

THE "GLOBE-TROTTER" FOR ALL WAVES (See Page 802)

# Popular Wireless

Every Thursday  
PRICE  
3d.

No. 448, Vol. XVIII

INCORPORATING "WIRELESS"

January 3rd, 1931.

*More Stations—  
Less Interference*  
WITH THE  
"NEW-COIL"  
DX UNIT

SEE  
INSIDE

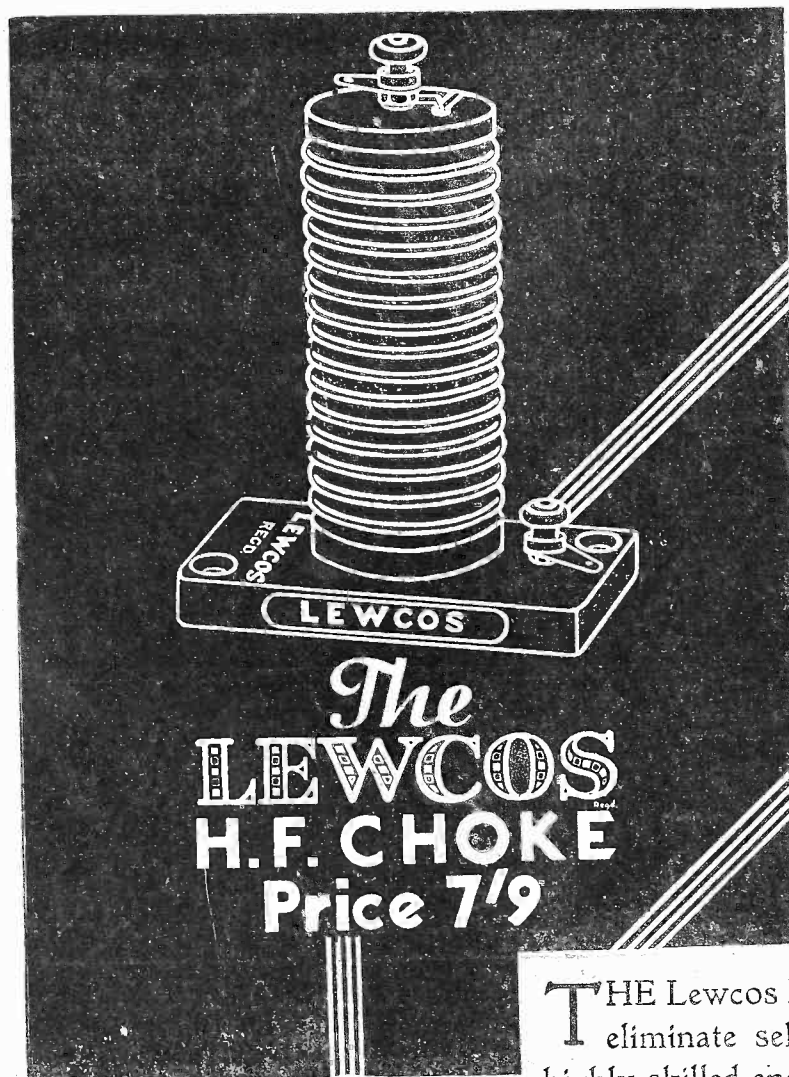
ALSO THIS  
WEEK

THE GERMAN GIANT

All about Mühlacker—the station that you have  
been hearing behind the London Regional Programme.







*The*  
**LEWCOS**  
**H.F. CHOKE**  
**Price 7/9**

**MADE BY  
MASTER-  
CRAFTSMEN**

**T**HE Lewcos H.F. Choke is specially constructed to eliminate self-oscillation. Scientific research by highly skilled engineers shows that this choke can be used with complete confidence in its efficient performance on all wavelengths from 20 to 2,000 metres.

The following are extracts taken from an appreciation by Industrial Progress (International) Limited, Bristol. "... the Lewcos H.F. Choke is, in our opinion, *the most efficient choke we have tested ... and its design places it in the front rank of high-class components.*"

In short, the Lewcos H.F. Choke fulfils its purpose because it is constructed on a scientific basis with the best materials by master craftsmen.

Write to-day for a fully descriptive leaflet Ref. RB33, which shows the choke curves and gives tested values.

THE  
LEWCOS H.F. CHOKE  
IS SPECIFIED FOR THE  
"POPULAR WIRELESS"  
"DX" RECEIVER  
DESCRIBED IN THIS ISSUE.



**LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION**

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E10

# Not a moving coil, but — the *Dynamic* 8

*The Unit which triumphs in every test!*

The Undy 8 pole Dynamic Loudspeaker Unit gives a volume and clarity of reproduction far beyond any other, yet, working on a minimum of power is amazingly economical to run.

This extreme sensitiveness ensures the maximum result from every receiver, however small and removes the necessity of high-power final stage valves, with the consequent saving on power whether from batteries or mains.

Within the few months of its introduction the "Undy" has literally swept the country—pronounced popularity which proves its amazing efficiency.

Hear the Undy at any radio store and realise its pronounced superiority.

Pat. No.  
336930.

Pat. No.  
336930.



# UNDY

# 8

POLE  
*Dynamic*  
UNIT



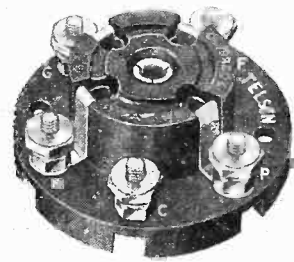
## VIVID REPRODUCTION!



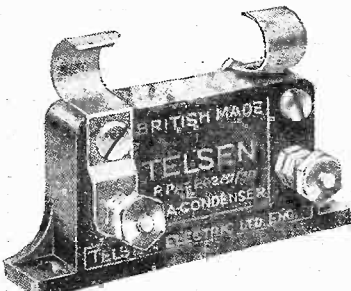
**TELSEN H.F. CHOKES.** Designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in genuine Bakelite. Inductance 150,000 microhenries. Resistance 400 ohms. Price 2/6 each.

Reproduction is astoundingly DIFFERENT when Telsen Components are used! Dull tones sharpen up! Flat voices take on a sparkle! There are a hundred reasons for this DIFFERENCE, the chief being their patented design, embodying many exclusive features, which means that Telsen reliability and vivid reproduction CANNOT BE MATCHED!

See that your Set incorporates Telsen Components!



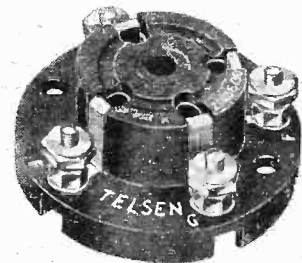
**TELSEN FIVE-PIN VALVE HOLDER.** Price 1/3 each.



**TELSEN FIXED (MICA) CONDENSERS.** Shrouded in genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/50. .0005 supplied complete with Patent Grid Leak Clips to facilitate series & parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.



Advt. of Telsen Electric Co., Ltd., Birmingham.



**TELSEN FOUR-PIN VALVE HOLDER.** Price 1/- each.

**TELSEN VALVE HOLDERS.** Pro. Pat. No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs, whether Split or Non-Split. Low-capacity self-locating, supplied with patent soldering tags and hexagon terminal nuts.

# WHY YOU SHOULD GET

## (NOW ON SALE)

# A MAGNIFICENT PROGRAMME

### "QUEER NOISES."

#### Gilbert Frankau Hits Out at Radio.

"... Take the announcer's voice. If anything, worse than the broadcast music. When I hear it, I want to scream. Oxford accent? The Boxford accent! No one ever spoke like that in the spired city. But I have heard those tones in Borstal. All the Borstal boys use them. Terrible! And listeners—"

I hurriedly changed the subject.

"The B.B.C.?"

"All wrong. Too aesthetic. Rather snobbish. I deplore their attempts to excuse the programmes by saying that they educate the masses. I deplore the way in which they treat the individual broadcaster. Very courteously, but that is not everything. The absurd fees!"

"They ask me to broadcast for thirty minutes, but this means that I have to write the MS., submit it for approval, and pass a microphone test. Practically a day's work, yet for this I am paid perhaps ten guineas. It is not worth it. In a day I could make far more than that. And, to top all, they are even frightened to mention my books because such an act would be a form of publicity. I believe they would have complete anonymity if they could."

"Again, they call broadcasting an art, and have evolved a broadcast drama. I have never been able to follow a word of it. People shouting and a lot of queer noises!"

### THE "TRIPLE TWO."

#### Three Receivers in One.

Whether you are on the mains (A.C. or D.C.), or use batteries as the source of power for your radio set, the "Triple Two" will interest you.

It is a set that has been specially designed in three versions, one for battery working, one for use on D.C. mains, and the third is an all-power A.C. receiver.

In each case the set is complete in itself—it is not merely one circuit "adapted" for various power supplies. It is a complete new design every time, and the result is naturally one of the finest two-valvers ever produced.

The description of the "Triple" Two (in the current number of "Modern Wireless") makes interesting reading, and will be of value to you whether or not you intend to build the set.

### PORTABLE PROBLEM SOLVED.

#### No More Inselective Receivers.

**"THERE are tens of thousands of inselective portable sets in use!**

**"... Those being sold to-day are, on the whole, quite good. It is in the 1929 and earlier**



These fellows are trying to get a glimpse of "Modern Wireless,"—Britain's Best Radio Magazine.

**vintages that you find the worst inselectivity. The Brookmans Park transmitters hit them hard, for the reason that no advantages can be taken of the directional qualities of the frame aerial."**

(The article from which the above is extracted goes on to show how easily many of the worst offenders in portable sets can be cured of the trouble.)

### INTERFERENCE.

"... Ever since... I regularly hear those three clicks on my wireless set at twelve midnight. It happens every night. The dance music from the London station ceases, Big Ben strikes twelve, and then, as clearly as I heard them on the original occasion, and with the certainty of the time signal itself, those three clicks arrive.

"You might say, why do I listen? I can't help it! I am drawn to that radio as a pin is drawn to a strong magnet. My wife has heard these clicks, and so have others, although I haven't told them that it is poor Rowley trying to use the radio ether as a means of communication from the other world."

(A Radio mystery thriller that will hold you spellbound.)

### NEGLECTED NOTES.

"... There are far too many radio-gramophone outfits (home-made and commercial) which, in order to secure what they think is a 'mellow' tone, and in order to pander to the public taste and fancy that electrical reproduction must always be completely free of scratch, cut down the high register so much that in a large number of records the reproduction is really hardly any better than that obtained with an ordinary good gramophone."

"As a matter of fact, I have heard many moving-coil outfits which have been distinctly *worse* than a good gramophone, simply because the brilliance of the record has been destroyed in an endeavour to get what is commonly known as 'moving-coil quality.'"

(The true reproduction of a gramophone record can be obtained if care is taken, as is shown in this "M.W." article that will appeal specially to radio-gram owners).

### A NOVEL SET DESIGN.

Have you ever wished for something a little less conventional-looking than the ordinary receiver, with its plain upright panel and baseboard?

A complete break-away from standard design is always refreshing, and you will find the "L.S. Three" more than comes up to your expectations of a real novelty in radio receivers. The whole thing is built inside an ordinary cone loud speaker, and... but you must read the whole story in "M.W." this month.

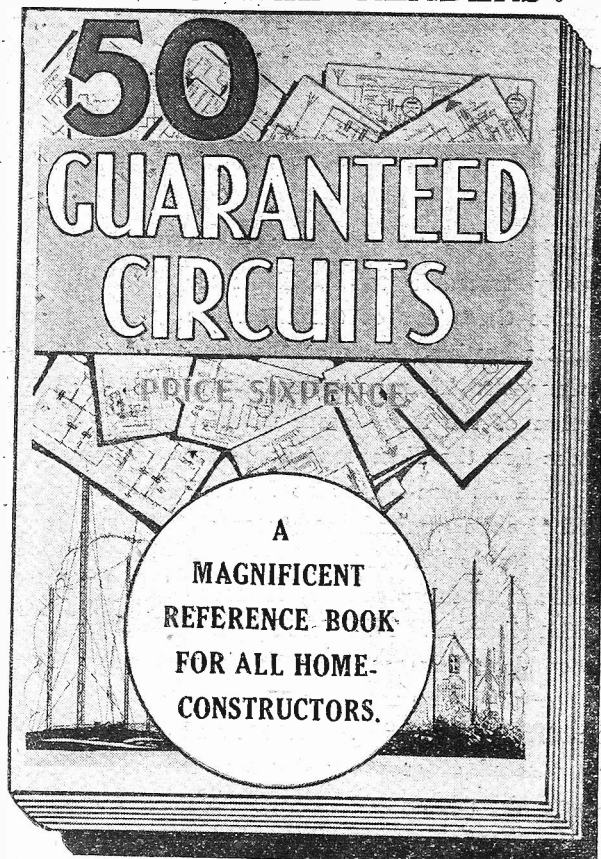


# "MODERN WIRELESS"

(PRICE 1/-)

## FOR EVERY RADIO ENTHUSIAST

**FREE TO ALL READERS!**



Every circuit shown in this remarkable gift-book, a copy of which is presented free with each "Modern Wireless" this month, has been tested under practical conditions.

### IN PASSING

"... On his fifty-ninth birthday Ahab announced that he was fifty-eight years old. Believing this, he began to cogitate a means of improving upon his time-saving notion. Eventually he decided to assume, for purpose of argument, that in order to reach Australia he had really gone right round the globe.

"Clearly this gained him another half day per diem, and he was growing younger! He repeated the process once a year, and when he had actually reached the age of sixty-five he was stating his age as twenty-five! And except for his rheumatics, asthma and lumbago, he might have passed for forty-five.

"Ahab then proposed to speed the process up..."

What happened to this enthusiastic

time saver? How did he fare? Did his scheme work?

You will find the answers to these questions in the current "Modern Wireless."

### DID YOU KNOW?

That Radio Paris had its aerial blown down recently, and had to use a temporary one.

That Budapest is going to have its power increased to 100 kilowatts.

That for greatest strength you should "tap high" on a tapped coil, but you should "tap low" for selectivity.

That Muhlacker-Stuttgart's interval signal (the musical notes C, D, G.) is produced by oscillating valves.

### LOOK AT THIS!

That when drawing up a tuning-curve special attention should be paid to getting known stations marked near the top and the bottom of the dial.

That Heilsberg, the second new German regional, has taken over Königsberg's old wavelength, 276.5 metres.

That Warsaw is using a power of 120 kilowatts—the highest in Europe.

That a new station is to be opened this month at Trieste.

This and other interesting information you will find in—

### —THE WORLD'S PROGRAMMES

A special section of "Modern Wireless" devoted to information about foreign broadcasting stations, how, when, and where to hear their programmes, and hints and tips giving the best methods and sets to employ for "DX" listening.

It is invaluable to the man who wants to get further afield than his own local broadcaster.

### A "STAR-TURN" RECEIVER

A High-Powered Super Set, using the Famous "Star-Turn" Coil.

... Anyone familiar with the results which can be obtained from two modern screened-grid valves in one of the latest circuits must agree that two low-frequency stages are no longer needed for general work.

Therefore the "M.W." Four was designed. It is a super-selective, highly sensitive receiver with wave-change switching, and is ideal for the listener who wants one set to do both for local use and for "DX" reception.

In addition to the "Star-Turn" Coil, this fine receiver employs the "M.W." dual-range coils, and the "Inter-wave" anti-interference system.

### RECENT RECORD RELEASES.

If you have a radiogram receiver, or a gramophone, you will be interested in this



Pointing out one of the finest gift-books ever offered to the public—the Free 50 Circuit Book presented with the January "Modern Wireless."

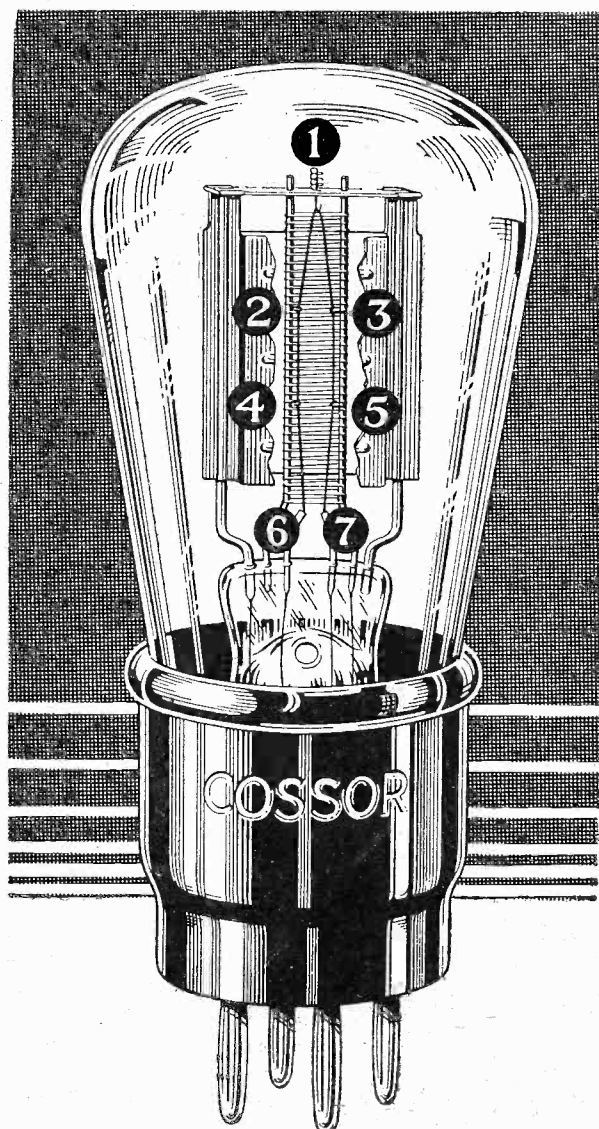
special review of records which have been chosen from among the various makers' lists as holding more than ordinary interest.

This feature is particularly valuable to pick-up users, as the records are chosen also with a view to their special suitability for pick-up reproduction.

These extracts and details will give you an idea of the wonderful variety and value of the fare offered in the Special Gift Number of "Modern Wireless, now on sale. Price 1/-.



# Seven point suspension *definitely prevents* microphonic noises



Cossor 210 DET. 2 volts, .1 amp.  
Impedance 13,000. Amplification Factor 15. Mutual Conductance 1.15 m.a./v.  
Normal working Anode Voltage 90-150. Price **8/6**

*—by eliminating  
filament vibration*

Microphonic noises in a Receiving Set are usually traceable to the Detector Valve. Nine times out of ten the cause is filament vibration. Look at the illustration alongside. This shows the internal construction of the new Cossor Detector Valve. See how the filament is held—not only top and bottom—but also by four insulated hooks spaced at intervals throughout its length. The purpose of these hooks is to damp out any tendency for filament vibration. Therefore by using this “steep slope” Cossor Detector Valve in your Receiver the possibility of microphonic noises is definitely eliminated and you are assured of greater volume with absolute tonal purity.

