

SHORT-WAVE VALVES—By J. C. JEVONS

Popular Wireless & TELEVISION TIMES

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Editor: G. V. Dowding

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POLAR RADIO
FRENCH STATIONS
CANADA'S PROGRESS

RADIO NOTES & NEWS

IN CEYLON
HIGHER POWER
MYSTERY SOLVED

Italy Sits Prettily

WHEN this all-too-short summer weather gives way to the nip of autumn Italy will be sitting prettily, from the radio-transmission point of view. The new Rome and Bologna stations will have settled down, while Turin, Genoa and Naples will all have some recently increased power to throw around.

Most important of all will be the short-wave situation, for Rome aspires to make the Daventry equipment look like a mere local. The new Rome station will have two transmitters working between 31 and 49 metres on 100 kilowatts; another pair of 40-kilowatts working between 16 and 25.19 metres, as well as a 50-kilowatt for different wavelengths.

Finally, there will be two entirely new stations, at Ancona, and Catania, Sicily; so what with one thing and another there should be no difficulty in tuning-in some radio when it's night-time in Italy.

Top of the World

THE North Pole radio station, established by intrepid Soviet airmen, is already banging its regular weather reports into Moscow twice a day. And relatives of the explorers are getting no end of a thrill out of sending radios to their kinsmen, addressed laconically to "Whatshisname, North Pole."

One of the first messages so received on the top of the world was to tell one of the chappies that while he was making Polar history, his wife had presented him with a bonny boy—that made him feel as though he really was "on top of the world"!

Another interesting thing about this station is that the airmen, on their way to provision it, dropped big dye bombs on the ice every 25 or 30 miles. The dye spreads out, forming a gigantic blot that guides the pilot's return.

Heard the New French Stations ?

THAT new transmitter which Radio-Cité, Paris, has built at Argenteuil, is now on the air nightly, soon after midnight on 280.9 metres. Announcements are made in several languages, including English, and "P.W." readers who like to be in at the birth of a new station are

invited to report on the reception to the Director, Radio-Cité, Boulevard Haussmann, Paris.

Another French station which is doing a bit of test gargling before he breaks out into regular song is Rueil-Malmaison. He disports himself on 360.6 metres, usually round about 8 a.m.

MY WORD

By THE EDITOR

PORTABLE RADIO

THE original conception of the use of a portable radio set was that it should be taken into the wide open spaces to enliven a picnic party or to provide soft music for balmy afternoons on the river.

But portables aren't used that way very much. Which is, perhaps, not surprising, because although there are always programmes on tap, there is no guarantee that at any particular time there will be programmes suitable for such purposes.

In any case, if there were as many radios in countryside and river retreats as there are motor-cars and bicycles carrying folk to such places, the result might well be alarming.

However, this does not diminish the real value of portable sets, for, in fact, those who possess them find them almost indispensable. Not only for carrying about from room to room in a house or, in the summer, into the garden (although I wish all those who do this would make sure that they do not infringe on the ears of their neighbours), but also for use in bungalows, boarding houses and other places during holidays.

As Victor King points out in an article in this issue, the very best time of all to listen to some of the B.B.C. programme items is at just that time when most listeners are cut off from their radio.

In the News

I WONDER if Mr. H. G. Wells was listening-in to the Regional news that night not long ago when the items broadcast included an account from a chappie flying in the Cavalier from Bermuda to New York, on the last experimental flight of the new Imperial Airways service ?

There was the chappie—looking down on Long Island, spying the toy-like Queen Mary below, and passing the great Pan-American aircraft flying above the clouds to Bermuda—and telling us about it at the

moment of happening; and somewhere, I hope, Mr. Wells was listening, for a few years ago he was the only man who had a clear mental picture of such wonderful aerial possibilities.

In the same news we had a first-hand account of that queer eclipse of the sun from the Pacific.

However much we train ourselves to be blasé there are times when the B.B.C. makes us realise that these are wonderful times to be living in.

New Stations for Canada

THE Canadian Broadcasting Corporation has been looking ahead, and best of all the dates in the calendar it likes the look of October 1st. So on October 1st it is to open a new broadcasting station at Hornby, Ontario, with two masts, each 750 feet high.

On October 1st also it will have in operation the new station at Vercheres, Quebec, a little east of Montreal.

Instead of having a mere six hours or so daily of its own programmes on the air, the C.B.C. is going to have from twelve to sixteen hours—starting October 1st, of course.

Finally, the Corporation has decided to construct and control all the new high-power stations in Canada, and to restrict all new leases to a maximum power of 1,000 watts, after 1st October.

Lifeboat Ahoy !

THE Royal National Lifeboat Institution—to whom be many successful flag-days—announce that among the fourteen places round our coasts which are to have wireless-equipped lifeboats are Aberdeen, Orkney and Caithness.

One glance at the map will convince the veriest landlubber that lifeboats working in these stormy regions can do with all the aids to safety Science can bestow upon them. The recently increased power of the Wick radio station will be another favourable factor, so it is to be hoped that whatever future winters may have in store for the sailor in these districts the landsman will have done all that he can towards promoting the safety of life.

(Continued overleaf.)

Next Week: INCREASING YOUR SET'S SELECTIVITY

ICELAND TO HAVE 100-KW. TRANSMITTER

"P.W." in Ceylon

IN a cheery letter from Colombo, J. S., an engineer chap, tells me that when he saw "good old 'P.W.'" on a bookstall there he nearly fell out of his rickshaw with



delight. (Are you sure it was the sight of "P.W." that did it, J. S., my friend? I know what a couple of Gin Rickies can do in Colombo, on an empty stomach!)

J. S. says that on the steamer going over he fell in with a Royal Air Force chap, and was delighted to find that his new friend's hobby was radio. They talked of nothing else for two days, but then J. S. discovered the snag—this Air Force laddie was such a dyed-in-the-wool fan that he was absolutely incapable of talking of anything else!

After describing in detail his favourite circuits, he gave J. S. an every-nut-and-bolt description of every set he had made—and how he got his pilot's ticket is a mystery, for his set-building prowess must have demanded a lifetime of midnight oil. For a solid three weeks he spoke of nothing but radio; and I take it as a real compliment that after such a glut J. S. could be pleased to see "P.W." again!

Where's Walton O'Donnell?

NEWS that B. Walton O'Donnell has been appointed Music Director at Belfast, reminds me that he was a great favourite of King George V.

The "Daily Telegraph" tells a good story of how, when King George and Queen Mary paid a visit to Broadcasting House, Sir John Reith, Dr. Adrian Boult (as he then was) and all the more distinguished members of the B.B.C. staff were there to greet them.

Having been received by the intellectual and musical aristocracy of the B.B.C. King George turned and said: "Where's that fellow, Walton O'Donnell?"

Many a high brow shot up questioningly!

Twenty-eight a Minute

IF you are a student of figures—and I'll bet you are, you rascal!—you will be interested in the nation-wide radio survey made recently by the Columbia



Broadcasting System of America. Out of a total number of 31,400,000 families in the U.S., no fewer than 24,500,000 have wireless sets; and some families have several sets, so that the total number of receivers

is estimated at 33,000,000.

This is double the number of phones in operation there, and the "Hello" girls are feeling very slighted about it.

The craze for car radios is increasing, and there are now about 4,500,000 in use.

The sales figures prove that every minute of every hour of every day and every night, the American radio public buys twenty-eight sets.

Who Said That—?

"TO talk of death rays and of electrical rays to bring down aeroplanes is fantastic. There is no ray to-day capable of killing a mouse, never mind a human being. I can say with confidence that the idea of rays being used for warfare is, with our present knowledge of physics, impracticable." (Mr. Wm. Dubilier.)

"We are promised facsimile telegraphy which will reproduce whole columns of a newspaper in a few minutes. The high

BROADCASTING BREVITIES

SAVOY HILL MEMORIES

Pioneers of the days when the B.B.C. was first putting radio revues "on the air" will take part in Ernest Longstaffe's production, "Savoy Hill Memories," to be presented in the National programme on July 1st, and on the Regional wavelength the following night. They will be heard again in the well-known old sketches and double turns, singing the tunes of the 1920's, and recalling to many older listeners those exciting nights when "the wireless" was becoming an accepted part of the country's life.

CHILDREN'S HOUR

Derek McCulloch and the Children's Hour organisers have recently made available the figures in the latest biennial Request Week ballot. The voting was of particular interest this year, as this is the first time that children all over the British Isles have recorded their opinions of the various programmes.

It is interesting to note that the four most popular items of the last ballot have again secured pride of place though in a different order. The winning programme this time is L. du Garde Peach's historical drama series, "The Castles of England," and the runner-up is the ever-popular "Zoo Man"; the "Toy-town" series come third, and Commander Stephen King-Hall is next on the list.

speeds attained to-day by teleprinting may yet be made to look ridiculous." (Sir Roderick Jones, Chairman of Reuters.)

"The B.B.C. has refused to give any public account of the amount which Empire broadcasting has cost. I suggest that nearly £5,000,000 will have been spent on Empire broadcasts by the end of this year." (Garry Allighan, in "Answers.")

Higher Power

ICELAND appears to have caught the craze for higher power, and it is reported that Marconi's have received a contract to reconstruct the Reykjavik transmitter, and increase its output to 100 kilowatts.

Another country with high-power aspirations is Finland. The Helsingfors Government has set aside a sum of 250,000 marks for a new short-wave transmitter; and, all being well, it will go to the building of a new station near Lahti.

Test programmes of this transmitter may sound a little unfamiliar to our ears, but there will be one thing about this station that nobody can dispute—it's Finnish!

Whose Call-sign?

DOES a call-sign belong to the locality to which it was allotted, or to the apparatus for which it was issued?

This pretty point has been brought up by the Spanish station E A J 8, which, at the time of writing, is performing the proverbially impossible feat of being in two places at once. The original E A J 8, when threatened by an advance of enemy troops, migrated to Bilbao, whence it transmits its programmes under the old call-sign.



The enemy took the view, however, that here was the station site, and if they could rig up a transmitter on it that transmitter would be San Sebastian, E A J 8, as before. Before long the new equipment was on the air, thus giving rise to my opening question above.

The fact that possession is nine points of the law does not help much, for one side possesses the equipment and the other side possesses the site. Cursing its rival, either station believes itself to be the one and only grandee magnifico—it's an old Spanish custom.

"Rock, Don't Fall on Me"

RADIO has been used for many different types of warning, but I am not sure that the warnings now being broadcast by Beromunster on Fridays and Saturdays are not breaking new ground. They have been arranged by the Swiss Ski Federation, and the idea is to give mountaineers warnings in advance of the likelihood of avalanches.

In these bulletins the state of the snow is described, and special attention is given to localities where Alpine experience suggests the possibility of the formation of avalanches. If the service is successful it will probably be extended and made permanent before the winter.

Another Mystery Solved

AN earnest gentleman has been writing to the daily Press about a mysterious telepathetic experience which afflicted him nightly.

In the early part of the day he felt as fit as the proverbial fiddler. But later on—"at the hour when the radio gets strong" in his own words—he felt a certain lightness of the head, a swelling of the glands, and an impalpable pressure and redness round the top of the neck.

Mysteriously, he hints that radio is causing all this. But in my opinion the explanation is much simpler—he's in for mumps!



ARIEL.

MICROPHONE MESMERISM

ACTORS WHOM RADIO AUDIENCES TERRIFY

SIX MONTHS' WAITING LIST FOR B.B.C. AUDITIONS

THE noise that emerged from the loud-speaker in the listening-room sounded very like a symphony of sizzling eggs and bacon; yet this was a drama audition, and a well-known actor standing before the microphone in the nearby studio should have been speaking.

Standing before the microphone he certainly was, but his knees were quaking, his hands were trembling, and his rustling script accounted for the noise that one associates with the preliminaries of break-fast. But he was unable to utter a word, this man who was accustomed to play to full houses in West End theatres, this actor who was able to hold an audience spell-bound with his playing before the footlights. He was, in fact, a victim of the mesmeric effect of the microphone.

Dropped His Notes on the Floor

Bruce Belfrage, who, in charge of all B.B.C. drama bookings, has seen its curious effect many times, talked about it—and other things concerning his department—when he said:

"It is incredible to see how even established actors become petrified with fright when they get before a microphone. In the case that you have just mentioned I told the unhappy person to rest for a few minutes and have a cigarette. Then I gave him another chance. But again he was dumb, and finally dropped all his notes on the floor before almost bolting from the studio.

"Drama auditions generally are necessarily apt to be unsatisfactory; it is not possible in a few minutes to tell whether a person reading, perhaps, from a carefully prepared speech is really 'produceable' or not. Frequently very good actors are so terrified that they cannot do anything—and very bad actors are very good, because they have been so busy doing nothing for a week but preparing their stuff. Only a few days ago we tried a new girl in a lead. She had been very good at the audition. But during preparation she could not get intonation or inflection into her voice, and after three rehearsals she simply had to go, and we found a substitute. I know the girl has ability, however, and she will have another chance in a less exacting part.

The "Dud" Book

"If I find six worth-while radio actors in every thirty auditions I am quite happy; the number varies between ten and four. Those who are no good at all go into my 'dud' book; the names of the others are carefully filed, and against each are my impressions of the audition concerned. Lists are then circulated to each drama producer, so that when he is casting for a

play he has the latest available talent at hand. In consultation with me he can usually find the person he wants. If the man or woman is a reputable actor or actress, he or she is engaged at once; an 'unknown' is invited to Broadcasting House again to read the part to the producer, who must know exactly what a newcomer can do. After all, it is his show.

"I let people do what they like at auditions—a bit of modern stuff, Shakespeare, or anything else. The incredible thing is that, even so, many actors and actresses will choose the very material to which they are not accustomed, and in this way deprive themselves of an important factor in success.

"Would you believe this? The other day a dear old lady of seventy came for an audition—and she read Puck from 'A Midsummer Night's Dream.' She may be very good in grandmotherly parts—but that is a thing that we shall never, never know.

"Actually at the moment we have three hundred people waiting for auditions, and we are compelled—reluctantly—to ask every new applicant to wait six months and write again. Normally, if I can get studio accommodation, we have one audition a fortnight.

Spotting Talent

"Part of my job is to see every play produced in the West-End: two or three a week is a good average. That helps me to spot people who might do well in radio drama. Quite a number of stage folk well known in broadcast plays have been found in this way. I usually sit in the dress circle—just an ordinary playgoer—and if anyone particularly appeals to me I get in touch with them afterwards. The thing to bear in mind is that gestures may mean a lot to a theatre audience, whereas in a broadcast production they are just an awkward pause.

"Radio has, to some extent, its own actors and actresses nowadays—people who have reduced microphone technique to a fine art and have become invaluable through concentrating entirely on broadcasting work, and never taking stage engagements. At the same time, listeners do like to hear stage and screen favourites taking part in a radio play, so we do our best to steer a middle course.

"The most difficult job? Casting children, I should think.

"How many parts has one man played in a single radio drama production?



CONTINENTAL RADIO NOVELTY

The column-like structure is a loudspeaker specially suitable for use in restaurants and cafés. It is fed from a seven-valve superhet (left) which is also provided with a remote tuning control.

Thirteen—not a bad record for Carleton Hobbs!

"Is melodrama still popular? I should think it is! You would be surprised to see the appreciative letters we get after something really heart-gripping or bloodthirsty."

B.B.C. CONDUCTOR ON HIS NEW POST "Wider Scope at Belfast"

SPEAKING of his new job, Mr. Walton O'Donnell, who, as announced in Radio Notes and News, is going to Belfast as Musical Director, says, "It will, of course, be a terrible wrench to leave the Band, but I hope that the good work that it has been doing will continue. I shall have wider scope at Belfast, for I shall deal with all music there, including the orchestra. It means, by the way, that I shall also have to give up my Academy work here as well; I usually conduct the orchestra there as deputy for Sir Henry Wood when he is away and generally train the orchestra.

"At present I do not know the date on which I shall take over at Belfast; actually I am going on holiday during the second week in August. Whether I shall conduct the Military Band when I return in September I do not know. Being an Irishman, I shall be very glad to go to Belfast. The O'Donnells came from Donegal, so I feel that I shall be more or less going home. I have been over to Belfast several times to conduct, and I have always thoroughly enjoyed myself there."

Mr. O'Donnell joined the B.B.C. in 1927, and formed what was then known as the Wireless Military Band. Besides being popular with British listeners, the band now has a large Continental audience.

"PEPPING UP" THE AMPLIFIER

I HAVE been intending to tackle a high-frequency amplifier. But the extra coils so necessary to this extension haven't yet turned up, so I will tell of some other efforts to "pep up" the existing O-V-1 rig.

As a detector with resistance-capacity-coupled power output valve, my set has given me lots of DX, especially with the two E-type coils tuning respectively from 12 to 26 metres and from 22 to 47 metres. I felt it was time to see what was happening

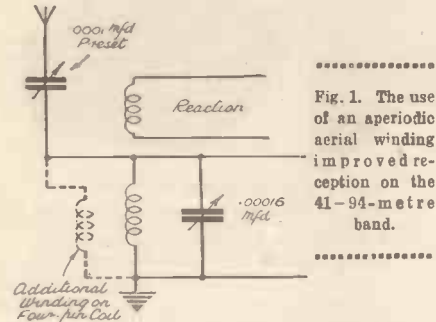


Fig. 1. The use of an aperiodic aerial winding improved reception on the 41-94-metre band.

in the band tunable by the third coil of the four-pin set—the one going from 41 to 94 metres.

And as soon as I plugged it in I came up against a snag. I found my reaction, so smooth and easy with the other two coils, now excessively sticky in all manner of ways. For one thing, it was hard to get oscillation at all, even with the little pre-set pushed out. And when, by some juggling, I did get reaction, it was "ploppy" to a degree.

An Aerial Winding

For the first time I began to wonder if the capacity-coupling form of aerial connection was all I imagined it to be. To make sure, I wound on six turns of No. 26 gauge silk-covered wire about half-way down the tuning winding of the four-pin coil. I then transferred my aerial pre-set from the grid end of the tuning winding to the top end of the temporary aperiodic winding, as shown by the dotted lines in the Fig. 1 diagram.

Oscillation was at once much easier to obtain. Furthermore, the ploppiness of the oscillation was reduced to a reasonable degree, so that at last I was able to sample the 41- to 94-metre band.

Of course, right at the bottom end I found lots of "forty-metre fone" signals. How these "hams" love to "chin-wag"! At times, I must admit, I could scream with impatience as they go over and over the same point. But I suppose this is done to make sure their messages are heard through the QRM.

(Note, by the way, that I am adopting some of the jargon of the short-wave world. Gained, I must add, from a perusal of that weighty tome, the Radio Call Book,

published at 6s. by the Radio Society of Great Britain.)

The most exciting signals I have heard with my largest coil are the aircraft between 50 and 60 metres, corresponding on my scale to readings between roughly 80 and 90 degrees. Some of these service planes pass right over my garden—usually in fighting formations. They have the oddest names—Buttercup, Redwing, and so on. I suppose the messages are not to be divulged, so I'll say no more of these ominously warlike signals coming literally out of the air.

I don't pretend that my temporary aerial coupling can be considered a general solution to the snag that confronted me. In fact, I am still wondering how to standardise a coupling arrangement that will conform to the following essential requirements:

- (a) Equally applicable from 12 to 94 metres.
- (b) Tolerably free from blind spots.
- (c) Capable of providing "pop-free" oscillation.

It looks to me as though no one system of coupling can be truly satisfactory over the whole of this wide band, unless one goes in for a pre-set condenser in series with an aperiodic aerial winding—meaning six-pin coils throughout. On the other hand, I must say I get far smoother reaction on the shorter bands with a pre-set direct on to the grid winding.

CHANGING THE GRID CONDENSER

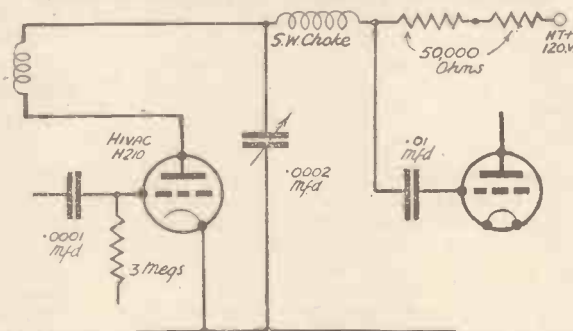


Fig. 2. A further improvement was effected by using a .0001-mfd. detector grid condenser instead of the .0003 mfd. employed previously. Note the extra 50,000 ohms resistance in the anode circuit of the Hivac H210 valve.

As I think I mentioned last time, I am now using resistance-capacity low-frequency coupling, with a Hivac H.210 detector valve. The 50,000-ohms anode resistance was obviously not large enough to give the full benefit of the valve's amplification, especially as its impedance is 22,000 ohms.

