to get considered opinions as well as first impressions of the B.B.C.'s latest addition. The time has now come when I can remove my gloves, take off my silk hat, and make a profound obeisance to Belfast's new station at Lisburn.

It is a genuine first-rater. Not one complaint has come my way, but everyone agrees that Lisburn is ace-high for quality and a trump card for distance.

(*Continued overleaf.*)

NEXT WEEK: SPECIAL ARTICLE BY JOHN SCOTT-TAGGART

OPPORTUNITIES TO JOIN R.A.F. RADIO SECTION

Moreover he is a good mixer, for he has provided many of us with an extra programme without stepping on neighbouring toes.

Congratulations to all concerned, and just one question to the B.B.C.—when are the other regional stations to be brought up to the same standard? We could do with half a dozen as good as Lisburn.

Radio on the Railroad

THE New York, Newhaven and Hartford Railroad is giving radio a thorough try-out on its long-distance freight trains.

There are sometimes 120-odd huge cars between the locomotive and the brake-van (which is known out there as the caboose), and the radio link not only keeps one end of the train in touch with the other but—it is suggested—can also be extended to speak with passing signal-boxes.

In the last eighteen months 36,000 miles of railway have been covered in this way, and the radio equipment has been in operation for about 1,800 hours.

Scandinavian Activities

THE Postmaster-General of Sweden has placed the contract for the new Horby 100-kw. station with the Telefunken Co. of Berlin. The preliminary work has already begun, and the station will be on the lines of the transmitters at Berlin, Hamburg and Breslau.

The Norwegians have brought broadcasting equipment to the aid of the sealing industry, and a fleet of vessels is being equipped to enable the little sealers to talk to the mother-ship, on short waves.

In Turn

MANY wireless stations are necessarily placed in lonely situations, and it is therefore not surprising to find that many have a station mascot, highly prized by the staff.

At one isolated station in Argentina the engineers on late duty half tamed a mouse, which regularly favoured them with a visit in the small hours, sitting up and washing its whiskers like a Christian. One day the mouse disappeared, but the same day a cat arrived from nowhere, looking very satisfied with itself. As it sat and surveyed the staff, licking a dainty paw and washing *its* whiskers, the boys couldn't help wondering.

However, it was a good cat, so they made the most of it, and eventually it became a great favourite. Then it disappeared, quite suddenly—and that same day a satisfied-looking puma arrived, seated himself at a friendly distance, and sedately proceeded to wash *his* whiskers. So the engineers have now been rather anxiously looking up in their books to see what preys on pumas!

Careers For Boys

HAVING been asked for more particulars of opportunities for boys in the expanding wireless branches of the Royal Air Force, I gladly give them.

There is to be a competitive examination for apprenticeships at numerous local centres on May 26th, for which nominations must be received by Tuesday, May 5th. Subjects: English and General Knowledge, Mathematics and Science. (Applicants having an approved first school certificate with specified credits may be excused the entrance examination.)

Candidates for whom apprenticeships are not available may be offered enlistment as boy entrants. For full particulars apply at once to the Inspector of Recruiting, R.A.F., Victory House, Kingsway, London, W.C.2.

Going Too Far!

WE expect radio to go on developing in new and fascinating ways, but this Hungarian professor people are talking of seems to be going too far with it. He created powerful "ultra-shorts," of about a centimetre wavelength, polarised a beam, and then projected it through a special series of coils.

Then came the startling part of the experiment. He sifted small scraps of paper and similar light objects on to the beam, which immediately carried them at an enormous speed to the wall of the room.

So far as I know this is the first claim to have produced such movements, and the possibilities are being seriously considered by scientists. Are we on the eve of discovering a completely new motive force?

BROADCASTING BREVITIES

The B.B.C. Variety Director, wishing to celebrate the "Queen Mary's" maiden voyage with a musical work, has commissioned George Posford to write a symphonic rhapsody in the modern idiom. This special work, entitled "Transatlantic Rhapsody," will be played in London by Geraldo and His Orchestra in the programme "Romance and Rhythm" during the time of the voyage.

This will be an important occasion for Mr. Posford, and should help to place the seal on his success with "Good-night, Vienna" and "Invitation to the Waltz."

* * *

"Mr. Mike Presents ——," which is featured in the Midland programme on April 30th, is the first of a series of topical revues produced by Martyn Webster on the same lines as his monthly "Cocktail," but on a bigger scale. Reginald Burston, who came to the B.B.C. after distinguished experiences in Cochran revues, will conduct the B.B.C. Midland Revue Chorus and Revue Orchestra.

The artists will include Cora Goffin, Dorothy Summers, Marjorie Westbury, Hugh Morton (as compère), Denis Folwell, Warwick Vaughan (who is a son of Madame Alice Vaughan, the singer), Harry Hartland (a young Birmingham tenor), and Those Three, a close harmony trio from Nottingham.

* * *

Western Cabaret No. 6 comes from The Palace Hotel, Torquay, on May 2nd (Western programme), when listeners will hear Arthur Askey (entertainer) and Stanley Le Marchant and His Band. Stanley Le Marchant was for three years one of the principals in the Bournemouth Symphony Orchestra with Sir Dan Godfrey, and his present combination of nine musicians can play straight music in the dining-room as well as the dance music which listeners will hear.

* * *

Those popular entertainers, Leslie and Lewis, who hail from Wembley, will broadcast from the Leeds studios on April 30th (Northern programme). Their act is entitled "In a Whirl of Melody and Song," and, besides singing, they play the piano and piano accordion.

He Was Too Successful!

IN the wild and snow-clad plateau-lands that lie north of Tomsk and south of the Arctic Ocean, there is plenty of time. Lucky is the man there who has a good hobby for the winter, and luckiest of all was Ivanovitch Mansyki, for his hobby was making wireless sets in miniature.

Crystal sets as small as his own fist he had made many times, but when the winter of 1935 set in he determined to make a world-beater—the size of a walnut, or, better still, the size of a pea.

His first attempt, though remarkably small, did not satisfy him; and by Christmas he had improved on it, reducing the midget's height by nearly a quarter of an inch. This, however, did not fulfil the high hopes of the ingenious Ivanovitch. He pondered, and one day inspiration came. He re-designed the whole thing, and made it incredibly small—a mere grain of sand. On test it worked like a charm, and in triumph he walked ten miles through the snow to show it to a neighbour. But on the way, tragedy of tragedies, he *lost* it! Unhappy Ivanovitch—it was too small to find!

One Crowded Hour

THE rapidly extending efficiency of wireless-equipped police cars makes one feel almost sorry for the wrong-doer of to-day. He stands a poor chance against Scotland Yard's radio.

An instance reported in the "Daily Telegraph" recently illustrates the rapidity of pursuit. I can summarise it as follows:

Midnight. — All quiet.

12.22 a.m.—Constable 'phones the Yard. He has been pushed off running board of a car when trying to arrest suspects who were alleged to have stolen a suitcase.

12.24 a.m.—"All cars" advised.

12.50 a.m.—Wireless car captures two suspects in car.

12.55 a.m.—Another wireless car waits at house of a third suspect. Having slipped the police—he thinks—he is met on his own doorstep. ("Where've you been?" "Come with us.")

1 a.m.—All quiet again!

ARIEL.

LOUDER STILL AND LOUDER!

The race for supremacy in Europe's ether is getting more and more furious. The voices of the broadcasting stations are increasing in strength—and in number.

An exclusive article by our Brussels Correspondent.

THE startling announcement that the B.B.C. intended to increase the power of five of its main Regional stations recently astonished listeners in all parts of the country. But if it brought joy to the suffering scores of thousands who for years have been complaining bitterly of the poor reception in coastal areas, it also caused some gnashing of teeth among the comparative few who are unlucky enough to have to try to listen almost within sight of the transmitter. For them the increased power means purchasing the most selective type of receiver on the market, if they want to get any but the all-too-local station!

The B.B.C.'s power increases, which are given in a table below, have officially been decided upon in order to improve reception in outlying districts, but (dare we whisper it?) there is also a suggestion of international politics behind it. Great Britain has got to make her voice heard above the bellowing from across the Rhine, the imprecations from sunny Italy and the "blastings" from other parts of Europe.

Power Increases On Continent

One by one, the stations on the Continent have stepped-up their power, until the existing B.B.C. transmitters are in some danger of being howled down. In recent months the situation has developed so rapidly that in the majority of cases the countries concerned have reached the maximum possible power output from their existing apparatus, and are now consolidating and preparing plans for new and more powerful stations or beginning to rebuild so as to permit of increased power being used.

Thus, the broadcasting organisations of Europe seem to be setting out on a power race, and where it will end, goodness only knows. Fortunately for listeners, the modern

(*Please turn to page* 174.)

Senor Toresky, the famous ventriloquist announcer at Barcelona.

THIS TABLE SHOWS YOU WHAT IS HAPPENING IN EUROPE

Station.	Wave-length.	Power.	Remarks.
ALGERIA			
Radio Alger	318·8 m.	11 kw.	100 kw. very soon.
AUSTRIA			
Vienna II	578 m.	1 kw.	To be a special emergency station in case of breakdown of Vienna.
Graz	338·6 m.	7 kw.	Power to be 15 kw.
BELGIUM			
Brussels I	183·9 m.	15 kw.	To be 100 kw.
Brussels II	321·9 m.	15 kw.	To be 100 kw.
CZECHO-SLOVAKIA			
Brno	325·4 m.	32 kw.	Power will be 100 kw.
West Slovak	298·8 m.	100 kw.	New station to replace Bratislava.
East Slovak	269·5 m.	100 kw.	New station to replace Moravska-Ostrava.
FINLAND			
Viipuri	569·3 m.	10 kw.	Soon to be 15 kw.
Sortvala	400·5 m.	200 watts	Soon to be 20 kw.
FRANCE			
Poste National (Radio-Paris)	1,648 m.	80 kw.	This station is to be replaced by a 150-kw. transmitter in Central France.
Radio-Toulouse	328·6 m.	60 kw.	To be 120 kw.
Rennes-Bretagne	288·6 m.	40 kw.	To be 120 kw.
Bordeaux-Lafayette	278·6 m.	30 kw.	To be 100 kw.
Alpes-Grenoble	514·6 m.	15 kw.	Power to be 60 kw.
Marseille	400·5 m.	1·5 kw.	New station of 60 kw. is under construction.
Lille	247·3 m.	1 kw.	New 60-kw. station testing.
Toulouse-Pyrenees	386·6 m.	1 kw.	Power will be 120 kw. at end of the year.
Limoges	335·2 m.	½ kw.	To be 100 kw. on 328·6 m. very shortly.
Radio-Normandie	269·5 m.	—	To be moved to Caudebec en Caux.
Nice	253·2 m.	60 kw.	Now building.
GERMANY			
Zeesen	1,571 m.	60 kw.	Will be 150 kw. by the end of this year.
Saarbrucken	240·2 m.	17 kw.	Will be replaced by a station of 60 kw. at end of this year.
GREAT BRITAIN			
London Regional / Scottish	—	—	Increase in power from 50 to 70 kw.
Northern Ireland	307·1 m.	100 kw.	Now working.
North Scottish	—	60 kw.	Under construction.
North Eastern	267·4 m.	50 kw.	Under construction.
Anglesey	373·1 m.	5 kw.	Under construction.
HOLLAND			
Hilversum	301·5 m.	20 kw.	Power to be increased to 120 kw.

Station.	Wave-length.	Power.	Remarks.
ICELAND			
Reykjavik	1,442 m.	16 kw.	Power up to 100 kw. eventually.
***ITALY**			
Rome	420·8 m.	50 kw.	Power up to 120 kw. soon.
Bolzano	559·7 m.	1 kw.	Power to be increased to 10 kw.
Bologna	245·5 m.	50 kw.	Under construction.
NORWAY			
Bergen	352·9 m.	—	Is to be replaced soon by Askby with 20 kw.
Bodö	348·8 m.	½ kw.	Power to be 10 kw.
Kristiansand	235·1 m.	½ kw.	Power to be 20 kw.
Stavanger	235·1 m.	½ kw.	Power to be 10 kw.
Tromsö	1,071 m.	10 watts	Power to be 10 kw.
PALESTINE			
Jerusalem	449·1 m.	20 kw.	Now working.
PORTUGAL			
Lisbon	476·9 m.	20 kw.	Power shortly to be increased to about 100 kw.
South Portugal	290 m.	20 kw.	New station to be built.
RUSSIA			
Kiev	415·5 m.	30 kw.	Power to be 100 kw.
Minsk	1,442 m.	30 kw.	Power to be 100 kw.
Baku	1,500 m.	10 kw.	Power to be 35 kw.
Tiraspol	280·9 m.	4 kw.	Power to be 10 kw.
Smolensk	824 m.	2 kw.	Power to be 10 kw.
Karaganda	437 m.	1½ kw.	Power to be 10 kw.
SPAIN			
Spanish National (Madrid)	1,639 m.	150 kw.	Now under construction.
Lugo	200 m.	250 watts	Now under construction
Talavera	201·1 m.	250 watts	Now under construction.
Sud Sevilla	410·4 m.	60 kw.	Construction of these stations on behalf of the Spanish Posts and Telegraphs will begin soon.
Madrid	293·5 m.	50 kw.	
Barcelona	274 m.	50 kw.	
Corunna	377·4 m.	30 kw.	
Vizcaya	238·5 m.	30 kw.	
Valencia	352·9 m.	20 k.w	
Tenerife	207·3 m.	10 kw.	
SWEDEN			
Motala	1,388·9 m.	150 kw.	Power to be increased.
Hörby	265·3 m.	10 kw.	Power to be 100 kw. next year.
Boden	765·3 m.	½ kw.	This autumn the power will become 10 kw.
SWITZERLAND			
Basle	218·2 m.	½ kw.	Power will soon be 25 kw.
YUGO-SLAVIA			
Beograd	437·3 m.	2½ kw.	Power to be 100 kw.
Zagreb	276·2 m.	½ kw.	Power to be 20 kw.

*It is reported that Italy is building in secret a 500-kw. medium-wave transmitter in the neighbourhood of Rome, but no details are yet available.

CARDEN SHEILS TELLS YOU ABOUT

PHOTO-CELLS

Under the action of light, certain substances exhibit properties which provide a means of controlling electrical apparatus automatically. These light-controlled devices have many applications, among which are the automatic switching on and off of street lamps, the counting of packages on a conveyor, and the sending of pictures by wire and wireless.

THE fact that light can be used to control an electric current is one of the outstanding discoveries of modern times. It has, of course, made television possible, as well as the sending of still pictures by wire or wireless, and it has brought the "talkie" film to the cinema

COMMON H.T. BATTERY

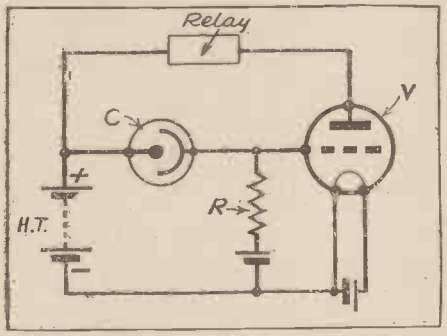


Fig. 1.—In this circuit the same source of H.T. supplies both the photo-cell and the amplifying valve, V.

theatre. In one form or other the photo-electric cell is finding its way into so many branches of industry that it is difficult to say where its commercial value will end.

The term light-sensitive device is often loosely used to cover the older selenium bridge as well as the more modern forms of photo-electric cell, though, strictly speaking, they all operate in different ways. Actually there are three distinct kinds of photo-electric effect.

Selenium, for instance, changes its ohmic resistance under the action of a ray of light, so that when placed in series with a battery the current passing through the circuit as a whole increases as the light grows in brightness. This is called the photo-conductive effect.

Voltage Generators

Another form is known as the "voltaic" cell. It depends upon the fact that certain materials, such as a film of copper oxide on copper, are found to develop an electro-motive force when excited by light. The same combination of copper and its oxide was originally used as a rectifier of high and low frequency currents, and for this reason it is still referred to as a "rectifier" cell even when operating as a photo-sensitive device.

It has the advantage of requiring no biasing battery. In the dark there is no potential difference across the "boundary" between the copper and the film of oxide, but one is created there as soon as the cell is illuminated, the voltage increasing with the intensity of the light. The same "voltaic" effect can be obtained by coating a disc of iron with a mixture of selenium and sulphur with a film of gold.

The third kind of cell, and by far the most commonly used, is the "emissive type." It makes use of the fact that electrons are liberated from the surface of certain metals, particularly the so-called alkali metals, when light falls upon them. The cell consists of a sensitive metal "cathode" mounted, together with a wire or film "anode," in a glass bulb, which may either be highly evacuated, or else contain traces of gas, such as argon.

The Original Discovery

The "emissive" effect was first discovered by Heinrich Hertz in 1887, in the course of his early experiments with wireless waves. He noticed that the length of the spark produced by the received waves increased when the gas was exposed to ultra-violet light. The following year Wilhelm Hallswachs showed that ultra-violet light causes a negatively charged body to lose its charge. On the other hand, an

FOR MAINS SUPPLY

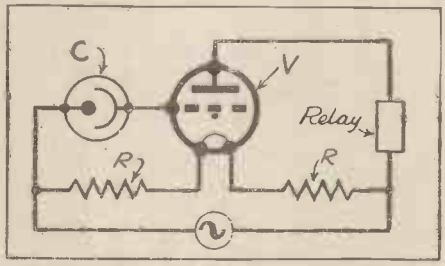


Fig. 2.—A photo-cell arrangement suitable for use on A.C. or D.C. mains.

uncharged and insulated body subjected to the same rays gradually acquires a positive charge.

We know now that the effect of the light is to release electrons from the surface of the metal. In the Hertz experiment the electrons so liberated helped to reduce the resistance of the air-gap and so allowed a longer spark to pass. When Hallswachs negatively charged body lost electrons it naturally became less negative, whilst any insulated and uncharged body will develop a positive charge automatically if it loses electrons.

The next advance was made by Julius Elster and Hans Gertel, who discovered that certain metals were much more sensitive to light than others. The alkali metals, such as potassium and sodium, were the best they could find, and although neither can be handled in the open air, they got over this difficulty by amalgamating them with mercury.

Ordinary Light Suitable

Alkali metals have the advantage of responding not only to ultra-violet rays but also to ordinary light. In the latest type of photo-electric cell they are used in the form of very thin films, which are sensitised by a special oxidising process and combined with traces of copper, silver, or caesium.

The action of light in this type of cell follows certain definite rules. In the first place the number of electrons liberated per second depends upon the intensity of the light. In the second place the energy of the electrons so released does not depend upon the intensity of the light but upon its frequency.

This is borne out by the fact that a weak ray of ultra-violet light will liberate electrons from metals which are quite unresponsive to an intense beam of ordinary light. The short-wave light, in other words, is above what is called the "threshold" frequency for that particular metal, whilst ordinary light is below it.

The current output from the emissive type of cell is very small compared with that produced by an ordinary valve, so that it must be amplified before it can be used to operate a relay or do any useful job of work.

Fig. 1 shows a simple circuit in which the same source of H.T. supplies both the photo-electric cell, C, and the amplifying valve, V. When light shines upon the cell, electrons emitted from the sensitive cathode flow across the cell to the positive anode and complete the circuit through the resistance, R. Since the latter is in the grid circuit of the valve, V, an amplified current flows through and operates the relay, R, in the plate circuit.

Working from A.C. or D.C.