*We have just issued a novel circular Station Chart which gives identification details of nearly 50 stations, and space is provided for entering your own dial readings. Price 2d. each, they are obtainable from any Wireless Shop. In case of difficulty write us, enclose 2d. stamp and head your letter “Station Chart P.W.”*

**THE NEW**  
**COSSOR**  
**DETECTOR VALVE**

**DEFINITELY FREE FROM MICROPHONIC NOISES**

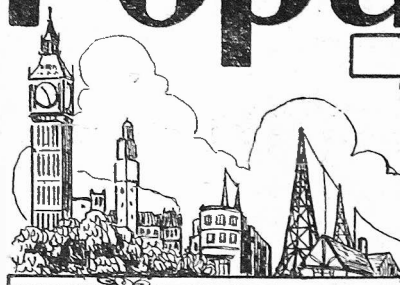
A. C. Cossor Ltd., Highbury Grove, London, N.5.

♡ 7120

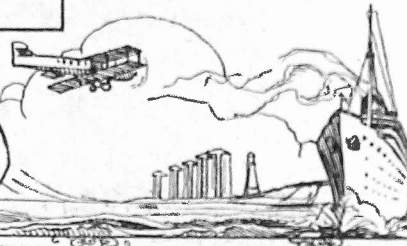


# Popular Wireless

LARGEST NET SALES



Scientific Adviser:  
Sir OLIVER LODGE, F.R.S.  
Chief Radio Consultant:  
CAPT. P. P. ECKERSLEY, M.I.E.E.  
Editor: NORMAN EDWARDS.  
Technical Editor: G. V. DOWDING, Associate I.E.E.  
Assistant Technical Editors: K. D. ROGERS  
P. R. BIRD, G. P. KENDALL, B.Sc.,  
A. JOHNSON RANDALL



N. Y. RESOLUTIONS.  
RADIO DOCTORS.  
METALLIC FRET.  
"SCIENCE & RELIGION."

## RADIO NOTES & NEWS

A B.B.C. RECORD.  
COMIC INTERLUDE.  
ONE BRIGHT SPOT.  
MOORSIDE EDGE.

### My New Year Resolutions.

I FIND that the best method of dealing with this resolution business is to make resolves, on the breaking of which one can look with complacency, even with pride. On this principle, I resolve to listen to as much Chamber Music as I can; to let my set remain unaltered for six months; to criticise the B.B.C. more rigorously; to deny myself Elgar, and to learn Home Brewing. Well, this is the first paragraph of the year, and not the least useful, I hope.

### Radio Doctors.

UNDER the Radio Association's new scheme for the maintenance of wireless receivers, five hundred panel "doctors" have been appointed. I don't know whether the fact that more than 3,000 owners have registered on the "panel" for twelve months ought to be considered a matter for the congratulation of the Association, or a grave reflection on the stability and "foolproofness" of apparatus now in use by the 3,000 or so owners. Am I wrong in asserting that, accidents excepted, a well-made set ought to require no attention except battery renewal?

### "Bouquets, Unlimited."

IF the B.B.C. announcers read the "New York Times" eulogies of them, the air must have been clamorous with the ping of flying waistcoat buttons, sartorial sacrifices to self-satisfaction. Says Noo York, "The British announcers have become the politest and best-informed men in England; at the microphone they are

paragons of decorum and good taste, enjoying the respect of everyone." I wonder how those "best-informed" men like the word "politest." Well, I agree that as a body they are very pleasant radio pals, though there is one, at a station which I will not mention, with a voice like a butcher's mate. But they certainly are not the best-informed men in England.

material is responsible for poor selectivity and may account for the loss of as much as 70 per cent. of signal strength. In the presence of a master I am comparatively dumb. I have my own feeble ideas about this matter, but I will postpone the expression of them until I have recovered. Meantime, I should like to have the views of other readers—if they will be so kind!

Don't forget the portable type of receiver, please.

### MAKING A MESS OF MUNICH'S MASTS!



Munich, the German station which works on 533 metres, has always been inordinately proud of its wooden masts—in fact, they have been copied by Mühlacker and other stations. But the winter gales gave Munich an awful shock, for one night with a roar and a rattle the whole lot came down! A temporary aerial was rigged up in time for the next programme, and now Munich is ruefully ruminating as to whether these wooden masts are so superior, after all.

Ten minutes after writing this paragraph, a London announcer said "awksistrah"—meaning band!

### Metallic Fret Covering.

A FROSTY chit from an anonymous expert whose initials are, he says, W.H.F., though I expect he has juggled with the letters; no address given! W.H.F. states that it is "advisable to inform me that it is incorrect to use a metallic material for covering frets of loud speakers; that such

### Another Exhibition.

IT is announced that the Twenty-first Annual Exhibition of electrical, optical and other physical apparatus will be held by the Physical and Optical Societies on January 6th, 7th and 8th at the Imperial College of Science and Technology South Kensington. Tickets are obtainable from the Secretary, 1, Lowther Gardens, Exhibition Road, London, S.W.1. This exhibition is always of a very high order, and I understand that amongst the exhibits will be some radio apparatus.

### "Science and Religion."

SOME weeks ago I commented upon the agitation which had been displayed by the "Catholic Herald" over the B.B.C.'s talks on science and religion. In effect, I merely expressed my belief that frank discussion by qualified people cannot harm either science or religion. These talks are not intended for babes, nor will babes listen to them; if they did they would not understand them, anyway. But the "C.H." returns to the attack, and deals us a foul blow by referring to "P.W." as "an organ of the B.B.C.," an error which is

(Continued on next page.)



## RADIO NOTES AND NEWS

(Continued from previous page.)

easily demonstrable. We are not an "organ," but a free and independent periodical, published by——. Well, what's an imprint for, Mr. Editor of "C.H."?

### The Apt Reply.

HAVE you heard the yarn about the man who was "listening-in" to St. Martin-in-the-Fields and who switched over to another station for a few moments? He heard a preacher ask: "Where shall we find peace?" Not being in the market for peace just then, he switched hurriedly back, only to hear: "You may obtain it by sending sevenpence to the Vicarage, Trafalgar Square." I have borrowed that one, but I can cap it with the story of the man who heard the fag-end of a sentence in a "talk," namely, "and what of the modern mother?" Hastily switching to another programme he heard: "Long-legged, thin-legged, foolish, vain creature, with marvellous plumage." It was a talk about flamingoes!

### Radio Versus Gramophone.

HOW happy could I be with either! I confess that I read with apprehension a report in the "Daily Telegraph," that a Dr. Vidal of Bapaume (shades of 1914-18)! was jammed, as to his radio receiver, by Madame Leriche's electrically-driven gramophone, and having failed to induce her to revert to the primitive steel spring form of drive, appealed to the courts, and won the day. My grammy is spring-driven, and the curse of that is the necessity of winding. I wish that mine were "on the mains." I wish also that M. Vidal could have married Mme. Leriche instead of setting up such an unfortunate legal precedent. Why should the lady have to crank up every record, and the gent get away with it?

### "The Wireless Constructor."

THE January number of "The Wireless Constructor" contains some articles to which I should like to invite your attention, because, if I mistake not, they are stunners, especially two of them. The first of these sensational items describes the construction of the "Brytacone," a loud speaker which can be made for a little over thirty shillings. Then there is the "Pylon" Three, a unique design in which the cabinet is given the form of a truncated pyramid, but one whose sides slope more steeply than those of the Egyptian "models." You will just love it. And then there is the "Vi-King" Five, a bill-topper, a rip-snorter, a radio-daddy dazzler!

### Comic Interlude.

BEHOLD this specimen of Western method as grafted upon the Bengali mind, from Calcutta to Messrs. .... "Dearest Sirs,—Your ad. in '——', duly noted. The undersigned are chiefest merchants and distributors hereabout. Large sample spaces vacant for British produces unless filled by Holland and American goods. Willing we are to harbour samples of yours produces scree vaves portable specially. No cash for samples f.o.b." Oh, yeah!

### The One Bright Spot.

IN the midst of our general economic gloom the radio trade is the one bright spot. According to recent returns of our exports for the third quarter of 1930 not only was the previous year's total maintained; it was exceeded by the handsome round sum of £10,000. The largest importer from us is Australia, with Holland and South Africa about even as second largest. France, Italy, the Irish Free State, Canada and New Zealand all took thousands of pounds worth. Our exports to Panama during the period were valued at £2.

### Moorside Edge.

CALL it that because everyone else seems to do so. This station ought to be in operation very soon, and I am expecting excellent results. It is interesting to know that its three masts are each higher than St. Paul's Cathedral, and that the

## SHORT WAVES.

### INNOCENT.

Dear old Aunt Agatha is of opinion that those B.B.C. announcers must have acquired their charming delivery from the speakies we hear so much about.—"Sunday Pictorial."

Singer: "I'm afraid I didn't do very well."

Wireless Official: "Oh, that's all right! As a matter of fact, through an error you were announced as 'Zoo imitations.'"

According to reports, a certain Professor is delighted with radio, and he states that nothing gives him greater pleasure than to broadcast.

An unkind neighbour has suggested that it is the only chance he gets of talking without being interrupted by his wife.

"I have a splendid ear for music," said the complacent broadcaster.

"Yes," replied a suffering listener, "but you don't sing with your ear."—"News of the World."

### THIS WEEK'S CONSTRUCTION TIP.

If you connect your H.T. battery to your L.T. terminals you'll wish you hadn't.

A case was recently brought to our notice of a Sydenham woman who fainted whilst wearing headphones.

A member of our Query Department suggests that this was probably the result of an epi-lectric fit.

"I suggest Grand Opera every Thursday night, nothing but Grand Opera from early tea till late supper. And every Thursday night. That would suit me excellently. I am always busy on Thursday evenings and have no time for the wireless."—"Sunday Graphic."

A description of the new B.B.C. headquarters in London says that "Sir John Reith can toss a biscuit against the spire of All Saint's Church."

But why should he, and why a biscuit, and how far will a biscuit carry, anyhow?—"Birmingham Gazette."

area of the buildings almost equals that of Manchester Town Hall. In order to defeat possible droughts the station has a reservoir of 200,000 gallons of water; on the other hand, as protection against frost and ice, arrangements have been provided for heating the aerials. Wave-lengths—Nat. 479 metres and Reg. 301 metres.

### Lighthouse Development.

THE first application of radio to lighthouse work was the "wireless beacon," which sent out automatic wireless signals by means of which operators aboard ship could detect its presence, and thus the ship could steer away from danger. The

latest development is the "talking beacon" which radiates its name by wireless from a gramophone record. This invention is said to be due to the Clyde Lighthouse Trust, which is I think, carrying on nobly the traditions surrounding the Stevenson family and the Northern Lighthouse Board.

### The Absolute Limit.

WE are indebted to the "Tiverton Gazette" for an axiom. "There is a definite limit of range and volume for every set, and no amount of dial twiddling will make a set do work for which it was not intended." That reminds me of the joke I saw recently about the lady who, when buying a set, asked the salesman if he could guarantee it to be good on Beethoven. Or the Irishman, who said that the farther off the sending station is the nearer you have to be to it to get as strong signals from it as you could if it were closer.

### A Wireless Pioneer.

A FEW weeks ago I had the great pleasure of attending a unique function, a presentation of a radio-gramophone as a gift to the first person ever employed by a wireless company, from some of his old colleagues. The gentleman who possesses that distinction has never sought and never received publicity; yet, it is safe to say, he knows more about the wireless business than any man living.

He is Mr. Henry W. Allen, late a General Manager of Imperial and International Communications, Ltd., who has retired but is to act as a consultant to that Company. He assisted the then Mr. Marconi to form the world's first wireless company which later became the world-famous Marconi Company, in the service of which he rose from Secretary to Deputy Managing Director.

### A Famous Exhibition.

FOUR times bigger than ever before the "Daily Mail's" Schoolboys' Exhibition opens at Olympia on January 1st for ten days, from 10 a.m. to 9 p.m. Admission eightpence. How they will get the boys out of the place short of using dynamite I don't know, for this exhibition appears to be designed to attract every kind of human boy ever born, with everything their little egos long for except things to eat. Amongst the attractions for radio enthusiasts and electrical hobbyists generally will be a boat controlled by flash-lamp signals and a wonderful new invention for recording and reproducing sound.

### Looking Ahead.

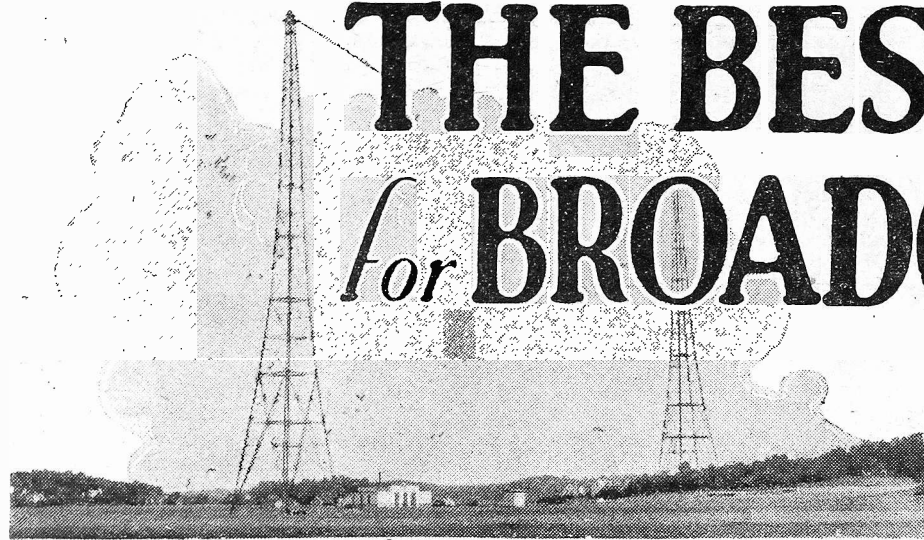
HARDLY have I done broadcasting my good wishes for Christmas than in goes the jolly old quill again, to come up dripping with dittos for the New Year. All consider yourselves duly splashed with the magic ink of "Ariel," which is made of good will, good humour and good temper—all radio-active. May all your circuits be well-behaved and "right first time"; may this year see the advent of the perfect x-stopper, the half-a-crown (good) valve, the aluminium accumulator, the five-pound portable and the millenium.

ARIEL;



# THE BEST WAVE for BROADCASTING

By  
Capt. P.P. Eckersley, M.I.E.E.



I SHOWED in my last article that the best wave-lengths for broadcasting were those which are commonly described as "long."\* This was because we cannot expect to give true service unless the strength of the signal exceeds a certain minimum and unless it is constant. Fading signals are all very well for playing about with, but no engineer can definitely guarantee a service outside the direct-ray service area.

But, say you, broadcasting organisations are, on the whole, rich, and they can surely go on pushing up the power until they obtain their ideal. The wave-length may be bad but "bad workmen complain of their tools, and it's just shilly-shallying not to tackle the problem in the obvious way of increasing power ad lib."

## Fundamental Facts.

Well, the argument's not a bad one at first sight, but help me to help you to remember its more fundamental basis by looking at Figure 1. This figure shows a bit of the world.

It shows the rays going out from an aerial. There is a ground ray G and space waves S.

The latter are reflected (at night) from the so-called Heaviside Layer. They impinge on the earth. Consider a point F.

Here the strength of the signal is made up of two radiations, one ground ray G, the other space waves S. Now S can either help G or oppose it. There is nothing to say which it will do. If S opposes G the total signal will be reduced. If S is then equal to G the total signal will be zero.

## Just as Bad!

Let us say that this occurs at F. Then signals will constantly fade to zero at F. This is what I call the point of intolerable fading.

Now I raise the power of the station tenfold. What happens? Why obviously S increases tenfold and F increases tenfold and the fading goes to zero, and things are just as bad.

We have achieved nothing by raising the power because the space ray cancels our

There is no one in a better position to give authentic facts concerning this fascinating subject than Captain Eckersley, and no one able to present them in a more readable manner.

(2) MORE AND MORE POWER.

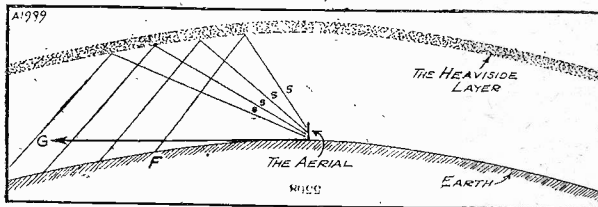
ground ray (at intervals). But if the wave were longer the ground ray is stronger (see previous article). But the space ray strength is independent of wave-length and so the point of intolerable fading is moved further away from the station when the wave is longer and the ground ray stronger.

In fact, the service area is increased independently of the power by using long waves. There is, furthermore, a definite argument against super power on the shorter waves.

Because the space rays are obviously increased in strength with very high power and so produce, as you will see from Fig. 1, great disturbances at big distances yet gain nothing in local service area.

Some quantitative examples may serve to drive the point home. I have calculated that if the Dominion of Canada were to

## TWO KINDS OF RAYS



The longer the wave-length the stronger the ground ray "G." The space ray "S" can either help or oppose the ground ray.

have 25 exclusive wave-lengths between 200 and 550 metres it would be impossible, whatever the power of the stations, to cover more than 8 per cent to 10 per cent of the total area of Canada with first-class non-fading broadcasting!

But if Canada had 25 waves (the same number) between 300 and 2,000 metres, 80 per cent to 90 per cent of the area would be covered!

Again, a 200-metre station using 100

kilowatts in mountainous country would have a service of about 20 miles radius only, but would produce severe interference over an area of ten million square miles!

Dear old quantities—they are the things to count; they are the things to realise, and no amount of qualitative means anything beside the realities of measurement and calculation.

The poor wave-lengths bring about all sorts of troubles with which you are daily brought into contact. Because the service areas are so restricted all the European countries clamour for wave-lengths and more wave-lengths, in order, on its lowest terms, to cover their countries.

## Best in the World.

And they force up the power so as to get, at any rate, a decent strength at the point of intolerable fading. They over-modulate so that all and sundry shall hear their most inadmissible propaganda (for instance, a concert on a Sunday at 7 o'clock).

And you who listen get fringing side-band interference right in your local service area. And you complain. And you are right. But what can we do?

In the European Union of Broadcasters some few of us have worked for years trying to solve the problems. We have not done so badly and it is remarkable to realise that in Europe there is a greater measure of inter-station co-operation and a better standard of technique in so far as it concerns frequency stability than even in the United States of America.

Nevertheless, our situation is pretty bad and relies too much upon an excess of knowledge and goodwill coupled with poor technical facility ever to find its solution in present terms.

## Shall We Change?

That is why the Union is pressing the Administrations to investigate proposals for a revision of international wave-length allocations—a revision based on technical necessity rather than past practice. Let me make it clear at the end of this article that the Union is well aware that its claims are no more or less valid than can be demonstrated in a quantitative way.

No one thinks that all the other claimants can be just swept aside. The Union wants an amicable and just solution. Its case is in some measure quantitatively outlined above. Incidentally, you are concerned vitally. That is why I think a further article may be of interest to you.

