POPULAR WIRELESS. February 8th, 1936. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

THIS WEEK: RADIO MYSTERY CIPHER No. 1 (TURN TO PAGE 654)

Popular Wireless & Television Times

LINING UP YOUR "ROTALOG"

EVERY WEDNESDAY PRICE 3D

No. 714. Vol. XXVIII. Feb. 8th, 1936.

And Don't Miss These!

INSTALLING AND USING YOUR "AXIS"

Further notes on G. T. Kelsey's Great World-Searching Set

\+ + +

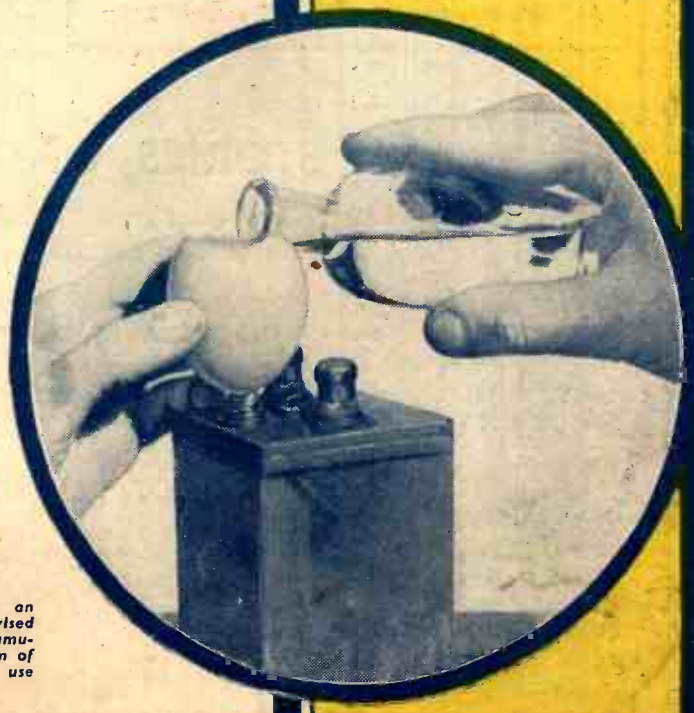
PRACTICAL RADIO AND ELECTRICITY

Our new instructional feature for beginners

\+ + +

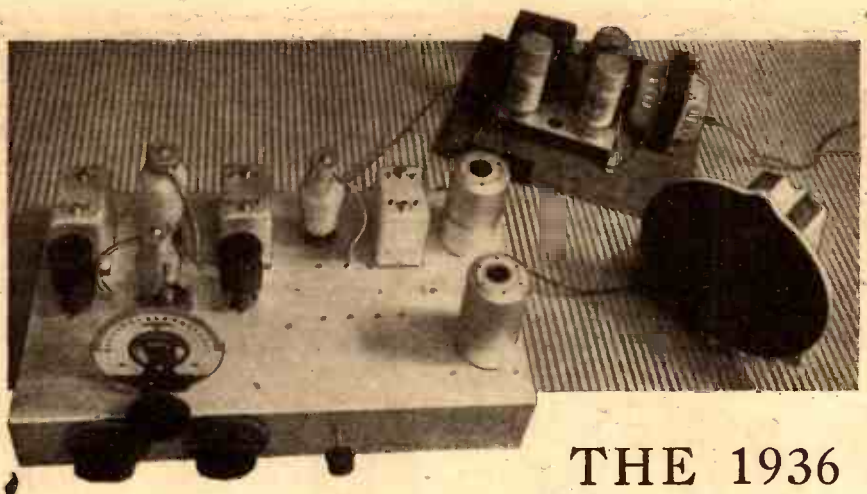
YOUR CHANCE OF A 50% SHARE IN A NEW TELEVISION INVENTION

This is the amazing prize in our competition this week. Full details appear inside



AN EGGS-ELLENT IDEA!

The adjacent photo illustrates how an egg-shell can be used as an improvised funnel for "topping up" an accumulator. A hole is pierced in the bottom of the shell. Note: It is advisable to use distilled water.



Here It Is!

Just the set for which so many—especially Overseas listeners—have been waiting. A sensitive, easy-to-operate, all-mains short-wave receiver which gives excellent loudspeaker reception of S.W. broadcasting.

THE 1936 EMPIRE SUPER

It is fully described by W. L. S. in the

FEBRUARY

WIRELESS AND TELEVISION REVIEW

On Sale Everywhere—Price One Shilling

ALSO IN THIS NUMBER THERE ARE:

Special Contributions by
JOHN SCOTT-TAGGART
entitled :
Audio-Reaction
Dealing with his remarkable invention which is incorporated in the S.T.700.
From My Armchair
An entertaining causerie on varied topics.

ALL ABOUT S.W. ADAPTORS AND CONVERTERS

An 8-page section dealing with every aspect of this subject, and including articles on :
The Choice of a Circuit
Modern Instruments and Practical Points.

AND

STORIES OF RADIO STARS

Articles giving intimate facts about popular broadcasters, including Effie Atherton, Gilbert Rumbold, "The Wireless Chatterers," Jean Sablon, and Hildegarde.

THE RADIO RACKETEER
An unusual radio story that will grip your interest to the last word.

SET INSTALLATION
An article for the new set owner who has no technical knowledge.

A FOUR-WATT BATTERY AMPLIFIER
How to build an economical but powerful unit for quality results.

INEXPENSIVE A.V.C. FOR ANY SET
Details of a new development together with 10 circuits.

BUT THAT IS NOT ALL, FOR OTHER TITLES INCLUDE:

When to Listen During February.
"I'm Sorry It Happened."
The B.B.C. in the Provinces.
Wireless in the Wilds.
British Broadcasting News and Views.
Television To-day.
What is Happening in Radio.
A Word on Soldering.
Television NOT to Compete With Cinemas !
Berthe Grossbard of the Rome Station.

POPULAR WIRELESS AND TELEVISION TIMES

MANAGING EDITOR : G. V. DOWDING. ASST. EDITORS : A. J. RANDALL, K. D. ROGERS.

DETECTING STORMS
"CLAN MACARTHUR"
MOSCOW BROADCASTS

RADIO NOTES & NEWS

PARIS CONFERENCE
"CHEEK BY CHEEK"
AMAZING CURE

Stormy Weather

ONE of the most interesting of the inventions displayed at the Conference on Acoustics, held in Moscow, was an apparatus for detecting the approach of storms at sea.

The young scientist who invented it, Victor Shuleikin, claims that it enables stormy weather to be detected long before it breaks. The invention picks up and magnifies the so-called "Voice of the Sea," which is a very low-frequency wave produced by the action of the wind upon the waters.

Details of the range over which the device is effective are not yet made known. But habitual Channel-crossers are already talking about a medal for Victor.

Rival to Radio Route

IT has generally been assumed that when an air service is established across the Atlantic the guiding star will be radio. But now Mr. F. G. Creed—inventor, among other things, of the Creed printing telegraph systems and teleprinter—advances the claims of the cable.

His idea is the Creed seadrome, with landing-place, supported high above the turbulent ocean and steady in the wildest weather. He thinks that the seadromes should lie on the track of a submarine cable, serving as a repeater station.

Each Creed seadrome would have a powerful beacon light and wireless equipment for guiding aircraft, and would carry a large stock of supplies. A crew of ten could be accommodated at each, and it has been estimated that to construct and anchor such a seadrome would cost from £300,000 to £500,000.

The Tuneful Two Hundred

TO pick out for your edification the choicest titbits of radio news the world over is not easy. Right through 1935 I was at it, now here, now there, with unceasing vigilance. Shall I then blame myself for not noticing what they were up to in Tulsa, Oklahoma?

Alas! I did not know at the time. But in Tulsa, Oklahoma, they broadcast a wow.

Apparently the Tulsa folk favour those items on two pianos, or three pianos, or even four playing at once. And one of the citizens, irked at such numerical restriction, said, "*Let us have two hundred pianists playing simultaneously.*"

So that was decided upon, and they broadcast it! I wish I'd known in time to tell you to listen to the tuneful two hundred.

Clan Hornet!

WHEN I read that Siemens Bros. Ltd., of Woolwich, are fitting the new Clan Line steamer, "Clan Macarthur," with a Hughes' magneto-striction recording echo sounder, my heart rejoiced; not because this is the twelfth of the Clan ships to be so fitted, but because the Clans deserve well. For was it not a Clan steamer that, having been fitted with a small gun to defend herself against submarines, used it so smartly on the first one that attacked her that *she sank the war vessel?* Considering how well the subs. were handled, this was a magnificent feat for a merchantman, which "should never be forgot."

Siemens are also fitting the "Clan Macarthur" with a direction finder, ½ kw. station, and automatic alarm. Makes one wish to be a Clansman, doesn't it?

Radio Lady of the Clouds

I AM asked by a professional wireless man—one of many who follow these dissertations of mine week by week—to "tell the fellows about the latest recruit to the ranks, Anne Morrow Lindbergh." My correspondent has been reading Mrs. Lindbergh's book, "North to the Orient," in which she describes the flight she made with her famous husband through the Canadian Arctic to Japan and China.

Mrs. Lindbergh's struggles as the wireless operator on this occasion have so excited my unknown friend that I am glad to know of the book (Chatto and Windus, 10s. 6d.), and though I have not read it I can vouch that it has fired one reader to most enthusiastic praise.

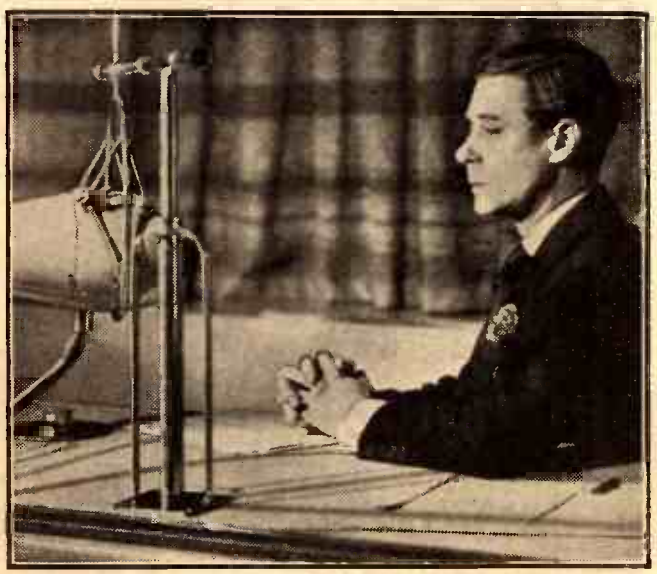
Note on Moscow

ACCORDING to the opening statement in a letter from J. P., of Bognor Regis, his object in writing to me was to praise the S.T.600, "That Ace of Aces." But after telling me how well the set receives the Moscow programme on 1,724 metres, J. P. goes off into politics.

He tells me of some highly interesting and significant broadcasts he has heard from the Soviet stations. And he asks why I do not let my readers know what Moscow is doing when writing about foreign station broadcasts. Evidently he suspects me of some political bias, whereas all I look for is radio interest. And since Moscow's English broadcasts

(*Continued on next page.*)

H.M. KING EDWARD VIII



Our King is no stranger to the microphone. As Prince of Wales he frequently broadcast, and this photograph was taken at Broadcasting House on the occasion of an appeal on behalf of King George V's Jubilee Trust Fund.

NEXT WEEK: A SPECIAL CONSTRUCTOR'S PRIZE IN "P.W." COMPETITION NUMBER THREE

AMERICAN CONVICTS AND CRIME BROADCASTS

are of radio interest, Comrade Ariel gladly gives them herewith :

Wavelengths : 1,724, 50 and 25 metres. Times : Sunday, Monday, Wednesday and Friday, at 9 p.m., on 1,724 and 50 metres. Sunday, 25 metres only, 11 a.m. and 3 p.m. Wednesday, 25 metres only, 11 a.m.

"Where There's a Will . . ."

DID you see the interesting news item about the latest use of telegraphed photographs ?

A Californian firm wanted to send a lawyer's document to London, but this would have taken at least ten days by ordinary methods, from San Francisco, and time was all-important. So an expert was called in, who suggested that the document, signatures and all, could be photo-telegraphed.

Only a few hours afterwards an exact facsimile of the original was available in London.

It appears, therefore, that the Victorian optimists and moralists were fully justified in their faith that "Where there's a Will there's a Way."

Ruling the Short Waves

ON February 27th there will meet in Paris one of those conferences that periodically try to straighten up the mess that is inseparable from rapid radio development. It is calling itself the Inter-Continental Conference, and the title is well justified, for all the broadcasting organisations in the world have been invited.

The reason that the net has been so widely cast on this occasion is that the conference will concern itself with the regulation of the short waves ; and short waves are so hoppity-skippity that Siam may upset Guam, the Spanish may annoy the Danish, and a station in Madrid may cause consternation in Madras. In fact, short waves are a solemn warning of what is laughingly styled the Brotherhood of Man.

Naughty ! Naughty !

ONCE upon a time the accountant of an electric light company got the willies. For on adding up his books this worthy person found that although the company was supplying *more* electricity, consumers were paying for *less*.

In his extremity he called upon the Boss Inspector, who smiled a crafty smile and said the magic word "Ilc-fixit." Now this Boss Inspector had a suspicion, and he kept watch upon a certain Radio Dealer to see who were his customers. And having gathered certain information the Boss Inspector visited customer after customer and demanded to see the meter at each house.

These meters looked all right, but the Boss Inspector, whose name was Gimleteye, had not been so named for nothing. And he found, opposite the little spinning jenny in each meter, a tiny teeny hole had been bored in the case. Into this a teeny tiny wire could be inserted, to act as a brake on the recording apparatus.

And so it came to pass that they who tried to save money, *lost*. For a tiny teeny hole can land anybody into a Mighty Big Hole when Gimleteye takes the stand and Ohm's is not the only Law.

"Cheek by Cheek"

A WARWICKSHIRE reader of "P.W." wants to know what I think of the following "remarkable coincidence." It seems that his small boy, aged eleven, has a flair for music, so they got him a piano about a year ago.

To encourage him with the more serious music they buy a song book now and then and let him have a fling at popular tunes. Recently they got him one containing the tune, "Dancing Cheek by Cheek" ; and when he was playing this for the first time somebody switched on the radio, *to find the same tune coming from the loudspeaker.*

"Two other people can vouch for this," says my correspondent. But no corroboration is needed, I assure him. A few weeks ago it would have been remarkable to switch on and hear anything else !

Short-Wave Life-Saver

A CHILD patient of the Giessen clinic, in Germany, owes her life to ultra-short waves. The empyema from which she suffered had followed pneumonia. A collapsed lung, displaced heart, and curved spine rendered the case apparently hopeless. Being strongly pressed, however, the doctor tried ultra-short-wave radiation for twelve days, after which the patient was discharged as incurable.

MICROPHONE SLIPS

Vocalist :
Somebody wanted me to have a shot at "Lily of Laguna."

* * *

Announcer :
Good-morning, everybody. It's a beautiful morning in the city—quite the best we've had this morning.

* * *

"In Town To-night," interviewing street photographer :
I think Sydney girls as a man are marvellous.

* * *

During talk :
Anyone born to-day must be very discreet during the next twelve months.

* * *

Announcer, at conclusion of a concert :
To-night the audience at the Melbourne Town Hall was as full as possible.

* * *

During community singing :
Miss S—— is not an artist : she comes from Newcastle.

* * *

Speaker :
Visitors are often killed many times by these fish.

* * *

News Bulletin :
Infantile morality is lower.

("Wireless," Australia.)

Two months later, to the doctor's surprise, the child reappeared, the parents stating that she had benefited from the treatment, which they were anxious to continue.

"Eventually the heart assumed its normal position, the lung expanded completely, and the vertebral column became almost quite straight," says the report.

To the congratulations from scientists all over the world let us add ours, less expert, but none the less hearty.

A Super D.F. Station ?

THE relationship between successful long-distance flying and radio is so close that whatever progress is made with this idea of an Atlantic Air Service is bound to be reflected in wireless activity.

Already I hear talk of a super-wireless direction-finding station, to be erected somewhere in the neighbourhood of Limerick. A site at Foynes has been mentioned. It is only about 100 miles from Dublin, and the wide stretch of inland water on the Shannon would appear to be well suited to the needs of Europe-bound seaplanes.

Rumour says, also, that the Shannon suggestion is only one of several. We must watch this, fellow sleuths.

Great Liner's Eleven Aerials and Thirty-Two Wavelengths

ONE of the most remarkable stations now under construction is that of R.M.S. "Queen Mary," which is to be heard by listeners shortly.

In addition to the main aerial (with a length of 600 ft.), there is a 150-ft. auxiliary aerial, three for the short-wave transmitters, five receiving aerials, and one for emergencies, making eleven in all.

Of the ship's thirty-two wavelengths, eleven will be used for short-wave telegraphy. Nine are required for wireless telephony, five for medium-wave telegraphy and seven for telegraphy on long waves.

When this little lot is working full pelt, any ships that may pass in the night will be well aware that the "Queen Mary" is about !

Programmes From Gaol

YOU remember a recent reference I made to the jolly convicts of Joliet Penitentiary, near Chicago, who are broadcasting to the American public from behind the bars ?

Well, those boys are in the news again. It seems that they were not unanimous about what sort of turns they should give before the mike—until somebody suggested *Crime*. So they have arranged to re-enact the various misdemeanours for which they are now paying the penalty, in playlet form. Realism in every word.

In this way, it is argued, they will impress young listeners with the view that crime does not pay. Perhaps I should add that the performers will not be paid for broadcasting.

ARIEL.

INSTALLING AND USING YOUR AXIS

FOLLOWING THE CONSTRUCTIONAL DESCRIPTION OF HIS GREAT SHORT-WAVE INVENTION WHICH APPEARED LAST WEEK, G. T. KELSEY TELLS YOU HOW YOU CAN DUPLICATE THE AMAZING RESULTS GIVEN BY THE ORIGINAL SET.

REMEMBER: THE "AXIS" PLACES SHORT-WAVE LISTENING ON AN ENTIRELY NEW BASIS! IT BRINGS THE RECEPTION OF THE WORLD'S SHORT-WAVE PROGRAMMES WITHIN THE EASY REACH OF EVERY LISTENER.

THIS week the fun really begins! Construction—that aspect of the "Axis" with which I dealt in detail last week—is a great game, and because of the intrinsic interest in building your own set and in acquiring thereby an intimate knowledge of it, it is a pastime that is hardly likely to diminish in popularity just as long as there is broadcasting.

But to most of us, at any rate, construction is only a means to an end. And that end, in this case, is something that has hitherto been impossible—the reception of stations in all parts of the world *by name!* That is the claim that I make for the "Axis" receiver and the "Rotalog" dial on which it is based. It is a claim that you will never have seen in print before and, well, why not let us be frank and say that you may in consequence feel rather inclined to accept it with a certain amount of reserve?

The Evidence Is Clear

I don't blame you! If our positions were reversed, I am afraid that I should feel rather the same way about it. But you can, at least, accept the evidence of your own eyes.

If I could demonstrate the "Axis" separately to each one of you, it would convince you of its merits as nothing else can convince you; and if you failed after that to duplicate my results, who would you blame?

Alas, such a gigantic undertaking is impossible, and ordinarily I should have to ask you to accept my word for it without a demonstration. But in this case it is rather different. Last week "P.W." presented you with a dial. Excluding the amateur bands, it had on it the names of no less than forty stations: South American, North American, Australian, English, French, Russian, German, Italian, and so on.

And all that I ask you to believe is what must be an obvious fact—that the positions of those stations on the dial could never have been determined *other than by actually receiving them!* Every single one of the stations calibrated on the "Rotalog" dial was received and identified under average reception conditions. Is not that almost as good as having you by my side for a demonstration? And if you fail to duplicate my results, who will you blame? But you will *not* fail, because I am convinced that my warnings concerning the pitfalls will not have gone unheeded.

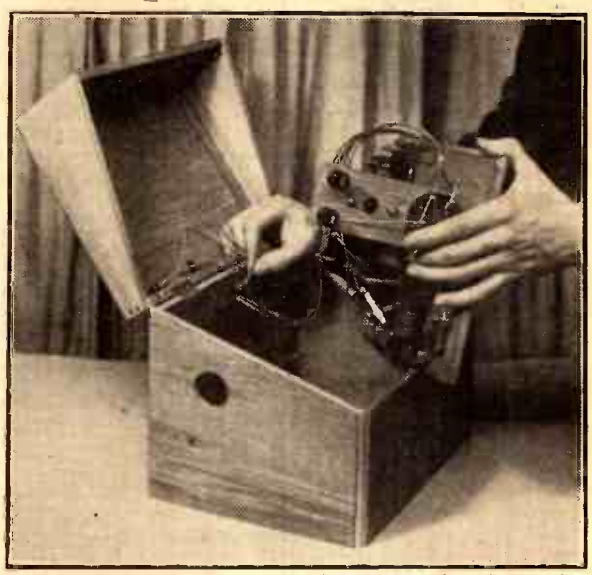
The "Axis" is no ordinary set, and success is dependent upon what may be compared to the piecing together of so many parts of a jig-saw puzzle. If you try to complete the picture with a piece that doesn't fit—well, I don't need to tell you what will happen. The set will probably work; the dial may not. But that is up to you.