Fig. 2 shows a circuit suitable for working from the electric mains, the series resistances R being used to reduce the terminal voltage to a value suitable for the filament of the valve, V. This arrangement can be used either for D.C. or A.C. mains, though in the latter case current will only pass during one half-cycle, so that the sensitivity of the circuit is somewhat reduced. Fig. 3 illustrates a multi-stage amplifier with resistance-capacity coupling as used for amplifying voice frequencies in "talkie" film work, or for handling the picture signals in television.

(*Please turn to page* 179.)

A RESISTANCE-COUPLED AMPLIFIER

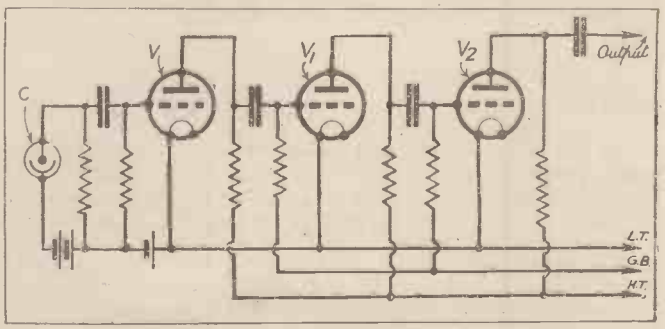


Fig. 3.—A multi-stage resistance capacity-coupled amplifier as used for "talkie" work or television.

THE MEMOIRS OF A RADIO JOURNALIST

By Sam Heppner

In which he tells of some of the "lovelies" that are among our foremost radio stars, and who, till the coming of television, must remain unseen personalities to listener fans.

Jane Carr—"A lovely, tall, dream of a woman."

CHILDREN and false teeth have one thing in common. Both should be seen and not heard. Now the reason for this very mediocre crack is that I wish to draw a sort of inverted analogy between the aforementioned and the stars of the air who, to my unspeakable regret, must be *heard and not seen.* Being in addition to a radio fan a worshipper at the shrine of beauty, the thing I find so maddening is that all the numerous "lovelies" who grace the studios at Broadcasting House, the shimmering blondes and gorgeous brunettes, remain unobserved by the listening masses.

I am in the happy but rather exclusive position of being able to meet them; until television becomes a universal reality, however, those of you who are not so fortunately placed may enjoy an orgy of envious drooling when I describe some of the delights you miss.

Always Superbly Dressed

Jane Carr is one of them. If you see a lovely, tall, dream of a woman with abundant fair hair that converges into a tantalising peak, an engaging smile and magnificently chiselled features, drifting round Broadcasting House, you may be sure that she is Jane. Another clue to recognition is her distinctive attire, for Jane always dresses with superb taste; in fact, it is generally acknowledged that she, Doris Arnold and Eve Becke are the best dressed women in the world of wireless.

Being in such close association with professional people who are notoriously extravagant in their language and manners, I sometimes regard extreme amiability with a degree of suspicion; but, unlike many who are lavish with affectionate epithets, Jane's verbal caresses have a strong foundation of real sincerity. She likes and dislikes with equal passion.

How long have I known her? Three years? Four? However long it may be, I can well remember the first meeting. I was taken along to her flat by my sister. Obligingly, Jane sang all the newest numbers—accompanying herself very ably since her first ambition was to become a concert pianist—and a then recent number, "Let Me Explain," which Harry Pepper had written for her.

In those days Jane was perhaps better known to listeners as Rita Brunstrom. She changed her name, however, not only in consideration for people with ill-fitting dental plates (for Rita Brunstrom, which is not so easy to say, is her real name—she's half Swedish), but because she joined a West End show as a crooner and found a new name—to distinguish her from Rita Brunstrom, mimic—essential. During the show a B.B.C. talent scout was captivated by Jane's crooning and, unaware that she was Rita Brunstrom, gave her a radio date. After that, Jane and Rita broadcast regularly in their separate capacities and, naturally, received twice as many engagements!

TWO RADIO FAVOURITES

ESTHER COLEMAN

EVE BECKE

But now Jane is plain Jane (definitely not to be taken in the axiomatic sense), and Rita is almost forgotten.

Periodically, Jane throws a cocktail party. Whenever the invitations arrive I make the most scrupulous entries in my diary. I wouldn't miss a cocktail party of Jane's for the world.

Some of the most entertaining stars of stage and radio foregather in her queer little red and cream luxury flat near the Marble Arch. Anyway, stars or no stars, I always look forward to a chat with Doris, Jane's shrewd and observant cousin who manages her affairs for sheer love of it. Jane's two Scotties, Llal E. Lhorton and Dzill E. Llorton (we once smuggled them into the pictures with us and they occupied a separate seat in the back row!), have fun and capers on the rugs, while our hostess, after dispensing the cocktails, retires to the piano and croons dreamy Cole Porter melodies for the delectation of her guests.

Writes Her Own Dialect

Jane writes all her own material, you know, for those amusing impressions in American, Scotch and Cockney dialect that she frequently gives on the air. We once set to work on a radio play together. Comparing ideas and scribbling feverishly in her flat one afternoon, Jane, ever the outdoor girl, said: "It's such a lovely day. Let's come and work in the Park." So, armed with pencils and notebooks, we completed the first sequence on a park bench. Next day Jane was called out of Town and the thing was postponed indefinitely. But having got a little of the dialogue done it was then that I discovered Jane's penetrating sense of microphone technique. She is one of those gifted people who understand the psychology of wireless instinctively.

One day, when both of us are less busy, we might have another shot at that play.

Another enchanting friend of mine who delights the eye as well as the ear is Esther Coleman. To her house, also, I make a frequent pilgrimage, where, as a rule, I am rewarded with more glasses of sherry than I can comfortably imbibe.

She lives in Maida Vale in a long basement studio approached by a stairway with walls that disport the most murderous

(*Please turn to page* 177.)

RADIO MYSTERY CIPHERS

By Louis C. S. Mansfield

Our code expert continues his description of the transpositional cipher which he introduced last week. See what you can make of this week's problem and remember YOU MAY WIN A TEN SHILLINGS PRIZE for your solution

AS pointed out last week the name Simple Columnar Transposition is given to that method of ciphering in which the plain text message is written out in columns which are then mixed to form the secret message.

We might, for instance, write the words "RADIO CIPHER MYSTERIES" in five columns each containing four letters thus:

R A D I O
C I P H E
R M Y S T
E R I E S

Then if we wrote down the letters in the first column, R C R E, and to them added the letters in the other columns the cipher would be: R C R E A I M R D P Y I I H S E O E T S.

In practice cipherers seldom write the letters in their usual columnar sequence 1, 2, 3, 4, 5, but prefer to mix them somewhat, according to arrangement, to make deciphering harder for those who have not the key. The columns might be taken in the order 5, 3, 4, 1, 2, or in any other fashion desired.

A Good Example

Suppose we are faced with the following:

E A E T V C U R P E T K O E A T E H H L S R D T A H S T A R O Q E E U.

On account of the frequency of the E's and T's we decide that this is a transpositional cipher, *not a substitutional one.*

On counting we find that there are thirty-five letters in all, so it is almost certain that it was originally written either in seven columns of five letters or in five columns of seven.

RESULT OF CIPHER No. 9

Owing to the early press date of last week's issue of "P.W." we were unable to give the name of the winner of Mystery Cipher No. 9, and, as promised, we are giving it this week.

The prize of Ten Shillings for the first correct solution examined after the closing date has been awarded to:

Mr. W. F. Dobinson, 17, Park Crest, Knaresborough, Yorks.

The correct solution was given in our issue of April 11th.

Seven columns of five is more probable, so we divide the message into groups of five letters and arrange them in columns:

E C T T S H O
A U K E R S Q
E R O H D T E
T P E H T A E
V E A L A R U

If we refer to the place where we grouped the message "RADIO CIPHER MYSTERIES" we see that the five letters in the first line form the word RADIO. It would not matter whether this word had been grouped to read DIROA, RIAOD, DORIA or AIODR, etc., the five letters would still be capable of being arranged to spell the correct word RADIO.

The same thing follows in all ciphers of this class. No matter how the columns are arranged *the letters in the columns will combine to form words and parts of words* if the grouping is correct. So our next step is to go through the groups and try to identify commonly occurring combinations (or Bigrams, about which we have learned so much already) in an attempt to build up parts of the original message.

Working It Out

One of the first things which strikes us are the letters Q and U in the second horizontal line. Q is never followed by any other letter than U, so we are certain that the second column must follow the seventh, and write it down accordingly:

O C
Q U
E R
E P
U E

In the first of these two columns we find two E's. In the fourth column we see two H's occurring in identical positions, and since we already know that the combination H E is a very common one, we decide to fit this in front of the others in an endeavour to forms words:

T O C
E Q U
H E R
H E P
L U E

So far, we have no complete words, but each of these groups can form parts of words so we feel that we are on the right track.

When we first grouped the cipher the first horizontal line read: E C T T S H O. Of these we have already accounted for T, O, and C, leaving E, T, S and H. Three of these will combine to form an extremely common word THE, so we decide to arrange the third, sixth and first columns in this order to see if we can build further words:

T H E
K S A
O T E
E A T
A R V

This block may precede or follow the first block we constructed, and there only remains one column to be fitted in.

"P.W." CIPHER No. 12

For some time past you have been intercepting and decoding enemy radio messages!

Suddenly through the ether comes a cipher which is strange to you!

What do you make of it?

N O S D F R S H D M S L E I R D E
R U S N E C T F U A I E I U E L T S
T A E U A R M W O B O T N O.

For the first correct solution of this code message opened after the closing date we will pay TEN SHILLINGS. Your attempt may be sent in a sealed envelope if you wish. All attempts must reach us on or before TUESDAY, April 28th. The Editor's decision is final.

Try to solve it, write your translation on the back of a postcard, add your name and address, and post to: "P.W." Cipher No. 12, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.).

SOLUTION OF LAST WEEK'S PROBLEM—CIPHER No. 11

ALL TOLD THERE WILL BE FIFTEEN OF THE WIRELESS CONTROLLED AEROPLANES TAKING PART IN THE RAID ON THE FORT AND THE TOWN.

Result of Cipher Contest No. 10.

The Prize of Ten Shillings for the first correct solution examined after the closing date has been awarded to:

Mr. A. S. McNicol, "Airlie," West Park Road, Cupar, Fife.

The correct solution was given in our issue of April 18th.

Inspection is all that is needed to tell us that this column is the centre one joining the others together to form:

T H E S T O C
K S A R E Q U
O T E D H E R
E A T T H E P
A R V A L U E

from which we get the message "THE STOCKS ARE QUOTED HERE AT THE PAR VALUE."

In tackling this week's problem, pay particular attention to the Bigrams and try to build up the message bit by bit to form common words.

CUTTING OUT HUM

Details of a scheme used by loudspeaker designers

IN some moving-coil energised speakers, particularly in those of the more expensive type, it is common to introduce a coil for the purpose of suppressing the hum. This coil is included in some examples of the relatively inexpensive types of speaker, but inasmuch as the cost cannot be anything appreciable, I never can understand why it is not universally adopted. The coil in question for preventing hum is really a duplicate of the speech coil, but wound in the opposite direction, and is connected in series with the speech coil. It is wound, however, in such a position in relation to the field winding that it is able to pick up the hum in the opposite phase and so neutralise the hum which would otherwise be received in the speech coil.

Similar to a Balancing Coil

In principle it is very similar to the balancing coil which is sometimes used in the suspended system of a galvanometer, where the two coils taken together neutralise one another if placed in a uniform field: only one of the coils, however, is exposed to the main field of the galvanometer, and so the instrument indicates the strength of that field and is independent of any general field (such as the earth's field) which acts equally on the whole of the suspended system.

J. H. T. R.

FROM OUR READERS

LICENCE FEES BY INSTALMENTS

A reader suggests that the splitting-up of the ten-shilling fee into sixpenny instalments would help many listeners who at present find difficulty in paying the amount in "one go."

The Editor, POPULAR WIRELESS.

Dear Sir,—Although a regular reader of the "Old Paper" for several years, this is the first time I have ever written to you. May I begin my first letter with an age-old grouse! It concerns the licence fee. The princely sum of ten shillings is certainly not much to pay for the great variety of entertainment afforded rough the medium of the radio set. The fact that the full amount has to be laid down provides the proverbial fly in the ointment.

To people of very small incomes who desire a radio set this is a very serious stumbling block. Of course, the sum could be saved; but talking from personal experience—I am unemployed—I find this a very difficult matter, because as soon as a substantial amount is put away in an old sock, or some similar savings bank, an immediate and pressing need for the money crops up.

A simple solution to the matter would be for the P.M.G. to issue savings books in which a sixpenny stamp could be affixed at different periods of the year until the full sum of ten shillings was paid up. I am sure that this method would practically cure "piracy" and be a great boon to pensioners and unemployed.

Yours faithfully,

JAMES ALLAN.

80, Gibraltar Gdns., Dalkeith.

HAVE YOU HEARD IT?

The Editor, "Popular Wireless."

Dear Sir,—Have any of your readers who own very sensitive short-wave receivers and long directional antennae noticed the "mystery broadcast" on 14·6 metres, 20·548 megacycles?

This "broadcast" is in the form of a high-pitched hiss like an unmodulated carrier, of unknown origin; and was first discovered in 1932 by Dr. Karl G. Jansky, of the Bell Telephone Laboratories, of U.S.A.

He was using a long directional antenna that could be turned abont on its axis, and by turning it in all possible directions till the maximum signal-strength was heard, he found that by the end of one year the antenna had shown, by following the maximum strength of the signals, that it had made one complete circle, which shows that the source, whatever it may have been, had been going round; also, the direction from which the signals have been strongest approximates to the direction the whole solar system is moving.

The signals, of conrse, were due to some electromagnetic radiation seut out by some mysterious moving source.

Is it possible that some distant star is radiating in this manner, or some inhabitant of a distant planet is trying to communicate with us?

If it is not any of these, then what is the cause of this hiss, and why isn't it noticed on any other wavelength? I think that this is a very interesting problem, and if any reader has by any chance heard this "broadcast," I should like to have his opinion.

Yours truly,

J. MORCOMBE.

Kingsbury, Milborne Port, Sherborne, Dorset.

DETECTIVE BROADCASTS

The Editor, POPULAR WIRELESS.

Dear Sir,—We are all devotees of the mystery yarn and detective thriller these days, and the B.B.C. might increase its own well-deserved popularity by making public recognition of the fact in future programmes. Might I suggest a visit to Portland Place by retired Scotland Yard detectives, released from reticence by changed status, to give us, through the microphone, a few extracts from their adventurous lives while counteracting criminal activities. By affording concrete evidence that justice inevitably overtakes the evil-doer and right must triumph, the series suggested would have a powerful effect in influencing the minds of youth to the good citizenship that has made for national credit.

W. G.

Seymour Street, N.W.1.

AN UNUSUAL FAULT

The Editor, POPULAR WIRELESS.

Dear Sir,—Here, I think, is a decidedly unusual fault that I recently had. A 4-valve screen-grid portable, running from an eliminator, suddenly developed the annoying habit of fading out temporarily every time an electric light switch was used. The circuit of the set was S.G.—D., transformer-coupled to resistance capacity output.

Obviously the fault lay in the H.T. circuit, but where?

I found it in about twenty minutes. It was the anode resistance of the power valve which had broken down.

Yours faithfully,

M. D. SMITH.

3, Gamlen Rd., Putney, S.W.15.

THE "EVERLASTING GROUSE"

The Editor, "Popular Wireless."

Dear Sir,—May I begin *my* epic by grumbling at Shirley Cartwright.

I do not see from where this reader gets her idea of "everlasting grouse—the programmes."

I sometimes wonder if it is possible to satisfy some people at all. What about the following bands and orchestras: Commodore Grand, B.B.C. Military, Bath Pump Room, Hastings and Eastbourne Municipals, Troise, Mantovani, and the numerous Works Bands. I think these are the cream of the programmes where music is concerned.

I fail to see how announcing the racing results is encouraging gambling, for after all many people buy the evening paper to see what won the 2.30 without waiting for broadcast announcement; also, racing is not dealt with as a subject, as are films, but merely as News.

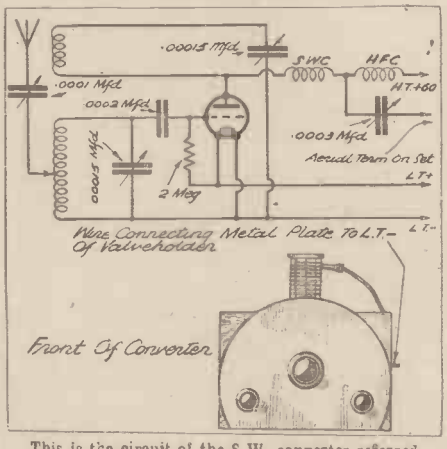
To take "fat stock." Although I personally have not the slightest interest in cattle, except that in butcher shops, this bulletin is, no doubt, of considerable value to farmers and dealers. Besides, how many minutes does this item take up out of the fourteen hours or so that the B.B.C. is on the air?

Although I, myself, do not know much about films, I do not grumble about the talks on films, but merely switch off, and I suggest S. C. does the same when "fat stock" and racing are announced.

Carry on B.B.C.

Sunbury. L. W. R.

GIVES GOOD RESULTS



This is the circuit of the S.W. converter referred to by Mr. Durrant in his letter on this page.

A SUCCESSFUL S.W. UNIT

The Editor, POPULAR WIRELESS.

Dear Sir,—I have recently constructed G. T. Kelsey's "Everybody's Adaptor," and used this on my S.T.600 set, with very good results. This having created very great interest to me in S.W. reception, with a great thirst for more, I have been experimenting with it, and have now been successful in making it into an excellent converter. I am now receiving a tremendous lot of stations on the loudspeaker, and several times I have had to cut the volume down. Really the reception is surprising and quite beyond all my expectations.

I will now endeavour to give details of all the necessary alterations, of which I enclose a sketch. First of all, I removed the three condenser knobs off the front of the cigar-box, then covered the front with a metal plate, soldered a piece of wire to this, connecting other end of wire to L.T.— terminal of valve holder. Replaced condenser knobs. Result was, it did away with all hand-capacity. Then I removed S.W. choke and connected this to anode terminal of valve holder, put ordinary H.F. choke in series with this and connected up to H.T. + 60, taking aerial output lead from junction of the two chokes, inserting in this lead a pre-set condenser of ·0003 capacity.

For connecting converter to set: remove aerial from set and connect this to input aerial terminal of converter, leaving earth connection and all H.T. and L.T. connections intact. Now connect the L.T. leads from converter to same accumulator as used for set (leaving the set connections still on). It is not necessary to connect separate wire from accumulator L.T. — to the H.T. — of eliminator (or H.T. battery). Finally place a Mullard P.M.I.H.F. valve in valve holder of converter before switching on, swing set into silent position at bottom end of long waves, approx. 800 to 900 metres. I might add that I cut down an old ·0005 tuning condenser to use in converter to approx. ·000015, otherwise all components are as specified, so that, including the extra valve, the cost was under £1.

Trusting this will be of interest to some of your regular readers, and wishing your valuable paper every success,

Yours faithfully,

E. G. DURRANT.

"Eversleigh," Ipswich Road, Woodbridge, Suffolk.

FROM AN OVERSEAS ENTHUSIAST

The Editor, POPULAR WIRELESS.

Dear Sir,—I wonder how many of the home readers of "P.W." give the slightest thought to the conditions in the Empire?