As luck would have it, I lack a 100,000-ohms resistance. But I remembered my elementary "stuff" and put a spare 50,000-ohms resistance in series with the existing one of the same value, thus giving myself the equivalent anode resistance value of 100,000 ohms, as at Fig. 2.

I found the increase in value had little, if any, effect on the signal strength. That

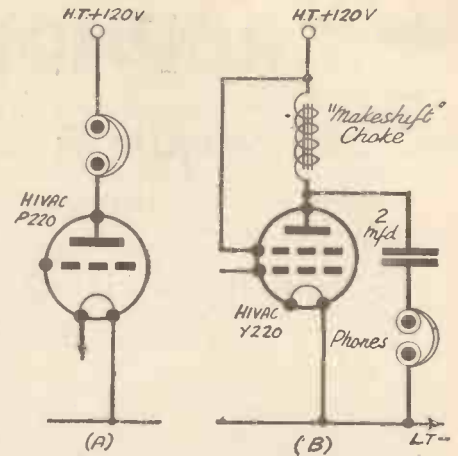


Fig. 3. The change-over from triode (A) to pentode (B) in the output stage necessitated a choke filter arrangement consisting of an L.F. choke and a 2-mfd. condenser.

is one of the troubles with this game, I imagine. So very difficult to be quite positive whether an improvement has been made. We must keep a sense of proportion, obviously. What I mean is this: If a change cannot be detected, clearly it doesn't matter which value is used.

In the Fig. 2 diagram you will note that I have gone over from my standard .0003-microfarad grid condenser to what I believe is the most accepted value for short-wave work these days—.0001 microfarad. Here, definitely, I noticed an improvement.

Reverting to my small-sized coil—tuning from 12 to 26 metres—I had a shot at bringing in Bound Brook, New Jersey, on 16 metres. It was just after lunch—and, to my gratification, I heard a distinct American accent around 56 degrees on the dial.

I was mistaken in thinking it was Bound Brook, though. I was listening to W 2 X E, the Columbia short-wave station on 16.89 metres. Very good strength, with no fading at all. This station must either have increased power or erected a directional aerial.

Complete Schedule Heard

The announcer gave a complete schedule for the station's 16-, 19-, and 25-metre transmissions. The international character of these American stations was emphasised by the multi-lingual announcements—a woman doing Spanish, presumably for South America. On second thoughts, though, doesn't that rule out a "beam" aerial?

After tea, that is to say at 4.15 p.m., I had a try for the Schenectady (W 2 X A D) programme on the 19-metre band. I heard a very faint unresolvable carrier that might have been my journey's end.

Forthwith, I had another look at my amplifier. Remembering all the nastiness of transformer coupling—with its high level of mush and its tendency to cause threshold howling—I could not bring myself to revert to that system. The resistance-capacity coupling, though lacking perhaps in "pep," has the vast advantage of being quiet.

But I felt that perhaps I was being rather too conservative with my output valve. It was, you may recall, a Hivac P.220—just a good, plain power valve, nothing more or less. In my half dozen Hivacs—bought en bloc in a wave of early

(Please turn to page 383.)

ON THE

SHORT WAVES



WAVEMETERS
AND MONITORS
By W. L. S.

LAST week I had a good deal to say about keeping a log, and much of it hinged on the necessity for having a decently calibrated receiver. Since calibration is a matter that requires checking from time to time—although this can sometimes be done with the help of actual stations—it is a good plan for every real enthusiast to possess a wavemeter.

Some people seem to have terribly hazy ideas about wavemeters. They sling together something resembling a single-valve receiver, call it a heterodyne wavemeter, and imagine, thereafter, that it is a paragon

tiny transmitter. But it has certain refinements, which, without making it complicated or expensive, make all the difference to its stability.

Take an ordinary oscillating receiver, and beat it with a signal that you are receiving on another receiver. You can get your beat down to zero and take a reading. While it's there, just think of all the factors that can change that beat-note. A variation in the setting of the reaction control, obviously—therefore we do without a variable reaction control and use a fixed condenser to give a fixed degree of oscillation.

to think of it as 4,000–3,000 kilocycles. It's so easy to think of harmonics in frequency, and our bands become 8,000–6,000, 12,000–9,000, 16,000–12,000, and 20,000–15,000.

The whole point of choosing this particular range is that we haven't got too wide a range on the scale. A nice, wide 0–100 division scale tunes over 1,000 kc., giving us an average of 10 kc. per division, and this allows pretty accurate readings to be taken.

The wavemeter is calibrated, in the first place, simply by tuning the receiver to a known station and then by rotating the wavemeter dial until the beat is heard. If you tune-in a station on 40 metres (7,500 kc.) you will hear a beat when the wavemeter is on half this frequency—3,750 kc.—and you can mark that point on the scale.

W. L. S.'s CIRCUIT

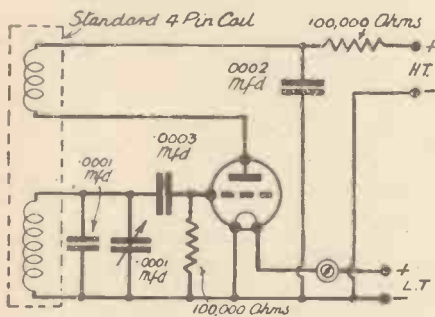


Fig. 1.—This is the circuit used by W. L. S. for his wavemeter. It is, basically, nothing more than an oscillating receiver.

of accuracy. Very often it may have been made in such a way that it doesn't hold its calibration as well as the receiver with which it is to be used.

A Reliable Instrument

I don't propose to talk about the absorption type of wavemeter now, since a far better calibration can usually be obtained from stations on the air than from the average absorption affair. The heterodyne wavemeter, however, can be made into a really reliable instrument, and it is one that you will never wish to be without, once you have experienced the pleasure of owning and using a good one.

Fig. 1 shows a circuit that I have used for my own wavemeter. This has been in action for more than a year, and has not needed re-calibrating. It is still accurate enough to tell me exactly where I am on any waveband, and I should be completely lost without it. If I stuck to one receiver a direct calibration would be sufficient for my needs; but I am often testing out new ones, and I should waste a lot of time if I had to calibrate each of them. So, instead of doing this, I rely on the wavemeter.

It is, basically, nothing more than an oscillating receiver—or, in other words, a

Obtaining Constancy

A variation in H.T. or L.T. voltage will also do it. The L.T. we can't do much about, except to make sure that it is well charged and has been switched on for a few moments. The H.T. will run down—in other words, the internal resistance of the battery will increase as it gets older. We can help to off-set this effect by using a fairly high resistance in series with it all the time—hence the 100,000-ohm resistance in the anode circuit.

It is too obvious, perhaps, to mention that an alteration in the setting of the tuning condenser will alter the beat-note. But even that has a bearing on the matter, and to make the circuit more stable we want "high C"—in other words, plenty of capacity and a fairly small inductance.

So, in parallel with our .0001 tuning condenser we place a .0001 fixed condenser. In our four-pin coil holder we now insert a coil of the type supposed to tune from 41 to 94 metres—such as an Eddystone Red-Spot. And by some kindly chance we find that it tunes almost exactly from 75 to 100 metres, which is just about the most useful range we could possibly have.

Any valve oscillator of this kind is rich in harmonics, which are just as useful for beating with our signal as is the fundamental radiation from the thing. The harmonics of the 75–100 metre range give us waveranges of 37.5–50 metres (second harmonic), 25–33.3 metres (third harmonic), 18.75–25 metres (fourth harmonic), and 15–20 metres (fifth harmonic).

The Frequencies Covered

Thus the only blank spots are between 33.3 and 37.5 metres, and between 50 and 75 metres—neither of which is a region where we are likely to miss it particularly.

All we want is a calibration of the actual scale, between 75 and 100 metres, and right from the start it will be best

Using the Final Graph

Then, perhaps, you will find a station on exactly 14,000 kc. From this you will get a "quarter frequency"—when your wavemeter gives a beat it will be on 3,500 kc. You can at once check up whether these two points look right, and proceed to get some more.

THE COMPLETED UNIT

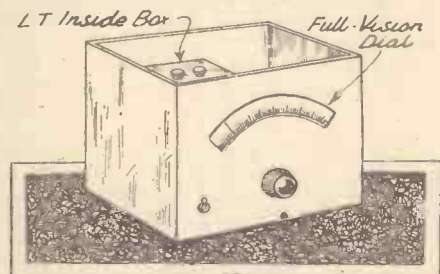


Fig. 2.—The wavemeter built into a neat case forms an invaluable piece of apparatus.

A station on 15,000 kc. will give you two points—the quarter (3,750 kc.) and the fifth (3,000 kc.). And so you can go on building up your readings until you have enough of them to plot a nice curve, which will show you at once if any of your readings have been wrong. If any points are badly off the regular curve—leave them out.

Once you have a good calibration of the wavemeter, you can just reverse the process. Tune-in an unknown station, produce your beat with it, read off the frequency on the graph, and multiply it by 3, 4 or 5, according to where you are in the frequency spectrum—and there you are.

ON THE SHORT WAVES—Page 2.

POINTS from the POST-BAG

W.L.S. Replies to Correspondents

T. W. M. (Topsham) sends in a nice QSL from K 6 C M C (Hawaii)—one of the few that I have received from Zone 1 in our scheme. He also forwards a card from the Austrian station O E 3 A H, which proves to be owned and operated by "Anton Habsburg, Grand Duke of Austria," another addition to the fairly long list of illustrious and famous owners of amateur transmitters.

Co-Operation Wanted

C. R. T. (Woodbridge) forwards a letter from the Dutch station P A O L B, from which he asks me to quote: "The N.V.I.R. (the Netherlands national society) has organized an observation service among its members, so every licensed operator as well as short-wave listener keeps a separate log of the DX stations worked or heard and sends it monthly to the 'band manager.' From the logs they receive the band managers compose monthly time-tables and send them to the Bureau of Statistics, who keep contact with foreign organisations and stations that are interested in the same work."

P A O L B would be grateful if some English amateurs would co-operate in this work. Logs should give frequency, time, R-S-T code, etc., and should be tabulated for 3.5 mc., 7 mc., 14 mc., and 28-56 mc. The 14-mc. logs should be sent to P A O M G Mr. W. V. D. Meulen, Valkenburgscheweg D 122, Valkenburg-Leiden, Netherlands; the others should go to P A O L B, Mr. J. F. Diepstraten, Loopschansstraat 74, Breda, Netherlands.

Several readers enquire after the QRA of Y I 2 B A, the new station in Iraq. This Y I 2 B A has been pounding through at R8 and R9 on 20 metres, and everyone seems to have heard him. I have no knowledge of his QRA, but the cards would probably reach him if addressed to the QSL Bureau, R.A.F. Station, Hinaidi, Iraq

Back Numbers Available

J. T. (Mr. James Todd, 71, Cobden Street, Jarrow-on-Tyne) has several back numbers of "P.W." from October, 1933, up to the present date, and he would be pleased to send them to any readers who care to forward postage or to "swop" second-hand short-wave components that they have finished with. It will be advisable to write to J. T. first, before making any requests, in case they have all gone!

J. G. McK. wants "some information about dry cells instead of 2-volt accumulators for L.T." The large bell-batteries can be used quite nicely, two of them in series giving 3 volts, which can be cut down with a variable resistance. Alternatively, in a two-valve set, the valve filaments (if they both take the same amount of current) can be wired in series, and three cells will just about run them nicely. It certainly pays over and over again to get large cells in the first place, and not to keep running down small batteries of the cycle-lamp type.

E. H. (Ossett, Yorks) offers to identify short-wave stations for readers, as he says that he has every address to which QSLs should be forwarded. His full QRA is E. Hudson, 26, Spring Villas, Springstone Avenue, Ossett, Yorks.

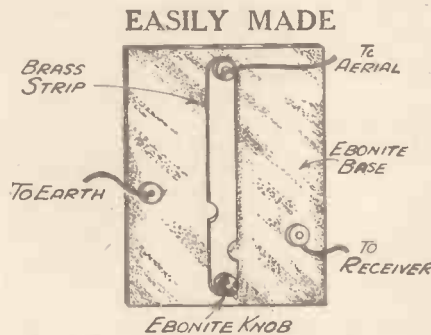
Some "B.C.L." Two Queries

H. W. S. (Leeds) asks queries about the "B.C.L." Two—has there been an H.F. stage designed for it; have we had any reports about the 10-metre band on it; are we designing an H.F. stage in the near future; and can anyone supply him with three or four back numbers describing the set?

Answers: (a) No; (b) Can't remember any; (c) No, but we are doing a two-H.F. unit very soon; (d) What about it, someone, please?

H. J. C. (Duns, Berwicks) has built the "Simplex" Three, which gave splendid results at first, but is now distinctly off-colour. But all the faults which he describes are of the same kind. Signals are weak; reaction is good when the set is first switched on, but then falls off; it won't oscillate at all below 19 metres except when the set is first switched on—and so on.

All these fairly cry out "Run-down L.T. or H.T."—but H. J. C. assures me that



A neat idea for an aerial-earthing switch sent in by a reader.

his batteries are perfectly O.K. All I can say is, "Is he quite sure of that?" I can't think of any other conceivable fault which would account for these troubles.

M. H. (Bidborough) has a "Simplex" Two which works all right within limits, but he always has to use far more turns for reaction than I recommended with the original coils. This sounds like too tight a degree of aerial coupling, or a detector valve with poor emission, assuming that M. H.'s layout and wiring are above reproach.

The diagram on this page shows a neat idea for an aerial-earthing switch sent in by a reader. The spacing between the movable strip and the terminals at either side should be reasonably large, and the ebonite base of good quality. With these provisos the device should be pretty good.

NEXT WEEK

Constructional Details of the
1937 Midget Portable

A USEFUL SELECTIVITY
UNIT

Another Long Instalment of
Marconi's Life Story

AMATEUR BAND NEWS

SO many readers seem to have been puzzled by the strange things that they heard on the R.S.G.B.'s National Field Day that I have been asked to explain the object of this great "day out" a little more fully than I have done before.

Originally the purpose of National Field Day was to test the efficiency of portable apparatus, possibly with a view to seeing how it would shape in the event of a national emergency. In the States, of course, portable equipment has often formed the only link between one town and the rest of civilisation, in times of flood or earthquake.

A Test for Portables

Fortunately we don't have to rely on amateur radio in this country—but there is no knowing what we *might* have to do! So, once a year, each district of the R.S.G.B. sends out portable stations into the wilds, and they spend twenty-four hours on the air making contacts with as many stations as they can. Specially high scores are allowed for contacts with *other* portable stations.

On June 5th and 6th this year, each district had four stations on the air, covering the four amateur bands on 160, 80, 40 and 20 metres. Power supply had to be carried, i.e. batteries or motor-generators run from accumulators had to be used, not public or private supply mains. Aerials had to be erected on the day. The whole station, in fact, had to be built in a place "where none grew before."

I carried out a little tour of some of the stations, and found that the N. F. D has now become more of a social event than the real test of portable stations. Many of the stations are simple transmitters and receivers removed bodily from their usual homes and erected on tables inside tents.

The power used was restricted to 25 watts, except on the 160-metre band, where 10 watts was the maximum. One 20-metre station, with 25 watts, had a good contact with V S I A I (Straits Settlements), and several of them contacted Canada and U.S.A. Two distant stations that were much sought after were a couple of Egyptian portables that were taking part in the event. One of them was out in the desert, near the Pyramids.

Working All Stations

On 160 and 80 metres the chief thing was for each portable to try to work with all the other portables within the British Isles, and most of them succeeded in doing so.

Needless to say, nearly all stations chose the tops of high hills for their week-end location, and many operators found that 25 watts, in such good situations, got farther than 100 watts from their own homes. Reception, too, was marvellous, and made me, for one, want to go back to a battery receiver far from all electric-light mains.

The next interesting event of this kind is a National 5-metre Field Day, of which I hope to be giving more details very soon.

W. L. S.

THE DIAL REVOLVES

By LESLIE W. ORTON

RADIO AVERTS A TRAGEDY

LATIN-AMERICAN AMATEURS :: "LIGHTS OUT" PROGRAMME
RECEPTION AT STONEHENGE

AN unrehearsed firework display was averted by inches, and listeners the world over had an unexpected thrill when the United States army ship "Cristabal" caught fire at sea recently.

"Please rush torpedo boat or plane quick," radioed the ship's operator with more speed than grammar, for one doesn't bother much about nouns and verbs (though adjectives are often much in evidence!) on such occasions.

There were 700 tons of high explosives aboard, and gee, how that SOS set ships and planes racing to the rescue to avoid a grand slam! Once again radio averted a tragedy, and everyone lived happily ever after.

A Mystery Station

The 20-metre amateur band is excelling itself, and the other day it gave me another pleasant surprise (I must be under a lucky star!) in the form of VK2TI at Sydney. This was followed by another faint station, and with more than usual enthusiasm I hung on to it like grim death. Then came the call G8KL. Can you imagine my feelings? I nearly kicked my two-bit set to kingdom-come in my fury!

Have you DX hounds noticed how well Latin-American amateurs are coming in of late? I've had no trouble in pulling in anything from nine to twelve almost any night after 11 p.m. Thrills are two a penny on this band, and it's well worth attention—and here's a tip, the Brazilian "nuts," and so forth, come in best just above the "W's."

During the week I've heard PY2BA, San Paulo; PY5AQ, Curitiba; LU6KE (calling a Mr. Smith!), Argentina; CE1RN and CE1AY, Chile; HK7CT, Colombia, and VE5DA, Yukon, Canada—hot and cold to order!

If I gave you a full list of the "Yanks" I've heard, I fear the compositor would run out of "W's." and so I had better content myself with giving the calls of the best-heard stations. They are W4CO; W2KL; W5RM; W1AXO; W1ADM and W2PMY.

A dyed-in-the-wool mystery station, DS2H, provided me with a minor thrill. Wonder where he is?

A Fright!

Fear (or was it indigestion?) gripped my heart with icy fingers when I listened to the "Lights Out" programme from W2XAF, Schenectady, the other morning.

Our American friends certainly know how to radiate fear over poor "Mike," and that's spilling a bib-full!

Any of you drama-loving enthusiasts who want a thrill are advised to tune into the "Lights Out" programme at 5 a.m. Sometimes they are quite tame, but on other occasions they would make the hair stand up on an egg with fright; then you'll be glad it's daylight in England!

Mark Anthony's Words

Friends, Romans, countrymen, lend

me your ears. I come not to bury Caesar but to praise reception in the vicinity of Amesbury. The noble Brutus hath told you that Caesar was ambitious, but I bet he never told you how well short-wave stations come in at Stonehenge—he left that to thine scribe!

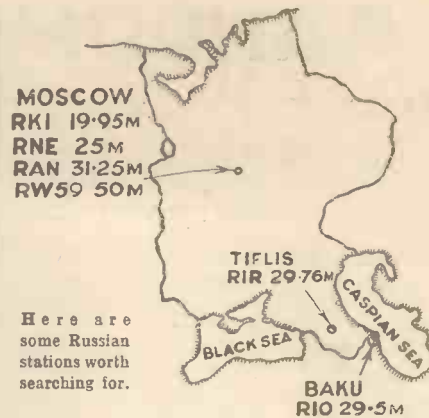
And this, dear friends, is how it happened. Having difficulty in procuring a crystal for my set, I visited Stonehenge, taking my radio with me, of course. Whilst there I rigged up a short aerial and swung the dials in the hope of picking up some back transmissions which the Druids may have made. I didn't, but I did hear a lively dance programme from W3XAL, Boundbrook, on 16.87 metres and that was just as good.

Up there, on the Wiltshire Downs, stations buzzed in like wasps around a jam pot, and before I left I had tuned in W2XAD, Schenectady; W8XK, Pittsburg, on 19.72 metres; CLR, Prague; PLE, Bandoeing; I2RO, Rome; TPA3, Paris; DIQ, DJA and DJZ, Zeesen, and the Empire stations—but I didn't get my crystal!

Home, Sweet Home

At home I've found long-distance reception so good that I've burned the candle at both ends rather a lot of late.

The Cuban stations COCH and COCO



can always be relied upon to give powerful, if not particularly entertaining, signals on the 31 metre band, but W2XAF, W1XK and W3XAU have been poor signals until after 2 a.m.—the temperamental blighters!

W3XAL has frequently provided an excellent signal on 49.18 metres, but the remaining North American stations appear to have taken a sleeping drug—I've hardly heard them.

Latin-America has been well represented by COCD, Havana, and YV5RD and YV6RD, Venezuela. There are dozens of other South and Central American stations audible, but it's a game of a lifetime to try to identify them!

A new Spanish station has made an appearance on the 20-metre band. He broadcasts news bulletins in English from 11.30 to 11.45 p.m. daily (according to station announcement), and is often a powerful signal, and being in the middle of the amateur band, a very unwelcome one!