\* There is some confusion here—International Regulations class the waves 1,000-2,000 as "medium" waves, we in the broadcasting world call them "long"!



# THE GERMAN GIANT

THE Muhlacker high-power transmitter, the first of a chain of powerful radio stations covering the whole of Germany, has recently started transmitting.

The new station is situated on a hill close to the little town of Muhlacker, midway between Stuttgart and Karlsruhe, from both of which cities the transmitter can be modulated via special land-lines.

The cage-shaped vertical aerial is carried by two wooden masts each about 330 ft. high, placed about 665 ft. apart. A buried network of copper wire is used as an earth.

## On 360 Metres.

The station has not a power-house of its own, but is fed from 15,600-volt, 50-cycle three-phase mains. The H.T. for the plates is produced by rectifiers or high-tension direct-current generators. Generators also supply the filament current; in fact, the station does not use any batteries.

The transmitter is a seven-stage one, having twelve water-cooled valves of the 20-kw. type in the last stage.

The station works on a wave-length of 360 metres (833 kilocycles), the same as that of Stuttgart. The Muhlacker station now provides the programmes of the South-German broadcasting service.

No ceremony was held in connection with the inauguration of the new station, the present tendency in Germany being to waive all festivities.

A special talking film entitled "Der Gross-Sender" (the high-power transmitter) which is a vivid sound picture

Much has been heard of late, both in the Daily Press and also on our radio receivers, of the first German giant broadcaster. The station is situated at Muhlacker, and its inception marks the beginning of the reorganisation of Germany's broadcasting system. Here are some first-hand details of this colossal-powered station.

By OUR SPECIAL CORRESPONDENT.

of the erection of the new station has been prepared by a Stuttgart firm.

Next year Germany is to increase the power of the Langenberg and of the Königswusterhausen stations, and will probably build four high-power stations.

Muhlacker, Germany's first giant, was opened on November 21st, Heilsberg on December 10th, 1930. Muhlacker is actually

on the air with 75 kw., but this can readily be increased to 150 kw.!

Heilsberg will operate during the first few weeks with 75 kw., slowly bringing the power up to the 120 kw. the transmitter is rated at.

Telefunken built Muhlacker, the other big German firm, Lorenz, erected Heilsberg. Both stations have wooden aerial masts—these, of course, are much better than steel masts as far as radiation is concerned, but seem inferior to the metal in the case of stability.

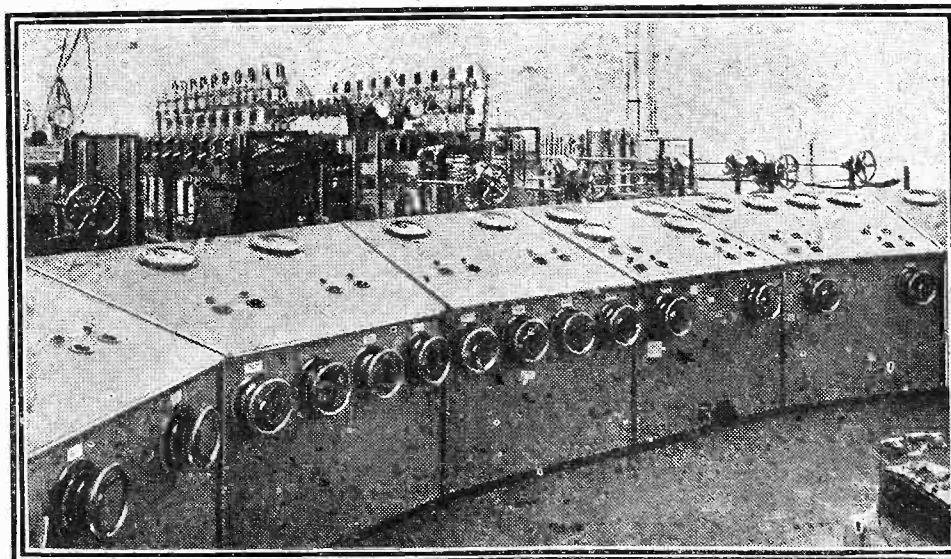
## Following B.B.C.'s Lead.

Munich's aerial masts, only 80 metres in height, were blown down by a storm towards the end of November, and they were of wood—in fact, the first wooden masts ever to be used by a broadcasting station.

Muhlacker is an express train stop between Stuttgart and Karlsruhe, and that is about all there is to be said about the town, except that it has a kind of sister town called Dürrmenz which boasts of a 12th-century ruined castle going by the name of Löffelstolz.

Following on B.B.C. practice the aerial and mast are situated some 200 yards from the transmitter house proper, a feeder line and feeder house connecting up the two. The aerial itself is remarkable for the fact that it is a vertical cage aerial, the tops of the two masts only being connected by a cable, from the centre of which hangs the aerial, ending at the feeder and tuner house.

## THE "DASHBOARD" OF THE MÜHLACKER STATION



The controls and meters of the Telefunken transmitter at Muhlacker are arranged on a number of "desk" mounts, which are placed in a large semi-circle. The operator-in-charge normally sits at a small desk located on the inside of this semi-circle of control panels.

(Cont. on next page.)



## THE GERMAN GIANT

(Continued from previous page.)

The transmitter is very much like all Telefunken transmitting sets: A large hall; on one side a small desk; behind the desk a man; behind him the last amplifier; in front of the desk and the man a large semicircle of controls and measuring instruments, and at the other side of the hall the transmitting gear.

### A Cellar Aerial!

The high-frequency stages are of normal dimensions, with the exception of the last stage, where 20 valves, two of which are reserves, bring the power up to the desired 75 kw.

The transmitter, when not in use, is automatically switched on to an artificial aerial fitted in the cellar, where the otherwise radiated power is transformed into heat. This is a valuable asset for tests and the like.

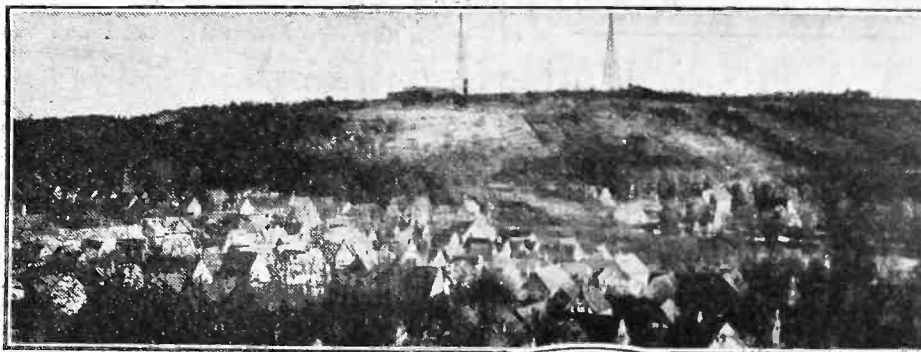
An imposing machine hall completes the layout of the station. Only half of it is occupied at the moment, space having been left for the necessary machines if the power requires increasing.

The Strasbourg station, although operating on very much smaller power, is only some 50 miles away from Mühlacker, and the wave separation is but 36 k.c.

### Will Strasbourg Shift?

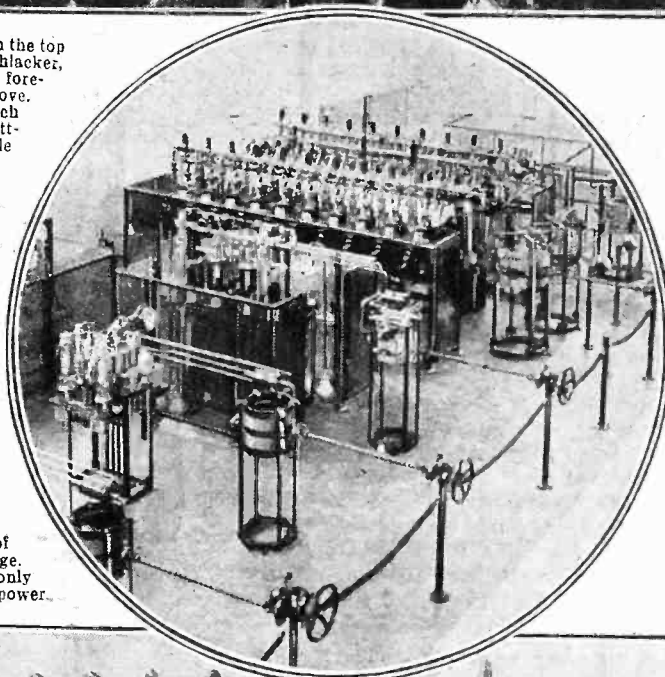
Should this prove insufficient, I understand that an agreement exists to the end that Strasbourg will then exchange waves with Bordeaux Lafayette, to prevent mutual interference. Of course, selective sets can keep them apart, but local Strasbourg and local Mühlacker listeners with older apparatus may find it difficult.

The station is situated up on the top of a hill, and there is clear space on all sides.

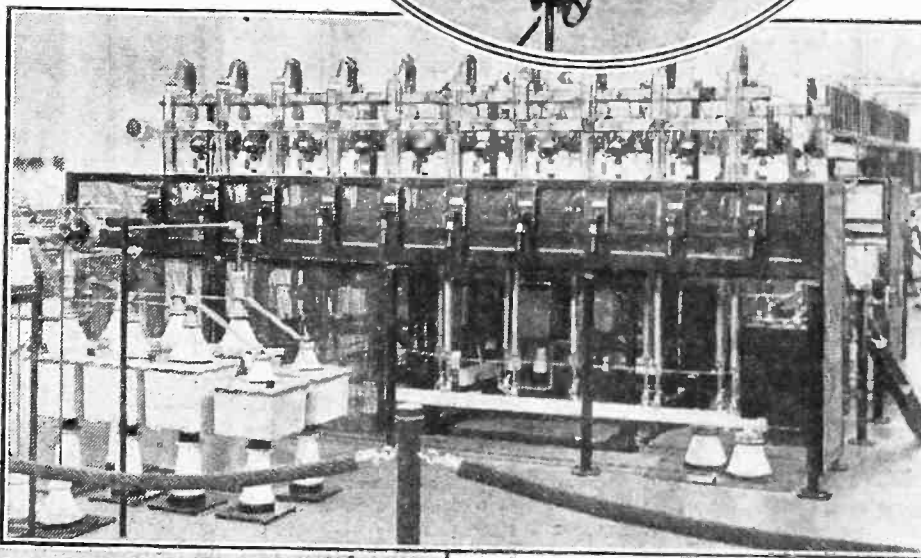


The new station is situated on the top of a hill just outside Mühlacker, which can be seen in the foreground of the photograph above. The masts of the station (which is about midway between Stuttgart and Carlsruhe) are visible on the horizon.

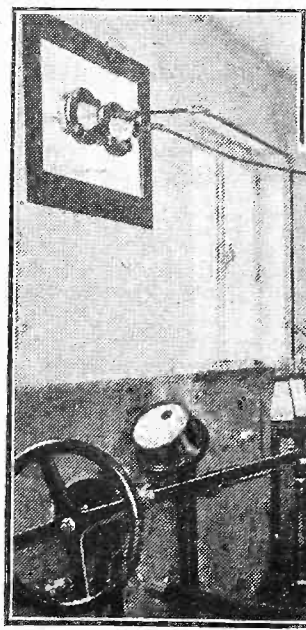
### SOME VIEWS OF GERMANY'S FIRST REGIONAL STATION.



On the right is a general view of the powerful transmitter, which is of the seven-stage type and has twelve water-cooled valves of 20 kw. in the last stage. Normally the transmitter is only working at about half its full power.



### NOT A SINGLE BATTERY IS USED



A close-up view of two of the "steering-wheel" type controls, which make the very accurate adjustment of condensers, inductances, etc., an easy matter. The wheel on the right adjusts a rotor inside the heavy inductance seen just behind it. On the right, above, is a view of one of the large banks of transmitting valves, with their associated condensers in the foreground.

The earth system's network of wires is buried below the surface of the ground immediately underneath the aerial.

400 kw. must be put into the transmitter if 75 kw. is to be radiated by the aerial.

### Some Interesting Experiments.

As Stuttgart always was one of the most enterprising German stations, I am sure listeners all over the place will be found tuning their sets to Mühlacker's wave to listen to interesting experiments such as the Christmas broadcast consisting of Bandoeng, Schenectady, and Mühlacker, via the German S.W. station, all having a chat together.

## LATEST BROADCASTING NEWS.

## THE OPERA WAR

SIR JOHN REITH'S SPEECH—  
CEREMONY OF THE KEYS—  
FISH STORIES—ETC.

THE Opera Subsidy War continues unabated. Not even unemployment itself has stirred up such keenness and political controversy in recent months. Over seventy questions with a hundred supplementary follow-ups were put down in the House of Commons.

Most of them were addressed to the Chancellor of the Exchequer, who passed them on to the Postmaster-General. But the Prime Minister got a good share. Even in the World War there was an unofficial Xmas truce in the trenches, at least in 1914.

But there is no Christmas truce in the Opera Subsidy War. On the one hand, the Government is determined to establish the important precedent of State support for artistic enterprise; on the other hand, political "Opposition" discovers in the proposal what it regards as a heaven-sent opportunity to embarrass Downing Street.

The B.B.C. stands in the middle and, so far, has not been heavily engaged. There are signs, however, that Savoy Hill is not as desperately keen as is generally supposed. One thing is certain, and that is, that if, for one reason or another, the Parliamentary subsidy is withdrawn, the B.B.C. will not "carry the baby" for longer than two years.

## Sir John Reith's Speech.

The success of Sir John Reith's recent address at the Aldwych Club calls attention once more to the infrequency of the public appearances of the Director-General of the B.B.C. This is a pity for more reasons than one.

Sir John is very much at home on the platform. He has consummate ability in adapting himself to his audience, in arousing and maintaining attention. Therefore, he is naturally a valuable advocate and exponent of policy. This asset has been largely wasted by the B.B.C. Sir John hardly ever speaks in public, and still less before the microphone.

## The Ceremony of the Keys.

That good old stand-by of outside broadcasts, the Ceremony of the Keys, has a place in the National programme on Thursday evening, January 15th. For those new listeners—and there are lots and lots since "The Keys" was last broadcast, because the licence figures are still going up by umpteen thousands every month—we might just mention that the ceremony is performed nightly at the Tower of London, as it has been done for hundreds of years back into history.

It begins at about 9.50 p.m. when the chief warder meets his escort at the Bloody Tower, from where they proceed to the Visitors' Entrance Gate on Tower Hill, which they lock and then return through Middle and Byward Towers, locking each in turn. Back again at the Bloody Tower, the chief warder and escort are challenged and then proceed to the Main Guard, the Guard and escort presenting arms, and the

warder, raising his hat, calls "God Preserve King George," after which the drums and fifes play the National Anthem and the "Last Post."

This quaint link with mediaeval times makes a truly impressive broadcast; the tramp of feet through old corridors and the enacting of ceremonial, so remote from present times, unfailingly stirring the pride of all Englishmen through our glorious traditions.

## Fish Stories.

A bright spot in the New Year programmes for Scottish listeners is the gathering of fishermen at the "Anglers' Tryst," on Thursday, January 8th, when stories of "whoppers," caught and missed, will be

told by the most truthful of all true sportsmen. It should make a good broadcast this gathering arranged ostensibly for anglers "to give voice to their hopes for the approaching open season."

## Broadcasting a Circus.

For some reason or other circus performances have always been more popular in the north than in the south, although the great annual show at Olympia rather tends to demonstrate that this form of entertainment is recovering its prestige among Londoners.

It is perhaps a little difficult to visualise a successful broadcast of a circus, but northern listeners voted a relay from the Tower Circus at Blackpool, which took place in October, to be among the most enjoyable programmes of the whole year.

It was, therefore, only to be expected that the North Regional headquarters would take the first opportunity of putting on a similar entertainment, and this will be done on Saturday, January 10th, when the microphone will be on duty at the Belle Vue Circus, Manchester.

Mr. George Lockhart, who has spent practically the whole of his life in the sawdust ring, will take part; and Doodles, the Clown, is also expected to be very much in evidence.



**COMING SHORTLY**  
A new and exclusive series called  
**"BEHIND THE MICROPHONE"**  
HITHERTO UNPUBLISHED DETAILS!  
Written expressly for  
"P.W." Readers  
by  
Capt. P.P. ECKERSLEY  
**NEXT WEEK**  
"THE OUTER CIRCLE"  
AND  
"THE "P.W."  
"SUPER-COIL" THREE

## FOR THE LISTENER.

By "PHILEMON."

A chat about broadcasting, persons and programmes, with frank comments on the fare provided and the way it is served up.

## About the Amateur.

THE complaint is made against the B.B.C. that it is "amateurish." The word has fallen in popular usage from a high estate.

The "amateur" originally meant the "lover"; it now means something like "eager incompetence" or "rash experiment." It ought to be a word of praise; but it has become a word of derogation.

On the lips of many it is a half-veiled sneer. Yet the amateur represents the inquiring, experimenting mind; a vital rather than a technical tradition.

He works in the spirit of play. He is freer-handed, because his motive is simpler, than the professional. He is the salt of all the worlds, from the world of sport to the world of science or art.

## Ten Years Ago.

Broadcasting is not yet ten years old. From the first it was an amateur affair.

As a method of entertainment, it was taken up and worked by amateurs. It is

questionable whether it would ever have been taken up by professionals. Professionals are, as a rule, chary of an untried thing.

The professional's first question is, "Will it pay?" The amateur's first question is, "Will it be an interesting and amusing thing to try?" If broadcasting had waited upon the professional entertainers it would probably have been waiting yet.

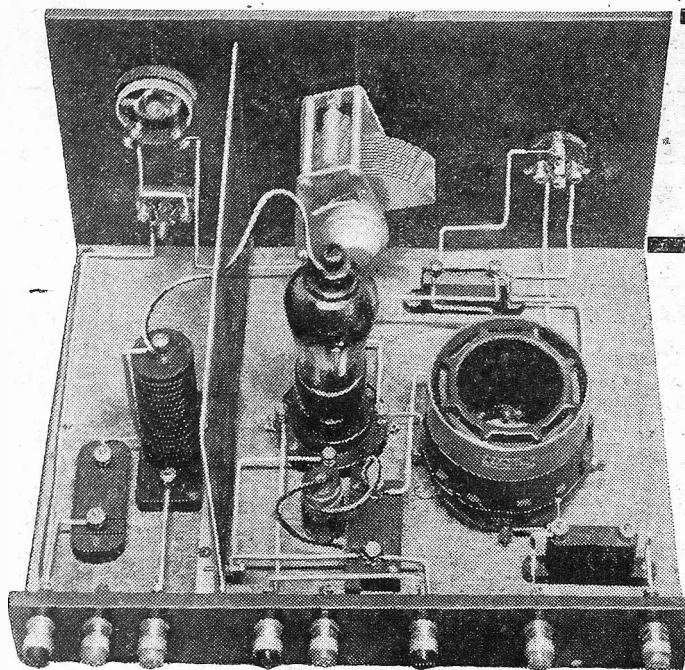
They have so many other interests to consider. So it fell into the hands of amateurs. From all accounts, they had a hard time, but quite an amusing time.