It is only seven months since I left home to join the British South Africa Police as a trooper. I gave up my greatest hobby of all—wireless. My den is now but a memory, and all the excitement I used to experience when finding something new on short waves is but a pleasant dream. I wonder if my components are giving the joy to our less fortunate blind as they gave me? I'm getting sentimental I think!

For six months I was able to listen to home on a radio, and I even heard my father broadcast, 5,000 odd miles away! Now I've not got that. Please reflect and think of how empty your spare time would be without our latest and least understood hobby.

American sets are all-popular here

(*Continued overleaf.*)

FROM OUR READERS

(*Continued from previous page.*)

because they say "They give us what we ask for to suit our conditions." You at home ask for our trade but will not furnish us with what we want, or if you do—at an excessive price. Can you blame our choice ?

The "X's" are often terrific here, but reception from home is reliable and strong, usually much stronger than the German and French broadcasts. It might interest S.W. fans to note that to receive Johannesburg, 500 miles away, is as hard if not harder than at home ; and how would you like to listen when the corrugated iron roof is struck by lightning twice in three minutes, or when H.T. batteries of 120 volts of standard capacity are 18s. 6d., or when, as in my case, the electric light is 416 volts D.C. ! I think the powers that be delight in trying to make things awkward, don't you ?

Still, I get one consolation. I have "P.W." sent to me regularly every week, and black is the Friday that doesn't bring it in the post. How I missed S.T.700 this time ! I'd previously built all his sets from the simple S.T.100. Well, good hunting.

Yours faithfully,
"RHODESIANA."

P.S.—I don't think you can improve "P.W." much more for 3d.

B.S.A.P. Camp, S. Rhodesia.

OUR EASY-WAY SERIES

The Editor, "Popular Wireless."

Dear Sir,—I am writing to express my appreciation of your enterprise in publishing lessons in French, and I think S. C. Gillard has hit upon a novel and effective method of teaching French to many who otherwise would never have attempted to master the language.

While I am writing, I am anxious to get into touch with someone in my neighbourhood who has built and successfully operates an S.T.600. If you publish this, I may perhaps get a postcard from an S.T.600 enthusiast whom I can consult.

Wishing "P.W." every success,
I am, Yours very truly.
W. G. JOHNSON.

6, Dunheved Road North, Thornton Heath.

A GUINEA

is paid each week for the best letter sent in by a reader (Mr. Durrant gets it this week), and there is no reason why you should not win one. Anyhow, it's worth having a shot at.

If you have had any interesting radio experiences—and who hasn't ?—or if you have any opinions of general radio interest to ventilate, send them along to "P.W."

These pages are open to readers every week, and from each batch of correspondence we select those letters which we consider to be of the greatest general interest to other readers.

So don't hold back ! Remember you may get a guinea

FOR YOUR LETTER

THAT INTERFERENCE PROBLEM

The Editor, POPULAR WIRELESS.

Dear Sir,—I would like to air my views on the subject of interference raised in your excellent paper recently.

In my opinion it would be rather unfair to legislate for same, as one of your correspondents suggests.

Firstly, the majority of owners of interfering apparatus would not like to be forced to combat the interference they cause when, if approached in a tactful manner, they would be only too pleased to help make listening-in more enjoyable.

Secondly, I wonder how many owners of electrical apparatus are aware that they are causing interference, and who would be only too willing to fit, or have fitted, suppressors if they knew ?

May I say I agree wholeheartedly with the suggestion made in your columns as to fitting of suppressors to electrical appliances before they leave the factories.

Let the Post Office carry on their good work, but to listeners I would say, notify the P.O. of your difficulties—you must act before they can.

Yours faithfully,
ARTHUR HOPE, JNR.

73, Morningside Road, Liverpool, 11.

WILL IT EVER HAPPEN ?

The Editor, "Popular Wireless."

Dear Sir,—I have an unusual idea in my mind which may or may not interest your readers. Wireless is my hobby. I am interested in the past and present, but more especially in future developments.

Up to now it has been possible to transmit sound and light. Now, scientists are working on the transmission of heat by radio. Taking these developments into consideration, might it not be possible at some future date to be able to transmit complete objects by radio, by splitting the object into its electrical constituents at the transmitting station and by building the constituents back into the object at the receiving station ?

This might make a very easy-going world, especially perhaps for the housewife. No more need to cook. All she would have to do would be to "tune-in" to the local "radio kitchen" and the lunch would arrive from the ether ! The only snag would be if the set went wrong during the meal, when the roast might suddenly disappear into the ether!

This is a fantastic idea, but you see I am very young and imaginative, and think of the slogan that "all is possible."

Yours faithfully,
IAN CONSTANTINESCO.

Oxen House, Torver, Coniston.

GOOD WORK

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to the letters in "P.W." recently by Mr. A. Pope on "Those 'DX' Results," and Mr. R. Wheeler, "Loudspeaker Results at 9,000 Miles," if Mr. Pope doubts DX-ing, I mention that I have "on the wall" here 880 QSL or letter *verifications* from 74 countries ; and if not as many as Mr. Pope has, I think this will take a little beating (?), especially as all these verifications were heard *on loudspeaker* (I have no headphones), and all were on either music or voice. These "veries" include four from VK3ME (well over 9,000 miles), VK3XX, VK3LR (3 veries), VK2ME (9 cards), K6CIB, 20-m. phone.

I was the first in Great Britain to report this phone (in Hawaii) ; ZLT (New Zealand) ; ZBW (Hong Kong, 2 cards) ; XGR (Shanghai) ; VLZ, PMA, PLV, PLE, PLP (Java), etc. Other DX results include H17G (my report was the first he ever had on phone and when he was using only *twenty* watts), H16O, ZSS (Cape Town), VUC (Calcutta), W6FQY (another first time phone)—Ditto W7DAA ; also Tashkent on 19 m ; R10 (Baku) 29 m. ; CX1AM and CX2AK ; OPL (B. Congo) ; HSP (Siam) ; VWY (Poona), 4 veries ; Prado, HC1FG, HJ5ABE (21 m.), YR5IY ; OAX4D and OCJ (Peru) ; CEC (Chile), VV4AC, VV5AM, 5RM.O, 6RV, VVR, VUQ, etc. (Venezuela) ; VP3MR ; VR4TC (Trinidad) ; VP2CD (Antigua) ; VP2KM (St. Kitts) ; CO8YB (75 m.), H17G (75 m.), CO5RY, etc. ; LU4BC, LU8DR, LSX, SQ, SM, SN (2), SL, etc. (Argentina) ; CT2AS ; 2AV (Azores) ; JVH, JVN, JVM, JVP, JVQ (Tokio) ; HPF, HP1A, HP5B (Panama), HRM (Honduras) ; TGF (Guatemala), and many others which *can* be *inspected* by any "Doubting Thomas" (*no* "consolation" or phone "veries" are put up on the wall).

Complimenting you and W. L. S. for your very fine work.

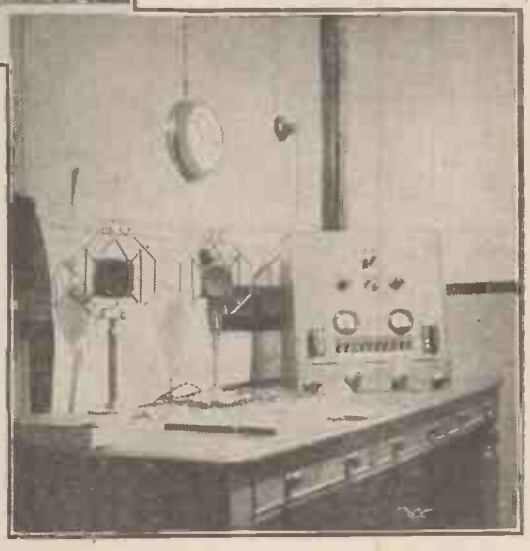
Yours truly,
R. D. EVERARD.

Member B.L.D.L.C., H.A.C.C., etc.

[*Mr. Everard does not enclose his address.* —ED.]

G.E.C. POWER AMPLIFIERS—

—AT EUSTON STATION



The latest innovation at Euston is the provision of loudspeakers for announcing trains, etc. This equipment has been installed by the G.E.C. The top photograph shows one of the speakers attached to the cross-girders supporting the roof, and the view on the right illustrates the microphones and switching controls in the announcing box.

STEAM-TRAIN INTERFERENCE

The Editor, "Popular Wireless."

Dear Sir,—In a recent "Popular Wireless" under the heading of Random Radio Reflections, by Victor King, the question is asked about interference from steam trains. I live about twenty-five yards from the main line between Johannesburg and the coast, and consequently have more trains passing my home than are welcome.

Yes, on my home-built receiver I have frequently noticed crackles when a train passes. However, I have always blamed a loose contact, which I have never succeeded in locating.

I must thank Mr. Victor King. I think he has solved my loose contact problem! In about eight month's time I shall be able to give a better verdict, since electric trains are to be inaugurated. The engineers are at present erecting the standards.

The inauguration of electric trains promises to prove a serious setback to short-wave reception, since no steps are being taken at present to eliminate interference at the source. Johannesburg, with its numerous new buildings, is suffering at present, the lifts being the worst offenders. Every radio salesman has to deal with long-faced, irate customers !

In conclusion, I might mention that considerable excitement prevails at the moment, since a woman announcer has just begun the afternoon sessions from the Johannesburg, Pretoria and Bloemfontein stations. It will be interesting to see if she is successful after the experiment of the B.B.C.

Wishing you every success in the future.

Yours faithfully,
J. H. NANKIVELL.

30, Hamilton Road, Webber, Germiston, Transvaal.

IMPORTANT B.B.C. CHANGES FORESHADOWED

Barry Kent gives you the very latest news about broadcasting

Changes in the Autumn

MR. CECIL GRAVES has been in charge of B.B.C. programmes for about seven months, and has announced his intention of introducing important changes and developments at the beginning of the Autumn season. What these changes and developments will be is to be decided in the next few weeks. They will concern the daytime programmes chiefly. These are definitely to be strengthened both in quality and variety. Then the tendency to lighten the Sunday offerings will be continued and accelerated.

* * *

Another Reorganisation

Sir John Reith is giving attention to internal organisation. For the past year he has been almost exclusively concerned with external affairs, chiefly the Ullswater Committee. Now, however, the internal situation can claim some of his time—and from all I hear, it deserves attention. The trouble is that the system of organisation in which administrators and creators are separated is not working.

Recently there have been serious complaints and signs of growing unrest. The work has been suffering because of the failure of the administrative side of the B.B.C. to recognise what the development of broadcasting means in terms of fresh staff and fresh accommodation. Overwork has resulted in wholesale casualties. Many people of an already attenuated staff are breaking down. It is likely that Sir John will carry through a general shake-up recommended by Mr. Graves.

* * *

For Scottish Listeners

On April 28th Mr. Melville Dinwiddie, Scottish Regional Director, will divulge some of the secrets of the outstanding programmes to be broadcast during the Spring and Summer. He will reveal plans for a number of interesting microphone tours, which include one to Iona. Immediately after his talk Mr. Gordon Gildard will provide a sound picture of some of the programmes referred to by Mr. Dinwiddie. A small repertory company will play the excerpts from plays, etc.

* * *

The King and Henry Hall

I am told that His Majesty the King recently caused his appreciation to be conveyed to Henry Hall and his enlarged orchestra for one of their Saturday night performances. This sign of Royal favour has naturally caused much pleasure at Broadcasting House. It was the first occasion of the kind during the present reign.

* * *

"Tightening-up" the Empire Service

It has at last trickled through to the heads of the B.B.C. Empire service that the leisurely methods of home programme announcing are entirely unsuited for the overseas audience. The result is a "tightening-up" which it is hoped will eliminate delays and ragged presentation. I myself have had complaints of this aspect of the B.B.C. short-wave service, and I only hope that the reforms go far enough.

The point is that the B.B.C. has to contend with real competition overseas. All the competitors follow the American method of "slick" presentation. Therefore the B.B.C. must go one better—that is, incorporate slickness with finesse and polish.

* * *

A Nightingale Feature

On May 17th the B.B.C. proposes to put a novel feature into the National programme for fifteen minutes at 7.45. This will take the form of eavesdropping on the arrangements for inducing the nightingale to perform. Mr. de Lotbinière, the Director of Outside Broadcasts, will allow the microphone to chronicle all the movements and other noises of the endeavours of himself and his squad in this connection. Also, there is a fair prospect of the nightingale performing. I am assured, however, that there will be no faking if the elusive bird is in a bad mood.

* * *

Staff Commentators

The B.B.C. is now considering and is likely to adopt a proposal to substitute staff commentators for the outside commentators who are now engaged to describe the big sporting events and state occasions. This will entail following the example already set by both the German and American broadcasting organisations which have fully trained corps of commentators always on tap.

"JACK OF ALL TRADES"

Here is the ever-popular Jack Hulbert listening to one of the new H.M.V. "Station Selector Ray" sets after recording hits from his latest film, "Jack of all Trades," at the H.M.V. studios.

The scheme when in working shape will involve a number of new permanent appointments. Names mentioned are Messrs. H. B. T. Wakelam, Christopher Stone, S. P. B. Mais, Howard Marshall and R. Bowman, with "Freddie" Grisewood in charge. I am very pleased to learn of this good news about Mr. Grisewood, who is long overdue for promotion. He is largely wasted as an announcer.

* * *

Fifty Years of League Football

William Bassett, who will be interviewed by George Liddell (manager of Birmingham Football Club) in the Midland Club-Room Conversations series on April 29th, has been continuously associated with football in his native town of West Bromwich for fifty years. He played for the Albion's first team from 1887 until 1899; has been a director since 1905, and Chairman since 1908.

He played in eight successive International matches against Scotland, four against Wales, and four against Ireland. He was in three Cup Finals, gaining two winner's medals, was a member of the first team that went abroad under the auspices of the Football Association in 1899, and played against Germany and Austria.

* * *

Glee Society Broadcast

The Port Talbot Cymric Glee Society, conducted by J. Bowen Davies, and the Welsh Regional Trio, will give a programme of works ranging from Handel to Kreisler, on May 2nd. This Glee Society was formed in 1912, and J. Bowen Davies has conducted it for the whole of the twenty-four years since its inception. The society does much good work in visiting hospitals and homes, and has raised over £2,000 for charity.

* * *

"Beauty Queen"

"Beauty Queen" is the title of a new radio play, written by Howard Thomas (a London correspondent of a Manchester evening newspaper), which is to be broadcast from the Newcastle studios on April 30th. The play, which is presented in a series of rapid, almost film-like vignettes, and which involves a cast of no less than sixty players, tells the story of a mill-girl who is elected "Hat Queen" of her native town in the North—a town specialising in the manufacture of hats.

Her sudden elevation has an unpleasant effect on the girl; her veneer of sophistication is gained at the expense of genuineness and common sense. It is not until she goes to London to take part in an All-England competition that, by reason of the humiliating reception she experiences there, she is jolted back to normality and returns gratefully to the embrace of her long-suffering sweetheart. If you are a Northern Region listener, you should listen to this play.

RANDOM RADIO REFLECTIONS

Some further views on the interesting subject of steam Interference and a fascinating Radio Word Ladder diversion, are included in his jottings this week

By VICTOR KING

STILL STEAMING ALONG !

I AM still receiving quite a number of letters relative to the subject of interference caused by steam emitted from railway engines, and some of them are very interesting indeed. For instance, Mr. Bower, of Kirkcaldy, Fife, says :

"Railway carriages are fitted with a generator below their chassis for lighting purposes ; maybe this was the source of interference in that case. I've experienced something similar but, so far, have not paid particular attention to it."

Maybe ! Certainly, maybe, but there has now been plenty of proof that the steam can be a direct cause of nasty noises on a radio set despite what Mr. Bower or even Mr. Temperley of Cambridge says. These are the words of the latter reader :

"Might I suggest that radio interference said to be due to steam is really due to the cracking of coal in the fire ? I read a letter in a wireless paper (I believe it was ' P.W.') some years ago by someone who had actually observed this effect. I suggest the following very rough explanation : Coal is an inhomogeneous substance, and in the fire it is unequally heated and parts of it are subjected to considerable strain. Under these conditions quite large electric fields may be set up, due to thermo-electric and piezo-electric effects. When the coal splits, these fields are altered and a sensitive set in the neighbourhood might easily pick up the electrical disturbance that would result.

"I should be interested to know what is expert opinion on the subject. It seems to me almost incredible that steam should cause crackles ! !"

Well, Mr. Temperley, thank you very much for writing such an interesting letter, although I think you might have omitted those two exclamation marks ! ! !

You might like to know that they are referred to as "astonishers" in editorial circles ! ! ! !

However, I agree that crackling coal fires can cause interference, not often very marked, on near at hand sets. It has been noted that poking a coal fire on occasions produces crackles in a sensitive set.

But don't be incredulous about our dear old steam. The emission of steam under high pressure will cause charges of electricity to be produced. This is solid, concrete, cast-iron, indisputable, observed, tested fact.

As I have said before, steam-driven road vehicles having rubber tyres are fitted with dragging chains simply for the purpose of allowing such charges to escape to earth.

Surely, it is no great step from the development of electrical charges to crackles in a radio set ?

Anyway, here is Mr. Hayes of Rugby who says that he has had the thrilling experience of observing puffs of steam from a loco coincide exactly with crackles on his set. What didn't coincide was the actual sound of the snorting engine. There was slight lag, and that is explainable by the fact that sound travels slower than electrical disturbances.

And that, dear friends, is that ! ! ! ! !

P.S.—Or is it ? At the very moment of correcting the above paragraphs the postman arrived with another bunch of letters and I shall have to give you extracts from at least one of them on some future occasion for it is packed with interesting facts.

RADIO WORD LADDER

INSTEAD of dipping into our old friend Professor Varrinace's radio classic this week, I am going to set you a Radio Word Ladder. I enjoy doing these myself, and so I expect there will be others who regard them as pleasant little diversions for those odd five minute intervals between radio and other activities.

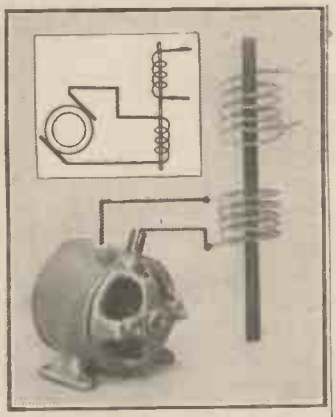
What you have to do is to change COIL into FUSE by altering one letter at a time, but each alteration must produce a word. For example, you might proceed as follows : COIL, FOIL, FAIL, FALL, FILL, FILE and so on until you arrive at FUSE.

I can make the change in ten steps, and I give them on page 180. But maybe you can achieve the result in a less number. However, don't write in about it, for this is not a competition.

(*Please turn to page* 179.)

PRACTICAL RADIO AND ELECTRICITY

This week Mr. Johnson Randall discusses the transformer and introduces those two important types of electricity supply, A.C. and D.C.



A very simple transformer can consist of two windings with an iron core through them. The primary is supplied with a varying current from a generator or some other source of energy. Such a transformer is, of course, relatively inefficient.

I ENDED my article last week by saying that the principle of the transformer was based upon the ability to produce a current in a secondary coil coupled to a primary coil.

Transformers are commonly used for raising or lowering a voltage to suit some particular requirements. For example, you might have a supply mains giving a voltage of 200, which you wished to decrease or "step down" to, say, 20, in order to operate a special device which would only work at this voltage. A transformer inserted between the supply and the device would enable you to step down the voltage to the required value.

To do this you would use a transformer having ten times as many turns of wire on the primary winding as there were on the secondary winding. The primary winding would be joined to the 200 volts supply and the secondary to the device designed to work on 20 volts.