S.W. Station Identification

By F. A. Beane

THROUGH NICARAGUA and HONDURAS

NICARAGUA, like many other Central American Republics, has a wealth of short-wave broadcasters, although, unfortunately, they are seldom heard, very inconsistent, and difficult to find and identify. However, a friend has just informed me of YNPR (or YN1PR), which is being heard quite well in the vicinity of 34.7 m., situated in the capital city of Managua and styling itself "Radio Pilot."

On a neighbouring wavelength of 34.92 m. we find an old friend, viz., YNLG (ex-YNVA), also situated in the capital, and which employs the title "La Voz de Ruben Dario," while the 1 kw. YNOP of the same city, operating on 52.1 m., announces itself as "Radiodifusora Bayer."

Other stations and slogans are listed below, perhaps somewhat optimistically!

YNGU (32.26 m.), Managua, "Alma Nica."
YNLF (39.7 m.), Managua, "La Voz de Nicaragua."

YN1GG (45.9 approx.), Managua, "La Voz de los Lagos."

YNAM (41.6 m.), Managua, "La Voz del Pacifico."

Any reader who has managed to log all of the above may rightly regard himself as a real DXer! But still several of them are audible in this country, and I have friends who can claim verifications from YNOP, YN1GG, and YNLG.

Leaving Nicaragua we journey into the adjoining Honduras, where we find but two stations of note, and, sad to relate, there is a

touch of notoriety about the first one, which is frequently referred to among members of the DX fraternity, as the "champion Coupon (International Reply Coupon) Snatcher"! The station in question is HRN of Tegucigalpa, which operates on 51.06 m. and is well heard in this country, and which may be identified by the slogan "La Voz de Honduras," an occasional announcement in English or the closing refrain—the Ted Lewis "Good Night Song." Incidentally, HRN is styled "notorious" because it has been known to request reports, promise verification, and then fail to make any acknowledgment of the Reply Coupon or the report; therefore, brother DXers—BEWARE!

The Listener's Friend

Happily enough, its compatriot HRD of La Ceiba, operating on 48.11 m., partly redeems for the sins of HRN, for HRD, or, as it styles itself, "La Voz de Atlantida," is a great friend of the listener, and is prompt to verify reception reports. Besides employing the above slogan, HRD announces in English at about every hour, the speech having a hollow, sepulchral effect. On 47.24 m. there is a HRPI, "Ecos de Honduras," of San Pedro Sula, but I do not think it is likely to be heard with any regularity in this country, if at all.

Having "disposed" of Nicaragua and Honduras, we must proceed to Guatemala and Mexico, but for the present I must leave you to digest the "Voices" and slogans of the YN's, and HR's!

RANDOM RADIO REFLECTIONS

By Victor King

The greatest experts are those who make the fewest mistakes :: Marconi is one of the kindest and pleasantest of persons :: At the Stratford railway exhibition

EXPERTS' RESPONSIBILITIES

A NOTE from Mr. A. Forest, Hackney, in which he is pleased to pass me a platitude. (No offence, Alf.)

He says apropos one of my recent pars, "Experts shouldn't make mistakes. If they do, then they are not expert. A man claiming to be an expert assumes a responsibility beyond that of those who do



★
It is to the expert
that others should
be able to look
for guidance.
★

not claim to be experts. It is to him that others should be able to look for guidance."

Well, Brother Forest, that's easier said than the directions for finding the "expert" who never has made a mistake. Though there are, no doubt, plenty of them who would never admit having done so. But there are mistakes and mistakes, you know.

Some mistakes, such as those in the design of the top-heavy Japanese destroyers, or in certain types of aircraft used in the Great War, or in the first plans for the Panama Canal, led to considerable loss of life or money, or both.

Other mistakes, such as putting your boots under your pillow instead of your wrist watch, lead to only temporary inconvenience. Indeed, there have been mistakes that turned out advantageously.

I know a stockbroker who made a lot of money for one of his clients by dropping a brick on a transaction. He was told to buy or sell some shares, I forget which, and went and did the opposite. The market worked a different way from that which had been expected by his client, who was overjoyed to learn that his order had been carried out wrongly.

Still, that doesn't prove that errors are pardonable on any other grounds than that of human fallibility.

I've just had another case brought to my knowledge. It concerns a portable set specially built by a competent radio engineer for a special purpose. He instructed his client to place the batteries in according to a certain definite arrangement. (This was not an ordinary portable radio.)

He described a method in great detail. Now his client noticed that the unspillable accumulator was tucked in on its side with its terminals and vent downwards, but did not query his "expert's" instructions.

Now even the best of "frec-acid" unspillable accumulator cells are liable to "leak" if they are bumped about continuously in a completely upside down position. And this one did. The acid kept on dribbling out. And the "client" kept on mopping it up the best way he could until the set was almost eaten to bits.

But he never queried the expert's instructions, he merely formed a libellous

opinion of the "unspillable" accumulator.

No, experts aren't generally expected to make mistakes, and those who make them often lose the confidence of their employers, their status and finally their jobs.

I say that the greatest experts are those who make fewest mistakes, but that those who never make 'em are only to be found in the golden-harp manufacturing or playing profession.

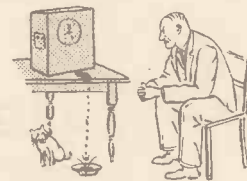
A GOOD FELLOW

THE announcement that our "P.W." was to publish an authorised life-story of Marconi filled me with the keenest of anticipations. You see I have several times had the honour of meeting and speaking to the great inventor, and am able to say that he is one of the kindest and pleasantest of persons it could ever be anyone's good fortune to encounter.

He is entirely free from any "side" or stiffness and has that happy knack of being able to put at ease the shyest and most diffident of those who first meet him.

Ladies call him "charming"; men "a nice chap."

At about the time when I first met him there was one of those periodic attempts to discount the value of his pioneer work. It almost amounted to a personal attack.



★
"The acid kept
on dribbling out."
★

I asked him what he thought about it all. He neither shrugged his shoulders, as he could well afford to have done, nor did he display any anger. He was puzzled and, in his kindly way, perturbed.

I must say I was a bit puzzled, too. Anyone would be who knew the facts—as every reader of "P.W." will in due course. Just read what Judge William K. Townsend said in New York in 1905 after giving judgment in favour of Marconi in one of the world's most historic patent actions.

"It would seem, therefore, to be a sufficient answer to the attempts to belittle Marconi's great invention that, with the whole scientific world awakened by the disclosures of Hertz in 1887 to the new and undeveloped possibilities of electric waves, nine years elapsed without a single practical or commercially successful result, and that Marconi was the first to describe and the first to achieve the transmission of definite intelligible signals by means of the Hertzian waves.

"The exact contribution of Marconi to the art of spark telegraphy may be stated as follows:

"Maxwell and Crookes promulgated the theory of electrical oscillations by means of a disruptive discharge; Hertz produced

these oscillations and described their characteristics. Lodge and Popoff devised apparatus limited to lecture or local experiments or to such impracticable purposes as the observation of thunderstorms. Marconi discovered the possibility of making these disclosures available by transforming these oscillations into definite signals and, availing himself of the means then at hand, combined the abandoned and laboratory apparatus and by successive experiments reorganised and adapted and developed them into a complete system capable of commercially utilising his discovery.

"Other inventors, venturing forth on the sea of electrical movement, met the rising tide of the Hertzian waves and allowed them to roll by without appreciating that this new current was destined to carry onward the freight and traffic of the world commerce. They noted their manifestations, suspected their possibilities, disclosed their characteristics, and hesitated, fearing the breakers ahead, imagining barriers of impracticable channels and shifting sand bars. Marconi, daring to hoist his sail and explore the unknown current, first disclosed the new highway."

STOUT CHAPS

SPENT an interesting afternoon at the Stratford Railway Exhibition. Nearly the whole of the works thrown open to the public. Rides in an eighty-five-year-old train and what not.

But the most appealing thing to me was not any of the huge cranes, furnaces, steam hammers and what not, but the men who were there working them. All voluntarily and for the good cause for which the exhibition was held. Just as if they hadn't had enough of their forges, lathes and so on during the previous six days! And to



★
"The most appealing
thing to me was not
any of the huge cranes,
furnaces, steam
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were there working
them."
★

spend hours in the workshops on a sunny Sunday afternoon for the local hospital!

Thank goodness there were some nurses with collecting boxes. I was able to salve my conscience to some little extent!

WHAT A DETECTIVE!

ARE you chaps listening to the Inspector Hornleigh items in the "Monday at Seven" programmes? If so, do you think as I do that it is a good series rather poorly executed?

In the last one to which I listened there were two good clues pointing to the "criminal" that the so-brilliant detective seemed to overlook, while the one he did pull out!

Or am I too sharp?

PREVENTING GATECRASHING

By K. D. ROGERS

How to prevent that annoying hum which sometimes occurs only when a station is tuned in, and how to stop stations coming through on top of others

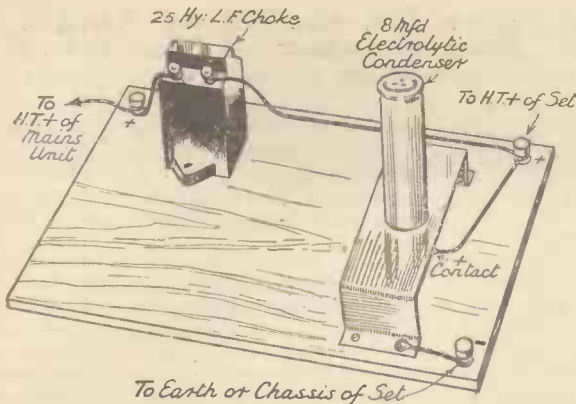


Fig. 1.—How extra smoothing may be added to overcome modulation hum.

mains input and the set. If you use Fig. 2, try it first in one mains lead and then the other.

This method of stopping modulation hum will also help to stop—if it does not do so altogether—the mains noises which sometimes upset listeners, and are generally known, among other noises, as man-made static. A great deal of these come up the mains and get into the set through the mains feed supply.

You may get this type of interference, and also a certain amount of modulation hum, in a battery set if it is used near a mains feed supply which is noisy; that is, carrying H.F. If this is the case, the use of an H.F. filter on similar lines to Fig. 2 connected in series with the mains supply

WE do not hear so much nowadays of social gatecrashing, but it is still going on in radio—the unwanted visitation of all sorts of extraneous noises which upset reception and nearly drive the listener mad.

It is impossible to cover the whole field of radio gatecrashing in one article, but I want to spend a little time on some of the most annoying and prevalent forms.

In the first case, modulation hum. Yes, that is a form of gatecrashing, as a rule, for it is usually caused by H.F. from the mains getting into the set and upsetting the H.F. side. How can it be cured? In two ways, at least.

Improving Smoothing

The first is the improving of the smoothing in the mains apparatus of the set. Modulation hum is usually to be found in mains sets, though I have had complaints about it from owners of battery receivers. I have never experienced it in such sets myself.

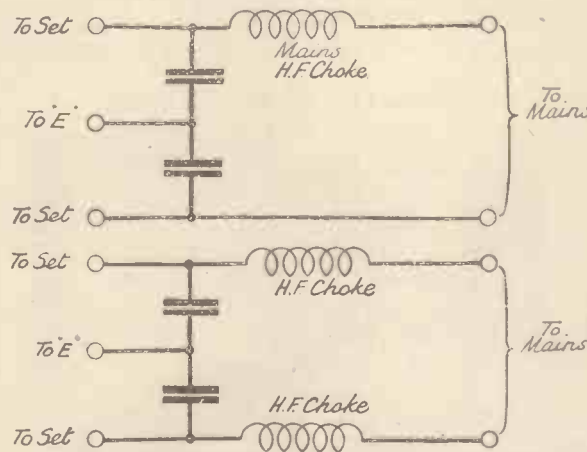
It is the easiest thing in the world to improve the smoothing of the mains unit, but you must use good components. Most of you have some good 4- or 8-mfd. condensers on hand. If so, connect one or two with an extra choke as shown in Fig. 1. If you have no suitable choke—that is, of reasonably low resistance (400 ohms or less)—I should try one of higher resistance as a test, and then substitute it when you have proved that the choke helps. But it must be capable of carrying the whole H.T. current of the set.

Make up a small unit as shown in the sketch, and breaking the H.T. positive feed between the main H.T. smoothing choke of the set and the H.T. + feed to the valves, insert your unit.

Connected in the Mains Feed

That additional smoothing may do the trick. If not, try the effect of H.F. smoothing in the mains feed to the receiver. You will want a big mains type H.F. choke here and a couple of .1-mfd. condensers. If you have two chokes, you can make the double unit in Fig. 2a; but usually the one in Fig. 2 is sufficient. Connect as shown by the diagram between the

FILTERING THE MAINS



Figs. 2 and 2a.—Showing single and double choke mains filters.

to the house may help. But this is a job which should be carried out by a skilled electrician.

There is a nasty form of gatecrashing which is experienced by those who live fairly close to a transmitting station. It occurs in sets where one or more H.F. stages are used, and is known as cross-modulation. Its symptoms are the faint sound of broadcasting from another station behind the station to which you are listening. In other words, if you are listening to the London National, you may hear faintly (or perhaps not so faintly) the London Regional programme going on all the time.

That is not necessarily a cause of poor selectivity on the set. I have heard it in a superhet which is very selective. It is caused by two things which, either separately or together, set up the interference. One is the fact that you are getting too great a signal strength on your aerial, and the other is that your valves are not properly biased.

The trouble is due to one or other of the H.F. valves of the set rectifying. It receives the more powerful station and, either due to overloading or because the bias is not properly adjusted, it cannot help rectifying a certain amount of it. H.F. valves will rectify quite well, you know, and when there is too much bias or too little bias, or for some other reason, the input swings the grids off the straight portion of the curve, they act as H.F. amplifiers and rectifiers at the same time.

It is practically impossible in any ordinary set so to design the tuning that when two powerful stations are near at hand the one that is not tuned-in will be totally absent from the grid circuit of the first H.F. valve. There will be a preponderance of the station that is required, but there will also be a residue of the unwanted station.

Later in the set the proportion between one and the other is further increased, and the unwanted station is rendered inaudible.

Amplifying and Rectifying

But when the first valve is overloaded, or is wrongly biased, it not only amplifies the unwanted station, but it also rectifies the wanted station to a certain extent. All H.F. valves do this.

Thus, in the anode circuit of the valve you have (a) wanted station H.F. strong, (b) unwanted station H.F. weak and (c) wanted station rectified output.

That is all very well in itself and not very harmful, but the valve is acting as a rectifier, because it is being operated on a bend in its curve, and this fact also makes it rectify not only the wanted station, but the unwanted station. The strong wanted station forces the valve grid to rectify, and this enables rectification of the unwanted station to take place. So there is another component in the anode circuit; the rectified unwanted station. Call that (d).

REDUCING INPUT

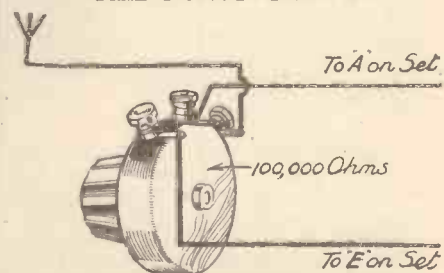


Fig. 3.—A useful input control can be arranged with a potentiometer in this manner.

Now what happens? You have (a), (b), (c) and (d). But (a) and (b) are H.F., and (c) and (d) are L.F. You get a combining together of (a) and (b) with (c) and (d). Further tuned circuits cut out (b) with its combination of (c) and (d), but (a) is tuned (Please turn to cover iii.)

"OVER THERE"

A feature devoted to various aspects of American radio, giving interesting sidelights on the artists and microphone methods of that country

MORE STUDIOS

AN extensive building programme involving expansion and improvement of six National Broadcasting Company plants in key cities of the red and blue networks was announced recently by Lenox R. Lohr, president of N.B.C. The project includes immediate construction of new studios at Philadelphia and Schenectady, the completion of a building already under way in Washington, and the subsequent provision of new facilities at Hollywood, San Francisco and Cleveland.

A VOICE EDITOR

EDITORS edit the news. So far broadcasters, movie and record makers could only audit, not edit, the human voice. Because they could not edit they cast off singers and actors whose voices don't stand the audition test, says "Science Service."

Hope for the cast-offs may lie in U.S. Patent No. 2,064,305, just granted to John Hays Hammond, Jr., holder of some 400 patents, son of the famous civil engineer.

His latest invention is an electrical voice editor. On movie film sound track, or phonograph disc, it records only the most pleasing qualities in the artist's voice. It suppresses the unpleasant squawks, thereby making a bad voice sound better; possibly good.

Main works of the voice editor are a plurality of parallel electrical paths between the microphone and recording instrument. Each path has a filter which filters out unpleasant qualities in the particular type voice for which it is designed.

Thus, when broadcasting or recording, baritone Smith's voice would pass through a filter specially designed to make his voice sound pleasant. When songstress Brown started performing before the microphone, the control man would cut out Smith's filter and switch in the one that beautifies her voice.

"BING" ON TOP!

TIN PAN ALLEY rates Bing Crosby as its favourite singer, but not necessarily for the way he sings. Whether they like his singing or not, Bing is the favourite because he is the biggest help in selling sheet music. All bands and singers are rated in this branch of the business strictly on their value as song salesmen.

After Crosby there is some difference of opinion, divided between Guy Lombardo and Rudy Vallee. Vallee's programme has a bigger network and a bigger audience, but when he introduces a new song he usually won't repeat it for several weeks. Bands can use up a song in three or four successive programmes, or at least repeat it much oftener than singers.

Since radio is not the most effective way of bringing a song into the "hit" class, Tin Pan Alley has all the singers and bands classified.

ANOTHER "HOT" NUMBER

DUKE ELLINGTON, Cotton Club band leader who has just passed his 38th birthday, has composed nearly 100 hot

numbers that have reached print and scores of others never set down, which his orchestra plays. His best, according to his own estimate, was "Mood Indigo." His latest is, "I've Got to be a Rug Cutter," which is just out in record form.

CAN YOU BEAT IT?

FOR a long time James Melton and Frank Parker have been carrying on a good-natured, private feud about their top notes. A favourite trick was for one to call the other and sing, "Give a man a horse he can ri-i-ide," hitting a very high note on the ride. "Top that, you bum," would conclude the 'phone call.

Jim Melton conceded that Frank was winning, hitting higher "ri-i-ides." In spite of Frank's high notes, Jim finally did win the

In the studios Ed Wynn behaves more like a prize-fighter than an actor. Between skits he rushes into the wings for a change of costume, but, like a "pug," is also handed a towel to wipe off the perspiration, takes a quick drink of water and gets a fast rub of his back and neck muscles.

In his many years in show business, Haven MacQuarrie has never displayed "temperament." But, due to claustrophobia, the "Do You Want to Be An Actor" impresario has not entered an elevator in sixteen years!

Although Gracie Allen has been on the air five years, George Burns still has to mark with chalk the spot where she should stand to prevent her from speaking too close to the microphone.

IN ONE OF WOWO's NEW STUDIOS



Dorothy Durbin and Jean Brown, playing the Steinway Grands in one of the new studios at the Westinghouse Station W O W O, Fort Wayne.

feud. He enlisted Jessica Dragonette and called Frank Parker. At the very top of his range, Jim began "Give a man a horse he can—" and had Jessica add a high soprano "ri-i-ide" far beyond the reach of either tenor.

"Hey," Frank protested, "you couldn't have sung that!"

"It came out of my telephone, didn't it?" Jim answered. "Now go ahead and top it. I'm waiting."

THREE NEW MEXICAN STATIONS

MEXICO continues to add short-wave stations. On an official list issued by the Mexican Government the following transmitters join the procession:

X E T A, 11,760 kc., Monterrey; X E T M, 11,730 kc., Villahermosa; and X E T W, 6,045 kc., Tampico. With these additions, Mexico now has twenty-four stations on frequencies between 6,000 and 15,300 kilocycles.

WRITING IN THE AIR

DR. FRANK BLACK, N.B.C.'s General Music Director, is writing music in the air—and liking it. On a recent airplane trip from Chicago he completed the entire transcription of the scherzo from Mendelssohn's quartet in E minor for string symphony.

Dr. Black spends considerable time in his flying office commuting between Radio City and Chicago to conduct N.B.C.'s Carnation Contented Programme each Monday.

SETS TO COST MORE

COMMODITY prices having climbed, the new 1937-38 radio sets to be introduced will carry higher price tags, according to a survey by O. H. Caldwell of "Radio To-day." The forecast is for prices to be 10 to 15 per cent. above those of last season.

IT'S EASY!