Never let it be said that I belong to the ignoble band of "dismal jimmies." I most certainly do not. Actually, I am full of the highest hopes and expectations concerning your results with the "Axis," and any tendency on my part to dwell upon the might-be's may be put down solely to my desire to ensure that you shall not be disappointed. But I must confess that I would far sooner that you did not build it than that you should build it and be disappointed through my failure to put you on the right road.

And may I straighten out another point? I claim the reception of stations in all parts

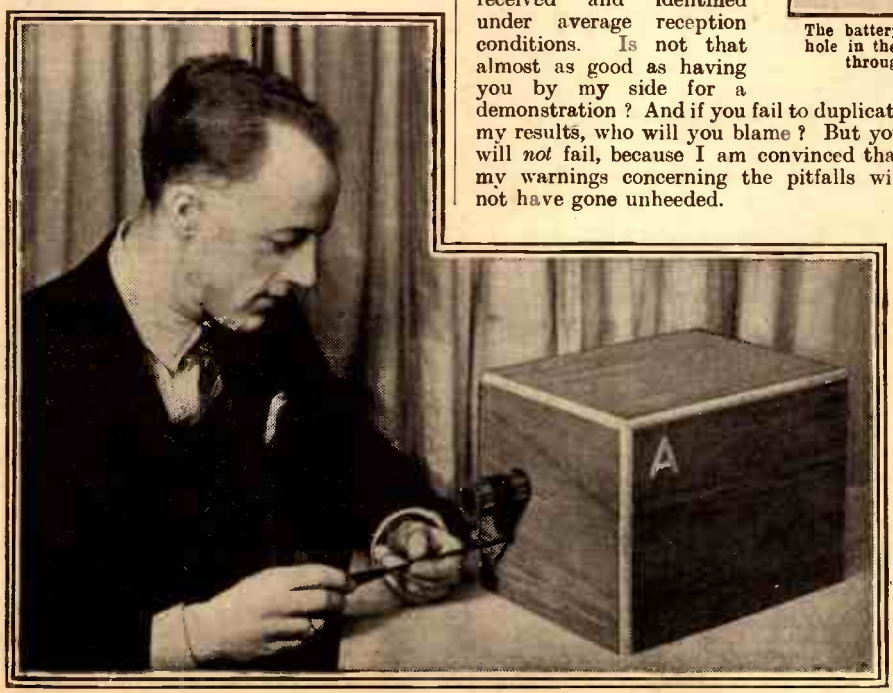
(*Continued on next page.*)

ARRANGING THE BATTERY LEADS



The battery leads are grouped together and pass through a small hole in the back of the cabinet. These leads should be threaded through before the set itself is finally placed into position.

ADJUSTING THE TRIMMER



Adjusting the aerial trimmer with the aid of a screwdriver. This method was used in the original set, but the procedure is greatly simplified if an extension spindle is attached to the trimmer. A suitable extension spindle is obtainable from Messrs. Peto-Scott.

USING YOUR "AXIS"

(Continued from previous page.)

of the world by name. I do *not* claim the rollicking reception on the speaker of tin-pot stations in all parts of the globe. No human being in the world can make such a claim where short waves are concerned.

You will get stations on the speaker, and dozens of them. But you will be subject to the occasional tricks that short waves play even on the B.B.C. itself when they short-waver in the world that tells you precisely where it is landing you.

And now about installation. The list of recommended accessories was given in my constructional article last week, and is repeated below. The valves I advise you to adhere to because they were the ones I used when calibrating the set; the batteries were chosen on account of their reliability; the speaker receives the specification because of its renowned sensitivity. With the exception of the valves, I am content to leave it to your discretion as to whether

But since the object of this present article is to enable you to get your "Axis" working properly—the dial adjustment can follow when all else is well—a coil will, of course, be required for the tests. I suggest that you use the middle coil—i.e. the "6Y," since if the set works well with this one there is a reasonable chance that it will be O.K. with the other two.

It is clear, I hope, that your set must be in its cabinet before the coil is inserted. But then it has to be in its cabinet before the leads are connected to the batteries, for

THE PARTS YOU WILL NEED TO BUILD THE "AXIS"

COMPONENTS

1 Six-pin coil base, catalogue number 969	Eddystone or B.T.S.
2 Six-pin short-wave coils, types 6Y and 6R	Eddystone or B.T.S.
NOTE.—Constructors desiring to receive stations below 22 metres will also require an Eddystone type 6LB six-pin coil (see text for further details).	["Axis"
1 Special ·00016-mfd. "Rotalog" condenser	J.B.
1 ·0003-mfd. solid dielectric reaction condenser	Polar "Compax"
2 Four-pin valve holders, "Vibrolder" type	Benjamin
1 Five-pin valve holder	Benjamin
2 Short-wave H.F. chokes, type HF3	Bulgin
1 Rotary on-off switch, type S91	Bulgin
1 Aerial coupling condenser, type UTC	B.T.S.
1 ·0002-mfd. fixed condenser, type S	T.C.C.
1 ·002-mfd. fixed condenser, type 34	T.C.C.
1 ·1-mfd. tubular fixed condenser	T.C.C.
1 ·0001-mfd. fixed condenser, type 665	Dubilier
1 ·5-mfd. tubular fixed condenser, type 4517	Dubilier
1 2-mfd. fixed condenser, type BB	Dubilier
1 3-meg. resistance, 1-watt type	Dubilier
1 ·25-meg. resistance, 1-watt type	Dubilier or Polar N.S.F.
1 50,000-ohm resistance, 1-watt type	Dubilier " "
1 100,000-ohm resistance, 1-watt type	Erie or Polar N.S.F.
1 50,000-ohm resistance, 1-watt type	Erie " "
1 30,000-ohm resistance, 1-watt type	Erie " "
1 ·25-meg. resistance, 1-watt type	Erie " "
1 "Nicore II" L.F. transformer	Varley
1 Westector, type W6	Westinghouse
4 Engraved terminals, type B (Aerial, Earth, L.S.+ and L.S.−)	Belling-Lee
6 Wander plugs; engraved "H.T.−", "H.T.+1", "H.T.+2", "G.B.+", "G.B.−1" and "G.B.−2"	Belling-Lee
2 Spade connectors (L.T.+ and L.T.−)	Belling-Lee
Wood for cabinet and panel (if home-made)	
1 Cabinet to specification	Peto-Scott
1 Structakit, comprising 1 Plymax panel ready drilled and with "E" terminal, 1 coil bracket, 1 wooden condenser support, 2 2B.A aerial coupler supports complete with 8 nuts, 1 aerial coupler extension rod, 1 battery cord clip, flex, Maxamp connecting wire and all necessary component wood screws	Peto-Scott
Screws, 18 gange tinned copper wire, flex, etc. (not required if Structakit is used)	Peto-Scott

NOTE: The first mentioned makes of components were those solely employed by the designer of the set.

attempt a relay. But what does that matter really? Is not the great attraction in being able to wrench yourself from the limitations of Europe and in having the facilities for roaming the world at large? In hearing a titbit from here, an important news item from there; in going back into yesterday or forward into to-morrow according to that part of the world to which you are listening?

Short-wave stations on the "Axis" are like bees around a honey-pot. There are dozens and dozens and dozens of them, and if, out of such a cosmopolitan collection of broadcasters you cannot find one to interest you—well, I advise the abandonment of radio as a hobby in favour of match-box collecting!

For this preamble, important as I regard it, I crave your indulgence. But at least we do now know where we stand, and we

ACCESSORIES.

VALVES.—V1, Cossor type 210 H.F.; V2, Cossor type 210 L.F.; V3, Cossor type 220 P.T.
BATTERIES.—H.T., 120-volt Drydex, type H 1006. L.T., 2-volt Exide, type D.M.G.-C. G.B., 15-volt Drydex, type H 1037.
LOUDSPEAKER.—W.B. Stentorian, type 36J.
HEADPHONES.—Ericsson.
AERIAL EQUIPMENT.—B.T.S.
NOTE: If you intend to use your "Axis" as a radiogram in accordance with details to be given later, you will also require a Graham Farish Pick-up.

can enter upon a heart-to-heart consideration of the installation and operating procedure to be adopted without any lurking doubts or misapprehensions. I can feel that I have discharged my responsibility of ensuring that you do not take the wrong turning; you can feel reassured that you are not being led up the garden. The "Axis," built as I have described it and used as I shall now endeavour to explain, is as good a short-waver as any of comparable design, but with the added and entirely unique advantage that it carries its own sign-post. It is, in fact, the only

or not you follow me exactly. Rather, perhaps, should I put it this way.

If in any case you have to buy the accessories complete, then buy the ones that I used. If you already have some of them by you—well, use them. But do please be certain that they are in perfect order.

Connecting the Batteries

When you are all complete, start off by connecting up your batteries and speaker. With regard to H.T. voltages, H.T.+2 should be plugged into the maximum voltage tapping, but H.T.+1 may be subject to experimentation between certain limits in order to determine the best position. Start off with it at 60 volts.

For grid bias you will require 13½ volts for G.B.−2, and from 1½ to 3 volts for G.B.−1. The aerial, earth and speaker connections will be obvious from the engravings on the terminals.

I do not propose in this article to say much on the subject of coils. Those are closely allied to the question of dial-reading accuracy which is dealt with in detail on another page of this issue.

these leads pass through the hole in the back. When all the necessary connections are made, and with the coil inserted, switch on.

(Continued on page 653.)

★

WORLD-WIDE RECEPTION FOR EVERYONE

★

Mr. G. T. Kelsey with the completed "Axis." Simple in its construction, it is a set which places world-wide reception within the reach of everyone.

LINING UP YOUR "ROTALOG"

The accuracy of the station calibrations on the "Rotalog" dial is dependent entirely upon the way in which you carry out the preliminary trimming and adjustment procedure. You are not likely to encounter any difficulties if you follow carefully the recommendations that are given in this article by the designer.

LAST week I gave you full details for the construction of the "Axis." This week, on other pages of this issue, you will find information concerning preliminary testing procedure. Now follows what is perhaps the most important part of the whole job—that of lining up your "Rotalog" so that the station-name calibrations become accurate.

In some respects, particularly if you have not previously handled a short-waver, the procedure that I am about to describe may sound a bit tricky. I would hardly say that that was true of it, but it *is* a job that must be undertaken with care. And I do seriously suggest that this little business of lining up the dial should be deferred until you have had just a day or two's experience of operating procedure with the set itself.

Tune in some stations. Try to get the hang of working on the border line of reaction. Get the "feel" of the "Rotalog" tuning control. Endeavour to identify one or two of the nearby short-wave stations in order that you will be able speedily to recognise them for the purpose of lining up your dial. Experiment with the voltage applied to H.T. + 1 until the change to the oscillating condition is absolutely smooth, for remember that in the case of some of the short-wave stations which are coming from thousands of miles away, everything depends upon the proper use of reaction.

I am stressing these points particularly because I do feel that if you are able first to grasp the correct procedure to be adopted when tuning in a station, the procedure involved in lining up the dial will be very much more simple.

There are three variable factors which have to be taken into consideration when tackling the dial adjustment.

First, there is the "Rotalog" condenser; secondly, there is the rotating pointer, and lastly, there is the series aerial condenser which, for the purposes of this article, I shall refer to as the aerial trimmer.

The First Step

The first part of the "trimming" can be done without the set connected up at all—in fact, I think that that is probably the best way of doing it. This consists of setting the rotating pointer in relation to the position of the moving vanes of the "Rotalog" condenser. It is a job that requires to be done with care, but it is not difficult.

Turn the "Rotalog" tuning control until the moving vanes are all out and hard up against the stop. In other words, until the condenser is at minimum capacity. It is important that the moving vanes should be hard up against the stop, but in ascertaining that they are there, be careful not to strain the gears by attempting to turn the knob farther than it is intended to go. Perhaps the best way is actually to look underneath the set, and then you will be able to see if the moving vanes are where they should be.

Now remove the knob, and it would be as well when you have removed it to have one further glance underneath to make quite certain that you have not shifted the vanes. If you have, you will find it possible to readjust them by turning the spindle on the front with your fingers. But do not in any circumstances *push* the actual vanes into position with your fingers. Such a procedure is likely to upset everything.

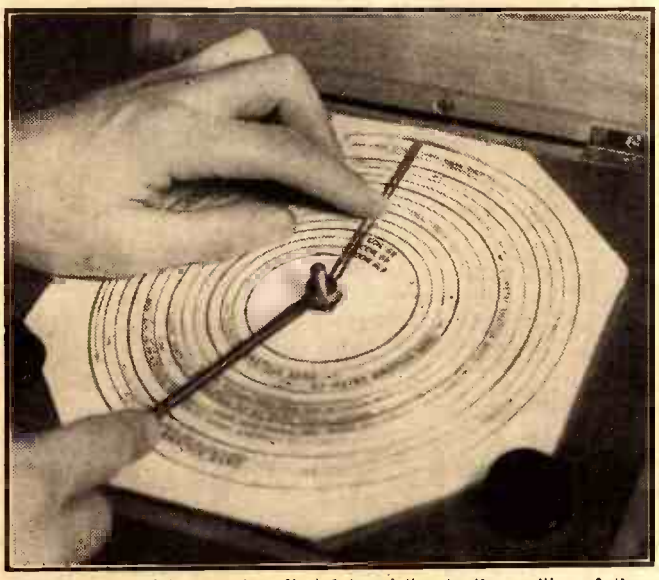
Next for the adjustment of the pointer. Holding the "Rotalog" spindle (the part, of course, that extends through to the front of the panel) between your fingers, turn the pointer until it interleaves itself right to the centre of the spiral, and until the two parallel wires constituting the pointer are hidden from view, with the exception of that part of them which crosses the heavy black line indicating the end of the spiral in the centre. There can be no doubt about the line to which I am referring, because it is the one against which appear the words "Coil 6R," "Coil 6Y," etc.

Perhaps I should make it clear that the grub-screw in the pointer centre-collar must be loosened off before this adjustment can be undertaken, and it should not again be tightened up until the black line to which I have referred above appears dead in the middle of the two wires.

If you have undertaken this task correctly, your pointer should now be over the black line marking the inner end of the spiral, and should disappear from view where the black line joins the spiral just by the "C" of "Coil 6R." And the "Rotalog" moving vanes, of course, should still be at minimum.

In tightening up the pointer grub-screw, attention should be paid to the height of the pointer above the surface of the dial. Actually, the pointer should be as near to the surface of the dial as possible without rubbing tightly. It is bound to rub slightly at the point where it passes from the outer surface of the dial to the under surface, and if you attempt to cure that by lifting the collar higher up the spindle, you will find that the pointer tends rather to "lift" the sections of the dial away from the panel. It should only lift them away to the extent of the thickness of the wire constituting the pointer.

ADJUSTING THE POINTER



Before your pointer can be adjusted in relation to the position of the "Rotalog" moving vanes the grub-screw in the centre collar must be slacked off.

Finding the Stations

You can now replace the "Rotalog" tuning knob, and before the next procedure can be undertaken the set must be in working order. Incidentally, these directions apply so far only to those readers who are using the same dial method that I used, but I shall be covering the second method next week.

With the set in working order, and with the middle coil in the holder—that is, the "6Y"—adjust the aerial trimmer condenser until it is approximately half-way between the minimum and maximum positions. Actually, the condenser in question has a 360-degree movement, but it will no doubt be clear

(*Continued on next page.*)

LINING-UP YOUR "ROTALOG"

(*Continued from previous page.*)

that by "half-way" I mean the half-way between the minimum and maximum capacities—in other words, half-way between the position where the moving vanes are enmeshed with the fixed, and the position where they are completely disengaged.

If there is likely to be any doubt about it, I advise you to make a small scratch on the trimmer knob, and to indicate with marks on the woodwork round the clearance hole where these two positions occur.

Next proceed to tune in a station—I suggest G S D, Rome, or Moscow—on the 25-metre band, and make certain by listening for announcements that you are on the right station and *on the right wavelength!* All of these stations make announcements in English periodically, and even if it means waiting for an hour it is essential that you should be certain on this point.

When you have definitely identified the station, and are certain that it is the station on the 25-metre band (both Moscow and Rome have other wavelengths beside this one), note where it comes on your dial. It may be as much as a quarter, or even a half-turn out from the reading that is shown for it on the 25-metre section of the "6Y" line. Be very careful not to confuse this 25-metre band, which occurs in the lower half of the second spiral from the centre, with the one which occurs on the outside spiral immediately over the words "42-metre amateur band." This last mentioned set of readings is on the same wavelength, of course, but it concerns the "6LB" coil.

The Aerial Trimmer

If the position at which you tune in the station is out from the calibration point given on the dial (and you will be very fortunate if, in the setting of your aerial trimmer condenser, you happen to have struck it first time), you must seek to correct the error by means of the trimmer condenser. But it must be done very carefully, and I recommend the following procedure.

Move the trimmer condenser a fraction of an inch, whereupon you will find that the setting on the dial at which you were receiving the station has altered quite appreciably. You must, therefore, find the station again, and note whether the new setting at which you are receiving it is nearer to, or farther away from, the point at which it is calibrated on the dial.

If it is nearer to it, then you are on the right track, and the procedure is to adjust the aerial trimmer (in the same direction as the way in which you started) just a fraction at a time, returning the station with the main "Rotalog" control after each minute adjustment of the trimmer. Thus, a bit at a time, you will slowly shift the position at which you are receiving the station until finally you are receiving it at the identical spot that is marked for it on the dial.

I am afraid that this all sounds complicated only because I have endeavoured to explain it in very great detail. But if you get a clear idea of what you have to aim at, you will not find it too difficult.

When You Change Coils

If, when you make the very first minute adjustment to the trimmer condenser, you find that the setting at which you are receiving the station has moved *farther away* from the setting at which it should be received, then you are turning the trimmer in the wrong direction, and you should go back to the half-way mark and start all over again by moving it in the opposite direction. Unfortunately, I cannot lay down any hard and fast rules as to the direction in which you will have to turn it, because it depends upon your particular set of conditions.

Having once set your trimmer so that the station is received at the point at which it is calibrated, you should find that all the other stations that are marked on the dial for that particular coil are correct. *But you must not again touch the trimmer until you change the coil,* and even then it may not be necessary.

When you try the "6R" coil, pick upon one of the well-known and easily received stations on the 49-metre band, and when you have found it and identified it, see whether the setting at which you are receiving it corresponds with the point at which it is calibrated on the "Coil 6R" line. It probably will. It should do. But if it is slightly out, then the trimmer condenser will enable you to correct for the error.

The Lowest Waveband

The coil "6LB" was not included in my list of components as an essential, mainly because there are fewer stations on this band to hear; and as the wavelength decreases or, in other words, as the frequency is increased, tuning is apt to be rather more difficult. But if you do finally decide that you would like the smallest coil, the procedure for lining-up the dial will be exactly the same as for the other two coils.

Although a certain amount of care and patience will be necessary when dealing with the "locating" station, once the setting for that particular station has been lined up with the calibration point on the dial, all the other stations on the coil that you happen to be using are found for you.

Next week I shall be covering one or two other points in connection with this general question of lining up. In the meantime, perhaps I should make it clear that the correct calibration is when the indicator line for the particular station is midway between the two wires of the dial pointer.

HOW THE READINGS ARE MADE

The correct reading is obtained when the calibration mark appears midway between the two wires constituting the pointer. The pointer shown in this photograph is the original one which, as explained last week, is not now used.

TELEVISION JOTTINGS

A brief summary of present-day affairs in the world of television.

By L. H. Thomas

A READER who has heard about the new receiver developed in the U.S.A. for ultra-short-wave work—a rather marvellous affair known as the "Super-Infragen"—writes to inquire whether it will have any effect upon the design of television receivers. Admittedly, one might suppose that it would, when one has heard vague claims for its efficiency, but I cannot see that it has any possible bearing on *vision* receivers.

It is a combination of the superhet, infradyne and super-regenerator, built specially to combine the sensitivity of the super-regen with the *selectivity* of the superhet. Its whole point, in fact, is selectivity; and since high-definition television is a branch of radio science in which one apparently has to avoid selectivity like the plague, its position is fairly clear!

A Very Queer Position

What *has* a distinct bearing on the future of television is the fact that with these new sensitive receivers, longer and longer distances are being covered on 5 metres. From recent experiments it looks very much as if a television broadcasting station, using high power on 7 metres, is going to have a service range of 30 miles or so, and an interfering range of about 3,000!

It is a distinctly queer position. On the one hand we have amateur transmitters and certain commercial concerns, busily designing receivers for picking up long-distance low-power signals on the ultra-short waves; while on the other hand, also on the ultra-short waves, we have people designing television receivers for a very local high-powered station, in which selectivity is absolutely *taboo*.

It should be rather interesting to see, side by side, a 5-metre amateur-band superhet and a 7-metre television superhet; the two would hardly have a single point in common, from one end to the other.