Turn Ratio

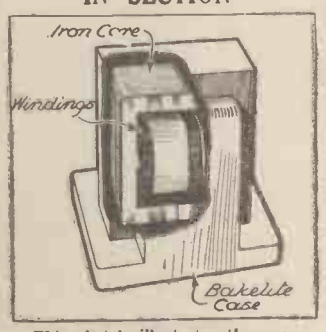
The voltage given by any transformer is directly proportional to the ratio of the number of turns on the secondary to the number of turns on the primary.

In the case of a "step-up" transformer, that is, one designed to increase the voltage, a ratio of 1 : 3, that is, one turn on the primary for every three on the secondary, would provide a voltage of 3 volts at the secondary terminals for every volt supplied to the primary.

In practice all transformers have a laminated iron core. The reason for this is that it is possible to obtain much greater magnetic effects when two coils are wound upon iron than if they were separated by air.

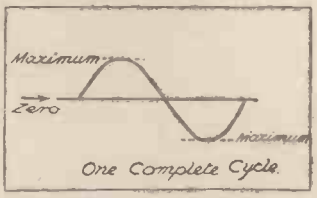
This brings us to the question of permeability. The ratio of the number of magnetic lines which, under the action of a given magnetising force, exist in iron, to those which would exist in air—under the same magnetising force—is called the permeability of the iron. For example, if for a given magnetising force the flux density for a square centimetre is, in the case of iron, a thousand, whereas for air there is only one line per square centimetre, then the permeability of the iron is 1,000.

IN SECTION



This sketch illustrates the construction of a small transformer of the type used on the low-frequency side of a radio set.

ALTERNATING CURRENT



An alternating current starts at zero, rises to a maximum and falls back to zero in one direction. It then increases from zero to maximum and falls to zero in the opposite direction. This operation forms one complete cycle.

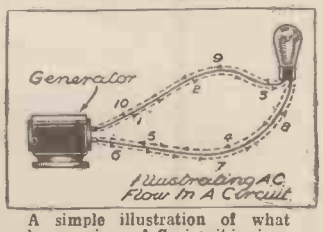
Iron Cores

If, therefore, by using iron you can get, say, 1,000 times the effect of what you can obtain with air, then you will see the importance of using an iron core.

A transformer, as we saw in last week's article, will only work when the magnetic field cutting the windings is changing. In order to produce this changing field it is necessary for the current to

(*Please turn to page* 178.)

WHAT HAPPENS



A simple illustration of what happens in an A.C. circuit is given above. The flow for the first half cycle is in the direction 1, 2, 3, 4, 5, and during the second half cycle in the opposite direction, 6, 7, 8, 9, 10.

CAN YOU TALK?

If so, the B.B.C. would like to see you—provided you have something really interesting to say. Some of the plans of the Talks Department are disclosed by Alan Hunter in this exclusive article

EVEN the most captious of critics no longer sneers at B.B.C. talks. Thanks to the excellent spade work of Charles Siepmann, talks over the air have often enough provided a welcome relief from everlasting music. And now J. L. Rose-Troup is carrying on the good work as Talks Director. His job is no sinecure. My chat with him proved that.

A friendly sort of fellow, I found him. Ready to listen to my complaints, eager to explain his very real difficulties. At the moment he is trying to solve all kinds of knotty problems involved in the general business of drawing up a talks schedule for broadcasting.

Possibly the first axiom is that a talk on the radio is not merely a read-out-aloud written lecture. If it degenerates into just that—well, it fails to satisfy Mr. Rose-Troup. Yet the problem of finding the right kind of microphone talker who knows what he is talking about is a combination of human attributes considerably more rare than you might imagine.

A Kind of Research Department

Indeed, Mr. Rose-Troup has been forced to initiate a kind of talks research department. Under Mr. Moray McLaren's questing guidance the right human "stuff" for the microphonic art is being slowly unearthed.

We all know the savant with his subject at his finger-tips who chants a lecture rather after the manner of a funeral dirge. We all switch off that kind of master mind. Now, it is the pious hope of the new Talks Director that once your interest has been enlisted in a broadcast talk you will be forced to go on.

"And that's why it is useless to try to decide what the exact time limit ought to be for a radio talk," emphasised Mr. Rose-Troup. "Possibly a good many talks ought to be short, snappy ten-minute affairs. But if the man is good you can stand a good deal longer than that. Max Beerbohm talked for about twenty-five minutes—but not many listeners realised it.

"As a rule, I should say, the maximum length of time for a normally interesting talk might be twenty minutes. So much depends on the talker, though."

I wanted to know whether the talkers' scripts needed much "vetting" these days. Mr. Rose-Troup smiled. "Sometimes," he admitted, "we have to ask talkers to change their long words into the short words they would normally use in conversation.

"It is very difficult for those new to the microphone to realise that the talk must sound as though it is being spoken—not just read from a script."

I asked whether it would always be necessary for talkers of repute to go through the somewhat soul-destroying business of submitting script before the talk.

"Well, we have been trying the idea you have in mind with the unrehearsed debates in the Concert Hall. Those debates have taught us a good deal. We know better now how to handle people. The problem is to find people who are quick enough on the uptake. A good chairman is also essential to smooth over the rough passages and to keep things moving."

A BROADCAST TALK

"It is very difficult for those new to the microphone to realise that the talk must sound as though it is being spoken—not read from a script." Here we see Mr. Oliver Baldwin delivering a speech before the microphone.

Then I brought up the vexed question of the morning talks. Many people are saying it is fatuous to broadcast talks to housewives just when they are most busily engaged on their household chores.

Getting the Biggest Audience

"Well, the point there is that we aim to appeal rather to the poorer classes. It is not easy, all the same, to decide which is the best time to gain the maximum audience. We have asked Women's Institutes to tell us more about the habits of the country people.

"Meanwhile, we are assuming that by eleven o'clock the children will be well away at school, the place will have been tidied up and the woman of the house will be sitting down to a well-earned cup of something. It is then that we think our talks on cookery and child welfare are most welcome."

I wanted to know what the B.B.C. thought it could teach people that they did not already know about cookery and looking after children. Mr. Rose-Troup smiled again.

"We try to tackle the problem of making the most of cheap foods, and show many interesting ways in which the household budget can be balaneed with the maximum degree of food value for the money available. The proof that these talks do interest a great body of housewives can be seen by the enormous response to the issue of our pamphlets. Over thirty thousand applications were received for the last one!"

Another sort of morning talk that he is keen about is the "off duty" appeal to those with leisure—either of the enforced category or otherwise. Unemployed gathering together in the club rooms of social centres are, he says, deeply grateful for morning talks that help to give the men a wider interest in life.

Those Droitwich Transmissions

"And now, Mr. Rose-Troup, I come to my real muttons—why, oh, why, is Droitwich National weighted down with uplift stuff from six to eight every evening?"

The Talks Director went into this very carefully. To give him his due, I must say he is up against a real difficulty. Many of the talks during this period are definitely of sectionalised appeal—talks to farmers, to gardeners, to listening groups, and so on. These talks, to have any sustained value, must be given at the same time each week—and, to save encroachment on the main evening programmes, must be squeezed in before eight o'clock.

The Talks Director pointed out that the people most of these talks were designed for were often enough far from the urban centres—where there was a strong Regional signal. They relied upon the Droitwich National signal for good reception.

"And what about these language talks?" I asked.

Mr. Rose-Troup was once again blandly reassuring.

"We are going to sit down to see whether we can make them a little less obviously like lessons," he promised. "We hope to give listeners the invaluable advantage of hearing natives speaking their own tongues—but at the same time we shall attempt to humanise the presentation."

I came away with an added respect for the "snags" inherent in broadcast talks.

RADIO AND TELEPATHY

Here is a second selection to be printed of the articles written by entrants in our Amateur Writer's Contest. They are written by readers who are trying to become professional authors. And this is how we shall choose the winner to whom the prize of the opportunity to contribute a weekly signed article to "P.W." for three months will be awarded. A number of the articles entered for the contest will be printed and paid for. The writers of the six considered by the Editor to be the best will be invited to submit further articles. Two or three of these will be printed and paid for and their writers will be asked to submit further contributions. And from these the final winner will be selected.

THIS article is not the usual kind associated with these pages, but I feel sure you will find it of interest.

I expect everybody has at some time or other experienced or heard of Mental Telepathy. There have been several incidents recorded in the press, and the other day, whilst thinking over several points concerning Wireless Radiation and Reception, a stream of thought suddenly ran through my mind.

When certain telepathic incidents have happened, the general explanation given is the persons concerned are in tune with each other, namely, their mind or brain are of the same frequency. This, then, gives rise to another thought (omitting that the occurrence could be coincidental): was the other person able to radiate as well as receive, or are such people fixed as to this extraordinary gift? Also, is it at all possible, as has been pointed out, that we all possess the gift of Telepathic Radiation and Reception, and conceivable that in the distant future this now dormant "sense" will be realised and usefully controlled?

Supposing the above to be possible, and, borrowing H. G. Wells' mind, on looking far into the future I visualise a drear world controlled by machines. Everybody as robots, governed by a radio station which will transmit orders into the ether and be received direct by the brain.

It is an interesting subject upon which one could everlastingly theorise.

(If you are sufficiently interested and have been unavoidably detained at the office, have a shot at tuning in on your good lady's thoughts—the radiation ought to be strong.)

F. J. PINNER.

WHY NOT SPONSORED TELEVISION?

By J. Burgess.

TELEVISION seems to be in the convalescent stage. It has suffered from all those minor set-backs that befall new industries—its newness, technical difficulties, opposition from rival entertainments, and the rest. One symptom only of weakness remains, and it is one hard to cure—lack of funds.

Why not give a spur to television by allowing sponsored programmes? After the cries of "NO!" have ceased, let me explain my plan. The B.B.C. is now sufficiently organised to exercise a restraining influence in order to avoid the type of programme that has become so common in America.

In addition, big firms in this country are more sane, and would realise that imbecile programmes would be of little advertising value. A simple plan would be for an association to be formed of the various firms, who would finance the transmission of matter to be compiled, or at least edited, by the B.B.C.

Advertising would then be on general lines, and the grateful public would buy from all the firms concerned. Of course, individual names can be mentioned on programme sheets, and so on, and perhaps slight prominence given to anyone who was enthusiastic enough to respond financially as required.

All will agree that the whole thing could be organised to please everyone, and just imagine the rush among the firms to be first!

The B.B.C. is seeking the co-operation of the big stores on the reception side, so why not let national advertisers assist transmission?

USE THE ON-OFF SWITCH

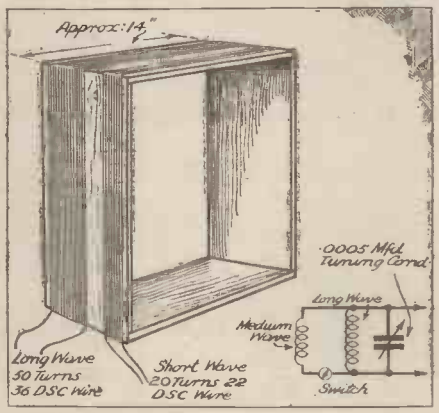
By E. T. Bell.

IT is really surprising the number of people who, having installed Radio Receivers, yet do not really appreciate what broadcasting brings to them. When a set is switched on there is, in my opinion, only one thing to do, and that is to *listen and enjoy what is being heard.* Strangely enough, quite a large percentage of listeners do not listen at all to hardly any programme.

The set is on, certainly, and that is as far as it gets. The occupants of the room where the set is installed very often talk, read, play cards, not taking the slightest notice of the programmes whether they are good, bad or indifferent. Wireless is, in fact, to them a "background" to their everyday life. Because the set is there it must be on. This class of listener never really appreciates a good quality set, for the simple reason he never, or at least very seldom, gives his whole attention to any one complete programme.

The proper way to enjoy wireless programmes is to switch on the set only when it is intended to listen. If one wants to read, talk or play cards, for instance—well, switch the set off! It should bever be on at all when anything that is coming over has no appeal. If this is done, wireless listening will always be a pleasure, and when the opportunity to listen presents itself, the programme will be thoroughly enjoyed.

FOR PORTABLE SETS



The season for portable sets is approaching again—the time of the year when one feels the urge to take the radio out on picnics and to listen in the fresh air of the countryside. Most portables have enclosed frame aerials, and for the benefit of those considering building this type of set we give here the details for a representative aerial.

RADIO BEACONS

By J. Lightfoot.

TUNE to a wavelength of about 1,000 metres and you will find a number of Morse stations transmitting reiterated three-letter signals interspersed with long dashes. These are the Radio Beacons, the automatic transmissions of lighthouses and lightships, used by navigators in connection with D.F. gear for finding position at sea. The British beacon signals begin either with a G or an M; the Continentals vary. Even a low-power valve receiver will bring in quite remote Beacons.

It may seem a somewhat dull game spotting these transmissions, but with a little imagination it is quite fascinating. You pick up G G J, Lundy Island, for instance, reminiscent of smugglers and Amyas Leigh; G G M, Bar Lightship, Liverpool, rolling perhaps in the wash of a Cunarder outward bound; or May Island, M M M, guarding the entrance to the Forth. The great rotating beacons of Tangmere and Orford Ness, G F T and G F P, are most impressive as they fade out and swing in again with tremendous efficiency; while there is a real thrill when you first identify North Ronaldshay, M N G, or Sule Skerry, M S G, lonely and remote way up in the Orkneys.

Then there are the Continentals. French, Belgian and Dutch lights are easily receivable; the Germans, too, come in very well, and even the Scandinavians. Horns Reef, Graadyb, Hanstholm, Borkum, Norderney, Terschellingerbank, West Hinder—fine romantic names—rocks, reefs and sandbanks in the Channel and North Sea; rust-stained lightships pulling at their anchor chains; tall, painted lighthouses, flashing periodically over a waste of grey waters. Dull, uninteresting Morse? Perhaps!

ORGANISED LISTENING

By R. G. Gibbs.

OUT of the thousands and thousands of listeners in the British Isles, each with a large number of programmes to choose from, I wonder how many arrange their evening's listening so that it fits in with their other home duties; and how many say, when it is too late, that they would have liked to have heard a certain item, but they had not known that it was being broadcast.

Many people intend to listen to a certain programme, but when the time arrives, are busy doing something else.

Now, it will well repay anyone to sit down and scan the "Radio Times," "World Radio," or whichever journal is taken, and mark off any item which appears interesting. Use a bright-coloured pencil (I use a green one, although any colour such as red or light blue will do), and underline or place a cross in the margin by the item which you wish to hear. Underline with two lines anything which you think should be specially interesting.

If you do this you will find that, as soon as you open the journal to the day's programmes, your eye will be immediately drawn to the items thus marked, i.e. those which you specially wish to hear.

FOUNDATIONS OF DANCE MUSIC

By A. S. Craig.

BUT don't let the title put you off; listen a moment. Judging from my experience, a very popular topic for discussion consists of the merits (and demerits) of the various radio dance bands. The discussions usually run on pretty much the same lines and rarely drop into technicalities.

Certain sections of the community automatically exclude themselves; musicians detest "jazz," and that's that; the middle-aged and elderly rarely express an opinion beyond "the old tunes are the best, this modern stuff doesn't last;" blaming the music and ignoring the present system which can kill a beautiful melody in a few weeks; dancers are usually good judges of tempo, but not always of tune.

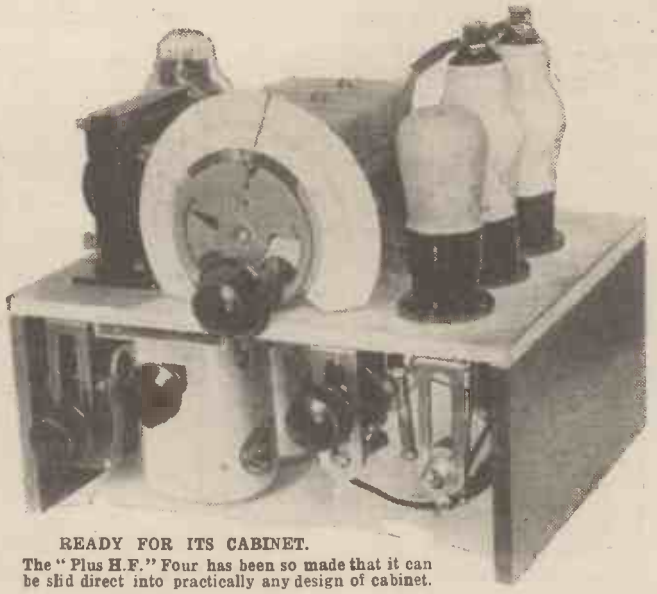
Every evening half an hour is devoted to the "Foundations of Music," which do not deal with dance music. A feature which I believe would be popular with listeners to the late dance music (which is not much used for dancing to) might consist of half an hour on one or two evenings per week, dealing with the make-up of the modern dance band and the growth of dance and "swing" music.

Programmes of this nature are to be found tucked away in the Regionals at odd times in the form of gramophone recitals; but this is not enough, and a regular feature run by some "Walford Davies of dance music" would surely explain to my unmusical mind what I might term the sweetness of Winnick, the hotness of Roy, the all-roundness of Ambrose, and so on throughout the various dance bands.

THE "PLUS H.F." BATTERY FOUR

A compact chassis design for the battery user who requires not only quality but distant reception. The "Plus H.F." is a set that is sensitive, selective, simple and stable.

Described by G. V. DOWDING, Assoc.I.E.E.



READY FOR ITS CABINET.
The "Plus H.F." Four has been so made that it can be slid direct into practically any design of cabinet.

AT one time there used to be unending controversy regarding the relative merits of H.F. and L.F. amplification. Of course, it is now widely appreciated that in some respects at least it was quite absurd to line up two dissimilar processes and endeavour to make comparisons between them.

It was rather like trying to argue as to whether a typewriter was better than an adding machine. If the arguments had been confined to the question as to which was the more useful, taking everything into account, that would not have been so bad. But they were not. However, it must also be remembered that this particularly controversy was hard on the heels of that other classic: Is H.F. Amplification Worth While?

To many of you it must sound incredible that this question was ever seriously debated. But it was. And very seriously indeed. There were plenty of reputable authorities to make a stand for the negative, and they were able to prove to their own satisfaction, if not to that of everyone else, that H.F. amplification very definitely was not worth while. That it was a waste of time trying to obtain amplification preceding detection.

But, of course, that was a long time before the introduction of the screened-grid valve and also before neutralisation methods were invented to eliminate unwanted feed-back between the anode and grid circuits which caused instability.

Instability! That was the snag. The H.F. circuits had to be reduced in efficiency to such an extent in order to obtain a stable condition, that they were damped down below the level of practical usefulness in the majority of cases.

Present Day H.F. Amplification

How different is the modern application of High Frequency Amplification. As with every other branch of radio, it is now as soundly engineered, as amenable to scientific design and as easily and exactly predictable in its performance as a steam engine. And just as stable, efficient and reliable in its action, one may add.