VIC ARDEN, N.B.C. maestro, was approached by a young man after a recent broadcast, who asked, "How can I get into radio without much trouble? I'm pretty good in brass."

"Oh, that's easy," drawled Vic, "just start when you're eight, practise every day, later on work nights in an orchestra, get a job in a music library during the day, take a whirl at show business and you'll get there easily!"

WATT TAX

ACCORDING to the "New York Times" a proposal for a Federal tax on broadcasting companies, the rate to be based on the amount of power used, is to be introduced in the House by Representative Boylan. The plan is proposed by George Henry Payne of the Federal Communications Commission.

Proposals to tax the broadcasting companies as holders of Federal franchises have been made before, Mr. Payne said, but the plan has been to tax them on either gross or net revenue, a method which would require extensive audits.

Under the proposed measure stations using 1,000 watts or less would be taxed at the rate of a dollar a watt; stations using from 1,000 to 10,000 watts would pay two dollars a watt.

"MIKE" AS GUARD

A £200,000, five-storey, fire-proof, earthquake-proof and robbery-proof mint on a solid rock foundation was dedicated in San Francisco recently.

Huge twenty-two-ton doors protect vaults with two-foot concrete walls, reinforced with steel bars. The doors are equipped with one time lock and two combination locks each.

Should a robber get into a vault microphones in the ceiling would transmit any noise he made to the central guard-room, which has two-way radio connections with police headquarters and the Precidio.

TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

A REVISED WORK

WE have received a copy of the second, revised and enlarged edition of "Television Up-to-Date," by R. W. Hutchinson, M.Sc. The price is 2s. 6d., and the publishers University Tutorial Press, Ltd.

This is a work which, although assuming no previous knowledge of radio or electricity, yet succeeds in explaining how television works. This has been achieved by dealing in a simple manner with the various theories required in the explanation of television.

Beginners, experimenters, club members, and students will all find the book understandable and valuable.

MURPHY TELEVISION

Readers who remember the photos we published a while back showing the Murphy experimental television model will be interested to know that Murphy television receivers are now being manufactured—one will actually be among those on show at the Television Exhibition referred to elsewhere on this page.

Details of price, when they will be available, and so on, are not to hand at the time of writing, but we hope soon to be able to give readers all these together with full technical specification.

POWERFUL AMERICAN STATION

The Columbia Broadcasting System have applied for permission to build a super power television and sound transmitter at the top of the Chrysler Building in New York. The power of the station will equal that of the Eiffel Tower television station—30,000 watts.

PROJECTION IN AMERICA

The latest development in television in America is the production of a high-voltage cathode-ray tube for projection television. This has previously been achieved in Germany, but is new to America. Dr. V. K. Zworykin, of the R.C.A. Manufacturing Company, is largely responsible for the development, which was recently demonstrated.

The idea is to produce a television picture on the end of a cathode-ray tube in the ordinary manner, but the tube is a small one so that the picture is also small—about 2 in. square—but due to special construction of the tube and the high voltages employed, the picture is extremely bright. It thus becomes possible to project it like an ordinary cinema film—with an object lens—to a picture several feet square.

INTERESTING FEATURES

Interesting points which the development of the above system has brought to light include the fact that the quality of the lens employed for projection need not be of such high class as the normal optical lens used for such a purpose, because definition is restricted to 441 lines.

Another point is that the shape of the

spot on the fluorescent screen is oval instead of round, as in normal cases. This was found definitely to improve definition on the screen.

NEW YORK'S 100 LOOKERS

There are 100 engineers and other officials in New York, who have television receivers which are continually in use in receiving the transmissions sent out from the Empire State Building transmitter. Just as it was with Alexandra Palace, they are finding the range of the station to be greater than was at first anticipated. Good results up to 45 miles are reported. The power in use is understood to be around eight kilowatts.

A TELEVISION EXHIBITION

EVERYONE who is interested in television the slightest bit will find a visit to the Science Museum at Kensington, in London, of especial interest at the present moment. There is a special exhibition dealing with this subject to be seen there at the present time.

Admission is free, and the hours are as follows: Mondays, Tuesdays and Wednes-

days from 10 till 6; Thursdays, Fridays and Saturdays from 10 till 8; and on Sundays from 2.30 till 6. The time on August Bank Holiday is 10 till 8. The exhibition is to be open to the public until September of this year.

The object of the exhibition is threefold. It is partly to demonstrate that television has now emerged from the experimental stage, partly to illustrate the general principles which underlie the modern technique and partly to foster the widest possible appreciation of television as a home entertainment.

Among the exhibits are historical ones which show early attempts to solve the problem of television, and a number which show development over the last ten years. There is a working demonstration of the old 30-line system used by the B.B.C., and there are also demonstrations on cathode-ray tube instruments of latest design by various manufacturers.

Finally, a useful work describing television in all its aspects has been produced in connection with the exhibition.

This work is partly technical, but deals with the subject in a way no one should have difficulty in following. The title is "Television," and the price 6d., postage extra, and copies can be obtained from the Science Museum, South Kensington, London, S.W.7.

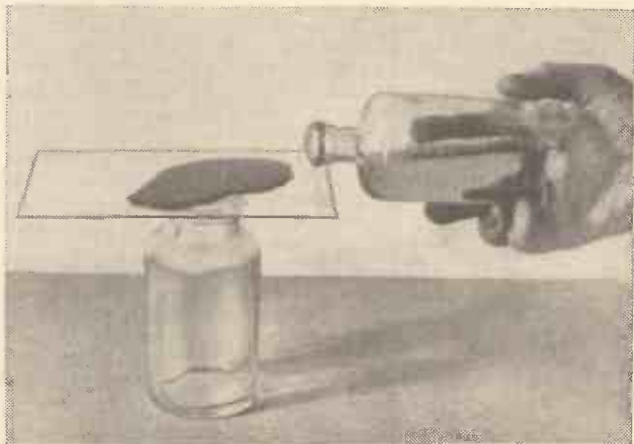
MAKING PHOTO-CELL FILTERS

AMATEURS who for their selenium and photo-electric cell experiments require a number of colour filters, may very easily prepare such for themselves by following the directions below.

Obtain a small quantity of ordinary cooking-gelatine and dissolve five parts of the gelatine in one hundred parts of hot water, filtering the solution afterwards in order to render it free from suspended particles. When cold, the gelatine solution should "set" in to a jelly.

Procure, now, a very small amount of an aniline dye of the required colour (the "packet" dyes obtainable at any chemist's will suffice) and, having warmed up the gelatine solution so that it becomes liquid, dissolve the dye in the solution until the latter acquires the necessary shade of colour. Shake the gelatine solution well and, if necessary, filter it again through muslin or cottonwool.

Now obtain some perfectly clean glass plates (old photographic negatives with the emulsion scraped off serve excellently for the purpose), warm each of these by placing it for a few minutes in a dish of hot water and then rest it on a perfectly level surface. Before the glass plate has had time to become cold, pour over it a quantity of the



The glass plate should be kept level while the liquid is poured on to it.

warm dyed gelatine solution. Distribute the solution equally all over the plate by means of a lightly-applied finger and then put the plate away in a level and dust-free place until the gelatine has set.

Afterwards, in order to protect the gelatine surface, bind the plate up with a plain sheet of glass in the fashion of a lantern slide. The colour filter, for placing in the rays of the illuminant used in the photo-cell experiments, will now be complete. Such filters are cheaply made and when prepared in the form of a series of different colours and varying shades of the same colour they become exceedingly useful for testing the reactions of light-cells to different coloured rays.

By immersing the gelatinated plate in a very dilute solution of formalin (1 in 200) for ten minutes, the gelatine will become hard and insoluble and may be ripped off the glass plate in the form of a transparent film.

SHORT-WAVE VALVES

One of the great advantages of ultra-short-wave broadcasting is the excellent quality which it is possible to obtain. There are difficulties, however, in receiving on these very high frequencies, especially where the question of amplification is concerned, as you will see from the interesting facts given below

By J. C. JEVONS

THE waveband below 15 metres was until recently the happy hunting ground of a select group of experimenters, who made up by keenness for their lack in numbers. One result of television on 6 to 7 metres is to open up this region to a much wider circle, because those of us who cannot, for the time being, afford the luxury of looking-in are at least able to share in the speech and music.

Gain In Quality

The "quality" that is possible on these wavelengths will prove something of a revelation to the music-lover. In ordinary broadcasting we are limited to a side-band spread of only 9 kilocycles—so as to avoid overlap. But on a 7-metre wave "the sky is the limit" so far as audio-frequencies are concerned, and the full audible range up to 30 kilocycles will be available—once we have a set capable of doing justice to them. For this reason alone there is bound to be a permanent future for ultra-short-wave broadcasting.

Now the modern valve does not usually make any bones about the kind of frequency it is asked to handle. High and low come all alike to it, until we get in the neighbourhood of 15 metres. But below that level the ordinary valve begins to "pack up" as an amplifier.

It was just the same in the early days of broadcasting, before the introduction of the Neurodyne and the S.G. valve. The so-called H.F. stage we used then did not pull its weight any more than its successor does now—if it is called upon to handle very short waves.

The reason is the same in both cases. In the older valves the capacity between the electrodes inside the glass bulb was large enough to allow a 300-metre wave to "shoot through" them, just as it would across any other condenser. The incoming wave simply by-passed the valve, and so gave the latter no chance to put in any work as an amplifier.

Reduced Valve Capacity

In the modern screen grid and H.F. pentode, inter-electrode capacity has, of course, been cut down to a very small margin, but even so, it is sufficient to by-pass waves only a few metres long. A 5-metre wave, for instance, oscillates at a frequency of 60,000,000 a second, which is high enough to "jump" anything that even looks like a capacity. If the waves are allowed to get across the electrodes in this fashion, there can be no proper "valve action" by the electron stream inside the valve. In other words, there is no amplification—or precious little!

Multi-grid valves, such as pentodes, heptodes and octodes, put up the best show as ultra-short amplifiers, but on television frequencies the gain per stage on a "straight" set is very small. For this reason the superhet is often preferred because it converts the signal wave into one that is longer, and therefore more easily amplified. The triode-pentode, for instance, is a suitable frequency-changer for a television superhet.

Apart from capacity losses inside the valve, the same sort of leakage also occurs across the connecting leads and the external circuit wiring. Tuning, as we know, is all a matter of capacity and inductance, and the time comes when there is enough capacity inside the valve, and enough inductance in the leads alone, to provide all—and sometimes more—than is required on the ultra-shorts.

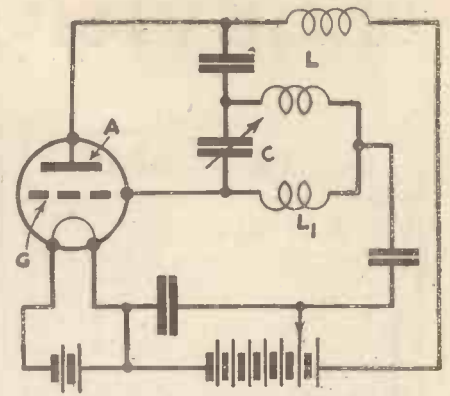
This difficulty has been tackled in the midget type of valve, such as the Hivac and Acorn, by reducing the size of the electrodes to half or even a quarter of their usual dimensions. In addition the leads can be made very short, and brought out to terminals that are spaced well apart, so as to reduce both capacity and inductance. In this way "leakage" losses can be cut down and the effective amplification of the valve improved.

Electrons Not Fast Enough

Another problem peculiar to ultra-short-wave working has to do with the fact that the electrons take a certain amount of time to make their way across the space separating the filament from the plate. They certainly put up a fine turn of speed—about 10,000 miles a second—but for very short waves this is not fast enough. As a result the electron stream gets "out of step" with the incoming signals because the latter vary the grid potential at too fast a rate. Directly this happens the amplifying action of the valve goes flop.

One simple and ingenious remedy is to work the valve with a high positive voltage on the grid and with zero potential on the plate. This so-called Barkhausen-Kurz circuit has the merit of being applicable to any type of valve with symmetrical electrodes, such, for instance, as the ordinary triode. Further, it gives satisfactory results on waves down to one metre or less.

When biased in this way, the highly-positive grid becomes the centre of attraction inside the valve, and the electrons tend to huddle themselves around it. When they first leave the cathode, the electrons shoot a little way past the open-wire grid, towards the plate, but the positive grid voltage draws them back again, until they finally settle down in a



In this circuit, utilising a new type of short-wave valve, a cloud of electrons around the grid serves to generate ultra-short waves of the order of one metre.

cloud about half-way between the filament and plate. Here they can respond to the applied signal voltages without having to move more than a microscopic distance, so that the time-lag disappears. They soak into the grid, and from it into the tuned external circuit, in response to each incoming signal no matter how rapid.

A New Development

The figure shows a new type of short-wave valve in which the same idea of setting-up a cloud of electrons around the grid is utilised to generate ultra-short waves of the order of one metre. In this case, however, the anode A is kept at a positive voltage instead of the grid, whilst the valve is partly filled with helium or neon gas at a pressure of about 1 mm.

Under these conditions the gas above and below the perforated grid G becomes ionized, and the free electrons cluster into a cloud on each side of it. Meanwhile a thin sheath or layer of "free" positive ions settles down on to the meshes of the grid layer and normally keeps the two clouds of electrons separate. This positive layer, however, moves backwards and forwards as the grid voltage fluctuates, and so allows electrons from the lower cloud to pass through from the cathode to the plate, and from there into the tuned circuit L, L₁, C. The back-coupling between the coils L, L₁ then serves to build up sustained oscillations.

When the grid is thrown more positive, the plate current at once rises to its maximum, whilst when the grid turns more negative the plate current is completely cut off. This provides a much more effective and clear-cut control than the grid action of the ordinary type of valve.

BLACKPOOL ENTERTAINS

BLACKPOOL will be the source of a big outside broadcast feature on June 29. Northern listeners will then hear excerpts from the Royal Follies Concert Party show at the Central Pier (with Phil Stricklan, Jack Hayes, Evelyn Bury and others); part of a revue, "Punch and Beauty," from Feldman's Theatre (featuring Reg Bolton, Elsie Prince and Terry Wilson); and an excerpt from Jack Taylor's 1937 revue, "King Cheer," at the Opera House (featuring George Formby, Frank Randle and Randolph Sutton).

THE 1937 MIDGET PORTABLE



High efficiency combined with compactness! The Midget Portable is here seen ready for use.

"I watched over that job like a mother chicken . . . for when a radio engineer has a portable set with him on his travels it's got to be A SET! In fact, it's got to be THE SET!" says Victor King. And when you have built it you will agree that it is the finest portable you have ever handled.

IT'S a strange fact that at the very time when certain of the B.B.C. broadcasts would be most eagerly listened to, the majority of listeners are cut off from their sets.

Let me explain that curious statement. During the holiday months, the O.B. department of the "Big House" wages energetic battle on the ether. They get "all lit up."

Tennis, mainly. For days and days they commentate on Davis Cup play and championship events. With a bit of cricket or tattoo or dirt-track, or something else thrown in now and then.

Improving the Shining Hour

Popular items these, and they would certainly have bigger ether audiences were it not for the fact that so many folk are away on holidays or are pushing outwards into the wide open spaces.

But I don't expect a very great number of you have thought of this; it is during a lazy afternoon on "the Downs," or down the river, or on the sands, that it is most interesting to hear descriptions of sporting and other O.B.'s. I know, I've tried it. Everywhere I go I take my little portable with me.

I've sat in Manchester lodgings listening to the cricket results on it; I've reclined on a bench in a Devon bar parlour absorbing the First News, I've heard Perry walloping Vines, or Vines walloping Perry, while lying in a Brighton bathroom.

I've even used the outfit as a car radio.

Well, this year I decided the time had come for my small radio companion to be pensioned off, and also that it would be replaced by the very best one that it was possible to devise.

A Combination in Design

So this is what I did. I suggested to the Editor that all the lessons of portable radio I had learned during a decade of practical experience should be incorporated in a proved "P.W." design. Plus any improvements the "P.W." Research Dept. might be able to suggest themselves.

The result ought, you might reasonably

anticipate, be a really "hot stuff" little job. And it is. It could hardly be otherwise in the circumstances. You see it in the accompanying photos. The 1937 Midget Portable.

The set which is destined to accompany me upstairs and downstairs and all over the country, and, perhaps, all over many parts of Europe.

I've already had it with me for a week-end holiday in Norfolk, anyway, and you can take it from me that it is a complete success. I nearly said "with knobs on," but that might give you a wrong idea, for it hasn't got many controls to twiddle.

So there you are. I'm introducing to your critical attention and advising you

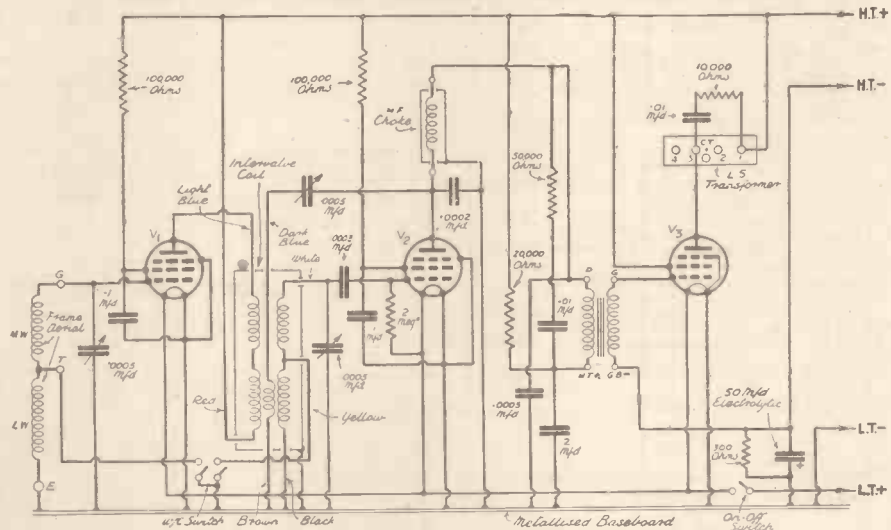
And weren't the "P.W." chaps glad when the design had been completed and the final test carried out!

I watched over that job like a mother chicken—for when a radio engineer has a portable set with him on his travels it's got to be A SET! In fact, it's got to be THE SET!

You can see from the theoretical diagram how we moved up and up just as far as our technique would carry us. First an H.F. Pentode. Then an L.F. Pentode. And finally a pentode for the detector. Sensitive? and how! Bring me a radio box with equal sensitivity in equal compactness and serviceableness and general all-round qualities and I'll willingly step down.

But I know you can't, because *this* Midget is the little giant that has descended from a line of past successes and had personal need tacked on!

THREE PENTODES ENSURE HIGH SENSITIVITY



The 1937 Midget Portable is an all-pentode design, and its sensitivity is amazingly high. It is completely self-contained and makes an ideal companion for the summer months.

to build a set bearing the highest recommendation it is possible for me to give. Being perfectly honest (as always), I'll repeat, this set has its being because I wanted to use it myself!

That many of you will also be wanting something like it is a coincidence. Or is it?

It's a cunning little affair, and I don't think it would be possible to obtain similar results with such robustness and in such a compact, light construction in any other manner.

But, of course, it has got to be built. Not a hard job for anyone who can handle simple tools. Nevertheless, don't expect that all you are faced with is the slinging together of a few standard bits and pieces. Did you know that the last Midget portable was constructed by a Very Famous Person?

No, I thought you didn't. However, he got someone else to do the actual work. Which was his loss.

(Continued overleaf.)

THE 1937 MIDGET PORTABLE

(Continued from previous page.)

I like to think most of you will enjoy a spot of real He-Man's set-building.

Have I said all I should say about what you get for your labour and money? Let me see. I expect you at once gathered that this is an entirely all-in job. With its own frame aerial and speaker and batteries. Oh, yes. A moving-coil loudspeaker from whence sprays excellent, surprisingly excellent quality.