In this country the leading manufacturers have all been quietly working at the development of a suitable receiver, and many interesting designs will be on the market as soon as transmissions commence.

Long-Distance Reception

Of the superhets, there will probably be three distinct types; and there will certainly be a few receivers that are not superhets at all. The one feature that will be common to them all—at least, we assume so—will be ease of operation.

An ultra-short-wave superhet is really the simplest thing in the world to handle. Its single tuning control need only cover a narrow band of wavelengths, and, in the case of a television receiver, tuning may almost be fixed. Those readers who have got the idea into their heads that an ultra-short-wave set is a "touchy," fiddly sort of affair, with tuning even more critical than that of the average home-constructed short-waver, would do well to remove it forthwith!

No reports have yet come to hand concerning reception of the French high-definition transmissions in this country. Just at present the ultra-short-wave skip distance is particularly long, and that may account for it. Six months ago we were receiving the whole of Europe, in this country, on 10 metres; nowadays we hear only Americans and Australians. It seems highly probable that some of the American high-definition transmissions will be heard over here before the French signals.

Al Bowlly running over the air of one of the latest dance numbers.

The Memoirs of a Radio Journalist

Last week we commenced under this title a short series of personal sidelights on radio personalities. This second article reveals some interesting facts about one of our most noted dance-band vocalists—Al Bowlly

By SAM HEPPNER

WHEN I interviewed Al Bowlly I found him a ready and abundant talker; he has a strong, colourful story and knows how to tell it in that lucid, continuous style which compels the interest of listeners.

The tale begins in Durban where, as a tiny baby, he was taken to escape the black plague which was then ravaging Portuguese East Africa, his birthplace. When he was eight he swept the floor of his brother-in-law's hairdressing saloon for two-and-sixpence a week. He sang as naturally as he talked, accompanying himself on an old guitar which he discovered in the back parlour of the shop.

Giving his first haircut and shave when he was twelve, he continued to work in the shop until three years later, when a circus proprietor who had come for a shave heard him singing and gave him a twelve pounds a week job of singing in his dance halls. Al then toured Africa—Nairobi, Mombasa and Zanzibar. Falling out with his employer Al left the show in Samarang, and a chance encounter with another theatre manager enabled him to continue working not only as a crooner ("Don't believe that crooning's a new stunt," he told me. "I've always sung exactly as I sing now—years before the Bing Crosby vogue!"), but as a comedy man and trapeze artist!

Smuggled Out of Hospital

Al was not a trained acrobat, but his natural agility and good physique enabled him to carry off the stunts quite effectively.

An accident was bound to happen sooner or later. It happened sooner; and Al was rushed off to hospital for an operation.

The operation was successful, and he was to have remained in the hospital for at least another fortnight, but he had an important engagement at the Grand Hotel, Calcutta, on his mind. "Be at the hotel next Monday morning," the manager had said. Meanwhile Polly, the doctor's daughter who was nursing him, had grown "that way," as they say in Hollywood, about Al and, in her blind devotion, was ready to indulge his wishes to the point of folly. Wrapping him in blankets until he resembled a cocoon, she smuggled him from the hospital at dead of night and, getting him into her car, motored to the quay at top speed; there he took the boat for Calcutta, which arrived on Sunday night. Everything now seemed plain sailing. But as the customs officials left the quay at six every evening, passengers were not allowed to leave the ship until late the following morning. Al's engagement was automatically cancelled unless he turned up at the hotel sharp at ten!

To Paris and London

Finding a length of rope on a deserted part of the deck, he fastened one end to a mast and, thanks to his experience on the trapezes, slid down to the landing-stage with almost simian alacrity. But the whole plan was a wasted effort for, although Al turned up for the job in good time, he was fired the next night for socking a disagreeable visitor who insisted on using doubtful language in the presence of ladies.

Returning to Singapore he found a cable from his first employer, who asked him to go to London and work for him there. Some money awaited him in Paris, ran the cable. But on reaching the great French capital, Al applied to the travel agency, where nothing was known of the alleged money. With nine francs in his pocket he roamed the streets of Paris for days, hungry and unshaven.

Eventually the mislaid money came to light and Al took the first available ship to England, where his employer introduced him to Fred Elizalde and Len Fillis at the Savoy, and it was there that Al first began singing in this country. He afterwards joined Roy Fox, then Lew Stone and, a year or so ago, went over to New York.

A Thick Hide is Required

People often ask me how I like my job. Well, I don't deny that it is often jolly good fun, but, in addition to my shirt and waistcoat, I sometimes have to don a nice, stout rhinoceros hide before going out to do an interview. Through my sheer persistence I have been thrown out of at least three London stage doors (the B.B.C. has, as yet, spared me this indignity, although the day will certainly dawn when I shall find myself fondly embracing the unresponsive paving-stones of Portland Place). But let me record, here and now, that, on the whole, I find all those associated with broadcasting in its manifold aspects to be quite an enchanting crowd.

I know the film people. And I know the theatre. And I think I can safely say that I prefer the people in the radio game to either set. They are so much more informal. You see, radio, being a new innovation, has no lofty and sticky traditions; one is in no danger of violating its artistic canons.

Broadcasting House is beautifully free from snobbery. There's nothing of the Beethoven touch about most of our radio performers. No airs. No affectations. They'll do their stuff in any old drawing-room (providing the wine is just as old—or older), on any old piano. (Some time ago I sold my old piano on which Eve Becke, "Ginger" Croom-Johnson, and various other stars used to play; it was twenty-five years old, and I got six pounds for it! But Ginger has promised to come over shortly and play on my new one!)

Fearless Impressions and Criticisms

Only the smaller fry take themselves rather seriously. In these sophisticated times, when such complimentary adjectives as "charming" and "delightful" continue to bespatter our fan magazines, the enlightened public begins to treat these liberal blandishments with a degree of suspicion. And being prepared for this, I want to convince you of the sincerity with which I register my impressions of the world of wireless. So do not cry impatiently: "Oh, yes, everybody is 'charming' in the newspapers!" Because, throughout these pages, I intend to "impression" and criticise without fear or favour.

SETS OF THE SEASON

THE NEW MARCONIPHONE ALL-WAVER

Reviewed by Michael Butler

Henry Hall with the latest triumph of the Marconiphone Co.—the new All-wave "Model 345."

WHAT a topsy-turvy world it is that we live in these days! In the midst of enjoying my somewhat late Sunday morning breakfast, I have just been listening to a programme with which the day in Australia is drawing to a close. They are enjoying the coolness of the evening which comes as a welcome relief from the heat of a summer's day, while I shiver and struggle unavailingly with a fire that simply will not burn.

And yesterday, with that contented feeling which follows a hearty lunch, I sat and listened to a news bulletin designed for breakfast time consumption in New York. I heard that there had been another "shocking aviation disaster overnight" and that "six men had been killed when two planes collided in mid-air and crashed to the ground in flames due to the explosion of their gasolene tanks."

It seems as if I live not in the world of to-day, but in the world of yesterday and to-morrow as well. With a simple and easy-to-control knob I can do what genius throughout the ages has failed to do—I can cheat the clock! When it tells me by its hands that it is time for lunch-hour programmes, I can defy it and listen to breakfast-time transmissions. When its face reveals that the early morning shipping forecast from Daventry is acquainting us with the prospects for the day, I can turn to the other side of the world and learn what sort of a day it has been!

High Standard of Performance

These modern wonders of the world that we live in have been brought home more strikingly in some tests which I have just conducted than ever, I think, before. It isn't the first time that I have tried an all-wave set. But it is the first time that I have tried a Marconiphone all-wave set, for it is the first all-wave set that this firm has ever produced.

I can well see now why they have deferred the release of an all-waver for so long. The very high standards of performance and efficiency for which the name of Marconiphone is renowned might well have suffered from the release of an all-waver prematurely. And even now, although wonders can be done through the medium of short waves, and although yesterday and to-morrow seem to become a living part of to-day, this modern miracle of broadcasting can still only be considered in its infancy.

But that the all-wave set is the set of the future there can be no doubt. That is because in an all-wave set the listener is not called upon to sacrifice any of his ordinary broadcast facilities in order to participate in short-wave reception. He gets medium waves and long waves and short waves as well!

This new Marconiphone all-waver, which passes under the unassuming title of the "Model 345," is without doubt the best all-waver that I have yet tried. And in thus extolling its virtues, my verdict is arrived at not only because of the somewhat amazing performance that it has given during the period of its tests, but on account of the extreme ease with which stations in all parts of the world can be tuned in.

Apart from the true-to-reputation performance of the set on medium and long waves, it is, I think, a technical achievement of the highest order that the designers of this remarkable instrument should have succeeded in eliminating entirely all traces of hand capacity effects on short waves. It is as easy at two o'clock in the afternoon to tune in to the early morning programme from the States as it is to tune in London. And although, perhaps, from the quality point of view, the two would not exactly be comparable, the programme value on the short-wave side is of a very high order indeed by comparison with modern standards.

After all, even Marconiphone designers are tied down by the inherent vagaries and peculiarities of transmissions on the short waves, and no amount of technical brilliance in the world can overcome those factors at this stage in the march of progress.

Even so, I say without hesitation that this new Marconiphone receiver is a triumph of technical achievement, and it is indeed a credit to the firm whose name it bears.

By rights I should tell you of the technicalities with which this set is identified. But I *hate* the thought! To do justice to it technically might, I feel, completely destroy the impression of delightful simplicity with which one is left after actual operating experience. And what, after all, does it matter? What it *does* is for ever more important than what it is, and those of you who have the inclination to delve into technicalities can refer to the accompanying specification.

Plenty of Continental Programmes

But in the glamour and excitement of at last coming face to face with a commercial set that gives loudspeaker reception of the whole wide world, one must not neglect to do justice to its exceptionally fine performance on medium and long waves, and to the design as a whole.

Unlike the short waves, where the dial calibrations are given in wavelengths, the dial settings of practically all of the worth-while European broadcasters are indicated by name. And how they come in! Just one long, unending procession of Continental programmes. And practically all of them comparable from the aspects of strength and quality with our own local broadcasters.

The arrival of this first Marconiphone all-waver is an event that has been awaited for a long while. Now that it is finally here, it cannot fail to enhance the reputation of a firm whose traditions for tip-top performance are recognised throughout the world.

TECHNICAL SPECIFICATION

DESCRIPTION.—Six-valve (including rectifier), all-wave, table-model superhet for operation on A.C. mains (200–250 volts, 50–100 cycles.)

CIRCUIT ARRANGEMENT.—Five-valve superhet (excluding rectifier) with pre-mixer H.F. stage. The valve sequence consists of Marconi V.M.P.4 G. (H.F. amplifier), Marconi X.41 (frequency changer), Marconi V.M.P.4 G. (I.F. amplifier), Marconi M.H.D.4 (2nd dectector, 1st L.F. and A.V.C.), and Marconi N.41 (pentode output, giving 3-watts undistorted). The intermediate frequency employed is 460 kc. A.V.C. is applied to the first three valves. Individual coils are provided for each waveband, those not in use being short-circuited or suitably switched to obviate absorption. Independent tone control of bass and treble is achieved in the first case by variation of the coupling capacity between the last two valves, and in the second case by the use of a series of condensers connected across the output transformer primary.

CONTROLS.—Six, including separate mains switch. These consist of (1) main tuning (with vernier control), (2) volume control, (3) four-band wavechange switch, (4) bass tone control, and (5) treble tone control. Note: A switch and sockets enabling a pick-up to be used are provided at rear.

WAVELENGTH RANGES.—Long—750–2,200 metres. Medium—185–560 metres. Short (range S1) 47–140 metres; (range S2) 16·5–50 metres. Station names and wavelengths are provided on dial for medium and long waves, wavelength calibrations only are given for the two short-wave bands. These are very accurate.

PRICE AND H.P. TERMS.—17½ guineas, or £1 16s. 0d. deposit and 12 monthly payments of £1 10s. 6d.

MAKERS.—The Marconiphone Co. Ltd., Radio House, Tottenham Court Road, London, W.1.

THAT GHOST BROADCAST

THE newspapers created a sensation about the so-called "decision" of the B.B.C. to broadcast a ghost. Mr. Harry Price, psychic investigator for the University of London, it was stated, was to conduct a ghost hunt in a haunted house, which would be wired with microphones in the hope of "picking up the ghost."

Mr. Price was annoyed with the newspaper reports. Apparently someone at Broadcasting House had elaborated what was only a very tentative suggestion. Actually the idea was not a stunt, but a scientific experiment whereby an attempt would be made to relay the technique of a psychical investigation. Mr. Price had made no suggestion as to a ghost being broadcast. Now, if the relay is carried out at all, it will not be until March at the earliest. At the time of writing Mr. Price has no idea where the experiment could take place, even.

K. B.

ON THE SHORT WAVES

NEW PARTS for OLD

W. L. S. gives some valuable hints on converting old components with a view to making them suitable for short-wave work.

LAST week I tried to explain how readers with an experimental leaning could try out new circuits at very little expense by building them up quite roughly with old cast-away parts. I have built several such receivers myself lately, and they have all given excellent results; but many of them would have been still better had I had time to do a few "doctoring" operations on the parts that were used.

This week I want to pass on a few ideas on the rejuvenation of ancient components, particularly with a view to making them suitable for short-wave jobs. I have been through my own cupboard and weeded out several promising-looking parts, from which I am going to make small "try-out" sets—just for fun!

I have always found that short-wave radio is very much more fun when it is a real home-constructor's pastime. I don't know how readers feel about it, but it wouldn't give me any pleasure to pull in DX stations on a ready-built receiver. Mind you, for the short-wave broadcast listener it's another thing altogether; but these notes are addressed largely to the experimentally-minded "DX fraternity."

The first component that one comes across in *any* junk-box is an old-fashioned variable condenser with ebonite end-plates. As luck will have it, it is an extremely useful thing to have about the place. You all know, by now, the tip of double-spacing condensers, thereby reducing their capacity to about a quarter of the original.

A Very Easy Procedure

This is another tip altogether. By cutting out some of the fixed plates and leaving a few at each end of the stator, the rotor remaining untouched, we can make quite a presentable series-gap ("split-stator") condenser. Fig. 1 shows the elementary procedure. The rods supporting the fixed plates are cut into two and the plates replaced as required. You may only remove a couple of them (as in the sketch) or, if you want a very small capacity, you may remove them all except *one* at each end. The rotor need not be touched at all, unless you want to make the job look specially pretty.

If you leave it exactly as it is, all that you have to do when you reassemble is to make sure that the fixed plates that you replace at each end are so spaced that they are nicely in mesh with the moving plates.

The advantages of such a job? Well, there are several of them. For one thing, if you use it as a condenser tuning a straight circuit, both connections go to the fixed plates (one to each set), and the moving plates are not actually connected in circuit at all. This means that even if there is a noisy or slack bearing, its effect will pass unnoticed.

THE "SERIES-GAP" TYPE

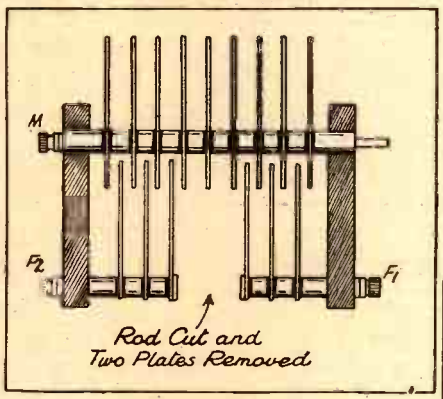


Fig. 1 (above) shows how an old condenser may be converted to one of the series-gap type. W. L. S.'s method of changing an ordinary H.F. choke into the short-wave variety is illustrated in Fig. 2 (right).

It also means that a circuit having a coil with both ends "live" can be tried, without the necessity of bushing the condenser or setting it back from the panel to cure hand-capacity effects. In some of these circuits the moving plates should be earthed, while in others they remain isolated—not actually connected in circuit at all.

So next time I talk about a circuit that requires a series-gap condenser, don't all write me indignant letters and tell me that you can't afford to buy new components just to try out my funny ideas! Thanks very much!

Fig. 2 shows the conversion of an ordinary broadcast-band H.F. choke into quite a good short-wave variety. The prescription is, "remove all the wire and put about a quarter of it back." With what's left you can make three more short-wave chokes, if you want to.

The slotted type is best treated by leaving alternate slots blank and winding about fifteen turns into each of the other ones. Sixty turns is a useful figure for a short-wave choke, although it may not be sufficient if you want to listen much above fifty metres.

Winding Special Coils

An ultra-short-wave choke is a much smaller affair, consisting of twenty or twenty-five turns of wire space-wound on a very slender former. If you attempt to use a big one, like that shown in Fig. 2, you should use only two of the slots, winding about ten turns in each; and don't choose two adjacent ones. Such a choke is not terribly efficient, however, for ultra-short-wave work.

Coils are the next things that come to mind. All sorts of old things can be utilised as coil-formers. Rummaging through my own cupboard, I found some beautiful old H.F. transformers (A.D. 1922) with real ebonite formers and a peculiar system of slotting that turned out to be very useful.

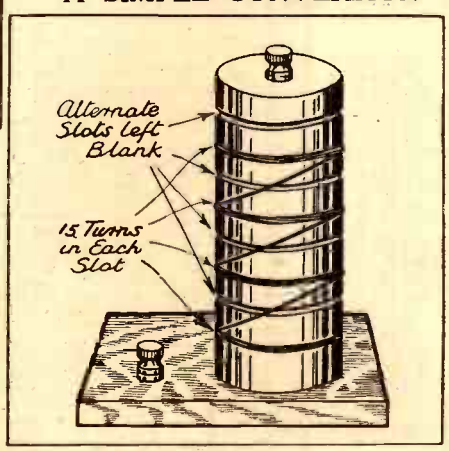
The four-pin or six-pin coil is now firmly established as the favourite type, and is certainly more efficient *and* more easy to construct than some of the queer large-diameter, self-supporting types that used to be all the rage.

Even old-fashioned slow-motion dials can be "cooked" to be useful for short-wave sets. In some cases (particularly referring to the friction-driven types) a new pointer and a larger diameter knob are all that are required. The old geared types are not much good, as they are apt to be very noisy.

Pre-set condensers can be pulled to pieces and reassembled with two plates and a very thick piece of mica for dielectric. Old-fashioned neutralising condensers can likewise be subjected to a "slimming" process until they make very nice air-dielectric trimmers or aerial coupling condensers.

Even valve holders can be improved by removing ebonite and leaving only the sockets with their connections to the terminals.

A SIMPLE CONVERSION



"P.W." CIRCUIT SPOTLIGHT No. 2

The second of a new series in which K. D. Rogers introduces to you the insides of up-to-date radio receivers.

THE H.M.V. MODEL 444

ON this page you see the simplified circuit of the H.M.V. Console "Superhet Five," a good example of modern radio practice. Several small features have been left out so that the basic circuit can be the more readily studied, and you should note that the power pack and its associated mains aerial connection, and certain trimming, smoothing, and decoupling condensers have been omitted. The absence of the power pack in the diagram accounts for the fact that only four of the five valves are to be seen.

The five valves are the mixer valve (a heptode), the intermediate frequency amplifier (an S.G. type), the double-diode-triode (which operates as detector, A.V.C. valve and first L.F.), the output pentode; and finally, of course, the full-wave rectifier.

It is interesting to note at this point that all the smoothing of the H.T. is carried out by the loud-speaker field winding, which is in the negative lead.

The aerial feed is through a specially designed anti-image circuit, different circuits being introduced for long and medium waves, and switched in automatically when the wavechange switch is operated.

The mixer circuits are quite normal, the output from the anode of the heptode being fed through an intermediate frequency transformer to the grid of the S.G. valve. The output of this valve is fed into another intermediate frequency transformer which is coupled to one of the diodes of the double-diode-triode in such a way that while the full diode rectified voltage is available for one of the A.V.C. feeds, only a certain amount is available for passing on to the triode section for L.F. amplification.

Tone and Volume Controls

This L.F. output from the diode is fed through the variable potentiometer marked "volume" to a second potentiometer, which is in series with a small condenser. This potentiometer is used for varying the tone, and is known as the "tone control."

From the output of the triode portion of V_3 the circuit is straightforward, a resistance feed being used to the output pentode V_4.

Now let us have a look at the A.V.C. arrangements. There are two forms of A.V.C. that can be used at will by the operator of this set: straight A.V.C. and the "quiet" A.V.C. They are provided by means of the volume control, which has coupled to its shaft a push-pull double-pole change-over switch, A1 B1, A2 B2.

When the volume-control knob is pulled out the "quiet" position is obtained, and inside the set contacts across B1 B2 are connected together. With the volume control pushed in, the switch is changed over so that B1 B2 contacts are open, and contacts across A1 A2 are shorted together.

On the back of the set is a small additional control, marked in our diagram "Quiescent Control," and this allows the operator of the set to adjust the amount of "quietness" which he requires. In other words it allows him to pick the strength of station below which he will receive nothing, for the quiet A.V.C. allows the set to be tuned with complete silence until a station is tuned in, when the set at once springs to life. But it needs a station of a certain strength to "release" the set, so to speak, and until it "finds" a station of that strength the receiver remains silent. The quiescent control fixes the minimum strength to which the set will respond.