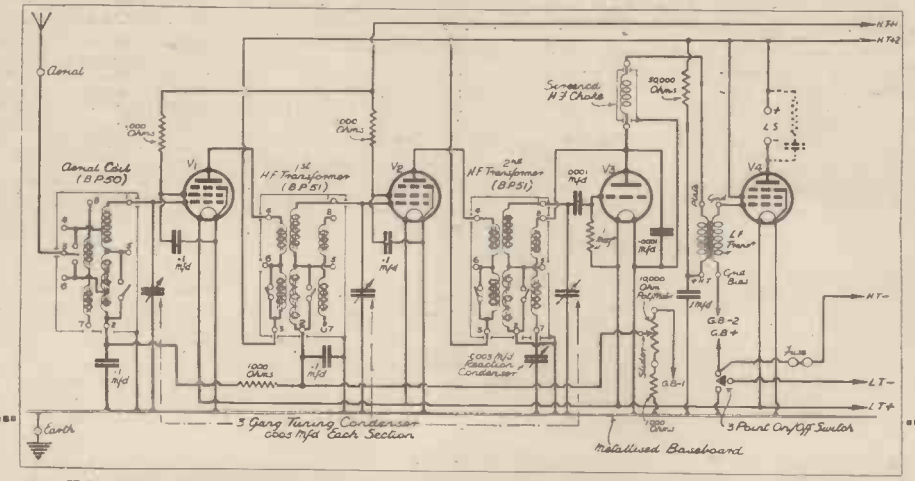
High Frequency Amplification, in its most modernised and effective form, plays a very prominent part in the four-valve receiver shown in the accompanying illustration.

There are two stages of it. And there is to be found in them an advancement on even the revolutionary screened-grid valve. This is the High Frequency Pentode, which is, one can almost say, the screened-grid valve plus a further improvement, an additional grid provided for the purpose of reducing secondary emission effects and their results.

This little grid, by the way, has been the cause of one of the biggest lawsuits of modern times, and even as we write these words, long and learned arguments about it are being delivered in the House of Lords. Anyway, whatever the upshot of that case there is one fact which will remain, and that is, that the practical value of the pentode is very considerable and not likely to be challenged for a long time.

Each of the two H.F. pentodes used in this set contributes a considerable degree of amplification, but there is also complete stability due to the inherent properties

A STRAIGHT SET FOR THE "DX" LISTENER



Two H.F. valves can accomplish an amazing amount of stable amplification—when they are used properly. The "Plus H.F." Four gives you distance and ease of control with first-rate quality.

ALL YOU WILL NEED

- 1 Polar "Midget" 3-gang tuning condenser, each section ·0005-mfd.
- 1 Polar semi-circular drive, for above.
- 1 Varley 3-gang "Nicore" coil unit, types B.P.50 : B.P.51 : B.P.51.
- 3 Clix 4-pin chassis-mounting valve holders, with screw terminals.
- 1 Clix 5-pin chassis-mounting valve holder, with screw terminals.
- 1 T.C.C. 1-mfd. fixed condenser, type 50.
- 4 T.C.C. ·1-mfd. tubular fixed condensers, type 250.
- 2 T.C.C. ·0001-mfd. fixed condensers, type 34.
- 1 Erie 1-meg. grid leak, 1-watt type.
- 1 Erie 50,000-ohm resistance, 1-watt type.
- 4 Erie 1,000-ohm resistances, 1-watt type.
- 1 Polar 10,000-ohm potentiometer.
- 1 B.T.S ·0003-mfd. reaction condenser.
- 1 Wearite H.F. choke, type H.F.P.
- 1 Ferranti L.F. transformer, type A.F.4.
- 3 Peto-Scott 2½-in. mounting brackets, with long slot.
- 4 Clix indicating terminals.
- 1 Peto-Scott terminal strip, 4 in. × 1½ in. × $\frac{1}{16}$ in.
- 1 Peto-Scott "Metaplex" (both sides) baseboard, 10 in. × 8 in. × $\frac{3}{8}$ in.
- 2 Wood runners for above, 8 in. × 4 in. × $\frac{3}{8}$ in.
- 1 Coil B.R.G. "Quikon" connecting wire.
- 5 Belling & Lee wander plugs.
- 1 Belling & Lee wander fuse.
- 2 Belling & Lee accumulator spades.
- Screws, flex, screened wire, etc.

of the valves themselves and the screening and engineered layout of the set.

The effectiveness of these H.F. amplifiers is further increased by the provision of another comparatively recent innovation, Iron-cored Coils. That sounds a simple sort of thing, doesn't it? Just use iron instead of air for the cores of the coils and increase the range of your set!

But it isn't quite so simple as that. Ordinary iron employed for such a purpose would make you lose more than you would gain. It is a very special iron. Iron reduced to powder and each grain of the powder

VALVES AND ACCESSORIES

V1 and V2.—Cossor: 210 V.P.T. (4-pin type).
V3.—Cossor: 210 H.F.
V4.—Cossor: 220 H.P.T.
H.T.: 120 volt, Drydex. G.B.: 9 volt, Drydex.
L.T.: 2 volt, Exide.
Loudspeaker.—W.B. Stentorian.

insulated from every other grain so that eddy currents cannot swish about and cause disastrous losses.

There is negligible loss of that kind in these modern iron-cored coils, but the increase of inductance following the introduction of iron instead of air as the core is such that very considerably less wire is needed, and that is where the gain is achieved. No theoretical gain either, but a very real one.

Enormous Reserves of Sensitivity

Greater sensitivity and greater selectivity are the reward. With one thing and another these two factors are most prominent in the set. With iron-cored coils and two hefty pentode H.F. amplifiers the set has enormous reserves of sensitivity.

It is controllable by means of a variable-mu control. The potentiometer, by altering the grid bias of the valves, varies their amplifying power. This is the ideal method of volume controlling. You make the set just as sensitive, no more and no less, than it is required to be to bring in the desired station at the required volume.

With a volume control applied at the L.F. end of the set the H.F. valves would be working at full efficiency the whole time and most probably overloading the detector terribly on half the stations on the dial.

No Overloading

This cannot happen on our four-valver. There is even no danger of the second H.F. valve overloading. So long as the volume is kept down to the output limits of the L.F. valve (and that is enough for all domestic purposes), there simply cannot be overloading and consequent distortion.

So much for sensitivity. There is sufficient of it to bring in almost everything going in Europe at loudspeaker strength. As for the rest, they will be little relays tied up on common waves.

But what about selectivity? you will probably be asking. This, too, is of an extremely high order. Not only are there the iron-cored coils but there are three sets of them into the bargain. Three complete sets of tuned circuits that means as well. We claim no credit for achieving such a high degree of selectivity, for without it the extraordinary power of the set would be quite wasted. No good being able to tune in heaps of stations at great strength if you are unable to separate any of them!

We shan't say much about reaction. This set has it and it is smooth and efficient. But it is very seldom that you will find it necessary to use it to any extent. Though it is there if it is ever required in order to meet some exceptional demand.

Pentode Output

The L.F. stage incorporates a pentode valve and this provides for an economical power output.

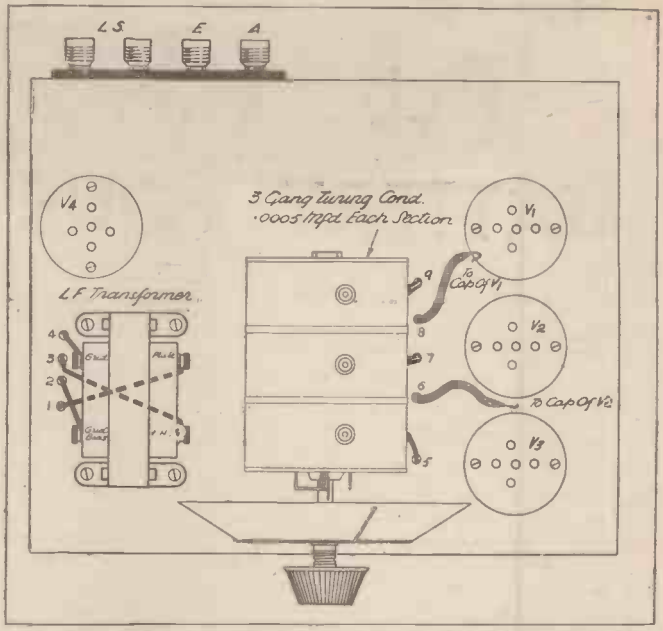
You can see for yourselves that it is a simple set to operate. Ganged tuning reduces the station selection to a one-knob process with volume and reaction as subsidiary adjustments.

We won't go so far as to say that it is the easiest set to build that has ever been designed. There have been three-valvers quite as easy to assemble. But for a modern high-efficiency four-valver having two stages of H.F. amplification it is a very simple constructional job.

The kind which anyone ought to be able to tackle with complete success so long as he is able to use pliers and screwdriver and follows the instructions closely.

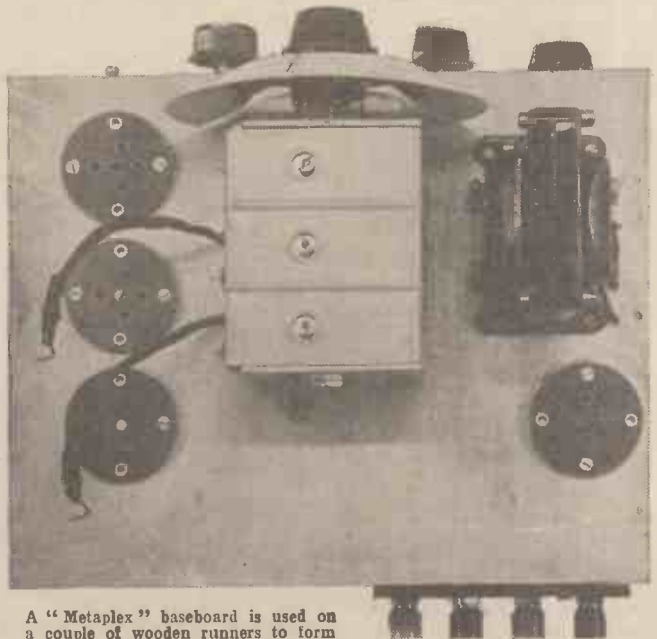
And you must admit that it makes up as a very neat and attractive instrument. Next week we shall present the full constructional details.

HOW THE VALVES ARE PLACED



The H.F. and detector valves are placed in a row, while the output pentode is next to its input transformer.

ABOVE THE WOODEN CHASSIS



A "Metaplex" baseboard is used on a couple of wooden runners to form a simple but effective chassis. The "Metaplex" must be of the double-sided kind, with metallising on both surfaces.

NOISY INTERFERENCE SUPPRESSORS

Some Interesting information concerning the case mentioned recently by Victor King in his Random Radio Reflections.

The Editor, POPULAR WIRELESS.

Dear Sir,—We have noted with considerable interest a part of the article appearing in POPULAR WIRELESS, recently, under the name of "Victor King," and as we have had experience of cases similar to that described, we feel we may be able to clear the matter up. To remind you, it was not understood why an intermittent earth lead to a suppressor should give rise to greater interference than was already present.

As stated in the article, one would expect to hear the interference starting and stopping if the earth connection to a mains suppressor were poor, but in addition to the interference current flowing through the suppressor (which probably amounts to no more than micro-amps, or at the most milliamps), there is a constant current which flows from the live mains through one suppressor condenser to earth. This current amounts to 78 milliamps with a 1-mfd. condenser on 250-volts A.C. This is a capacitative current and does not represent any waste of energy from the mains, but if the earth connection to the suppressor is intermittent, the current is well able to cause surges along the mains wiring, and down the earth lead, which can interfere very strongly with near-by radio sets.

We always find on A.C. that the removal of fuses from a suppressor on the mains gives a loud click in the receiver, and we consider this noise to be due partly to the change in current in the suppressor circuit, and partly to the sudden change in H.F. potential of the wiring of the building. This is corroborated by the fact that on D.C. the click is hardly noticed.

Yours faithfully,
BELLING & LEE, LTD.
(E. G. Cropper).

ON THE SHORT WAVES

A STRAIGHT TWO-VALVER

W. L. S. shows how his single-valve baseboard layout may be converted to a detector and one L.F.

THE practice of making up the best possible receiver from the components on hand is one that deserves plenty of encouragement, always provided that one has *good* ones on hand! Since I started my "standard baseboard" layouts a few weeks ago—the second series—I have received a lot of appreciative letters asking me to carry on, and here, accordingly, is the second dose.

Readers who built up the single-valver shown in the first of the articles will find that they can convert it into the two-valver shown on this page in a very short space of time. The only extra components required are resistances, condensers, and an output choke.

The latter may be regarded by some as an unnecessary luxury, but I don't think of it in that light at all. This series is not intended as an encouragement to build up the cheapest possible set with parts that are almost valueless and cut down to the very minimum.

I don't intend to introduce complications that are not worth while, but I *do* want to make sure that every single receiver built up on this baseboard is as good as it can possibly be for its own particular type.

Ample Signal-Strength

First of all, a word about the single-valver. If you have built it and used it, you should have been deriving ample signal-strength from it during the past fortnight. Conditions, on the whole, have been pretty good. If you have made it and are dissatisfied with the results you have obtained, don't immediately pounce on this two-valver and say, "Ah, that L.F. stage is just what I want!"

If you do *that*, you will never find the trouble that probably exists in your detector stage. Find that first of all. Play with the detector until you are getting good signals from it, and *then* add your note-mag., and you will have a set worth having.

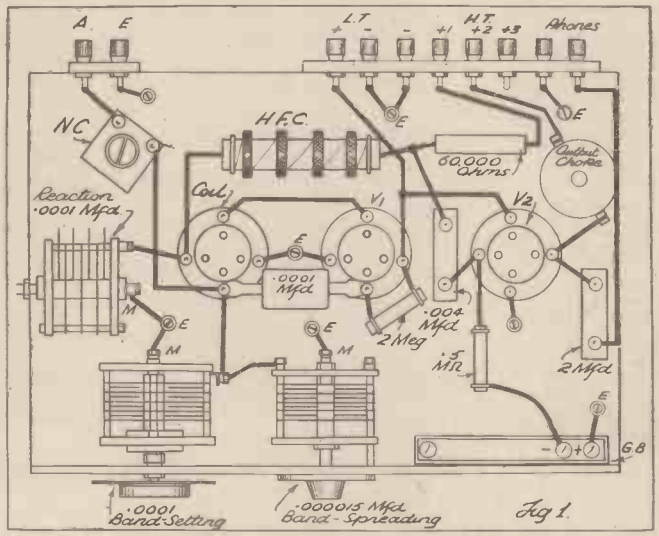
If you compare the diagram on this page with that of the single-valver, you will take in the necessary alterations at once. The end of the H.F. choke that formerly went to one of the headphone terminals now goes to one end of a 60,000-ohm resistance.

From the point of junction a ·004-mfd. condenser couples to the grid of the second valve, and the other end of the 60,000-ohm resistance is taken to the first H.T. positive terminal.

Completing the Connections

The filament terminals of the second valve holder are wired up, one to the metallised baseboard and the other to the L.T. positive terminal. The output choke is connected between anode terminal of V_2 and the second H.T. positive terminal. Finally, a 2-mfd. condenser goes from the anode to one of the headphone terminals, the other one being earthed. And we must not forget the grid leak and grid-bias battery.

SIMPLE WIRING THROUGHOUT



This is the wiring and layout of the straight two-valver which W. L. S. deals with this week.

In other words, you should be able to convert your single-valver into a "two" within twenty minutes or half an hour, and there is no reason to suppose that you will not be getting really good results as soon as you connect up the batteries.

I don't know whether you are clear in your mind as to what "good" results on a two-valver should mean. If it is up to scratch, and you have a respectable aerial, you should find quite a lot of stations coming in at sufficient strength to make you jump considerably when they are tuned in!

That seems a vague statement, I know—most unscientific, and all that—but I know so many two-valve users that plod along quite happily, straining their ears after anything they can get. A "two" that does no more than that is absolutely useless.

You should definitely find a dozen or a score of stations that are too loud to permit you to wear the headphones in comfort. If you find that, you are on the way to the possession of quite a good two-valver.

So far as H.T. requirements go, I recommend you to use as low a voltage as possible on the detector. Don't carry it to ridiculous extremes, but use the lowest voltage that will permit of smooth oscillation control all round the dial on all bands.

If you are using the set on phones, you may use an HL-type valve as the L.F. stage, with 100–120 volts on the anode and only 1½ or 3 volts of grid bias. This arrangement is economical for H.T. consumption, as well as giving a greater degree of amplification.

The second valve may overload on strong signals, but if you are using phones all the time you will naturally reduce such signals to a workable degree of strength, and that disadvantage will not arise.

For Loudspeaker Work

If you are thinking ambitiously of loudspeaker work, you will need to use a pentode or a biggish output triode. Of the two I am inclined to recommend the pentode.

You will have to fit a five-pin valve-holder, taking the connection from the fifth pin to the second H.T. positive terminal. But *please* don't use a pentode for headphone work—it's so very bad for the ear-drums, if the detector is anything like efficient.

The next sets I shall describe in this series will probably be "freak" two-valvers of various kinds, after which we shall have to alter the baseboard a bit and go to on something "heavier."

MOST POPULAR S.W. SET

W. L. S. informs us that he has judged the entries for the recent "ballot," announced in the March 21st issue, and that a full analysis of the results will appear on this page next week.

The winner is Mr. Ian Fraser, 11, Upper Clwyd Street, Ruthin, N. Wales.

ON THE SHORT WAVES—*Page 2.*

POINTS from the POST-BAG

W. L. S. Replies to Correspondents

R. W. D. (Reading) has been connecting his short-wave adaptor to an all-mains broadcast receiver and gets no results beyond the blowing of the H.T. fuse every time! It rather seems to me that the article last week will clear up his trouble for him.

Another Choke Wanted

J. C. H. (Welling) has a short-waver that doesn't work too well, in that the complete removal of the reaction condenser doesn't seem to make any difference! From his diagram I see that he uses parallel feed for the detector, and if the H.F. choke in that position is at all doubtful, reaction difficulties probably *would* set in. I suggest that he replaces the choke or changes to series-feed.

J. W. B. (Southall) wants me to publish a few hints for the myriad owners of the "B.C.L." Two, showing how to convert it into a three- or four-valver, and how to add such refinements as a separate reactor valve. I have thought of the latter and hope to do it soon, but I shall have to rebuild the old set, which has been in bits long since!

Cryptic remark from J. W. B.: "If ever my wife should meet you—exit W. L. S." I don't know why (unless she's a wireless widow), but it seems that I had better keep clear of Southall for a while.

J. S. B. (Ryde) wants to know where he can find (*a*) the "Q" code; (*b*) all international Morse signals; (*c*) names of all stations, ships, etc., regularly sending out telegraphy on short waves. The only answer is "Radio Amateur Call-Book." This can be obtained from the R.S.G.B., at 53, Victoria Street, S.W.1. The price is 6s. (or possibly 6s. 6d. this time), but it is a huge publication and gives the full address of every amateur station in the world, in addition to all the other dope.

A Puzzling Fault

E. B. O. (Bristol) complains of crackling noises when his aerial sways in the wind, but assures me that there are no dirty joints or loose connections. Personally, I have found that the cause of such troubles generally may be traced to the point at which the aerial is twisted round insulators. If enamelled wire is used, it should be scraped bare and tightly twisted, or even soldered, at those points, being taped afterwards as protection from the elements.

The two sketches on this page show two danger-spots: the end of the aerial and the transition from lead-in to "flat top." Anything at all "floppy" at either point will surely cause trouble.

E. H. B. (no address) has made a set of valve-base coils, but finds that he invariably wants many more turns than I specify for reaction. Quite rightly, he wants to know why. Here are three ideas, E. H. B.: (1) Detector valve with low emission; (2) Insufficient H.T.; (3) Layout giving unnecessarily long wiring in grid and reaction circuits.