YOUR SHOPPING LIST

- 2 I.B. "Dilecon" .0005-mfd. tuning condensers.
- 2 I.B. 3-in. knob-dials for above.
- 1 B.T.S. .0005-mfd. solid dielectric reaction condenser, with insulated bush and spindle.
- 1 Bulgin on/off switch, type S.80.
- 1 Bulgin W/C switch, type S.126.
- 1 B.T.S. screened coil, type ML/S/1.
- 1 T.C.C. 2-mfd. fixed condenser, type 50.
- 1 T.C.C. 1-mfd. fixed condenser, type 50.
- 1 T.C.C. 1-mfd. tubular fixed condenser, type 250.
- 2 T.C.C. .01-mfd. tubular fixed condensers, type 250.
- 1 T.C.C. .0002-mfd. fixed condenser, type S.
- 1 Dubilier 50-mfd. electrolytic condenser, 12-v. wkg., type 3016.
- 1 Dubilier .0005-mfd. fixed condenser, type 690 W.
- 1 Dubilier .0003-mfd. fixed condenser, type 690 W.
- 1 Dubilier 2-meg. resistance, 1/2-watt type.
- 2 Dubilier 100,000-ohms resistances, 1/2-watt type.
- 1 Dubilier 50,000-ohms resistance, 1/2-watt type.
- 1 Dubilier 20,000-ohms resistance, 1/2-watt type.
- 1 Dubilier 10,000-ohms resistance, 1/2-watt type.
- 1 Dubilier 300-ohms resistance, 1/2-watt type.
- 1 Wearite H.F. choke, type H.F.J.
- 1 Varley L.F. transformer, "Niclet" 3/5/1.
- 2 Clix 7-pin chassis-mounting valve holders with screw terminals.
- 1 Clix 5-pin chassis-mounting valve holder with screw terminals.
- 1 "Metaplex" baffle-board, 8 1/2 in. x 7 in. x 1/8 in. (Peto-Scott).
- 1 "Metaplex" baseboard, 14 in. x 6 1/2 in. x 1/8 in. (Peto-Scott).
- 1 Plywood panel (polished front, "Metaplex" back) (Peto-Scott). 9 in. x 6 1/2 in. x 1/8 in.
- 1 Plywood base for accumulator carrier, 4 1/2 x 2 1/2 in. x 1/8 in. (Peto-Scott).
- 1 Plywood block for mounting accumulator carrier, 4 1/2 in. x 2 in. x 1/8 in. (Peto-Scott).
- 4 Plywood strips (two 13 in. x 1 in., two 8 1/2 in. by 1 in.) for aerial frame (Peto-Scott).
- 1 Piece 18-gauge aluminium for valve panel, 15 1/2 x 2 in. (Peto-Scott).
- 1 Piece 24-gauge aluminium, 14 1/2 in. x 1 in., for accumulator carrier (Peto-Scott).
- 1 Piece 10-gauge aluminium for screen, 9 in. x 4 1/2 in. (Peto-Scott).
- 2 Belling & Lee accumulator spades.
- 2 Belling & Lee wander plugs (H.T.+, H.T.-).
- 1 oz. 36-gauge D.S.C. copper wire (Peto-Scott).
- 10 ft. 18-gauge T.C. wire (Peto-Scott).
- 2 Lengths 1 1/2 m.m. insulating sleeving (Peto-Scott).
- Screws, flex, 6 B.A. nuts and screws, etc. (Peto-Scott).
- 1 W.B. loudspeaker, type 37 B.P.

VALVES.

V ₁	V ₂	V ₃
Mazda S.P.210 (Metallised)	Mazda S.P.210 (Metallised)	Mazda Pen.231
H.T.		
120 volts.		
L.T.		
2-v. Exide, type P.O.2.		

Stations? Well, it brings the Northern Regional in at fine volume in London during the daytime. In Norfolk I could tune in a number of Continentals. But as I don't know where some of you might take the thing (down coal-mines even, for all I know) I'm not going to say too much about its range. Except this. I think it is absolutely safe to say that anywhere in the whole of the British Isles you are certain to get one of the B.B.C. stations

anytime during programme hours. And that on a little portable, so handy in size and without the need of any aerial or earth attachment, is I think, pretty good.

In practice, lots of you will get dozens of stations in the most unpromising circumstances, and there are hundreds of satisfied owners of previous Midgets who will be able to back up that statement.

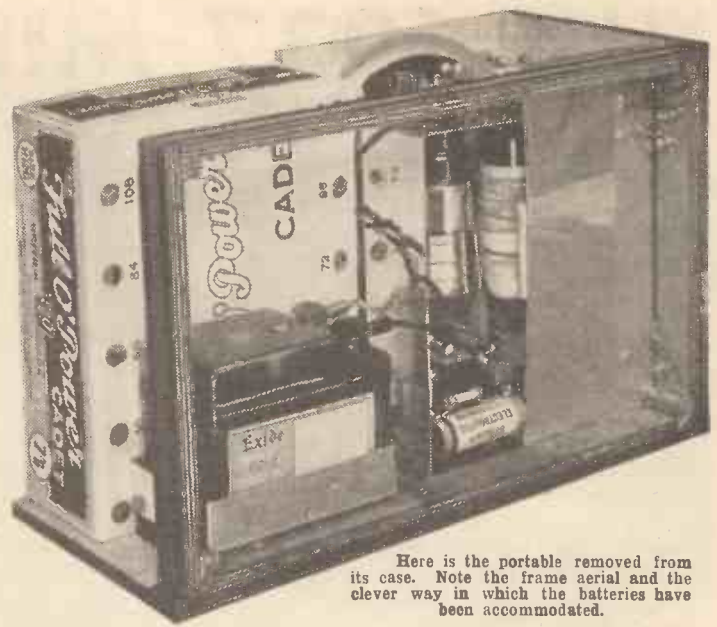
But now we must get to work. There is nothing more that need be said about the attractions of this set, for by now you will have gathered that if there were a better one I'd have been after it! Right. First step. Get together all the bits and pieces. And don't try to "make do" on this or that. This set has been designed. Take the list which appears with this article and see that you provide yourself with everything exactly as specified. If you don't do that you won't be building my set! You will be building a slightly different design.

Concerning Alterations

You may be tempted to use up various things already in your possession. Now I'm not going to say that in certain cases that would completely ruin the outfit. It wouldn't—probably.

But there are two things to note. The first is that this little portable doesn't ramble all over a couple of cubic yards.

There isn't any squashing, but all the components neatly fit together into a nice, compact assembly. Some alterations to the makes of parts specified simply couldn't go in and that's that.



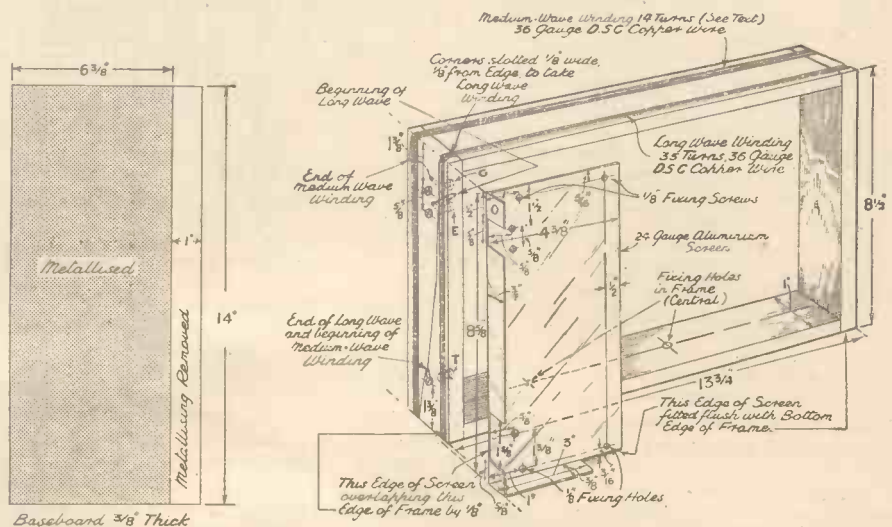
Here is the portable removed from its case. Note the frame aerial and the clever way in which the batteries have been accommodated.

The other thing is that even if other bits would go in, it is on the cards that there might be an electrical upset due to the different shapes or what not. Anyway, having got that off my chest let's get down to the actual job of construction.

I think we might as well start with the frame aerial. The frame consists of two pieces of plywood, 13 in. x 1 in. x 3/8 in., and two pieces 8 1/2 in. x 1 in. x 3/8 in. The ends of the longer pieces butting the inside faces of the shorter pieces. One-inch panel pins and glue should be used for the joints.

When the glue has dried, the slots at the four corners should be cut to take the long-wave winding. Next drill the holes to take the three terminals G., T. and E., and also the fixing holes. Fit the terminals. Drill two 1/8-in. holes to take the beginning of the long-wave and the end of the medium wave windings (positions of holes are shown in the diagram). The construction of the frame aerial will be completed next week, together with constructional details of the remainder of the set. VICTOR KING

HOW THE FRAME AERIAL IS MADE



In this diagram you will find all the details you need for building the frame aerial and the metal screen which is fixed to it. On the left are details of the baseboard.

MARCONI—THE MAN AND HIS WIRELESS

CHAPTER IV: THE SCENE SHIFTS TO ENGLAND

Marconi's intuition and perseverance—He takes his wireless to England—Reasons for leaving Italy—What Marconi showed Britain—How Jameson Davis helped him—Sir William Preece's welcome—When military duty threatened to interfere—The first Marconi demonstrations in London—Organization of Marconi's Wireless Telegraph Company—He protected Italy in patent rights—His first interview in London—His statements called "astounding"—Proclaimed in the headlines—His faith in wireless and its future—Preece concedes the honours to Marconi—What Slaby witnessed—Some German competition—New stations and triumphs along the English coast—When wireless first went to sea.

MARCONI'S youthful intuition and patience, his ambition and perseverance would carry him far. Having put the spark of life into wireless he offered it to the Italian Government, but the offer was not accepted. So following in the footsteps of Columbus, Marconi at the age of twenty-two left Italy to seek encouragement under a foreign flag.¹ Accompanied by his mother, whose method of doing things was English rather than Italian, he set out for London. Yet in their hearts both held a strong love for Italy.

"I first offered wireless to Italy," Marconi explained, "but it was suggested, since wireless was allied to the sea, it might be best that I go to England, where there was greater shipping activity, and, of course, that was a logical place from which to attempt transatlantic signalling. Also, my mother's relatives in England were helpful to me. I carried a letter of introduction to Sir William Preece. Mind you, Italy did not say the invention was worthless, but wireless in those days seemed to hold promise for the sea, so off to London I went."

There he met Sir William Preece,² Engineer-in-Chief of the British Post Office, a man deeply interested in the possibilities of signalling without wires. Marconi told Sir William about the magic tin boxes or cylinders, and how he had discovered, "when these were placed on top of a pole two metres high, signals could be obtained at thirty metres from the transmitter"; and that, "with the same boxes on poles four metres high, signals were obtained at one hundred metres, and with the same boxes at a height of eight metres, other conditions being equal, Morse signals were easily obtained at four hundred metres."

It began to look as if the higher the pole the greater would be the mileage. So the sky was the limit to this youth hot on the track of something stupendous. The urge for distance pushed wireless on to new goals just as it has enchanted explorers and astronomers.

¹ First British patent, No. 12039 of 1896, described use of transmitter and coherer connected to earth and elevated aerial.

² Died, November 6, 1913.

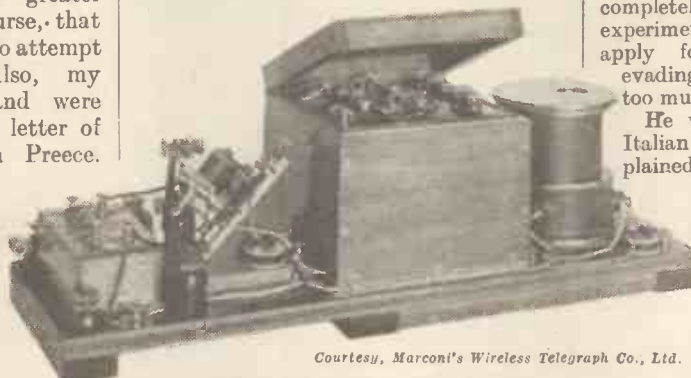
Distance, distance, more distance—that has always been the call ringing amid the wireless signals since the beginning.

Now there were two gentlemen in London at the same time from different countries, to tell the same story—telegraphy needs no wires. And the messages will go through walls, houses, towns and mountains—even through the earth—on the wings of an electrical flash.

The Italian youth, aided by his cousin Jameson Davis,³ was soon ready to begin experiments in London.

"When Guglielmo was a small boy, about six or seven years of age, I stayed with his parents for a short while in Italy," recollected Mr. Davis. "He was a bright, intelligent child, but, of course, no one suspected at that time or for a long time afterward that he would blossom into a genius.

"When he was twenty-two or three I was in considerable practice as an engineer



Courtesy, Marconi's Wireless Telegraph Co., Ltd.

A complete coherer receiver. The coherer was the earliest form of detector, and consisted of a sealed glass tube in which were placed two silver plugs attached to platinum wires. The space between them was filled with nickel and silver filings. In use it was found that these filings tended to remain cohered and mechanical shock was necessary to restore them to their original non-conducting state. This was achieved by an electro-magnetic vibrator or tapper. The coherer and de-cohering device may be seen in the photograph on the left of the case with the half-open lid.

in London, and his mother wrote asking if I could help him; I replied that I would be glad to do what I could if he came to London to see me. This he did very shortly after. His instruments were broken by the Customs authorities, as they were not understood and were thought to be dangerous. New instruments had to be procured, and these were ordered on Marconi's specifications.

"When they were assembled and started to work, the possibilities of wireless telegraphy were very evident to me, and for some weeks experiments were conducted at my home in London; many prominent experts and others came to see them."

Among the notabilities was Sir William Preece. He welcomed Marconi and extended an invitation to use his laboratory.

³ Died on Christmas Day, 1936.

Britain was interested in this thing called wireless and was anxious to get to the root of it. This was fortunate for the Italian, who otherwise might have encountered opposition from the British authorities. On the contrary, their co-operation was at his command and he installed apparatus at Westbourne Park.

Preece, in December, 1896, lectured in London on "Telegraphing Without Wires." He described the Italian's magic and expressed complete faith in Marconi. He disclosed that he had been instructed by the Postal Department to spare no expense in testing the Marconi instruments and ideas to the fullest degree.

The Marconis, however, were not long in London when the Ministry of War in Rome declared that Guglielmo should do regular military service as all others. He had two choices: go to Italy and enrol for three years of military training and be completely distracted from his wireless experiments, or remain in England and apply for citizenship papers, thereby evading Italian service. But he thought too much of Italy.

He went to General Ferrero at the Italian Embassy in London, and explained the situation: he wanted to remain an Italian, but he also wanted to continue the conquest of wireless. Ferrero was sympathetic and wrote to the Minister of the Navy, who, luckily for Italy, decided if the young man consented to conduct his tests under the auspices of the Italian Embassy, he could be attached to it as a naval student in training.

Marconi quickly agreed, and the demonstrations that followed for the benefit of the Post Office officials were highly successful. The signals first covered only 100 yards, but later travelled between the General Post Office and the Savings Bank Department in Queen Victoria Street. Trivial distances, yes—but extremely important.

The next step was to establish stations at Penarth and Weston-super-Mare. Between those two sites the sputter of wireless sounded more triumphant than ever as Marconi "pumped" more power into the mystic waves.

All of these English tests were so encouraging that the Wireless Telegraph and Signal Company, Ltd.,⁴ was incorporated in England (July, 1897), as the first commercial organisation of its kind, the chief

(Continued overleaf)

⁴ Name changed to Marconi's Wireless Telegraph Co., Ltd., in 1900.

MARCONI—THE MAN AND HIS WIRELESS—Continued

purpose of which was to install wireless on lightships and at lighthouses along the English coast. The capitalisation, £100,000, was sufficient to acquire Marconi's patents in all countries except Italy and her dependencies. Marconi was given a half-share of the capital and £15,000 in cash. Jameson Davis, who assisted in the formation of the company, was appointed managing director, a position he held for two years.

Marconi, disappointed in Italy's lack of interest in his invention, nevertheless, did not yield the Italian patent rights to the English Marconi Company. More faithful to Italy than Italy was to wireless and to him, he wanted to be liberal to the land of his birth, the land over which wireless first vibrated. He felt that Italy in case of war might want to be independent of any foreign nation, so with his usual foresight he protected Italy in regard to wireless apparatus and patent rights.

The serious-mannered Italian youth, speaking with grave precision in his London home in Westbourne Park, made no claim whatever to being a scientist. He simply said that he had observed certain facts and invented instruments to meet them.

"My work," he said, "consists mainly in endeavouring to determine how far these waves will travel in the air for signalling purposes. I am forced to believe the waves will penetrate anything and everything."⁵

Inquiry was made if fog would interfere.

"Nothing affects them," he replied. "My experience with these waves leads me to believe they will go through an iron-clad."

"What are you working on at present?"

"Mr. Preece and I are working at Penarth, in Wales, to establish regular communication

through the air from the shore to a lightship."

"What length of waves have you used?"

"Various lengths from thirty metres down to ten inches."

"Why could you not send a dispatch from London to New York?"

"I do not say that it could not be done," he continued. "Please remember wireless is a new field, and the discussion of possibilities which may fairly be called probabilities omits obstacles and difficulties likely to develop in practical working. I do not wish to be recorded as saying anything can actually be done beyond what I have already been able to do. With regard to future developments I am only saying what may ultimately happen; what, so far as I can now see does not present any visible impossibilities."

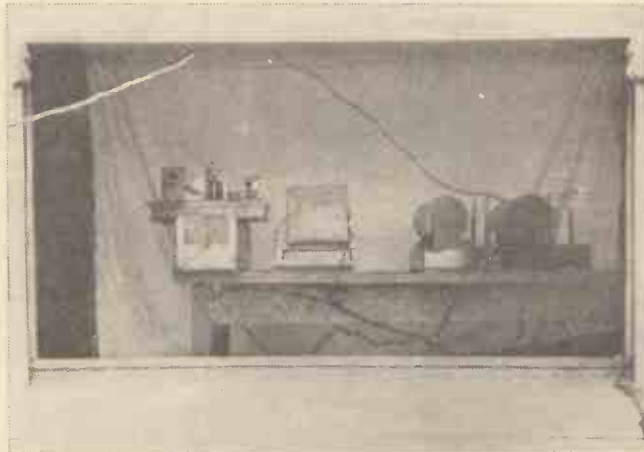
The interviewer concluded: "Such are

the astounding statements and views of Marconi. What their effects will be remains to be seen. The imagination abandons as a hopeless task the attempt to conceive what—in the use of electric waves—the immediate future holds in store. The air is full of promises, of miracles. The certainty is that strange things are coming."

What is his magic? Proclaimed in a headline across the front page of the New York "World" as "the boy wizard, an Italian lad of 23 years of age," Marconi described his invention and his faith in wireless:

"I am uncertain as to the final results of my system. My discovery was not the result of long hours and logical thought, but of experiments with machines invented by other men to which I applied certain improvements. These experiments were made principally at Bologna, Italy. I used the Hertzian radiator and the Branly coherer. The radiator was what would be known in telegraphists' speech as the sender and the coherer the receiver. Before I began the experiments these two instruments would send a message without wires a distance of from three to thirty yards, but there the power ended.

THE FIRST MORSE INKER



Courtesy, Marconi's Wireless Telegraph Co., Ltd.
The first set of wireless telegraphy instruments fitted at the Haven station, showing the first Morse inker on the left. The aerial lead can be seen in the top left-hand corner. It was taken through a glass window and the hole for it was made with an old file.

"The improvements which I made were to connect both receiver and sender with first the earth and second the vertical wire insulated from the earth. The latter was by all means the more important of the two innovations.

"At once instead of being limited to a few yards in results, I extended the distance over which a message could be sent without wires to about two miles. I found this principally due to the vertical wire, and, speaking as simply as possible, I believe the following theory may explain why this was so:

"Everybody knows how sound is transmitted by means of vibrations of air. For instance, if you fire a cannon, the concussion produced by the explosion of the powder causes the air to vibrate, and so far as these vibrations of air extend just so



Heinrich Hertz, inventor of the Hertzian radiator used by Marconi in his early experiments. It was Hertz, who while Professor of Physics at Karlsruhe, showed how electro-magnetic waves were propagated through space and measured their length and velocity.

far is sound audible. In other words, sound consists of vibrations of air. Well, my vertical wire carries the electric vibrations up into the air and produces certain vibrations in the ether, and these vibrations extend in every direction until they reach the receiving instrument. Thus a message can be transmitted through ether for as great a distance as you can cause vibrations to proceed.

"The original Hertz radiator worked on the same principle, but the vibrations its two brass spheres produced were very slight. My improvement magnifies them.

"An Italian scientist in speaking of the case said: 'The old Hertz radiator and old Branly coherer might be likened to the reed of an organ. By the Marconi improvements the pipe of the organ is added. The reed would make very little noise, but when you add the reverberant power of the pipe you get a great volume of sound. Marconi's connection of both receiver and transmitter, first with earth, second with air, supplies the pipe to the reed and makes the volume of vibrations great enough so that it will reach great distances.'

"As a matter of fact, before I improved the receiver it was impossible to end one pole of the transmitter with the earth and the opposite pole with insulated vertical wire. It was impossible to communicate intelligible messages even thirty yards, but after I had done these things I succeeded in communicating from the Arsenal of San Bartolomeo at Spezia with an iron-clad twelve miles away upon the water.