You know how A.V.C. works, I expect. It is merely the automatic control of bias on an H.F. and/or mixer valve. The valve or valves on which A.V.C. is to operate are supplied with a certain minimum bias. Any additional bias will cut down their amplification, and therefore the volume.

A.V.C. supplies that added bias by using a fraction of the signal strength of a received station. And as the strength of the station varies so does the strength of the added bias. In this way the strength of a station can be kept pretty constant. When the station fades the added bias is reduced. The valves then amplify more and the strength of the station at once comes up. And vice versa.

Now let us go back to the H.M.V. circuit. V_1 and V_2 are the valves on which A.V.C. is to be used. In the first place, V_1 is biased by the cathode resistance in its circuit just below the quiescent control resistance. V_2 is biased in two ways, one for straight (not "quiet") A.V.C. and the other for Q.A.V.C.

Let us take the former. That is, when the switch closes at A1 A2. Then the cathode of V_2 goes to earth through a fixed resistance shown to the right of the quiescent control.

How A.V.C. is Obtained

The grid circuit of V_1 is fed through a decoupling resistance to the second diode (D2) of V_3. Also fed to V_3 second diode is the lower end of the secondary of the first I.F. transformer.

A.V.C. is obtained on the amplified D.C. principle. The rectified volts from diode D1 due to the carrier are fed on to the grid of V3 lowering the anode current. This makes the cathode of V3 less positive to diode D2, and if the carrier is strong enough to make cathode of V3 negative to diode D2, current flows between cathode and D2. This current develops a voltage across LR., which is applied as A.V.C. volts to the grids of V1 and V2.

That is the straightforward A.V.C. which operates without allowing you to fix any minimum strength below which you do not trouble about a station.

Now for the quiet A.V.C. This comes into play with contacts B1 B2 of the switch in use.

The cathode of V_1 is still earthed through the bias resistance, but the cathode of V_2 is now taken to earth through the quiescent control resistance, and the resistance used also for V_1. Thus an added bias can be obtained, and can be adjusted in accordance with the wishes of the operator by means of the quiescent control. In other words, a very strong negative bias can be applied to V_2.

You would think that that would stop the valve from amplifying. But it does not, for this reason: Follow the grid circuit of V_2 with the contact B1 closed. It goes now to the secondary of the second I.F. transformer and not to diode (D2) of V_3 as before. Thus, any A.V.C. applied to V_2 comes from the diode (D1) in V_3. But more than that happens, for following the circuit through we find that there is a D.C. connection between the grid of V_2 (through the 50,000-ohm and the ·23-meg. resistances by the second I.F. transformer) and the line of resistances P, Q, R and S. And so to earth.

Now, through P and Q is the anode current of V_2 flowing, while through R and S are the anode currents of V_1, V_2 and V_4. For the H.T. negative feed to earth of the set is taken through the pot of the speaker and the resistances R and S. In other words, the earth line is more *positive* than is the point between Q and R.

That means that the output valve V_4 has a negative bias applied to it by virtue of its grid tap between R and S, but that owing to the fact that the anode current of V_2 passes through P and Q we find that the grid return of V_2 is positive with regard to its cathode, the junction point between the two being the point between Q and R. Something like 100 volts is developed by the anode-cathode current of V_3 through P and Q.

The Voltage Drop

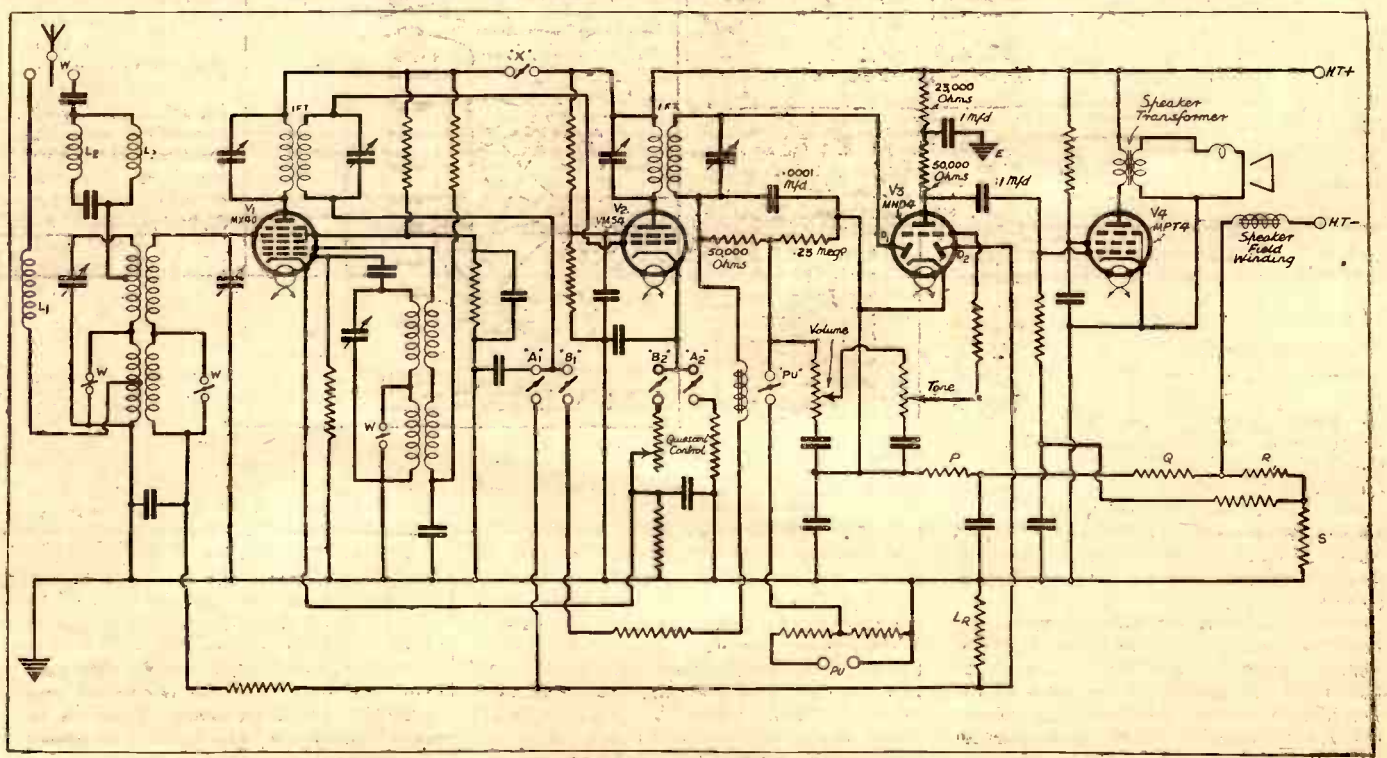
This 100 volts (positive to earth) is nullified, to a certain extent, by the anode currents of V_1, V_2 and V_4 (some 30–40 m.a.) flowing through R and S. But R and S are of low resistance, whereas P and Q, carrying just under 2 milliamps, are of high resistance, and the values are so arranged that the voltage drop through P and Q is nearly twice that through R and S.

The result is that although the grid of V2 would appear to be about 50 volts positive, it actually is only about two or three volts positive, due to the current flowing through the grid resistance.

Thus, in a no-signal condition of the set we have V_1 biased negatively by its cathode resistance, and V_2 *positively* biased through the resistances just discussed. This bias can to some extent be cancelled by application of negative bias by the quiescent control, which increases the negative bias applied by virtue of the cathode resistance, but until a signal comes along and still more negative is applied from the first diode of V_3, the valve V_2 is not functioning.

The diode of V_3 is not affected by the positive bias scheme, for it is connected to the cathode of V_3, while the grid of V_3 is also not upset by the peculiar circuit of its cathode because it, too, is connected to its cathode through the ·23-meg. resistance.

The operation of the pick-up switch itself is obvious. But additionally on operation of that switch the points "X" are broken, so that the mixer valve is deprived of H.T. and no radio signals can obtrude.



The simplified circuit of the H.M.V. Console "Superhet Five." Note the ingenious A.V.C. circuits and how the two diodes of V3 are employed.

ABOUT THESE PROGRAMMES

By HIGHAM BURLAC

This week our broadcasting critic takes the B.B.C. to task for some of their variety programmes and also makes a few suggestions concerning historic broadcasts

OF all the numerous periodical programmes presented by the B.B.C., few, if any, have lasted very long, counting in years, excepting the apparently illimitable "Foundations of Music," and oddments like church services, French lessons, news, and the like. The Queen's Hall "Proms" are fairly long-lived, and "In Town To-night" seems to have had a good run before it was broken and then re-enlisted as a mere page of "The Saturday Magazine." But generally speaking, the B.B.C. acts as though it runs out of ideas for a certain item, which is then dropped, at least for a time.

Nevertheless, that it is possible to keep a popular feature alive for a long time is proved by the continued existence of the now eight years' old "Corn-Cob Pipe Club," a Saturday-night entertainment given by station W E A F (U.S.A.). And don't let anyone imagine that American radio users ("sponsors") are not sensitive to the public's reactions! An exposed nerve in a hollow tooth is absolutely callous compared with them!

Most of our "variety" or music-hall programmes strike me as dreadfully uneven in quality—though I suppose we ought to be thankful that the mediocre is occasionally relieved by first-class work. You would not be edified or amused, and little but ill would result, were I to mention by name some of the "variety" turns which have made me screw up my calm Grecian features in agony. I will, however, declare that we get quite enough crooners *outside* these "variety" programmes, and that the profusion of male-voiced ladies who half-recite, half-howl tripe about "lurving you-hoo-oo" denotes mistaken B.B.C. notions about what the public here likes.

A Top-Notch Comedian.

Claude Dampier is, I hope, going to supply us with chuckles for many a long day. Drollery simply oozes out of him. And the fact that he goes over the radio so well, when his face alone is a fortune, shows that he does not have to rely for his results on funny clothes, eccentric antics or facial distortion—and it needs a top-notch comedian for that.

A very well-known lady I heard not long ago singing love lyrics has a voice which I thought was quite unsuited for this type of song. It is exceedingly beautiful, but very powerful when raised, and would be better suited to Wagnerian opera, with the gods galloping home to Valhalla and the orchestra going "all out."

Centenaries as celebrated by the B.B.C. are, in a desultory way, informative and possibly deeply interesting to people who like to browse on variegated facts about all conceivable subjects. But these commemorative programmes in so many instances are constructed from such volumes of imagination that they neither add much to historical literature nor constitute very substantial monuments to the great ones which they honour. More lasting impressions might be made upon our minds by a "talk" by a carefully selected speaker.

A Suggestion for the B.B.C.

The James Watt programme is an instance, and though well done—save for the Scots accents in the stokehold, which was much too well done—was an ounce of fact and a world of romantic make-believe. Anyway, steam isn't what it was. Sing hey for the jolly old electron!

Now, if the B.B.C. would like to boost some notable Scotch worthies—and I presume that the idea would not exactly nauseate them—I recommend them to commission two plays, one dealing with Sir Walter Scott, the other with Robert Louis Stevenson. The private lives of these two men are far more inspiring and romantic than anything written by either. Talk about stark heroism, of the sort which is used quietly, without the waving of flags or the boom of bands! Read Scott's Life and his Journal, and Stevenson's Life and his Letters, to discover what human greatness can be.

The idea of the European broadcasts is excellent; broadcasting would naturally develop on such lines. But unless some of the Continental orchestras will consent to come down to a somewhat lower level, these European hook-ups will not prove to be very attractive to listeners in Great Britain. The Polish concert, for example, which was given not long ago, was not only "highbrow"—it was esoteric.

When I examine the broadcasting programmes of America I feel like giving up this *causerie* and turning into an ecstatic B.B.C. "fan." I forgive that Corporation all its sins of omission and commission and regard it as nearly perfect. As mentioned elsewhere by "Ariel," the Americans are actually considering some of the nattier crimes which landed the inmates of Joliet Penitentiary into that haven of rest, with a view to their being worked up into playlets to be broadcast by the prisoners themselves. The avowed aim is to prove that crime does not pay; but did you ever come across more grotesque, or a more dangerous experiment?

A Stroke of Genius!

Said the immortal but unknown schoolboy in his famous essay, "The elephant is a noble beast, but when enraged he will not do so." This joyous aphorism calls to my mind that Lepolemus, a noted strutter upon the ancient Greek stage, told the local press that his most dramatic heights were obtained while he was wondering whether his wife had locked the cat well away from his fish-pond. "Do then cats swim after fish?" inquired his hearers. "Nay, but they might—with practice," replied the actor.

All this is but the light overture to my remark that given fitting occasions the B.B.C. can rise to them sublimely, without forethought or groping after effect. That night when King George died was, on the wireless, one of the most dramatic and unforgettable experiences of our lives. The reiterated warning of the ebbing of a great life, the inspired, re-introduction of the "pulse" interval signal—*what* a stroke of genius!—raised the programme—call it what you will—to the level of an epic. We may thank our stars that the pomposity and superiority of Broadcasting House is so readily convertible into dignity, reverence and nobility.

A TASK WELL DONE

To Mr. A. S. Hibberd fell the sad task of giving the final bulletin concerning the closing hours of our late King, until Sir John Reith himself took over the duty of announcing the last tragic news. During the evening of January 20th the B.B.C., in the words of Higham Burlac, "raised the broadcast to the level of an epic."

FROM OUR READERS

ARE OUR DANCE-BANDS RIGHT?

Some letters from readers on a much-discussed subject. Do you agree with the opinions expressed—or don't you?

The Editor, POPULAR WIRELESS.

Dear Sir,—"I don't like jazz bands because I hate the saxophones," an elderly lady exclaimed to me the other day.

On further investigation I discovered the "squeaky saxophones" she objected to were not saxophones but trumpets!

Lover as I am of good dance music, I cannot but help agree with my friend of the old school on the matter of tone.

I usually find these haters of dance music listen only at 5.15, and then, of course, by accident, and never to the "real thing" broadcast during the late dance sessions fairly regularly by the O.B. bands.

The only reason I can find for the B.B.C. Dance Orchestra (and others) giving such prominence to the wrong instruments for solo parts is an endeavour to display technique. But technique is not art, and I feel sure that hundreds of listeners, now haters of dance music, would soon learn to appreciate even the hot stuff if the "tune part" of the numbers was given to the right instrument or instruments to handle.

Played artistically, even "hot music" is exciting to listen to and "sweet music" most charming. But sweet music played with bad tone and an overdose of filling in at the wrong moments from otherwise accomplished musicians, is sufficient to raise criticism from anyone.

Thanking you for your excellent weekly, POPULAR WIRELESS.

G. KITCHENER.

25, Hamilton Road, Ealing, W.5.

MODERN ARRANGEMENTS

The Editor, POPULAR WIRELESS.

Dear Sir,—I heartily agree with your correspondent, Ronald Brewster, that dance bands should stick to their own game.

Their so-called "modern arrangements" of old-time favourites are beyond all sense or reason. They mutilate the original tune until it is completely submerged in a horrible din caused by each player trying to outdo the other in a display of fantastic noises.

The very fact that they must keep on doing this sort of thing proves that they are at a loss to know how to find pleasing melodies, and therefore they insult listeners' intelligence by grinding out the rubbish called "hot music."

It is a well-known fact that most things which burn at white heat soon burn themselves out, so let us hope that "hot music" will become hotter and hotter.

Yours faithfully,

T. E. PRESTON.

6, Treaford Lane, Birmingham 8.

JACK JACKSON and his Band, one of the popular combinations heard "over the air." It is, without doubt, the favourite of a large number of listeners.

TOO MUCH VOCALISM

The Editor, POPULAR WIRELESS.

Dear Sir,—Always after listening for about twenty minutes to modern dance music, as it is played by Henry Hall and the B.B.C. Dance Orchestra, I feel so bored that I simply have to switch off to prevent myself from going crazy. In spite of this I do not think unkindly of Henry Hall or of any member of his band, because I am sure that they all try very hard indeed to please everyone.

In my opinion there is too much vocalism in the programmes presented by Henry Hall and the B.B.C. Dance Orchestra. Maybe there are numbers which do require the services of a vocalist; but where there is no real need for one, if I am not asking too much, then, instead of hearing the vocalist, I should like to hear an instrument, such as a banjo or a guitar, etc.

Yours faithfully,

GEORGE STYLES.

90, Fife Street, Nuneaton, Warwickshire.

WIN A GUINEA

Every week we pay one guinea for the best letter from a reader on any radio topic. There's no reason why you should not win one. So why not have a shot?

Radio experiences, faults you have found and remedied, programme opinions; these are all permissible topics. If you enjoy reading what others have to say, why shouldn't they find interest in some words of yours?

Anyway, give us the opportunity to decide whether or not that letter you have in mind merits printing. It may even earn a guinea!

The winner of the guinea this week is: Mr. J. H. COPELAND, Myreside, Bridge of Marnoch.

S.T.700—A FINE SET

The Editor, "Popular Wireless."

Dear Sir,—Having built the S.T.700, as published in your paper some time ago, I would like to tell you how much I appreciate such a fine set.

I have been an ardent "S.T." fan since his S.T.300 and consider the "700" to be the finest value for money extant. I live in a notoriously bad district (for other sets, of which I have had a few), but I have had the pleasure of logging and identifying close on eighty stations, including some ten or eleven long-wavers.

Every time I get out the pliers and screwdriver the family nod or shake their heads, and murmur, one to another, in stage whispers, "Good heavens! More knobs:" But lo! "S.T.," knob fiend as he is, has confounded them all, and my bunch of armchair critics are delighted.

No more, "Hi, come and tune this polution in," or "Darn these dratted knobs!"

By the way, we have christened the "700" "the "Mighty Barnum," because it attempts and does more than any other set of its time.

Yours truly,

J. S. CLARKE.

"Dergalt," Ophir Gardens, Belfast.

AMERICA ON MEDIUM WAVES

The Editor, POPULAR WIRELESS.

Dear Sir,—I read with interest of Mr. Lancefield's DX effort, details of which are on page 570 of January 25th "P.W." It certainly was a fine piece of DX, and I heartily congratulate him.

My own record piece of reception was on a one-valve receiver, and here are the details in case they are of interest:

On October 25th, 1932, I was on the air between 01.00 and 05.00, using a one-valve battery-operated receiver. A good outdoor aerial, and headphones completed the outfit. Before 02.00 I had excellent reception from LR 4 on 303 m., LR 3 on 315 m., and LR 6 on 330 metres. All these stations are in Buenos Aires. LR 4 was a steady R6, and LR 3 and LR 6 were R5 at peak strength.

My best two-valve effort on the 200–500 metre band was on December 24th, 25th, 26th, and 27th, 1933. This set was also battery operated, and used the same aerial and headphones.

The following call signs were heard during the above period: WCAU, WOAI, WKAQ, WNAC, WOWO, WHAM, WLWL, WPG, WTAM, WTIC, WBZ, WBT, WCSH, WFAA, WWL, WABC, WLW, WEAF, WSM, WJZ, WBAL, WHAS, WRVA, WGY, WOC, KMOX, VAS, LR 3, LR 4, LR 5, LR 6, and WRNY. This latter station informed me in a letter of verification that their power when I heard them was 250 watts.

These are my best "bags" so far on my 0-v-0 and 0-v-1 receivers.

Yours faithfully,

WILLIAM W. WARNER.

56, East Grove Road, St. Leonards, Exeter, Devon.

A LIFE OF RADIO

The Editor, "Popular Wireless."

Dear Sir,—By your encouragement and the example of so many fine letters in your excellent paper, I have been tempted to give you an outline of some of my experiences.

When I was a kid, I had a great hankering to know something of electricity; but having my home in an out-of-the-way country district, I just had to go on without the benefit of any book on that subject. It amuses me to look back on the time when I tried to make electricity by holding a steel knitting needle into the spokes of the flywheel of the sewing machine, driven at a terrific speed, when my parents were absent. Then I got to know that magnetism had something to do with it. But it was a long time before I really got the true facts, though I did manage to have electric light in my bedroom by means of disused flash-lamp batteries and brass snare wire for line, insulated with newspaper and, of course, the necessary bulb without a proper holder at about the time flash-lamps were introduced in our district. It was a wonderful achievement!

A young city dweller of the present day could not comprehend this, for they take electricity for granted. Even radio is looked at by some as the commonplace. It is the experimenter and short-wave fan who know it is not. Well, then the war came, and, after I was demobilised and had again settled down, I met a fellow who was at the Scottish Wireless College, Aberdeen. It was not long before I was there too, and finally got my first class P.M.G. This was November 2nd, 1920, and at that time the Board of Trade changed the rules regarding radio operators and watchers, with the result that I could not find employment.