F. H. (Hall Green) has to bring his aerial lead-in through a greenhouse, and is perturbed because signals disappear when anyone goes near it. Nothing to worry about, F. H.—it shows the aerial's working! Now, if it didn't make the slightest difference, you'd have cause for complaint!

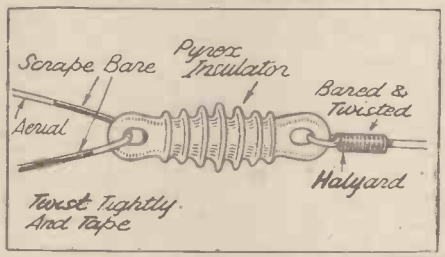
G. M. M. (Walsall) sends an interesting idea for using a pentode in the so-called "electron-coupled" detector circuit. Instead of using the cathode as one of the "live" electrodes, as the original circuit does, he uses the first grid, the second being the control grid and the third at earth potential (to H.F.). I haven't had time to try the scheme, but I will.

J. W. (Bradford) reports hearing a Japanese station on about "20 metres." Surely it is J V H on 20·55 metres. He broadcasts between 7 and 8 p.m. on Tuesdays and Fridays.

J. D. (Aberdeen) wants the layout (not the circuit) of my little set using a Class B valve as detector and L.F. I find that I have already drawn it, and he will discover it on page 550 of the January 18th issue.

P. C. (Renton) has got his S.T.500 working on short waves by rewinding the original coils, and says that it is excellent. I should be rather interested to receive fuller particulars of the new coils, in case other readers would like to try the same with their S.T.500's.

THE RIGHT METHOD



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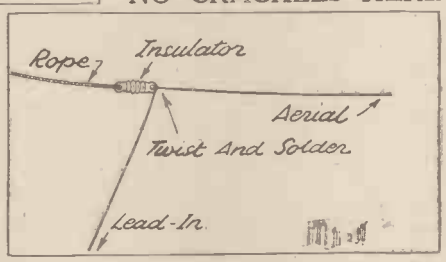


Here are the two sketches mentioned by W. L. S. in his reply to E. B. O. (Bristol). Very frequently crackling is caused by damaged insulation at points where wires are twisted round one another.

WINNING ANSWERS

As announced last week, we print below the winning answers in "P.W." Competition No. 9. The Marconiphone Model 237 Receiver, presented for the most effectively stated replies to answers in the questionnaire on wireless programmes, was won by Mr. A. E. Rose, 75, Breedon Street, Long Eaton, Notts., who sent the following answers.

1. **Do you listen to Henry Hall's Hour?**
   No. It is timed too late for we Provincial "early birds."
2. **Do you like the Foundations of Music?**
   No. Like all foundations, they need building on to become interesting.
3. **Do you listen to the Saturday Magazine?**
   Yes. The element of surprise counterbalances the rather puerile material.
4. **Do you like Crooners?**
   Yes. Some dance-tune words are really funny and crooners do articulate.
5. **Do you believe in Studio Audiences?**
   Yes. They encourage artistes to give their best—which is wanted.

Short-Wave News

A NEW schedule of frequencies for the B.B.C.'s Empire transmitters came into force on April 19th, as follows:

0515–0715:	G S B, 31·55 metres.	
1100–1345:	G S G, 16·86 metres.	
1400–1700:	G S G, 16·86 metres,	and
	G S F, 19·82 metres.	
1530–1700:	G S D, 25·53 metres.	
1715–2100:	G S I, 19·66 metres,	and
	G S B, 31·55 metres.	
1715–2245:	G S D, 25·53 metres.	
2100–2245:	G S B, 31·55 metres,	and
	G S O, 19·76 metres.	
2300–0100:	G S C, 31·32 metres.	
0200–0400:	G S C, 31·32 metres.	

No 49-Metre Transmissions

From the above it will be noticed that there will be no transmission in the 49-metre band for the present. The following is also of interest for overseas listeners.

G S B, 31·55 metres, operates in Transmissions 1 and 4, intended for Australasia, Far East, Africa, Near East and Mediterranean. After 9 p.m. Transmission 4 is also suitable for West Indies and America.

G S G, 16·86 metres, is in Transmission 2, for Malaya and the Far East, as well as Transmission 3, for India and Ceylon.

G S F, 19·82 metres, is also for Transmission 3, as is G S D, 25·53 metres.

G S I, 19·66 metres, is in Transmission 4, for West Indies and America, as well as Africa and the near East.

G S C, 31·32 metres, operates in Transmissions 5 and 6, for Canada, West Indies, South America and the U.S.A.

This comprehensive service is rather difficult to describe in detail for *all* listeners, but home listeners will find the above table of times sufficient, while others will presumably single out the transmissions intended for them, although in many instances some of the others can be received well.

The B.B.C. points out that Australia can often make use of Transmission 2 as well as 1, which is intended for them, and that Western Canada can use Transmissions 1 and 3, as well as 6, which is really their own.

The Marvels of Radio

Side-line on Empire listening: "When my mother-in-law listens to Big Ben she is silent for ten minutes. Carry on the good work." The B.B.C. assures the listener concerned that it has every intention of doing so!

I hope to publish the full schedule of the German transmissions, as well as that of the Japanese stations, which are becoming almost as numerous as those of the European countries.

One other point, Mr. R. R. Jenkins, 56, Pantbach Road, Birchgrove, Cardiff, would like to get into touch with a local radio society or with a fellow-enthusiast in that district.

W. L. S.

LEARNING FRENCH THROUGH YOUR RADIO

PART THIRTEEN

Apart from its radio columns, your morning newspaper might appear to have no connection with your wireless set. But follow the suggestion made in this week's French talk by S. C. Gillard, M.A., and you will see that the daily paper can be very closely linked with your radio receiver

These children are pupils of one of the French municipal girls' schools, and they are taking part in a Children's Hour broadcast from Lyon, P.T.T. Note the adjustable microphone stand.

LET us begin with a little word-collecting. This week we are going to hunt that large class of English nouns which ends with -er and -or, i.e. doctor, porter, dictator, etc. You should have a big bag here. All you have to do with these nouns is to substitute an -eur for the -er and -or. Easy, isn't it ? Look ! Doctor (le docteur), porter (le porteur), dictator (le dictateur), voyager (le voyageur), conductor (le conducteur), professor (le professeur), predecessor (le prédécesseur), editor (éditeur), sculptor (le sculpteur), senator (le sénateur), inspector (l'inspecteur), ski-er (le ski-eur), transporter (le transporteur), visitor (le visiteur), ambassador (l'ambassadeur), author (l'auteur), actor (l'acteur), inoculator (l'inoculateur), aggressor (l'agresseur), etc., etc.

Your morning newspaper should supply you with scores of these nouns. So read your paper with this in view. Ring the nouns with a pencil as you come across them in your reading. Then, later in the day, enter them in your word-book. PERFORM THE LITTLE OPERATION OF SUBSTITUTION ON THEM, AND THEN YOU WILL HAVE AS MANY FRENCH WORDS. Don't forget, of course, that all these nouns are masculine. Their feminine form is different (see last week's BOX !).

It would seem something of an undertaking to embark on that broadcast item known as LES INFORMATIONS SPORTIVES—Sports Bulletin. There is such a variety of sport with which broadcasting deals that the vocabulary to be mastered would seem unlimited. We mustn't let this dishearten us, however. There is, I think, something unusually interesting about a French Soccer vocabulary, especially to those of us who are interested in Soccer. That is why I have decided to deal with Soccer terms in this first INFORMATIONS SPORTIVES of mine.

There is no order in this list of phrases. I have written them down just as they occur to me.

le goal—the goal-keeper—*gohl*
les arrières—the backs—*leh-zah-re-air*
l'inter-droit—inside-right—*la(n)-tair drwah*
le centre-avant—centre-forward—*sah(n)tr ah-vah(n)*
l'avant-centre — centre-forward — *lah-vah(n) sah(n)tr*
l'inter-gauche—inside-left—*la(n)-tair gohsh*
l'ailier droit—outside-right—*lel'yeh drwah*
le demi-droit—right-half—*dem-e drwah*
le demi-gauche—left-half—*dem-e gohsh*
le centre—centre-half—*sah(n)tr*
l'ailier gauche—outside-left—*lel'yeh gohsh*
la première partie de jeu—the 1st half of the game—*pre(r)-me'air par-te de(r) she(r)*
la seconde partie de jeu—the second half—*s'go(n)d par-te*
la première mi-temps—the 1st half—*pre(r)-me'air me-tah(m)*
la ligne intermédiaire—the half-back line—*leen'ye(r) a(n)-tair-meh-de'air*
la ligne de but—the goal-line—*leen'ye(r) de(r) bü*
l'attaque—the attack—*lat-tahk*
la défense—the defence—*deh-fah(n)ss*
au début du match—at the beginning of the match—*oh deh-bü dü match*
les deux équipes—the two teams—*leh de(r) zeh-keep*
un match nul—a drawn match—*match nül*
une course superbe—a superb (solo) run—*koorss sü-pairb*

FEMININE OF NOUNS AND ADJECTIVES

(*Continued.*)

Notice the peculiar FEMININE forms here :

bas (*bah*), basse (*bahss*)—low
las (*lah*), lasse (*lahss*)—tired
gras (*grah*), grasse (*grahss*)—fat
gros (*groh*)—grosse (*grohss*)—big
épais (*eh-peh*), épaisse (*eh-pehss*)—thick
faux (*foh*), fausse (*fohss*)—false
roux (*roo*), rousse (*rooss*)—russet-red
doux (*doo*), douce (*dooss*)—sweet
frais (*fray*), fraîche (*frayssh*)—fresh
blanc (*blah(n)*), blanche (*blah(n)sh*)—white
franc (*frah(n)*), franche (*frah(n)sh*)—frank
sec (*sek*), sèche (*sehsh*)—dry
grec (*grek*), grecque (*grek*)—Greek
turc (*türk*), turque (*türk*)—Turkish
public (*püb-leeck*), publique (*püb-leeck*)—public
nul (*nül*), nulle (*nül*)—no
sot (*soh*), sotte (*sot*)—foolish
long (*lo(ng)*), longue (*lo(n)g*)—long
malin (*mah-la(n)*), maligne (*mah-leen'y*)—wicked
favori (*fah-vor-ee*), favorite (*fah-vor-eet*)—favourite

(*À Suivre.*)

la bonne combinaison—good combination—*bon kom-bin-ay-zo(ng)*
le terrain—the ground—*tair-ra(ng)*
botter un corner—to kick a corner—*bot-teh u(ng) kor-nair*
à la mi-temps—at half-time—*ah lah me-tah(m)*
par 3 buts contre un but—by 3 goals to 1—*par trwah bü kontr u(ng) bü*
après la reprise—after half-time—*ah-preh lah re(r)-preez*
un shot de biais—an oblique shot—*shot de(r) be'yeh*
faire une longue passe—to make a long pass—*fair ün lo(ng) pahss*
en possession de la balle—in possession of the ball—*po-zess-e'o(ng)*, etc.
scores à la mi-temps—half-time scores—*scores ah lah me-tah(m)*
la balle—the ball—*lah bal*
la cage vide—the empty goal—*lah kahsh veed*
envoyer la balle dans les filets—to send the ball into the net—*ah(n)-vwah-yeh lah bal dah(n) leh fe-leh*
un maître coup de botte—a master shot—*maytr koo de(r) bot*
marquer un but—to score a goal—*mar-keh u(ng) bü*
les assauts des avants—assaults of the forwards—*leh zass-oh*, etc.
stopper deux tirs au but—to stop 2 shots at goal—*stop-peh de(rr) teer oh bü*
un cafouillage—scrimmage—*kah-fwee-ahsh*
leurs vis-à-vis—their opposite numbers—*lerr veez-ah-vée*
en pleine foulée—in full stride—*ah(n) plen foo-leh*
de longs coups de pieds—some long kicks—*lo(ng) koo de(r) pe'eh*
shooter de loin—to take a long shot—*shoo-teh de(r) lwah(n)*
score 2 à 1 et plus de seize minutes à jouer—score 2–1 and only 16 minutes to go—*score de(rr) ah u(ng) eh plü de(r) sehz me-nüt ah shoo-eh*
rien n'est marqué—no score—*re'ah(n) neh mar-keh*
un beau mouvement offensif—a fine offensive movement—*boh moov'mah(n) off-ah(n)-seef*

One could write dozens more of these phrases. But these will suffice. Listen for them in LES INFORMATIONS SPORTIVES, particularly when you know that an important match has taken place in France, one likely to be recounted in a bulletin.

Now for a little GRAMMAR. This week I want to say something about COMPARISON OF ADJECTIVES. If we compare two people or things (say A and B), we shall say one of three things. We shall say, for instance, that :

A is AS TALL AS B
or A is TALLER THAN B
or A is NOT SO TALL AS B

This is expressed in French by :

A est AUSSI GRAND QUE B
a eh toh-see grah(n) ke(r) B
A est PLUS GRAND QUE B
a eh plü grah(n) ke(r) B
A est MOINS GRAND QUE B
a est mwah(n) grah(n) ke(r) B

Look at these three sentences :

UNE CAUSERIE EST AUSSI ENJOYABLE QU'UN CONCERT
ün koh-zree eh toh-se ah(n)-shwah'yahbl ku(ng) ko(ng)-sair
A talk is as enjoyable as a concert
UNE CAUSERIE EST PLUS ENJOYABLE QU'UN CONCERT
ün koh-zree eh plü zah(n)-shwah'yahbl ku(ng) ko(ng)-sair
A talk is more enjoyable than a concert

(*Please turn to page* 177.)

WIN THIS BELLING-LEE COMPLETE KIT

for suppressing interference

ABSOLUTELY FREE!

Now is the time to overhaul your aerial and earth system. It should be done at least once a year to make sure you have the full efficiency. And while you are about it why not fit one of the wonderful Belling-Lee "Rejectostat" units and cut out that annoying static interference?

ENTER THIS EASY COMPETITION AND YOUR NEW SCREENED AERIAL SYSTEM MAY COST YOU NOTHING.

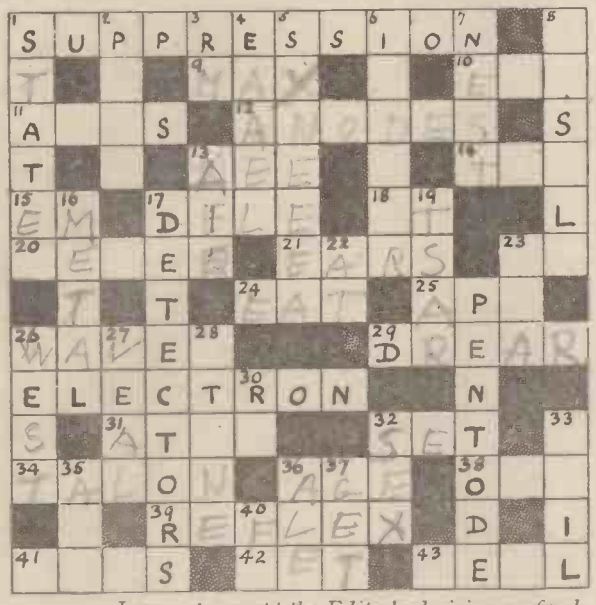
All you have to do is to solve the accompanying radio crossword, and maybe you will be the winner of the complete aerial kit and a mains suppressor to fit on your set inside the house as well.

THERE IS NO ENTRANCE FEE.

Just spend a few minutes studying the clues to the few words missing in the crossword puzzle on this page, fill in the square, cut out round dotted line, and post it, with your name and address, to: "P.W." Competition No. 13, 1, Tallis House, John Carpenter Street, London, E.C.4. It must reach us on or before May 2nd.

The above prize will be awarded to the sender of the best and most correct solution; in the event of a tie or ties the Editor reserves the right to offer tieing entrants alternative prizes, but the full prize value will be awarded. The Editor's decision is final. No employees of the proprietors of POPULAR WIRELESS may enter.

Don't forget—closing date is May 2nd.



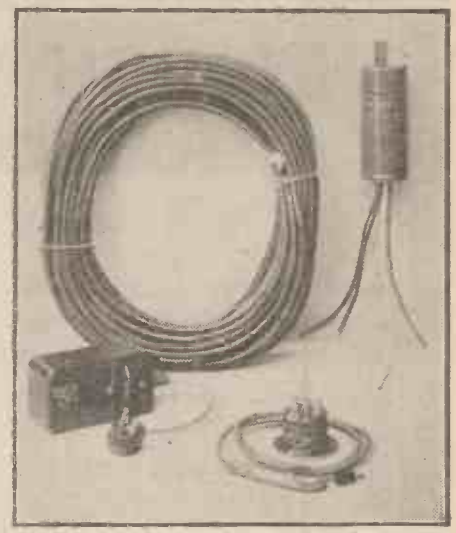
I agree to accept the Editor's decision as final.

Signed.....

Address.....

P.W. Comp. No. 13. .....

P.W. Competition No. 13



The complete aerial anti-static kit, and the special mains noise suppressor, to be given away as prize to the winner of our simple radio crossword.

HERE ARE THE CLUES

DEFINITIONS ACROSS

9. Name for a girl.
10. Tune in to Australia for this bird.
11. You hear plenty of these on the air.
12. Positive electrodes of valves.
13. "Popular Wireless" will *** to your radio efficiency.
14. A small child.
15. Electro-Motive, abbreviated.
17. Air is a ****ectric.
18. Now behead "14 across."
20. Put off.
21. What every listener uses.
23. Half "leak."
24. Even the worst of cooks can do this.
25. Mimic.
26. Etheric disturbances.
29. Describes a cheerless outlook.
31. The smallest quantity of an element.
32. "P.W." helps you to build it.
34. The claw of a bird.
36. Valves deteriorate with this.
38. Three-parts of oboe.
39. A circuit in which a valve amplifies differing frequencies.
41. Beats.
42. Super-***
43. Worked by electricity.

DEFINITIONS DOWN

1. Fixed.
2. To remove.
3. Concerning.
4. A lot of people ***** paying their licences.
5. Listeners all know this famous violinist.
6. A kind of aerial.
7. Built by birds.
8. Push.
13. You pick up things over "the ***."
16. What many components are made of.
19. Former Russian ruler.
22. Yes.
23. Curtail a "lead."
26. One of the Regional stations.
27. You hear about this meat in the "Fat Stock Prices."
28. "Lew's" band is often on the air.
30. Root mean (initials).
32. At the B.B.C. the "fair *** " do NOT announce.
33. A metal part useful to constructors.
35. Turkish commander.
36. A drink.
37. Obtain.
40. F.H. actual.

LOUDER STILL AND LOUDER!

(*Continued from page* 159.)

receiver—particularly the superheterodyne—is selective enough to handle an ether full of stations of super-power. It is important to remember, moreover, that, roughly speaking, the strength of reception decreases according to the square of the distance; so if you want to get a signal twice as loud from a given station, you have not to double the power but to square it.

Hence, even those stations which are going to have twice as much power as before will not necessarily give you noticeably louder reception. But, as a general rule—certainly at night, when factors relating to reflection of waves from the Heaviside layer have to be taken into account—British listeners can bank on fairly distant foreign stations becoming louder and louder still and louder.

Italy's secret Stentor, if it ever gets on the air, may shake the ether and produce effects such as no other broadcasting station has ever produced before, because, although Moscow is supposed to be using 500 kilowatts, it is common knowledge in international radio circles that the Soviets have never yet been able to obtain anything like this output.

Here, in Belgium, we are glad to hear that the B.B.C. is at last thinking in terms of high power, because we enjoy the British programmes and deplore the fact that your stations are swamped by others which (as close as we are to England) come in much better. About some of the other power increases in Europe we are not so pleased.