"I have no reason to suppose that this is the limit of the possibilities of the system. Indeed, I am sure that it is not the limit. What the ultimate limit will be I cannot say. I have no idea whether or not my system will ever be able to carry messages across the Atlantic, but for land purposes it will be a complete commercial success within a comparatively short time."

England still wondered what Sir William Preece, after association with this young man from Italy, really thought of him. Why should Britain be devoting so much

(Please turn to page 381.)

⁵ McClure's Magazine, March, 1897.

⁶ August 8, 1897.

FROM OUR READERS

SAT ON THE SPEAKER—AND IMPROVED

The Editor, POPULAR WIRELESS.

Dear Sir,—Reading Mr. Suddard's letter on loudspeakers (June 5th) reminds me of an amazing experience I had last winter. I was sitting in the dark, after listening to a broadcast, and I unfortunately forgot that I had left the loudspeaker (an old 1928 or 1929 Brown cone model) lying face upwards on an easy chair. My mother walked into the room without switching the lights on and sat down. Loud rendings and a scream or two!

When the lights were on we found the outside edge of the cone was entirely separated from the frame. I decided to make the best of a bad job and join the cone and frame together with black adhesive tape.

After this was done we switched the set on, hardly daring to listen. Miracle! The tone quality was 25 per cent improved. As Mr. Suddard remarked: "Drums were drums."

In my more desperate moments I seriously consider improving my present set by the same method, viz. leave it in an armchair one dark night with the light out!

H. ROGERS.

132, Wheelwright Road, Erdington, Birmingham.

P.S.—Carry on with the short-wave stuff. It's good—especially news about amateurs.

THE USE OF LISTENERS' CARDS

The Editor, "Popular Wireless."

Dear Sir,—With regard to your article headed "Please QSL," in "P.W." of May 8th, I am enclosing one of the objects so scorned by many Hams.

When I report on a transmission (which is only when a definite request is made), I forward the usual QSA—, R—, W.X.—, etc., and technical diagram of the receiver in use. Furthermore I give details of the programme or conversation, with Greenwich Mean Time at 10-minute intervals. In addition I enclose full dimensions and directional properties of the aerial and a Reply Coupon.

On receipt of the QSL card I forward my card as a token of appreciation. I also use the cards in my first communication with fellow-listeners. It is therefore my opinion that listeners' cards are quite in order if used in the correct manner.

MAURICE L. HUNT.

16, Princess Street, Knutsford, Cheshire.

HARKING BACK

The Editor, POPULAR WIRELESS.

Dear Sir,—Whilst hunting around my shack the other day for some components to build an O.V.I. I found a POPULAR WIRELESS dated April 4th, 1925. I might tell you that the components were completely forgotten about, and a very interesting hour was passed away poring over this old number.

The first thing that caught my attention was the picture on the front cover: it was of Mr. S. F. Lewis, of Hampstead, doing a spot of listening-in, the QSL cards on the wall of his shack would put many of the S.W.L. to shame, including myself. Given a modern R.X., Mars would be only a local station to him. However did those chaps manage to do the job with those out-of-date R.X.s?

Another interesting article was "A New Valve." This went on to describe how it had been found possible in the same length of filament to create a variation of resistance that will accommodate voltages from 4 to 20. The valve may be worked with either A.C. or D.C., without hum, etc. The biggest advantage in these valves is that there is no vacuum whatever. And according to the writer the time was not far distant when all valve repairing could be done at home.

By the way, Mr. Editor, what happened to these valves? Were they a flop? After reading an article entitled "Getting Down to

RESULTS

An amusing experience described by a reader

K D K A with a Reflex Set," and another entitled "Spade Tuning, its Advantages and Disadvantages," I passed on to the adverts. I might tell you that they were a joy to behold. H.T. batteries, 108-volt, priced at 25/6; horn speakers, £5 5s.; S.T.100 kit of parts, £5 10s.; complete instrument wired ready for use, £7 6s.

WIN A GUINEA

This sum is awarded each week to the sender of the letter which is best in the opinion of the Editor. All readers' letters stand a chance. This week the award goes to Mr. H. Rogers

But the best bargains of the lot were the two-pin plug-in type of coil at 6s. 4d. each. Well do I remember paying this price for that at a much later date.

From the adverts. I came to "The POPULAR WIRELESS Continental Broadcasting Time Table." According to this, Koenigswusterhausen headed the list, working on 4,000 metres, followed by Eiffel Tower, 2,660 metres, Boden, 2,500 metres, Marsanto, 2,450 metres, Lyngby, 2,400 metres, and Amsterdam, 2,100 metres. This brought to a close, as I mentioned before, a very interesting hour. I should like to add

BRINGING BACK OLD MEMORIES

The Editor, "Popular Wireless."

Dear Sir,—Congratulations on attaining the fifteenth anniversary of "Popular Wireless." Your reproduction of the cover design of No. 1 brought back many memories of the early days of broadcasting, and I realised with something of a shock how long ago it was that I first became interested in radio. It may interest you to know that I am still the proud possessor of No. 1 and of a good many subsequent volumes (with some gaps, I'm afraid) up to the present, and I would not part with the first issue for anything. It represents a new epoch in modern history to me—the advent of radio as a popular hobby.

Prior to then radio had been the hobby of a few scientifically minded amateurs (apart from its commercial communication usage, of course); with the advent of your journal it rapidly became the hobby of thousands who found it all-absorbing. Do you remember the term "wireless widow," coined to describe the wife of a "wireless maniac"? Those were the days! I wonder how many wireless widows there are nowadays? Not many, I am afraid. The mass-produced commercial receiver has taken away the mass appeal of home construction, and only a few stalwarts like myself are left. However, what we now lack in quantity we have gained in quality. Hi!

Some of us "old timers" could write books about our early experiences—how we had to make our own variable condensers, valve-holders, coils, grid-leaks, even low-frequency transformers (these only by the adventurous, however!)—in fact, nearly everything we wanted, since even when components were obtainable (which they usually weren't!) the prices were prohibitive. And here's a grumble—why are the prices of components still so high? Some of them have come down very little, if any, for the last eight or ten years, although during that time commercial receivers have been reduced to ridiculously low figures. Isn't this profiteering in components one reason why home construction has fizzled out so rapidly with the advent of the cheap commercial receiver? You have to be a real out-and-out enthusiast to build a set yourself for twice as much as a commercial receiver with about twice as many refinements and "gadgets."

Finally, thanks for the splendid anniversary issue. I am enjoying Marconi's life-story, and shall look forward to further instalments. I was also interested to read "How a Threshold Howl Was Cured" in "My Short-Wave Adventures." I have come across this annoying fault in one or two ordinary broadcast-band receivers, and in every case first-class transformers were in use (usually of low ratio, and therefore with high primary inductance).

One receiver was an old Det.-2 L.F., and in an endeavour to cure the howl decoupling was resorted to (both detector valve and first L.F.), also a filter output to the speaker—no cure. Then various values of grid leak and condenser were tried; still no result. (Of course, adjustment of H.T. had been tried without success.) Then a potentiometer across L.T. was tried, taking the grid-leak return to the slider. Some improvement was obtained with this; in fact, with the slider nearly at the negative end, the howl disappeared. With the valve in use (an old Mazda H.L.210) this did not seem to affect detection (sensitivity) at all; with some other valves I imagine sensitivity would fall off considerably with the grid-leak to negative L.T. However, I give the tip for what it is worth, as an alternative to the method described by your contributor.

The latter method is certainly an infallible cure for either short-wave or ordinary broadcast-band threshold howl; though sometimes, if a resistance low enough to remove the howl is used, (Continued overleaf.)



The listener's card referred to by Mr. Hunt in his letter on this page.

in conclusion that any reader of "P.W." who has an hour to spare and can get hold of one of these old issues, my advice to him is read it over—it makes darned interesting reading.

F. G. SADLER.

154, The Guinness Trust, Stamford Hill, London, N.16.

[We regret that no further information was ever received by us concerning this valve, so we cannot say why it apparently was not further developed.—EDITOR.]

FROM OUR READERS—Continued

some slight reduction in signal strength is noticed. (Using this method on the old Det.-L.F. receiver already mentioned, a 100,000-ohms resistor was found necessary across the primary of the first transformer, and there was quite a noticeable decrease in volume.)

F. W. T. ATKIN.

25, Hayfield Crescent, Frecheville, Sheffield.

M.C. MODIFICATIONS

The Editor, POPULAR WIRELESS.

Dear Sir,—I am very interested in the correspondence referring to M.C. speakers, and particularly in the letter of C. Studdard. I have also had several attempts in this direction and always found that the cone, after the flexible surround was put in, had a very noticeable dither or buzz, more so as the input wattage was increased.

I use a battery set, with Bulgín Vibrator, 2 H.F. pentodes, double-diode-triode R.C. coupled first L.F., A.F.5 transformer, P.M.202 using O.P.M.6, 45/1 output transformer, and have now got a Rola 9.12. I am satisfied with the speaker, and agree with the W.B. Co. that speakers are best as sent out, and most sets are hampered by lack of H.T. (battery) to give good results.

Thanking you for a good paper, which I have had for the last six years.

H. W. BOWSER.

Magadales, Thurgarton, Notts.

A CHALLENGE TO S.W. LISTENERS

The Editor, "Popular Wireless."

Dear Sir,—Through your columns I have followed the controversy regarding QSL's, and even though the subject is well worn I would appreciate it if space could be found for the following.

I cannot and will not try to explain the reason why some short-wave listeners obtain a good percentage of replies to their reports to stations and others do not.

My experience in collecting QSL from "hams" is very limited, having only sent one report (in this case to a J 2 station on 40 metres), nevertheless it shows a full percentage because I received a "veri" from the station.

I have, on the other hand, had considerable experience in reporting to broadcast stations, etc., and readers can judge for themselves if this is worth while after reading what follows.

Last August I entered a short-wave contest, the winner being the contestant who obtains the greatest number of verifications from stations (not "hams" or commercial code stations) logged over a thirty-day period. During the period I chose (August 1st to 30th) I managed to log 247 foreign short-wave stations; from these I selected 201 and sent them reports in answer to which I received 152 replies. Of these 78 had to be sent back because they did not comply in one way or another with the rule governing "veris." In this contest, which reads: *Only letters or cards which specifically verify reception of a given station on a given wavelength, and on a given date will be accepted.*

To date my total is 95 verifications all of which are in accordance with the above rules.

In 1935 I entered the International Short-Wave Club's ("veri") competition, and received 57 points for the 57 replies that I received in answer to the 129 reports I sent stations. As one will notice every reply was accepted in this contest as verification, although to be frank only 33 of the 57 replies actually verified reception of a given station, and out of these only 25 would be accepted in the contest I am now entered in.

I have seen cards and letters which fellow listeners "treasure" as "veris" which in the true sense of the word are not, they merely being acknowledgment of receipt of their report from the station in question, or a card which states "We thank you for your report. Please write us again, etc." there being no mention of the word verified on it anywhere. The lesser heard South American stations are in my opinion the worst offenders of this type of reply.

But then, from the other man's point of view, my version of a "veri" or QSL may be wrong, in which case every reply from a station is a "veri," providing that it does not state the words NOT VERIFIED on it. What are readers' opinions on this? After all, a verification from a station is the only way in which a listener can prove that he or she had actually heard the station; the

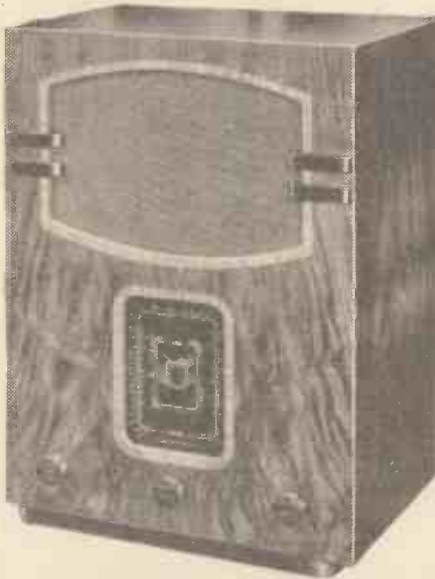
mere fact that so and so station is entered in one's log book does not prove anything except that someone wrote it in there. In this short-wave game as in all other games there are a certain class of people who don't exactly play the game right. (Sorry, readers, but if the cap fits, wear it.)

In view of this, readers are perfectly justified in taking my log of 247 stations with the proverbial grain of salt, but the collection of 95 "veris" should speak for itself, and I challenge anyone in the British Isles to beat this number with "veris" received from short-wave stations (not "hams" or commercial code stations) logged over any thirty-day period, all verifications to comply with the rules stated above in italics.

I issue this challenge fully aware that there are DXers in England who have long passed the 1,000 verification mark, and that the I.S.W.C. 1935 contest (listening period three months) was won with 109 verifications by Mr. F. A. Beane, of Ridgewell, Essex, a person so well known to "P.W." listeners for his articles on identifying South American stations, a feature to which he is so aptly suited.

My receiver is a two-valver of my own design and construction, although in my above challenge I bar no receiver irrespective of make or number of valves used, with nothing further to add except

NEW McMICHAEL SET



A new McMichael all-wave superhet for A.C. mains which is priced at 101 guineas. It has an ingenious edge-on illuminated dial, and further details are given on cover iii.

to wish all short-wave "fans" happy hunting and your evergreen magazine continued success.

FRED LANAWAY

(The Ear of Edmonton).

49, Granville Avenue, London, N.9.

WELL SATISFIED

The Editor, POPULAR WIRELESS.

Dear Sir,—To me one of the main interests of Short-Wave DX listening lies in searching for some insignificant station in a far-off land, with luck logging it, and (if it is in a new country) securing a reception verification.

For this reason I would like to express my appreciation of your new series of articles, "Short-Wave Station Identification," by F. A. Beane. The full details of each individual station must entail a great deal of work, and each week trying to log one of them adds a new fascination to DX listening—as many of your readers are probably finding.

I cannot now fairly single out any other of your "P.W." features for comment, as they are all so first-class, and I have no doubt that even

those which least appeal to me are keenly followed by many of your readers.

With best wishes for your continued success.

C. WILLIAMS.

P.O. Box 24, Gaza, Palestine.

RE "P.W." ARRANGEMENT.

The Editor, POPULAR WIRELESS.

Dear Sir,—Yes, certainly! Have always wished it were arranged as Mr. Ward suggests. As it is, one never knows where to look for anything—including advertisements. A note on the outside cover saying which page each was on would be another helpful aid.

A. WIGHTWICK.

Pembroke House, 1, Ashfield Road, Chelston, Torquay.

IT'S O.K.!

The Editor, "Popular Wireless."

Dear Sir,—Re F. Ward's article, I don't think it is necessary when the page of continuation is plainly given. Surely it is not too much trouble to turn to another page if the article is worth reading. What I should like to see is an index, say once a year. Most books have a double number for which they charge double price. Why not put the index in a double number and charge the extra for it?

H. W. WHITE.

Overdale, Morris Road, South Nutfield, Surrey.

NOT THE ONLY ONE.

The Editor, POPULAR WIRELESS.

Dear Sir,—In the June 12th issue of POPULAR WIRELESS you publish a review of the G.E.C. Transportable Five, in which you say that the switch-plug to cut out the unwanted speaker when an external speaker is being used is probably only found on G.E.C. sets. Have you ever heard of a McMichael set? I see that you have as you gave details of one in POPULAR WIRELESS of June 5th. If you examined it at all closely you would most likely have found the same arrangement incorporated as that used by the G.E.C. I may be wrong, as McMichael, Ltd., may not include this switch-plug now, but it is fitted to their superhet No. 135 of two years ago, which I use, and very useful I have found it.

CYRIL A. WILLIAMSON.

Cromer Hall, Norfolk.

WANTED—

A SHORT-WAVE CORRESPONDENT.

The Editor, "Popular Wireless."

Dear Sir,—I am almost 15 years old, in fact "P.W." is just three weeks older than me. I am the proud possessor of a two-valve short-wave set, having had it only since Easter. I follow with interest your short-wave articles each week. My total DX "bag" is seven Americans, five Central Americans, and J Z J Tokio, which I received distinctly with an aerial only 8 inches long. I should be very pleased if, through your paper, I could get into communication with another short-wave "fan," to exchange "logs," etc.

We have a wireless club at school, with "P.W." as part of it, of course. Here is wishing your paper will be even better in future.

GEORGE NEWBY.

37, Hibbert Road, Barrow - in - Furness, Lancashire.

S.T.800 CORNER

The Editor, "Popular Wireless."

Dear Sir,—Re Mr. Pullen's suggestion for an S.T.800 Corner, I am in agreement. Having built the S.T.800, I now find my radiogram lying idle, so should like to see an article on fixing up a pick-up to same, having built the 300 Star, 400, 1-point-Five, my last set, and now the 800. It's the best set I've built so far.

Re Luxembourg interference, I might say I've never had any interference with this station, and on my present 800 Luxembourg is O.K.

Re Mr. Ward's suggestion, I think "Popular Wireless" best left well alone. Editors and press know their own business best. I've learnt more out of your weekly than any paper I've known, and it's in my hands every Wednesday morning. I've nothing but praise for you all.

J. W. PYBLE.

30, St. Michael's Road, Paignton, S. Devon.



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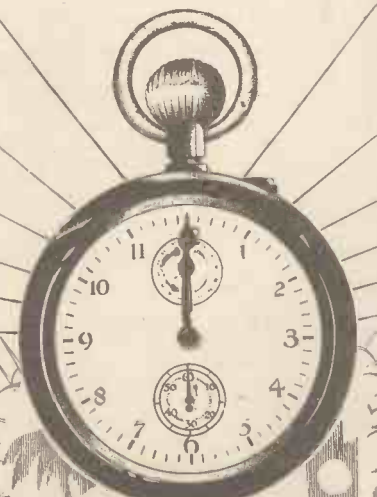
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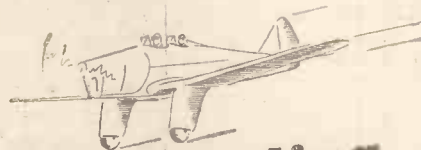
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0-120 "
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0-120 volts
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0-1,200,000 "
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SYDNEY 10 p.m.				WARSAW 1 p.m.
VIENNA 1 p.m.				MADRID Noon
STOCKHOLM 1 p.m.				PRAGUE 1 p.m.
OSLO 1 p.m.				ROME 1 p.m.
LENINGRAD 2 p.m.				ISTANBUL 2 p.m.
TORONTO 7 a.m.				HELSINKI 2 p.m.



Safe Landing

Just what constitutes a good tobacco is largely a question the individual smoker must decide for himself. A man may be forever buying new brands—trying this and that in the endeavour to attain a coveted ideal.

Sooner or later, he fills his pipe with Player's "Airman" and at once feels that, here at last he is on safe ground. Few tobaccos may be said to combine so successfully those advantages of price, pleasing flavour and satisfactory smoking which make a man feel he can settle down to it for good.

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ALSO MIXTURE OR FLAKE



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PER OZ

P.A. 56C

NAVY CUT DE-LUXE 10



A large and easily readable, illuminated dial is a feature of this Ferranti all-waver.

EIGHT GUINEAS for an all-wave A.C. superhet with about 3 watts of undistorted output serving a moving-coil speaker, automatic volume control and other such technical refinements would seem too good to be true.

And we think it well might be if it were not the product of a huge concern such as Ferranti, Ltd. But, of course, Ferranti make everything themselves, even valves and loudspeaker, so they can mass-produce on the most economical lines.

Even so their new set, the 837 Superhet, is still cause for wonder as an example of quite inspired design. No other explanation is possible for such extraordinary value for money.

Remembering that it costs eight pounds

THE Coronation has come and gone, but I do not think it is too late to mention one of the Columbia records which has a very regal flavour. I refer to *Changing of the Guard*. It is a twelve-inch disc on which the ceremony which attracts onlookers as no other regular "sight of London" does has been remarkably fully recorded.

The record has been made with the full co-operation of the Brigade of Guards, and the Regimental Band of the Grenadier Guards was engaged to play the ceremonial tunes.

Up and down the Columbia studios (sorry if I give the show away, for it was not made at St. James's where the real changing of the guard takes place) marched a platoon of the Grenadiers in order to get the right atmosphere. An amazing sight for those who saw the recording. It is an authentic reproduction of the real thing that Columbia have captured, and has already had an astonishing sale (DX 768).

And since we are discussing historical events let me suddenly transfer you to the Tower of London. Not for a serious recording of the ceremony of the keys or anything like that.

Meet Young Albert

I want you to meet an old friend in a new place. Folks, meet young Albert, of Lion and Blackpool Zoo fame. Yes, none other than Stanley Holloway's son of Mr. Ramsbottom.