Their mistakes were innumerable. They laughed at their mistakes. They were willing to learn—which is the mark of the amateur.

The professional has no need, to learn, for he is the one who knows. These broadcasting amateurs had a new instrument, one might almost call it a new toy; they had a new medium, and a new world before them.

(Continued on page 816.)





## THE NEW-COIL "DX" UNIT

### MORE STATIONS—LESS INTERFERENCE.

That is what this wonderful little wave-change unit gives you. Just add it to your receiver, tune in, and you immediately find you can reach out between the powerful transmissions and bring in those distant programmes you have so long wanted to hear. Simple to build, cheap and efficient, the New-Coil "DX" unit includes the new "P.W." wave-change coil, and is a real distance piercer.

Designed and Described by the "P.W." Research Department.

enables you to cut right through the interference from the local station and get the foreigners, clearly and without "jamming." Thus it gives

you the other essential for successful "DX" reception.

### Adds An S.G. Valve.

So, you see, its name does indicate pretty clearly what this unit is and does. To sum up, it is an instrument containing a complete stage of high frequency amplification, using a screened grid valve, and designed

**FIRST**, just a word about the name of the unit we are going to describe, because that will tell you exactly what it is and what it does:

The abbreviation "DX," as everyone knows, refers to long distance reception, but it is rather strange that nobody seems to know exactly how it originated. It was certainly in common use very many years ago as a recognised operator's abbreviation in the American telegraph service, and now it is employed by amateur wireless transmitters the world over, and that is about all we do know.

Never mind the derivation, however, for its meaning is what matters at the moment. It is always used nowadays to mean "long distance," and so it comes in most appropriately as a name for the remarkable little unit you see illustrated on the pages of this article.

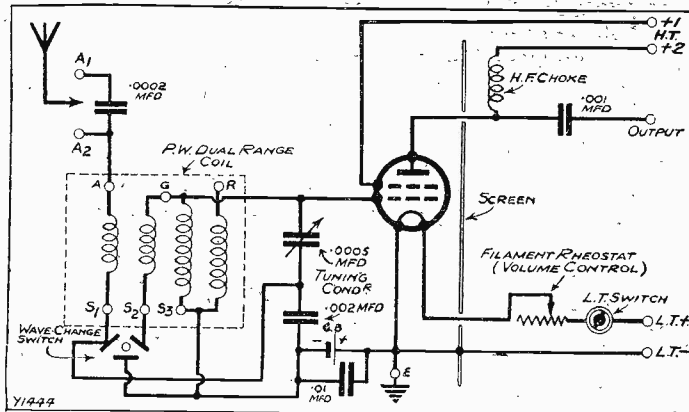
What that unit will do is plenty, to lapse for a moment into the lingo of the talkies, but in brief its function is to give your set the two qualities which are absolutely essential for real genuine "DX" work.

### It Fetches the Foreigners.

First of all, it adds the tremendous sensitivity of a hard-working stage of screened grid H.F. amplification. That means that it gives you the power to get not merely dozens of stations previously out of reach, but also to get all distant stations more easily and reliably and with better quality because you are no longer so dependent upon exactly the right adjustment of reaction.

Secondly, it produces a very great increase in the selectivity of your outfit and so

### A SIMPLE CIRCUIT WITH SUPER POWERS



The New-Coil "DX" unit employs the new "P.W." wave-change coil and gives you not only more stations, but greatly enhances the selectivity of your set, thereby decreasing interference.

so that it can be connected up very easily in front of your existing receiver.

More accurately put, it is connected between the aerial and your set, so that it takes the signals as they come down the aerial, amplifies them up, and sorts them out from any interference, and then passes them on into the receiver proper.

It is not a complete receiver in itself, of course, and must always be used in conjunction with one. Note, too, that it is intended for use *only* with sets which do *not* already incorporate a screened grid valve.

### Tip-Top Tuning.

In other words, it is to be used only with sets of the detector or detector and one or two L.F. type. Do not try and add it to sets which already have a stage of high

### WHAT IS IN IT?

- 1 panel, 12 in. × 7 in. (Lissen, or Goltone, Red Seal, Paxolin, etc.).
- 1 cabinet with baseboard 10 in. deep to fit (Cameo, or Osborne, Lock, Pickett, Kay, Digby, etc.).
- 1 .0005-mfd. tuning condenser (Polar, or Lotus, Lissen, Dubilier, Ready Radio, Igranie, Formo, Burton, J.B., Ormond, etc.).
- 1 3-contact push-pull switch (Bulgin, or Ready Radio, Ormond, Magnum, Wearite, Keystone, Red Diamond, etc.).
- 1 L.T. switch (Goltone, or Igranie, Lissen, Benjamin, Ready Radio, Keystone, Bulgin, Wearite, Lotus, Red Diamond, Junit, Pioneer, Magnum, Ormond, etc.).
- 1 Fil. rheostat. (Wearite, or Lissen, Igranie, etc.). (See text.)
- 1 "P.W." Dual Range Coil (Wearite, or R.I., Ready Radio, Parex, Goltone, Magnum, Keystone, etc.).
- 1 .0002-mfd. fixed condenser (T.C.C. or Telsen, Lissen, Dubilier, Ready Radio, Mullard, Igranie, Ediswan, Ferranti, etc.).
- 1 .002-mfd. fixed condenser (Magnum, or Lissen, etc.).
- 1 .01-mfd. fixed condenser (Lissen, or Telsen, etc.).
- 1 .001-mfd. fixed condenser (Dubilier, or Telsen, Lissen, etc.).
- 1 valve holder (W.B. or Telsen, Igranie, Lotus, Benjamin, Lissen, Clix, Bulgin, Junit, etc.).
- 1 H.F. choke (Lewcos, or Ready Radio, Telsen, Varley, Igranie, R.I., Parex, Keystone, Magnum, Wearite, Watmel, Dubilier, Lotus, etc.).
- 1 Standard "P.W." Screen 10 in. by 6 in. (Ready Radio, or Parex, Magnum, Keystone, Wearite, etc.).
- 8 Terminals (Belling and Lee, or Igranie, Clix, Ealex, etc.).
- 1 terminal strip, 12 in. × 2 in. Flex, Wire, screws, etc.

frequency amplification on board, for you are not likely to get very satisfactory results in such cases.

Subject to that one limitation it represents a fine way of adding enormously to the range, power and selectivity of your outfit without going to the expense and trouble of building a new and bigger receiver.

To understand how very efficiently it performs this duty you must observe that not merely does it exploit the possibilities of the screened grid valve as a powerful out stable H.F. amplifier, but it incorporates the new "P.W." high-efficiency dual range coil.

That means, as you probably know, that it has really tip-top tuning circuits, which  
(Continued on next page.)

## THE NEW-COIL "DX" UNIT.

(Continued from previous page.)

make the very most of every incoming signal and give you very fine selectivity as well. Needless to add, it also gives you wave-change switching in its best and most

up-to-date form, so that at a touch upon a single knob the unit goes over from medium to long waves and vice versa.

Even if your receiver is of the older type in which you have to change coils to do this, the wave-change switching in the unit is a great convenience. It means that when you have added the unit to your set you have not added to the coil-changing nuisance with which you have had to contend all along.

What's more, we fancy that when you have discovered what a convenience our switching scheme is, and how completely efficient on both wave-bands, it will not be long before you incorporate a new coil in your receiver also. It is usually very easy to do so, and you can be pretty confident that it will send up your general efficiency quite a lot.

Now to get down to details. The first thing you will discover from the circuit

### NOTHING MUCH IN IT—BUT PLENTY COMES OUT!

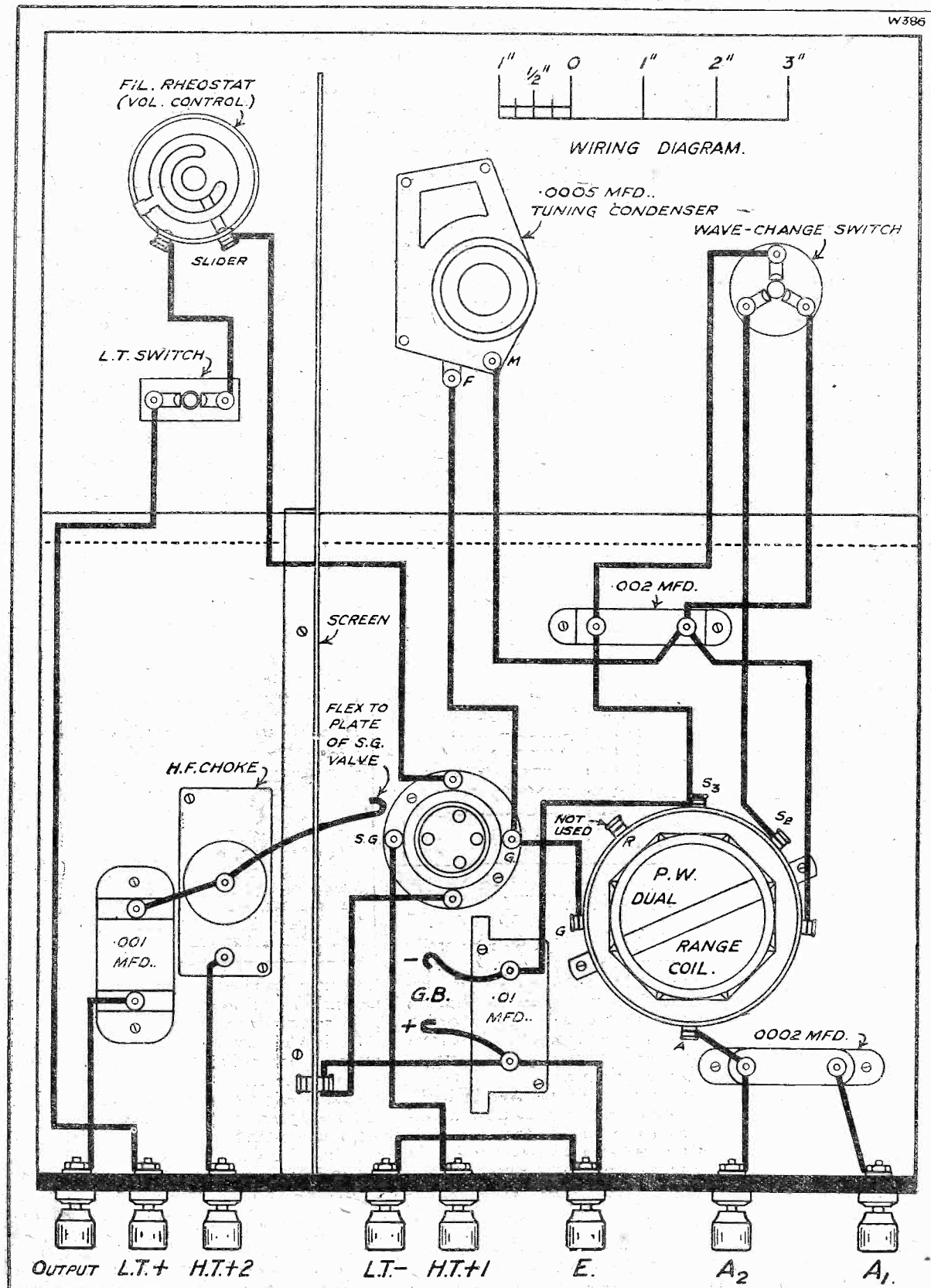


diagram is that the "DX" unit is remarkably simple and contains very few components, so that it is correspondingly easy and simple to make, and not at all expensive.

#### Very Easy

It consists essentially of the standard P.W. "dual range" tuning and aerial coupling arrangements, followed by a screened grid H.F. amplifying valve. The latter has just the usual "parallel feed" type of output circuit which passes the amplified signals across to the receiver.

The constructional work is proportionately simple, and starts with the drilling of the panel to take only four components. These are the tuning condenser, wave-change switch, on-off switch and volume control.

The latter takes the form of a filament rheostat operating on the S.G. valve, and it is to be noted that this should be of a resistance suited to the filament voltage of the valve you are going to use.

#### Economy

For the most satisfactory and effective control it should be of 10, 12 or 15 ohms for a 2-volt valve, and from 30 to 50 ohms for 4 and 6-volt types. It is chiefly for use on the local station, and some sort of control is most important if this is to be received with good quality when an H.F. stage is at work.

Of course, an easy way out of the difficulty, and one which will appeal to those who must economise current strictly, is

(Continued on next page.)

There is nothing very much (except efficiency) in the unit, is there? And yet what a tremendous amount can be got out of it!



## THE NEW-COIL "DX" UNIT.

(Continued from previous page.)

just to cut the H.F. unit out of circuit when receiving the local.

To do so, just put the L.T. switch on the unit to "off," take the aerial lead off its terminal on the unit and put it back on its old point on the receiver. This is easy enough, but may be a bit of a nuisance at times, and so we have provided the volume control.

To use it to the best advantage it should be supplemented by a little judicious

cient in many cases, however, more particularly on long waves, so give it a trial. You may find you will still get all the selectivity you need if you are not too close to your local station.

Next connect up to the batteries, noting that there is no terminal for H.T. negative, because then you will be using the same H.T. and L.T. batteries as for the receiver. This means that H.T.— and L.T.— will already be joined together by the wiring of the set.

### Some Final Hints.

To terminal H.T. +1 apply 60 to 80 volts, adjusted later for the best volume. This is best done on the weakest distant station you can find.

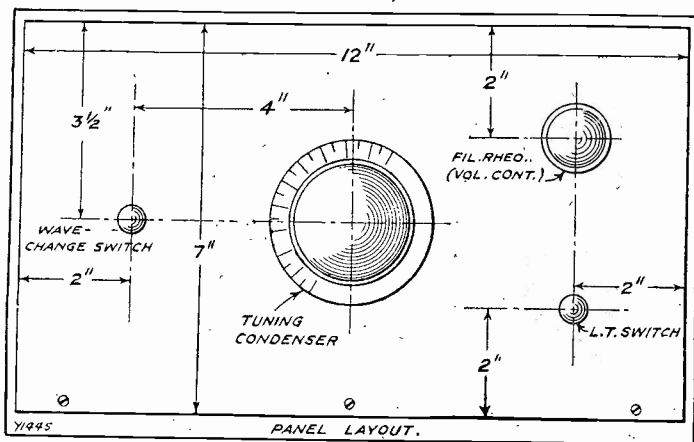
Then on H.T. +2 put 120 volts, or more up to 140 volts if you have it available. On

no account try to use a lower voltage here, or your S.G. valve will be unable to give anything like its full amplification. This is a most important point, and one over which many beginners go wrong.

Now there remains just one more connection. Join "output" on the unit across to the old aerial point on your set, and you are ready to switch on. (The S.G. valve is already in place, of course.)

This lead should be short and direct and well away from all other connections. If your receiver has more than one aerial terminal, try the lead on each in turn in search of the most suitable one.

### EASY TO TUNE, ISN'T IT?



The handling of the unit is simplicity itself, and the volume control is a very useful refinement.

detuning on the unit and on the receiver. Like this: first cut the volume right down with the rheostat and tune in the local fully on both receiver and H.F. unit.

Next, shift the H.F. unit dial upwards a little and the receiver dial downward (or the other way about. It doesn't matter which). This will cut the volume down still further, so now bring it up to the desired level with the volume control and the adjustment is finished.

### No Need for Soldering.

To complete the constructional work you have just to fix the screen and the various components on the baseboard, fit the terminal strip, and wire up. None of these operations will take you very long, and you will find the lay-out is one which produces particularly simple and easy wiring.

Note that as in all "P.W." designs matters have been so arranged that there is no need for soldering in the wiring-up process. All connections can run between points provided with terminals, and perfectly efficient wiring will result.

Now supposing that the unit is finished, and ready for its first test, this is how it should be hitched up. Place it close up against the left-hand end of your receiver for a start.

Next take the aerial and earth leads off your set and connect them to the terminals on the unit. Put the aerial on A<sub>1</sub> for normal use, but try it also on A<sub>2</sub>.

### Connecting Up.

When it is on this latter terminal you get a trifle more volume, but the selectivity of the unit is reduced. It may still be suffi-

## RADIO ODDS AND ENDS

Copper-plated steel screws are now available to constructors, and being rustless they have many advantages.

Gramophone enthusiasts should make certain that pick-ups are tracked properly, or otherwise they may tear up the grooves on the records in a very short time.

Any type of wireless set with two good low-frequency stages is suitable for radiogram work. But if your set is of the detector and one L.F. variety you need to choose a very sensitive pick-up to get sufficient volume for good gramophone reproduction.

## A CONDENSER ECONOMY

**M**OST constructors know by bitter experience that the only safe thing to do with a dud condenser is to throw it straight into the dustbin.

If a misplaced sense of economy causes a broken-down condenser to be put into the junk box for possible further use, instead of discarded altogether, the probability is that its delinquencies will be forgotten, and some day it will be included in a new set once again. Here it will give rise to the same old trouble, and thus the experienced experimenter gets into the habit of discarding a bad component altogether.

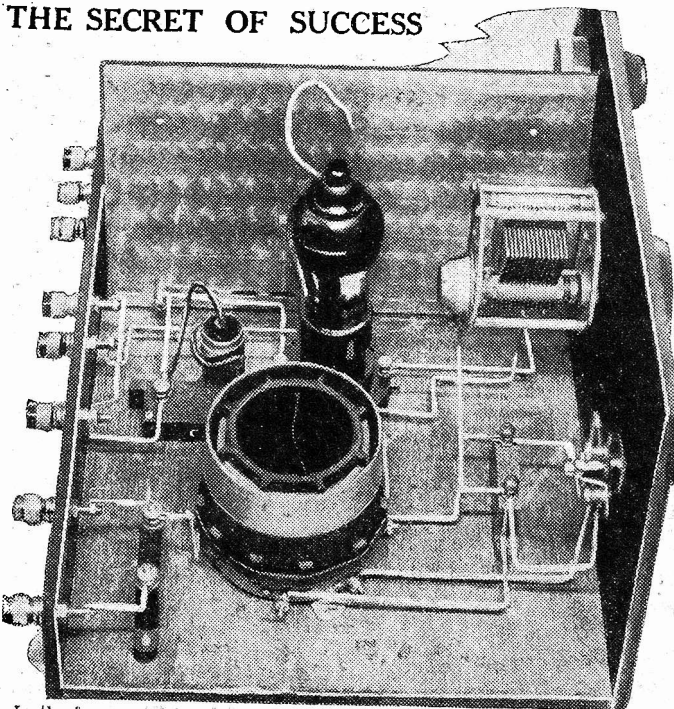
An exception can often be made in the case of aluminium encased large fixed condensers. The writer recently traced an annoying crackle to a breakdown in one of these in his mains unit, and was about to scrap it when curiosity compelled him to open the case to see inside.

It was a 4-mfd. condenser, and it contained four separate 1-mfd. blocks, connected in parallel. Obviously one of them was faulty, but possibly the other three were good, so tests were made, and three out of the four 1-mfd. units were salvaged from the wreck and saved from the dustbin.