During the time I was at the Radio school several of us started experimenting with valves, and before we could buy these we had to have receiving station licences, which could only be acquired after getting two very responsible persons to vouch for our good character. The valves available then were Marconi V.24s; the filament current they took would do for three up-to-date superhet sets. Our high-tension batteries we made from a dozen 4½-volt flash-lamp batteries or thereabouts, and our sets took various forms from time to time. The best tuning coil I had was made of 36 S.W.G., O.S.C. wire, 10 in. long by 5 in. across. The reaction coil was of smaller wire and wound on a turned piece of wood with a hole up the centre, for it to slide on a wooden shaft up the

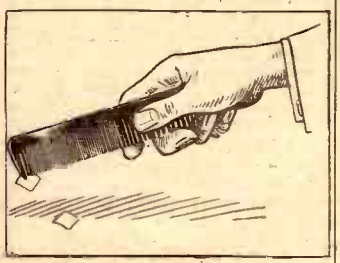
(*Continued on page 653.*)

PRACTICAL RADIO AND ELECTRICITY

Electricity can be produced in several different ways, some of which are amazing in their simplicity. And you will agree that this is so when you read this week's instalment of our new series

ONE of the simplest forms of electricity is that produced when two substances are rubbed together. For example, there is one experiment which you can all try for yourselves. If you take an ordinary pocket comb and rub it vigorously against your coat sleeve, you will find

TRY THIS!



If you rub a comb on your sleeve and then place it near some small pieces of paper, you will find that it has acquired the property of attracting the paper.

that this vigorous rubbing has imparted to the comb the ability to pick up small pieces of paper; the pieces of paper jump towards the end of the comb when this is placed close to them. The rubbing of the comb on your sleeve has caused the comb to become electrically charged.

Of No Real Value

Electricity of this type can be produced in several other ways, but the comb example is probably the simplest one I can give you. In actual practice, of course, frictional electricity such as this is of no real value. In the form of electricity which we use for lighting electric lamps, running motors, working wireless sets and so on, frictional electricity plays no part.

Another method of producing electricity is that in which heat plays a big part. It has been discovered that certain dissimilar metals if joined together produce a flow of electricity when the junction is heated. Copper and iron, for example, exhibit this phenomenon.

If a number of alternate discs of copper and iron are clamped together and exposed to a flame, as shown in a small sketch on this page, a definite flow of electricity can be measured with the aid of a sensitive instrument joined between the end discs.

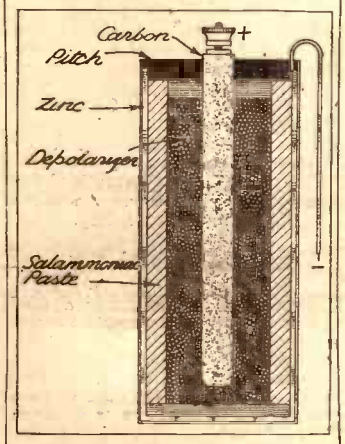
The discs have to be clamped together in a certain manner. For instance, the rod of metal must not be allowed to pass through the discs in such a fashion that either it or the clamping nuts touch the surfaces of any of the discs. There are reasons for this which will become apparent later on.

Voltaic Electricity

Electricity produced by heat—that is, thermo electricity—is made use of in connection with certain scientific instruments, although the apparatus, of course, differs very greatly from the form shown in the sketch.

The type of electricity which you will be more interested in is that which we can call voltaic electricity. That obtained from batteries and

A DRY BATTERY



This sketch shows the principle of the dry cell. Cells of this type are very popular owing to the fact that they can be made in a wide variety of sizes and there is no liquid in them to spill.

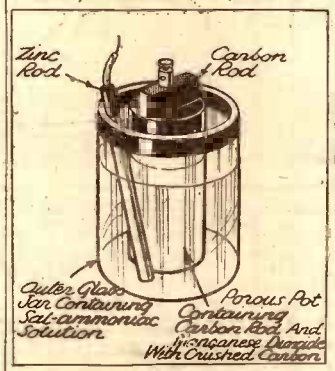
dynamos comes under this heading, and is, in fact, the practical commercial form.

One simple generator of voltaic electricity is the well-known electric bell battery. This can either be of the wet or dry type.

On this page I show examples of both. A single unit, such as is illustrated, is called a cell. And the actual types shown are based on what is called the Leclanché principle.

In the wet Leclanché cell there are two main elements. These are a zinc rod and a carbon rod. If you take a piece of carbon and a piece of zinc and immerse them in a saturated solution of sal-ammoniac (that is, sal-ammoniac crystals dissolved in

LECLANCHÉ CELL



This is the well-known Leclanché cell. It is often useful where small quantities of electricity are required.

water until it is impossible to dissolve any more crystals), and if you join the two exposed ends of the rods together with a piece of wire, electricity will flow along the wire. In practice, however, this is not a very satisfactory procedure, because the carbon rod very soon becomes covered with tiny bubbles of hydrogen gas, which quickly puts a stop to the flow of electricity.

Removing the Gas

For this reason it is necessary to surround the carbon rod with what is termed a depolarizer. This depolarizer takes the form of a quantity of manganese dioxide mixed with crushed carbon and placed in what is termed a porous pot. When this is done you have the well-known Leclanché cell, which will go on generating electricity for a long period.

In time it becomes necessary to clean out the glass jar containing the sal-ammoniac solution and to mix up some more. Also, owing to chemical action, the zinc rod may gradually be "eaten away" and need replacement. But, generally speaking, the life of a Leclanché cell is a long one, and it is convenient where the amount of electricity required is small and when it is only used intermittently, such as for ringing bells. It is usual to amalgamate the zinc rod with mercury, a process which lengthens its life very considerably.

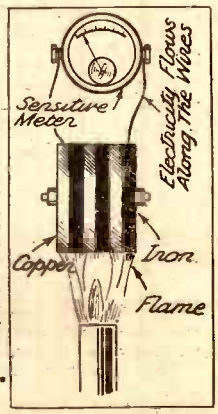
But owing to the fact that a wet cell is not always convenient, there is another form which many people prefer, and which has various advantages over the ordinary Leclanché. This is a dry cell.

Based on the Wet Type

From the sketch it will be seen that it is very similar in principle to the one we have just described. There is a carbon rod, a zinc outer casing—usually a circular container—a depolarizer of manganese dioxide, and a layer of sal-ammoniac paste between the depolarizer and the zinc casing. The cell is not truly dry, inasmuch as the sal-ammoniac paste is, of course, damp, and, in fact, the cell will only function while this paste remains in its wet state. But it is "dry" to all intents and purposes, because the top of the cell is sealed with a layer of pitch, and there is no liquid of any sort to spill out.

THE THERMOPILE

Electricity can be obtained by applying heat to the junctions of two dissimilar metals, a principle that is utilised in connection with certain scientific instruments.



Cells based on this principle are used all over the world, for pocket torches, cycle lamps, wireless H.T. batteries, etc.

PRACTICAL RADIO AND ELECTRICITY

WHY YOUR PROGRAMMES FADE

THIS WEEK MR. JOHNSON-RANDALL TELLS YOU SOMETHING ABOUT THE CURIOUS TRICKS THAT WIRELESS WAVES PLAY, AND THEIR EFFECT UPON RECEPTION

LAST week, in the first of this series, I told you something about those mysterious electrical impulses which travel from a broadcasting station to your receiver, and are responsible for bringing to you the broadcast programmes.

You read that these electrical impulses, which reach out from the broadcasting station to your aerial, are called waves, and that they travel through a "something" which has been given the name of ether.

Now a wireless wave does not necessarily take the direct and shortest route between the transmitting aerial and the receiving aerial. It plays all sorts of tricks. No doubt you have often noticed that at night you are able to receive a greater number of programmes than during the daytime. This is not necessarily because there are more stations working; the various Continental stations are sending out during the day just the same as are our own B.B.C. stations.

Two Kinds of Wave.

But a wireless wave, as I mentioned above, often plays tricks. Actually it can be split into two parts. One portion takes the direct route from the transmitting station to your receiving aerial. This particular wave is sometimes called the direct ray and sometimes the ground wave; in the diagrams I have referred to it as the "ground wave."

The other part of the wave goes shooting away into space, and because of that it is called the sky wave or indirect ray.

Now, above the earth there is a layer of gases which has the remarkable property of reflecting wireless waves. This layer (which is called the Heaviside layer, after its discoverer) acts rather like a mirror does to a beam of light. The wave meets the layer and is reflected back again to the earth. I have shown the effect in the Fig. 1 sketch.

Night Reception.

During the daytime we rely for our reception of broadcasting very largely upon the ground wave. If we are outside the range of this wave, we hear nothing, because, as we go farther away from the broadcasting station, so the wave gets weaker and weaker. Naturally, if our receiver is a very sensitive one, it will pick up the programmes on the ground wave at a greater distance than if it is a small and only moderately sensitive set.

But the fact remains that we do arrive at a point where, no matter how good our receiver, nothing will be heard from the broadcasting station in so far as the ground wave is concerned.

At night, however, the effect of this mysterious layer above the earth comes into play. Actually, as darkness falls it becomes nearer the earth, and its effect is more potent, owing to certain factors which we shall touch on later.

The sky wave from the distant station meets this layer and is instantly reflected. The reflected wave returns once more to the earth and brings with it programmes from the distant transmitter.

Now, the curious thing is that this sky wave enables great distances to be covered. Often, in the case of a Continental station, both the ground wave and the sky waves are received. If so, the result is frequently very powerful reception.

Sometimes our reception depends only upon the sky wave, because we are out of range of the ground wave. But most of us don't mind how we get our programmes, so long as we do get them.

Unfortunately, the sky wave is not a very reliable source of programmes. You have all noticed that when your receivers are adjusted to one of the Continental programmes, you will frequently hear the station quite loudly to begin with. Then, after a minute or two, it begins to get weaker, until perhaps it gradually fades right out. After this, if you keep your receiver adjusted in the same position, you will notice that the programme returns, becoming gradually louder, until finally it is as strong as ever. Then after a while the phenomenon commences all over again.

The Heaviside layer is the cause of the trouble. It does not remain at a constant height above the earth. It varies in height and also in density, and in consequence the sky wave, or rather the reflected portion of the sky waves, tends to wander away from your aerial at one moment, then after a while it will come back to it, and so on.

This causes the strength of the programme to vary. An effect which is known as fading.

Why A.V.C. is Used.

Set designers have done a lot towards reducing the results of fading. One of the greatest of the recent advances is the application of automatic volume control to broadcasting receivers. This control tends to keep the volume constant irrespective of whether the broadcasting station is increasing or decreasing its strength. But all sets do not incorporate this. And in a very large percentage of those in use at the present time fading is all too common.

Another cause of fading, and also of distortion on distant stations, is when the ground wave and sky wave are received together. While these two waves are in step, as it were, reception is quite satisfactory. But when the sky wave gets out of step with the ground wave, owing to changes in the Heaviside layer, reception gets weaker, and so you again get this fading effect.

Although we have been talking about the Heaviside layer, it is interesting to note that there is also another layer above it. This is called the Appleton layer, after Professor Appleton, of King's College, London, who discovered it.

It has been proved that very short waves pass right through the Heaviside layer until they meet the Appleton layer, when they are reflected back to the earth.

At the Transmitter.

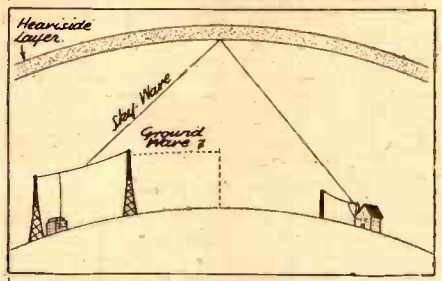
At this stage, however, we will not deal with what may be termed the more complicated effects of these reflecting layers. I have only given you a very simple explanation of the basis of this queer phenomenon. Other factors we shall deal with later on in the series when I have told you more about waves and how they behave.

But it is interesting to note that a great deal of research has been carried out at the transmitting end with a view to minimising the effects of fading. Special aerials are in use in Germany which in appearance are not unlike the sketch on this page. The B.B.C. is also employing one of these aerials at its new Lisburn station in Northern Ireland. Listeners will be able to judge for themselves the success of the system when Lisburn commences its regular programme service in March.

Effect of Mineral Ore.

Hilly country has a marked effect upon wireless waves. This is particularly the case when the hills contain a percentage of metallic ore. Very often listeners who are situated in spots where there is a range of hills between their aerials and the transmitting station find difficulty in obtaining satisfactory reception. On the other hand, listeners at a similar distance from the transmitter and who are not screened in this manner have no such difficulty.

REFLECTED BACK AGAIN



CHANGING HEIGHT

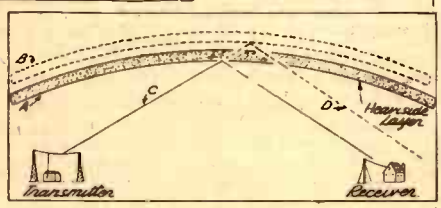
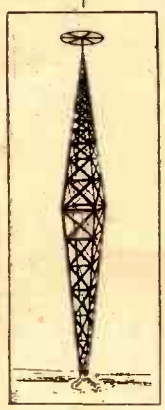


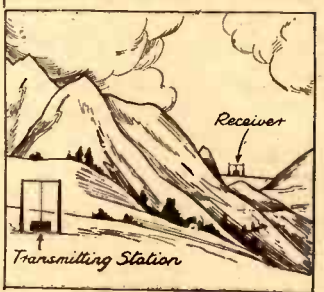
Fig. 1 (above) shows how the "sky wave" is reflected back to the earth by the Heaviside layer. On the right (Fig. 2) the layer is depicted in two positions, A and B. When such changes in height occur the reflected wave does not strike the earth at the same point, as seen in C and D.

ANTI-FADING



In order to try and reduce fading as much as possible special aerial systems have been evolved. One type that has been used successfully in Germany is illustrated here. The mast actually acts as the aerial. Note the peculiar wheel-like object on top.

SCREENED BY HILLS

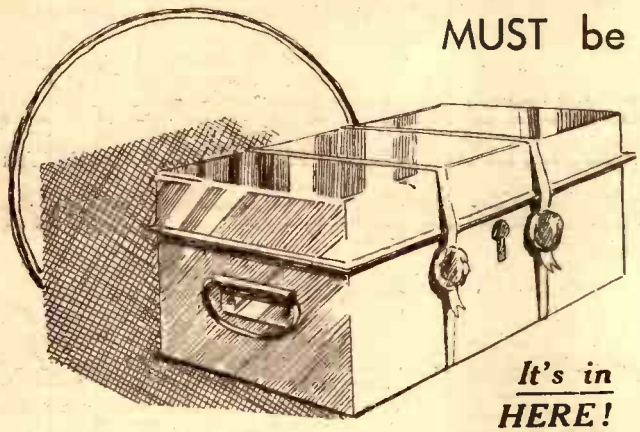


If you are unfortunate enough to live in a spot where there is a range of hills between your aerial and the local broadcasting station, your volume will often suffer owing to the screening effect of the hills.

★ THIS WEEK! The Editor's Own Special Prize:—

A HALF-INTEREST IN HIS NEW TELEVISION INVENTION

MUST be Won FREE by a "P.W." Reader!



It's in HERE!

The mystery box! What is its secret worth to you?—certainly a few minutes' effort and interest in this week's novel competition! What my secret will make in hard cash I simply don't know, but I AM out to make money—and, remember, if it does turn out well, you or whoever wins the prize will be in with me fifty-fifty!—Ed.

All You Do to Enter—

Television will really have arrived when the general broadcast television programmes start shortly—so as your entry in this competition, we simply ask you to write on the coupon *your* suggestions for eight items which you think would make the **IDEAL TWO-HOUR TELEVISION PROGRAMME**, each item to be of approximately a quarter of an hour in duration. Time, 6 p.m. to 8 p.m.—any week-day evening.

You should not find it difficult to devise this one programme, for with the addition of *sight* to the broadcast *sound* there is vastly more scope. That is to say, many items of one sort and another which did not lend themselves to sound broadcasting only, may now be possible. Complete novelty in all the items is not essential. Your job is merely to scheme *one* programme which you think will appeal to the widest number of "lookers." A programme which would best "exhibit," too, the range and possibilities of this new wonder, Television!

Take order into account in framing your programme, too—thus you would not switch straight from a religious service to a music-hall programme or cookery, and so on.

Here are a few suggestions concerning the types of item available for televising: Short talkie films of both the cartoon and the ordinary type. Sporting events such as boxing, tennis, table tennis, billiards and so on. Talks with demonstrations and illustrations. Variety turns, including many that have hitherto not been suitable for broadcasting, for instance, acrobatics, dancing, conjuring, juggling, etc. Fashion parades and demonstrations. Cooking and other household instruction. News items captured by talkie cameras. Glimpses of foreign countries. Visits to places of interest, including power stations, factories, cathedrals and castles.

Try yourself out as a programme director, anyway. It won't take you long and may result in your winning the amazing prize. Fill the form in *in ink*, one item only briefly described or titled in each space.

Be careful to add your name and full address underneath, then post your entry to:

"P.W." Television,
1, Tallis House,
John Carpenter Street,
London, E.C.4 (Comp.),

to reach there not later than February 15th, 1936, the closing date.

RULES

The prize of a fifty-per-cent interest in any net profits derived by the Editor from Prov. Patent No. 6035/35 will be awarded to the reader whose entry the Editor considers the best all-round programme for the time and purpose. The Editor will give the winner an agreement entitling him to a half share of his (the Editor's) net proceeds from the patent, and otherwise in terms decided by the Editor, who will also retain absolutely all rights in the invention and its exploitation.

The Editor's decision in all matters connected with the competition and prize will be final and legally binding throughout, and acceptance of this is an express condition of entry. All entries must be written IN INK, and no correspondence will be entertained or responsibility taken for delay, non-delivery or otherwise. Proof of posting will not be taken as proof of delivery.

No one connected (directly or indirectly) with "Popular Wireless" or its proprietors is eligible to compete.

The Editor of "Popular Wireless" is one of the most successful inventors in modern radio. During the last two successive years he has sold patents to Marconi's Wireless Telegraph Co. Ltd., for the use of the British Licensing Pool, and that is, perhaps, the highest distinction a radio inventor can achieve.

Many other firms, such as Radio Instruments Ltd., Igranic Electrical, etc., have marketed his inventions on a royalty basis.

Now, as a prize in connection with our competition this week, the Editor offers a fifty-per-cent interest in a new television invention. This has been shown in its provisional form to one of the largest radio and television concerns in the world, though it would be impolitic to reveal their name at this juncture.

Within a week or two a famous firm of Patent Agents who handle the patent work of some well-known radio concerns, will be instructed to file a complete British specification in respect of this television invention.

And a "P.W." reader will hold a fifty-per-cent share in it without a penny of cost to himself or one iota of responsibility for its negotiation or anything else! Don't miss this unique offer—go all out for it yourself!

The invention may be worth anything or nothing at all. But the Editor believes it has as good a chance as any he has previously produced. A great company is obviously interested in it, and may make an offer of cash for it should it pass through the Patent Office successfully.

How much might it be worth? No one can say. The Editor has received four-figure sums for some of his patents, on the other hand others have fetched only modest sums, while not a few have never found a market or have not survived the Patent Office processes. Here, then, is an *adventure* for a "P.W." reader.

The "P.W." reader awarded the prize will receive an agreement entitling him to fifty-per-cent of the net profits of the patent.

It's *waiting*—the most original prize ever offered—to be won in the novel competition specially devised on this page!

"Popular Wireless" Competition No. 2

MY "IDEAL" TELEVISION PROGRAMME IS AS FOLLOWS:

1 (6 p.m.) .....

2 (6.15) .....

3 (6.30) .....

4 (6.45) .....

5 (7 p.m.) .....

6 (7.15) .....

7 (7.30) .....

8 (7.45) .....

I agree to accept the Editor's decision as final and legally binding.

Name .....

Address .....

.....

PLEASE WRITE IN INK AND USE CAPITAL LETTERS

HURRY! Closing Date, SATURDAY the 15th.

LEARNING FRENCH THROUGH YOUR RADIO

Part II of our new and exclusive method of simple instruction specially evolved for "P.W."

By S. G. GILLARD, M.A.

AS I want you to begin listening-in to French stations immediately, I commend to your notice especially the gramophone recitals. Sunday is an excellent day for these. Listen to the announcer (le speaker). Listen to what he says before and after the record (le disque) is played. You will find that he uses, with only slight variation, the same words each time. Be satisfied for the present with recognising just a few of them. This should not be difficult if I tell you the sort of phrase to listen for. But you must LISTEN, and KEEP ON LISTENING. Don't get bored by the constant repetition. I need not remind you that it was only by hearing the same thing over and over again that you learnt your own language.

Now for a selection of phrases which I heard only the other day. You are likely to hear them in any gramophone recital. So LISTEN for them.

Le morceau (the piece of music); Jack Hylton et son orchestre (J. H. and his orchestra); une chanson par le grand artiste anglais (a song by the great English artist); ce morceau termine le concert (this piece terminates the concert); le numéro de ce disque est 1,234 (the number of this record is 1,234); une chanson avec l'accompagnement d'orchestre (a song with orchestral accompaniment); un fox-trot; le violoniste Georges X (the violinist George X); un pot-pourri (a medley); le valse; une sélection de Cavalcade (a Cavalcade selection); l'orchestre philharmonique (the Philharmonic Orchestra); and Voix de son Maître (H.M.V.).

