

SHORT-WAVE UNIT FOR MAINS SETS

Popular & Wireless & TELEVISION TIMES

ORTON ARRANGES AN-
OTHER "P.W." SHORT-
WAVE TEST
SOUVENIRS FOR READERS

EVERY
WEDNESDAY
PRICE

3^D

No. 788.
Vol. XXXI.
July 19th, 1937



THEY'VE A FEELING IT'S FALLING!

And it doesn't matter anyway because there's nothing inside it. It's just an empty cabinet from which the loudspeaker was carefully removed before we staged this picture. But we hope the moral is clear. And that is, leads should not be allowed to stray about so that they get caught up by passing feet, vacuum cleaners, brooms, cats, and what not. It is surprising how grimly tight a lead will hold on in such circumstances. They come loose on their own—when you don't want them to. And grip like the very devil if there's a new set or speaker or battery to be pulled over.

Can you Do Crosswords?

WIN £100

for Solving This One!



Second Prize £20 CASH!

ENTER ANSWERS' LATEST "X-WORD" COMPETITION!

HAVE you heard about the "X-Word" Contests in ANSWERS? Each week people are winning lots of money in these fascinating weekly puzzles.

To introduce them to you, here is this week's puzzle. Try it! An entry on this coupon may be worth a whole Hundred Pounds to you. And there is also a £20 second prize. The best solutions win!

TO ENTER simply use your skill and knowledge to complete the puzzle, and send it up before Thursday, the 15th. The letters already filled in give you a start, and here are the

ACROSS: CLUES DOWN:

- | | |
|---|---|
| 2. The fruit rhyming with wig. | 1. To turn towards. |
| 4. "Don't put the **** before the horse." | 2. Move through the air. |
| 8. Prisoners are locked in these. | 3. "What ** to be will be." |
| 10. "All work and no **** makes Jack a dull boy." | 5. A monkey. |
| 11. Upon. | 6. Simply write down R.L. |
| 12. This sometimes keeps people apart. | 7. These are designed to surmount "obstacles." |
| 13. "Much *** about nothing." | 8. And this helps to keep one warm |
| 15. To spoil. | 9. A kind of animal. |
| 16. The heavens above. | 12. A whim. |
| 18. Dwells. | 14. Implement used for rowing. |
| 20. "What's the *** of worrying." | 15. If they're well-developed these prove "rich." |
| 21. "**** and bear it," they say. | 16. Sun—as far as it will reach. |
| 23. "The next **** on the programme is—" | 17. The opposite to "no." |
| 25. The wise bird. | 19. To hang. |
| 27. "Happy the bride the sun ***** on." | 22. To pull along—as in a boat. |
| 31. We want peace, not this! | 24. Nest, without a beginning. |
| 32. What the hen lays. | 26. They affect the running of a ship. |
| 33. "Choose one or *** other." | 28. Has saved many lives. |
| 35. Some give themselves "**** and graces." | 29. No head to "figs" here. |
| 37. United States—initials. | 30. An examination usually proves one. |
| 38. Business folk like a substantial one. | 34. Used in describing a ship. |
| 40. Distributed the cards. | 35. Water is called "Adam's ***." |
| 41. A faulty one spoils progress | 36. Half "pepper." |
| 42. Move quickly. | 39. "Come ** once." |
| | 40. "How do you do?" |

HOW TO SEND IN—Remember, the best solutions win in ANSWERS' "X-Words"—so think over each clue carefully and fill in your answering words across and down IN INK. The form here may be sent in: either one or two attempts may be made on it, but in either case the form must be cut out whole round the dotted lines and sent. Sign and address the coupon, attach 1½d. in stamps as entry fee for one "square," or 3d. if you fill in both, then post to:

ANSWERS' "New X-Words" No. 29,
G.P.O. Box 682,
The Fleetway House, London, E.C.4 (Comp.).

The Closing Date is THURSDAY, July 15th, 1937.

RESULT—The names of the winners will appear promptly in ANSWERS.

NOTE—Every entry is properly examined in ANSWERS' "X-Words," and it is the aptness and accuracy of answers to the clues that count. The £100 First Prize in this contest will be awarded to the sender of the best and most fitting set of answers to the clues. In case of ties, the prizes are divided. Full rules and conditions governing this contest and prize off.—also, if you are interested, other forms to enter—are in

This Week's ANSWERS (Issue dated July 10th)
£120 Cash MUST be Won!

Attempt A

New X-Words No. 29.



Attempt B

New X-Words No. 29.



This panel MUST be cut out and sent in WHOLE!

This panel MUST be cut out and sent in WHOLE!

In entering "X-Word" Contest No. 29, I agree to accept the published decision as final and legally binding.

Usual Signature.....

Address.....

P.W.

Affix 1½d. in stamps for "Attempt A," or 3d. if "Attempt B" is completed as well.
NOTE:—If "Attempt A" only is filled in, cross out "Attempt B," but send in the whole tablet—do not separate the squares.



Editor: G. V. Dowding

Asst. Editors: A. Johnson-Randall, A. S. Clark

**POLAR RADIO
COOL WORK
STARTING YOUNG**

RADIO NOTES & NEWS

**THE ALARM
STILL SMALLER
THE EXPERT**

Thunderstorm Reception

SEVERAL letters have reached me recently in which reference is made to a dangerous practice—that of listening during a local thunderstorm.

I can well believe, as is claimed by these enthusiasts, that when heavily charged clouds are overhead radio reception is affected to some degree. It may be that reception seems to be "sharpened" at such times—as the memory of a drowning man is supposed to be sharpened when he comes up for the third and last time. But is the experience worth the risk?—as the chap said when a tight-rope walker offered to wheel him across Niagara Falls on a wire.

As one who has no desire to be permanently earthed before his time, I advise all thunderstorm listeners to do as I do, SWITCH OFF. It is better to watch the lightning than to conduct it.

Conquest of the Ice

RUSSIA'S faith in the possibilities of the air-route over the North Pole had not long to wait before being vindicated. The three pilots who blazed the route from the old world to the new are but fore-runners of a mighty host, for there are many advantages in dodging the wide Atlantic by the short cut across the Arctic wastes.

Powerful planes, aided by well-placed radio direction-finder stations, could soon change the world's loneliest locality into a highway between the two hemispheres. How soon we shall see that happen will largely depend upon the lone wireless operators who have been chosen to man the chain of radio stations through the rigours of the coming winter.

Ambitious Australian Scheme

FURTHER news from Canberra about the new Australian broadcasting stations indicates that they are of the type to make glad the heart of the "Digger." Some £18,275 will be spent on the new equipment for Sydney and Melbourne, and the cost of Brisbane's station will be £3,300.

Melbourne's station will be on a site about ten miles west of the city; Sydney's will be about twenty miles out, at Liverpool. Later a new station will be built in each city to replace the existing transmitter.

Problem of the Children's Hour
IN Illinois, as in London, every care is taken with the Children's Hour.

On one occasion they were rehearsing a playlet which contained the lines:

She could not trust him. He had proved two-faced.

"Wait a moment," said the Programme Director. "You can't expect children to understand that."

He thought for a moment, and then inspiration came.

"Make it, She was wise at last to that double-crosser. If he was straight, so was a corkscrew."

The play continues.

MY WORD

By THE EDITOR.

TELEVISION TRIUMPHANT

Technically television has advanced amazingly in this country. The Wimbledon tennis transmissions were marvellously successful. The ball could be followed across the net as easily by viewers as by spectators actually present on the court.

Yet television as home entertainment moves forward very slowly. The reason is easy to see. Sets are expensive and programme hours extremely limited. One hour during each week-day evening, no Sunday programmes at all and a three-weeks complete blot out for staff holidays and gear adjustment.

What chance has television to progress in such circumstances?

It is said that there can be no extension of service until more money is available. That, dear readers, is tripe. With a little ingenuity and without encroaching on the funds or facilities allocated to normal programmes, items from these could surely have the television cameras turned on them for the benefit of viewers.

Studio audiences, admitted free, are "played to" for no obvious purpose except to provide "atmosphere" and to give artists something to leer at and bow to, and Toscanini's at £500 or so a time are hired by the B.B.C. to gesticulate before elite musical dilettantes of London's West End. Why can't Gerald Cock sneak in on these things with his television cameras? In such a way he could surely fill in a few more programme hours and hasten the day of really inexpensive sets.

Cool Work

NOW that the northern latitudes are so much in the news it is appropriate to recall the difficulties under which radio work is sometimes carried out there.

Take the recent Oxford University Arctic Expedition, for example.

Like the War Office, they used for wireless work a motor-car engine and generator set, to provide the juice for long-distance communications. Starting up from cold—and in those latitudes the thermometer goes to 20 degrees F. below zero!—meant wrapping hot cloths round the carburettor, or even using a blow-lamp to heat the plugs!

Once the engine fired, however, the generator hummed like a bird, and transmission was perfect. From the reception point of view the Arctic regions are a paradise, as there are no X's, and no other stations to interfere. Once you can keep your accumulator from freezing over and your toes from dropping off with frostbite, you listen in comfort!

Starting Young

MUCH prominence has recently been given to the account of a young Southampton mother who wheels her baby out every day in a perambulator which is fitted with a radio set, an aerial and a loudspeaker.

But is this so very wonderful after all? My own experience suggests that most perambulators are liable to contain "loudspeakers," especially if there is more wind than usual.

And as for the aerial—well, it might have been only a "dummy."

Plane's Radio Brains

DESPITE the spectacular nature of some of the formation flying, the real star turn of the recent R.A.F. pageant at Hendon was the pilotless, radio-controlled plane.

For a long time, as has been disclosed in "P.W.," the Air Ministry has been able to equip "Queen Bees" with wireless controls that flew the little machines with uncanny precision, in accordance with the wireless direction from the ground. The Fleet Air Arm has been using these pilotless planes for years as aids to target practice.

But at the Hendon pageant the public got its first glimpse of the Envoy "Queen Wasp" biplane that is also a radio-controlled machine. The purpose for which

(Continued overleaf.)

Next Week: HOW TO SWITCH OFF YOUR SET IN BED

FEEDING THE BOGY MAN IN THE RADIO

this particular machine is intended, is no doubt somewhat similar to that of the "Queen Bee," but having a performance comparable with the modern fighter, it is a difficult target to hit.

From the radio point of view it is a beautiful piece of work. Those R.A.F. boys seem to be as happy "on the air" as in the air—which is saying something.

Matrimonial Problem

THE B.B.C. recently made known some of the queer requests they get from listeners to the Empire programmes.

Many are in connection with food—how to make pork pies, faggots, and so on. And one fellow wrote from Barbados to know if it was possible to send him out a pair of "Welsh Rabbits" for breeding, as he understood they made the most delicious supper dish.



So far, however, none of the enquiries are as bad as those which poured into one of the American stations that opened an information and advice bureau for its listeners. One day an agitated young farmer called up this bureau and said, "What would you advise me to do? My girl says she won't marry me after all unless I give up messing about with radio."

"That's bad," began the official reply, but the distant voice chipped in: "I'll say it's bad. I'm going to miss her something terrible!"

Second Channel Mystery?

IN an effort to encourage the tourists from abroad to visit France, the Customs authorities there have relaxed some of the rules, and permitted the temporary importation of various articles without the payment of Customs duties.



Among the articles so permitted are gramophones; but there is no similar latitude with regard to portable wireless sets, which still incur the full duty. There has been a great outcry about this, and many explanations have been advanced as to why it is still so difficult to take your portable with you into France when you go there.

Perhaps the real reason is that the wily Frenchman, having seen some of our portables, are afraid that we may leave them over there, on the wrong side of the Channel!

Flying Boat Radio

UNLESS something unforeseen interferes with the schedule the Imperial Airways flying-boat Caledonia will have inaugurated the Atlantic air service before these lines are in print. That means

another heavy responsibility will have been placed upon radio, for accumulated flying experience in all parts of the world tends to emphasise the importance of wireless on regular long-distance services.

The Caledonia carries a pilot and first officer, an engineer and two wireless officers. The wireless stations at Rynanna, on the Shannon, and at Botwood, Newfoundland, have been working together for several weeks in preparation for service conditions, and it is intended that all important changes in the meteorological situation on the route shall be notified immediately to the flying boat at all stages of the voyage.

Midnight Prowler

ONE of those wealthy Americans who spare no expense to be safe from gangsters and kidnapers engaged an inventor to make a super alarm device that would defeat the wildest criminal.



The inventor, on his mettle, produced a device more sensitive than any before known—it was based on radio and worked by capacity effects; the mere presence of an intruder

actuated the mechanism, and he did not have to cross an invisible beam, step on a contact, or anything so crude, for it was impossible to go near the apparatus without raising the alarm.

Satisfied at last, and feeling secure, the new owner went to bed and slept soundly—to be awakened in the dead of night by bells, sirens, searchlights switched on, and all the elaborate warning apparatus in full blast.

The armed guards turned out and rushed to catch the criminal: it was a big black cat cleaning his whiskers and looking with great earnestness at the too-sensitive alarm!

International Items of Interest

OSLO is experimenting in the humanising of prison life, and a well-appointed prison is shortly to be opened there. Every cell will have facilities for radio reception.

New Zealand has no prejudice against politics being aired by radio. The Parliamentary Labour caucus recently approved the regulation of controversial broadcasts.

Norway is planning to equip six new stations round her coasts to provide an up-to-date radio service of ship-and-shore telephony.

Burma is apparently aiming at a comprehensive radio coverage, and P.O. engineers there are now experimenting with short-wave transmissions in a big way.

The North Pole station established its first short-wave communication with an amateur transmitter at Alexund, Norway.

Smaller and Smaller

ALEXANDER, who burst into girlish tears because there were no more worlds to conquer, was spared a lot of misery by dying a long time ago; he would have hated to see how the scientist of to-day makes the world seem smaller and smaller every hour.



This new air-mail service to South Africa will bring the Cape almost within week-end distance, and the new radio-telephone rates now in force will allow you to speak to your best girl there for a mere matter of £1 a minute.

Should you find that the inconstant nymph has flown to India you can still hold sweet converse with her for about the same figure, or an extra ten bob at the most. (And what's ten bob when you're in love with a girl like yours?)

A Knowing Child

SPEAKING to the British Social Hygiene Council not long ago, an eminent psychologist brought up the question of the "problem child" in this age of scientific marvels.

He cited the case of a small boy who honestly thought that a strange man lived in the wireless set—a man who had to be placated and kotowed to. Offerings and tit-bits of various kinds frequently found their way to this wireless boggy, and when the set broke down on one occasion they found it full of small pieces of food.

I am not sure that this incident should be regarded as having some half-mysterious psychological significance. Some of those crooners really sound as though they needed a square meal to console them.

The Expert

DID you hear about the party of privileged visitors who were allowed to look over an island off the South American coast which is used as a convict settlement?



They saw prisoners working at every kind of uncongenial employment, but finally they came across one prisoner, garbed like the others, but granted amazing privileges—he was smoking a cigar, doing no work, and he looked extremely well fed.

"Who's that fellow?" asked the visitors. "Sssshh! We mustn't offend him," said the guide. "He's the only fellow on the island who knows how to stop the Governor's wireless set from oscillating!"

ARIEL

BRIGHTER CATHODE-RAY PICTURES

By J. C. JEVONS

THE loudspeaker has been called the weakest link in broadcasting, because in so many cases it is unable to handle the full range of musical frequencies supplied to it by the set. We can compare the fluorescent screen of a cathode-ray tube to a loudspeaker, in the sense that it is the last link in the chain of television. And from many points of view it is the weakest link in that chain.

One obvious defect is that it is unable to reproduce the pictures at a really high level of brilliance. To go back to the parallel of broadcasting, the fluorescent screen, so far as efficiency is concerned, is something like an old-fashioned pair of headphones coupled up to a modern high-powered wireless set.

Where Light is Lost

The trouble is that we have not yet been able to find any really efficient method of converting wireless signals into visible light, nor have we discovered how to amplify light in the same way as we can amplify an electric current. So for the time being, the cathode-ray receiver seems anchored to the fluorescent screen.

But the point is, are we making the best use of it? For instance, the fluorescent material is usually applied, either directly or indirectly, to the glass surface at the bulb end of the tube, and the picture is then viewed from the far side of the screen, that is, from the opposite side to the one on which the picture is actually formed by the impact of the electron stream.

Obviously this means the loss of a certain amount of valuable illumination, because the fluorescent light has to travel through the material of the screen, and its backing plate, as well as through the glass end of the bulb, before it reaches our eyes. Apart from reflection losses at the various surfaces, the screen itself must necessarily be made of a very thin layer of fluorescent material, since otherwise it would not be transparent enough to allow much of the light to pass through.

On the other hand, it would be better in many ways if we could use a fairly thick layer of fluorescent material. Finally, the fact that the fluorescent material is deposited over the curved end of the glass bulb, instead of being laid on a perfectly flat surface, tends to introduce a certain amount of distortion.

Use of a Flat Screen

Turning for a moment to the transmitting side of television, we find there is a type of cathode-ray tube known as the "Iconoscope," which is fitted with a perfectly flat photo-electric screen mounted at an angle to the main axis of the tube. This arrangement is necessary because, when using the Iconoscope as a "camera," the picture to be televised must be focused on that side of the screen which faces the anode or "gun" of the tube. Otherwise it would

How the best advantage may be taken of the light produced on the screen of a cathode-ray tube.

be impossible for the electron stream to scan it.

The Fig. shows the same principle applied to a television receiver.

Instead of being fitted to the round end of the glass bulb, as usual, the fluorescent screen S is mounted at a definite angle inside the tube, so that it is inclined to meet the electron stream used for scanning. In this position it becomes possible to see the picture from the front face of the screen, instead of from the back.

As the illumination is obviously more intense at the point where the electrons first strike the screen, this arrangement also makes it easier to magnify the picture without losing any of the essential details. As shown, the picture is projected from the fluorescent screen S through a projection

fall slightly out of focus as it moves away from the centre, either up or down the picture. Unless this is corrected for, the resulting picture will appear clear-cut in the centre but slightly blurred at the top and bottom.

In the second place, since the upper part of the screen S is farthest away from the cathode or gun G, the electron stream will trace out a longer line there than it will at the centre of the picture. Similarly, the line traced out along the lower edge of the picture will be shorter still.

Corrector Windings

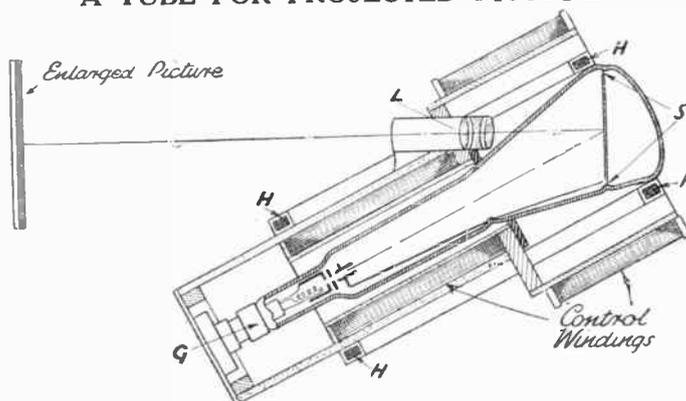
That this is so will be clear if one imagines the electron stream to be the equivalent of a thin rod or wire vibrating to and fro about the cathode as a pivot. Obviously as the wire "stretches out" to reach the upper part of the picture, it will sweep over a longer scanning line than it will at the bottom of the picture, which is closer to the cathode. The upshot is that the complete picture appears wedge-shaped instead of rectangular in shape, for which reason the effect is known as "trapezium distortion."