He has gone t' Tower, lad, ee' he 'as 'an all. He wants to gaze upon Anne Boleyn's ghost. Pa is agreeable and so to the Tower they go.

Albert attracts the attention of the "Eadsman, and as the executioner lifts his great axe Pa remarks that they ought to get the insurance this time, with regretful tone as he remembers the failure of the lion at Blackpool to do his stuff.

What happens in the end you must find out by listening to Columbia DX 770. On the other side we find young Albert once more. He has watched his father doing swallowing conjuring tricks with a "Jubilee Sovereign," and tries his hand (and mouth) at it himself, with disastrous results.

Do you like cinema organ gymnastics? If so, listen to Regal-Zonophone MR 2342. It contains a record by Henry Croudson, organist of the Paramount Theatre, Manchester, on which he does a descriptive picture of a *Motor Ride*. It is certainly a fine sound picture. On the other side is *Manhattan Serenade*.

A FERRANTI TRIUMPH

"A grand little set" is our technical expert's opinion of the latest Ferranti eight-guinea all-wave superhet

eight shillings absolutely complete and all ready for world-wide reception service, just consider the specification. The circuit includes iron-cored coils covering the following waveranges: 16.7-52, 200-550, and 1,000-2,000 metres. There are four valves: full-wave rectifier, heptode, variable mu. H.F. pentode and double-diode output pentode. There is a large dial calibrated in wavelengths on all three bands with medium and long-wave station names. The various short-wave broadcast bands covered are plainly indicated to facilitate tuning. The whole of the dial is well illuminated, a special reflector system being used so as to spread the light evenly.

As we have said, there is a moving-coil loudspeaker and extension speakers can be operated if desired.

Rustproof Chassis

A simplified rustproof steel chassis is employed, and the outfit is housed in a moulded cabinet of very attractive appearance. The set is suitable for any A.C. supply ranging from 200-270 volts, 40-100 cycles. It is supplied adjusted for 200-240 volts, and the dealer will adjust it if your voltage is above that.

There are only three controls, and these are on-off and volume, wavechange and tuning.

Eight guineas! But you will want to

know what kind of performance you get with it.

Well, in brief, it is good superhet performance. Its sensitivity and selectivity are definitely surprising. Vastly superior to what one might reasonably anticipate even from the product of a firm noted for the efficiency of its apparatus.

Dozens of stations can be tuned-in on the medium and long-wave bands with the greatest of ease using only a small indoor aerial. And the A.V.C. holds well so that the programme value of distant stations is maintained.

American Programmes Every Night

The short-wave band is no makeshift affair either on this grand little set. In fact, it is extremely lively. Every night during the week the set was on test we were able to tune-in American programmes, although conditions were not good and independent observers were failing to do so with big outfits.

Quality is also of good standard, and the smoothing and circuit design in general such that even in respect of "background" hum, second-channel interference, and other such things where one might expect to have to do a little glossing over in view of the extraordinary low price, this little Ferranti still stands four-square as a sound proposition.



an impression of a young composer writing a symphony in a New York skyscraper.

As you may know, Joe Loss quite recently took a new signature tune. It is "Let's Dance at the Make-Believe Ballroom." Regal-Zono have recorded it, with Joe and his boys playing, of course. It is on MR 2351, and the same popular band give Eric Maschwitz's *At the Balalaika*, on MR 2352.

One of the most popular of Billy Cotton's dance hits was *Somebody Stole My Gal*. You are pretty certain to hear it every time Billy and Co. broadcast. You can also get the number played by his band on Regal-Zono MR 2355. It is full of the bite and kick that the famous band puts into all its playing. A good record.

I wonder what Paul Robeson fans will think of his recent change-over in recording from film ditties and spirituals to a couple of good old English ballads? Yet we find him in the H.M.V. list singing *Passing By* and *Oh, No John!* The record is B 8541, and the two titles are so un-Robeson that I am not going to make any comment about the records. You must hear them for yourselves.

One of the recent show hits is *There's a Small Hotel* from "On Your Toes." You must hear it sung by Bebe Daniels and her husband Ben Lyon. You'll like them on H.M.V. B 543.

That much-discussed £10,000 instrument, the B.B.C. theatre organ, is now figuring on the record lists. Reginald Foort, to be ever remembered for his early broadcasts from the New Gallery, and for his recording in those days, is at the console, of course. He has chosen two items which show off the effects of

the organ very well. One item is the popular *Chapel in the Moonlight*, and the other a lullaby—*Sleep My Little One*. The number of the record is H.M.V. BD 401.

Foort has one grouse about the B.B.C. organ—it will not make a noise like a dog barking as well as a certain other organ he used to play at a cinema. I have heard the B.B.C. "dog" and think it is as realistic as one could desire, but Reginald assured me one day that he once had an organ that beat it.

"I won't tell you where," he said, "but I remember that the manager of the cinema had a fox-terrier which used to come into the cinema sometimes when I was practising. I used to have some fun with that dog. I nearly sent him mad rushing round to find the other "dog" that was barking up in the organ chamber."

One of the finest Foort records was one that was never issued. How come? as Alexander and Mose would say. Well, though first-class as a musical reproduction the record was not so good technically. It was of the Albert Hall organ and had one of those popular numbers on it—Handel's Largo or some such tune. The trouble with it was that the finished record would not play the requisite 50 times before wear was noticed. It only scored 46, I believe, and in those days every record had to reach 50 or it was not issued.

H.M.V. Coronation Record

To-day, with good pick-ups instead of the harsh gramophone sound-box, the record would no doubt last 80 or more playings. I wish H.M.V. would decide to issue it if they still have the master. As it is, a first-class record, one which Reginald considers his best, is lost to the public.

As I write this a notice comes in that a "decorated Coronation record" is being released by H.M.V. It will be out by the time you read this. It contains fanfares specially composed by Herbert Menges, a couple of Shakespearean speeches declaimed by John Gielgud, and a "mighty arrangement" of Elgar's setting of the National Anthem.

In addition to a specially designed label on its face, the record also bears a large decorative design covering practically the whole of the other side, and showing a portrait of the Royal Family. The price is

(Continued on next page.)

ROUND THE RECORDS

(Continued from previous page.)

3s., and the profits are being handed to King George's Jubilee Trust. The number is H.M.V. SCB 1.

When in doubt regarding dance recordings try *Limhouse Blues* or *Dinah*. That is the apparent motto in the recording world. So once again the latter appears in the recent releases. Ray Noble is responsible, and the record is H.M.V. B 8563.

One day in 1870—forgive the sudden switch back in time—a band of musicians gathered beneath Cosmia Wagner's window. No, it wasn't a German band, nor the Christmas waits. It was a special band conducted by Richard Wagner. It played a surprise serenade to Wagner's wife and infant son Siegfried. The piece is now famous as the "Siegfried Idyll."

To-day Toscanini and the New York Philharmonic Symphony Orchestra play the Idyll with full orchestra and wonderful effect. It is recorded on H.M.V. DB 2920-1, and is a very fine record indeed.—
K. D. R.

MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 376.)

attention to the foreigner when Preece and Lodge were already in pursuit of the mysterious waves?

Preece endeavoured to clear up the matter when interviewed by the New York "World":

While I cannot say that Marconi has found anything absolutely new it must be remembered that Columbus did not invent the egg. He showed how to make it stand on end.

Marconi shows how to use the Hertz radiator and Branly coherer. He has produced a new electric eye, more delicate than any other known system of telegraphy which will reach hitherto inaccessible places. But enough has been shown to prove its value.

I have experimented freely with Marconi's instruments and I find for a certainty that they all proved of immense value to shipping and lighthouse purposes.

The next experiments, the historic dots and dashes on Salisbury Plain, proved the wisdom of Preece's remarks, and caused many others to agree with him. First, the signals flashed across 100 yards; then for a mile and a quarter; six miles, and nine. Army and Navy officials were summoned to watch this demonstration. If any were sceptical when the tests began, they left with plenty of evidence that wireless could speed through house and hill, and that neither brick, rock, earth nor wood could stop or block the subtle waves.

Surprisingly, Marconi was able to send the messages at Salisbury in a more or less definite direction. By aiming aerial reflectors he projected beam-like waves. The Hertzian energy was concentrated by a parabolic copper reflector or bowl, two or three feet in diameter, thereby shaping the waves into narrow strips, in much the same way that a searchlight stabs a streak through the darkness.

The waves measured about two feet from crest to crest instead of two or three hundred feet as previously used. The reflector results, however, were not so satisfactory as the results obtained with longer waves radiated from a pendant wire. Naturally, at this time Marconi was more desirous of widespread coverage than limitation of range or area, so he resumed his experiments with longer waves.

Lavernock Point and Breen Down, eight miles apart, were the scenes of the next

demonstrations. One witness was Professor Adolphus Slaby, a German electrical scientist, who lost no time in carrying the news of what he had heard and seen—back to his fatherland. In the summer of 1897, while Preece was busy bringing the attention of the Royal Institution to bear upon the miracles being performed, Professor Slaby was lecturing on wireless telegraphy before a royal audience that included the German Emperor and Empress, and the King of Spain.

Professor Slaby also contributed an article to the *Century Magazine* in 1898, from which these remarks are quoted:

In January, 1897, when the news of Marconi's first successes ran through the newspapers, I myself was earnestly occupied with similar problems. I had not been able to telegraph more than 100 metres through the air. It was at once clear to me that Marconi must have added something else—something new—to what was already known, whereby he had been able to attain to lengths measured by kilometres. Quickly making up my mind, I travelled to England, where the Bureau of Telegraphs was undertaking experiments on a large scale. Mr. Preece, the celebrated Engineer-in-Chief of the General Post Office, in the most courteous and hospitable way permitted me to take part in these, and in truth what I saw there was something quite new.

Marconi had made a discovery. He was working with means, the entire meaning of which no one before him had recognised. Only in that way can we explain the secret of his success. In the English professional journals an attempt has been made to deny novelty to the method of Marconi. It was urged that the production of the Hertz rays, their radiation through space, the construction of his electric eye—all this was known before.

True; all this had been known to me also and yet I never was able to exceed 100 metres. In the first place Marconi has worked out a clever arrangement of apparatus, which by the use of the simplest means produces a sure technical result. Then he has shown that such telegraphy (writing from afar) was to be made possible only through, on the one hand, earth connection between the apparatus, and, on the other, the use of long extended upright wires. By this simple but extraordinarily effective method he raised the power of radiation in the electrical forces a hundred-fold.

Incidentally, Marconi had taken out German patents covering his invention. A year later, however, patents were granted to Professor Slaby, who had modified Marconi's aerial system, and developed in collaboration with Count Arco the Slaby-Arco system, which in 1903 was merged with other German wireless organisations into what was called the Telefunken system. There was bitter rivalry between Marconi and the Germans, but the former held the secrets of long-distance communication.

There was some talk by enthusiasts that wireless might replace the cables, which were expensive, and always in danger of destruction by upheavals at the bottom of the sea. And for the lonely lightship wireless was a boon. That had already been indicated. Wireless seemed to belong to the sea and its sailors.

"There must be a great saving by the wireless over cables," remarked a newspaper reporter.

(Please turn to page 383.)

PETO-SCOTT

1937 MIDGET PORTABLE

"KIT A" Cash or C.O.D. 63/- Yours 5/9
Carr. Paid

Comprises all parts exactly as specified with all aluminium and wood parts ready drilled, including all wire, screws, etc., but less valves, cabinet, speaker and batteries. CASH OR C.O.D., 63/-, or 5/9 down and 11 monthly payments of 5/9.

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"KIT A" YOURS FOR 7/- DOWN

Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konektakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carr. Pd. £3/10/0, or 7/- down and 11 monthly payments of 6/4.

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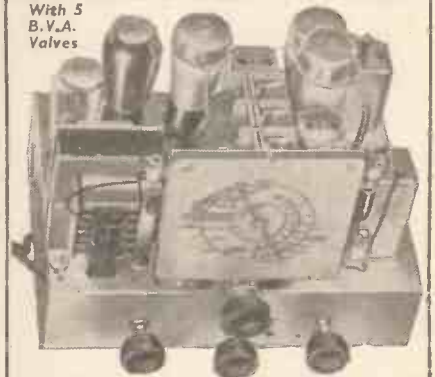
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NEW 5-Valve ALL-WAVE

A.C. SUPERHET CHASSIS

With 5 B.V.A. Valves



Dimensions: 10" high; 11 1/2" wide; 8 1/2" deep. £5:19:6

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● 3 Wavebands: 18-50, 200-550, 900-2,000 metres. ● Automatic volume control on 2 stages. ● Bandpass on all stages. ● Mains input filter.

Circuit: Aerial inductively coupled to bandpass input to Triode Hexode as Detector and Oscillator, bandpass transformer coupled to Variable-mu H.F. Pentode as I.F. Amplifier, I.F. stage bandpass transformer coupled Double-Diode-Triode for second detection, A.V.C. and 1st L.F. amplification. Triode section resistance capacity coupled to high slope output pentode. 4 position wavechange switch for 3 bands and grammo. Each band separately dial lighted. Provision for extension speaker. Combined on-off switch and volume control. Separate tone control. Each chassis tested. For A.C. Mains, 200-260 volts, 50-100 cycles. Output 3 watts. With 5 B.V.A. Valves, ready to play, £5/19/6, or 10/- down and 11 monthly payments of 13/-. If required with High-Fidelity Field-Energised 8" cone Moving Coil Speaker, add £1/7/6 to Cash Price, or 2/6 to Deposit and 2/7 to each monthly payment.

12 Months' Guarantee with Each Chassis

All Postal Orders must be crossed and currency registered.

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Glissold 9875-6-7.

62 (P.W.36), HIGH HOLBORN, LONDON, W.C.1.

Holborn 3248

AN ALL-WAVE SET—BUT IT DOESN'T WORK ON THE SHORT WAVES

C. B. (Plumstead).—*I have a seven-valve superhet which has worked for nearly a year in everyday use on the medium and long waves, but I have not been able to get anything on one of the short waves. It is supposed to be an all-wave set, yet I have never had any signals on the 19-metre band. The other bands are O.K. What is likely to be the trouble?*

I cannot say definitely, but probably the whole trouble is due to the fact that the oscillator is not oscillating on the 19-metre coil. Does the set sound dead down there? If there is no audible sign of life, and you find that the speaker is quite silent, without any of that "breathing" or rushing noise which is characteristic of the superhet when the oscillator is going, then it is pretty certain that the cause of the trouble lies in that stage.

It may not be the valve at fault in itself; it may be the coil which is used for the 19-metre band. You do not say whether the set is home-made or a commercial design; but, in any case, the first thing to do is to connect a milliammeter in the anode circuit of the oscillator valve.

Switch the set on and watch the meter. As the valve heats up, you will see the meter pointer move. Then, suddenly, it will jump; that is the point at which the valve goes into oscillation.

Try it with the set on the medium or long waves where you know it works. Watch how the meter behaves. Then try it on the other bands on which the receiver operates, and get to recognise the behaviour of the meter. Then, finally, try the same test with the set switched to the "dead" waveband. You will then be able to see if the valve oscillates or not.

You should use a meter reading to about 5 or 10 milliamps—not a bigger one, or you may not be able to see the change in anode current properly.

DO YOU WANT THEM?

R. Duke, 6, Malvern Terrace, Gillett Street, Hull, writes to say that he has copies of "P.W." from Dec. 7th, 1935, to Jan. 11th, 1936—should anyone want them. He has noticed an inquiry for copies between those dates, and as he has practically all the "P.W.'s" from 1930 to the present date, he will be pleased to help any needy reader. I gather that he does not want to lose his copies, however, and is prepared to lend them if the person requiring them will defray postage. So those who want copies please write to him.

THANKS, EVERYONE

I am still getting hordes of letters and cards from readers who are willing to help F. H. (London, W.9), who asked about S.T.600 coils in a recent issue. Unfortunately I have not received F.H.'s full address, so cannot forward the letters, which total some 100 or more. I have put a notice in "P.W." hoping F. H. will see it and have told him to write to certain names I have mentioned. To the rest of you, please accept my thanks on behalf of F. H. and also of "P.W." We can do no more now, but I am very gratified at the response to the small paragraph which laid bare F. H.'s needs. Thank you, everyone.

THE PROBLEM SOLVED

It is not often that after the insertion of a query in this page I hear the result of the application of the test suggested, or alternatively the manner in which the fault is found. If a set is not going well and my suggestions do not bring to light a remedy—and I'm not infallible, you know—I often hear about it with further pleas for help. But this time I have received a letter from a reader who has succeeded in finding his fault, and I am printing the letter for the benefit of others—it may help.

It is in answer to the test suggested to J. R. B. (Scarborough) in our June 5th issue.

J. R. B. writes:

"... It was the coil that was at fault. I found on taking the bottom from the coil case that a piece of wire about 4 in. long had got into it. When the coil was connected up, the set worked properly. Evidently the wire had been dropped into the coil and had shorted some part of it."

I wasn't far wrong then, J. R. B. I wish some more of you would write and let me know

when you trace your troubles.

S O S

Please lend a hand to J. Jackson, 5, Hollis Street, New Basford, who wants a blue print for his 600. Thank you.

WHY THEY WENT

L. M. E. S. (London, S.E.5).—*I have been told by a dealer that the withdrawal of the small K class of valve (H. L. 2/K and so forth) was because of their unsuitability for use in all-wave sets. I have found that the H. L. 2/K is very good on short waves. Was that the reason?*

Normally such questions should be answered by post, but as this dealer may be telling others of the same "reason" it is only fair to give your query due prominence. The reason stated is quite wrong, according to the makers, and they ought to know.

The K class of valve you mention was brought out because people were showing a liking for small valves, for deaf aid apparatus, portables, and so forth. But they were found to be more expensive to produce than other types, and accordingly the pentode was dropped as a start. The H.L. and the H.F. valves are still available at their old prices, but the makers state that while the K valves are quite O.K. for short-wave work they are no better than the larger types, and as they are more expensive to make, the reason for withdrawing them is obvious. The K valves now on the market are the V.S.24/K and the H.L.2/K, the pentode having been withdrawn.

The question of expense in production depends largely on the ease or otherwise of assembly and evacuation. The K valves are not easy to assemble accurately, and they are decidedly more difficult to evacuate than the larger valves. Therefore with a market for small valves not large enough for the K types to be kept on solely for that purpose they have been and are being withdrawn gradually.

There is no question of technical inefficiency, as you have found out by the statement in your letter that you get good results on short waves with the H.L.2/K. The dealer was evidently under a misapprehension when he told you that the withdrawal of the valves—which is not complete, anyway—was made because they would not work on all-wave sets.

PUT IT BACK

K. P. (Streatham).—*I have pulled my earth up and it doesn't make any difference. Why?*

I don't know. Put it back again or you may find a difference when the next thunderstorm comes along. I am afraid I cannot help you with your query, it does not tell me enough about the set or the earth. If the latter is inefficient it will not make any difference whether you use it or not—except during a thunderstorm. I am assuming, of course, that you use an outdoor aerial.

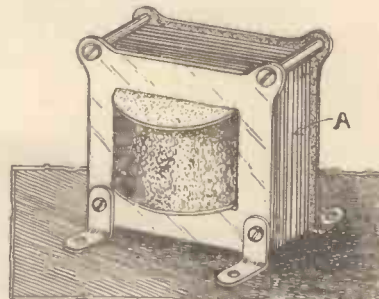
THE MUSIC MAGNET THREE

H. G. Brisco, 3, Whistler Street, Drayton Park, London, N.5, is in a terrible fix. He is having trouble with his "Music Magnet Three," and he has appealed to me to help him if I can in the provision of a wiring diagram of the set.

I am sorry, H. G. B., I have no diagram and I note your appeal to the makers—who have no diagram now. There is only one hope: that some reader of "P.W." may have the diagram on hand. So, if you have, any reader, please drop Mr. Brisco a line. This request is not one of the usual S O S's, and I cannot undertake in the future to "broadcast" for commercial diagrams; we should soon fill this page with such requests.

TECHNICALITIES EXPLAINED—No. 57

Laminations



This is the name given to the strips of metal "A" which are used in the cores of transformers. They are made of iron or iron alloy and together form the complete core of the component. Each lamination is insulated from its neighbours. The reason for using laminations is to avoid a solid iron core which will absorb the alternating magnetic field in the transformer and set up eddy currents in the core itself.

These currents are set up to a certain extent in the laminations, but as there is little room there can be no great potential rise set up, and therefore the currents cannot reach any harmful proportions. If the core were whole there would be a comparatively large area in which the currents could be set up, and also a large cross-section which would soon become "seething" with these currents. They in turn set up magnetic fields which operate against the field of the transformer, thereby reducing its efficiency.

MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 381.)