Imitation pronunciation:

le(r) mor-soh; J. H. eh son(g)-nor-kestr; ün shah(ng)-so(ng) zahr le(r) grah(n)-dahr-teest ah(ng)-gleh; se(r) mor-soh tair-mcen le(r) kon(g)-sair; le(r) nü-meh-roh de(r) se(r) deesk eh 1,234; ün shah(ng)-so(ng) ah-vek lah-kom-pah-n'ye(r)-mah(ng) dor-kestr; u(ng) fox-trot; le(r) ve-oh-lon-eest G. X.; u(ng) poh-poor-ee; le(r) vahlsse; ün seh-lek-se'o(ng) de(r) C.; lor-kestr feel-ahr-mon-eek; and Vwah de(r) so(ng) Meh-tr.

Now I want you to learn the announcer's formulae which he always employs before putting on a record. He generally uses one of these three:

VOUS ALLEZ ENTENDRE (You are going to hear——)

ÉCOUTEZ MAINTENANT (Listen now to——) or

VOICI MAINTENANT (Here is now—)

For instance, you will hear him say:

Vous allez entendre une chanson (a song)

Vous allez entendre un valse

Vous allez entendre un fox-trot

Vous allez entendre un pot-pourri (a medley)

Vous allez entendre le violoniste G. X.

Voo-zahl-leh-zah(ng)-tahndr le(r) ve-oh-lon-eest G. X.

Eh-koo-teh mah(n)-te(r)-nah(nt) trwah dah(n)ss

Eh-koo-teh mah(n)-te(r)-nah(nt) u(ng) tre-oh poor pe-yah-noh, flüt, eh ve-oh-lo(n)-sell

Eh-koo-teh mah(n)-te(r)-nah(nt) ün sweet de(r) dah(n)ss

You have probably heard this announcer speak—he is M. Jean Roy, at Radio Toulouse—but have you been able to understand him? If not, these French lessons will soon enable you to do so.

Or, as an alternative:

Écoutez maintenant trois (3) danses

Écoutez maintenant un trio pour piano, flûte, et violoncelle

Écoutez maintenant une suite de danses

Écoutez maintenant un sonate pour le piano

Écoutez maintenant la sérénade

Imitation pronunciation:

Voo-zahl-leh-zah(ng)-tahndr ün shah(ng)-so(ng)

Voo-zahl-leh-zah(ng)-tahndr u(ng) vahlsse

Voo-zahl-leh-zah(ng)-tahndr u(ng) fox-trot

Voo-zahl-leh-zah(ng)-tahndr u(ng) poh-poor-ee

Eh-koo-teh mah(n)-te(r)-nah(nt) u(ng) soh-naht poor le(r) pe-yah-noh

Eh-koo-teh mah(n)-te(r)-nah(nt) lah seh-reh-nahd

Then, after the record is played, the announcer will say:

VOUS AVEZ ENTENDU (You have heard——) or

VOUS VENEZ D'ENTENDRE (You have just heard——)

EXAMPLES:

Vous avez entendu un solo de flûte (a flute solo)

Vous avez entendu une sélection de la Walkyrie

Vous avez entendu un pot-pourri des Opéras de Kalman

Vous avez entendu un programme de musique militaire (military music)

Vous avez entendu des melodies classiques (classical melodies)

Or, as an alternative:

Vous venez d'entendre une sélection de musique de chambre (chamber music)

Vous venez d'entendre une sélection de musique populaire (popular music)

Vous venez d'entendre des ballades favorites (some favourite ballads)

Vous venez d'entendre un air pour baryton et piano

Vous venez d'entendre un festival de musique religieuse (sacred music)

Imitation pronunciation:

Voo-zah-veh-zah(n)-tahn-dü u(ng) soh-loh de(r) flüt

Voo-zah-veh-zah(n)-tahn-dü ün seh-lek-se'o(ng) de(r) lah W.

Voo-zah-veh-zah(n)-tahn-dü u(ng) poh-poor-ee deh-zop-eh-rah de(r) K.

Voo-zah-veh-zah(n)-tahn-dü u(ng) proh-grahm de(r) mü-zeek me-le-tair

Voo-zah-veh-zah(n)-tahn-dü deh mel-oh-de klahss-eek

Voo ve(r)-neh dah(n)-tah(n)dr ün seh-lek-se'o(ng) de(r) mü-zeek de(r) shahmbr

Voo ve(r)-neh dah(n)-tah(n)dr ün seh-lek-se'o(ng) de(r) mü-zeek pop-ü-lair

Voo ve(r)-neh dah(n)-tah(n)dr deh bah-lahd fahv-or-eet

Voo ve(r)-neh dah(n)-tah(n)dr u(ng) air poor bah-re-to(ng) eh pe-yah-noh

Voo ve(r)-neh dah(n)-tah(n)dr u(ng) fess-te-vahl de(r) mü-zeek re(r)-le-she-e(r)ze

You will not understand the grammar involved in these expressions. But, never mind. Practise the imitation pronunciation, and listen on the wireless for it. Announcers use these formulae more than anything else, not only in gramophone recitals but whenever they have announcements to make.

Here is another selection of announcements I heard recently:

Écoutez maintenant la revue de la presse (press review)

(Continued on page 656.)

The INDEFINITE ARTICLE:

That is (in English), A or AN, before a SINGULAR NOUN. SOME, before PLURAL NOUNS.

Examples: a man, a woman, some men, some women.

In French the INDEFINITE ARTICLE is:

UN (imit. pron. *u(ng)*) before a MASCULINE SINGULAR NOUN.

UNE (imit. pron. *ün*) before a FEMININE SINGULAR NOUN.

DES (imit. pron. *deh*) before PLURAL NOUNS OF BOTH GENDERS.

Examples in French:

UN CONCERT UNE ÉMISSION DES CONCERTS DES ÉMISSIONS

Imit. pron.

u(ng) kon(g)-sair ün eh-me-se'on(g) deh kon(g)-sair deh-zeh-me-se'on(g)

INSTALLING AND USING YOUR "AXIS"

(*Continued from page 640.*)

In making this preliminary test, you need not concern yourself very much with stations. The test is primarily for the purpose of determining whether the set will oscillate correctly, and that is an easy matter. With your "Rotalog" condenser at minimum (this is with the plates all out), and you need not worry very much about the setting of the pointer), advance the reaction condenser slowly towards maximum (clockwise) and note whether the general background noise in the speaker changes at one position into a very much more lively noise—a noise almost as of air escaping fairly rapidly from a balloon.

Reaction Must Be Smooth

At the point where that change occurs the set has commenced to oscillate, and your next job should be to determine whether that change to the oscillating condition can be affected throughout the range of the "Rotalog" condenser. I suggest that you move the rotor vanes of the "Rotalog" condenser roughly half an inch at a time, noting at each readjustment whether it is still possible by means of the reaction condenser to obtain that audible change in the general liveliness of the background noise.

The actual change to the oscillating condition, by the way, is most important. It must take place without the slightest semblance of, to use an expressive word, a "plop." If there is a tendency for the change to be ploppy, then you must experiment with the position of the H.T.+1 wander plug, trying lower voltages, but not too low.

The series aerial condenser, which is controlled by the knob protruding from the side of the cabinet, plays a most important part in the function of the set, and it is a component concerning which full details appear in the dial adjustment article. May I just say at this stage that you should use it as near as possible to maximum, although it may not be possible to leave it there when the dial trimming is finally done.

Try For a Few Stations

Having determined that the set oscillates quite normally (and if it doesn't, an *increase* in the H.T.+1 voltage may work the oracle), you can, if you like, try your hand at reception before concerning yourself with the dial.

When searching for stations, you must search with the set just—but *only* just—oscillating the whole time. As you slowly, very slowly, turn the "Rotalog" control knob, and with, as I say, the set actually oscillating, the presence of a station will be heralded by a whistle. To resolve it, the reaction condenser has slowly to be reduced until the set *just* stops oscillating, and the "Rotalog" control may require very, very slight readjustment.

It is a two-handed job until you get used to it, but it is a procedure which will be familiar, I think, to most "P.W." readers. Get the hang of the set first, and then, when you have a fair idea of general operating procedure, turn to the dial adjustment article and learn how to set your "Rotalog."

FROM OUR READERS

(*Continued from page 648.*)

inside of the inductance, which was tapped and tuned by a shaving-soap tin and a plunger covered with tinfoil as a "billie" condenser. I still have this tuner.

I learned most of my figures on this outfit from station B Y D (Aberdeen). Then in my long wait for a position, I copied all the news the day before it came in our newspaper, the stations I got that from being P O Z and L P (Germany) and L C M (Norway); the time signal from P O Z being taken every day. Sometimes W S O (U.S.A.) came in—that was a thrill the first time.

A great many people called to see this novelty. Some even said I made the noises myself, others said I was "nuts." Later on The Hague started broadcasting, but the results were very poor. I predicted that broadcasting would never be a success. How short-sighted lots of us were. I wonder if it will be the same with television.

I had been away for a time when again I was out of a job. Now the British began to broadcast on shorter waves, so the set had to be remodelled—this time with variometers, tuned grid, tuned plate, home-made L.F. transformers and a loudspeaker from a Brown's earphone, with a horn of a bottomless oil can, gallon size.

In 1923 I went to the U.S.A. That was the place for broadcasting. No licence; buy anything if you had the money. Strange to say, I made my first workable crystal set there, and on several occasions heard K D K A from the Bronx, New York City, where I lived. Then I got a "tube" and roped in almost everything, as far west as K F K X, Neb., south to Atlanta, Ga., where the announcer talked like a Negro. I never managed to cross the Atlantic on the medium waves, but I did often hear 5 X X on short waves later on. My radio kept me from getting homesick. I built lots of sets and even worked a "ham's" station. On that occasion the station I raised was A R R L Headquarters, Hartford, Conn.

* * *

I have stuff coming to make a very modern type of short-wave receiver to work from D.C., copied in part from the "P.W." Universal Converter.

I look forward to "P.W." every week. In my opinion it is the best all-round paper on the market. I "fell" for its first copies. My only regret is that I did not have it sent abroad to me.

Always looking for the latest,

I am,

Yours faithfully.

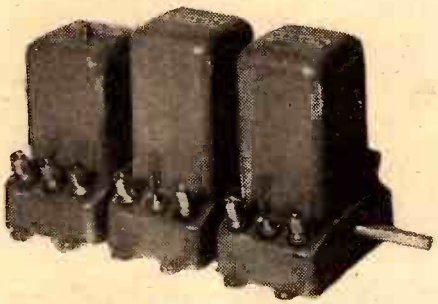
JAMES H. COPELAND.

YEAR by year, almost month by month, the ether conditions of Europe become worse. The Lucerne Plan under which we have been operating for the past three or four years is nearly finished, and we may expect that a new plan will be drawn up by the broadcasting nations in the next year or so.

It is urgently required, and on paper I expect to find that the result of a new plan, when and if it comes, will to a large extent clean up the ether. I say on paper because it will probably be quite another pair of shoes in practice.

The present plan looked all right when written down in frequencies, but when things were got going under it, it was found that the stations did not

GANGED COILS



The three Wearite coils which are used for superhet design.

quite fit in as expected. Some collared wavelengths that they had no right to usurp; others strayed badly off their wavelengths (and are still doing so); while scores of new transmitters have taken the air since the plan was inaugurated.

If you want to obtain true realisation of the extent of the jamming in the European ether, just try to get a few stations other than the locals on a simple sort of set. Try a detector and a couple of L.F. stages, or a flatly-tuned H.F. and detector followed by one low-frequency stage.

Try these without any aids to selectivity such as band-passing or wavetraps.

SEPARATING THE STATIONS

The latest Wearite ganged coils and intermediates for providing selective superhet designs.

By K. D. ROGERS

The terrible interference that will accompany your efforts will be striking proof of the need for one of two things; I am not sure it does not indicate that both are required.

The first is a new plan which will either restrict the number of stations or require that single sideband transmissions should be used. The second is the need for receiving sets to be constructed on the superhet principle, in cases where they are expected to get more than, perhaps, a score of prominent stations free from interference.

The first requirement is not an easy one to satisfy. The second is easier.

And to assist in the design of effective superhets many of the coil manufacturers have spent hundreds of pounds in research. Wright and Weaire, of 740, High Road, Tottenham, London, N.17, have taken a leading part in the research. Some of their new superhet coils and intermediate transformers go a long way to solving the congestion troubles for the home constructor.

These coils are of the iron-cored variety and are known as the I.C. type. Those in the photograph are the P.I.C., S.I.C., and the N.S.O./T.P. The coils make a very efficient three-gang variety for aerial, mixer and oscillator coupling.

The P.I.C. coil is for use in front of an H.F. stage, and is designed to eliminate break-through. The S.I.C. is an H.F. transformer coil for coupling between the H.F. valve and the mixer valve. They can be used in other circuits than superhets, of course, but in the three-coil assembly which I illustrate here they are used for superhet purposes.

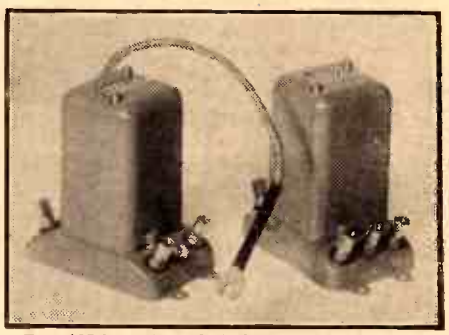
The third coil is the oscillator, which is designed for an intermediate frequency of 465 kc. and for use with the triode pentode type of detector and mixer valve. A "tracked" oscillator condenser should be used and a padding condenser for the long waves.

The prices of the coils are 7s. 6d. each, while intermediates for 465 kc. are available.

These intermediates are shown in the other photograph. Either a pigtail or ordinary model can be obtained, according to the type of valve to which it is to be coupled. The pigtail type costs 8s. 9d. and the other 8s. 6d.

These intermediates are provided with two trimming condensers each, one for each winding, and are capable of providing a band width limited to 7–8 kc. The dynamic resistance is ·25 megohm under working conditions. At the moment of

THE I.F. TRANSFORMERS



Two 465-kc. intermediate-frequency transformers made by Wearite.

writing a couple of the Wearite intermediates are being put through their paces in a set in the research department and very fine results have been obtained with them.

One thing particularly strikes me regarding the design of the Wearite coils. That is the switch mechanism, which is not only strong but also so constructed that a very definite wipe contact is obtained. It would appear that there is no possibility of any switching troubles arising. Moreover the switch gear is of low self-capacity. Incidentally, if you want further details of the coils, the manufacturers will be pleased to provide them, and also advice as to how they should be used.

RADIO MYSTERY CIPHERS

By Louis C. S. Mansfield

Try your hand at this new and instructive diversion. The codes are not nearly so difficult to unravel as they at first appear. And there's a ten-shilling note waiting for somebody in the bargain.

I WONDER how many of the present-day readers were "Radio Ops" during those hectic days of 1914–18?

Those of you who were will remember the strange, unintelligible enemy signals which used to come through night after night. Do you remember? How you used to wonder what it was all about!

But, above all, I wonder how many (or how few) of you were "on the inside" and saw what happened to those signals in that famous little room which will go down to history?

And yet, if war broke out to-morrow, maybe quite a percentage of you would be repeating the performance. First the strange signals, then a long period of

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.)

wondering "What's it all about?" and then back to the work on hand!

The aim of POPULAR WIRELESS in presenting this series of problem ciphers to you is to show you what happens when the simpler forms of secret messages are deciphered without the key.

The Law of Probability is the fundamental basis of all cryptanalysis. For instance, it has long been known that, in English, the commonest letter is E, which accounts for nearly 12 per cent of all letters. So that, if we meet in a cryptogram a symbol which appears frequently it will most probably turn out to be the letter E.

In the same way we know that by far the most frequent word in the language is the three-letter word THE; if, then, we meet a three-letter group which crops up from time to time we can usually take it to mean THE.

Armed with these letters we replace all the appropriate symbols in the text and are soon able to guess such words as THERE, THESE, THOSE, HAVE, WITH, WHICH, etc., all of which occur very frequently.

Solution of such words arms us with other letters with which we carry the process still further.

It often happens, however, that E is not the commonest letter in a particular cipher. In such cases we usually find that the most frequent symbol stands for such letters as A, S, O, T, etc.

Where we cannot get an entering wedge we have recourse to such things as common endings, initial and final letters, etc., which often help us to identify complete words.

As you will see from the list herewith, T is the commonest *initial* letter with which we identify words like THAT, THIS, etc.; and E is the commonest *final* letter which enables us to guess words like THE, ARE, HAVE, etc.

Often we strike single letters standing alone. Then we know that either I or A is indicated, because these are the only two letters which are words in themselves.

"P.W." CIPHERS No. 1

Atlantis and Lemuria are at war! Secret information of high military value has been leaking out! Strange, unintelligible signals have been heard on the ether! The spy station has eventually been located by the aid of the "pirate finder," and the following message (in code) has been found on the sender's message block:

I WTD VIHJL HTIUF VIX FIM PTTW JWCTWUTH FTVT. DT DJBB MTWH UFT HTUIJBM UL UFT MIKT ABIQT DJUF UFTMT LUFTV VTALVUM.

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, February 11th. The Editor's decision is final.

Now, can you make it all out? It's worth trying. If you think you have solved it, write your translation on the back of a postcard, add your name and address, and post to: "P.W." Ciphers No. 1, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.).

Here is a little problem for you to try your hands on. The first thing to do is to count up the number of times each *different* symbol occurs. This will probably mean the letter E. This, in turn, will enable you to guess words like THE and THESE. There is one thing to keep in mind. Always try to fit common words first.

If you get stuck refer to the Frequency List, which might help you quite a lot.

[*Solution and winner will be given next week.*]

RADIOTORIAL
QUESTIONS AND ANSWERS

A selection of readers' queries, the answers to which are of general interest. Although our query editor endeavours to present his material in the most entertaining manner possible, and even introduces a spot of humour now and then, the purpose of this important feature is to convey authentic advice and information regarding the various aspects of home radio and to present solutions of those tricky problems which you all encounter from time to time.

LIFE'S LITTLE PROBLEMS

T. L. M. (Forest Gate).—"You get a good many problems to solve, but I'll bet you never had one to beat the following:

"My set, all-mains four, recently developed a sort of rustling noise, and I found I could cure this by pushing down the grid leak with a pencil. The other night the noise came on, just when I wanted to hear Nelson Keys, so I didn't wait to pick up a pencil, but pushed the leak down with my finger instead.

"Evidently I touched something else. For suddenly twenty million needles stuck into my hand, inside the set, and I stepped back with a jerk, knocking over the loudspeaker.

"This fell over on to a tray with coffee cups on. Coffee and milk flowed all over the carpet, frightening the dog, who banged against another small table and knocked the lamp over.

"The bulb went off with a bang, and all the lights in the house went out!

"The funny part of it was that it all happened so suddenly. One minute we were listening in comfort. The next moment all the above had happened, the lights had gone out, and in the silence that followed my small son piped out, 'The wireless has stopped, Daddy.'

"What do you know about that?"

Good for you, T. L. M. It's not everybody who could see the funny side of a catastrophe of that magnitude! We congratulate you on your philosophic attitude, and draw two lessons from the incident.

In the first place, it is not wise to poke about inside a switched-on mains set.

Secondly, if you do get radio trouble, its seriousness will depend on the way you take it.

So, when the tumult has died away, T. L. M., write us again if the set won't work. We shall be delighted to help a man who can laugh at an electrical earthquake like that one!

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 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.

S.T.700—IMPORTANT

W. C. A. (Paddington).—(1) "Will you let me know how I can build the S.T.700 with a push-pull output stage instead of using the PX 230? I am specially interested in

(*Continued on next page.*)

RADIOTORIAL QUESTIONS & ANSWERS

(*Continued from previous page.*)

Mr. Scott-Taggart's audio reaction scheme, but I do not see how this can be applied to a push-pull arrangement.

"(2) Also, would it be beneficial to use an H.F. pentode as detector, while retaining the audio reaction, when push-pull output is used? I should be glad of any remarks you can make upon the best way of setting about the modification."

Since you find the audio reaction "specially interesting," W. C. A., why not give it a fair trial? And, if you admire the S.T.700, why not build that set?

(1) *You cannot* build the S.T.700 with a push-pull output stage. *You cannot modify it in any way* after your own ideas without spoiling it.

(2) In describing the S.T.700, Mr. Scott-Taggart said: "As far as I know, this is the first occasion on which the principle (of adjustable audio reaction) has been successfully applied, or, for that matter, attempted." Remember that! And remember, when a new set is introduced, and even more especially when that new set contains a new principle, the *only* way to build that set is to follow the designer's recommendations.

We repeat, THE ONLY WAY TO BUILD THAT SET IS TO FOLLOW THE DESIGNER'S RECOMMENDATIONS.

If you wanted to know the *easiest* way to build the S.T.700 successfully, we should have to say, FOLLOW THE DESIGNER'S RECOMMENDATIONS.