The necessary corrections are produced by first applying a uniform magnetic field along the main axis of the tube from two external "control" windings (as shown in the Fig.). In addition, there are the usual pair of deflecting coils for producing the scanning motion. One of these is shown at H, whilst the other lies at right-angles to it, but has been omitted from the drawing for the sake of clearness.

The combination of the "control" windings and the two deflecting coils causes the electron stream to take a slightly spiral path, instead of a straight one, the pitch of the spiral being such that it sweeps over equal lines at all points on the fluorescent screen, irrespective of its distance from the cathode of the tube. For the

same reason, the focus of the stream is automatically varied as it travels from the top to the bottom of the screen, so as to keep all parts of the picture free from blurring.

A TUBE FOR PROJECTED PICTURES



C R Tube Designed To Give A Brighter Picture

This receiving scheme adopts some of the principles of the electron camera used for television transmission.

lens L on to an enlarged viewing screen mounted outside the tube.

The fluorescent material can now be deposited as a thick layer upon a metal backing-plate. This allows a higher voltage to be applied to the anode, with a corresponding gain in brilliance, because the metal backing will stand up to a more intense bombardment without risk of burning out.

Owing to the fact that the screen is set at an angle, scanning becomes somewhat more difficult than if the surface was everywhere at right-angles to the electron stream. The same difficulty occurs, however, in the case of the Iconoscope tube, and special control fields can be applied to put matters right.

Compensations Needed

There are two points to be observed. In the first place if the electron stream is correctly focused along the centre-line of the fluorescent screen, it will tend to

THE DIAL REVOLVES

By LESLIE W. ORTON

SPAIN'S SECRET STATIONS

DISAPPOINTING CONDITIONS :: TOKIO'S TEST
PROGRAMME :: 20-METRE RECEPTION

SPAIN is overrun with secret radio stations. Yet another one has been unearthed—this time in Madrid.

Indignant government officials claim that the station radioed results of air raids, transmitted information "lifted" from valuable documents procured by Bill Sikes' methods, and otherwise passed on information detrimental to the government to insurgent headquarters.

This somewhat naturally riled the Madrid authorities, who decided to take a hand in the game. Calling "check," they pounced, and now the officials of the secret station are behind bars awaiting with painful anticipation the next move!

A Game of Chance

The short-wave broadcast bands remind me of a game of chance; you don't know what to expect next. To be honest, conditions have been disappointing on the whole, and if you are after a thrill your luck is out, for you would obtain more excitement trying to cross Piccadilly during the rush hour!

C O C D (Havana), on 48.92 metres, is about the only bright spot on the 49-metre band. Between 5 and 7 a.m. he is often quite an entertaining signal. Announcements in English make identification fairly easy.

There are a number of mysterious sounding Spanish stations around 40 metres. Half an hour on that band is enough to bewilder anyone. It's a hot-bed of terribly modulated unidentifiable stations.

One's ear-drums are in danger when tuning to the 30-metre band. Here the European big noises—Zeesen, Rome, and Moscow—raise the roof with their volume. Unfortunately, programme value is poor, and often a Salvation Army band would win in a contest against them. W 2 X A P, W 1 X K, and W 3 X A U have been very disappointing signals, and W 1 X A L and W 2 X E on 25 metres have been little better.

If you wish to demonstrate the pulling power of your set to your friends I suggest that you turn to W 2 X A D or W 3 X A L on 16.87 metres—or, better still, put them off for a day or so!

J V H on 20.55 Metres

I was swinging the dials of my short-wave receiver in the region of 19 metres the other evening when a sound as if of cats fighting burst upon my ears. Thinking that one of my cats (I've only two!) was impersonating Tommy Farr, I was about to get a little cold water to clear the atmosphere when I realised that the din was coming from my loudspeaker. After listening to another cat fight and a lady "singing," I learned that I was listening to a test programme broadcast by J V H (Tokio) on 20.55 metres. Volume was excellent and I thoroughly enjoyed myself, resulting in a friend remarking with sarcasm: "You would enjoy hearing a pig killed if it were

in America!" No indeed—that wouldn't be DX!

Klu-Klux-Klan Stations

The Goddess of Luck is once again smiling on the 20-metre enthusiasts—we must be in her good books!—and it behoves us to take advantage of our good fortune.

A Klu-Klux-Klan member could hardly be more mysterious than some of the fellows I've heard of late. First, W C C R A announcing as being "aboard an aeroplane." Then, coming to ground—or water—W T O M, presumably a ship. Where are these stations? Any of you fellows know?

Latin-American and Canadian amateurs have continued to provide the sort of signals that make the DX-hound spend nights on end at the dials.

An hour at the dials the other night resulted in my logging F R 8 V S (Reunion), L U 8 A A (Argentina), P Y 1 F R (Brazil), Y V 5 A K (Caracas), and V E 3 C H and V E I D R (in Canada). Doubtless you could beat that little lot hollow, for conditions are wonderful at present.

Listening to W I C Z Z the other evening, I was amused at the following conversation that took place before "mike." "Ned here has got to beat it," remarked W I C Z Z.



South America offers plenty of opportunities for DX.

"He wants to get something to eat, so you had better spill the beans quickly!" Friend Ned then spoke. "How-d'y-do, bo?" he asked. W I C Z Z then closed down, leaving me with a smile on my lips.

The Fighting Spirit

W 2 X A F let me down badly recently. Wishing to hear the Louis-Braddock fight I rigged up my set by my bed, set the alarm clock, and dropped off to sleep. At 2.45 a.m. I awoke and set about searching for W 2 X A F. C O C H and C O C Q (Havana), R A N (Moscow), and the Zeesen transmitters were coming in, but instead of hearing the thud of gloves I merely heard atmospherics where W 2 X A F should have been. I almost wished I were a fighter, so that I could ease my feelings on someone!

SHORT-WAVE STATION IDENTIFICATION

By F. A. BEANE

MEXICO'S TRANSMITTERS

STILL in Mexico, which is rapidly developing into a DXers' paradise, we find, in the capital city of Mexico, X E W I operating on 25.2 m., which is devoted to the development of a "Moral, Mental and Spiritual Culture in Mankind all Over the World." Slogans such as "Fraternity of New Life" and "My Voice to the World from Mexico" are used, and talks given in various languages, including Esperanto, but it is doubtful whether X E W I is audible in this country, although good reception has been reported from Australia and New Zealand. Should you be fortunate enough to log it, write to P.O. Box 2874 in Mexico City; the report will be appreciated. Below will be found a few more details of some of the better-known stations, but I cannot guarantee that all are likely to be heard across this side of the "Pond."

X E U Z (49.10 m.) Mexico City, styles itself "Radio Nacional" and relays X E F O. Address: Apartado 2641.

X E P W (49.02 m.) Mexico City, announces as "La Voz del Aguila Azteca." Address: Apartado 8403. Reports are requested and answered over the air in English.

X E U W (49.83 m.) Vera Cruz, employs the slogan "El Eco de Satavento desde Vera Cruz."

There are many more Mexicans, but at the moment I cannot "introduce" them all to you as I am not yet conversant with their identification signals or slogans. However, when I receive accurate details of any newcomer I will let you know.

Before leaving the Latin-American republics I would like to conduct you to a few additional stations that we have either overlooked or which have just made their ethereal debut. To commence with we have O A X 4 Z, which is being heard particularly well on 49.42 m. Listen for it before 05.30 or 06.00 and note the announcement "Radio Nacional en Peru"; mention of "Westinghouse"; an organ playing the "Rhapsody in Blue" with superimposed announcement or the final closing announcement in Spanish, English and French.

Two Newcomers

Cuba provides two well heard newcomers. The first is C O G F on 25.4 m., the relay of medium-wave C M G F of Matanzas. C O G F, when first heard, obliged with periodical English announcements, but now one must rely on catching the Spanish call-sign, or its mention of "General Electric y Westinghouse," for it does not appear to follow the old Cuban custom of radiating a miscellany of noises and chimes! Havana provides the other Cuban, namely C O V C (or possibly C O B C) which has been heard from 06.00 until 06.30 on a wavelength of 32.1 m. approximately. For identification they use a bugle call, but do not appear to use English.

We have concluded our imaginary tour of the South and Central American countries, but should anything further of interest crop up I will temporarily defy time and momentarily revert to the countries we have left behind!

ON THE SHORT WAVES—Page 2.

POINTS *from the* POST-BAG

W.L.S. Replies to Correspondents

L. W. J. (Sheffield) writes: "My vote goes to 'more dope on the broadcast band stations.' I get them better than the hams, so naturally I want to know more about them." Might I suggest that L. W. J. would find the hams even more interesting than the broadcast stations if he took steps to find why he doesn't receive them so well? I always look upon a set that doesn't receive the amateurs very well as one that can't be working too well on the broadcast stations, either. Some of the weaker and lesser-known broadcast stations are far more difficult to receive than the hams.

The same reader, L. W. J., wants to "travel round the world via loudspeaker, not headphones, and asks about connecting his two-valver up to the pick-up terminals of a five-valve broadcast receiver. If he does it through an L.F. transformer, as I mentioned recently, he will be perfectly safe and should get good results. But readers who do this must not be disappointed if instability sometimes sets in before the volume control has been turned the whole way round.

More Wailing Noise

Re S. A. K.'s recent remarks about a wailing noise on 31 metres, N. P. (Darwen) now writes to say that he has heard it blotting out Zeesen on 25 metres—so it really looks as if it may be one of those "sabotage" stations one hears about occasionally. He also heard a funny phone transmission from someone asking "if DJD and DJN were O.K.," and saying that he would "try to get DJE ready by Sunday." It all sounds somewhat "phony" to me!

H. T. J. (Cleethorpes) submits one of his pet brainwaves. He metallises his panels and baseboards by saving sheets of silver paper from cigarettes and chocolates, sticking them to the wood by means of liquid glue. He puts on three layers, allowing one to dry before starting on the next. It's an excellent scheme, but I shouldn't be inclined to trust too much to all the different kinds of "silver paper," some of which are practically non-conducting.

I recently had a 5-amp. fuse blow on my car. I did the usual stunt of wrapping some "silver paper" round the glass tube of the fuse and re-inserting it in its clips—but it wouldn't work. It didn't blow again—it just didn't complete the circuit at all. So beware—and even if you use good stuff, don't trust to it for closed-circuit returns or L.T. connections.

A. D. (Handsworth) has made a one-valver that I recently described, but seems to have come properly unstuck, since it doesn't oscillate and it receives Midland Regional and National programmes all round the dial. This always puts me on the track of a broken grid circuit or dud grid condenser or something of that kind. Possibly the coil wiring is all wrong. Once more let me drop a hint about making sure whether your coil connections are thought

out by looking at the bottom of the former or the holder into which it plugs.

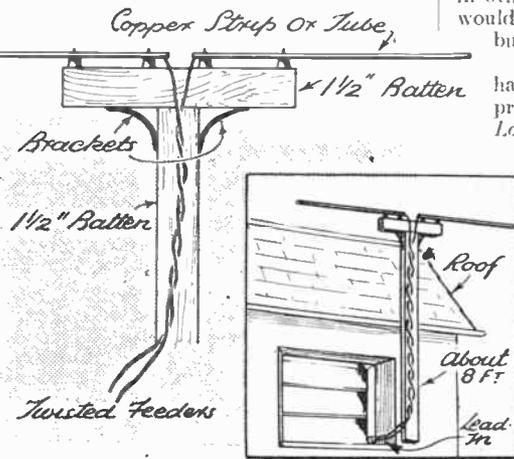
Bitten by Short-Wave Bug

S. A. (also of Handsworth) says: "You got me bitten by the short-wave bug and now I'm short waves all over!" Sounds like a painful disease. He has a "Simplex" Two with a power valve added, but wants to "superecharge" it still more for loud-speaker work. I don't think it would be a terribly good plan to add a third L.F. stage—and yet an H.F. stage won't give a terrific increase in output. It should be capable of working a speaker perfectly well as it is, with the extra valve.

He asks whether a bandspreeder would help, as he gets U.S.A. stations all mixed up with Daventry. A bandspreeder won't improve selectivity—only ease of tuning. It looks as though real inselectivity is the trouble, in which case an H.F. stage should help matters.

J. M. S. (Glasgow) has built up several

FOR THE ULTRA SHORTS



Here is a neat scheme for those who are thinking of erecting a dipole aerial for ultra short-wave work.

specimens of the "B.C.L." Two, and finds them all afflicted by a strange fault—to wit, the tendency to go into oscillation with a "shuddering" noise. This only happens on the 41-04-metre coil, so I am inclined to think that the H.F. choke may have something to do with it. An alternative suggestion is to play around with the voltage on the screen of the S.G. detector until the thing behaves itself.

Another little trouble that he mentions is "hill and dale" tuning on the reaction condenser—in other words, a tendency to dead spots. This is probably due to tight aerial coupling. Although six-pin coils were used in the "B.C.L." Two, that separate aerial winding sometimes provides too tight a degree of coupling, and it is an advantage to use a pre-set condenser in series with the aerial terminal.

The sketch on this page is the answer to a reader who wants to know how to make a 5-metre or 7-metre dipole effective without climbing about on the roof. The thing can be mounted quite well on a length of battening, and it is easier to do with a vertical dipole than with a horizontal arrangement—but the latter is all right if copper strip or tube, thick enough to be self-supporting, is used.

Short-Wave News

THE engineer in charge of W 2 X A D / W 2 X A F has been forwarding descriptions of the two stations to listeners who have sent reports. One of these has reached S. J. (Croydon), who has been good enough to send it to me. For the benefit of readers who are interested in these two stations I am reproducing it below:

"A Brief Resumé of General Electric's Around-the-World International Broadcast Transmitters—W 2 X A D and W 2 X A F, Schenectady, New York.

"The General Electric Company operates W 2 X A D and W 2 X A F on a non-profit basis without charges for services rendered, for the purpose of improving the international broadcast field, furnishing listeners in other countries with programmes which would not otherwise be received, and the building of international goodwill.

"W 2 X A D, operating on 15,330 kc., has been on the air for regular programme service since July, 1926. Location: Latitude 42° 47 mins. 37 secs. N. Longitude 74° 0 mins. 36 secs. West. Power input to final amplifier output stage, 55 kilowatts. Power output (carrier), 18 kilowatts. Maximum variation from assigned frequency, 100 cycles. Modulation, Class B, low level; — 100 per cent. on modulation peaks.

Directional Aerials

"Antennas: Vertical dipole (essentially non-directional). Beam on Europe (Centre of beam on London, England).

"Effective Carrier Power of W 2 X A D with beam antenna, 180 kilowatts.

"W 2 X A F, operating on 9,530 kc., has been on the air for regular programme service since June, 1925. Location: Same as for W 2 X A D. Power input to final amplifier output stage, 80 kilowatts. Power output (carrier), 25 kilowatts. Maximum variation from assigned frequency, 100 cycles. Modulation: Class B, low level; — 100 per cent. on peaks.

"Antennas: Horizontal dipole (essentially non-directional). Beam on South America (centre of beam on Buenos Aires).

"Effective Carrier Power of W 2 X A F with beam antenna, 250 kilowatts."

Here is another news item: W 2 X G B is now testing on 17,310 kc. (just above 17 metres) every day except Saturdays and Sundays, between 15.00 and 18.00 G.M.T. The address of the station is Radio W 2 X G B, Hicksville, New York (U.S.A.). These particulars were supplied by K. B., (Derby).

Finally, I should like to mention a new short-wave club: The Redhill and District Short-Wave Club, of which the secretary is Mr. S. Hessenauer, of 139, Frenches Road, Redhill, Surrey. Anyone in that district who is interested is asked to get in touch with the secretary, who will be pleased to supply full particulars.

W. L. S.

NONE SO BLIND . . . !

MY last flourish before going over to a high-frequency amplifier valve has been a systematic worrying of the eternal blind spot business, which seems inseparable from all simple short-wave sets where the first valve is an ordinary reacting detector "tube."

You remember I got over most of my troubles with the adoption of the four-pin type of coil, doing away with the aerial

Our contributor describes his experiments in his attempts to overcome a common short-wave trouble, viz., that of "blind spots" at points on the tuning range

mistaken belief that it will let stronger signals through!—the only effect is to stop the detector oscillating. Indeed, too tight a capacity coupling seems to be even worse than an aperiodic coupling in the production of really blind spots.

Another thing: the pre-set or neutralising condenser must be a good one, preferably air-spaced. And it must be raised a little from the Metaplex baseboard or even more so from a metal chassis. I made a grave error in bolting down my pre-set to the chassis—and it took me quite a time to realise what was wrong. In my new metal chassis O-V-I I have got my pre-set half an inch above the metal baseplate.

Even so, there are blind spots, especially around middle settings of the coil tuning from 22 to 47 metres.

In an attempt to remove this particular spot of blindness, I inserted a small short-wave choke in the aerial lead, so that the

my earth is pretty dud—but is it? I found by removing the earth lead altogether the blind spot still stayed where it was. And, what is even more odd, the aerial made no difference, either. Even when that was taken off there was still this mysterious lack of oscillation over some 15 degrees.

Still, I did put down a new earth, because I live on rather dry soil, and the former earth was left over by the preceding tenant of my cottage. It was one of those spikes, about 18 in. long, with the earth lead soldered to the top. I carefully laid to rest a large biscuit tin with neatly soldered 7/22 wire.

Well, I don't know, chaps. Either there is a lot of bunk talked about aerials and earths—or I am particularly immune from the so-called benefits of careful installation: For the plain truth is I could detect no difference at all—and the blind spot remained!

METHODS OF AERIAL COUPLING

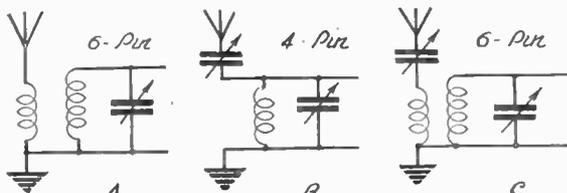


Fig. 1: Three methods of arranging the aerial coupling. B is the scheme used by our contributor in his two-valver. C is a combination of A and B.

aperiodic winding altogether and coupling the aerial to the grid end of the tuning through a small pre-set.

The three possible alternatives I know for aerial coupling are shown by Fig. 1 this week. *a* is the aperiodic coupling (not so aperiodic when it comes to the point!) used usually with six-pin coils. *b* is "my" system—and maybe yours, too—with a .001 pre-set or "neut" condenser used with a four-pin coil. *c* is the combination of the two methods, whereby the pre-set is inserted in series with the aperiodic aerial winding to loosen the coupling enough to dodge the blind spots.

Lack of Oscillation

By blind spots I am, of course, referring to those distressingly "dead" sections of the tuning band over which no oscillation seems possible. And, of course, without oscillation the set is a very dead thing indeed.