"Judge for yourself," replied a Marconi engineer. "Every mile of deep-sea cable costs about £150; every mile for the land-ends about £200. All that we save, also the great expense of keeping a cable steamer constantly in commission making repairs and laying new lengths. All we need is a couple of masts and a little wire. The wear and tear is practically nothing. The cost of running, simply for home batteries and operators' keep."

While the controversy of wireless versus cable spread, strange antics were witnessed in various parts of England during 1897. Masts were temporarily abandoned while 10-ft. balloons covered with tinfoil were sent up as "capacities." They might be efficient aeriads, but they were heavy and required a strong wind. Gales, however, ripped them to shivers. Then long-tailed calico kites bedecked with tinfoil were entrusted to the winds. The atmospheric were none too favourable, nevertheless signals broadcast from these lofty aeriads covered about eight miles. The tests were made in the daytime, the experimenters being unaware that at night the range might be doubled if not tripled.

The kites offered interesting results, but Marconi soon realised such aeriads bobbing up and down at the mercy of the winds were impractical, so in November, 1897, at the Needles, Isle of Wight, he rigged up a stout mast to support a 120-ft. aerial wire. It connected with a transmitter destined to radiate the first paid Marconi-grams sent by Lord Kelvin to his friend George Stokes, and to Sir William Preece. *

Marconi, anxious to test the range of the Needles signals, hired a tug and went to sea with a receiving set fed by an antenna suspended from a 60-ft. mast. For several weeks he tossed about on the water, all the time tinkering with the apparatus. When he returned to land the tests were

reported successful, for he had heard the signals over a distance of eighteen miles.

Encouraged, Marconi built a new station at Bournemouth, fourteen miles west of Needles, but later moved it to Poole, which was eighteen miles away. The station was erected on the sand dunes of a barren promontory six miles from the town. Wireless from this transmitter vibrated with such strength that a Marconi engineer intercepted the signals at Swanage, several miles down the coast, by simply lowering an antenna from a high cliff, dispensing with the usual mast.

Marconi stations were visualized dotting the coastlines, because, even as the invention stood at this time, it would be possible for all incoming and outgoing vessels within twenty-five miles of shore to broadcast position reports. So apparent were the advantages of the system that in May, 1898, the Lloyd's Corporation negotiated for instruments at various Lloyd's lighthouse stations; and a preliminary test was made between Ballycastle and Rathlin Island in the north of Ireland. The distance was seven and a half miles, and the fact that a high cliff intervened made the communication all the more astonishing.

Wireless was on its way from England to the sea.

* June 3rd, 1898.

MY SHORT-WAVE ADVENTURES

(Continued from page 364.)

enthusiasm!—I found a type Y.220, which is a Harries power output valve that proudly boasts of "triode tone and multi-grid sensitivity." Tone was not my aim, but sensitivity certainly was.

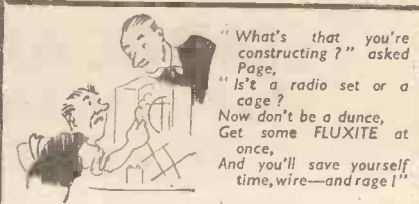
It did not take long to change over from a four-pin to a five-pin valve holder, but then I discovered that some sort of choke-capacity output was desirable with this type of valve. Once more I dragged in my heavy-duty low-frequency transformer and used it primary as a choke, with a 2-microfarad fixed condenser in series with the phones, anode and earth, as shown by Fig. 3.

Warning: Always study the data sheet before playing around with new valves. Fortunately, my failure to do so was not fatal, simply disconcerting. I forgot to alter the grid bias, that's all.

The result was that when I switched on the set with the Hivac Y.220 in circuit the signal strength was, if anything, less than it had been with the P.220. Only later I realised that instead of 9 volts negative bias I ought to be applying 3.

Then things did happen. The improvement in volume was really appreciable. On twiddling around the dial to about 118 degrees I heard Schenectady (W2XAD) on the 19-metre band as clearly as I ever want to hear a transatlantic signal. Definitely, this combination of resistance-capacity coupling and Harries output valve is the goods. It would no doubt be even better with the proper choke.

And so we go on. Let's hope those coils turn up soon!



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CHAPTER V

AS TRIUMPHANT AS A CAESAR

Marconi reveals new possibilities for his invention—He reports yacht races off Irish coast by wireless—Queen Victoria invites him to Windsor Castle—Messages a Queen wanted sent and received—Royalty awed by wireless—An interview on the outlook—Defying the earth's curvature—Fooling the theorists—He discusses directional waves—First wireless service for lightships—Italy recognises Marconi and begs him to return—Patriotically he heeds the call.

TECHNICAL JOTTINGS

From an expert's notebook

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

Short Waves in the U.S.A.

I DO not know whether anybody has ever made any accurate calculation of the number of short-wave fans in this country, but I think it is pretty certain that they are much less numerous than in the United States. Some little time ago I received an account of short-wave transmission and reception in the United States, according to which there were about 50,000 amateur stations working there. I should say, however, that most of these, up to as many as 90 per cent., were using code operation, only a small percentage using phone. With the code it is, as you know, possible to work much greater distances with small power. Another advantage is that the code station is very much cheaper to operate.

There is no doubt that interest in short-wave experimenting is increasing in this country, but I do not think we shall ever approach the number of short-wave amateurs they have in America, partly owing to the smaller population but mainly to the much better facilities which prevail in the States.

Mains Aerials

Readers often ask me whether it is possible to use the electric light mains as an aerial and, if so, how to set about it. The answer is yes, it is quite a practical proposition to use the mains and a number of devices for doing this are on the market. These mostly consist of some condenser arrangement, but if you do not want to use the standard component for the purpose you can use a fixed condenser, with a capacity of about .0001 microfarad, connecting one side of this to the aerial terminal of the set, and the other side of the condenser to one terminal of the mains. It goes without saying that this condenser should be a good one and preferably tested up to at least 500 volts, because in the event of a breakdown of the condenser you have a direct connection to the mains. A point to note in this connection is that you should try one terminal of the mains and then the other (even if the supply is A.C.) because, for various reasons not always very clear, one terminal often acts much better than the other for the purposes of aerial pick-up.

Questions of Efficiency

The efficiency of this arrangement varies considerably in different cases. In some you will find that a connection like this to the mains acts as a very good aerial, and you are able to receive B.B.C. and some foreign stations, whilst in others the connection seems rather inefficient as an aerial.

Anyway, the above is what you can do if you particularly wish to use the mains, but for all-round purposes, and also for greater safety and reliability, it is better to use either the conventional outdoor aerial or an indoor aerial consisting of a wire round the picture rail. Mains aerials tend to bring in any H.F. interference picked up

by the mains, and for that reason are often unsatisfactory in practice.

Interesting Uses for P.E. Cells

Scarcely a month passes without some new use for the radio valve being discovered.

One of the latest industrial uses of valves—or, rather, of photo-electric devices in this particular case—is in connection with the separation of coal into different sizes or grades. The separation in this case depends upon the measurement of conductivity, and it is found that with the photo-electric tube the coal can be picked and sized very much more rapidly than by hand.

Another interesting use of photo cells is for regulating the "on-and-off" of a sprinkler which wets down coal before it is loaded into coal trucks. Formerly the switching on of the sprinkler was done by hand, but now, with the photo-electric arrangement, as the truck passes under the sprinkler the latter is automatically turned on and wets down the coal, the water being turned off immediately the truck has passed and on again for the next truck, and so on, being finally shut off when the whole of the train has passed.

CLUB NEWS

NEWCASTLE RADIO SOCIETY

Only a few more members are required to enable this club to obtain permanent headquarters in Newcastle-on-Tyne. Meanwhile the Thursday meetings—7 to 10 p.m.—are being held at the Hon. Treas. W. C. English, 191, Stone Street, Newcastle, while continuing on Sundays, 6 to 9.30 p.m. at Gosforth. The Whiteley Electrical Radio Co., Ltd., recently forwarded a 1937 Stentorian Senior Loudspeaker Chassis Type 37 S.C. for test, and some interesting demonstrations have taken place. The final tests will be made with the 37 S.C. mounted on a baffle 5 feet square. Radio dealers in the district have shown willingness to help by displaying notices in prominent positions.

Readers of POPULAR WIRELESS who are interested are asked to call or write as early as possible for full particulars to the Hon. Sec., G. C. Castle, 10, Henry Street, Gosforth, Newcastle-on-Tyne.

SOUTH WIGSTON SHORT-WAVE RADIO CLUB

The first general meeting and formation of the above club was on April 28th, 1937. On June 3rd, G 2 X D, Leicester, gave an interesting lecture on short-wave aerials and receivers. A meeting is held every fortnight on a Thursday or Friday evening at 7.45 p.m.

All enquiries concerning membership and so forth should be sent to the Hon. Sec., W. Dawson, 5, Irlam Street, South Wigston, Leicester.

A Radio Pioneer

The name Thomson is a well-known one in science. You have only to think of Lord Kelvin (formerly Sir William Thomson), his brother James Thomson, Sir J. J. Thomson, the discoverer of the electron, and Elihu Thomson, amongst others. Why there should be so many eminent scientists of this name, I don't know; I suppose it is just coincidence. The last-named Professor Elihu Thomson has just died at his home in Massachusetts, U.S.A., at the age of eighty-three. It has been said that Elihu Thomson, together with Edison, Brush and one or two other American electrical engineers, were the real founders of the electrical engineering industry of the world.

Some of Elihu Thomson's inventions were connected with arc lights, the repulsion-type induction motor, the resistance method of arc welding, the magnetic blow-out, the constant-current transformer and many other important electro-technical matters. He is said to have held several hundred patents in the United States alone.

So far as radio is concerned, the interesting thing is that Thomson was claimed to have demonstrated the transmission of signals without wires ten years before Hertz discovered electro-magnetic radiation. He originated the three-phase electric generator and developed the first practical watt-meter, as well as other electrical measuring instruments.

How Closely Do Valves Match?

I wonder if you have ever stopped to consider the variation in characteristics between two valves by the same maker and of the same specification, reputedly identical? This is a point of considerable practical importance, because it affects the performance of the set when one of the valves goes phut and has to be replaced by another. It is also of importance in the case of a pair of valves in push-pull and in many other cases.

The leading valve manufacturers take the greatest possible care in the mechanical finish of the electrodes and the assembly of the same, and in the chemical characteristics of the cathode, the "getter" and so on. In the days when electrode assemblies were relatively large the mechanical arrangements were not so troublesome, but in these days, when valve assemblies are becoming so small, the very fine clearance renders the mechanical difficulties much greater, and deviations from the mean value of the characteristics are more difficult to avoid. It goes without saying that with greater uniformity in the valves, the manufacturer of receiving sets is able to use more efficient circuits.

Variations of Characteristics

You may be surprised to know that the "spread" in characteristics from valve to valve, even with the utmost precautions in manufacture, is comparatively large. It reaches 20 per cent. either way, and in some cases as much as 40 per cent. either way on such characteristics as anode current and mutual conductance.

As already indicated, the factors which mainly affect the characteristics of a valve are the mechanical dimensions, mechanical arrangements and the chemical properties of the surfaces of the electrodes. With the small distances between electrodes

(Continued on facing page.)

TECHNICAL JOTTINGS

(Continued from previous page.)

which are employed to achieve the high efficiency of the modern valve, uniformity in these factors becomes increasingly difficult. In symmetrical circuits such as push-pull, it is important to use valves which have been picked after manufacture to match up.



Up-to-the-minute news concerning the radio industry

THE latest release in the McMichael range is an all-wave band-pass superhet which is available in separate models for A.C. and A.C./D.C. mains. The circuits employed are basically similar and the short-wave coverage is 16.5-50 metres.

Capable of giving undistorted outputs of 2.3 watts for the A.C. model and 2 watts for the universal mains version, this new addition is provided with full A.V.C. and mains static suppression.

A new feature is the "Polychrome" tuning scale, which consists of a black glass dial with station names engraved in white. Edge-on illumination through the glass give the names a brilliantly luminous effect, whilst the tuning position is indicated by three differently coloured light bands, which appear in turn as the wave-change switch is operated.

The price of the A.C. model is 10½ guineas and the A.C./D.C. version costs 11 guineas.

NEW BATTERY VALVES

Two new two-volt valves are announced by A. C. Cossor. The first, which is known as the 210 DDT is designed primarily for sets in which A.V.C. is to be provided, and is a double-diode triode. Filament current is .1 amp., maximum anode voltage 150, impedance 25,000 ohms, and amplification factor 27.5. The price is 9/-.

The second valve is the 240 Q P and consists of a pair of matched pentodes for use in a Q.P.P. output stage. Characteristics are: filament current, .4 amp.; anode volts 150 (maximum); auxiliary grid volts 150 (maximum). The mutual conductance is 2.5 ma/v., and the price 17s. 6d.

LATEST MARCONIPHONE MODELS

Marconiphone's have just released two new models, viz., a 6-valve superhet battery transportable, priced at 15½ guineas, and a 8-valve A.C. de-luxe superhet table grand costing 14 guineas.

The transportable is a two-band set covering the medium and long waves, and is completely self-contained, the aerial consisting of two frames inside the cabinet. Provision is made for an outside aerial and earth to be used if desired.

Automatic grid-bias is incorporated and the H.T. consumption is given as 12 milliamps. There is a ball-bearing turntable beneath the cabinet which enables the set

to be turned into the position for maximum reception. The output stage operates on the Q.P.P. principle.

The table grand is an all-waver, covering 16.5-52 metres on the short waves. It has an elliptical cone moving-coil speaker, an undistorted output of 3 watts, and a mains consumption of 90 watts. A visual tuning indicator ensures accuracy of tuning.

BELMONT RADIO RELEASES

Belmont Radio announce two new all-wave sets. One is an A.C. mains model, costing 13 guineas, and incorporating a 7-valve superhet circuit.

Among its features are cathode-ray visual tuning; a multi-coloured oval dial calibrated in metres and station names; constantly variable tone control; provision for an extension speaker and pick-up and an 8-inch moving-coil speaker. The total tuning range is 15.5-2,100 metres.

The second set is an 8-valver for A.C. or D.C. mains, and costs 13½ guineas. It can be used on mains ranging from 100-260 volts and has push-pull output. Belmont receivers are now being made in England under the Marconi licence.

NEW APPOINTMENT

Mr. H. Francis White has been appointed Marine General Manager of Gambrell Radio Communications, Ltd. Mr. White, in his 34 years' experience, has filled with distinction practically every known position in his profession, from operator on the maiden voyage of the "S.S. Corona," through Travelling and Shore Inspector, Chief Instructor, Contract Manager and Marine Superintendent to his latest appointment.

PREVENTING GATECRASHING

(Continued from page 369.)

to the right frequency and goes through the set, being amplified still further and then rectified by the detector. And (a) carries with it not only the true self (wanted station H.F. with its modulation), but also (c), which does not matter, and (d) in a weak form, but which does matter very much.

It is this (d), carried on the H.F. of (a), that you hear when cross-modulation takes place.

The way to stop it is to cut down the aerial input by means of the potentiometer shown in Fig. 3, or to make sure that your H.F. valves are properly biased. I prefer to do both.

The potentiometer in Fig. 3 can be of any value between 50,000 and 100,000 ohms. You only use it when you are listening to the local stations, or when you find that cross-modulation is present. Easy to make, but very effective.

There are other forms of interference which I might discuss, but those are the few that are most likely to trouble you, and which you can combat yourself without expensive apparatus.

Aerial interference really needs special aerial suppressor units, and perhaps screened down leads. But if you are troubled with gatecrashing that disappears when you disconnect the aerial, and can find out what is causing the trouble, you might remedy the fault by altering the position of your aerial, getting it at right-angles to what you think is the source of interference.

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"P.W." LIST OF EUROPEAN BROADCASTERS

This list contains the more important European medium and long-wave stations which are likely to be received in this country. There are some relay stations working on very low power and sharing common wavelengths. These have been omitted because their programmes are usually too weak or badly interfered with to be of value to British listeners.

WAVE-LENGTH.	STATION MEDIUM WAVEBAND.	COUNTRY	POWER KW.	WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth	Gt. Britain ..	0.3	356.7	Berlin	Germany ..	100
203.5	Bournemouth ..	"	1	360.6	Kiev (No. 2) ..	U.S.S.R. ..	35
203.5	Eiffel Tower (Paris) ..	France	7	364.5	Bucharest	Rumania ..	12
215.4	Radio-Lyons	"	25	368.6	Milan (No. 1) ..	Italy	50
233.5	Aberdeen	Gt. Britain ..	1	373.1	West Regional ..	Gt. Britain ..	70
236.8	Nürnberg	Germany	2		Penmon	"	5
238.5	Riga	Latvia	15	377.4	Lwów	Poland	50
240.2	Saarbrücken	Germany	17	382.2	Leipzig	Germany ..	120
242.9	Cork	Irish Free State	1	386.6	Toulouse (P T T)	France	120
243.7	Gleiwitz	Germany	5	391.1	Scottish Regional	Gt. Britain ..	70
245.5	Radio Marconi (Bologna)	Italy	50	400.5	Burghead	"	60
247.3	Lille (Radio P T T Nord)	France	60	405.4	Marseilles (P T T)	France	100
251	Frankfurt	Germany	25	410.4	Munich	Germany ..	100
253.2	Nice Côte d'Azur ..	France	60	415.4	Tallinn	Estonia	20
255.1	Copenhagen	Denmark	10	420.8	Kharkov	U.S.S.R. ..	10
257.1	Monte Ceneri	Switzerland ..	15	426.1	Rome (No. 1) ..	Italy	50
259.1	Kosice	Czechoslovakia	10	431.7	Stockholm	Sweden	55
	{ West National ..	Gt. Britain ..	20	443.1	Paris (P T T) ..	France	120
	{ North National ..	"	20	449.1	Sottens	Switzerland ..	100
	{ London National ..	"	20	455.9	North Regional ..	Gt. Britain ..	70
261.1	Trieste	Italy	10	463	Cologne	Germany ..	100
263.2	Hörby	Sweden	10	470.2	Lyons (P T T) ..	France	100
265.3	Newcastle	Gt. Britain ..	1	476.9	Prague (No. 1) ..	Czechoslovakia	120
267.4	Radio Normandie (Fécamp)	France	15	479.9	Lisbon	Portugal ..	15
269.5	Moravska-Ostrava ..	Czechoslovakia ..	11.2	483.9	Trondelag	Norway	20
271.7	Kuldiga	Latvia	10	491.8	Brussels (No. 1)	Belgium ..	15
274	Vinnitsa	U.S.S.R.	10	499.2	Florence	Italy	20
278.6	Bordeaux-Lafayette ..	France	35	499.2	Sundsvall	Sweden	10
283.3	Bari (No. 1)	Italy	20	506.8	Rabat	Morocco ..	25
285.7	Scottish National ..	Gt. Britain ..	50	514.6	Vienna	Austria ..	100
288.5	Rennes-Bretagne ..	France	120	522.6	Madona	Latvia	50
291	Königsberg (No. 1) ..	Germany	100	531	Stuttgart	Germany ..	100
296.2	Midland Regional ..	Gt. Britain ..	70	539.6	Athlone	Irish Free State	100
298.8	Bratislava	Czechoslovakia ..	13.5	549.5	Beromunster ..	Switzerland ..	100
301.5	Hilversum (No. 2) ..	Holland	60	559.7	Budapest (No. 1)	Hungary ..	120
304.3	Torun	Poland	24	569.3	Wilno	Poland	50
304.3	Genoa	Italy	10		Viipuri	Finland ..	10
307.1	Northern Ireland Regional	Northern Ireland	100				
312.8	Poste Parisien	France	60	1107	Moscow (No. 2) ..	U.S.S.R. ..	100
315.8	Bréslau	Germany	100	1153.8	Oslo	Norway	60
318.8	Goteborg	Sweden	10	1250	Kalundborg	Denmark ..	60
321.9	Brussels (No. 2) ..	Belgium	15	1293	Luxembourg	Luxembourg ..	150
325.4	Brno	Czechoslovakia ..	32	1339	Warsaw (No. 1) ..	Poland	120
328.6	Toulouse	France	60	1379	Novosibirsk	U.S.S.R. ..	100
331.9	Hamburg	Germany	100	1389	Motala	Sweden	150
335.2	Helsinki	Finland	10	1500	Droitwich	Gt. Britain ..	150
338.6	Linz	Austria	15	1571	Deutschlandsender	Germany ..	60
342.1	London Regional ..	Gt. Britain ..	70	1648	Radio-Paris	France	80
345.6	Poznan	Poland	16	1744	Moscow (No. 1) ..	U.S.S.R. ..	500
349.2	Strasbourg	France	100	1807	Lahti	Finland ..	150
				1875	Radio-Rumania ..	Rumania ..	150
				1875	Hilversum (No. 1)	Holland ..	150