### Look Inside.

They could, if desired, have been used as three separate units, suitably mounted. But as a matter of fact they were all three joined up in parallel again, placed in commission in their original position in the eliminator, and they carried on there just as well as the 4-mfd. had done previously, representing a saving of several useful shillings!

## THE SECRET OF SUCCESS



In the foreground is the secret of the success of the "DX" unit—the new "P.W." coil, which gives selectivity and sensitivity all in one go.

And then it will not be long before you begin to find new stations rolling in at a volume that cannot fail to delight you.

## UNCLE SAM IS PLEASED WITH OUR B.B.C.

By THE EDITOR.

"The British listener lacks none of the good music that we in America must pluck from a heavenful of trash . . ."

AN article on broadcasting in a well-known American magazine, "Current History," contains some striking tributes to the B.B.C. system—so striking indeed, that the whole staff at Savoy Hill will probably have a prolonged fit of blushing when they read the article. American broadcasting methods are compared unfavourably with ours; in fact, the critic who wrote the article is most unkind. He says: "The whole great commercial system of broadcasting has brought us programmes that, for the most part, tickle the tastes of the mentally deficient."

### "Huge Intellectual Waste."

"No wonder the officers and advisers of the networks, perhaps a little dazed by this huge intellectual waste, have been inviting free educational experiments, saying they were eager to co-operate in every way to raise the quality of programmes. But an incredible complacency characterises most of their trite and stilted speeches, and there is an aura of ultimate dividends about them all."

The writer thinks there is not much room for optimism except in the field of music, and even then he expresses the opinion that a casual examination of programmes will show what an overwhelming majority are superficial and educationally worthless.

"It is claimed, for instance," continues the critic, "that advertising has become so unobjectionable, so subtle, that enjoyment of programmes is no longer interfered with by the intrusion of the mere mention of the sponsor's name. Certainly, we do not, in a fifteen minute programme, hear fifteen minutes of direct sales talk."

"But indirect promotion can be even more annoying because of the very trans-

parency of the attempt to hide its commercialism. A series of songs about eyes is sponsored by an optician, a life insurance company broadcasts setting-up exercises, and a roofing company gives a series of sketches about a fireman to prove that asbestos is best."

And how!

Those of our readers who have listened to American broadcasts will realise the truth of the above, and will probably feel glad that the B.B.C. does not allow advertising by "sponsored" programmes.

Fancy hearing a talk from, say, the London Regional on "Feeding Chickens," as well as a lot of intrusive "guff" from some maker of chicken food urging you to patronise his business and reminding you at the same time that if it hadn't been for his generosity in paying for the talk you wouldn't have heard it! It's almost worth paying yourself—not to hear it!

Now, consider these facts.

### Six Hundred Stations.

"There are more than six hundred broadcasting stations in the United States."

"Morning, noon and night, every day of the year, they broadcast through the loud speakers of 12,500,000 receiving sets, and into the ears of 56,000,000 listeners, each of whom they entertain for an average of over two hours a day."

"These stations, in 1930 alone, will have projected their advertisements into 40,000,000,000 of the listening hours of the American people."

"Nothing in American history has paralleled this mushroom growth," says the "Current History" article. "Although as recently as five years ago money spent upon radio advertising was negligible, in 1929 national advertisers paid almost \$19,000,000 for network broadcast alone."

## A BOBBY JONES BROADCAST



Preparing to broadcast a running commentary on a recent Bobby Jones golf match in the States.

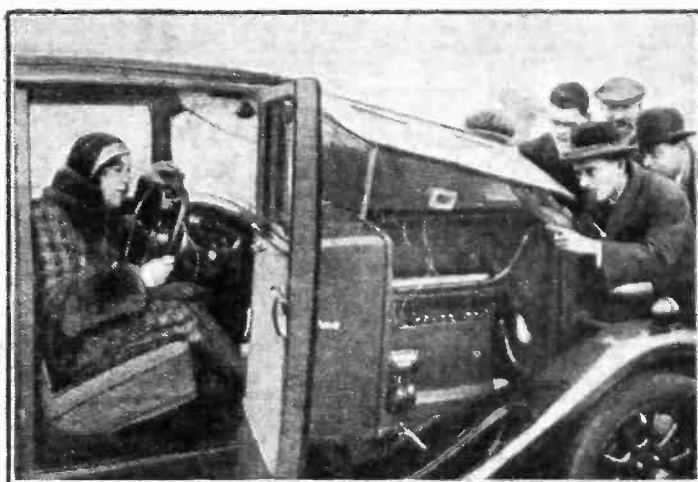
Preliminary reports for the first seven months indicate that by the end of 1930 this total will rise to at least \$28,000,000."

When the author deals with the B.B.C. he becomes highly complimentary. For instance, read this:

### No Lack of Diversion.

"Nowhere has more vision gone into the development of broadcasting than in England. The British Broadcasting Corporation, in attempting to 'please 75 per cent. of the listeners 75 per cent. of the time,' instead of 90 per cent. of the listeners all of the time, has demonstrated what genuinely fine programmes an enlightened ideal can produce."

## "AUDIBLE WARNING OF APPROACH!"



A motor car which has a microphone and loudspeaker on board so that the driver can speak to pedestrians or police and tell them what he is going to do.

"The B.B.C. devotes a sensible portion of each day to the light popular broadcasts with which we are familiar. The people do not lack diversion. But there the parallel ends. Realising that it is difficult to draw a line between recreation and education, the directors of the B.B.C. and their advisers have gone ahead with programme experimentation and betterment that have won the support of all classes of listeners."

"The British listener lacks none of the good music that we must pluck from a heavenful of trash, and then be grateful for it to the courtesy of an advertiser. But the British listener has many things that we have not. When grand opera is to be broadcast, for instance, the B.B.C. offers librettos to its audience in advance of performances at 4 cents each."

### We Should Be Grateful.

As they say in New York, "Oh Yeah?" Still—it's nice to know the merits of the B.B.C. are appreciated abroad. It makes us realise that we often forget those merits ourselves, and although we grumble and criticise and sometimes say unkind things about the pundits at Savoy Hill, we can at least feel very grateful that our broadcasting system is free from the drawbacks so caustically described in the "Current History" article.

## NEXT WEEK

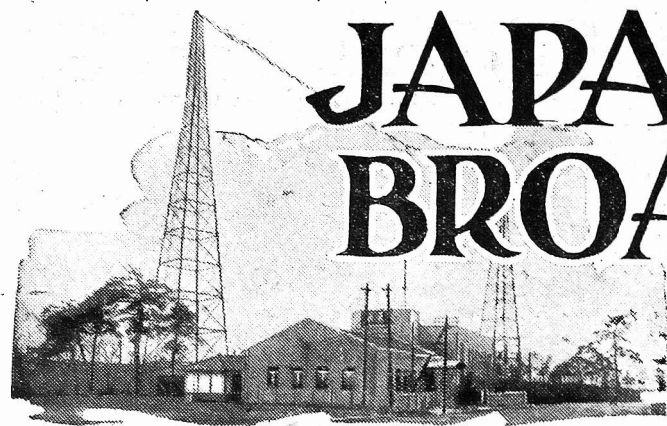
The "P.W." Super-Coil Three



# JAPANESE BROADCASTING

Some fascinating facts and figures that reveal the wonderful progress made by broadcasting in Japan.

By A SPECIAL CORRESPONDENT.



**R**ADIO progress in "the land of the rising sun" seems to run very parallel with that in our own country. This is strikingly illustrated by the development of broadcasting in Japan. And it is in the hands of an organization very similar to our own broadcasting corporation. In fact, it is known as the Broadcasting Corporation of Japan.

The first Japanese Broadcasting station was built on the water front of Tokyo harbour, by a public service corporation organised by the sanction of the government, to serve Tokyo and adjacent territories. The corporation was under the supervision of the Bureau of Communications at Tokyo.

## Well-organised Corporation.

Subsequently, similar organisations were constituted in Nagoya and Osaka. These three independent concerns worked under the supervision of the Government for nearly eighteen months and achieved considerable success.

Eventually, the three separate bodies voluntarily dissolved their organisations in favour of a national broadcasting corporation. That was on August 20th, 1925.

The Broadcasting Corporation of Japan is run entirely as a public service and not for profit. It has a special charter giving it the right to control and operate the whole of broadcasting in Japan.

The corporation is divided into two main sections, the administrative one being located at the National headquarters at Tokyo, and then there are seven service districts covering various regional divisions, forming the operating side. There is a board of directors re-elected every two years by the 6,000 members of the corporation holding non-transferable shares.

There are now seven ten-kw. broadcast stations and one having a power of three kw. Approximately 700,000 licensed listeners are registered. An addition of five small relay stations is anticipated in the very near future.

## The Licence Scheme.

Over 2,000 miles of cable are used to connect the various stations together. No advertising matter is allowed, and all stations have to be shut down by ten o'clock except on special occasions.

Listeners in Japan are required by law to take out a licence that costs one yen per year (a yen is about 2s.). This is a government licence, but, in addition, a listener also has to sign a contract with his regional division and pay a monthly fee of a further yen.

Two years ago, however, the broadcasting corporation decided that in future they would pay the yearly licence fees to the government on behalf of listeners, provided that they (the listeners) paid the fees for their first year's licences themselves. Wireless pirates get treated severely in Japan, and when they are caught sentences of up to one year's imprisonment are meted out to them.

## Seven Hours a Day.

Each broadcasting station transmits daily for about seven hours. Weather forecasts, stock exchange reports, time signals, news items supplied by news agencies, newspaper offices, etc., are given as well as outside broadcasts of sporting events and events of national and international interest.

About two hours per day is devoted each to general information, educational and recreational features. Language courses in English, French and German are included in the programmes, and as with our own B.B.C. there are household topics for housewives and women enthusiasts in general.

## NAGOYA'S PECULIAR PROGRAMME PROCEDURE



This studio photo reveals an interesting variation from European practice. As you will see, the vocalists are provided with music on the stands, whereas the orchestra has no music.

Suitable text books and pamphlets supplementing talks, etc., are published and are retailed to listeners at cost price. In order to widen the appeal of the programmes, the Broadcasting Corporation of Japan is planning a double station system similar to our own regional scheme.

They propose, if possible, to get this working in Tokyo and Osaka within the next twelve months, and after that, if the service is successful, to extend it to various other localities.

A very interesting example of the way the corporation protects its listeners is in the institution of a board of examiners which sits in judgment on any receiving sets and parts sent in by manufacturers for official approval. The gear is given very stringent tests in accordance with standard specifications, consideration being paid to the cost of the apparatus to the listener. Any trader can send in any kind of apparatus for approval.

The B.C.J. is a very live organisation and it does not wait for licence fees to be taken out, but actually has a publicity department co-operating with local post offices, etc., for the purpose of canvassing for listeners.

## Valuable Service System.

There are also service stations in charge of corporation engineers where technical enquiries from listeners are answered and faults in sets located. No less than 1,500 temporary service stations and 25 permanent service stations now exist, and during 1929 these handled nearly half a million queries, of which over 300,000 were actual cases of set examination. Frequently small repairs are carried out without any charge whatever.

The 700,000 listeners in Japan are certainly very well cared for and in many respects are very much more fortunate than British listeners.

The Broadcasting Corporation of Japan has a magnificent research laboratory at Tokyo, where skilled engineers are at work all day experimenting in all branches of radio transmission and reception.

Japanese listeners seem to be very well

satisfied with their radio fare, and appreciations greatly outnumber complaints in the postbags of the various stations.

Over two and a half years elapsed after broadcasting properly began in Great Britain before it started properly in Japan, but in the subsequent years it has forged so far ahead that our own B.B.C. will have to look to its laurels if it is going to retain anything approaching a leading position; that is, even if it can be said to do so now, which is a debatable point!

## SHORT-WAVE NOTES

Some answers to interesting correspondence, a suggestion for a future "P.W." article, and "five fresh transmissions" from the main topics this week.

By W. L. S.

I HAVE to thank a Yorkshire reader for a most amusing and interesting letter, which takes the form of a discourse on all the aspects of short-wave radio that one could possibly imagine, together with "the good work that 'P.W.' is doing in allotting so much space to the matter, although we should all like more."

This reader, "G. H.," says that naturally they know far more about radio "oop North" than we mere Londoners can ever hope to know; but then, in a most Irish way, he explains that they have learnt it all from "P.W." and he adds some flattering but quite undeserved references to the occasional hints and tips that I am able to throw out, and asks for more of them.

### Troubles and Tips.

Well, "G. H.," these "hints and tips" only come from my own troubles and their solutions. If you want more tips, that means that I shall have to have more troubles, and, even in radio, troubles cannot be arranged to order.

He suggests, however, that I should summarise all the little points that have cropped up at various times (for instance, the stunt of tuning the earth lead to obviate hand-capacity effects, and the various cures for threshold howl). I could then blossom forth with one complete "trouble-killers' manual," all neatly set out on one page, or less, of "P.W." It shall be done, "G. H.," and many thanks.

"A. T.," of Liverpool, is another who has cured threshold howl in all its forms, tuned his earth lead, and used all the well-known tricks. He still finds an improvement, however, when he connects 0001 direct from the plate of the detector to earth.

Naturally, with some sets this may considerably alter the reaction arrangements, but, nevertheless, it is worth trying. Particularly is this so in cases where the trouble is caused by H.F. getting through to the L.F. side.

### A.C. Mains and Short-Wavers.

"C. A. P." wants me to recommend a good A.C. mains H.T. unit for use with a short-waver. I think I have tried to make it clear before that any unit that is good enough for the broadcast waves should be good enough for short waves, provided that the receiver itself is stable and thoroughly de-coupled.

Two or four microfarads of extra capacity across the detector tapping will usually take care of any hum that is left, or, if they do not, a resistance inserted in the lead from the eliminator to that tapping, with the microfarads across from the "set" end of it to earth, should do so.

One trouble experienced is sometimes the gentle creeping of the set in and out of oscillation, owing to slight fluctuations in the mains voltage. This can be cured by the use of a "bleeder" resistance across the output of the eliminator. 50,000 ohms seems a suitable value.

Across 200 volts this will, of course, pass 4 m.a. only, so that any wire-wound resistance will fill the bill. An alternative is a neon tube designed for 200 or 220 volt mains, which must, of course, be put across the D.C. output, and will take 5 watts or so.

### From Far Uganda.

"A. B. T." writes from Uganda with an account of short-wave reception out there. W 2 X A F appears to be getting there well, while P C J has disappeared! Rome on 25 metres is the best station, being received at R 9. Yes, "A. B. T.," R P K is a Russian station, Q R C I cannot place, and have never heard. Can anyone else fill the gap here? Lastly, I am afraid you are wrong about the identity of W. L. S.

Further reports of reception of Buenos Aires continue to flock in; but, as I gave

### "HALLO MIKE!" SAYS MOLLY



Miss Molly Brown, of Preston, the retiring Railway Queen of Great Britain, broadcasting her farewell speech at Manchester.

the definite particulars about him last week, I will not refer to them at present.

Another fruitful subject is that of the Transatlantic 'phone in its distorted condition, when all the eavesdroppers over here are disappointed at not being able to hear the latest gossip. I am besieged by requests for information as to how it may be received! As a matter of fact, it is quite easy, even with

an ordinary receiver; but, as I should obviously get into trouble if I gave away the secret, I will keep very quiet on the subject.

A Brixton reader wants particulars of a Spanish station transmitting between 43 and 47 metres, apparently doing speech only. Unless this is E A R 96, Barcelona, on 46 metres, I cannot identify it.

My frequent correspondent, "G. G.," of Birkenhead, writes describing quite the most unique broadcast of which I have heard. It was a relay by W G Y from a submarine below the surface in Long Island sound! The submarine, O8, was connected by a "mike line" to O4, which was on the surface, and the two were actually in communication by short-wave radio through the water, quite apart from the line. They are not lacking in originality over on the other side!

And now for this week's five "freak transmissions." I have again picked a group of five, of which I myself have heard three, and shall await details from any readers who have heard any of them.

### The Five "Freaks."

They are: F M 8 K R (Constantine, Algeria), on 80 metres; P K 2 A F (Java), on 50 metres, from 11.40 to 14.40 G.M.T.; W S B N (s.s. Leviathan), on 45.21 metres; C M 2 M K (Havana, Cuba), on 32.06 metres, from 22.20 to 02.00 G.M.T.; and X D A (Mexico City), on 20.5, from 19.30 to 20.00 G.M.T.

Throughout the last two week-ends I have been listening on the longer "short waves," namely, between 75 and 180 metres. My chief surprise was of two natures—pleasant, at finding how extraordinarily efficient my S.G. stage was up there, and unpleasant on reflecting how absolutely inefficient it must be "down below."

On 150 metres the S.G. stage, even on strong signals, apparently gave more

magnification than an extra L.F. valve, and the gain in selectivity was most apparent. Below 50 metres it is apparently only acting as a "buffer"; although it definitely does amplify, the gain is so extremely small that one would hardly notice it. At the same time, I could not possibly do without that "buffer" effect, now that I have got used to it.

as when the paper is removed all the flux and odds and ends, etc., come away with it.

A good method of indicating whether a soldering iron is hot enough is to hold it against a piece of newspaper, the right heat being sufficient to scorch, but not burn, this.

When joining two surfaces, remember that the hot soldering iron should be placed on both, and should heat them equally if a sound joint is to result.

## NOTEBOOK NOTIONS

Helpful hints and tips for the practical amateur.

The old plan of spreading a newspaper over a panel or baseboard on which parts have to be soldered, has much to commend it,



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Specially designed to give high quality coupling between detector and first L.F. valve (or successive stages). By turning a switch, bass can be made to predominate to compensate certain loud-speaker deficiencies. A component which will make a remarkable difference to your reception.

Complete with Switch for Tone Control. **20/-**

## H.F. CHOKE

Range, 10-2,000 metres.

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*Also supplied Centre Tapped.*

## QUICK MAKE AND BREAK SWITCHES

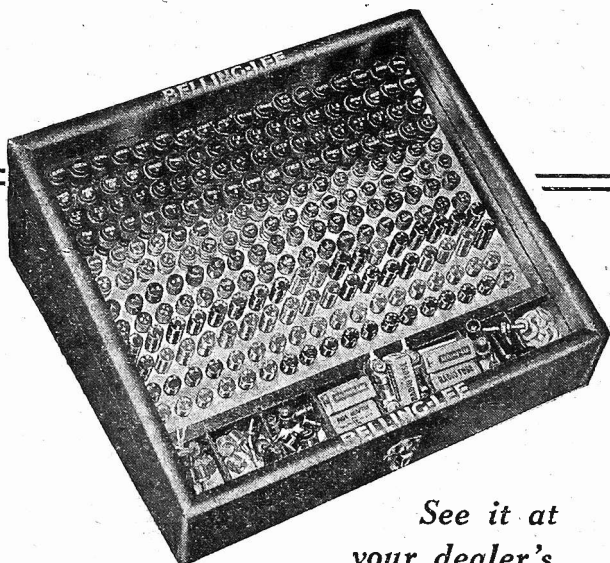
Supplied in Single and Double Pole Make and Break Change-over—with delayed action for indirectly-heated valves.