M. Raymond Braillard and his assistants who "police" the ether from their Brussels checking laboratory look like having an unusually busy time during the next few months. Just how busy you will realise if you study the table, which I have been able to secure exclusively for POPULAR WIRELESS. This table shows at a glance the changes in power (and in some cases wavelength) which are likely to be made by all stations within range of London during the present year. Of course, one or two of the stations may not be finished for some time (particularly the French and Spanish); but, nevertheless, the plans have been drawn up and passed.

RADIOTORIAL QUESTIONS AND ANSWERS

SOME FACTS ABOUT MAINS ENERGISED SPEAKERS

All Types of Readers' Queries are Dealt With on This Page, conducted by K. D. Rogers

A. S. (Timperley).—*I would like some particulars as regards mains energised speakers. Why do they specify 2,000 ohms, 6,000 ohms fields, etc.? If I have the volts to spare, won't any of them do? I want one that will carry 120 milliamps. What is the smoothing properties of a mains energised speaker? Who make them?*

Well, A. S., you have asked plenty in your short letter, but we will do our best to answer the points briefly. The resistance of the field winding of the mains energised speaker is most important. It depends on the resistance what current will be passed at a given voltage. But that is not the end of it. Speaker fields are wound to provide a certain strength of magnetism, and usually they are stated to take a maximum of so many watts—eleven is quite a normal figure.

At 200 volts input voltage it means that 55 milliamps must be passed for that wattage to be reached, so that if you have D.C. mains of 200 volts you will need a speaker with a winding of about 4,000 ohms, or slightly less. That is just an example. The wattage required by a speaker depends on its design, Big ones need perhaps 25 watts before the field strength is sufficient.

But the makers realise that with the variation of mains voltages available, and also the fact that set designers often prefer to place the speaker field winding in series with the H.T. supply to the set, they have to provide different speaker field resistances. In other words, they provide different windings so arranged that they provide the right field strength with different currents.

The example we took gave the right strength with 55 milliamps, but took 200 volts to do it. That means that if you placed the speaker in series with the H.T. to your set and passed 55 milliamps through you would drop 200 volts across it—rather a serious drop. Usually about 100-volt drop is considered ample, and in such a case the resistance of the speaker is usually about 1,250 ohms, and it is intended to be placed in series with an H.T. supply passing about 90 milliamps.

A field of 1,250 ohms placed in the D.C. electric light mains supply would be over-run, and those low resistance speakers are all meant for inclusion as smoothing chokes in the H.T. supply.

You want a speaker to carry 120 milliamps? You will need one of the 1,000-ohm, or less, field variety, therefore, placed as a smoothing choke in your H.T. supply to the set. You cannot use a 5,000 or 6,000-ohm field speaker, for you will lose too much voltage from your H.T. With 1,000 ohms you will lose 120 volts.

The smoothing properties vary with the make and type of speaker, but you can reckon that the field winding is at least as good as a 20-henry choke.

As to makers, there are W.B., Rola, Magnavox, Amplion and many others who market mains speakers with alternative field windings. Choose one of these and tell the makers how much current you want to pass and, most important, how much voltage drop you are prepared to have across the field winding. They will then send you the correct speaker.

S.T. AUTO-DIALS

A. M. S. (Bradford).—*I have damaged my S.T.700 auto-dial which was given away with "P.W." Can I get another?*

We are afraid not. The card dials that were available for 2d. post free for some months after the S.T.700 was published have now run out of print and no more are available. You can use the paper dial printed in "P.W." for March 21st, 1936, if you like, or you can get a Celluloid dial, costing 3/-, post free, from Celluloid Printers, Ltd., Kingston By-Pass Road, Surbiton, Surrey.

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.

SET "CHOKES" BADLY

F. T. (St. Albans).—*I have a battery set of the detector and two L.F. variety. It has gone well for years, but recently will not take any volume. The local station has to be cut down with a series aerial condenser. I have tested the valves on another set and they are O.K. Likewise the H.T. and L.T. and grid bias. Distant stations come in fairly well, with the aid of a wavetrap, but with not much volume. If I try to bring up the volume with reaction the whole thing seems to choke up.*

By the way, I have tried other valves in the set with the same results. The pick-up works quite O.K. on the two L.F. stages.

The fact that the pick-up works O.K. is a sign that the L.F. stages are all right. A pick-up test is always a good one, and often allows you to isolate the L.F. side from being suspected of causing the trouble in a set. In your case it seems to have eliminated the L.F. side, so that you are left with the detector only to test.

The valve is all right, you say, and other valves used behave in the same way. Just to make sure it is the detector circuit that is at fault, try placing a pair of phones in series with the H.F. choke and the H.T. supply to the detector. If the choking still occurs and is heard in the phones, it is pretty certain that the detector circuit is causing the trouble. Test the H.T. voltage at the valve anode. Also the L.T. voltage across the two filament pins.

If anything is upsetting these voltages you will probably find the trouble quickly. An anode resistance (if you have one in the detector circuit) may be faulty, or a dirty L.T. connection to the valve holder or to the valve pins may be present.

If voltages are O.K., suspect the grid leak and condenser. Try others in their places one at a time. You will probably soon unearth the fault. A disconnection in the condenser may cause the trouble, but more likely it will be found to be due to a "dis." in the leak circuit.

THE EARTH THAT WASN'T

"All-Mains" (Horley).—*Some time ago I bought an A.C. set. It hummed rather badly when I tried it, and someone suggested my earth was faulty. I was using a long lead to a gas pipe. So I went to a lot of trouble and dug a big hole outside the window (taking up the concrete to get at the earth) and buried a large biscuit tin with a lead soldered on it. The hum was cured and all went well till recently (about twelve months afterwards).*

Now the hum is back again, though not quite as bad, I think. I tried the set next door and it was O.K. What do you think has happened?

It looks pretty obvious to us. Your earth is no longer a true earth. If you dig it up we think you will find that the biscuit tin has badly rusted, and that probably the lead is no longer attached to it. Those tin earths rarely last long and are not advisable. Crowds of people use them, we know, but a great deal of set trouble would be avoided if listeners would keep right away from the biscuit tin and other form of iron earths. Try a good copper tube, well driven home, and with the earth lead soldered to the top, bound with tape and well varnished over to keep the air away.

Keep the joint portion above ground so that you can keep an eye on it. And if you come across anyone who uses a tin earth tell him to do the same.

"SCREENED" AERIALS

"Beginner" (Birmingham).—*What is meant by a screened aerial?*

That depends. It may be the term given to an aerial that is run along between buildings or trees high enough to act as screens between the aerial and the radio stations that it is supposed to receive. Or it may mean an aerial with a screened down-lead, used to reduce static interference from electric machinery, trams and the like. In the latter case the horizontal part of the aerial will be free (not screened) and the down-lead only will be covered with a metal sheath.

The first case mentioned is defiultely bad. The horizontal part of the aerial should be as far away from buildings and trees as possible.

There seems to be a certain amount of confusion about the term, though, for we had an answer recently from a reader whom we asked: "Is your aerial screened?" (meaning, "Is it hedged-in by buildings and so forth?"). He replied (thinking that we meant "is the down-lead screened?") "I did not think it necessary."

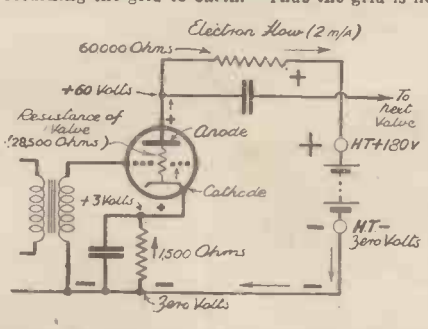
It is best always to say "screened down-lead," and not "screened aerial" when referring to the anti-static screening. Leave the term screened aerial to mean an unwanted type of screening.

TECHNICALITIES EXPLAINED

No. 1—SELF-BIAS

The name given to bias that is provided by tapping off a voltage from the H.T. supply to a set, as distinct from the voltage provided by a separate supply.

Usually used only in mains sets, but sometimes provided in battery receivers. Mains set bias is obtained by raising the cathode of a valve above the earth potential (H.T.—) and by returning the grid to earth. Thus the grid is negative in respect to the cathode.



In the circuit we have H.T. supplied to a valve which passes 2 milliamps. In series with the cathode connection to H.T.— is a resistance. The anode-cathode current of 2 milliamps flows through the resistance on its way round the circuit. This causes a voltage drop across the resistance, in the case shown of 3 volts. As the grid circuit is returned direct to H.T.— the cathode is 3 volts positive to the grid. In other words the grid has a negative bias of 3 volts. To make things clear we have marked the H.T.+ voltage at various points in the circuit, showing how it is gradually dissipated till it disappears at H.T.—. The plus values become smaller as the voltage is reduced.

AMATEUR RADIO TO THE RESCUE

A thrilling account of the valuable work carried out by American amateurs during the recent great floods, and on other occasions on which radio has answered the emergency call.

DOZENS of voices, hundreds of high-pitched dots and dashes, filled the air, asking help here, reassuring there, carrying messages from military, naval and red-cross officials. While telegraph and telephone wires went down, while electric power plants failed, the air vibrated with talk by voice and Morse code as radio amateurs throughout the eastern United States responded to their own S O S, the dreaded Q R R, which went ringing forth from dozens of towns struck by the recent floods in Pennsylvania, Ohio, the New England states, and West Virginia.

Typical of the amateurs who were using radiophone on the 75-metre (3,900 kilocycles) band was W 8 B W H (J. P. Vancheri, of Punxsutawney, Pa.). His was a key station, and the traffic flowed to and from his emergency-powered station. To those listening in "Doc" was heard day and night for practically the entire duration of the Pennsylvania flood. In eighty-five hours he had ten hours of sleep and had to stop from exhaustion. From the neighbouring states and cities calls came through for "Doc" Vancheri, and as soon as he was heard clear with one station, another was calling him with urgent messages telling of help on the way, asking for news from anxious relatives, and answering his reports and his calls for assistance.

On the 160-metre (1,800 kilocycles) band, other amateurs were busy with radiophone. Morse code handled the bulk of the traffic on the 40-metre (7,000 kilocycle) band and on the 80-metre (4,000 kilocycle) band. Everywhere the amateur spaces of the radio spectrum were busy with answers to Q R R. Listeners on multi-wave receivers could follow rescue in the making step by step.

Regular Station Networks

Q R R has sounded in the minor and major catastrophes of the United States and Canada for many years. Florida's amateurs are well organised for the periodic hurricane, as are Cuban amateurs. Floods in the New England states, New York, New Brunswick, and the Mississippi Valley have resulted in regular networks of emergency operating amateurs. Earthquakes are no novelty to Californian and Montana amateurs, and even Nicaraguan and New Zealand earthquakes have seen amateurs come to the rescue. Sleet storms in other parts of the country, ships at sea and on the Great Lakes—all have been the cause of amateur emergency work. It is not unusual for an amateur to stay on the job upwards of seventy hours at a stretch when Q R R is heard on the air.

Waves dashed over the 135-ft. high lighthouse at Tillamook Rock, Oregon, hurling fifty-pound boulders through the roof and the lenses of the high-powered light. Battering with full force, the waves broke the telephone cable connecting the lighthouse with the mainland a mile distant. The rooms of the lighthouse were flooded, its keepers struggled to keep their necks above water. Still the heavy seas pounded on the rock, tore part of it away, made danger to shipping doubly dangerous, for the lighthouse was unable to function, no help could reach it.

A Set Made on The Spot

An assistant keeper, Henry Jenkins, was a radio amateur. His call W 7 D I Z. He took an old broadcast receiver, battery operated, pulled it apart. From its parts and odds and ends of wire, door knob plates, tin foil, wax paper, he fashioned not only a receiver but also a transmitter. Without any precision instruments, while high seas continued to pound on the lighthouse, he made his emergency apparatus function exactly on an amateur band. He heard an amateur at Seaside, Oregon, talking in code to another in Portland. He called the former. The latter heard the weak, jumpy Q R R call, notified the Seaside amateur, who then made contact with Jenkins. The U.S. Lighthouse Service was notified, a broadcast was sent to all ships in the vicinity that the lighthouse was not functioning with light beam or fog machinery. Contact continued with that crude, slapped-together equipment till the storm abated days later and repairs were made on the lighthouse. Unknown lives at sea were saved with that emergency amateur radio equipment.

Albert H. Davis, W 4 G Q, Clewiston, Florida, listening in one July morning, heard the emergency signal, signed by a Canadian call. Answering, he was told it was the Canadian yacht "Casarco Fifth," stranded for seven days off the Cuban coast, leaking badly, and with a sick woman passenger aboard. Would Davis please notify the coastguard. Davis contacted a commercial marine radio station, ships were sent in search by the coastguard and the Cuban government, while a broadcast was sent to all shipping.

Two days later Frank Finlay, C M 2 A C, of Havana, was listening in, heard a Canadian call, answered, and thinking he was making contact with an Ontario station, surprisedly copied in code that this was a Canadian yacht off Cuba. Would he please notify the coastguard and find out when they would be rescued, as drinking water was low. Finlay 'phoned the Cuban government, and that day the "Casarco Fifth" was located and towed into port.

J. M.

FILLING ACCUMULATORS

A simple gadget that anyone can make

"TOPPING-UP"—the addition of small amounts of water or acid to an accumulator—is somctimes a difficult business for the amateur to undertake owing, mainly, to the small filler-orifice provided at the top of the accumulator case.

A "filling bottle," however, constructed on the lines indicated in the accompanying illustration, will make the task of "topping-up" an accumulator easy and capable of accomplishment without spilling any liquid.

Simple to Rig Up

Procure a fairly wide-necked bottle fitted with a good cork. Bore two holes through the cork. Into one of these holes push a straight length of glass tubing (or metal tubing if glass tubing is unobtainable), this tube reaching nearly to the bottom of the bottle. Through the other hole in the cork push another piece of tubing, its lower end not coming much below the neck of the bottle. If it is possible to bend this

THE FILLER is made from an ordinary wide-necked bottle, well corked with a rubber stopper, or good cork, and with a couple of lengths of glass tubing inserted as shown. The bent piece is for the liquid to flow through and the other to allow air to come into the bottle.

piece of tubing at its upper end do so, and draw out the end in the form of a jet.

When the bottle so fitted is filled with water, and then tilted, the liquid will flow out via the bent tube. When, however, the finger is placed over the open end of the straight tube, the flow of liquid will instantly cease. Thus complete control of the amount of liquid flowing from the bottle into the accumulator is easily established and, moreover, by having the delivery tube drawn out at its end into the form of a jet (this is easy with glass tubes) an accumulator having the narrowest filler-orifice may be "topped-up" rapidly and accurately and without the spilling of a single drop of liquid.

J. F. S.

JUST IN PASSING

One of our contributors has a surprise

AFTER an interview with the Editor, during which it was arranged that I should contribute certain articles, I peeped into the POPULAR WIRELESS Research Department.

First time I had ever done that. I have often passed its door with the forbidding notice: "No Admittance—Research Staff Only." Generally, I must admit, with a secret grin. Thought it was a spot of impressiveness for the benefit of visitors.

I wouldn't have been surprised if the door had opened into a small typist's office—a small office for a large typist, if you like. Being now a commissioned contributor to POPULAR WIRELESS, I pushed open this door with all the assertiveness of someone who'd come to clear the wastepaper baskets or inspect the drains—if any.

Apparatus Everywhere!

Instead of the small room I had half expected, I found myself in a curious area of two largish rooms knocked into one, with an odd pillar or two straying about to mark where once there had been a wall.

And everywhere large benches and apparatus—heaps of it. Huge cupboards, yards of shelves filled with radio components and yards and yards of sets in all conditions.

Two big cabinets, each large enough to enable two men to stand up in it comfortably. One lined with copper and equipped with queer-looking apparatus for testing sets. The other holding an electric clock for precise measurements, and special loud-speaker testing gear.

Imitating Stations

Two men wearing smocks, like surgeons, bending over a hooked-up medley of bits and pieces. Another, smoking a cigarette and gravely watching a complete artificial transmitter for duplicating any ether conditions, as I learnt later.

An imposing power-board with huge switches and A.C. and D.C. meters, orange lights glowing, a big generator humming away. Meters and oscillators and testing panels everywhere! More meters filling up odd spaces. Lots of switches. Big standard amplifiers. Rows of speakers. And miles of cables and wires criss-crossing the walls and ceiling.

A Research Department, forsooth! With knobs on it and in it. I stole away humbly. A small typist's room! My! Oh, my!

H. A. R. B.

NEXT WEEK

Full constructional details of the

"PLUS H.F." BATTERY FOUR

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page 173.*)

UNE CAUSERIE EST MOINS ENJOYABLE QU'UN CONCERT

ün koh-zree eh mwah(n) zah(n)-shwah'yahbl ku(ng) ko(ng)-sair

A talk is not so enjoyable as a concert

If we put these three sentences into the plural and say, "The talks are more enjoyable than the concerts," etc., we get:

LES CAUSERIES SONT PLUS ENJOYABLES QUE LES CONCERTS

LES CAUSERIES SONT AUSSI ENJOYABLES QUE LES CONCERTS

LES CAUSERIES SONT MOINS ENJOYABLES QUE LES CONCERTS

I want you to notice the PLURAL form of the ADJECTIVE here—ENJOYABLES.

Now try your hand on the following. But first of all let me give you a small programme vocabulary.

un concerto de violon—*ko(ng)-sair-toh de(r) vwoh-lo(ng)*
un cabaret-concert—*kah-bah-reh ko(ng)-sair*
les chansons populaires—*shah(n)-so(ng) pop-ü-lair*
un concert pour la flûte—*ko(ng)-sair poor lah flüt*
un concert pour petit orchestre—*poor p'tee tor-kestr*
une causerie en anglais—*koh-zree ah(n) nah(n)-gleh*
une chanson de music-hall—*shah(n)-so(ng) de(r) music-hall*
une comédie en trois actes—*kom-eh-dee ah(n) trwah zahkt*
une chronique sur le Cinéma—*kron-eek sür le(r) sin-eh-mah*
une causerie théâtrale—*koh-zree teh-ah-trahl*
un concert d'après-midi—*ko(ng)-sair dah-preh me-de*
un concert vocal—*ko(ng)-sair vok-ahl*
un concert à deux pianos—*ko(ng)-sair ah de(rr) pe'ah-noh*
un concerto pour piano et orchestre
une comédie radiophonique—*kom-eh-dee rah-dyoh-fon-eek*
la musique militaire
la musique d'opéra
la musique instrumentale—*mü-zeek a(n)-strü-mah(n)-tahl*
un relai du Théâtre—*re(r)-leh dü teh-ahtr*
un solo de flûte—*soh-loh de(r) flüt*
un solo d'accordéon—*soh-loh dah-kor-deh'o(ng)*

A violin solo is more interesting (intéressant) than an accordeon solo.

A theatre talk is not so interesting as military music.

Instrumental music is as popular as a vocal concert in England.

Radio comedies are more frequent in France than in England.

A music-hall song is more amusing than a flute solo.

An afternoon concert is not so popular as a relay from a theatre.

A light orchestral concert is not so long (long) as a radio comedy in 3 acts.

Operatic music is more difficult (difficile) than a music-hall song.

A concerto for piano and orchestra is rarer (rare) than an accordeon solo.

A talk in English is not so difficult as a talk in French.

Now correct your effort from:

Un solo de violon est plus intéressant qu'un solo d'accordéon.