On the other hand, if you wanted to know the *surest* way to build the S.T.700, experience would compel us to advise you to FOLLOW THE DESIGNER'S RECOMMENDATIONS.

In fact, to achieve satisfactory results, it is very important that the set-builder should FOLLOW THE DESIGNER'S RECOMMENDATIONS.

WHAT'S IN A NAME?

A. O. W. S. (London, E.C.1).—"What is the difference between a wavemeter and a frequency meter? I have been comparing the two circuits, and cannot find any important differences, so perhaps there is a mistake in my circuits?"

No, there is no mistake, because a wavemeter circuit should look exactly like a frequency-meter circuit. The difference between the two instruments is in the calibration only.

The wavemeter is calibrated in metres, to indicate wavelength. The frequency meter is calibrated in kilocycles, to indicate the frequency.

Otherwise the instruments are identical.

WHY IS A PENTODE INJURED BY DISCONNECTING THE LOUDSPEAKER?

H. V. D. (Brighton).—"It seems to be generally accepted, and I have seen the statement more than once in 'P.W.,' that a pentode is liable to injury should the anode circuit be broken, though a triode is apparently unharmed. I should be grateful if you could tell me *why* this should be so, and also whether a tetrode is similarly affected.

"Efforts to obtain this information from those that should know have been singularly unsuccessful, but I feel sure 'P.W.' can satisfy my curiosity."

The reason that the pentode is liable to injury in this manner, while a triode is not so liable, is two-fold.

In the first place the construction of the pentode, with a greater number of electrodes in a given space, renders it a more "ticklish" valve to manufacture with due regard to spacing, insulation, and so forth. Rough or improper treatment would therefore be more likely to upset a pentode than a triode.

The foregoing aspect, however, is comparatively unimportant, for manufacturing methods are continually undergoing improvement, and the valve's design gets more and more robust. The really important peculiarity of the pentode from the point of view of accidental damage due to an open anode circuit is its high impedance.

In order to function satisfactorily the pentode must have a high-impedance output load; and whereas the triode output valve is quite happy with a 4,000-ohm load, perhaps the pentode demands a much higher value.

Now consider the effect of breaking the grid or anode circuit of the output pentode. Apart from the sudden removal of any impressed voltage, there is an enormous change in anode current due to the changed conditions.

A break in the grid connections, for example, would send the anode current soaring upwards, due to the removal of grid bias.

Alternatively, a break in the anode circuit would convert the valve, in effect, into a triode. Its screen current would rise enormously, and cause loss of emission.

With a high value of impedance, as used in pentode circuits, a sudden removal of the *loudspeaker load* will cause the anode circuit's characteristics to alter so greatly that tremendous A.C. voltages are developed across the inductance in the anode circuit, due to the incoming signals. These voltages may easily be of such magnitude that internal damage to the valve will result. The valve instead of being a power amplifier has become a voltage amplifier.

The tetrode also has a high anode impedance, but since it has a comparatively very small anode current it is not liable to the same degree of damage when its anode circuit characteristics are altered suddenly.

But the output pentode gets it both ways. The anode circuit, therefore, must not be too drastically changed. Hence the two important rules for pentode operation:

(1) Never interfere with the anode circuit while the set is switched on; and (2) never break the grid circuit while the set is switched on.

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page* 652.)

Voici maintenant le programme de ce soir (this evening's programme)

Vous allez entendre la première de 4 Causeries par Monsieur R. (the first of four talks by Mr. R.)

Dans quelques instants vous allez entendre les prévisions météorologiques (the weather forecast)

And after the broadcast:

Vous avez entendu une causerie littéraire (a literary talk)

Vous venez d'entendre des informations de presse (press news)

L'émission que vous venez d'entendre est exécutée par l'orchestre de Radio-Paris (the broadcast which you have just heard was given by the Radio-Paris Orchestra)

Let me repeat once again the five expressions I want you to listen for:

1. VOUS ALLEZ ENTENDRE
2. ÉCOUTEZ MAINTENANT
3. VOUS AVEZ ENTENDU
4. VOUS VENEZ D'ENTENDRE
5. VOICI MAINTENANT

And lastly, a word or two about the joining up of words in speaking and reading. It is generally the practice in French to carry on the sound of the last consonant of a word to the next word when it begins with a vowel or a silent *h*.

For the present, however, remember always (1) to join the DEFINITE ARTICLE "LES" to its noun whenever the noun begins with a vowel or a silent *h*.

Examples:

les⌣émissions les⌣heures⌣enfantines

And (2) the PRONOUN SUBJECT "VOUS" always joins up with its verb "AVEZ," e.g.: Vous⌣avez⌣entendu

Look at the imitation pronunciation (above) of this sentence.

WE APOLOGISE

Owing to great pressure on our space several articles have had to be held over. These include Dr. Roberts' Technical Jottings, W. L. S.'s Short-Wave Correspondence and Short-Wave News. G. T. Kelsey's description of the alternative fixing for the "Rotalog," and several special contributions which are not regular features and had not been previously announced but which we had very much hoped to have been able to include in this issue.

However, there is always next week . . . and the week after that! Still, we realise that among the held-outs there are articles many readers would have liked to read *this week*. Please accept our sincere apologies.

BARRY KENT CALLING!

Our exclusive broadcasting news feature. Barry Kent secures "scoops" almost every week, for he has an uncanny knack of being able to "get there first." Watch his paragraphs in "P.W." and note how long it is after they appear that many of his news items find their way into the newspapers!

"Northern" European Exchange.

THE North Region of the B.B.C., under the able and imaginative guidance of "Red Ted" Liveing and "Archie" Harding, turn out more than their share of original ideas. They have now discovered strong links between individual towns and cities of their Region and towns and cities on the Continent. So they are going to link them up in programmes. For example, Leeds–Roubaix. The subject appears to be rich in that kind of historical material which lends itself particularly well to microphone portrayal.

* * *

Olympic Sports Relays

The concluding stages of the Olympic Winter Sports at Garmisch, Germany, are to be broadcast by the B.B.C. The chief interest will be in the ice-hockey, which will be covered by Mr. Bob Bowman, the young Canadian member of the Empire news staff, supported by Mr. Dick Carpendale, the athletic son of Sir Charles Carpendale, deputy chief of the B.B.C.

These commentators will tell the listeners of both America and Britain about the finals and semi-finals of the world ice-hockey championship. The favourites for the finals are Canada and the United States. Incidentally, it is a compliment to the B.B.C. and Bob Bowman that he was specially chosen as the best available commentator for the Columbia network of U.S.A.

* * *

Grenadier Guards at Zoo

The B.B.C. has decided to relay the Grenadier Guards Band from the Zoo once a fortnight during the summer. This will be a very popular decision among listeners generally. The Guards Bands pick their programmes with unerring judgment.

* * *

Armistice Day

Last year the B.B.C. tried an experiment with Armistice Day. For the first time they got away from the 1914–1918 War atmosphere and celebrated the bravery and devotion of Scott in the Antarctic. It has been decided that the experiment was a success, so the "war atmosphere" is gone for good so far as celebration of Armistice Day on the air is concerned.

* * *

Programmes Stabilised

Many ambitious plans for programme development this year have had to be shelved. About £800,000 has been found for the programme services, or about £100,000 more than last year. Most of the increase has gone to light entertainment, with the balance fairly evenly distributed. But the demands of television are proving more expensive than was expected. There is no hope of radical improvement in the ordinary sound service. On the other hand, the progress of light entertainment should be steady throughout the year.

* * *

Palm Sunday Surprise

The B.B.C. has decided to include the play "The Upper Room" before the main evening broadcast service on Palm Sunday. This is an important departure from tradition.

* * *

"Death in the Dressing-Room"

This is the title of a "musical thriller" which will be broadcast in the National from 8.30 to 9.30 on Monday, March 16th, and in the Regional from 7.45 to 8.45 on the following evening. I hear it is first rate, and listeners should note it specially.

* * *

"Foundations of Poetry"

After years of "Foundations of Music" we are to have a parallel course to be entitled "Foundations of Poetry." This is the result of a good deal of agitation on the part of Mr. H. A. L. Fisher, Warden of New College, recently appointed a Governor of the B.B.C., supported by the new Chairman, Mr. R. C. Norman.

If, as is alleged, the Foundations of Music influenced millions to appreciate good music, then the same process is to be applied on behalf of poetry. Many likely readers of poetry are being tried out, but the B.B.C. says that so far only two or three really good ones have been found.

* * *

Studios Too Hot

The Talks officials of the B.B.C. have been complaining vehemently about the heat of the studios in which their work is carried out. There is apparently a committee in charge of studios and it is this

(*Continued on next page.*)

BARRY KENT CALLING!

(Continued from previous page.)

body which decides on all matters such as temperature and air pressure. But what is right for talks is usually too cold for the variety people; so it is not easy to please everyone simultaneously.

* * *

"Nationalism" on the Air

Next autumn Moray McLaren promises to treat us to another of his stimulating series of talks, this time the subject being the various aspects of nationalism encountered in the British Isles. Scotland and Wales are definitely to be included: Ireland is under consideration as it presents rather a different problem.

* * *

"Live List" of Artists

In looking through a part of the "live list" of artists at Broadcasting House the other day, I was interested to pick out these names, all of whom we are likely to hear before long: Albert Chevalier, Joan Matheson, Winnifred Evans, Peggy Webster.

* * *

Sir Walford Davies Joins Variety

Sir Walford Davies is likely to resume broadcasting in the general programme under the aegis of Mr. Eric Maschwitz, who is planning a most attractive presentation of Sir Walford in his rôle of world's greatest interpreter of good music to the multitude.

THE LINK BETWEEN

In which G. T. Kelsey maintains a friendly liaison between the radio industry and readers of "P.W." He also describes the newest catalogues and leaflets and will get you any of them if you send him a postcard giving the numbers of those you would like to have.

I HAVE been doing these notes for so long now that I have grown up to regard this almost as my own little corner of "P.W." Perhaps I should say rather as *our* own little corner. For there is a very great difference between writing an article for the main part of the issue and writing this.

In the case of an ordinary article, where the subject is perhaps of a general nature, the author is conscious of the fact that his remarks are addressed to a vast, unseen army of readers merely on the evidence of "P.W.'s" robust circulation figures. The subject may be of such a nature that correspondence is not occasioned.

But with "Link Between" it is very different, and on every day of the week, and particularly on Monday mornings, the pile of cards and letters on my desk, which are a direct result of our literature service, makes me very conscious of the fact that you follow these notes. I almost feel that I know you—indeed I *do*, by name. And I must confess that I derive a great deal of pleasure from your little confidences and exchanges of views which so often accompany your applications for catalogues.

It is, in fact, a very tangible link that is forged by your communications, and because I feel that I know you, Mr. Thompson, of Wallsend, and you, Mr. Dunn, of Leith, and you, Mr. Medlan, of Dartmouth, and all of you, I do try to abandon formalities and to write these notes rather more from the personal angle.

And it is from this angle that I want to say just a word or two about the "Axis." Obviously, the biggest obstacle in urging you not lightly to overlook it lies in the fact that I am responsible for it. I have purposely to put the damper on my own enthusiasm because—well, I would far sooner that you should judge its merits for yourselves.

Let me just say, therefore, as the one who has had more to do with it than anybody else at the moment, that I really do think that you will be missing something if you do not build it. It isn't just a question of possessing a short-waver. It's the joy of having a world-getter, the like of which is unobtainable in any other quarter—a set, in fact, which I sincerely believe will bring short waves within the reach of everybody.

This little tip, straight from the horse's mouth, as it were, is based upon my own personal experiences of the set, and you have my word for it that if you follow the "book of rules" you will not be disappointed.

"Bad Boys," Kindly Note

It is not often that I have a little grumble to get off my chest. But just lately there has been a phenomenal increase in the number of applications under our postcard service, and in consequence the percentage of "bad boys" has shown signs of increasing. I am thankful to say that even now the percentage of readers who fail to comply with our very simple regulations concerning postcard literature is fortunately very small.

But even half a dozen irregular applications can cause slight dislocation of the system which has been developed for dealing with your applications, so perhaps I may be forgiven for calling attention to the matter.

First and foremost, may I remind you that the correct postage on a postcard is 1d.? Several cards of late have been received with only a ½d. stamp on, which means not only that the cards are subjected to delay, but that we have to pay postage due on them. It is also "against the rules," if you prefer to write a letter instead of sending a postcard, to put that letter inside an unsealed envelope with only ½d. stamp on it. In other words:

To use a stamp that riles the sorter,
Now that's a thing you never ought'er!

Just one further point. May I ask that where possible you will be good enough to print your names and addresses in block capitals.

A Stunning "Bob's" Worth

The essence of our literature service is that it is free. In the ordinary course of events you can apply for as many catalogues as you like, and the only cost to you is the 1d. (not ½d.!) stamp on your postcard application.

But among the many and varied catalogues that I receive, occasionally one comes along for which, usually on account of its size and the wealth of information contained in it, a small charge is made by the manufacturers who have produced it to cover the cost of packing and posting.

I usually judge such a catalogue on its merits, and if I consider that it is one in which "P.W." readers are likely to be interested, I feel that it becomes my duty to include it in what is otherwise a free service. That this occasional departure meets with your approval is very obvious from the number of applications I get—usually as many, and sometimes more than when there is nothing to pay.

But have no fears, I am not going to make a regular habit of it. The free service will remain in principle as long as I have anything to do with it.

However, this week a book has been sent to me which is so absorbingly interesting and so essentially practical that I cannot let the opportunity pass of bringing it to your notice, despite the fact that it costs money. But it very definitely does not fall into the catalogue class. It is a constructional manual roughly about the same dimensions as "P.W.," and contains 40 pages of first-class information.

The book in question is "Radio Progress," published by that enterprising firm, Bulgin, and it contains full constructional details, including theoretical and wiring diagrams, and all the necessary component values for ten tested circuits. These include a three-valve battery Q.P.P. set, a five-valve A.C.-D.C. superhet, an A.C.-D.C. short-wave converter, a ten-watt A.C. amplifier, a short-wave superhet, a four-range A.C.-D.C. superhet, a battery short-wave converter, a radiogram five-valve A.C.-D.C. superhet, a five-watt D.C. amplifier and a midget self-contained portable.

"Radio Progress" is very well printed indeed, and the descriptive matter concerning the various sets and amplifiers is excellent. It costs a shilling, but that amount cannot possibly repay Bulgin for all the work that must have been put into the production of the book.

I shall be happy to arrange for a copy of the book to be sent to you upon receipt of your application, enclosing a shilling postal order, or stamps to that amount. Make your postal orders payable to A. F. Bulgin & Co., Ltd., and I will do the rest (**No. 384.**).

Will readers please note that applications for the catalogues reviewed in "The Link Between" should be addressed to G. T. Kelsey, John Carpenter House, John Carpenter Street, London, E.C.4, mentioning the number given at the end of the review.

THE S.T.700 AUTO-DIAL

You can now get celluloid dials for the S.T.700. Special white dials, costing 3/- post free, are available from Celluloid Printers Ltd., Kingston By-pass Road, Surbiton, Surrey. The white matt surface is ideal for the marking of station names, and any pencil mark that is made wrongly can easily be washed off.

THE RADIO BULLETIN

A complete guide to all the current activities of the radio industry which are of direct interest to the listener. In this Bulletin you will find recorded each week news of every new set, component and accessory produced, or about to be produced, by the radio industry, together with price alterations and so on. It is the only guide of this nature available to the public and provides further proof of our desire to make "P.W." the complete radio journal for listener, constructor and experimenter.

PHILCO BATTERY RECEIVER

A FURTHER addition to the **Philco** range in the shape of a **three-valve battery receiver** costing £6 19s. 6d. is announced. Low battery consumption is a feature of this set, the H.T. current being only 8½ milliamps. Ganged tuning, a new type dial with station names and wavelength readings in white on black and an 8-inch permanent-magnet moving coil speaker are other features of the design.

* * *

THREE NEW MARCONIPHONE MODELS

Last week we made reference to the new **Marconiphone** all-wave model, and now comes news of **three more new sets.** These are **four-valve (including rectifier) designs for use on A.C. mains.** A special wavetrap is included in the aerial circuit to ensure freedom from Droitwich interference under all conditions, and a pentode output stage giving an undistorted power of 3 watts is employed.

The prices are as follow: Model 238, table receiver, 8 guineas; Model 237, a similar set to the Model 238, but housed in a cabinet of leatherette, 8 guineas: Model 245A, a radiogramophone employing the same chassis as the Model 237 and housed in a figured walnut cabinet, 16 guineas.

* * *

BURGOYNE PRICE CHANGE

As from February 1st the prices of the **Burgoyne** Dragon range are increased as follow: Dragon A.C. Superhet, increased from 10 guineas to 11 guineas; Dragon Radiogram, from 17 guineas to 18½ guineas; and the Dragon Recordagraph, from 20 guineas to 21½ guineas.

* * *

TRUPHONIC ALL-WAVE SETS

Details of the **Truphonic all-wave designs** are now available.

There are two models—one for A.C. mains and a universal type for A.C. or D.C. Both are priced at 12 guineas. A five-valve superheterodyne circuit is employed.

Among the special features of the set are quiet automatic volume control, variable tone control, and static suppression. The wavebands covered are 16–50 metres on the short waves, 200–600 metres on the medium broadcast waveband, and 1,000–2,000 metres on the long waveband. The tuning scale is independently illuminated for each waveband in three different colours.

* * *

CHANGE OF ADDRESS

Messrs. W. Andrew Bryce & Company inform us that they have now moved their offices and works to North Road, Burnt Oak, Edgware, Middlesex. This change has become necessary owing to increasing orders and to enable the firm to be near its source of raw materials.

Special departments have been planned for dealing independently with coil winding, mains transformers and chokes, and condensers. Rapidly increasing business is the cause of another move. This time it is **W. Bryan Savage, Ltd.,** whose new address is Westmoreland Road, Stanmore, Middlesex (adjoining Queensbury Metropolitan Station). This is Bryan Savage's second "step-up" in three years.

The new factory is already in production with the well-known Savage mains and public address equipment.

* * *

PRICE REDUCTION

The price of the Wearite type H.F.O. **H.F. choke** has been reduced from 6s. to 4s. 6d.

* * *

DRYDEX BATTERIES

Readers will be interested to learn that those **Drydex** H.T. batteries which are supplied in special sizes for various receivers are now to be labelled with the names of the receivers for which the particular battery is suitable. For example, the type H.1100 now bears a label signifying that the battery is suitable for the B.24 and B.25 Murphy sets.

* * *

RECTIFIER UNITS FOR D.C. SETS

Messrs. Holiday & Hemmerdinger are marketing a number of **rectifier units** designed to enable D.C. sets to be used with A.C. mains.

We are informed that these units have been supplied to Edmundson's Electricity Corporation in connection with their change-over from D.C. to A.C. mains at Glossop, Derbyshire, and very satisfactory results have been obtained on all kinds of receivers.

The units incorporate valve rectifiers, and are made for any specified load, the prices being from £2 12s. 6d. upwards.

* * *

THE ULTRA "26"

The latest addition to the **Ultra** range is an **A.C. superhet** costing 11½ guineas. Known as the **Ultra "26,"** this new model is provided with full automatic volume control and clock-face tuning, the wavelength-calibrated dial being clearly marked with station names. Simple control is a feature of this set.

EDDYSTONE SHORT-WAVE GEAR FOR THE MOUNT EVEREST EXPEDITION

The wireless equipment for the forthcoming Mount Everest Expedition, led by Mr. Hugh Ruttledge, is being supplied by Messrs. Stratton & Co., Ltd., the well-known makers of Eddystone Short-Wave apparatus. There are two short-wave C.W. transmitters and receivers for maintaining contact between the base camp and the outside world. In addition there will be six Eddystone 5-metre transceivers for inter-communication between the advance parties.

This, incidentally, is the first occasion on which radio is to be used for linking up the various camps.

RANDOM RADIO REFLECTIONS

By VICTOR KING

Mr. Victor King is one of our leading radio-set designers, but in these radio ramblings he assumes a lighter vein and shows us a most enjoyably humorous side to his character.

I TINKER—UNPAID

IT seems extraordinary to me that in these enlightened days more people have not mastered that very simple and most useful art of soldering. With a seven-and-sixpenny Solon electric iron, a tin of Fluxite, and a stick of solder, you can do all sorts of useful jobs with the greatest of ease.

And the iron hardly ever wants cleaning. You just connect it up, and while it's heating, clean the work with file and sand-paper (or just scrape it with a knife !), apply a little Fluxite, and by then the iron is hot and you neatly complete the operation.

I wish I had a shilling for every job of soldering I have carried out. I've mended kettles and cakestands, wired up radio sets, repaired jewellery, and patched up bathroom fittings.

Not so very long ago I filled in a leak in the boiler of a toy loco. for a small friend. Result—my fame as a tinker spread, and I now have a broken cannon and a rudderless clockwork speed-boat waiting my attention !