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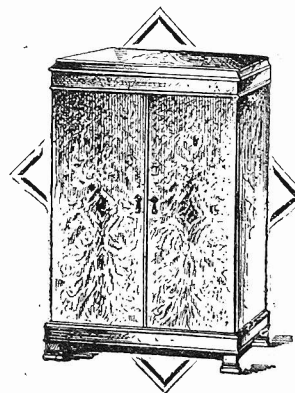
## Well! Who Was Right?

REMEMBER that argument you had with John the other night? Neither of you would give in, and so it went on for hours and hours. But who was really right after all? You don't know, do you? Don't argue—buy **THIS AND THAT**. It will tell you all you want to know about everyday subjects. It is a paper for men and women of all ages and all classes. Bright, lively and topical—it is the paper for the million. Buy it regularly!

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A Radio or Radio-Gramophone Cabinet 3ft. 9ins. high, 2ft. 2ins. wide, 1ft. 6ins. deep. The battery and loud-speaker compartments are at the bottom and are partitioned off. Size of the baffle board behind the fret is 24ins. x 24ins. Metallic fabric for the fret front is included. Opening at the top and back. This cabinet will take a panel 2ft. x 9ins. or smaller.

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# CAPT. ECKERSLEY'S QUERY CORNER

HEATING OF THE POWER-VALVE—A  
VERY QUEER CASE INDEED—CHARGING  
H.T. ACCUMULATORS—WHY SMOOTH  
FOR H.F.?

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your queries to Captain Eckersley, however; a selection of those received by the Query Department in the ordinary way will be answered by him.

## Heating of the Power Valve.

N. M. (Weybridge).—"I am using a three-valve receiver consisting of a detector and 2 L.F. stages. The last valve is of the super-power type, and I notice it has a tendency to get warm after the set has been working for half an hour or so, whereas the other two valves remain quite cool.

"The receiver is giving highly satisfactory results, but I wondered whether it is quite in order for the power valve to warm up when in use."

"You can be quite happy about this. I have seen "power" valves that are kept too cool. Pentodes working loud speakers, for example!

"Think! When you use the word *power* valve surely it must convey to you that the valve is feeding *power* into your loud speaker. It can't do that unless it has *power* put into it.

And putting *power* into any machinery always invokes the production of heat. Your last valve is no exception.

The other valves, of course, were not designed to give out power, they generate volts only, and so do not get hot in the same way. They do get a little warm, but not really hot.

\* \* \*

## A Very Queer Case Indeed.

K. G. London.—"As I live in a flat, I have to use an indoor aerial.

"The room in which this is erected is about 25 feet above the road, and the aerial consists of a single straight stretch of insulated instrument wire run diagonally across the room with the down lead going from one end thereof directly to the set. The set is run from D.C. mains with the negative conductor earthed and no actual earth connection is used.

"At first I found the tuning range of the receiver (det. and 2 L.F.) very restricted, and attention to the aerial coil seemed indicated. After some experiment, I found that quite a small coil was required, consisting, in fact, of some 20 turns on a 3-in. former. The condenser is .0005.

"In view of the small physical dimensions of the aerial, I should have thought that a larger coil was needed. Could you tell me where I was wrong in this assumption."

But are you using the circuit shown?

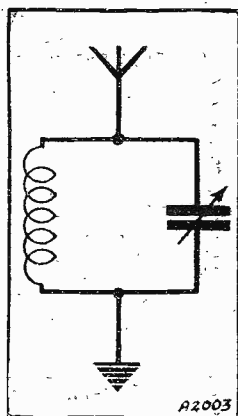
If you are, the small aerial makes no difference in comparison with the condenser. Is that not right?

You do not give me the length of your winding nor the coils diameter, but I calculate 20-30 microhenries. With a .0005 condenser this tunes to 200 to 220 metres, which certainly seems wrong, as you say. But is there any way in which the aerial could get near the mains?

This would increase the capacity, of course. Frankly, I am beaten on this, and unless there is some spurious capacity or inductance extra to what you have specified, I do not see what is happening.

## Charging H.T. Accumulators.

W. H. (Blackburn).—"I have a dynamo



## APPARENTLY SO SIMPLE!

What would YOU do if something unexpected happened with a simple circuit like this one? Read the reply to "K.G." (London), dealing with the very queer case he reports.

capable of delivering approximately 30 volts at 5 amps. I wish to charge my H.T.

accumulator of 200 volts, which is made up of 10-volt units. Is there any way in which I can utilise the above dynamo to charge this accumulator? The charging rate of the accumulator is approximately 1 amp.

You should work out a change-over switch which connects each block of 20 volts in parallel, and then charge these blocks from the dynamo through a variable resistance.

Divide up exactly into 10 equal blocks of 20 volts each: connect

+ and - as shown to centre part of double-pole change-over switches a, b, c, etc. When the switches are thrown over one way all the 20-volt blocks are in parallel; but as shown, when thrown the other way, they are all in series. A switch X connects the batteries to the dynamo. A resistance R varies the charging rate shown on the ammeter, A. It can read ten times the charging rate of one cell or battery.

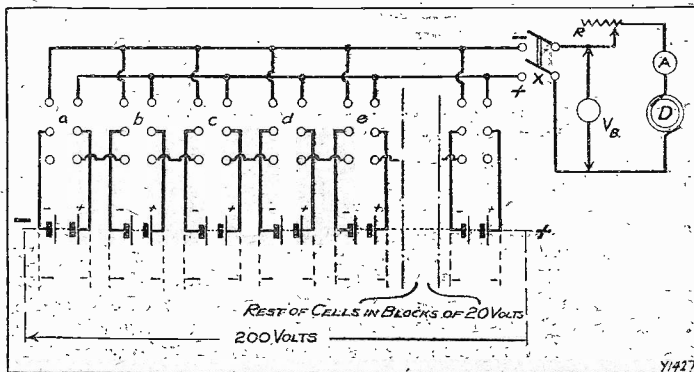
\* \* \*

## Why Smooth for H.F.?

D. T. O. (Carlisle).—"In a receiver which obtains its H.T. supply from the mains, why is it necessary to smooth the mains current to the plates of valves which only function as H.F. amplifiers? This seems to me particularly unnecessary in the case of H.F. valves which are coupled by means of H.F. transformers, as these devices are, presumably, incapable of transferring to the succeeding valve the low-frequency impulses of mains ripple."

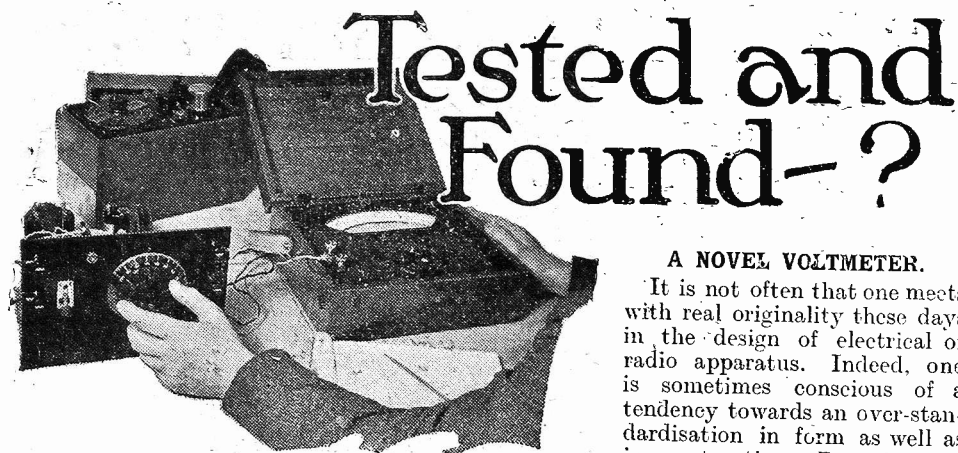
While it is quite true that the ripple on the high-frequency valve anode is not heard as a low-frequency hum in the loud speaker, the high-frequency valves could not function correctly with a varying L.F. voltage. If this were varying 100 times a second, then the magnification of the valves would vary, and this would produce hum (at the least). So it's advisable to give them sensibly D.C. steady volts if stability is required.

## CONTROL SWITCHES FOR H.T. ACCUMULATORS



The letters a, b, c, etc., denote the D.P.D.T. switches which are linked together for charging and running the set from an H.T. accumulator.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.



# Tested and Found-?

## A NOVEL VOLTMETER.

It is not often that one meets with real originality these days in the design of electrical or radio apparatus. Indeed, one is sometimes conscious of a tendency towards an over-standardisation in form as well as in construction. But the new adjustable voltmeter of Messrs.

Ripaults does strike a completely novel note.

It is of the pocket pattern and has two ranges 0 to 6 and 0 to 120 volts. It has only two connecting points, one a spike rigidly fixed to the case of the device, and another spike terminating a flexible cord.

You change the range by pressing a small button, and this not only introduces the required shunts, but also changes the figures on the scale, so that only the one set of figures shows at a time.

Thus there is no need for distinctive colouring of cords or dial markings, and there is no possibility whatever of confusion arising between the ranges. The price of this voltmeter is 12s. 6d. Of course, it is not a precision meter, but it gives readings close enough for the ordinary L.T. and H.T. battery tests listeners make. And you do not have to test an H.T. battery while this accessory is in circuit in order to get the necessary current drain! The Ripault voltmeter has but a moderate resistance and, therefore, it cannot be used successfully with ordinary mains units.

## FINE ALL-MAINS SET.

I have tested quite a few of the all-mains receivers on the market, and the experiences have been interesting and most instructive. But I have been bitterly disappointed by the degrees of all-round efficiency achieved by most of the commercial productions.

You can easily count the really satisfactory makes on the fingers of one hand, and this without taking into consideration such incidental essentials as safety construction, etc.

But I have no hesitation in saying that the Philips all-electric sets are, in every way, first-class jobs. I can tell you something about the Philips type 2531, because, quite recently, I was sent one of these for test.

It is an A.C. three-valver employing a screened-grid valve and an adequate power valve. A valve rectifier is used. It is a wonderfully compact little outfit built into a handsome and solid metal casing.

The few controls are placed at the side of the case, while, in the centre, you see the tuning condenser scales that are illuminated when the receiver is switched on.

One of the safety measures adopted is that the outfit is automatically switched off when the case is opened. Provision is made for the use of a gramophone pick-up.

The wave-change switch provides a choice of three bands and covers the unusually wide range of from 200 to 2,100 metres, and

an effective volume control is also provided. The selectivity of the set is easily adjustable and is entirely adequate.

On test the set gave a fine performance. The reaction is smooth and contributes its full usefulness on all three wave-bands. The set is well-smoothed and mains irregularities are not heard. The quality is excellent.

The more Philips' sets one sees the more one realises the debt we owe to this great world radio organisation for showing us that good radio receivers *can* be manufactured in quantity.

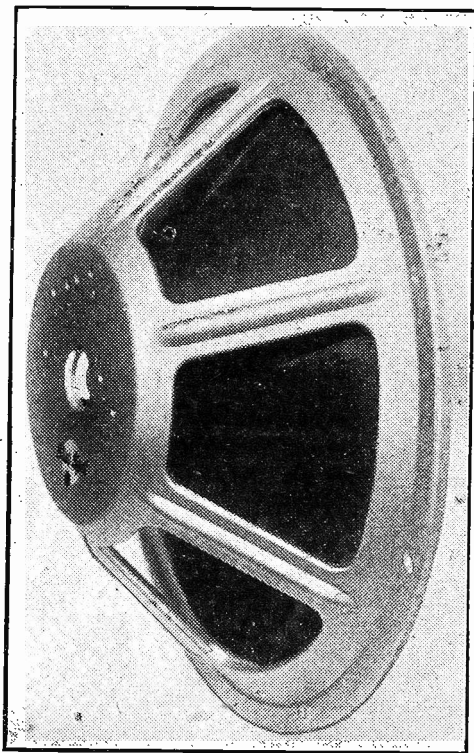
Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

## TELSEN PROGRESS.

I hear that the Telsen people are doing wonderfully well with those new components of theirs. I refer, of course, to the Telsen fixed condensers, valve-holders, and H.F. choke. And it is obvious that Telsen's are meeting with similar success in the marketing of their range of L.F. transformers, for you see them everywhere.

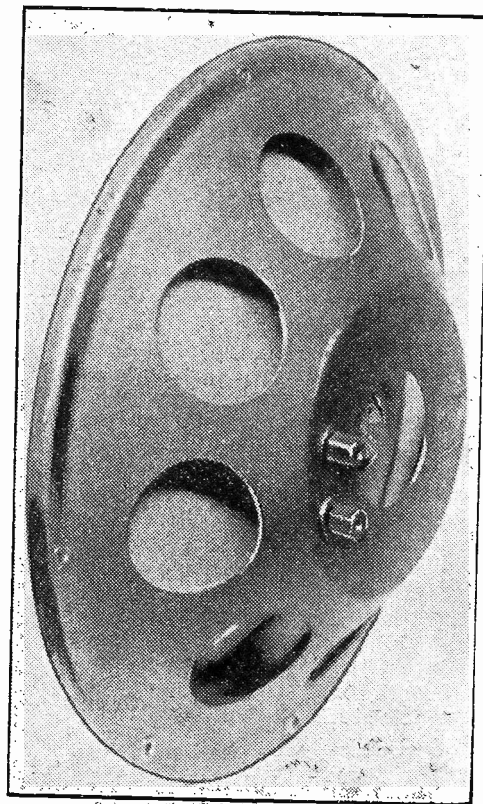


This is the new Blue Spot Special Chassis.

meet the demands of home constructors who are unable conveniently to use the Blue Spot Major.

The new chassis costs 10s. 6d. and I certainly agree with the claim that it is very good value for money. It takes either the 66P or the 66R unit and the results are not very noticeably inferior to those given with the large chassis.

There is an even smaller chassis now available and this is made only for the 66P unit as it is not considered that justice would be done to the 66R unit if any smaller chassis than the "Special" were used, but the 28P chassis in combination with the 66P makes a nicely compact little assembly that gives results which are far ahead of many loud speakers costing vastly more.



And here you have the Blue Spot 28P Chassis. The two photos on this page are not on the same scale of reduction.



# THE BEST NEW YEAR RESOLUTION



# ALL CHANGE!

## -BUT CHANGE TO PERTRIX

### PRICES:

60 v. Standard,	8/-
90 v. "	11/9
100 v. "	13/-
120 v. "	15/6
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Last year many hundreds of thousands of radio users changed over to Pertrix Non-sal-ammoniac Dry Batteries. And what is more, did not change back!

They found, as you will find, that NO sal-ammoniac means no deterioration when the battery is not in use . . . purer reception . . . absolute freedom from battery noise . . . positively longer life.

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*Did you know that you can get Pertrix Batteries for your flash lamp? They are 6d. each, with an unlimited guarantee.*

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The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs John H. Lile, Ltd., 4, Ludgate Circus, 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 subject of Letters Patent, and the amateur and the trader should be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### VARIABLE RESISTANCE FOR D.C. UNIT.

T. F. (Leicester).—"The sketch of the D.C. H.T. eliminator, which I am building, shows a 10,000 ohms variable resistance between the positive mains input terminal and the first smoothing choke. Instead of buying a special variable resistance for this could I use the tapped resistance I have on hand?"

"It has an arm rotating across studs which are fixed on a sort of black cardboard which I take to be the resistance element. The value of resistance is up to 25,000 ohms, so I thought possibly I could use half of it to get the same results as the proper variable resistance would give?"

### HOW IS THE SET GOING NOW?

Perhaps some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an unrivalled service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you free and post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

**LONDON READERS PLEASE NOTE:** Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House

We are afraid your resistance is quite unsuitable because for use on the input side of an H.T. unit a heavy-duty resistance is required, and yours would certainly not appear to be of this type.

Apart from giving you poor voltage control (because you would only be able to use less than half of it), it would in all probability give all sorts of unwanted fluctuations and variations of resistance. So we should buy a special 10,000 ohm variable resistance of the type intended for the comparatively heavy current required for a mains unit.

### A WAVE-CHANGE FAULT.

"NOVICE" (Winchester).—"One of the best points on the new set is the changing over from long to short waves, and from the short to the long by a switch on the panel instead of coil changing. But now this is giving trouble.

"Sometimes it goes perfectly, but other times only the long waves come through whichever way the switch is put. What would be the cause of that?"

The likeliest cause is a bad switch contact, and this could be put right for you in about two minutes by anyone of experience. In fact, it is so simple that you could try it yourself.

First, of course, you must disconnect all batteries from the set (undo the leads at the battery end, not at the set end), and then examine the wave-change contacts. If it is of the push-pull variety, with a screw-off knob at the front of the panel, you can probably withdraw the centre plunger from the switch altogether, and then press in the springs so that a satisfactory degree of tension is obtained before replacing the plunger and screwing the knob on again.

If, however, the working of the switch appears a little involved, and you do not see how the contacts could be improved, you had better ask a dealer or some experienced friend to look at it for you and tighten up the spring contacts.

### L.F. TRANSFORMER FOR PICK-UP WORK.

A. R. (Huntingdon).—"At present the leads from my pick-up go straight to a volume control, with the slider of this to grid of the first L.F., and the other end to grid bias negative.

"I should like to use an L.F. transformer to improve strength as I am told I can get a step-up in this way. What are the connections?"

Only a very small alteration is necessary. The slider's connection remains as before, and so does the grid bias, but the ends of the volume control, instead of going to the pick-up, should be taken each to one side of the secondary of the low-frequency transformer.

This may be marked IS and OS, or G and GB (or, if it is of American manufacture, G and C). The two leads from the pick-up then go to the primary terminals of the L.F. transformer, those marked H.T.+ (or B+) and P (or A), and this completes the alterations.

### BACK NUMBERS OF "P.W."

"Where can I get details of the 'Inter-change Three,' which I understand was described in an article in 'P.W.'?"

A description of this set was given in the November 22nd issue, "P.W." No. 442. (Back numbers of "P.W." are obtainable from Back Number Department, Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4. Price 4d. per copy, post free.)

### RELIEVING THE PRIMARY.

F. R. A. (Chester).—"In the plate circuit of the detector I have at present the primary of my low-frequency transformer, the secondary of which goes to the output power valve (as shown on leaflet enclosed).

"I am particularly keen on getting good bass response, and although I paid a good price for the transformer and reproduction is already very good, I feel I could possibly get a better bass response if I could relieve the primary of the D.C. current to the detector valve.

"From the details sent with it, I see the primary inductance with no D.C. is well over one hundred henries, and I understand that the resistance-feed method enables it to be used with only the speech current going through it. Do you think I should get an improvement if I changed over to resistance-feed, and if so, what would be the new connections?"

Probably you would get rather better response by relieving the primary of the D.C. current, and allowing it to be fed with only the useful speech current. In theory the method is certainly better than including the primary in the plate of the detector valve's circuit, and as the alterations are very simple, requiring only a resistance and large fixed condenser as additional components, we think you should certainly try it if you can.