I have, as I say, been worrying around. And I have made out a list of all the possible causes I can think of to account for blind spots. Whether it is comprehensive I don't know; nor do I pretend to know that all the causes I mention are, in fact, causes—and not just my wild imaginings.

Here, anyway, is the list:

- (a) Type of Coupling.
- (b) Value of Coupling.
- (c) Size of Aerial.
- (d) Efficiency of Earth.
- (e) Type of Reaction Circuit.
- (f) Efficiency of Anode Choke.
- (g) Degree of Grid Damping.

Using my standard capacity coupling with a four-pin coil, I have found that there are fewer blind spots than with any form of aperiodic winding—and believe me I have tried every number of turns of wire and placed them along different parts of the coil.

One thing that is most important: the coupling *must* be made small. If too much capacity is used—in, as in my case, a

NOT A CURE!

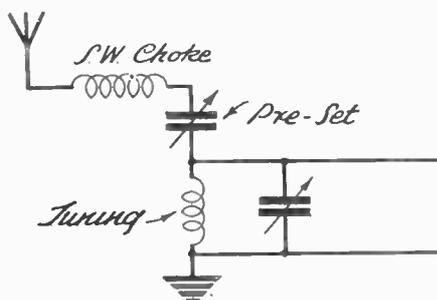


Fig. 2: In an attempt to remove the "blind spots" around the middle settings of the tuning between 22 and 47 metres a small H.F. choke was tried in series with the aerial.

complete aerial circuit then had the hook-up of the Fig. 2 diagram. This seemed very cunning at the time, because the blind spot did actually disappear.

Not entirely, though. It simply shifted to another part of the tuning scale. You see, my feeling was that the aerial might in some way be coming into tune at certain points, and I gather that this has the same effect as a very tight coupling, which would stop the oscillation.

I proceeded, still undaunted but definitely wilting, to my next attack—the aerial. I got up a fairly long aerial, about 80 ft. total length, in place of the standard 35-ft. aerial. Sorry, but this didn't make the slightest sign of difference, the blind spot occurring at exactly the same point as before—although I had to use even less aerial-coupling capacity than ever to get oscillation over the rest of the scale.

One naturally jumps to the conclusion

Looking Elsewhere

It dawned upon me the trouble might not be in the aerial circuit at all, but in the detector valve's circuits. Yet my prior tests with the two forms of reaction—series fed, as now being used, and the old system of connecting the reaction winding and condenser between anode and earth—were not greatly different in results; although I did decide, you remember, that the series-fed system gave slightly freer oscillation.

UNDER SUSPICION

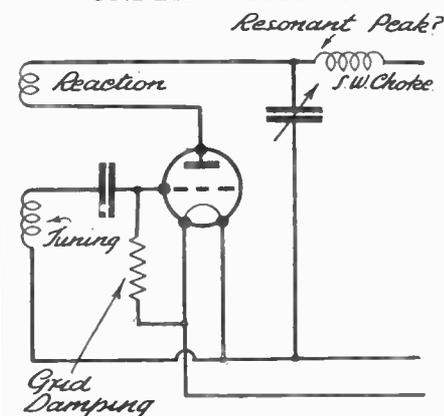


Fig. 3: Two points which Mr. Chester thought might be the cause of the "blind spots" were the S.W. choke and the grid leak.

Fig. 3 shows the two points I considered might be responsible for the continued blind spot. First, I wondered if that short-wave choke in the anode circuit was "peaking" in some way, and so causing the trouble. I tried two different makes of choke—and even wound 100 turns of No. 26 wire on a 1-in. test tube in an attempt to make my own.

My confession is this: The original choke proved the best for oscillation, the other two having the effect of demanding more reaction condenser capacity to produce oscillation. From which I concluded that

(Please turn to cover iii.)

RANDOM RADIO REFLECTIONS

By Victor King

GIVE THE TURNS A CHANCE—STUDIO APPLAUSE IS A GOOD THING :: HOUSE-TO-HOUSE COMMUNICATION :: RADIO AND RECORDS WITHOUT INTERFERENCE

STUDIO AUDIENCES

EVERY now and then there is a whale of a criticism in the Press against studio audiences. Apparently, judging by some of the printed comments, everyone ought to know that studio audiences are a wash-out. Useless folk serving no useful purpose. But on the contrary helping to boost bad broadcasts.

Yet clearly the B.B.C. considers them desirable. And doubtless the artists like 'em, although, probably, some of them are momentarily surprised at the readiness of the applause.

Of course, there will be applause. No one having waited eighteen months or



★
"Some of them are momentarily surprised at the readiness of the applause."
★

thereabouts to gain the privilege of a free evening's entertainment is going to start barracking. No, a studio audience is predisposed to be appreciative of everything dished up.

And why not? I think it's a good idea. Where's the advantage of giving a turn the "bird"? Someone thought that turn good even if it was only the man at the B.B.C. who booked it. You can't imagine that there would be a deliberate booking of a bad act.

Well, if there's someone who likes it, then the chances are that there will be millions of others who like it. And they'd be frightfully fed up if their listening were interfered with by outbursts of studio raspberries. Having got to the mike, a turn must be allowed to have the best chance of going over right up to its end. And its chances will be enhanced enormously by a measure of appreciation from an audience. What you or I might think a bad turn could well be transformed into tolerable listening by being put right up on its toes by an audience prepared to cheer anything.

Ask the profession what it thinks of those unresponsive, phlegmatic, unsympathetic audiences it gets in some parts of the country. "Like trying to be funny in a cemetery," said one old pro. to me a little while back.

You know I haven't much time for current criticism, whether of radio, books, films or the drama. So much of it is done by young "smart Ales" residing in west-end service flats who don't know how real men and women live, let alone what they are likely to want in the way of entertainment. Anyway, it's something a sight different from either Bach Cantatas or Surrealism.

YOU CAN'T DO IT

A YOUNG reader of my notes has been sending me many words on the subject of communication without wires.

He desires to establish a link between his house and that of a friend. I have explained that radio is out of the question. That the P.M.G. in his wisdom (or that of a predecessor) has made it quite, completely and entirely illegal for any but the Post Office or the B.B.C. or the Armed Services or the Police Force to engage in ether message exchanging.

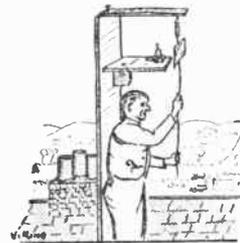
What about amateur experimenters? he then asked. To which I responded that they had to have qualifications and purposes before being allowed to experiment, and that if they used their little wireless stations for sending communications regarding social engagements and Aunt Matilda's health, they'd soon have their antennae extracted.

Then followed these Q.'s and A.'s.

Q. What about a buzzer stuck right on to an aerial?

A. Insufficient range for doing anything but interfere with the neighbour's radio. Penalty, on being detected and convicted, social excommunication and a fine dependent on the Magistrate's liver.

Q. Can one fix up a telegraph or telephone line so long as it doesn't pass across a main road?



★
"He desires to establish a link between his house and that of a friend."
★

A. Not if it wanders outside one's own domestic domain.

Q. Why not light signals?

A. Even such things as that, if used for communication purposes, can be held to be a contravention of the Wireless Telegraphy and other Acts which give the P.M.G. a communication monopoly in this land unfit for unofficial hearers to live in.

And why shouldn't he have a monopoly? After all, the P.O. services are cheap. But they wouldn't be if all kinds of "pirating" were going on.

PHONING YOUR RECORDS

I'VE been playing some of my records on to telephone receivers and been somewhat surprised at the good hearing one can enjoy by this means. You know the idea. You merely join the pick-up direct to the phones without using any amplification of any kind.

It's quite a useful way of enjoying dual entertainment in the same room. The phones tend to keep outside sounds getting to your ears, so even if there is a radio going you don't notice it much providing it is not too loud.

Of course, if you stuck phones on the radio you'd hear nothing at all of it and two lots of people could share radio and records without mutual interference.

There's another angle on the idea. Garden listening. You won't bust into the balmy quietness of a summer afternoon if you do your stuff on phones. A nice, pleasant little idea. All your latest jazz records (or chamber music recordings) with nary a squeak drifting to the outside air.

And another thing. Pick-up-phone listening is cheap. In fact, it costs you nothing at all beyond the wear of your records and the needles. Is this a sound scheme? My brothers, it's philanthropy and good fellowship and economy with gilt edges.

WHERE?

A NUMBER of you have written asking where those resistance leads I mentioned a few weeks ago are obtainable. I'm afraid I don't know where they can be bought separately in this country. You see, they come over from the States stuck on low voltage sets.

A jolly good idea. As you are probably aware, 110 volts is almost a standard pressure "over there." Which means that all the surplus stock sets for export have to be modified to suit our 230 and what-not mains. Instead of indulging in any interior fiddling about which would put up costs, the artful Yanks thought of turning out leads made of resistance wire to drop the voltage the required amount.

No doubt replacements are obtainable from those who handle the sets in this country. But to be quite frank I don't concern myself much with the commercial aspects of imported radio gear. Why should I when I derive the bigger part of my income from the commercial radio gents of my own country?

★
"They'd be frightfully fed up if their listening were interfered with by outbursts of studio raspberries."
★



POLICE RADIO

HAVE any of you who live in or near London seen the new police radio cars?

Glistening black outfits with large, built-in horn speakers streamlining from the top.

With a maximum speed of goodness knows what, I got on the tail of one on an arterial road, but at 75 m.p.h. I gave up. The thing seemed only to be ambling at that velocity, and when the driver, with a grin, put his foot down good and hard I think he must have accelerated up to 100 m.p.h.

Anyway, still maintaining my 75, I dropped back as though I'd gone in reverse.

And all the time the other perambulating P.C. was sitting with phones, on intently listening. Wonder if he was listening to Henry Hall?

MARCONI—THE MAN AND HIS WIRELESS

CHAPTER VI—FRANCE CALLS FOR PROOF

The English Channel's challenge to Marconi—He makes "sparks" leap from France to the cliffs of Dover—Historic bulletins—Marconi turns his attention to duplex wireless—He demonstrates how waves can be separated by tuning—The value of a famous patent, No. 7777—Marconi Company plans expansion ashore and afloat

CHAPTER VII—AMERICA BECKONS MARCONI

James Gordon Bennett extends an invitation—Marconi accepts and plans to report international regatta by wireless—He arrives in New York—Impressions of Marconi by reporters—The yacht race begins—Marconi flashes bulletins to the "Herald"—Conversations with newsmen—Interest of Army and Navy aroused—Preece congratulates Marconi and reviews progress of wireless

FRANCE called to Marconi in 1899. Could he send a message through the air across the English Channel? Marconi answered "Yes," and left for France to prove it.

It was March and all was ready for wireless to meet one of the most critical tests of its career. The "sparks" must leap from the little town of Wimereux, three miles out of Boulogne, to the cliffs of Dover. That was a long distance! Soldiers in ancient times had dreamt of digging a tunnel under the Channel to link the British Isles with the Continent, but no one had thought of talking back and forth across the water without the use of wires.

The French Government wanted Marconi to try this span. Electrical experts and government officials visited the station at Wimereux where Marconi and Jameson Davis met them and explained the installation, and what they believed could be accomplished.

Monday, March 27, was a momentous day in the history of wireless. At five o'clock in the afternoon Marconi pressed the sending-key that tapped out the first cross-Channel signal. There was nothing new in this for him except the distance! Months of work at the Poole and Needles stations had made wireless an everyday event in his life.

The transmitters and receivers used to spin the invisible thread to link England with the Continent were quite the same as utilised in previous experiments.¹ A seven-strand copper wire insulated from a sprit 150 feet high served as the aerial. The mast projected up from the sand at sea level, with no high cliff on the French side to aid in tossing the messages across the water.

¹McClure's Magazine, June 1899.

Crack! flashed the spark under the master hand from Italy. All eyes seemed to glance anxiously out upon the sea as the spring gales lashed angrily against Napoleon's old fort that rose forsaken in the foreground. Would the message carry all the way to England? There was nothing in the

later described the historic scene, "short and commonplace enough, yet vastly important, since it was the first wireless message sent from England to the Continent: First 'V,' the call; then 'M,' meaning 'Your message is perfect'; then, 'Same here 2 CMS. VVV'; the *cms* being an

abbreviation for centimetres referring to the length of the spark, while V was the conventional finishing signal.

"And so, without more ado, the thing was done. The Frenchmen might stare and chatter as they pleased, here was something come to the world to stay. A pronounced success surely, and everybody said so as messages went back and forth, scores of messages, during the following hours and days, and all correct."

Marconi with a stroke of diplomacy was quick to acknowledge the debt of science to Branly, the Frenchman. He flashed this message:

Marconi sends M. Branly his respectful compliments across the Channel this fine achievement being partly due to the remarkable researches of M. Branly.

Two days later Robert McClure, magazine publisher, was at the Dover station. Cleveland Moffett was at the Boulogne terminal to hold cross-Channel conversation. To test the accuracy of transmission, Mr. Kemp, who was operating the French trans-

mitter, was handed this message which he clicked off the spark:

McClure, Dover: Gniteerg morf Eenuarf of Dnalgne hguorht eht rehte—Moffett.

This meant, "Greeting from France to England through the ether," each word being spelled backward. The Dover operator may have thought something was tangled up, but he copied just what he heard, and all were pleased when the Boulogne receiver intercepted:

Moffett, Boulogne: Your message received. It reads all right. Vive Marconi—McClure.

(Continued overleaf.)

MARCONI CHATS TO RADIO CHIEFS



This picture was taken during the Marchese Marconi's visit to America a few years ago. He is seen here with David Sarnoff (left), President of the Radio Corporation of America, and E. F. McDonald, President of the Zenith Radio Corporation, in the library of the latter's yacht.

confident, deliberate action of Marconi to reveal that it would miss the mark. Thirty-two miles seemed a long leap!

Suddenly, as if he sensed something in the air for him to lend an ear, Marconi signed off with three Vs and stopped transmission. The room was silent. Every one was watching Marconi and their ears seemed to be strained more than his to catch some sound from the receiver. There was a pause but only for a moment, and then briskly the dots and dashes began to click as the tape rolled off the message.

"And there it was," said a guest, who

MARCONI—THE MAN AND HIS WIRELESS—Continued

The operators flashed "Good-bye" and the trial was over.

"How fast can you transmit a message?" Moffett asked Kemp.

"Just now at the rate of about fifteen words a minute; but we shall do better than that no doubt with experience," said the engineer. "You have seen how clear our tape reads. Anyone who knows the Morse Code will see that the letters are perfect."

"Do you think there is a field for the Marconi system in overland transmission?"

"In certain cases, yes. For instance, where you cannot get the right of way to put up wires and poles. What is a disobliging farmer going to do if you send messages right through his farm, barns and all? Then see the advantage in time of war for quick communication, and no chance that the enemy may cut the wires."

"But the enemy can read your dispatches."

"That is not so sure," replied Kemp. "Besides the possibility of directing the waves with reflectors, Marconi is now engaged in most promising experiments in syntony."

A great secret was out of the bag! Marconi had developed a method to separate stations on different wavelengths. His engineer referred to the invention as "syntony." He called it electrical tuning.

"I may describe syntony as the tuning of a particular transmitter to a particular receiver, so that the latter will respond to the former and to no other, while the former will influence the latter, and no other," said Mr. Kemp. "That, of course, is a possibility in the future, but it bids fair soon to be realised. There are even some who maintain that there may be produced as many separate sets of transmitters and receivers capable of working only together as there are separate sets of locks and keys. In any event any two private individuals might communicate freely without fear of being understood by others."

Those sceptics who had always clamoured that the weak link in wireless was the fact that if more than one station sent at the same time the messages would be a discordant jumble, now had no reason to scorn.

Tuning—a wireless miracle, protected by Marconi's famous patent No. 7777, solved the problem.

Little did the public realise in 1899 that their children would be using this magic tuning to separate great symphonies from talks by kings, weather reports from menus, and a funeral oration from jazz. Marconi had completely mastered the wild waves criss-crossed overhead.

New possibilities for wireless were seen overnight. Did not the wonder of tuning boom wireless as a powerful force? Indeed it did, and some inquired if the granting of a limitless number of distinct tunings for transmitter and receiver did not threaten the telephone, the cable, the telegraph and even the newspaper.

"Our newspaper system?" exclaimed a correspondent.

"Certainly," said a Marconi engineer; "the news might be ticked off tapes every hour right into the houses of all subscribers, who have received instruments tuned to a certain transmitter at the newspaper distributing station. The readers would have merely to glance over their tapes to learn what was happening in the world."

Great was the foresight of these pioneer Marconi men. Did they dream of facsimile broadcasts, photoradio or television?

Prophets were moved to point to the day when citizens would set wireless dials at a definite wave when retiring, so that during the night the machine could pluck a facsimile newspaper from the air. Should the owner of the machine prefer a New York paper he would tune to a specific wave; and another for Chicago. He would have a choice of tele-newspapers.

GOING ABOARD



Another snap of the great inventor—going aboard his yacht this time—during a Cowes Regatta.

Wireless in its race to overtake print, however, runs in a circle. The only way it can catch up is to receive and record automatically what the air waves say. That gets back to print again. Wireless and print supplement each other. Both are needed.

Marconi had other things to think about without trying to compete with such a powerful force as the printed word.

The Marconi Company then started unaided to develop its own systems of shore-stations for communicating with ships at sea. This course was free to anybody and everybody, because no licences were required, and no permission had to be acquired for performance.

The "ether" was a gold field of science: Marconi was the main prospector.

CHAPTER VII

AMERICA BECKONS MARCONI

MARCONI was anxious to see America. His mother had often told him stories of the land across the sea. As a boy he had read the adventures of Columbus. He had heard of America's commercial enterprise and how intensely interested Americans were in his invention.

A representative of the *New York Herald*, Milton V. Snyder, was in Ireland when the Kingstown regatta was wirelessed. Snyder reported that he had seen and heard to James Gordon Bennett, an enthusiastic yachtsman and owner of the *New York Herald*. He told him how the *Dublin Express* had posted the wireless bulletins in the window. In the meantime Snyder went to Paris.

"Go back to London," cabled Bennett, "and make arrangements for Marconi to go to New York in September to report the America Cup races for the *Herald*."

In London, Snyder talked with Jameson Davis, chairman of the British Marconi Company. He was in favour of the proposal, but Marconi hesitated. He was not sure he could send messages the distance required in following the yachts off New York Bay. Finally, the inventor agreed if the experiments he planned for the spring of 1899 in the English Channel were successful he would accept Mr. Bennett's invitation and go to America in September.

During the first half of that year, he increased the range of the wireless apparatus on a boat from eighteen to seventy-two miles, and boosted the speed of transmission to twenty words a minute. That satisfied him, as did tests he was invited to conduct during the British Fleet manoeuvres, so he decided to see America. The *Herald* attracted international attention when Marconi's acceptance was announced on September 12th, 1899.

Sir Thomas Lipton's *Shamrock I* had been built on the Clyde, and then was taken to pieces, sent in sections to London for reassembly at the yard of the Thornycroft Ship and Boiler Builders on the Thames. Finally, after much mystery, the *Shamrock* slipped into the Thames and headed for Manhattan Island.