Une causerie théâtrale est moins intéressante que la musique militaire.

La musique instrumentale est aussi populaire qu'un concert vocal en Angleterre.

Les comédies radiophoniques sont plus fréquentes en France qu'en Angleterre.

Une chanson de music-hall est plus amusante qu'un solo de flûte.

Un concert d'après-midi est moins populaire qu'un relai du Théâtre.

Un concert pour petit orchestre est moins long qu'une comédie radiophonique en trois actes.

La musique d'opéra est plus difficile qu'une chanson de music-hall.

Un concerto pour piano et orchestre est plus rare qu'un solo d'accordéon.

Une causerie en anglais est moins difficile qu'une causerie en français.

THE MEMOIRS OF A RADIO JOURNALIST

(*Continued from page 161.*)

looking Zulu assegais (I wish I could say that word). They belonged previously to her father, who roamed the world; but Esther has since added to the collection a silver stiletto that my hand fell upon as I leaned against the mantelpiece one day.

Esther then produced a longer dagger which, she assured me, once dealt death to someone aboard a Danish vessel. It was then that we made a pact. While she went into a detailed demonstration of how the knife was drawn and manipulated, we agreed that if ever she is unkind to me, I will write unchivalrous things about her; if, on the other hand, I am unkind to her, I may anticipate meeting a gory demise by her fair hand. Somehow, I am beginning to distrust the proverbial supremacy of pen over sword!

Countess and Radio Star

About seven years ago, my sister and I threw a party at home. We each invited guests that the other had not yet met. On scanning my sister's list, I saw a name that intrigued me. "Who's this Eve Becke?" I asked.

"Oh," replied my sister, "just a girl who does odd bits of stage and film work. At present she's in the Hulbert chorus. But she sings very nicely and ought to do big things later on. You'll like her."

She was right. I did.

When the guests were arriving, Eve telephoned to ask how she should proceed from the station. "Go along and pick her up," said my sister. "Look for a tall, slim girl with large eyes and red hair."

Of course, Eve is not the only tall, slim girl with large eyes and red hair, but, for all that, I spotted her at once. We got back into the car and drove home. She certainly helped to make the party a success, singing those wistful Noel Coward numbers with her brother, Colin Becke, the West End dress designer who makes all her gorgeous clothes.

One of the first broadcasts Eve ever gave was with Austen Croom-Johnson in an early and tentative "Soft Lights" show. The next time she attended a party of mine she was a fully-fledged star. That was just over a year ago—on the day that the announcement of her engagement to the Count Caneva de Rivarolo was made. Now, of course, she is the Countess. I know that when (and if!) my own engagement is announced, I shall probably want to make whoopee on the dome of St. Paul's. Nevertheless, Eve, the Count and Colin charmingly availed themselves of my modest hospitality.

ALL-WAVE RECEPTION

The latest type of superhet tuner.

By K. D. ROGERS

THE first short-wave station I ever heard was Pittsburgh, way back in 1923, I think it was, on about 80 metres. It came over remarkably well, and we considered the reception of wavelengths below 100 metres quite an achievement in those days.

To-day we think nothing of picking up stations from all over the world, on wavelengths less than a quarter of that of old Pittsburgh. Reception of short-wave broadcasting on 13, 16, 19, 25, 31, 49 metres is a commonplace, and it can be carried out with a regularity that we are apt to take far too much for granted.

It is worth while considering what has been done for short-wave listeners during the last ten years. From the old unreliable single detector circuits and headphones we have graduated through screened-grid valves to screen pentodes, the superhet has returned and with it we now have A.V.C. to help us to contend with that peculiar high-speed fading that is still evidenced on occasion by the short wavelengths.

Single-Knob Tuning

Instead of searching for the American and Australian stations on a single valve with headphones, or trying to tune two or more unreliable H.F. circuits in an attempt to get more amplification and sensitivity, we can sit back and turn a single knob and be assured that if there are any short-wave stations coming over with a strength sufficient for us to enjoy their programmes we shall get them practically fade-free on the speaker, and with a power more than enough for any average room.

This year British radio set manufacturers have followed the American lead and gone all-out on the production of all-wave receivers, enabling listeners to cover not only the medium and long-wave bands, but also those from about 16 to 50 metres.

What of the home constructor? It is by no means easy to design him a set that will give the results that can be obtained by some of the latest commercial all-wavers. The individual constructor may well shrink from the task, for coils and condensers have to be properly ganged up, high efficiency in the tuned circuits is essential, and screening must be properly carried out. If single-knob tuning, A.V.C., all-wave switching, and so forth, are required, it is hopeless to try to construct an all-wave receiver from what might be termed "standard" bits and pieces.

Components for such a set must be properly designed and efficiently turned out. On the whole the component market has been slow in getting to grips with the all-wave problem, but gradually complete tuning units are making their appearance, and the lot of the home-constructor who wants to make an all-wave set is becoming easier.

Incorporated Switching

One of the latest units to be placed on the British market is an American design marketed in this country by R. A. Rothermel, Ltd., of Rothermel House, Canterbury Road, N.W.6.

Known as the Sickles "Radio Heart" (picturesque titles the Americans use, don't they?), the unit is a complete tuning assembly for an all-wave superhet. It is incorporated in a chassis complete with two valve holders for pre-mixer H.F. valve and the mixer valve, and contains all the necessary switching for the three wavebands it covers, the trimming and padding condensers for the oscillator portion, the ganged tuning condenser, and special rubber mounting washers to prevent microphony. An intermediate transformer is supplied separately for use with the unit.

The valves recommended are the Standard Telephones and Cables "Brimar" valves, types 15D1 and 9D2, and from the home-constructor's viewpoint the chassis will save a lot of headaches and complications in design. The whole unit is trimmed and wired ready for use and covers in three steps the wavelengths from 16·5 to 2,140 metres.

Some idea of the simplicity of use in construction may be had from the fact that there are only seven connections to be made to the "Radio Heart" tuning unit. It is, indeed a radio heart. External to it, of course, one has to provide an intermediate H.F. stage, a second detector with the A.V.C. rectifier and some form of L.F. amplification, which can easily be decided in accordance with the individual requirements. Then there must be the power pack.

The price of the "Radio Heart" is 5 guineas without valves, and although it seems at first sight not particularly cheap, one soon realises that it is, in actual fact, something of a bargain. For that sum one is provided with a properly constructed and tested unit that is ready wired up and trimmed and provided with really efficient switching.

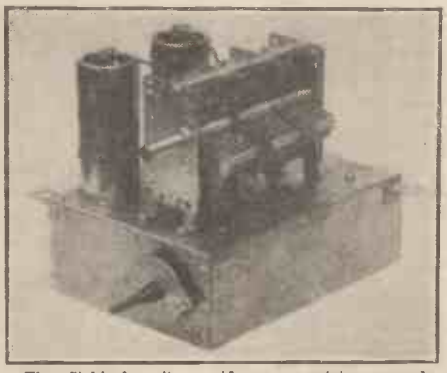
And switching is not a small point either. The design and construction of efficient wavechange switching has given set designers a bad enough time when considering only the more or less fool-proof and docile medium and long wavelengths. The construction of a silent, efficient, low-loss switch arrangement for changing over several circuits to and from *short* wavelengths is a far worse problem. Just you ask any competent radio designer, and he will agree with me—and then some!

Sorry I have gone American, but it must be the effect of the "Radio Heart." Honestly, though, switch design is the very dickens down below 50 metres, and the fact that really well tried, efficient, and strong switchgear is incorporated in the Sickles unit is something that is worth a lot.

I certainly like that tuner unit. It is a fine bit of work, both electrically and mechanically. Perhaps one should not be so surprised, however, when one realises that America has at least two years' more experience than we have in the design of short-wave commercial gear. They have been interested in short waves from a broadcast listening point of view much more intensely, and their radio manufacturers have carried out no end of research into the design of short-wave and all-wave tuners.

In the "Radio Heart" you have the result of that research. Well-made, compact, and ready for use, it forms the efficient and all-important nucleus of a really up-to-date all-waver.

THE "RADIO HEART"



The Sickles' unit provides a complete, ganged and trimmed superhet tuner for all-wave reception.

PRACTICAL RADIO AND ELECTRICITY

(*Continued from page* 166.)

be constantly varying in value or direction. For this reason transformers are only suitable for use on what is termed "alternating current."

In electricity there are two types of power supply. One is D.C. or direct current, and the other is A.C. or alternating current. In this country at the present time in one town you may have D.C. and in another A.C., but the increasing use of the grid system is tending to abolish D.C., and A.C. is becoming more and more usual as the source of supply. You can, for instance, step its voltage up or down quite easily by means of a transformer, whereas you cannot do this with A.C. Transformers are used to a large extent in radio. In A.C. mains sets you need a transformer to convert the mains voltage to the values required for the valve heaters and H.T. supply. Transformers are also used for low-frequency amplification.

A.C. Changes Its Direction

You will now wonder what is the difference between A.C. and D.C. A.C. is a current that constantly changes its direction. The A.C. voltage starts at zero, grows to a maximum, and then decreases to zero again. Then it changes direction, starting at zero, rising to maximum, and falling once more to zero. It does this continually. One complete change, that is, the rise from zero to maximum and back to zero in one direction, then from zero to maximum back to zero in the reverse direction, is called a cycle, and the number of complete cycles in a second is called the periodicity or frequency. The average periodicity for supply mains is 50 cycles per second.

Direct current does not change in direction; its value may vary slightly while it is flowing, but its direction never alters like that of alternating current. But I shall tell you more of this in future articles.

RANDOM RADIO REFLECTIONS

(*Continued from page* 166.)

ORDERS FOR RADIO FACTORY

TRUTH is stranger than fiction; an observation for which I claim no personal credit. Well, anyway, here are two stories. One is true and the other home-made—by me. No prizes are offered for discerning the true one. And to make you feel very annoyed I'm not going to tell you which one it is.

1. A lawyer friend of mine had (I say "*had*") a junior partner to whom he delegated the job of writing a letter to a party implicated in a possible slander action. It was not a good letter (not a patch on many of those you write me!). And so he called J. P. (abbreviation indicating Junior Partner) into his office.

"Now look here, J. P.," he said. "Supposing I were to call you a dirty little snake-in-the-grass, a vile sneak-thief, a white-livered little hypocrite who has sunk so low as to misappropriate the funds of our trusting clients, a nasty piece of work who ought to be rubbed out and drawn again? What action could or would you take?'

To his complete astonishment, J. P. burst into tears.

"I didn't mean to do it," he sobbed.

2. A radio factory has received an order from H.M. Office of Works for twelve pairs of telephone receivers and six break-back type mousetraps.

RADIO AND WAR

THE people who read POPULAR WIRELESS must form a complete cross-section of the population of this country—all ages, all classes, all creeds and in both sexes. Through writing articles for it I have encountered in person or through the post, peers and postmen, one duchess and at least twenty dentists, painters of both the artisan and the artistic variety, miners and ministers, song composers and compass makers, and so on ad infinitum.

I write about what was to me an entirely new American Society. What happens? Mr. F. W. T. Atkin, of Frecheville, Sheffield, at once sends me a letter starting:

"Dear Mr. King—I read your paragraph, 'An Ambitious Society,' in this week's 'P.W.' with much appreciation, as I am a member of the New History Society myself—one of the few English members."

You know, when I receive concrete evidence like this of the penetrating power of our old "P.W.," its huge circulation among folk of infinitely varied types and characters, I sometimes, as I believe I have said before, feel quite weighed down with responsibility and very humble.

Can my little paragraphs be good enough for such a medium? Still, the number of your appreciative letters appears to prove that they are. Obviously the Editor shares your opinion. With one exception, he tells me, I receive more letters than any other contributor, and so far—and this I believe to be quite a record—there have been only three of a critical nature.

1. That one from Mr. Sydney "Excitement" Horler, which was, after all, quite a friendly "dig."

2. The postcards signed "B. L. G., Liverpool," which I lump together as an exhibition of impish "tongue-in-cheekism" and through which I lose no sleep at nights.

3. The reader who wrote to point out an error in one of my diagrams which wasn't there, and dropped a brick himself in doing so! Which made me chuckle gleefully!

But to revert to Mr. Atkin, I think without further comment I ought to give you a further extract from his letter. He says:

"Anyway, thanks for your sane remarks on the use and misuse of broadcasting in bringing about a sane world order eventually. The way not only broadcasting but other branches of radio are being used to further nationalistic aims is maddening to those who, like you and me, look forward to a better use of this great invention. An example—reading American S.W. journals, one learns of the 'U.S. Army Amateur Net,' a scheme apparently making use of 'ham' transmitters ready for the 'next war.' When one thinks of the good fellowship and real, practical internationalism of old-time radio 'hams' and professional 'ops.,' such prostitution of one's pet hobby is sickening.

"Besides, being an idealist and an internationalist, I am a keen radio 'fan' and experimenter, having been one of the now fairly small (if not nearly extinct?) band who went through all the paraphernalia of applying for (? begging and praying for) and getting an Experimenter's Licence from the P.M.G. Now they're after you 'pronto' if you don't pay your 10s. down."

PHOTO-CELLS

(*Continued from page* 160.)

The photo-electric cell is already being used in ways that are as ingenious as they are varied, though there are plenty of opportunities left for those who have a gift for invention.

On an aerodrome, for instance, the boundary and signal lights for airmen are automatically switched on as daylight fades, or as fog sets in. The same automatic control is being used for ordinary street lighting, both to switch the lamps on at night and off at daybreak, and to operate illuminated night-signs and advertisements. The flash-lamps for buoys and other navigation lights can be switched on in the same way when darkness sets in, or during periods of fog.

Similarly the speed of an escalator can be regulated according to the traffic it carries, by a relay which registers each passenger as he crosses an invisible ray at the foot of the steps.

In much the same way the packages carried on a conveyer band can be numbered, and faulty pieces automatically rejected. Coffee beans, too, can be supervised and any imperfectly roasted specimens separated from those which have acquired the proper shade of brown. Again, the number of motor-cars passing, say, under a bridge, are recorded by a P.E. cell, which gives an automatic warning signal to the driver of any lorry carrying a load too high to pass safely through.

LOVELY POPPY SEEDS FREE

Free Seeds of the exquisite Paradise Poppies are given with this week's issue of POPULAR GARDENING (now on sale, price 2d.). This lovely flower has often a double or semi-double bloom, and the colours are particularly pleasant; no better choice could be made for a flower to be planted now, where a beautiful border show in the summer is desired. This number of POPULAR GARDENING is devoted chiefly to the problems of the beginner and the owner of a new garden. It explains clearly how the novice can quickly achieve a garden of charm and colour.

The RADIO Bulletin

Your guide to the newest developments in the Wireless Trade

A COMPACT HOME RECORDING OUTFIT

A COMPACT recording outfit in a black leatherette carrying case is obtainable from **Microphone Equipment, Ltd.,** for 18 guineas. Known as the "ME" RECORDA, the outfit contains everything necessary for the making of records in the home.

A high-fidelity transverse current carbon microphone, gramophone pick-up, mixing panel with switch to enable microphone or pick-up to be used at will, and the necessary cutting equipment and motor, are included in the equipment.

The cutting head is adjustable for wattages of 2½–15, and the complete outfit seems to be good value for money.

* * *

LATEST COSSOR RELEASES

Four **new all-mains** receivers form the latest additions to the well-known Cossor range. All of the sets are designed for use on A.C. supplies.

The least expensive of these new receivers is **the de-luxe "Super-Ferrodyne," Model 377,** which costs 8½ guineas. Among its features are thermometer tuning and exceedingly simple operation. The circuit incorporates three pentodes, and there are four valves in all, including the rectifier. Provision is made for the use of an extra loudspeaker and also a gramophone pick-up.

RESULT OF "P.W." COMPETITION No. 10

For the most interesting opinion on any selected feature that has appeared—or is still appearing—in "Popular Wireless" this year, the PETO-SCOTT S.G. THREE KIT has been awarded to

Mr. R. E. ATKINSON,
Silver Street,
Nailsea, nr. Bristol.

His choice was "W. L. S." and the reason as follows:

"W. L. S.'s weekly page, which combines breezy humour with bright ideas, interesting memories with the latest news, is written by an enthusiast for enthusiasts."

A superhet is available for £9 17s. 6d. This is the **Model 374,** and the circuit utilises four valves and a rectifier. An entirely new easy-to-read scale is fitted and a further feature is the special anti-fading circuit.

The remaining two models are **radiograms.** One is a superhet radiogram of the table type, and is known as the **Model 737.** It is little larger than the average table wireless set and employs five valves, a large illuminated scale calibrated with station names and wavelengths, a silent induction motor and 12-in. turntable on the gramophone side, and a high-grade pick-up.

The other radiogram is a **de-luxe floor console,** incorporating a four-valve Super-Ferrodyne circuit; single knob tuning is provided, and the illuminated full vision scale is calibrated in wavelengths and station names. The price of this model is 16 guineas.

* * *

R.G.D. ALL-WAVE CONSOLE

This is a luxury instrument. In common with other **R.G.D.** models special attention has been given to the attainment of exceedingly high quality reproduction. Twin matched moving-coil speakers, giving a uniform response from 70 to 7,000 cycles, are one of the features of this receiver.

The cabinet construction is particularly rigid, and there is an absence of cabinet resonance or boxiness.

The circuit is an eight-valve superhet, covering wavebands of 15–30, 30–60, 195–550 and 760–2,000 metres. Variable selectivity provides the highest quality for local station reception, easy tuning and the elimination of drift on short waves, at the same time giving the necessary razor-edge tuning for long-range reception. The price of this **R.G.D. all-wave console,** which is listed as the **Model 704,** is 65 guineas.

* * *

INTERNATIONAL MAJESTIC RADIO

Here are two more all-wave sets. These are **International Majestic Radio** receivers—American designs available in this country.

The first is **a twelve-valve superhet** covering four wavebands of 9–30, 30–75, 190–560 and 800–2,000 metres. Tone and sensitivity controls are fitted as well as provision for the use of a gramophone pick-up. The price of the chassis complete with valves and loudspeaker is 28 guineas, or in console form 37 guineas.

The same model is available in a radiogram cabinet (less motor and pick-up), price 42 guineas.

There is also an inexpensive all-wave design called **the "Atlanta,"** which is priced at 11½ guineas. This is a seven-valve universal mains superhet covering three wavebands of 18–55, 180–550 and 840–2,250 metres.

For use on the normal broadcast bands only there is a **"Baby Grand"** model incorporating a six-valve universal mains superhet circuit. The wavebands covered are 180–550 and 800–2,200 metres. The price is 6½ guineas.

* * *

INTERESTING VALVE CLASSIFICATION

The **Osram Q.P.21** quiescent push-pull double pentode has been subdivided into three groups in order that by varying the screen voltage or grid bias correspondingly good results may be obtained from all valves, in spite of the inevitable slight variations of characteristics.

Each group has a code letter, which is marked on top of the bulb. This code letter indicates the recommended screen voltage to use for a fixed grid bias or, alternatively, the recommended grid bias for a fixed screen voltage.

RADIO WORD LADDER

(See page 166.)

COIL, BOIL, BAIL, BALL, TALL, TALE, TILE, MILE, MULE, MUSE, FUSE.

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LOUDSPEAKERS REPAIRED, 4/-. Blue Spot a Speciality. Transformers and Headphones, 4/-. Eliminators Mains Transformers and Moving Coils quoted for. 24-Hour Services. Trade Discount, Clerkenwell 9069.—E. Mason 44, East Road, London, N.1.

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