It is fortunate you gave us the type of transformer in use, as the correct values to use for the resistance and coupling condenser vary with different makes of transformer. As different makers will recommend totally different values it is important not to use the values chosen haphazardly or because they suit a certain other transformer, but to obtain from the makers of your own transformer the values of resistance and coupling condenser they recommend.

In the case you mention the resistance should be 30,000 ohms and the fixed condenser should have a value of .5-mfd. Leave the grid terminal of the L.F. transformer connected to the grid of the power valve but remove the grid bias lead from G.B.—, and take this lead instead to the terminal which is marked "plate." This leaves you with the G.B.— terminal and the H.T.+ terminal on the transformer free, so join these two together and take them to one side of .5 condenser.

The remaining side of this fixed condenser goes to the plate of the detector valve (via H.F. choke if used), and it also goes to one end of the 30,000-ohm resistance. The other end of this resistance goes to the detector's H.T.—, and this completes the connections.

### THE GRID LEAK RETURN.

R. K. L. (Nuneaton, Warwick).—"I am using a three-valve set consisting of screened grid, detector and power valve, running from a 6-volt accumulator.

(Continued on page 812.)

## TECHNICAL TWISTERS

### No. 42. Output Connections. CAN YOU FILL IN THE MISSING LETTERS?

With a crystal set it is immaterial which way round the 'phones are joined in circuit, but when a . . . . . set is used the output connections are important.

Usually one 'phone (or louds peaker) cord is coloured . . . or marked with a . . . . . sign to show that it should be joined towards the H.T. battery.

The best method of arranging a loud-speaker set's output is to use an output filter circuit, such as the . . . . . combination, or a . . . . .

Last week's missing words (in order) were Series, Condenser, Satisfactory, Leaky, Shorted.



# GREATEST RADIO SENSATION

## NEW 3-VALVE SET OBTAINS OVER 50 STATIONS ON LOUD SPEAKER WITH DAVENTRY 5 G B WORKING

This is the new Northampton Plating Co. Super Selective 3-Valve Loud Speaker set, which is now offered to the public. After months of careful research a circuit has been designed superior in selectivity to a screen grid set, and yet remarkably simple. It can be used, not only for cutting out the local station, but for other disturbances such as Morse. It is the simplest, cheapest, and most selective in the world. No soldering required or coil changing. Experts have declared it absolutely unique. Over fifty stations have been obtained on loud speaker with aerial 20 feet high, using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Königswusterhausen, Radio Paris. These were obtained 3 miles from Daventry while 5 G B was working. Thousands of novices with no knowledge of wireless have built the old Northampton Plating Co. Super 2 and 3 in all parts of the world, and have been astounded by the results even with cheap components, but the new Super Selective 3 makes other sets old fashioned, and marks the greatest improvement in valve sets for years. Orders have poured in from all parts of the world, including America, Turkey, Gold Coast, and Nigeria. In order to give everyone the opportunity of testing out the new circuit two 6d. Blue Prints, one for new Super Selective 2 and one for Super Selective 3 Valve, will be supplied for 3d. each.

## NEW SUPER 4-VALVE PORTABLE SEPARATES TWO BROOKMANS PARK STATIONS UNDER THE AERIALS

This is the latest model circuit by the Northampton Plating Co., offered to the public for the first time. It has been specially designed to satisfy the requirements of the new regional stations. Owing to its wonderful selectivity, it requires no wave trap and obtains under favourable conditions a large number of Continental Stations at loud speaker strength, including Toulouse, Hilversum, Eiffel Tower, Königswusterhausen, and Radio Paris. At less than half the price of a high-class portable set, it is acknowledged under severe technical tests to be far superior. In order to show what marvellous results can be obtained the set was placed between two aerials at the entrance to Brookmans Park, and the two programmes were easily separated. The set was also taken on 1,000-mile motor-tour over England and Wales. On the South coast and East coast many stations were easily obtained on loud speaker at good strength. Even in Wales, where reception is difficult, excellent results were also obtained. In order that everyone may be able to construct this unique portable set, a full size shilling Blue Print, with details and instructions, can be obtained from Northampton Plating Co. for 6d. Letters must be fully stamped. NAME AND ADDRESS IN BLOCK LETTERS. TRADE SERVICE AGENTS WANTED.

READ THE LATEST REPORTS BY THE LEADING RADIO EXPERTS OF THE DAY:—

I refer to the receiver marketed by the Northampton Plating Co. as a kit set at a price that is more than reasonable. I had a pleasant surprise when I first operated it. I found there were 12 or 13 Stations easily brought in at loud speaker strength on the medium wave in addition to 5 G B. The set has remarkable qualities of selectivity and sensitivity, two characteristics rarely coupled in any one receiver. It must be set down as a definite advance.

("NOTTINGHAM JOURNAL," December 21st, 1929.)

Those who are too far from a station to use a crystal and are deterred from wireless by the present high cost of valves, will find it best to make a set from the Northampton Co.'s blue prints for two or three valves, price 3d. each. If they cannot afford a Mullard, the same company supply excellent valves at 4s. 11d. which give admirable reception, though so cheap. A thoroughly good two valve set ought not to cost more than £2 10s., including everything, and a three valve about 12s. more.

("REYNOLDS' NEWS," January 12th, 1930.)

READ THESE TESTIMONIALS.

I have had your Super 3 since Sept., 1929, and have had wonderful results, about 50 stations at full loud-speaker strength, and can get most of these any night of the week, chief among them being: Paris, Eiffel Tower, Budapest, Prague, Belgrade, Stockholm, Madrid, Toulouse, Stuttgart, Barcelona, Turin, Mar. ystra, Ostrava, Rome, Algiers, Langenberg, Oslo, Lahti and Kaunas. Wishing you every success.—W. T. Emsworth, Hants., 17/1/30.

I must write and tell you I am more than pleased with your three valve set I have just made. It is the most wonderful bargain I have ever known in wireless, and it is all that you claim of it. I wish to recommend it to my friend who is a keen wireless enthusiast.

W. F. T. Derby, 16/1/30.

I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud-speaker strength. As I am writing we are hearing in Aris from Rome. My last set cost me about £25. Your Super Three has cost me less than £5, including accumulators.

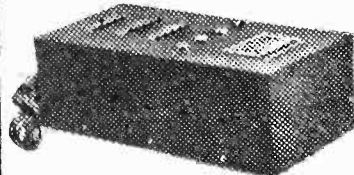
W. A. P., Norwich, 3/2/30.

Referring to the 3-valve set recently supplied, I have pleasure in informing you how satisfied I am with it. I recently put up an expensive 4-valver, and had such bad results. I may say I have had many circuits in use up to 5 valves with very good results—that means quality of reception, volume and distance. I purchased your Super 3 really for local use. As you will see, I am on top of the Brookmans Park Transmitter. The results I am getting are equal to my best with 4 and 5 valves. I can still have my Continentals on the loud speaker, and with perfect quality. Wishing you every success.—Yours faithfully, V. M. Cheshunt, Herts.

I feel I must write and congratulate you on a wonderful circuit. I have now had your "Northampton 3" only two nights, but in those two nights it has fully justified itself. I have the poorest of poor indoor aerials, and I have in 10 minutes logged 16 stations on the Loud Speaker. I have had to insert a volume control because of the power of the local station (Bournemouth, 70 miles away) and 5GB. I have just received Oslo, Paris (2), Hamburg, Berlin, Budapest, and many others. Your "3" gives 90 per cent better results than you specify. Wishing your sets the best of luck in the future.—Yours very satisfied, O. D. N.

I have examined the above testimonials, and am satisfied that these are genuine communications.—Advertisement Manager. "News-Chronicle."

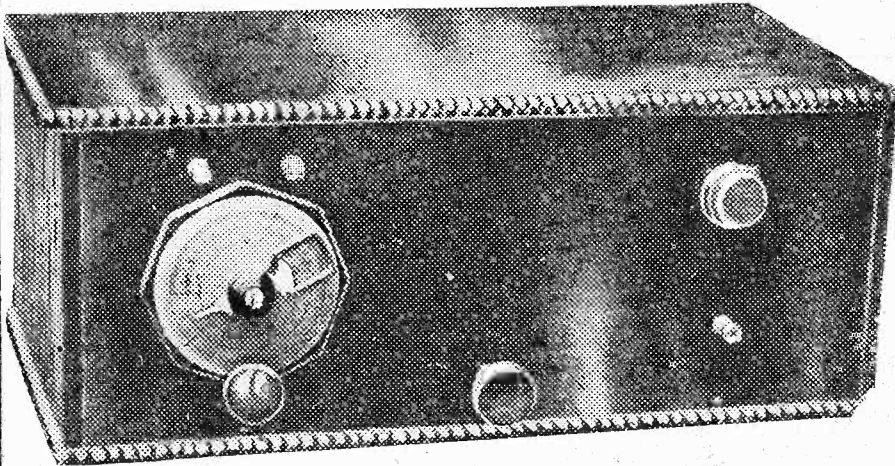
## THE NORTHAMPTON PLATING CO. SUPER A.C. ELIMINATOR



**SPECIAL OFFER.** 7 days approval to test. This A.C. eliminator value £4 will be sent to any address on payment of

59/- cash or C.O.D. with the guarantee that if it is not superior to any other eliminator on the market and not giving complete satisfaction the money will be instantly refunded if returned in good condition and undamaged. It is guaranteed to be most silent in operation giving over 20 milliamperes, and suitable for all 2, 3 and 4 valve sets. Test it for yourself. Trade enquiries invited.

STATE MAINS VOLTAGE AND CYCLES.  
Easy Payments Arranged.



## SPECIAL WIRELESS AND CYCLE BARGAINS.

Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.
10/- Latest Type Cabinet	4/11	17/6 New Corsor Type Long	9/6	12/6 Mullard Type Cabinet	6/11	12/6 100 Volt H.T. Battery	8/11
12 x 8	3/-	Wave Coils, pair	3/11	18 x 7	3/11	2 Volt Accumulator	3/6
5/- Ebonite for same, 12 x 8	3/6	Volume Control	1/3	Aluminium Panel 18 x 7	12/6	Accumulator Carr.	11d.
5/11 Transformer	2/11	H.F. Choke	3/11	Dual Coil for M.M.3	4/11	Neutralising Condenser	2/11
4/8 0005 Variable Condenser	1/3	Daventry 5 G B Coil	6/11	Triotron Dull Emitter	2/6	Reaction Condenser	2/6
2/- 0002 Condenser	10d.	6 Volt Amplion Valve	7/11	Valve	2/6	Diff. Reaction Condenser	11d.
1/8 0003	9d.	Cone Unit	11d.	Cycle Tyre	1/3	Loud Speaker Cord	11d.
1/- Grid leak 2 meg.	9d.	12in. Cone Speaker Frets	1/11	Cycle Tube	3d.	"Phone Cord	11d.
1/- Anti-Mic. Valve Holder	9d.	15in. Cone Speaker Frets	3/11	Panel Transfer	6/6	S.L.F. Condenser	3/11
2/3 Rheostat	1/6	Old Corsor Type Coils	7/11	Double Reading Voltmeter	9/11	D.C. Eliminator, 15 M.amp.	17/6
2/- Indoor Aerial	4/11	Old Corsor Type Cabinets,	3/11	Triotron Super Power	4/11	A.C. "20 Millamps.	59/-
5/- Earth Tube	1/11	21 x 7	7/11	Valve	6/6	Electric Iron. Weight 5 lbs.	7/11
10/- Guaranteed Phones	1/11	Ebonite for same	3/11	15/- Titan Coil	9/11	Cone Speaker	9/11
3/8 S.M. Dial				9/- 60 Volt H.T. Battery	4/11	"Phones Repaired..	2/6

Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Enquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List P.W.

Trade Service Agents Wanted all over the World.

Owing to the enormous number of enquiries and orders, write clearly Name and Address in Block letters to the firm that made Radio popular. Letters must be fully stamped.

**NORTHAMPTON PLATING CO. (RADIO and Cycle Manufacturers), NORTHAMPTON**

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 810.)

"Some months back I had the misfortune to drop the detector valve and put it out of action, so I bought a POPULAR WIRELESS to see the advertisements and what was being said about 6-volt detectors.

"Luckily for me! It contained details of how to put a resistance in series with the filament so that a 2-volt valve could be used with a 6-volt accumulator, and as I had a 2-volt valve on hand and an old rheostat I tried the stunt right away.

"Great success! It has been working ever since perfectly satisfactory, but the other day I noticed a funny effect on the grid connection. In my set the grid lead did not go from the grid lead direct to the filament socket on the detector valve, but to the L.T. +.

"Whilst having a clean up and fixing the added resistance permanently I decided to alter the grid leak return connections, which I shortened a bit so that the lead coming from the non-grid end of the grid leak went direct to the positive filament. To my astonishment results were better than ever. Why?"

In order that the detector valve should function efficiently it is recommended by the makers that a certain small positive bias should be imparted to the grid, and usually this is accomplished by taking the grid return to the positive end of the filament.

After you had added an extra resistance in the filament circuit you had in effect reduced the six volts to two volts across the filament terminals, but you still had the 6-volt bias on the grid.

That would have been O.K. for a 6-volt valve, but a 2-volt valve generally works better when its positive return is taken to about two volts, and not without extra four volts bias, as your arrangement gave it.

With the connections as at present you are getting the condition recommended by the valve makers. If in your junk box you have a 400-ohm potentiometer

it would be interesting to get the last ounce of sensitivity out of the valve by connecting this across the L.T. leads, and taking the grid return to the slider.

In this way you would get the exact positive bias the valve requires for best results, and as the valve seems to be working quite well with the present positive bias, we should be inclined to put the potentiometer right across the 6-volt accumulator and then adjust its slider for maximum sensitivity.

These are allowed to trail about like those for a movable electric lamp.

"Surely it would be better to fix a point in every room where the wireless is required, and then use quite a short lead from this point to the loud speaker, rather than long leads through doorways?"

Certainly. The leads to other rooms should be wired permanently, as trailing flex leads are often unsatisfactory.

Apart from the danger of tripping over them and of their liability to collect dirt, they are unsatisfactory from an electrical point of view, because of the liability to fracture at the point where the leads are frequently moved. Permanent wiring is easily carried out, and usually bell wire makes a good job.

If a filter output circuit is used (and this is recommended) finer wire may be used. Double cotton covered wire of No. 22 gauge is excellent where the set's output is filtered, and this wire can be run in the cracks of floor boards or behind a picture rail and remain practically invisible.

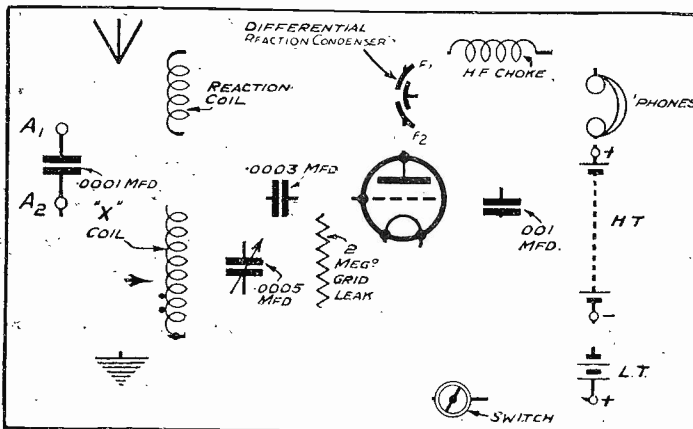
It should, however, be remembered that unless the set's output is filtered long loud-speaker wiring should be carried out by someone qualified for such a job, and it is obviously very unwise to have live wires running outside the set and over the house.

N.B.—This is particularly true if a mains H.T. unit is employed, when any such extensions should always be placed in the hands of some qualified person, or otherwise there may be a breach of the electric light bye-laws which might be regarded seriously.

(Continued on page 814.)

## POPULAR "WIRELETS" No. 27

### A SIMPLE ONE-VALVER.



Here are the "components" for a simple one-valver using differential reaction. Can you "wire up" this circuit?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

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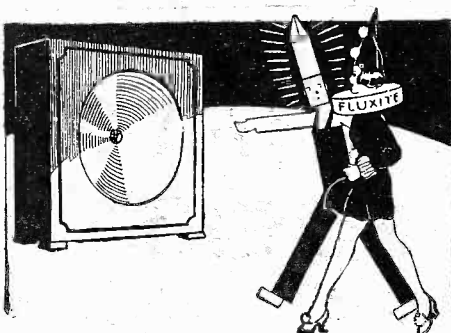
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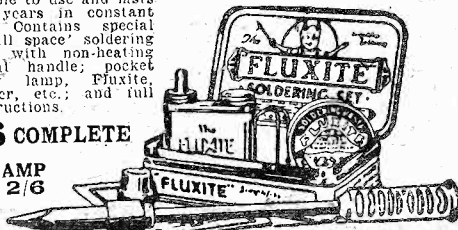
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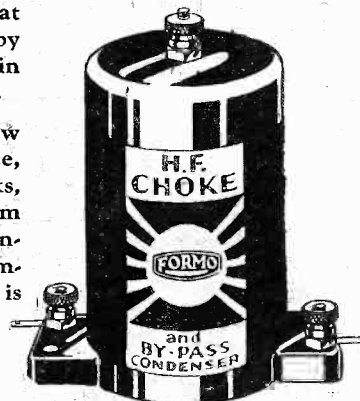
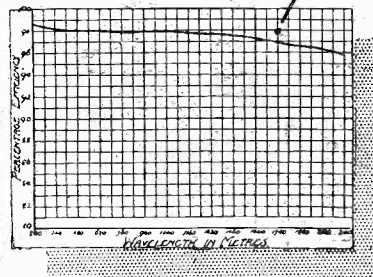
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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 812.)

### HUM FROM MAINS.

E. A. D. (Darlington).—"I am at present troubled with a very monotonous buzz with the programmes.

"I have just got the electric light fixed up in my house and since it appeared I have had this buzz. I do not work the set off the electric, so that I cannot blame mains trouble.

"The H.T. is Exide, just three weeks old, the L.T. is fully charged. The grid bias is new, the valves are new, the set is O.K., and everything is also O.K. at my neighbour's on his aerial.

"So can you please tell me the possible cause, and its cure?"

A monotonous buzz of this kind is usually fairly easy to cure because you can be pretty sure that the trouble is simply and solely due to bringing the set itself, or some of the wires to or from the set, too close to the wires of the house electric light system.

You see, what happens is this. Every wire which has electric current running through it has a magnetic field in the space around that wire.

All the leads in your set have magnetic fields around them, and so have the leads which come from the electric light company's installation. If the current in those wires is continually rising and falling the magnetic field around them also rises and falls continually, and when sensitive apparatus such as a wireless set is placed in that magnetic field, the rise and fall of the current gives rise to a hum in the set.

The remedy is to remove the set from out of the influence of the wiring which is causing the trouble.

In your case notice particularly whether any of the wires which are now installed in the house by the electric light company come near to your aerial wire, earth wire, battery wires, or to the loud speaker wires.