Marconi, accompanied by William Goodbody, a London director of the Marconi Wireless Telegraph Company, Charles E. Rickard and W. W. Bradfield and William Densham,

skilled engineers, sailed on September 11th from Liverpool on board the *Cunarder Aurania*, which arrived in New York on the 21st. As he came down the gangplank Marconi confidently exclaimed, "We will be able to send the details of the yacht racing to New York as accurately and as quickly almost as if you could telephone them. The distance involved is nothing, nor will hills interfere."

Sightseeing attracted Marconi for the next few days. After spending much time at the Custom House, he went to the top of the St. Paul building to get a bird's-eye view of New York's "monster" buildings; he was impressed with the swift-moving lifts.

(Please turn to page 432.)

LOW-MELTING-POINT SOLDER FOR CONSTRUCTORS

A practical article in which instructions are given for the making of a number of extremely useful alloys for electrical and radio use.

By J. F. Stirling

INVARIABLY in the working practice of every radio constructor there comes a time at which a small quantity of some ultra-low-melting-point metal is required or, at least, would be an advantage for some delicate piece of soldering work which is in hand.

If, for instance, you wish to join up permanently two or three fine strands of instrument wire you will find that unless you apply ordinary "soft solder" to them with extreme care, you will, in the act of attempting to join them together with any normal solder, merely burn them away.

The melting-points of the constituent metals of low-melting-point solders.

Metal	Melting-Point
Lead	326°C.
Cadmium	320°C.
Bismuth	270°C.
Tin	231°C.

For the uniting of such wires, the use of special low-melting-point metals is extraordinarily advantageous. Also, when it is required merely to make a temporary joint, a special low-temperature-melting solder will be found very useful, since such a joint can be released at the merest touch of a warmed iron.

The majority of these "ultra solders" are good electrical conductors and they will not give rise to resistance losses. They have one defect, and one defect only. They will not bear heavy strains when the melting-point of the solder is lower than 100° C. The majority of instrument connections in radio work, however, are not required to stand up to severe mechanical stresses. Hence, to all practical intents and purposes, this objection to the use of such low-temperature-melting solders is disposed of.

The Various Alloys

On this page the reader will find tabulated the exact composition and melting-points of a number of solder-like alloys. Ordinary solder, it will be remembered, contains merely lead and tin in varying proportions. By incorporating various quantities of bismuth and/or cadmium with lead-tin alloys, it will be seen that it is possible to obtain metals which melt at relatively very low temperatures.

Some amateurs may have a difficulty in obtaining small quantities of the metals tin, cadmium and bismuth in the pure state. Such metals are best obtained from the nearest wholesale chemical and laboratory furnisher, and they will not be found expensive.

The necessary lead can be obtained from any form of scrap lead, but this should have been melted down and all the impurities

skimmed away from the molten metal.

The whole secret of success in the making of low-temperature-melting solders lies in the accurate weighing out of the requisite quantities. These special solders cannot be made sketchily. The component metals must be weighed out accurately and the melting down must be done carefully and without undue heat.

For melting the metals an earthenware crucible is the best vessel. Since, however, the amateur may find it difficult to procure one of these articles, a small "tin" coffee or cocoa container, very carefully cleaned out, will make a perfectly satisfactory substitute.

The Order of Mixing

Support the container over a low bunsen-burner flame, that of a spirit-lamp or else an ordinary low-burning gas-ring, and melt up the metal with the highest melting-point first of all. In every case, this metal will be lead; cadmium coming next; then bismuth and finally tin—as shown from left to right in the table on this page. This procedure is important and should be rigorously adhered to.

Stir the molten metal with a clean iron nail. Take care that the molten mass of metal is not heated unnecessarily high. After the last ingredient has been added, stir the molten mass for about half a minute.



A carefully cleaned coffee or cocoa tin makes a convenient container for alloying the ingredients of low-melting-point solder.

If, to any of the alloys enumerated on this page, varying quantities of mercury (quicksilver) are added when the alloy is in a molten state, the melting-point of the resultant metal will be lowered enormously. Indeed, by adding large quantities of mercury, the alloys can be obtained in a permanently plastic state.

The radio constructor, however, should never employ mercury-containing solders for wireless work, for the reason that mercury is a slightly volatile metal and it is easily possible for traces of its vapour coming in contact with the aluminium vanes of a condenser to enter into union with the latter and to form a soft and rapidly corro-

Here is a wide range of low-melting-point solders for fine radio and electrical work. The constituent metals should be melted in the order given—from left to right.

Name	Melting-Point	Composition (Parts by Weight)				Characteristics
		Lead	Cadmium	Bismuth	Tin	
Lipowitz's Alloy	63°C.	2.7	1	5	1.3	Warm water melting alloys.
Wood's Metal	65°C.	2	1	4	1	
Lichtenberg's Metal	91°C.	3	—	5	2	Melt just below boiling-point of water.
Arce's Alloy	93°C.	1	—	2	1	
Newton's Metal	94°C.	3.1	—	5	1.8	
Rose's Metal	95°C.	2.8	—	5	2.4	
"Boiling-Point" Alloy	100°C.	3	—	8	4	Melts in sharply boiling water. An ultra-soft solder capable of bearing strains.
"Softened Solder"	150°C.	2	2	—	4	

Then turn out the flame and tip the molten contents of the heating vessel on to a clean slate, marble or stone slab. If none of these is available a perfectly clean brick will do. The metal will instantly solidify in "strip" or "ribbon" form, in which condition it is the most useful for soldering purposes.

It is best only to make small quantities of any of these special solders at a time, the reason being that when a large area of the molten alloy is exposed to the air, fairly rapid oxidation takes place, with consequent wastage of some of the metal.

able surface on the metal. It should also be remembered that the mercury in a special soft solder uniting two copper wires will, in time, tend to spread along the wires and will set up a softening of the copper metal which is exceedingly detrimental to the latter.

All things considered, it is far better to avoid the use of mercury in the making of ultra-low-melting-point metals when such are required for normal fine electrical and radio soldering work. Otherwise, as explained, you may meet trouble.

"RADIO DOCTORS" OF THE B.B.C.

The Story Behind the Technical Hitch

HARLEY STREET, within a stone's throw of Broadcasting House, is no more proficient in its diagnosis of obscure human ills than B.B.C. engineers are at discovering technical hitches-to-be.

Thousands of delicate pieces of apparatus, hundreds of valves, scores of phone lines that stretch like tentacles from one end of the country to the other, as well as a large amount of studio and other equipment, are all potential "patients." But radio technicians, unlike doctors, do not wait for a breakdown to occur before they begin to keep a "condition graph"; the exact behaviour of every link in the broadcasting chain is logged from the day that its useful life begins.

Nothing Left to Chance

There is a remarkable story behind this little known work at Broadcasting House. Let Mr. L. Harvey, Assistant to the Superintendent Engineer (Studios) tell it:

"Every possible precaution is taken to avoid even one second's breakdown; nothing is left to chance, and if we had a motto it would probably be something about prevention being better than cure.

"There are, of course, literally thousands of potential causes of breakdown. A studio programme could cease because of the failure of one of the numerous relays in the control room, of one of the scores of valves, or in any of the circuits connecting more than twenty studios. Only vigilant maintenance minimises the risk of breakdown till it is almost negligible. For instance, each valve is tested at regular intervals and rejected as soon as its efficiency, according to a carefully kept graph record, begins to decline; we scrap them long before listeners do. It's a full-time job for one man.

Plotting Characteristics

"Prior to every rehearsal and transmission, all studios and their associated apparatus are tested throughout. Amplifiers are examined regularly for their response to the musical range, and special testing apparatus gives a frequency up to about ten thousand cycles. That is about the limit of the normal human ear. Some people, it is said, can hear sounds up to a frequency of 13,000 cycles, but even ten thousand is nothing more than an almost inaudible whistle. At each test graphs are plotted, and when they are compared with the originals any diminution of 'characteristic' is obvious. In addition, amplifier tests will usually locate any other brooding 'snags.'

"A special engineering section looks after all telephone lines. Normal circuits—like those connecting studio centres—are tested daily, and lines for outside broadcasts are examined immediately before a transmission. Each line, you see, has its own distinct response to music, and sometimes electrical correction is necessary.

"Then there is inter-station working. Every morning a general round-up is made of music lines from London throughout the whole network to all stations—'station line-up' we call it. From Broadcasting House we send a definite tone down the lines at pre-arranged frequencies ranging from 50 to 10,000 cycles. Each station en route measures it and sends a report to us. Helps us to keep a watchful eye on circuits; more, we can usually anticipate trouble if a line shows a gradual loss of response. We know that some day a programme is going to get lost. So we just see that it won't.

"Studio microphones are inspected before every rehearsal and transmission, even though there is often an interval of only a few minutes in which to do the job. We send an engineer to talk to the control room through each 'mike'—a sort of private broadcast. No, they do not tell funny stories! But you'd be surprised how necessary this precaution is. In the old days, particularly, people used to trip over mike leads and jerk them out of the wall sockets.

The Turntable Tune

There are literally dozens of gramophone turntables in Broadcasting House, many of them in studios. They, too, have to be examined daily. You'd never guess the tune we use! The 'Teddy Bears' Picnic' played by the B.B.C. Dance Orchestra. An engineer sets off each morning with the record under his arm, playing it at least thirty times a day as he makes his tests. This little piece of music is played by such a combination of instruments and covers such a wide range of frequencies that it gives the engineer all that he needs for the test. Moreover, his ear gets so accustomed to the one piece that he can detect at once if the reproduction is not what it should be. Gramophone pick-ups have a test of their own carried out by the use of a special record on which are a series of different frequencies; quite by the way, it is a double check on amplifiers, too.

"All this, and more, is done to prevent irritating little breakdowns of even a few seconds.

"Yet breakdowns are bound to happen. So we have various ways and means of limiting their duration.



Mr. W. T. Forse, Controller of the H.M.V. factories, shows Mr. M. J. Savage (left), Prime Minister of New Zealand, one of the firm's latest all-world radiograms.

"Supposing a programme from the Concert Hall suddenly 'disappears.' It has to be found and put on the air again quickly. The first man who has direct indication that broadcasting has ceased is the engineer controlling the programme. He formally notifies the supervisor—who probably already knows—and a test is made by means of the appropriate jack-field in the control room. You can tell sooner than it takes to tell at what point the programme is being lost. A button is pressed, and reserve amplifiers automatically change the circuit. Fifteen seconds later the programme is going out again. The faulty amplifier is repaired immediately.

"One of our biggest difficulties is correcting a breakdown in a microphone circuit; an engineer has to dash to the studio, change the mike—and that takes perhaps a minute. Worse still if a whole studio goes 'dead'; thank goodness it very rarely happens because of our stringent tests. But if it does—well, the whole cast of a show may have to be moved to another studio. That's a real technical hitch!

"There is, as you know, quite a lot of S.B. work to-day—simultaneous broadcasts from several B.B.C. stations of the same programme. Imagine that London is giving one to the Regions:

"The programme goes along the normal telephone lines through the various centres, at each of which it is checked and passed through amplifiers. If a breakdown occurs at any point of the route a special control line makes it easy for the engineers at every centre to check backwards or forwards with each other, ascertain where the programme is being lost and switch over to a reserve circuit.

Keen Engineers

Engineers generally are exceedingly keen fellows, and losing a programme is to them as dreadful as dropping a musket on a Guards' parade.

They still smile at that old but true story of the dear old soul who 'phoned the B.B.C. one day and said: "When are you going to broadcast again? Your transmitters have not been working for three whole days. I know—because my valves won't light up."

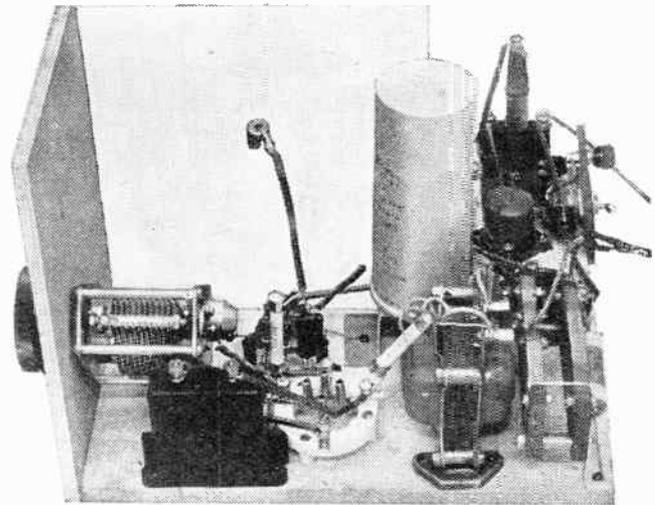
THE ALL-MAINS "REACTO"

(Continued from previous page.)

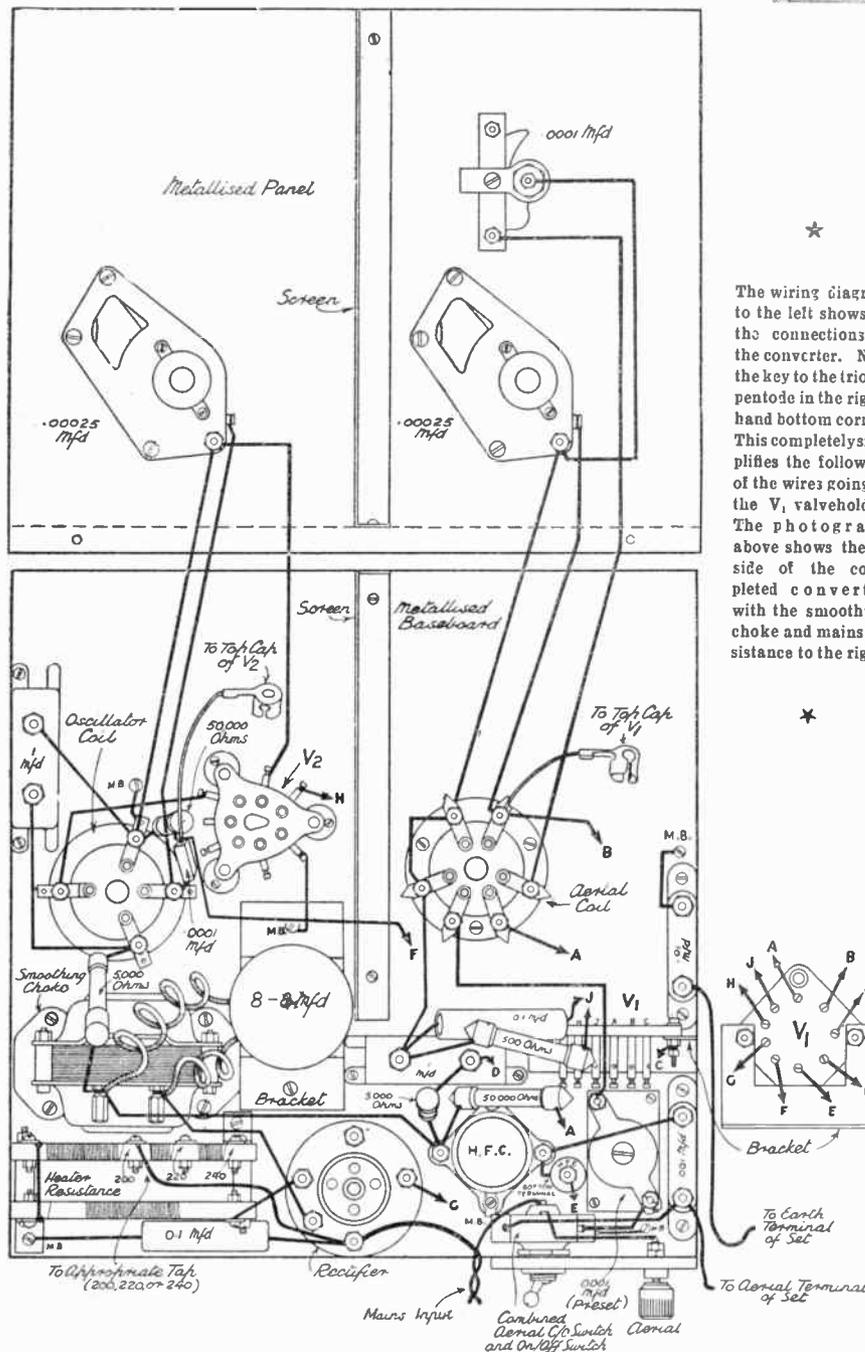
selectivity which results from the use of reaction is enormous, and the inclusion of the necessary extra valve is easily justified.

Having pointed out the reasons for the particular design of this circuit, we will now briefly run through the circuit from the aerial. The aerial is connected to the common point of one pole of a double-pole change-over switch. When the switch is thrown one way the aerial is connected to a .0001-mfd. pre-set condenser, which

couples it to the aerial coupling coil of a 6-pin aerial tuning coil. When the switch is thrown the other way, the aerial is coupled straight through to the receiver, and the converter is put out of action. The other pole of the double-pole change-over switch is connected in the mains lead, so that the mains are switched on when the aerial is coupled to the converter, and switched off when the aerial is coupled to the set.



YOUR GUIDE TO THE WIRING



The wiring diagram to the left shows all the connections in the converter. Note the key to the triode-pentode in the right-hand bottom corner. This completely simplifies the following of the wires going to the V₁ valveholder. The photograph above shows the V₁ side of the completed converter with the smoothing choke and mains resistance to the right.

In other words, once the converter has been connected up, it is only necessary to use the change-over switch to change from short waves (using the converter) to medium and long waves (using the set alone).

Separate tuning condensers are used for aerial tuning and oscillator tuning. This is necessitated by the use of reaction. It would be impossible to gang them effectively, as ganging would not hold over the whole of the waveband without some form of external trimmer.

One .00025-mfd. condenser tunes the grid circuit of the triode and pentode of the triode-pentode frequency-changer. The inductance in this circuit is the grid winding of a six-pin Eddystone coil. The aerial winding has already been referred to. The reaction winding is in the anode circuit of the triode section of the frequency-changer, reaction being controlled by means of a .0001-mfd. reaction condenser.

The Oscillator Circuit

Another .00025-mfd. condenser tunes the oscillator circuit. This is a 4-pin coil, the grid winding of which is tuned and coupled to the grid of a triode oscillator. The anode is connected to the reaction winding. Oscillations are fed into the frequency-changer (from the grid of the oscillator) via the suppressor-grid. Otherwise, the oscillator and frequency-changer are completely isolated and screened.

Of course, indirectly heated universal mains valves are used, with their heaters connected in series, the necessary voltage being dropped by means of a tapped resistance in one mains lead.

The signal output from the converter is fed from the anode of the pentode section of the frequency-changer, via a filter consisting of a condenser and a short-wave and a broadcast H.F. choke, to the aerial terminal of the receiver. That concludes the theoretical aspect of the circuit, and the actual construction of the converter will now be described.