From the depths of my experience let me fish up one tip which doesn't often seem to be teamed up with the old diehards such as "See that the iron is hot and well tinned," "Thoroughly clean the surfaces to be soldered," etc. And that is, don't regard solder as a kind of metallic glue which can hold together anything with strength equal to that of the materials joined.

Solder is very soft stuff indeed, and not to be compared in strength with even copper, let alone iron or steel. Therefore, two pieces of soft steel joined together with solder are not as strong as one solid piece of steel, but only as strong as the solder will let them be. Riveting or other means of bracing the job is sometimes necessary to supplement the solder.

A THIN POSTBAG

OVER two days of last week I received only one letter—which is a record. And the writer of this letter added the following postscript: "After reading the above, please pass on to the Editor of POPULAR WIRELESS to qualify for the guinea best letter prize."

What do you think of that ? It's almost as bad as writing a letter to your girl friend ending: "P.S.—Please, Maggie dearest, pass this letter on to the Editor of the 'Daily Scream,' which is running a competition for the sweetest love letter."

My, oh, my !

Let there be no misunderstanding about this matter. I positively have no connection at all with that correspondence shop a few pages up the street. Letters addressed to me are sent on the writers' own responsibility to me as a private person.

All the same, I welcome them even though a good fifty per cent of those which arrive are requests for technical assistance in matters radio, and which cause your little Victor to spend lots of hours per week trying to answer !

THESE I DISLIKE

In reply to a query from Mr. A. Curtis, of Manchester :

I DISLIKE Hughie Green and His Gang, Mr. Sydney "Excitement" Horler's books, Mr. Cochran and Beverley Nichols, Continental salads made with fruit and oil, most politicians, central heating, male impersonators, effeminate men, masculine women, beer (but not good wine, when I can get it), Dick Powell, Mae West (but not some of her jokes), underdone fat bacon, and a whole host of other things and persons.

But I realise that others *do* like such things, and so, being a tolerant sort of bloke, I just avoid them as much as possible and don't let them obsess me with consuming hatred. Maybe that's why I've got a good digestion !

NEXT WEEK !

There will be **another Competition** with a grand First Prize and six other prizes.

* * *

The solution of the First Mystery Cipher will be given together with a **second Cipher** to puzzle and amuse you.

* * *

Further articles on the **Kelsey "Axis"** set and the ingenious **"Rotalog"** will appear.

P.S.—Oh, yes, I've used the word "hate" quite a lot at one time and another. But that is mere carelessness ! So here is a general correction for all my past and future articles—For "hate" read "dislike." What's the difference ? As I see it, to dislike is merely not to like. To hate is to get angry about it, all red round the gills, want to run berserk, write to the newspapers, to develop spite, to wish to break something or hurt someone. But, I ask you, fancy letting anything or anybody get you down to that extent !

GOLDFISH AT DROITWICH

SOMEWHERE I saw the statement that the B.B.C. has goldfish in its water-cooled valves at Droitwich. The reason given is that the fish consume the moss and the seaweed which would otherwise gather in the valves and cause interference with the clarity of the programmes.

Let's not comment on this lest our wit run into intangling depths.

Shall we maintain a discreet silence the while we ponder the thought solemnly ?

A READER'S DREAM

AS you may have gathered, quite a number of people write to me. Much to my very great delight because there is nothing I like better than to receive letters. I get a real thrill when the postman delivers to my home address a big envelope which I at once recognise as letters forwarded on to me by the Editor.

Recently I told you about a doctor fellow who wrote to me regarding a dream theory connected with the activities of radio waves. And now I have a letter from a Mr. Bolton which reveals a rather different aspect of the subject. He says :

"One night I had a most amusing radio dream. I dreamt that I went over to my wireless set to switch it on, but instead of anything coming from the loud-speaker the whole of the front of the set burst into illumination and became like a cinema screen. It was a cinema screen, for there were figures moving about on it. A tall figure, grave and well dressed, obviously Sir John Reith, was striding up and down with a number of short men following him like the tail of a comet. Up and down they strode and every now and then another man would join the procession until it became so long that it stretched across the whole of the huge room in which the scene was taking place. Suddenly the leader stopped, turned round and raised a hand imperiously, at which the follower nearest to him fell down backwards, carrying each of the others down with him like a row of skittles falling. Said the figure who looked like Sir John Reith, very seriously and in ringing tones, 'That exactly proves my point.'

"Then I woke up. But the next day I went to a cinema and saw a picture entitled "A Fire Has Been Arranged." This was a comedy starring Flanagan and Allen. Another member of the cast had a very distinct resemblance to Sir John Reith. A coincidence ? Or does it PROVE ANY POINT ? "

Search me, I don't know. Maybe it proves that what Mr. Bolton had for supper was even worse for him than Night Starvation !

A NOISY INTERFERENCE SUPPRESSOR

THERE'S a contradiction in terms, if you like. Having experienced some electrical interference on my home set, I fitted a suppressor device. It was most successful—for a time. Then a new and louder series of noises began to come through. These were so loud, in fact, that they seriously interfered with the programmes.

It took me quite a long time to trace the cause. But who would think that a *suppressor*—a device designed to eliminate nasty noises—would itself turn into a maker of interference ?

Actually, though, it wasn't in the thing itself that the trouble originated, but in the earth connection to it. But I am puzzled as to why a poor earth connection in such circumstances could cause such loud noises. One could understand that it might kind of switch in and out those noises which were present before connecting the suppressor into circuit. But why louder noises than that ?

Can any of you tell me ? Am I an ignorant fathead that *I* am unable to tell *you ?* Mr. B. T. G. of Liverpool will be delighted with this opening, and already he'll be reaching for a pen with which to inscribe a large "Yes" on an unstamped postcard !

Printed in Great Britain and published every Wednesday by the Proprietors, THE AMALGAMATED PRESS, LTD., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices : John Carpenter House, John Carpenter Street, London, E.C.4. Registered for transmission by Canadian Magazine Post. Subscription Rates : Inland and Canada, 17/4 per annum. Abroad (except Canada), 19/6 per annum. Sole Agents for Australia and New Zealand : Messrs. Gordon & Gotch, Ltd. ; and for South Africa : Central News Agency, Ltd.—Saturday February 8th, 1936.

S.S.

MISCELLANEOUS ADVERTISEMENTS

3d. per Word

6d. per word for first words in heavy type.
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.
The Proprietors have the right to refuse or withdraw advertisements at their discretion.
Postal orders, in payment for advertisements, should be made payable to the Amalgamated Press, Ltd., and crossed.
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.—Blue Spot 1935 Series, with Universal Transformers to match any circuit. 99 P.M. 24/6; 32 P.M. in exquisite Cabinet, 42/- (List 97/6); 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). Lissen BAND-PASS 3-valve Battery Kits, 62/6 (List 99/6).
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.—Igranic Superhet Coil, set of four (1 Osc., 2 I.F. with Pigtails, 1 L.F. plain), 9/- per set (List 50/-). 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.
20/- PARCEL.—This is known as the "small trader's" parcel, and contains a wonderful selection of components valued at 85/-. We have supplied this parcel to hundreds of Traders for re-sale at a profit.
TELSEN BRAND-NEW COMPONENTS. BARGAIN PARCELS.—We are offering parcels of Telsen Components, each parcel containing 1 Binocular Choke; 1 Screened H.F. Choke; 1 5/1 Ace Transformer; 1 0·0005 Variable Condenser. Coils of wire; Resistances and Telsen Circuits. 10/- per parcel. Every article is brand-new and in original sealed carton. The list price of this parcel of Components is 30/-. Our Price 10/- per 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.

BANKRUPT BARGAINS. List free. All goods new. Amplion A.C., 12-gn. 5 v. superhets, £7.10.0. Burgoyne 15-gn. A.C./D.C. 1936 radiogram, 10 gns. Table A.C. radiogram, £7.10.0. Fury 4 v. A.C./D.C., £5. Mullard M.B.3 battery set complete, £4.15.0. Practically every type of replacement valves. A.C. and universal. Large stock components. Electric irons, 3/9. Soldering irons, 1/4. Write for quotations. Butlin, 6, Stanford Avenue, Brighton. Preston 4030.

RECEIVERS, COMPONENTS AND ACCESSORIES

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

VAUXHALL. Hivac Valves, all types, Mains and Battery, in stock for immediate delivery.
VAUXHALL. T.C.C. condensers, 4 or 8 mfd. dry electrolytic, 500-v. working, 2/6; 550-v., 3/-.
VAUXHALL. Polar station named. Scales for R.V.P. Horizontal Drives, 1/9.
VAUXHALL. Polar Midget 3-gang condensers, straight or superhet, 8/9; Polar full vision, horizontal or Arcuate dial and drives, 4/6.
VAUXHALL. Centre tapped iron-cored L.F. transformers, bases, terminals, 110 k.c.; 6/6. Guaranteed.
VAUXHALL. Set manufacturers' surplus, skeleton type Westinghouse rectifiers, H.T.8, 9/6, H.T.9, H.T.10, 10/-, complete with fixing brackets; Westectors, W.4, W.X.6, 5/9.
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, 10d.; 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. Permanent magnets, universal, suitable for Class "B" power or pentode, 7 in. cone, 16/6; 10 in. cone, 23/-.
VAUXHALL. Mains energised, 2,500 or 6,500 field coil, 10-in. cone, 17/6; 7 in. cone, 12/6; complete with humbucking coils; state power or pentode transformer; immediate delivery. Fully guaranteed.
VAUXHALL. Colvern G.1, G.2, G.3 or G.1, G.2, and G.8; superhet type, 30/-; Colpaks, £2/4/0.
VAUXHALL. Benjamin Class "B" transformers, 1-1½, to 1, 6/6; volume controls, Radiophone, with switch, 5,000 to 500,000, 3/-.
VAUXHALL. B.T.H. Minor, 16/6; Senior, needle armature, 29/-; Radiophone, 14/6; others from 10/-.
VAUXHALL. B.T.H. Truspeed gramophone motors, 30/-; Universal D.C./A.C., 47/6; sealed cartons.
VAUXHALL. Collaro 32 model, 32/6; Universal model, 47/6; complete unit, A.C., 200–250 v., first quality pick-ups and volume control, 48/-.
VAUXHALL. T.C.C., 200-mfd., 10-volt, 3/-; Continental valve holders for Universal valves, with terminals, 9d.
VAUXHALL. Repairs and conversions, any type receiver. Trade discounts allowed. Drawings and Advice, Queries, free.
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.

"AXIS"—"AXIS"—"AXIS." Complete Specified Kit, 57/6 (6/4 monthly). Lists Free. Trade Supplied. **MELFORD RADIO,** Queen's Place, Hove.

HEADPHONES. Brown, G.E.C., Western Electric, Siemens, B.T.H., Nesper, Brunet, Sterling, etc., 2,000 ohms, 2/6; 4,000 ohms, 5/-. Postage 6d. Guaranteed.—Kodesh, 56, Barnsbury Street, London, N.1.

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 1½d. STAMP FOR CATALOGUE.

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

NEW RECEIVERS, COMPONENTS, ACCESSORIES, &c.

NEW RECEIVERS, Kits, Components, supplied for cash, Blue Spot a speciality. Enquiries: Timmis, Radio Shop, Buerton, Audlem, Crewe.

"ALL-WAVE" A.C. Five, £9 9s. Novo Radio, St. John Street, Newcastle-on-Tyne, 1.

AMERICAN VALVES, by return post. Order by valve number. Post Free.—Giffen's, 373, Edgware Rd., W.2.

SITUATIONS VACANT

G.P.O. ENGINEERING DEPT. (No experience required.) Commencing over £4 per week. Age 17–23. Excellent prospects. Free details of Entrance Exams. from—
B.I.E.T. (Dept. 568), 17–19, Stratford Place, London, W.1.

POST OFFICE ENGINEERING. Excellent openings for youths and men. Good pay and prospects. Free details of vacancies, etc., from N.I.E. (Dept. 606), Staple Inn Buildings, High Holborn, W.C.1.

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.

HIGHEST POSSIBLE ALLOWANCE MADE ON YOUR OLD SET OR COMPONENTS IN PART EXCHANGE FOR ANY NEW SET OR PETO-SCOTT KIT. Bargains—S.T.600, £3; S.T.500, £2/5/0; S.T.400, £1/15/0; S.T.300, £1/7/6, all built, with valves. Lists free.
R. WIGFIELD, FURLONG ROAD, GOLDTHORPE, YORKS.

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.).

ELECTRIC MOTORS, Drills, Grinders, all voltages from 18/-. Lists Free.
EASCO, 18, Brixton Road, S.W.9.

MOVIES at home. How to make your own Cinema Projector. Particulars free.—Moviescope (P.W.), Pear Tree Green, Doddinghurst, Essex.

NEAREST OFFER. £4.10.0 secures S.T.700 with valve, exact specification.—Radiomart, 22, South End, Croydon.

500 GLADIOLI, 3½-4 inch circ., in 10 best named vars. 100 Double Anemones, 100 Single Anemones, 100 Clover of Happiness and 25 Double Begonias for only 7/6; double lot, 14/-. Carriage and duty paid to destination.
P. WALRAVEN, Stationsweg, Hillegom, Holland.

1 AMARYLLIS HIPPEASTRUM (for pot), the largest flower in cultivation; 500 Gladioli, first size, 4-5 inch circ., in 20 best named vars.; 100 Anemones, 50 Montbretias, 100 Clover of Happiness, 25 Double Begonias and 5 Liliums for only 10/-; double, 19/-. Carriage and duty paid to destination (C.O.D. 6d. extra).
P. WALRAVEN, Stationsweg, Hillegom, Holland.

500 GLADIOLI, first size, 4-5 inch circ., in named vars.; 100 Anemones, 100 Ranunculus, 25 Double Begonias, 5 Lilium Regale and
1 AMARYLLIS HIPPEASTRUM (for indoor cultivation) for only 10/-; double lot, 19/-. Carriage and duty paid to destination (C.O.D. 6d. extra). We guarantee that the Amaryllis flower with two large flowers measuring to 6 inches across. Cash refunded in full if not satisfied.
THE FIRST HILLEGOM BULB NURSERIES, Hillegom, Holland.

The Magazine of Masterpiece Fiction

The ARGOSY offers a splendid variety of really first-class fiction each month. Every story sets a standard of excellence, for the policy of this magazine is to print those stories which are indisputably great and written by acknowledged masters of the past and present day.

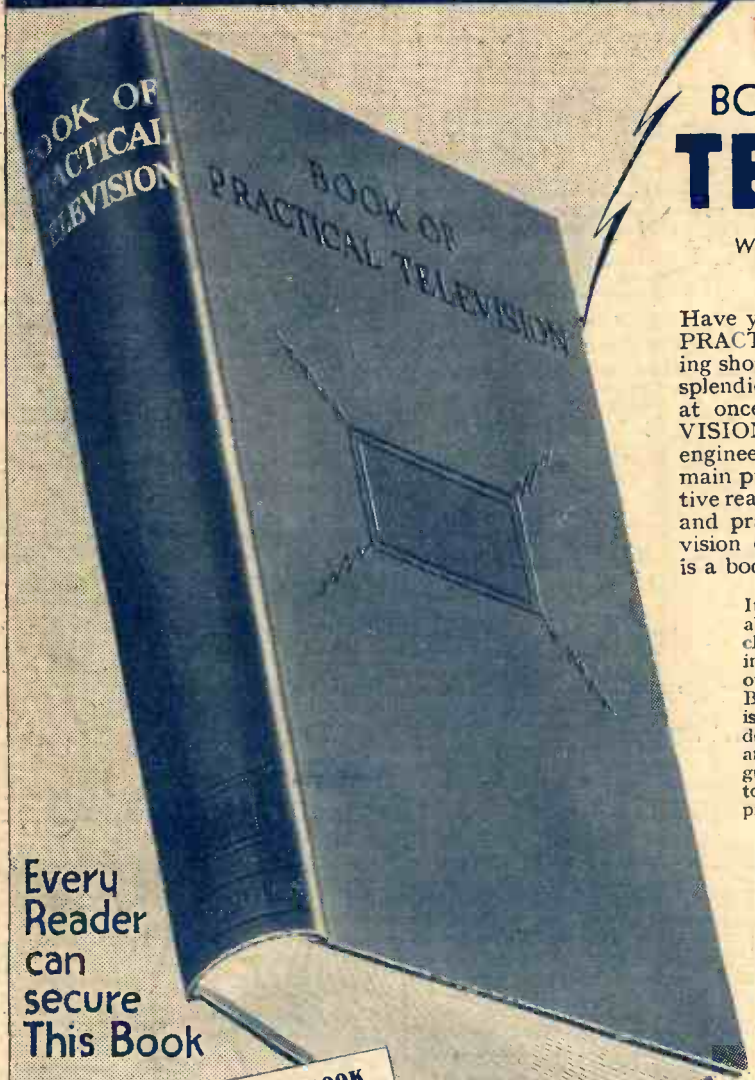
Famous authors whose masterpiece stories appear from month to month in the ARGOSY Magazine include

A. T. Quiller-Couch :: John Buchan
W. Somerset Maugham :: W. W. Jacobs
etc., etc.

The ARGOSY *MAGAZINE*

At all Newsagents. *Monthly* 1/-

ANOTHER OPPORTUNITY TO SECURE OUR WONDERFUL PRESENTATION VOLUME



THE FIRST GREAT BOOK DEALING WITH TELEVISION

Written and prepared under the direction of
G. V. DOWDING (*Associate I.E.E.*)

Have you applied for your copy of the BOOK OF PRACTICAL TELEVISION yet? Time is drawing short and if you want to take advantage of this splendid opportunity you must reserve your copy at once. The BOOK OF PRACTICAL TELEVISION will prove of great use to the television engineer and the television industry. But its main purpose is to provide enjoyable and informative reading for the listener and potential "looker" and practical and trustworthy guidance for television experimenters and home constructors. It is a book of equal value to amateur and expert.

It contains a vast amount of information which is absolutely original and which has never been disclosed previously in any journal or book. It even includes the full constructional details of a complete outfit suitable for the reception of the forthcoming B.B.C. television programmes, and this instrument is the very first home-constructor set for the new high-definition television in the whole world. In the ordinary way such a volume would not be sold under one guinea, but a large printing order has made it possible to offer this magnificent book to our readers at a price that is little short of a gift.

Here are notable contributors to this great work:

Sir NOEL ASHBRIDGE, B.Sc., M.I.E.E. (*Chief Engineer of the British Broadcasting Corporation.*)
L. T. BRANCH, B.Sc., A.I.C., **A. S. CLARK, G. PARR, ALAN HUNTER, J. C. JEVONS, G. T. KELSEY, Sir OLIVER LODGE**, F.R.S., **L. H. THOMAS, Dr. JOSEPH HARRISON ROBERTS**, F.Inst.P., **K. D. ROGERS** (*Fellow of the Television Society*), **J. F. STIRLING**, M.Sc., A.I.C.

This book is Superbly Bound in Rich Shade of Green Cloth with Silken Finish and contains 26 CHAPTERS, 384 PAGES including 63 ART PLATES and over 300 ILLUSTRATIONS.

Every Reader can secure This Book

HOW TO OBTAIN THIS BOOK

First of all you must write your name and address on Form 1, which is just an ordinary label, on which you must stick a ½d. stamp. Then fill in Form 2 which is your reservation form. Then send these two forms to POPULAR WIRELESS Presentation Book Dept. (G.P.O. Box No. 184a), Cobb's Court, Broadway, London, E.C.4. When they are received in our office, you will be sent a Gift Voucher on which to qualify for your "Book of Practical Television."

There are four spaces on this Gift Voucher on which you will have to stick four Gift Tokens cut from the bottom left-hand corner of the last page of reading matter of POPULAR WIRELESS. Any four tokens will do, but they must be consecutive. When this Gift Voucher is complete—i.e., after four weeks—you are asked to send a P.O. for 3/-. This 3/- is to cover the cost of cardboard container for packing, carriage and delivery to your door, and insurance. The "Book of Practical Television" can only be supplied to readers who complete the necessary Gift Voucher.

As this volume is only available to regular readers, if you have not placed a regular order for POPULAR WIRELESS you must do so at once. This offer applies only to readers residing in Great Britain and Northern Ireland. Irish Free State readers will be liable for any import duty imposed.

FILL IN THESE FORMS TO-DAY

1

½d. stamp must be affixed here by YOU

Name .....

Full Address .....

.....

.....

RESERVATION FORM

POST AT ONCE

2

Applicants must complete label on left and affix halfpenny stamp in space provided. Fill in this Reservation Form and send with label to:—

Popular Wireless Presentation Book Dept. (G.P.O. Box No. 184a), Cobb's Court, Broadway, London, E.C.4.

I hereby apply for GIFT VOUCHER and request you to reserve for me in accordance with your special offer the presentation "Book of Practical Television." I have given a standing order to my newsagent to supply POPULAR WIRELESS regularly each week.

Reader's Name .....
(State Mr., Mrs. or Miss)

Full Address .....

.....

Newsagent .....

For Office Use.

Address .....

.....

PLEASE WRITE IN CAPITAL LETTERS. You Must Fill in Label on Left and send with the Reservation Form in unsealed envelope bearing halfpenny stamp.