The panel (back) and baseboard (top) are both metallised. The baseboard is a standard "Metaplex" 3-in. board, measuring 10 in. x 10 in. Of course, it could be a plain baseboard covered with copper foil; but Metaplex is just as effective and looks infinitely cleaner. The panel is polished on the front side and is 1/4 in. thick. Mounted in the middle of the baseboard, by means of a flange, is a 24-gauge aluminium screen,

SEEN ON THE AIR

NEWS AND VIEWS ON THE TELEVISION PROGRAMMES
BY OUR SPECIAL RADIO-SCREEN CORRESPONDENT

L. MARSLAND GANDER

DISAPPOINTMENT awaits viewers who are cricket enthusiasts. Negotiations had been proceeding between the B.B.C. and the M.C.C. for transmission from Lord's.

Though the presence of the vans at Wimbledon precluded the possibility of televising the Test match there were high hopes of seeing on the home screen the Eton v. Harrow match, Oxford v. Cambridge, Gentlemen v. Players, and possibly some county matches.

Now I hear that there has been a hitch, whether technical or otherwise is not specified. I hear also that Mr. Gerald Cock has had doubts as to the suitability of cricket for television. Owing to the distance of the wickets from the boundary and the only possible sites for the cameras, the batsmen and bowlers might look too small.

On the other hand it seems to me that the stationary batsman is a better subject than a fast-moving tennis player, assuming that the telephoto lens can enlarge the figure to a reasonable size.

Wimbledon Thrills

I had, as I hinted last week, a slight feeling of disappointment about the quality of the Wimbledon transmissions. Just before I began to write these notes, however, I had some exceptionally good pictures in my office. After a "technical hitch," which delayed the switch-over to Wimbledon, the transfer from the studio was made shortly before 4 o'clock towards the close of the exciting match between the two "pocket" players, Bitsy Grant of America and our H. W. Austin. So clear were the pictures that the ball in its flight could be followed easily. I had for the first time a genuine kick out of television tennis, and all in the room agreed that the pictures were excellent. "Why go to Wimbledon?" I heard. Well, lest the Lawn Tennis Association should get it into their heads that television is keeping people away from Wimbledon, I am bound to remark here that good as it was the real thing is better.

To and fro swung the battle. Match point was called again and again. Then Austin made the extra effort which gained him the day. Net play makes an exhilarating subject. As Austin smashed and smashed again I was thrilled as never before by a tennis match.

We saw Queen Mary twice during the transmission. Her Majesty could be seen in the Royal Box, easily distinguishable by her toque, wearing sun-glasses. Later she retired for tea and was shown by the camera returning to her seat.

At the end of the game Grant was depicted taking his beating in a philosophical and sportsmanlike way, with a broad smile. After bowing to Queen Mary the two walked off the court together arms round one another's shoulders. What better entertainment could the viewer wish for, than this?

A Contrast in Styles

The next match, between Crawford and von Cramm, presented contrast in size and in speed on the court. If the previous game was a fast lightweight contest, this was a struggle of slower-moving heavyweights—so it seemed.

By the way, the programme which preceded the tennis, though unduly drawn out, provided good entertainment of an entirely different order. Principal dancers of Colonel W. de Basil's Ballets Russes, from Covent Garden, came to the studio to rehearse. It is a peculiar circumstance

Television, like sound broadcasting, exposes insincerity in a deadly way, and makes acting extremely difficult. By the same token, reality on the television screen is nearly always more interesting than the most elaborate and carefully rehearsed production. The ballet rehearsal, though as I say too long, was an object lesson.

While the programmes are reaching new levels, television on the sales side must necessarily be in the doldrums until after the three weeks' holiday at Alexandra Palace. I have said and I repeat that the shutting down of transmissions altogether for three weeks is a mistake.

But in the meantime manufacturers are preparing for television's first really big sales push in the autumn. This will coincide with the Radio Exhibition where, it is now revealed, there will be sixteen separate demonstration theatres each seating about thirty persons.

I am rather doubtful of the wisdom of this arrangement, but I am not disposed to prejudge, and anyway it will certainly be an improvement on the hole-in-the-corner demonstration of last year. Admission will be by ticket, and the idea is to let each visitor see a complete entertainment by television. This is certainly better than being marshalled in a queue and kept on the move.

Exhibition Times

The B.B.C. is completely revising its programmes for Olympia. During the afternoon, while the exhibition is on, the time of transmission is being put back to from 4 to 5. There will be a film transmission in the period from 12.30 to 1.30 p.m., and the evening transmission will be at the usual time, from 9 to 10.

Each hour of the afternoon and evening periods is being divided into three fifteen-minute programmes with intervals of five minutes between. These intervals are to allow the theatres to be cleared.

Then each of these fifteen-minute periods will, as far as humanly possible, give a sample of the best that television can do from inside and outside the studio.

I understand that the manufacturers who have already booked theatres are Baird, Cosser, Ediswan, Ekco, Ferranti, G.E.C., Halcyon, H.M.V., Kolster-Brandes, Marconiphone, Philips, Pye, R.G.D., and Ultra. Entry into the television market of so many new firms is highly significant. I regret, however, that the arrangements being made at Olympia will make difficult any direct comparison of results. But, of course, one cannot have things every way, so we'll hope for the best.

BRITAIN'S HEAVYWEIGHT CHAMPION

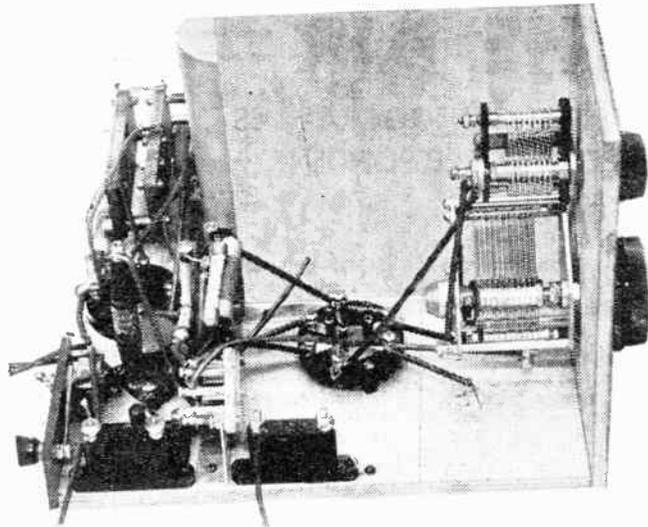


TOMMY FARR, British and Empire heavyweight champion, with his Philco all-waver. He used this set when he listened-in to the recent Louis-Braddock fight in Chicago.

that while ballet has not been particularly successful on the small screen this particular show, because of its easy informality, the laughter that greeted mistakes, and chiefly because of the graceful artistry of the performers, made a most favourable impression.

An Attractive Item

The dancers, who included Danilova, Baronova and Riezbouchinska, were dressed in bathing costumes—or garments closely resembling bathing costumes. I have never seen better pictures or a more attractive item than Danilova performing the Sugar-plum fairy *pas seul*.



The V_1 side of the converter is shown in this photograph. The valve-holder, which is mounted on a bracket, can be seen in the foreground.

sure that you mount the valve holder the right way round. The two heater pins form an isosceles triangle with the pin at the apex. The bracket should be mounted on the baseboard before the valve holder is fitted. The bracket is in line with the back edge of the screen and flush with the edge of the baseboard.

The components should now be mounted on the baseboard and the wiring

dimensions of which are given in a diagram on this page. This screen is also screwed to the panel by means of its other flange.

A terminal strip measuring 3 in. \times 1 1/2 in. \times 3/16 in. is provided at the back of the baseboard to carry the aerial terminal and the change-over on-off switch. Terminals for connection to the receiver have not been used, but flex leads have been taken out from the .001-mfd. and .01-mfd. coupling condensers.

First drill the panel. Three-eighth inch holes are drilled for the two tuning condensers and the reaction condenser, whilst the two holes for fixing to the baseboard are 1/2 in. That is all the panel drilling that is necessary. Now fit the panel to the baseboard. Next prepare the aluminium screen. This consists of a sheet of metal 8 in. \times 7 in. of 24 gauge. A 1/2-in. flange is turned over along each of two adjacent sides. Two fixing holes are drilled in the shorter flange for fixing to baseboard, whilst one hole is drilled in the longer one for fixing to the panel. The positions of these holes are not a bit critical, and are shown in the diagram.

The Terminal Strip

The screen on completion should be fitted to the panel and baseboard. The terminal strip, carrying the switch and aerial terminal, is drilled as follows: 1/2 in. hole for the switch, 1/2 in. from top, and 3/4 in. from the appropriate end; 5/16 in. hole for aerial terminal, 5/16 in. from the top, and 1/2 in. from the other end; two 1/8 in. holes for fixing screws, 3/16 in. from the bottom, and 1/2 in. from each end. Mount terminal strip on the baseboard and the "chassis" is completed, ready to take the components.

Before this is done, however, it is necessary to make the 18-gauge aluminium bracket for the valve V_1 . A diagram of this bracket will be found on page 302 of "P.W." dated June 5th (The Reactor Converter). The holes by means of which the valve holder is fitted should be drilled fairly accurately, otherwise they will not register properly with the holes in the valve holder. Make

done. Before mounting the V_2 valveholder you should fit the necessary leads to its terminals, as they are rather inaccessible when the holder is mounted. Wiring is carried out with 18-gauge tinned copper wire and 1 1/2 m.m. insulating sleeving. Connection to the V_1 valve holder is indicated in small diagram at the side of the main diagram. There is nothing further that need be said regarding the wiring.

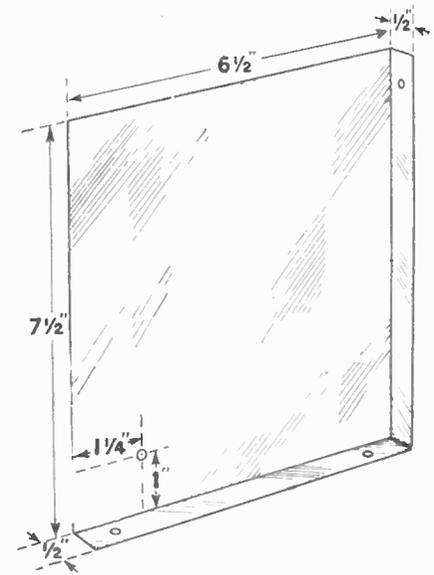
★.....★
THE COILS REQUIRED
 2 Eddystone 6-pin coils, types 6 LB and 6 Y.
 2 Eddystone 4-pin coils, types LB and Y.
 ★.....★

When the construction has been completed, connect mains leads to the mains plug, throw switch towards aerial terminal, and see that all the valves glow. By the way, make sure that you connect the lead from the "A" terminal of the rectifier valve to the correct point of the heater

Needless to say, it is necessary that your receiver should have at least one H.F. stage, or be a superhet. Remove the aerial from the aerial terminal of the receiver and connect it (the aerial) to the aerial terminal of the converter. Connect the lead marked "To aerial terminal of set" to aerial terminal of receiver. Connect the lead marked "To earth terminal of set" to earth terminal of receiver. Switch on both receiver and converter, the converter by throwing switch on terminal strip towards the aerial terminal. The receiver should be set to receive medium waves, and tuned to between 500 and 550 metres. Such a wavelength prevents any chance of double-channel interference.

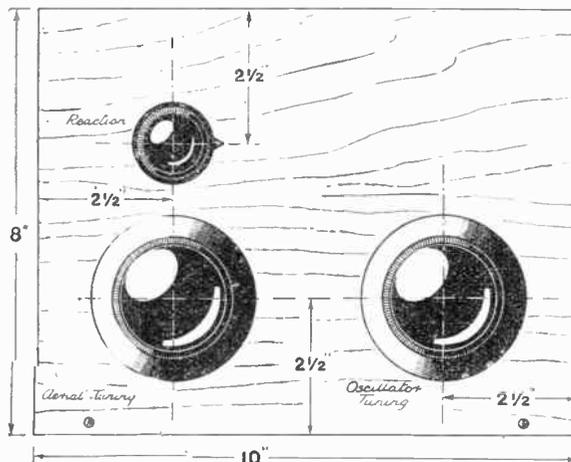
Depending upon the time of day at which the set is tested, insert the appropriate

SCREEN DETAILS



With the aid of this dimensioned sketch you will find it easy to make your own screen from a piece of aluminium.

THE PANEL DIMENSIONS



Five holes are required in the panel. Three for components and two for fixing screws to hold the panel and baseboard together.

resistance to suit your mains voltage. Mains voltages between 200 and 210 inclusive should be connected to the 200-v. tap. Voltages above 210 but not higher than 230 should be connected to the 220 volt, and those above 230 volts to the 240-volt tap.

Now for the testing with the receiver.

six-pin short-wave coil in the aerial coil holder, and four-pin coil in oscillator coil holder. As a matter of fact, at practically any time of the day or night you will obtain some of the powerful European stations on the 31-metre band. You will probably find it best to search with slight reaction applied—that is, with the reaction condenser vanes about one-quarter in mesh.

As a guide to finding the various stations we give the positions of the following stations. The first figure represents the aerial tuning and the second the oscillator.

Bound Brook (W 3 X A L), 26 : 23 ; Schenectady (W 2 X A D), 40 : 36 ; Pittsburgh (W 8 X K), 42 : 38 ; Boston (W 1 X A L), 64 : 60 ; Schenectady (W 2 X A F), 88 : 82. These stations are obtained with the L-B. coils. Using the Y coils : Schenectady (W 2 X A F), 28 1/2 : 23 ; Bound Brook (W 3 X A L), 74 : 63.

Just a final word, and that is regarding the .001-mfd. preset condenser. If too high a coupling is used here with a big aerial it may be found impossible to obtain reaction, so don't forget to adjust this to obtain a compromise between sufficient reaction and good signal strength.

The waverange of the converter is approximately 13 to 33 metres with the L-B. coils, and 24 to 60 with the Y coils.

TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

A SELF-SUPPORTING AERIAL

THE following is an extract from details we have received of a novel aerial from the inventor, Mr. A. F. Kent, Lee Moor, Plymouth.

"The self-supporting vertical aerial, herein described, obviates the use of mast or guy wires, is light in weight, and when fixed on a housetop adds to its appearance as well as embodying all the advantages of the vertical aerial.

"The flat-dweller may fix it at an angle to a wall from a window and where no space beyond the premises is available the problem of an outdoor aerial, so necessary for short-wave and television work, is solved.

"For portable aeriels, the base insulator would be mounted upon a metal stake, which when thrust into the ground forms both the support and the earth. Field Service transmitters are suggested as being the most likely users.

"A noteworthy feature of American broadcasting is that the lattice aerial towers are now insulated at the base and used as aeriels—being far superior to the wires previously supported by them. The self-supporting conical aerial lends itself admirably to such a purpose.

"The physical requirements of such an aerial are that it must be progressively stronger, towards the base, and that the least possible resistance is offered to wind from any quarter.

"The obvious form is that of an elongated cone, and to make this transportable and easy to construct, it is segmented.

"Owing to the gradual taper, the sections fit quite tightly when pushed together."

It is an ingenious idea, although not, so far as we know, yet on the market in any form.

AT THE SHOW

We understand that quite twice as many firms will be exhibiting television apparatus at the next Radio Show at Olympia, which is from August 25th to September 4th. Sixteen miniature theatres are to be built as television demonstration rooms.

DEMONSTRATING OPERATION

One of the most popular special exhibits on view at the Television Exhibition at the Science Museum, South Kensington, is an ingenious working model of the cathode-ray tube of a television receiver produced by the G.E.C. Cleverly arranged devices are used to show in slow motion the movements of the scanning beam which normally travels towards the screen at the amazing speed of 70 million miles per hour.

Alongside the model an actual cathode-ray tube is mounted as in a television receiver. The controls, arranged for operation by the public, are "ganged" to the model as well as to the real tube.

YOU MUSTN'T SWAY!

New broadcasters to television, who are to give a talk or other item in which they

are televised from close quarters showing just their heads and shoulders, are told they must not sway. If they do, they are likely to go out of focus.

So it would not seem advisable for newcomers who are nervous to boost up their spirits with a little "Dutch courage"!

HOW IS IT DONE?

It has been stated that television programmes can be recorded for future broadcasting just as sound programmes are. This is said to be done by recording the sounds of the vision channel.

The puzzling part is that recording on wax is said to be satisfactory. We wonder, because it is amazing if engineers have succeeded in producing a wax record that will faithfully reproduce the tremendously high frequencies dealt with in television.

BRIGHTER PICTURES

There is plenty of demand for brighter television programmes and brighter pictures. The new Baird receiver is claimed to give the latter—but cannot be expected to give the former!—and bright daylight is said to be no drawback to viewing. We do not at present know the voltage used on the tube, but think it may be higher than the average.

NINETY MILES AWAY

A whole television programme has successfully been received on a G.E.C. receiver at Coventry, ninety miles from Alexandra Palace.

SYNCHRONISING TERMS

SYNCHRONISING, as applied to television, refers to the keeping of the picture at the receiver in step with the scenes as picked up at the transmitter. Thus, not only must the spot in the cathode-ray tube at the receiver move across the picture at the same speed as the electron camera scans the scene at the transmitter, but each instrument must be dealing with the same spot of the picture at the same time.

Synchronising Impulses are transmitted along with the picture pulses to enable this in-step effect to be achieved.

Frame Impulses keep the change back to the beginning of a fresh picture or frame at the right moment, and,

Line Impulses, which are shorter than the frame impulses, do the same for the switch back of the spot to the beginning of a fresh line.

Synchronising Modulation refers to the percentage of the total maximum modulation that the synchronising takes up, and is usually about one-third. In order that the synchronising impulses shall not affect the picture, what is known as

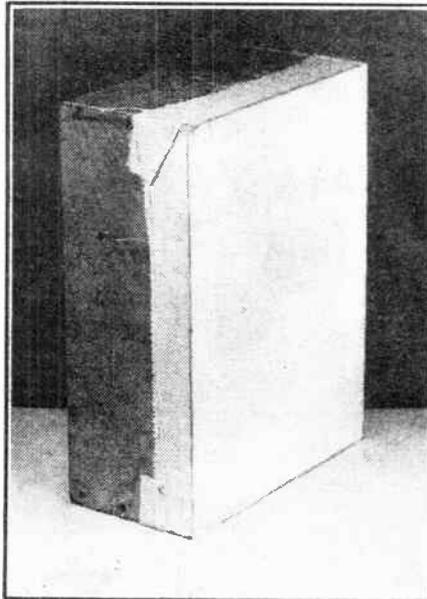
Black-out is adopted. This implies that the synchronising impulses occur at a value of modulation farther towards the black end of the picture than the value of vision impulse that produces a black effect on the screen.

Saw Tooth describes the type of impulse that the time base has to produce, and which is kept in step—or made to occur at the right time—by the synchronising impulses.

Separating Circuit, sometimes called differentiating or filter circuit, is the name of the circuit arrangement employed to pick out the synchronising impulses from the vision signals and to pass the right impulse—line or frame—on the right time-base circuit.

Separating Valve usually applies to a valve often used in conjunction with the above circuit whose essential task is to "trim" the synchronising impulses so that their value is always the same even if the received impulse varies. This ensures dead steady working of the time-base circuits.

A SCREEN FOR LIGHT-RAY EXPERIMENTS



The fabric is fixed to the frame while wet.

ONE of the simplest screens for light-ray projection in connection with television and photo-cell experiments is illustrated in the picture above.

It consists merely of a shallow box of convenient size, the bottom and top of which have been knocked out so that

only the sides remain, making a sort of frame. Upon this improvised yet amply efficient frame a piece of white cotton or linen fabric is stretched and glued down over the wooden sides. It is really essential to glue the edges of the fabric to the sides of the box and not to rely on securing the fabric edges by means of tacks or nails, for, when the latter method is employed, it will be very difficult to secure an even "pull" all round the fabric.

Immerse the Fabric in Water

Before securing the fabric in position on the frame, immerse it in water for about half an hour so that the fibres of the material become thoroughly saturated. Then pass it once or twice through a mangle or wringing-machine and, in this uniformly damp condition, immediately glue it down to the frame. The fabric will contract on drying and, being under a uniform tension all round, it will, when dry, present a perfectly smooth, taut and creaseless surface.

If, for any reason, the fabric, when stretched upon the frame, is not white or opaque enough, it may be gone over lightly with a rag charged with pipe-clay and water. Usually, however, a good white fabric needs no other treatment after being secured to the box-frame—and in this condition it will serve over a prolonged period as a highly efficient and convenient screen in all experiments, television and otherwise, requiring such an adjunct.

FROM OUR READERS

RESULTS ON AN EARTHED AERIAL

RESULTS ON AN EARTHED AERIAL

The Editor, POPULAR WIRELESS

Dear Sir,—The operation of my two-valve short-wave receiver, which has a single-tuned circuit using four-pin plug-in coils followed by a reacting detector, transformer-coupled to a small power output valve, has presented a rather interesting problem which I pass on as information and for comment. From my aerial, which is a single-wire bare 7-22 copper, one of the inverted-L type out-of-doors, I have three separate leads-in.

One of these is taken through a three-point aerial-set-earth change-over switch to the set when it is installed during the day in an attic, which I use as a listening-den. The other two leads-in go, each respectively, to an aerial-earth point in the living-room and in my bedroom. The points are ceramic short-wave chassis type valve-holders, with the anode and grid sockets employed as aerial and earth connections.

At night, before going to bed, I remove the set from the attic to the bedroom so as to listen late and early without disturbing the rest of the family. The three leads-in and the three earth-leads are all of electron insulated stranded wire and the earth-leads all go to the same earthing-point, namely, a water-tap. The aerial leads-in are all taken from the same point on the aerial, which is a continuous length of about eighty feet, and is not subdivided by intermediate insulators in any way.

The length of the attic lead-in is about 16 feet, and the earth-lead about 25 feet, giving a total of about 41 feet; the length of the living-room lead-in is about 15 feet and the earth-lead 5 feet, making in all 20 feet; lastly, the dimensions of the bedroom lead-in and earth-lead are about 16 feet and 20 feet respectively—i.e., a total of 36 feet. In no case, thus, are the lengths the same.

The curious fact is that, when transferring the set from the attic I always place the earthing-switch there so as to earth the aerial. The switch is functioning correctly, since when earthed all signals are cut off when the set is operated from the attic point. Despite the fact that the aerial would seem to be earthed for all signals, I find that the set operates perfectly from either of the points in the rooms, bringing in the same DX stations as when working from the attic lead-in.

There is no question of the aerial being earthed in the latter case, as the flex-leads from the points to the set are disconnected, and the point is therefore open-circuited. It does not seem that the leads-in to the points are acting as aerials, as the setting of the aerial series condenser in the set is the same for both points and for the attic site. Further, the settings of the tuning-condenser are the same for all wave-bands when the set is used in any of the three positions, thus showing, apparently, that it is the whole aerial that is the signal-collector in all cases. What is the explanation, and can any other reader claim to be receiving short-wave stations on an earthed aerial if, indeed, they are being so picked up?

GORDON BIRRELL.

11, Grove Road, Broughty Ferry West, Dundee, Angus, Scotland.

JUNK-PARTS SET

The Editor, "Popular Wireless."

Dear Sir,—Re J. B. Lowe's letter. I would also urge the making of a set from junk parts—or, as H. W. White stated, making most of the components. If these are not cheaper it would be more interesting, and a greater satisfaction would be felt when it is known that it was as near "home-construction" as possible.

Also, could the set be an all-waver? If not, could a S.W. set be included with the series?

I am only 17, but follow your paper enthusiastically. Wishing your paper every success, etc.

JACK GRUNDY.

P.S.—Kind regards to J. S.-T. Long may he contribute to "Popular Wireless."

41, Ashton Street, Little Lever, nr. Bolton.

An unusual pick-up system used by a reader, with satisfactory results on the short waves.

FROM AN ENTHUSIAST

The Editor, POPULAR WIRELESS.

Dear Sir,—I thought, maybe, you would be interested in a photo of me in my "den." Being a very old reader, I have not, until now, competed with other readers on the "Guinea Page," but after reading your promptings week after week, I plucked up enough courage, etc., to write; and here we are.

Short-wave listening, as a hobby, has definitely "got me." My receivers are a six-valve superhet plus converter and a well-known "Bandspread Three." My occupation, clerk in G.P.O., gives me wonderful opportunities to tune-in DX, as some weeks I arrive home about 1 a.m., 6 a.m., or 10 p.m., and I never miss an opportunity to give the dial the "once over."

Not being a Rockefeller, I do not report on every station I hear, but anything like good DX is worth the trouble and postage, not only for the sake of the QSL which sometimes arrives, but to show those "doubting Thomases." I find personally that reports—"real reports"—are really welcomed by amateurs; not, of course, English "hams" who can get a report from another station, and who are "just around the corner," so to speak; but those who do not contact so often, and who are "not on your doorstep."

At the moment my "bag" consists of 160 QSL's from 42 countries. I am also the proud possessor of W. L. S.'s POPULAR WIRELESS V.A.C. and "18" Club certificates, and anxiously awaiting the next "task."

The articles by Leslie Orton, Victor King, W. L. S., and the others are indeed a weekly tonic and eagerly awaited.

"ME IN MY DEN"



This is the photograph referred to by Mr. Croft in his interesting letter on this page.

Regarding the article ("P.W." 19/6/37) "In the Post Office Radio Service," I should like to inform any interested readers that during the past few months two of our clerks have left to take up Radio as a career. One is now in "school" at Port Patrick and the other in London. These two "graduated" from Telegraph messengers, and are, from reports received, having a "rattling" good

time; others will be following them shortly. Time is short, so I think I'll sign, after wishing you and "P.W." every success, "Kay please,"

WILLIAM J. CROFT.

"Pendine Villa," 53, Richmond Street, Totterdown, Bristol, 4.

BRINGING BACK OLD MEMORIES

The Editor, POPULAR WIRELESS.

Dear Sir,—For seven years, from being fifteen years old, I traversed the oceans and seas from corner to corner of this world of ours, through the fine limits of the Merchant Service, visiting one hundred and thirty cities and ports in every clime and nationality. China, Japan, Java, East Indies, West Indies, Australia, Africa, Europe, South and North America, Panama, on eight occasions through the Suez Canal, and had the joy of being one of a crew to go to the northern limits to within a few hundred miles from North Pole to supply whalers with fuel and stores, and many more places.

Being unable to carry on this fine life I now work ashore, and this is where I turn to radio, the "greatest of gifts" to mankind, especially the short waves, for here within their unlimited boundaries I again visit my ports of yesterday. "Rio" with a tone and voice picture of its waterfront and beautiful harbour with "old" Sugarloaf. I heard this description from P R F 5 during the hours broadcast on Monday, April 26th, and what a thrill this was, coming in at R7/8light F/Q R M 2.

I have heard Georgetown on only two occasions, however. But, again, the thrill of hearing the announcer calling streets in Georgetown by name and cafés being advertised through the sponsored programmes there, bring back fond memories of when I paid a short visit. The station V P 3 B G on 49 metres at midnight on Wednesday, April 28th, was responsible.

Havana on 31 metres (too bad, no English!), U.S.A., Sydney, and many more I've heard and logged, but my best long-distance station is Tokio (J Z K) on 19.79 metres—a fine station, and has been received every night on my set at R7 since May 31st, and it delights me. No need for aerial as this transmission is received easily on 6 feet of wire hung anyhow. Do believe me, readers—try it!

Yes, indeed, I have a lot to thank short waves for. I even had the fine experience of visiting the Mustapha Barracks at Alexandria, and still do now, although not in person but to hear S U I S G. Several of the boys came to his "mike" during a QSO with a G station, only last month! I remember the boys there trying on my "civvy" suit. Ha, ha! They are a lot of mixed tongues, from London to Durham "twang." If only you could give me space enough, but I'm not going to be selfish. Only to hear these place names over the air after my visits to many of them tends to make me talkative.

I receive a large amount of the popular stations and thank radio for a marvellous pastime, and to me a fine reminder of wonderful scenes. Whilst listening to a tropical station I imagine the transmitting masts as I often saw them; towering above tropical growth and in terrific heat, the top of the masts invisible at times as the hot misty clouds envelope them away up on some mountain side. Such is the scene at many stations near the line.

Carry on Short Waves and "P.W."

Wishing you continued success,

H. M. ROSS.

232, Blythe Road, Hammersmith, W.14.

WIN A GUINEA

This sum is awarded to the writer of the letter, which, in the Editor's opinion, is the most interesting of the week's batch. Letters on any radio subject are welcomed. Let us have your opinions or experiences. This week the guinea goes to Mr. Gordon Birrell.

50 STATIONS TO SEARCH FOR

There are over 50 stations to search for in this new reception test, and souvenirs for the best reports

By **LESLIE W. ORTON**

WHAT did Gladstone say in 1886? Candidly, I don't know. But I feel sure that if he had heard of the new POPULAR WIRELESS test which I am conducting on July 17th, and of the support I have received, he would have exclaimed "Gee, bo', it's a wow!" or something of the sort.

In many ways this new test is of more interest than the cross-country one conducted over the Whit-week holidays.

Have you ever had the experience of picking up stations well from one direction and only moderately from another? If so, it will probably have set you twisting your aerial all over the place, lopping down trees and so on and then you may have found conditions exactly the same. The annoying thing about this one-direction-signal business is that one's rival always seems to be situated in an ideal locality!

Up in Arms!

July 17th is a day that will go down to posterity—perhaps!—for then some fifty amateur stations and many hundreds of members of radio clubs will co-operate with POPULAR WIRELESS in an interesting experiment to ascertain reception in different places from different directions. Throwing away tennis rackets, they will arm themselves with receivers and transmitters and whilst one batch take the air the remainder will sit with headphones glued to their ears, fingers deftly twisting the dials, searching, ever searching.

And all this time yours truly will be crossing the country by car, receiving en-route and checking up positions, etc. Maybe I'll be enjoying myself more. But perhaps I'll get a puncture and then you wouldn't wish to change places with me!

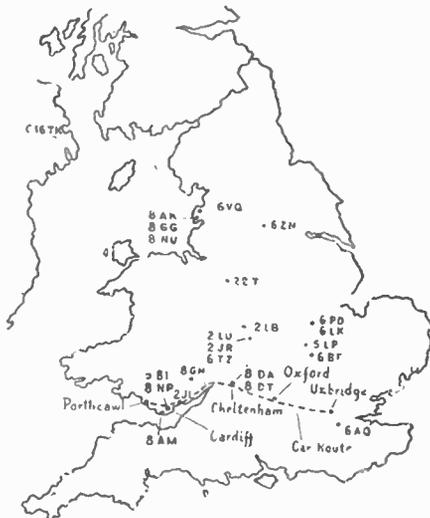
What You Can Do

The more receiving stations co-operating the more likely are we to get results. Why don't you co-operate? POPULAR WIRELESS has a heart, and seeing your gaze wander longingly towards the open window we feel that you gallant fellows deserve some reward for your help, and we are consequently presenting over a hundred souvenirs to those of you who send in the best reports. These souvenirs will look splendid hung up near your radio.

The test will commence at 11.55 a.m., and with a roar like Niagara Falls over fifty amateur transmitters will take the air. Transmissions will be made every hour until 7 p.m. for about ten minutes duration. Maybe you will be wondering where I am during the day—maybe not!—and you will get some cue from the stations participating in the test.

Listen for These

As this test is something of a competition as well as a test, I intend to give you the calls of about half the stations participating (they will all operate on the 40-metre band) and so here they are:



The route to be taken by Mr. Orton and the position of some of the stations co-operating.

- | | | | |
|------|----------------|------------|--------------|
| G5BK | Cheltenham | G8AK | Blackpool |
| G8DA | Cheltenham | G8GG | Blackpool |
| G8DT | Cheltenham | G8NU | Blackpool |
| G2ZT | Stoke | G6PD | Peterborough |
| G2LU | Coventry | G8GN | Monmouth |
| G2JR | Coventry | G6AQ | London |
| G6TZ | Coventry | G8AM | Penarth |
| G2LB | Birmingham | G8NP | Cardiff |
| G5LP | Wellingborough | G5BI | Cardiff |
| G6BF | Rushden | G2JL | Newport |
| G6VQ | Lytham | G6ZN | Keighley |
| G6LK | Peterborough | Etc., etc. | |

Among the other stations co-operating are some in Egypt, Sweden and Ireland.

Clubs Co-operating

But the transmitting "hams" aren't having it all their own way. There will be such a batch of listeners that if they all tuned to W2XAF that station would be absorbed and consequently unheard. Oh yeah?

I wonder whether a list of the leading clubs co-operating would bore you very much? Well, I'll risk it, and so here goes: Clubs co-operating include the Anglo-American Radio and Television Society; Blackpool and Fylde S.W. Club; British Short Wave League; Cardiff and District S.W. Club; Cars and Coventry Amateur Radio Society; Midland Amateur Radio Society; National Radio Society; Newcastle Radio Society; Newport and District S.W. Club; Southall Radio Society; Swindon and District S.W. Club; World Friendship Society of Radio Amateurs and the Wellingborough Radio and Television Society.

I hope I have made it clear what you have to do to obtain one of our souvenirs. Receive as many of the stations participating in the test as you can, and send in an accurate report.

PETO-SCOTT

S.T.800 BATTERY VERSION

KIT "A" YOURS FOR 7/-

Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carriage Paid **£3/10/0**, or 7/- down and 11 monthly payments of 6/4.
KIT "B." £4/16/6, or 9/- down and 11 monthly payments of 8/10.
KIT "CT." £5/14/0, or 12 monthly payments of 10/6.
KIT "CC." £6 11 6, or 12 3 down and 11 monthly payments of 12/-.
KIT "CLL." £6 14 0, or 12 3 down and 11 monthly payments of 12 3.

FINISHED INSTRUMENT TABLE MODEL



Battery Version. Built by Peto-Scott's expert technicians. Complete with FOUR FIRST SPECIFIED valves and Peto-Scott walnut table cabinet (illustrated on left). Less batteries. OVERALL DIMENSIONS: **13/3 DOWN**

Width 18 1/2" Height 12 1/2" Depth 12". Cash or C.O.D. Carriage Paid **£27/5/0**, or 13/3 down and 11 monthly payments of 13/3.

P.A. AMPLIFIER



6-7 Watts High Fidelity
A Super-Efficient General-Purpose Amplifier to earn you extra money!
MODEL A.C.67. — 4 valves; Triode, Resistance Transformer-coupled to 2 Triode Grid Power Amplifier Valves, in Push-Pull. Full Wave Rectifier. Special precautions have been taken in design to avoid parasitic oscillation.
 Pressed Steel chassis. Tapped and Screened Mains Transformer. Electrolytic condensers. Volume Control. Mains consumption approx. 60 watts. With microphone, speech easily heard at over 500 feet. Tapped for A.C. Mains 200-250 volts, 40/100 cycles. Output 6-7 watts undistorted. Complete with Valves. Ready to connect to microphone or pick-up. Cash or C.O.D. **£4.10.0**
 or 7/6 down and 11 monthly payments of 8/6.
High-Fidelity Field-Energised MODEL G476 SPEAKER for above. Cash or C.O.D. £2/7/6, or add 5/- to Cash Price and 4/3 to each monthly payment.

Charge your L.T. for 1d. a week!

PETO-SCOTT TRICKLE CHARGER
 ● 12 months' guarantee. ● Nothing to wear out or go wrong. ● Modern metal rectifier. ● Air-cooled mains transformer. ● 7 days' approval against cash.
 End outlet for accumulator recharging. The new Peto-Scott 1/2 amp. Trickle Charger will charge your 2-volt accumulator at 1/2 amp. while you sleep. Wonderfully efficient and simple to use. A.C. Mains, 200-240 volts, **CASH 12/6** or C.O.D. **12/6**
 Size: 2 1/2" high, 2 1/2" diam. **PRICE**

HERE'S NEWS!

A revolutionary new advance in Short Wave Home Construction! Peto-Scott's famous Short-Wave Experts have worked together and produced the—

"SHORT-WAVE EXPERIMENTER"

a booklet of 24 pages, illustrating and describing a range of 9 wonderful new PILOT short-wave kits. Each of these designs incorporates a standard chassis and panel. Commencing with a modest, but super-efficient 1. valve Adaptor - Converter you may, whenever you please, build this up, on the same chassis, into varying forms of 1, 2, 3 and 4-valve Short-Wave Receivers, complete in steel cabinet. No short-wave fan can afford to miss the fascinating hours this booklet will bring him.

Send 1/6 in stamps for free copy of this 6d. Booklet.

All Postal Orders must be crossed and currency registered.
PETO-SCOTT Co. Ltd., Established 1919
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 Holborn 5248

"OVER THERE"

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

"QUINS" ON THE AIR

THE Dionne quintuplets were heard over all networks on the celebration of their third birthday.

The little girls recited nursery rhymes and sang songs in Canadian-French. On their last two birthdays they made incoherent noises. Dr. Defoe opened the fifteen-minute broadcast with a few remarks on how the "quins" have been doing lately.

GIANT RADIO TOWER

ERECTED on a 300,000-lb. concrete base, a new radio transmitting tower just completed for a New York broadcasting station stands 640ft. high. The giant mast rests on a porcelain insulator built to bear a maximum weight of more than 1,000,000 lbs.

MORE RADIOS IN U.S.

THIRTY-THREE million radio sets are in use in the United States to-day, a survey completed by the Columbia Broadcasting System reveals.

Receivers are being bought at the rate of 28 sets a minute, 140 every five minutes. In the first three months of this year, 1,300,000 outfits were purchased for homes and automobiles.

At the beginning of 1937, the survey reports, 24,500,000 families owned radio sets and listened to them on an average of five hours a day. Five years ago the average daily period for each family listening was 4 1/2 hours.

HATS OFF!

MARY LIVINGSTONE wears such rakish hats that Jack Benny makes her take them off before they go to the microphone for their Sunday broadcast on N.B.C. He admits he is afraid the audience in the studio might be distracted from what they are saying.

"YOU AIN'T HEARD NOTHIN'"

AT a benefit for charity held at the Hippodrome Theatre in New York the great Caruso had just finished one of his famous operatic arias, and the audience went wild with applause. They demanded "Encore! Encore!" But time wouldn't permit; the show had to continue. The next act to appear was Al Jolson. Poor Al was sort of pushed on to the stage to face an audience that demanded Caruso. He held up his hand, called for silence, and said, "You ain't heard nothin' yet!" The crowd roared out its good-natured approval, and thus was started a typically American slang expression that is still going strong.

OVER 3,000 "SOUNDS"

WHAT scenery is to the stage, sound effects are to radio broadcasting. Seven years ago the business of providing illusory background noises was a minor part of broadcasting. At N.B.C. to-day it is the responsibility of an entire department under the supervision of Ray Kelly. Kelly once had a part-time assistant; now he has a staff of fourteen experts. Besides a heap of original apparatus (some of which was described on this page a short while ago), the N.B.C. has a library of 800 discs on which are recorded 3,000 different sounds—from the sizzle of a frying egg to the crash of a thunderstorm.

TEACHES THE BLIND

VIRGINIA PAYNE, talented radio actress heard over N.B.C. networks on Orydol's Ma Perkins' programmes, finds recreation from her duties before the microphone in the pursuit of an interesting and unusual new hobby.

She assists in coaching Chicago Braille Theatre Guild actors and actresses. This enterprising group of blind people stages its own plays and playlets regularly for Chicago audiences, learning lines by Braille and finding stage locations by the position of the rugs.

CANADIAN STATIONS READY IN OCTOBER

CANADA'S two most powerful broadcasting stations, each of 50,000 watts, to be located at Montreal and Toronto, will be completed by the Canadian Broadcasting Corporation about October 1st, along with an

WHAT LISTENERS HAVE WRITTEN

To Phil Baker: "We used to have a Phil Baker in this town who ran the lunch cart across from the station and he played the accordion, too. We're wondering if you're the same one, because if so we'd like to claim the honour of being one of your old neighbours."

To Major Bowes: "I was born in Russia, educated in this country and then moved with my family to France. I have travelled extensively in Europe, and am sort of a Spanish harp player. Don't you think you could give me a chance on your programme?"

To Al Pearce of "Watch the Fun Go By": "I want you to do me a favour. My sister is quite a talker, and she is coming to visit us in Miami, and since she has not been to Florida for several years I know she will have lots of visiting to do. Please won't you dedicate your Arlene Harris 'Human Chatterbox' part of your programme to her next week? I'm sure it will be lots of fun and save me much annoyance. Many thanks."

To the Saturday Night Swing Club: "We've been having swing down here for years and years at every neighbourhood party, and as old-timers we believe you'd be even better if you'd add a couple of ocarinas."—Signed, "One Who Knows, Shreveport, La."

international short-wave station designed to transmit Canadian programmes to other parts of the world. Although there are several dozen 50,000-watt stations in the United States, these are the first of such power ever to be built in Canada.

HE FALLS TO RISE!

ANNOUNCER George Watson is never the one to let a horse get the better of him. Thrown on Saturday, he was back on the same horse Tuesday. The horse has complained to C.B.S. officials.

NOT COMPETING!

VIRGINIA CLARK, of "Helen Trent," is getting up these days at 6.30 so that she can make her days longer. She cuts six vases of roses a day from her gardens. Janet Logan, of the same programme, claims that she could do just as well with her dandelions if she had the urge!

GARBO STILL WON'T TALK

GRETA GARBO has just turned down an offer of £1,000 to say a single word into the microphone in a sponsored programme.



Shep Fields, exponent of Rippling Rhythm, which has swept U.S. by storm. He broadcasts regularly with his orchestra from W 3 X A L, the N.B.C. station at Bound Brook, New Jersey.

16-YEAR-OLD STAR

NANCY Kelly, sixteen-year-old N.B.C. actress, who will star with Gertrude Lawrence in "Susan and God," the play to be produced by John Golden in September, played the lead in the True Story Court of Human Relations dramatization recently.

"I Married a Bad Girl" was the title of the True Story broadcast.

MIKE MAKE-UP

ARCH D. SCOTT, producer of the N.B.C. Jamboree, believes that a radio performer seasoned in the theatre, works better on the air if he is in costume or make-up.

"If the radio actor is a beginner," he says, "I believe it puts him on his toes to 'dress up.' Our N.B.C. Jamboree artists get almost as much fun out of building and putting on the show as we hope our visible and invisible audiences get from seeing and hearing it."

Scott—as his co-workers call him—speaks from experience. He started his career in a St. Louis vaudeville house, danced with the Glee Club at Washington University, dubbed around in a comedy vaudeville act, went into amateur producing business with LeRoy Prinz, now a Paramount dance director, produced shows for Shubert when he took over the Municipal Theatre at St. Louis and put out vaudeville acts by the score.

Scott's colleagues credit him with introducing to the stage the "via-light" and "chameleon" lighting effects. The former involves the use of luminous paint to show up in darkness in the glare of a quartz lens spotlight. The chameleon effects are achieved by means of colour vibrations.

TECHNICAL JOTTINGS

Varied aspects of radio discussed from a general standpoint

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

Testing a Set

I WAS examining a set the other day belonging to a friend of mine; it was a mains set, in which something appeared to have gone wrong with one of the H.F. amplifying stages. It was necessary to test the different stages and we soon found the cause of the trouble. But what I want to mention is that when you have a case like this, you should be careful not to pull out one of the valves while the set is in operation or, what amounts to the same thing, to switch on the set whilst one of the valves is removed. If you operate the set with one of the valve sockets empty you are reducing the load on the H.T. supply unit and consequently increasing the voltage applied to the other valves. The extent of this increase due to a reduction of the load depends on circumstances; in some cases it may be relatively small, but in some cases it may be quite large, large enough to cause damage. So you want to remember this, more particularly with a mains set or with an ordinary set operated by means of an H.T. mains supply unit.

Mains Operation

Many people have the idea that a mains set is something essentially different from a set operated with a mains unit. Actually, of course, although there are minor differences, the principle is the same. The mains set derives its H.T. current from a unit which is, for all practical purposes, a mains unit, only in this case it is incorporated in the set itself. At any rate, apart from constructional details, the effect mentioned above is the same in both cases, that is, the voltage delivered varies with the load.

Dropping Resistances

This variation is due in reality to the employment of dropping resistances which are necessary to obtain the different voltages from the one output voltage from the transformer. A more satisfactory, although more elaborate method is to have a number of tapings on the transformer, so that the correct voltages are obtained without the use of dropping resistances. In this case (assuming the regulation of the transformer to be good) there will be very little change in applied voltage when one of the valves is removed and the load consequently varied. But you will see that with dropping resistances there is bound to be a considerable variation. A resistance does nothing until current starts to flow through it, and its effect on the voltage at its extremities depends upon the amount of current flowing through it. A little consideration of the application of Ohm's Law will show you that quite appreciable variations are to be expected when the load is varied, using dropping resistances for obtaining the different voltages.

Variations of Applied Voltage

The same thing does not apply, however, if a high-tension accumulator battery or an ordinary dry battery (assuming the latter to be in good condition, that is, of low internal resistance) is employed instead of the H.T. mains unit. The reason here is simply that the resistance in question is relatively small and so an increase in the current load produces only a relatively small drop in the applied voltage. If an accumulator battery or a good dry battery is used as the H.T. source, then you can check up each stage by removing the valve and connecting a milliammeter between H.T. negative lead and H.T. negative socket.

Filament Life

In the early days of valves when we used to use bright emitters and regulate current by means of a rheostat for each valve, running the valve filaments pretty near incandescence, it was no uncommon thing for a valve to end its life by the burning out of the filament; in fact, that was how most valves finished up.

Since the introduction of dull emitters, however, the burning-out of the filament is a comparatively unusual event, especially as adjustable resistances in connection with the filaments have become unnecessary. When a valve ends its useful life in these days it is generally due to the decay of the emissive power of the filament. Valve manufacturers have devoted a great deal of research work to the problem of producing a highly emissive filament and, what is perhaps even more important, a filament which will maintain its emissivity reasonably uniform over a suitably long life.

Uniformity of Emission

It is no use having a filament which is highly emissive to start with, but which rapidly loses its emission. Far better to have a filament which is not so grand to begin with, but which keeps up a more or less uniform level over a long period, say, the conventional 1,000 hours. The life of the cathode of a valve depends on the running temperature and also its resistance to "poisoning" by evolved gas. In the case of oxide filaments the oxides evaporate, and barium oxide in particular is more volatile than some of the others. The oxide cathode when it fails usually does so because it takes in gas and is so "poisoned." One of the factors which contributes to poisoning is the gas evolved from the electrode system. It is true that we have the "getter" still present, to cope with such evolved gas, but its capacity is limited and it takes only a very little of a gas such as oxygen or carbon monoxide, both of which are readily absorbed by the cathode coating, to poison the emission.

Failure of the Filament

Another factor which influences the life of the valve is the design of the heater
(Please turn to page 431.)

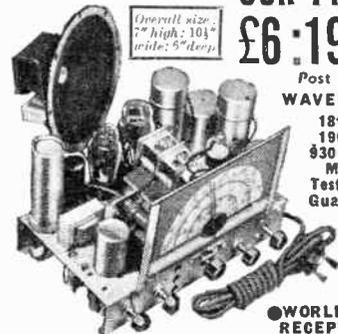
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Overall size: 7" high; 10 1/2" wide; 5" deep.

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18.5-50
190-560
930-2,100
Metres.
Tested and
Guaranteed

● WORLD-WIDE RECEPTION: 18.5-50, 190-560, 930-2,100 metres. ● Illuminated station named wide vision dial. ● Latest 6-valve All-wave Superhet circuit, comprising Variable Mu Frequency Changer, Variable Mu I.F. Amplifier, Double Diode Triode, Output Pentode, half-wave rectifier and Clorostat mains stabiliser valves. ● Separate tone and volume controls. ● Automatic volume control. ● Simple to tune. ● Complete with 6 valves, moving-coil speaker, all knobs, leads and plug. ● Ready to play. ● For A.C. or D.C. Mains 100-260 volts.

A marvellous opportunity! An amazingly efficient chassis and speaker, ready for instant world-wide reception—America, Australia, Africa—with wonderful purity of tone, splendid volume, outstanding sensitivity and selectivity... stations simply roll in. Send your order now... only a few left! 7/6 down secures, balance in 12 monthly payments of 8/6.

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To find the Date

... look at the calendar! Easy! And almost as easily you can discover all causes of trouble in your set if you test with the D.C. Avominor. It is a precision instrument—13 meters in one. Has milliamp ranges for testing all valves; voltage ranges for L.T., H.T., Grid Bias, Mains and Eliminator tests;



Ohms ranges for all resistance tests. Complete in case with testing prods, crocodile clips, leads and instruction booklet.

CURRENT
0-6 millamps
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0-120 "
RESISTANCE
0-12 ohms
0-6 volts
0-120 "
0-240 "
0-300 "
0-600 "

13 Meters in ONE
0-10,000 ohms
0-60,000 "
0-1,200,000 "
0-1 megohms
BRITISH MADE

45%

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USING CLASS B VALVES IN PARALLEL

J. B. (Ben-Rhydding).—*Some weeks ago I saw a circuit in "P.W." using two Q.P.P. valves in parallel. I have tried a similar arrangement with Class B valves, but the result is no better than with one valve.*

Can Class B valves be used in parallel to increase the power?

Theoretically, yes. Practically, it depends on your Class B driver transformer and your output transformer. You see both these have to carry current, in the former there is the driver anode current and the Class B valves' grid current. Incidentally this current will be greater with two valves than with one, and THE POWER THE DRIVER HAS TO PROVIDE WILL ALSO BE GREATER. Thus it may be that your driver valve is not large enough, or that your transformer is not suitable, being saturated with the current that is asked to pass through its primary (whence comes the power for the grid circuit) or the resistance of the secondary may be too great to allow of the correct value of grid current needed by the two Class B valves.

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped addressed envelope must be sent with every article. All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

It must not be forgotten that in Q.P.P. there is no grid current to bother about, so the same input transformer can be used for one, two or more Q.P.P. valves. With Class B the same thing does not hold; for the input transformer has to handle power, and it may be quite suitable for one valve yet totally hopeless when it is asked to handle the power required by two or more valves.

With regard to the output transformer the same thing holds. You must have a transformer that is capable of handling the additional anode current pulses which accrue from the use of two Class B Valves instead of one.

Do not forget that provided the input arrangement is O.K. you will be getting twice the current flowing through the anode circuits of the valves; that is, you will be asking the output transformer to handle twice the anode current swings, and moreover you will be asking your source of H.T. to provide gigantic swings of current.

Where the one valve might take you up to 50 milliamperes, every now and then on a loud passage, your two valves will take you to 50 milliamperes, quite often and the maximum swing now will be in the neighbourhood of 100 milliamperes!

I expect it is the driver valve and transformer that stand between you and success, limiting the energy that is provided to the grids of your Class B valves on loud signals, and that is the time when you would be disappointed with the output power obtained.

Thank you for your compliments, I feel quite bashful about them, and I can only hope that you will find the same satisfaction in this reply as you have in others.

CAN'T BOTH BE RIGHT

A. M. (Crediton) has a new battery with floating specific gravity indicators in it. They show "full charge," yet his own "nine-penny hydrometer" shows "dead battery." He asks which is right, and goes on to say that the hydrometer seems to work all right on his other accumulator and on his car battery.

I should say without doubt that the new battery is at fault, but I am not going to let myself into a row with the makers. So, let's be a Solomon. I

won't suggest that you cut the battery in two, but I do suggest that you take it round to a charging station and get them to test it, and to test your hydrometer at the same time. They cannot both be right, and if the hydrometer has worked properly before with other batteries, it certainly appears as if the new battery has faulty floats in it.

In answer to your other question, it should not be difficult to find a two or three-valve design in "P.W." that will be "foolproof" enough for your family, but a blue print may not be available. As you do not say what you want to enable them to get in the way of stations I cannot recommend any particular set design.

THAT GRAMOPHONE RECORD

In a rash moment I suggested a few weeks ago that a gramophone record that has been charged electrostatically by rubbing with a duster and is therefore collecting dust from the atmosphere can be discharged by touching it at various points with the hand. I have been told by R. D. C. (Romford) that I am wrong, and that as the record is a non-conductor of electricity it will have to be touched all over to discharge it. He says, "if it were possible to discharge the record by earthing it by touching with the hand, the very fact of its being held in the hand would automatically do so."

Very true. But I did not say that you earthed it by touching it with the hand. I am sorry to be so awkward, but what I did say was that the disc should be wiped gently so as not to charge it. Then (as an added precaution) you can touch it on various points and discharge it if you like. The inference being that the record has been wiped so carefully that it holds but the slightest charge on it, if any at all.

But, no matter what the amount of the charge, I have not suggested that the touch of the hand will "earth" the record. No, sir. I suggest running the hand lightly over it, or touching it at various places so that the charge shall be so reduced as to render the record non-attractive to floating dust.

I cross swords with the gentleman who says apropos the charged bar of ebonite that a touch at the charged surface only results in slightly discharging it. It might do so from a purely theoretical point of view, and the rod might still affect a gold leaf electroscope, but I warrant it will not continue to pick up bits of fluff after having been well and truly touched by the hand at the charged point. And when I say touched I don't mean a mere angel's kiss.

If touching it does not discharge it, how does my correspondent account for the sparks which fly across between hand and ebonite when it is touched at the point of charge?

But, as the cat said when it saw the remains of the fish, "I'm not going to pick bones with anyone." Just try the record idea and let me know if it works or not. I have tried it and made it work, but others may not be so lucky. Let's leave it at that.

MORE, PLEASE

W. O. McG. (North Ireland).—*Why do I get a carrier wave all round the dial when I switch on, just as if I was tuned-in to a station's channel? On the application of reaction it sometimes goes away.*

More details, please. I cannot tell you from the above few remarks. What sort of set have you? Does it work normally as regards reaction or does reaction make the stations weaker? If the latter, I think you will find the set is in constant oscillation due to H.F. instability, and that reaction is reversed, and when applied damps out the oscillation and allows some sort of reception to take place after stopping oscillation.

But I cannot let you have any sure answer unless I know more about the circuit employed, and the results the set gives as regards stations, and the quality of reproduction.

MATCHING EARPHONES

A. H. (Southampton).—*Is it necessary to match the impedance of earphones to that of the output valve?*

I have an output valve of 8,000 ohms impedance and the earphones are connected through a 1:1 transformer. Would the phones have to have the same impedance or could ones of 4,000 ohms be used?

I am afraid that you are rather mixing up the actual ohmic resistance of the 'phones with the impedance. The 4,000 ohms phones you mention have a D.C. resistance of 4,000 ohms. Their L.F. resistance or impedance will be much higher, dependent on the frequency of the note being reproduced. For all intents and purposes you will find that the 8,000 ohms valve and the 4,000 ohms phones will be quite a good match.

LUXEMBOURG AGAIN

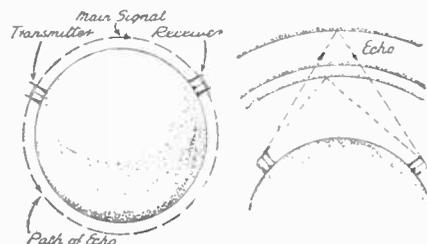
W. P. (Derby) writes in connection with the query published describing complaints from readers of whistles on Luxembourg.

He says, "If your correspondent N. F. (Elgin) would make some inquiries into the different aerials used by the listeners mentioned, it might help you and them and save the rest of your hair! Warsaw 1339 on one side and Leningrad 1293 on practically the same wavelength as Luxembourg will be bound to upset matters. The possible solution to the trouble lies in the direction in which the aerials are pointing: with about 60 degrees difference at least in their positions it is quite possible that while one favours Luxembourg another will favour one of the interfering stations. A change in the direction of the aerial in a case of interference so that the aerial becomes directional to Luxembourg may work wonders. Perhaps your readers will try it."

Perhaps they will. If so, please let me know what happens. Remember that the aerial should preferably be long and low to gain directional properties, and also should be of the inverted L type, with down-lead at the end pointing to the required station.

TECHNICALITIES EXPLAINED—No. 58

Radio Echo



This is the term used when a signal which has been sent out from a station is received twice by a receiving station, or when a signal is sent out by a transmitter and is reflected back to it from some reflecting medium.

Echo devices which reflect radio waves from the sea bed are used to test the type of bed over which a ship is passing, and to determine the depth of the water.

A simple form of so-called echo is that which is sometimes received on short waves by a station which picks up the signal from two different directions—the signal passing round the earth goes the long way round gives rise to the echo.

One of the most famous echos is that known as the Oslo echo. This was received by scientists who projected a radio wave into the sky. They received the reflected ray from one of the ionised layers above the earth, and then received another reflection from some source farther up. This echo has been the subject of much speculation concerning a further layer of ionised gas outside the two known layers—Heaviside and Appleton layers.

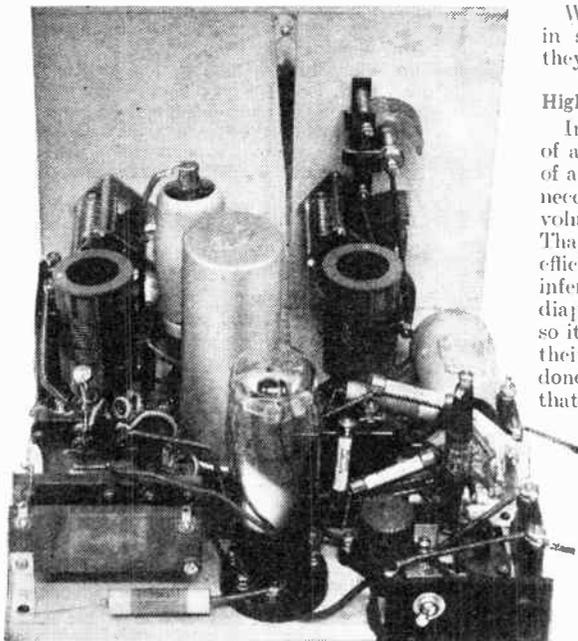
TECHNICAL JOTTINGS

(Continued from page 429.)

cathode system which determines the temperature distribution along the cathode. If the temperature difference between the ends and the centre is great, the ends will become poisoned and the valve will eventually fail because part of the cathode has been rendered useless.

A curious mechanical defect which sometimes develops in a valve is the fracture of the heater of an indirectly-heated valve, more especially when this is of the hairpin type. This is usually due to the fact that the tungsten expands and contracts much more rapidly, when the heater temperature is varied, than the insulator coating which adheres tightly to it. This condition is particularly severe when the valve is switched on and off several times a day, as is often the case. To avoid this defect it is desirable for the coating, instead of forming a smooth shell, to consist rather of

FOR A.C. OR D.C.



The All-Mains "Reacto" in its completed form and ready for connecting up to an existing receiver. This splendid unit is suitable for either A.C. or D.C. mains operation.

a series of beads. Valve-makers have now found out how to put the coating on in this form.

Extra Long Life

Where very long life, say 20,000 hours or more, is required (as in valves used for Post Office telephone repeater circuits), it is essential that the cathode be operated at a relatively low temperature in order to avoid poisoning during life. In the case of these valves the pumping treatment is lengthened to an extent which would be quite impracticable for the ordinary manufacture of valves for broadcast reception. This lengthened pumping treatment is necessary in order to ensure that the evolution of gas in the valve during subsequent operation shall be reduced to the very minimum.

What Size Loudspeaker?

The size of loudspeakers seems to be influenced very largely by considerations of space and is not based entirely on considerations of acoustic efficiency. There has been a tendency for a number of years past to make radio receivers more and more compact, especially since the introduction of high efficiency valves and the extensive use of screening. The compressing of the components of a radio set into a very small compass is, of course, a thing to be aimed at. The same applies to an outfit of any kind: it is no use having it all spreadeagled if you can have it compact without losing too much in other ways.

Compact Modern Sets

By far the largest single component in a radio set is the loudspeaker, and unless this can be reduced very considerably in size the rest of the components are a mere bagatelle. So it may be said that the compactness of the modern set is mainly due to the placing of the components more closely together (which has been made possible by the factors just mentioned), and the reduction in the size of the loudspeaker.

When loudspeakers were reduced in size some people thought that they would lose much in efficiency.

High Efficiency Achieved

In the old days we always thought of a large trumpet or, a little later, of a large conical diaphragm, being necessary in order to get a sufficient volume to fill a good-size room. That was in the days when the efficiency of diaphragms was much inferior to what it is to-day. As diaphragms have been made smaller so it has been necessary to improve their efficiency, and this has been done with such remarkable success that to-day a loudspeaker with a diaphragm of no more than five or six inches in diameter will give results much better than those of a speaker with a diaphragm two or three times that size a few years back.

Those Large Baffles

The main thing to guard against with a small diaphragm is shrillness in the reproduction. Generally speaking, a large diaphragm tends to give a low boomy tone and a small diaphragm a high-pitched one. But, as I say, diaphragms have been so improved that they will give a remarkably uniform response over the required range, and that without anything worth talking about in the way of a baffle plate. I expect many of you remember the enormous baffles, three or four feet square, that we used a few years ago. We would not have had much chance of making a compact portable set if we were tied to baffles that size or anything like it!

Never Really Natural

As regards the boomy tone which used to be so fashionable, people seem to have become "educated" away from this. The boomy tone was never a really natural tone, but it gave an impression of depth and power to the reproduction which some people liked, and so it became fashionable. There was precious little similarity between this kind of reproduction and the original.

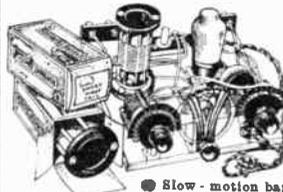
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The N.T.S. "3-in-1" Short-Wave Kit is entirely unique in short-wave technique. This amazing combined Adaptor-Converter-Receiver is offered you for the first time... at an astonishingly low price.

KIT "1" comprises every part for assembly, including 3 4-pin coils, wiring and assembly instructions, less valve only. Cash or C.O.D. Carr. Pd. 25/-, or 2/6 down and 10 monthly payments 2/6. Kit "2." With British valve, £1/8/9, or 2/6 down and 11 monthly payments 2/8. If N.T.S. headphones required, add 7/6 to Cash Price, or 8d. to deposit and each monthly payment.

2/6 DOWN

FREE! Write to-day for free Book-let describing in full, with actual photographs, the "3-in-1" Short-Wave Kit and 4 other entirely new N.T.S. Bargain Short-Wave Kits, and range of Short-Wave Components. SEND FOR BIG LIST OF BARGAIN SETS BY ATLAS, BRITISH RADIOPHONE, B.T.S., K.B., LISSEN, McMICHAEL, PETO-SCOTT AND ZONOPHONE.

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"I think I'll re-
-rive the old
-set."
Said Smith; and
his wife replied
"Pet,
If you wired it
right,
At first, with
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You'd have saved
yourself
trouble, I'll
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MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 418.)

And as he looked about he said, "I'm not frightened that your big steel buildings will stop wireless."

It was on this occasion that he had his first experience with New York reporters. Most emphatically he declared he did not like the ordeal. In fact, it took considerable persuasion to induce him to talk. At last he consented to see the reporters at his headquarters in the Hoffman House. His room was near the skyline, where the noise, turmoil and crowds, which he detested, could not disturb him.

The reporters were quick to observe that he was very sure of himself—a man convinced that he was destined to pass into history, else he could not have been so "glacial" and inflexible despite his modesty.

One news man referred to him as "a serious, somewhat self-centred young man who spoke but little but then always to the point."

"He is no bigger than a Frenchman and not older than a quarter century," wrote a reporter in the news. "He is a mere boy, with a boy's happy temperament and enthusiasm, and a man's nervous view of his life work. His manner is a little nervous and his eyes a bit dreamy. He acts with the modesty of a man who merely shrugs his shoulders when accused of discovering a new continent. He looks the student all over and possesses the peculiar semi-abstracted air that characterises men who devote their days to study and scientific experiment."

That night there was an explosion in the hotel, and there were some who wondered if the wireless apparatus from Europe had anything to do with it. Marconi smiled and with his assistants began to unpack the trunks containing the equipment. One trunk was missing. It contained the coherers and other essential parts. Search by Custom officials was futile. The temperamental Marconi declared he would return to England on the next ship out of New York.

Bradfield, Marconi's chief assistant, recalled that another Comander had sailed from Liverpool to Boston on the same day that the *Aurania* left. He had a hunch that the missing trunk might be on that boat. Robert E. Livingston, a *Herald* reporter, was sent to Boston to search both ship and dock. Bradfield was right; the trunk was in Boston.

Quickly the work of installation proceeded. The Highlands of Navesink in New Jersey was selected as the site of the receiving mast. Lighthousekeepers and Signal Corps men on the lighthouse reservation at Navesink were frankly sceptical.

"When Marconi explained buildings and hills would not interfere with wireless," said Snyder in recalling the event, "the Signal Service men spat scornfully and gazed at the inventor as they would at a madman."

The steamship *Ponce* of the Porto Rico Line and the ocean-going steamer *Grande Duchesse* were chartered, and Marconi installed his apparatus while Bradfield manned the receiving station at Navesink.

Then came the day for the race. Public interest was at fever heat, chiefly due to efforts to keep secret the details of the challenging yacht. The first few meetings ended in a "becalmed" contest because of light winds. Marconi, however, flashed a few bulletins to silence the scoffers. They were sent by wire from the Highlands to the *Herald* office in Herald Square for display on bulletin boards. Broadway in sixty seconds knew what was happening off the New Jersey coast.

The "drifting contests" continued. Marconi was impatient. Admiral Dewey had cabled he would bring his flagship the *Olympia* up New York harbour on a certain day and the metropolis prepared to welcome the hero of Manila Bay. Some one with a news sense suggested "Why not install wireless on a craft and meet the *Olympia* at sea, get the news and flash it back to the Highlands long before the

NEXT WEEK

Chapter VIII

THE FIRST TRANSATLANTIC SIGNAL

A vision at the turn of a century—Marconi as he looked in 1900—Selecting sites for transatlantic tests—Fleming designed the stations—Fessenden announces his high-frequency alternator—Pulsen introduces the arc transmitter—Ships begin to boast of wireless service—Fleming explains the science of tuning—A big station is built at Poldhu—Marconi arrives in Newfoundland—He prepares to make history—Kites hold up the aerials—December 12, important in the annals of wireless—Marconi picks up the first transoceanic signal—Scene of his success—His story of the achievement—The world doubted—What the Press thought about it—Tesla's comment—What Edison thought—Three dots that cost £40,000.

Olympia could be boarded by newspapermen inside Sandy Hook?"

The idea pleased Marconi. An 8-ft. mast was erected on the after deck of a Luekenbach ocean-going tug. The plan was frustrated because Dewey steamed into New York two days ahead of schedule. He had no wireless to report the ship's progress.

Attention was again directed on the *Columbia-Shamrock*. On the day of the first race 2,500 words were sent from the *Ponce* at an average speed of fifteen words a minute. From beginning to end, 1,200 messages, about 33,000 words, were sent through the air.

Eventually the *Columbia* won the series, and by that time Marconi was a national hero. The practical value of wireless at sea and as an agency for quick dispatch of news was apparent. No longer would the sea be a region of silence. No longer would ships sever communication with shore when they pulled away from the

docks. Wireless robbed the ocean of much mystery, uncertainty and death.

Let us return to the steamer *Ponce*, and see how a newspaper reporter observed the inventor:

When you meet Marconi you're bound to notice that he's a "fo'ner." The information is written all over him. His suit of clothes is English. In stature he is French. His boot heels are Spanish military. His hair and moustache are German. His mother is Irish. His father is Italian. And altogether, there's little doubt that Marconi is thoroughly a cosmopolitan.

From where we sat we could hear sounds coming from the chart room, as if somebody in there were striking parlour matches as rapidly as possible one after another. That was Marconi's operator sending *Columbia-Shamrock* telegrams by the Morse code, but without wires to the receiving station at Navesink, many miles away.

The "Beware of Live Wire" sign was excused by the fact that such a wire actually did run from the chart to the top of the mast, where the messages spread out into the air as Hertzian waves, after the fashion that ripples spread in a pond when a stone causes a splash.

"Fine day, Chevalier."
"Thanks," said the Chevalier. "That's the first time I've been given a title in this country. But mister's good enough for me."

"What do you think of New York?"

"Well, America may be all right but New York is simply purse-breaking. A New York cab costs me four times as much as a London cab. I guess I am not unlike tens of thousands of Europeans. I'd like to live here, but I cannot afford it."

Marconi's triumph was overshadowed in the news by the arrival of Admiral Dewey; that was the big story. Then, too, the steamer *Oceanic*, heralded as "the latest wonder and new giantess of the sea," had just reached New York on her maiden voyage. She was the biggest thing afloat, and measured 704 feet! Peary in an attempt to reach the North Pole also occupied columns of space.

There was plenty of news in 1899 other than wireless, the value of which many doubted, but the *Herald* declared: "The possibilities contained in the development of telegraphy without the use of wires are so important that any step tending to bring the system before the public and to show what it is capable of accomplishing in a commercial way must be of interest not only to those interested in science, but also to everyone who sends a telegram.

"The tests stimulate the hope that the man of the coming century may be able to 'halloo his name to the reverberate hills' and irrespective of distance or material obstacles 'make the babbling gossip of the air cry out' in intelligible speech."

The United States Navy became interested in the Marconi contraptions. Wireless was installed on the cruiser *New York* and on the battleship *Massachusetts*. Signals were exchanged up to thirty-six miles and that seemed to be about the limit! The earth's curve was blamed for restricting the range.

The United States Army was interested, too. The Signal Corps established communication between Fire Island and Fire Island Lightship, a distance of twelve miles, and later in 1899 between Governor's Island and Fort Hamilton.

(Continued on next page.)

MARCONI—THE MAN AND HIS WIRELESS

(Continued from previous page.)

England was busy, too. The warships Alexandra, Juno and Europa exchanged messages at sea up to seventy-five miles. Perhaps wireless could skirt the earth's curve after all.

When the sceptics laughed at the feeble signals and derided the thought that from them might evolve a new communication system, competing with the dependable telephone and telegraph, scientists who recognised the possibilities of Hertzian waves smiled and "painted" a bright future for wireless.

Over in England Sir William Preece in a speech, on November 22nd, 1901, reviewed the progress of wireless:

An immense sensation has been caused in these days by the facility we have acquired of transmitting messages across space to ships in motion at great distances.

The completion of an electric circuit through water was effected by Morse in America in 1844, and by Lindsay in Dundee in 1854, and it has been in regular practical use in India, for bridging rivers, for many years. In 1884 the distance to which electrical disturbances upon telephone were conveyed attracted my attention, and I reported the result to the British Association at Montreal.

In 1893, at Chicago I was able to announce the transmission of messages across three and a half miles to Flat Holme, in the Bristol Channel. In 1894 I reported to the Society of Arts that speech had been transmitted by telephone across Loch Ness. My paper ended thus: "If any of the planets be populated (say Mars) with beings like ourselves having the gift of language and the knowledge to adapt the great forces of nature to their wants, then if they could oscillate immense stores of electrical energy to and fro in electrical order, it would be possible for us to hold communication, by telephone, with the people of Mars."

In 1896 Mr. Marconi came to England, and the resources of the Post Office were placed at his disposal for experiment and trial. They were successful.

The conclusion I came to was that while his system was practical, the field for its use was limited. In the navy it would be of great service and in lightship service it might be beneficial, but that it was going to dispense with submarine cables or with poles and wires was quite chimerical.

It is still quite in an experimental stage, but it has attracted an immense amount of attention in connection with the highly successful tour of the Prince and Princess of Wales.

It is impossible to predict what will happen in the twentieth century. Progress is slow; anticipations are wild. Mr. Marconi, personally, is to be congratulated on what he has already done, and everyone wishes him continued success.

For the indefatigable inventor there was much ahead. At odd moments in the solitude of his workshop his thoughts roamed across the ocean. Wireless across the Atlantic! That was a new goal.

"Do you think wireless messages will ever cross from the Old to the New World?"

"I see no reason why it should be otherwise," replied the pensive man from Italy, "providing the transmitter has sufficient power to hurl the waves across the ocean."

And it would take no longer to leap that 3,000 miles than to span the English Channel.

The Atlantic was the slogan of his hopes. Marconi, in the words of Keats: "Doth tease us out of thought as doth Eternity."

MY SHORT-WAVE ADVENTURES

(Continued from page 415.)

my original choke was efficient. My home-made affair worked quite well—but not as well as the original.

Varying Grid-Leak Value

Reading others on the subject, one gathers the impression that a fairly high value of grid leak is desirable for the detector action on short waves. I myself have settled down to a 3-meg. leak connected from grid to positive low-tension; but it occurred to me that possibly the blind spot could be due to just that.

I therefore changed over leaks, using all values from 1 to 5 megohms, and also switched from positive to negative low-tension. The last move certainly made reaction smoother but did not get rid of the blind spot: it simply reduced volume.

It is often implied that blind spots are due to too close an aerial coupling. I don't wish to be dogmatic, but how anyone can get rid of my blind spot with a four-pin coil beats me. No matter how I unscrew that pre-set, it persists.

I am told the only real way out is to use a high-frequency stage as a "buffer" between the load of the aerial and the reacting circuit. My extra set of coils have now arrived, and I am sallying forth with hopes high that at least I shall get "all round the scale" reaction.

Effect of H.F. Stage

I can quite see the point. With a high-frequency stage, the aerial tuning is free of reaction altogether, and the reaction is applied to the grid winding of the detector that follows the high-frequency coupling.

I think I shall start off with a tuned grid coupling, with a high-frequency choke and pre-set between the amplifier and detector. It will be rather odd having two condensers to tune—more difficult, perhaps? This article seems to strike a somewhat negative note, I realise. But from negative results one learns positive facts. Don't tell me about blind spots any more.

Hi, hi!

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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
206	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	Welsh 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		Burghead	"	60
247.3	Lille (Radio P T T Nord)	France	60	400.5	Marseilles (P T T)	France	100
251	Frankfurt	Germany	25	405.4	Munich	Germany ..	100
253.2	Nice Cote d'Azur	France	60	410.4	Tallinn	Estonia	20
255.1	Copenhagen	Denmark	10	415.4	Kharkov	U.S.S.R. ..	10
257.1	Monte Ceneri	Switzerland ..	15	420.8	Rome (No. 1)	Italy	50
259.1	Kosice	Czechoslovakia	10	426.1	Stockholm	Sweden	55
	Scottish National	Gt. Britain ..	20	431.7	Paris (P T T)	France	120
261.1	North National	"	20	443.1	Sottens	Switzerland	300
	London National	"	20	449.1	North Regional	Gt. Britain ..	70
263.2	Trieste	Italy	10	455.9	Cologne	Germany ..	100
265.3	Hörby	Sweden	10	463	Lyons (P T T)	France	100
267.4	Newcastle	Gt. Britain ..	1	470.2	Prague (No. 1)	Czechoslovakia	120
269.5	Radio Normandie (Fécamp)	France	15	476.9	Lisbon	Portugal ..	15
269.5	Moravska-Ostrava	Czechoslovakia ..	11.2	476.9	Trondelag	Norway	20
271.7	Kuldiga	Latvia	10	483.9	Brussels (No. 1)	Belgium ..	15
274	Vinnitsa	U.S.S.R.	10	491.8	Florence	Italy	20
278.6	Bordeaux-Lafayette	France	35	499.2	Sundsvall	Sweden	10
283.3	Bari (No. 1)	Italy	20	499.2	Rabat	Morocco ..	25
285.7	West Regional	Gt. Britain ..	50	506.8	Vienna	Austria ..	100
288.5	Rennes-Bretagne	France	120	514.6	Madona	Latvia	50
291	Königsberg (No. 1)	Germany	100	522.6	Stuttgart	Germany ..	100
296.2	Midland Regional	Gt. Britain ..	70	531	Athlone	Irish Free State	100
298.8	Bratislava	Czechoslovakia ..	13.5	539.6	Beromunster	Switzerland ..	100
301.5	Hilversum (No. 2)	Holland	60	549.5	Budapest (No. 1)	Hungary ..	120
304.3	Torun	Poland	24	559.7	Wilno	Poland	50
304.3	Genoa	Italy	10	569.3	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	Breslau	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
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