Remember that even although the aerial wire, for instance, is well insulated, it will pick up disturbance from electric light wiring, because the insulation around an aerial wire will not prevent the magnetic field from affecting it.

The only thing that will prevent it is to remove the wires from the space in which the magnetic field is rising and falling. In other words, to take

the set wire farther away from the wire which is causing the trouble.

So you must see that the aerial does not run close to a power wire, where the electric light is brought to the house, and see that it does not run along the wall in which the wires to a light or power point are carried.

You must also make sure that the set itself is not placed close up to any of the wires of the house system, and take particular care with the earth lead, for this also will pick up the disturbance. It must be several feet away from the source of disturbance.

It is no good, for instance, placing the earth wire in one room running along the floor boards, with an electric wire which is parallel in the next room. The distance between the two (although a wall intervenes) is insufficient to prevent the hum from being picked up.

Similarly with loud speaker leads, which if placed too near to the house wiring will pick up the hum, even if the set does not feed hum into the loud speaker.

### FITTING A POTENTIOMETER TO THE "RADIO TITAN."

X. Y. Z. (Kent).—"I have on hand a 400-ohms potentiometer (Igranic) which I should like to use in my set. It is the 'Radio Titan'.

"I want this potentiometer to regulate the voltage on the grid of the detector valve, but as the grid leak is connected across the .0003-mfd. condenser I cannot see where the connections to the slider go. The other two terminals are connected to the filament terminals on the valve-holder. I think, but where does the slider of the potentiometer go in this set?"

"Can you put me right?"

The "Radio Titan" is very easily adapted for use with a potentiometer-controlled detector grid, but you must be careful to keep the grid lead as short as possible, so a little careful rearrangement of components may be necessary.

As you say, one end of the winding on the potentiometer goes to one filament terminal on the detector valve, and the other end of the winding to the other filament terminal (in other words, one goes to L.T.+ and one to L.T.-). So the only lead which needs modifying is the one to the grid.

At present your 2-megohm grid leak is fixed in clips across the .0003-mfd. condenser. With the new arrangement we still want the grid leak to make con-

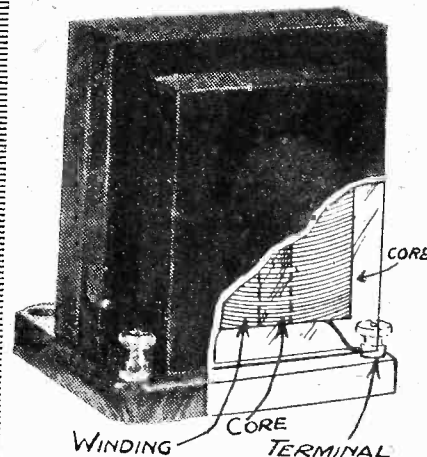
## "INSIDE" INFORMATION.

### No. 12. THE L.F. CHOKE.



Consisting of a big coil of suitable wire closely wound round (and inside) a carefully chosen core with the object of obtaining maximum inductance, the construction is well illustrated below.

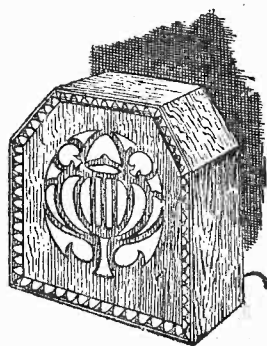
It will be seen that the theoretical symbol (above) also conveys the essential idea of the winding on a core.



tact with that side of the .0003-mfd. condenser which is connected to grid.

The other end of the grid leak must not touch the other terminal of the condenser clip. Instead it is taken straight to the slider of the potentiometer.

That is all there is to do, but although no doubt several ways of carrying this out will suggest themselves, you should choose the one which calls for a minimum of re-arrangement of components.

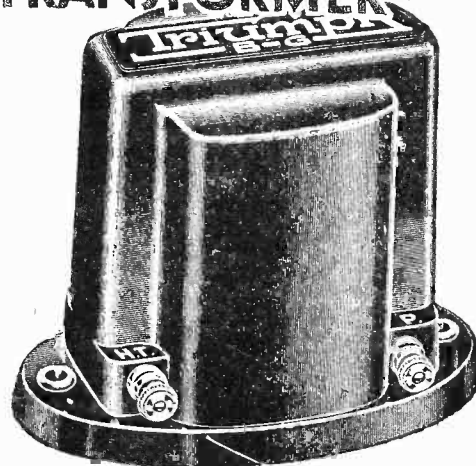


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# DOES FOG AFFECT RADIO?

**D**OES fog affect radio transmission and reception?

It is a question to which widely-differing answers are usually given. One observant amateur will assure you that the presence of fog in the neighbourhood will hardly influence a set's reception at all, whilst another equally conscientious individual will swear that on such and such an occasion a blanket of fog entirely prevented him from obtaining his usually readily-received stations.

Hence—and very excusably so—the reiteration of the question, “Does Fog Affect Radio?”

Really, it is a topic concerning which very little of any definite nature is known.

## The Results of Investigation.

American investigators, a year or two back, claimed to have investigated the question and to have shown that a fog-belt enveloping a transmitting station, the receiving aerial being situated in a fog-free area, had a more detrimental effect on signal-strength than was the case when the receiving aerial was fog-bound, and the transmitting aerial free from fog.

On the other hand, I rather fancy that these results were robbed of a good portion of their value, by the publication by the American Bureau of Standards, at approximately the same period, of a series of results obtained from investigations into the effect of atmospheric conditions of radio transmission and reception.

The B. of S. people said that heavy fog might cause more or less serious fading at considerable distances, but that an ordinary fog was hardly worth bothering about.

Still, I hardly imagine that the Bureau of Standards experts had the advantage of dealing with some of the hefty fogs which we in this country sometimes get. The river fogs of London, for instance, or the brown-black soot-laden fogs of the industrial North.

## Effect On Aerial System.

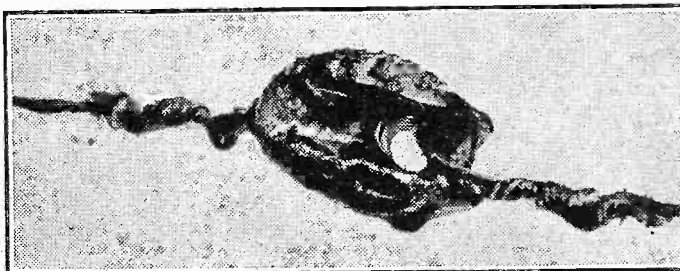
Naturally, prolonged fog is, at any rate, bound to have an indirect effect upon reception if only in view of the fact that a sooty fog not only gets the aerial, the insulators and the lead-in system into a thoroughly wet condition, but that it also results in their becoming covered with a tenacious deposit of black carbon matter, all of which is, of course, bad for the aerial's insulation as a whole. Half a dozen of these fogs, therefore, may very appreciably decrease signal strength.

By J. F. CORRIGAN, M.Sc., A.I.C.

Here is an interesting question, and one that has often been asked by amateurs. Mr. Corrigan points out that while there may be doubt as to the direct effects of fog on radio transmission and reception, its indirect effects are easily enough recognised.

We have also to consider the fact that a fog—even a mist—is, in reality a vast collection of minute water particles, and that each of these particles has a material centre. In other words, during certain states of the atmosphere, moisture vapour condenses around innumerable and almost infinitely small particles of solid matter in the air, which thus form nuclei around which the water particles grow.

## DOES THIS INSULATOR INSULATE?



An aerial insulator that clearly shows the effects of fog in a smoky area! It is doubtful whether the article retains any of its insulating properties.

In industrial cities, of course, the central particles of solid matter are relatively large, and other solid particles are attracted to the condensed droplets, too. The fog, as they say, “gets dirtier and dirtier.”

In many instances it has been shown that the fog particles are electrically charged, and the longer they remain in suspension the greater the charge becomes.

Now, if every fog is really a sort of vast electrified blanket of moisture, it seems very feasible to suppose that ether waves travelling through this must behave in some abnormal manner.

## Losses Due To Fog.

Again, the particles of fog, possessing within them solid cores and dirt particles of every description, must, when surrounding a receiving aerial provide a slight leakage path between the aerial and the ground, and

between aerial and roof or house walls. Here, therefore, we have another source of energy-loss which may quite reasonably be attributed to the presence of fog.

There are, I believe, different kinds of fogs, associated with varying states of the barometer. Perhaps, therefore, to this fact, may be due the seeming discrepancies in the reports of observers investigating the influence of foggy weather on radio reception.

## Weak Spots Will Show Up.

It stands to reason, of course, that if an aerial system of a receiver has any weak spots—weak spots in an electrical sense, I mean—it will show up during a fog period in a worse light than will an aerial which is electrically fit and healthy.

In all these matters, however, what we need are plenty of systematic investigations. It is, in many respects, difficult for the ordinary amateur to embark upon such investigations on his own, owing, for one thing, to the difficulty of correlating his results with those of others. Besides, it is a matter which would require very extended observations.

## A Possibility.

Some day, perhaps, one or more official bodies, either in this country or in others, will tackle the disputed question of fog's influence on radio in real earnest. The results will not only be of the greatest theoretical and practical interest, but they may, also, carry us one stage further to that long-dreamt-of feat—the dispersal of fog by electrical means.

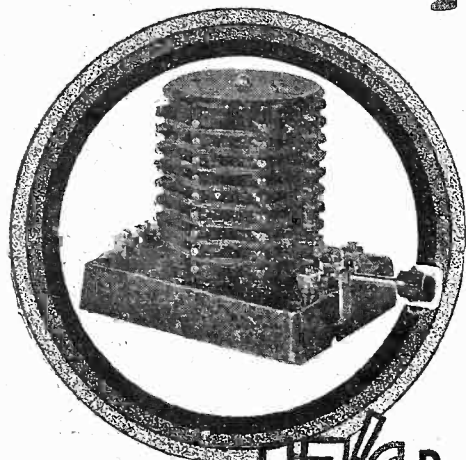
## WHEN BUILDING YOUR NEXT SET

Two little points to bear in mind.

If your cabinet is not quite as big as that recommended for the set you are building, do not forget that alterations in layout often seriously affect efficiency.

After mounting components on a baseboard, turn it over and run over the underneath side with a file to prevent screw points protruding and scratching the cabinet when the baseboard is inserted.

# "Excellent Selectivity"



for 17/6<sup>d</sup>

DESIGNED to meet the new Regional Scheme requirements, the Watmel Tuner serves as the Aerial Tuner for practically all circuits embodying reaction; also it acts as a wave trap, since the loose aperiodic aerial coupling gives great selectivity and a considerable degree of stability. Radio Paris and 5 XX are easily separated, as also are both Brookmans Park transmissions.

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Price complete 17/6

If you cannot get this Watmel product at your dealers, write direct to us and enclose remittance, the tuner will be sent to you by return.

THE WATMEL BINOCULAR H.F. CHOKE gives maximum efficiency, very low self-capacity and an extremely restricted field.

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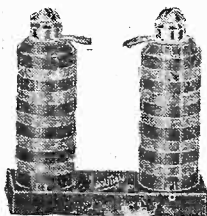
Inductance - 200,000 m.h.  
Self Capacity - 1.6 m.mfd.  
D.C. Resistance 1,400 ohms.

Price 6/-

#### TYPE DX2

Inductance - 40,000 m.h.  
Self Capacity - 1.2 m.mfd.  
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M.C.11

## FOR THE LISTENER.

(Continued from page 794.)

That was less than ten years ago. What they have achieved in that time justifies them. They have "made good." They have made so good that some of the professionals are angry!

### Critics and Criticism.

This is no reason why the B.B.C. should not be criticised, even criticised from the professional point of view. The thing in their hands is no longer a toy, but an instrument of very great power.

They cannot afford to be as irresponsible as they were in the early days. An amateur cricketer playing for his country in a Test Match cannot play quite so lightly-heartedly, or afford to take all the risks, as if he were playing on the village green on a Saturday afternoon.

### The Professional Way.

The Germans are much more professional than we are. I do not know whether their broadcasting is run by professionals or not, but they have the professional habit.

It comes as natural to them as the amateur habit comes to us. I have recently had a little experience of their programmes, particularly their musical programmes, which are very good indeed.

I do not think it would be possible for good music ever to be jazzed on the wireless in Germany, as once or twice has happened in England. The professional instinct would be dead against that.

Most of us would, I imagine, approve the professional instinct in such a matter. There is "light music" in Germany as with us; but there is good "light music" and bad; and you will not find the German programmes ever padded with light music which is "tripe."

That, too, is the professional touch. Moreover, when new music of importance is presented to German listeners, it is preceded by some form of introductory talk which gives the listeners some idea of what it is about, of what the composer is "getting at," of its method, its technique.

That, again, is the professional way. It is a good way. The Germans seem to take for granted that their musical listeners are serious students of music, that they must play up to them, and keep the standard high.

### Those "Lazy" Listeners.

There are, I suppose, many listeners who do not care tuppence what is provided for them so long as it is bright and cheery, and makes no serious demand upon their powers of concentration; something which consorts well with slippers and a pipe, and the free-and-easy time when the day's work is done.

There is no reason why these should not be catered for. The idea of the "alternative programme" was intended to cater for them.

It is not that listeners are "bone-lazy," but that many of them do their listening at a time of day when a man has every right to be lazy.

Every man must have a relaxing time, and it often happens that his relaxing time is his listening time. Personally, I think that such listeners are very well catered for.

They have a much thinner time. I assure you, in Germany! If the B.B.C. does its duty by anybody, it does it by the listener who wants to sit at his ease and be quietly tickled.

It is odd that, if one may judge by the letters in the papers, much of the criticism against the B.B.C. comes from this quarter; as if these listeners wanted all the time, and all the air! That, I think, is greedy.

### A Gramophone Alternative.

It is the quiet and unassuming listener who wants good stuff, who, perhaps, even wants to improve himself, his musical and literary taste, for example, who often gets "left" in spite of alternative programmes. And I have a friend who solves this little problem for himself by having a gramophone and a few favourite records.

When the programme is not to his liking, he does not sit down and write an angry letter; he assumes that somebody is being entertained by what he himself "has no use for"; and he turns to the gramophone, which cannot disappoint him.

A gramophone is a useful adjunct to the wireless set; and you can at least choose your own records.

### Bouquets and Bricks.

We shall continue to criticise the B.B.C. because we know that it is "sporting" enough to take criticism in the spirit in which it is offered, and sufficiently "amateur" to be willing to learn from the opinions of others. There is no doubt that it is an infinitely better instrument than it was a few years ago.

How far that is due to its attention to criticism I don't know, and don't much care. I, for one, am ready with praise.

But my job would be harder, and perhaps not so interesting, if there were nothing left but praise! That, I think, would be dull!

## TECHNICAL NOTES

By J. H. T. ROBERTS, D.Sc.

IN wireless matters it is often very difficult to give definite answers to the many questions which one is asked from time to time. This often seems rather surprising to non-technical people, as they get different answers when they ask the same question of different people!

All this only goes to show that the answer depends to quite a considerable extent upon the opinion of the person giving it, and the opinion itself again depends upon circumstances of the case.

### Matters of Opinion.

There are numerous points, which will occur to your mind immediately, where at least two (and sometimes more) different opinions can be given. For instance, take the old question as to whether anode-bend or leaky-grid rectification is the more satisfactory.

One person you will find is all in favour of anode-bend and will hear nothing to the credit of leaky-grid, whilst another will tell you that leaky-grid is more sensitive, better

(Continued on next page.)



## TECHNICAL NOTES.

(Continued from previous page.)

for reaction-control, and generally more satisfactory and adaptable.

The same sort of thing applies with regard to loud-speakers. Some people swear by the moving-coil speaker, whilst other people complain that they can never get a moving-coil speaker to work on their set nearly so well as the ordinary permanent magnet type.

Again, the pentode valve is the centre of quite a deal of controversy. According to some enthusiasts, there is nothing whatever to be said against the pentode (which does everything under the sun and completely supersedes power and super-power valves); others, however, will say that the pentode does not give good results with their particular speaker.

## Depends Upon Conditions.

In all these cases there is something to be said on both sides, and when a definite opinion is expressed this opinion is based (possibly unconsciously) upon the particular conditions and experience which the giver of the opinion happens to have in mind.

With regard to anode-bend rectification, it is usually considered that this is not so sensitive as leaky-grid rectification, but at the same time there are certain circumstances in which anode bend rectification can be made quite as sensitive as the other type.

If transformer coupling is employed after the detector, then, as a rule, leaky-grid rectification will be found more satisfactory, but if resistance-coupling is used, a decided superiority of signals is occasionally obtained by using anode-bend rectification.

The question of reaction has also to be considered, and you will, as a rule, find that with grid-leak rectification an easy control of reaction is more readily obtained than with anode-bend, but here again much depends upon the type of valve which is used.

Naturally, inasmuch as anode bend rectification depends essentially upon the peculiarities of the characteristic curve, the shape of the characteristic curve for a particular valve should be taken carefully into consideration before deciding its suitability for use with this type of rectification.

## The Moving Coil.

Now with regard to moving-coil and other types of speakers, I suppose most people will agree that in the proper circumstances the moving-coil speaker has a great deal to be said in its favour, but, if there is one mistake more than another which you want to avoid in the use of a radio receiver, it is to try to work a moving-coil speaker from a set which is inadequate to the task.

In such circumstances it is infinitely better to do away altogether with the idea of using a moving-coil speaker and to adopt a speaker of the ordinary cone type.

Another point is the question of the characteristics of the speakers. For instance, as you know, the moving-coil speaker tends to bring out well the bass or lower parts of the register, whilst there are other kinds of speaker which favour the higher parts of the scale.

Now, if the output from the receiver or, if you like, the input into the loud-speaker,

(Continued on next page.)

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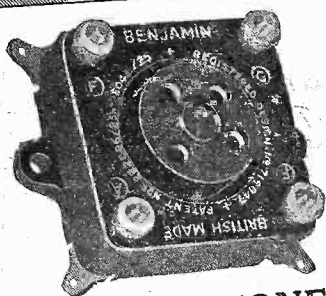
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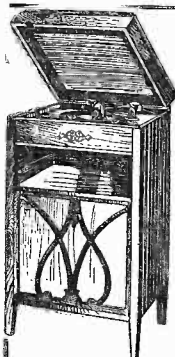
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## TECHNICAL NOTES

(Continued from previous page.)

happens to be on the shrill side, that is, if it favours the upper registers rather than the lower, it is clearly a disadvantage to use a type of speaker which still further emphasises the peculiarities of the input.

### A Question of Balance.

This brings me to the question of the pentode valve when used as the output stage of the receiver. As you know, the output from the pentode is apt to be rather on the shrill side and, consequently, if this output is fed into a moving-coil speaker, it is quite likely that the two opposite characteristics will, to some extent, counterbalance, and you will get quite good results.

With ordinary power or super-power valves, although you may get volume in your moving-coil speaker, often you do not get the same clearness and brilliancy as you do when using a pentode output stage. Of course, I am assuming that the moving-coil speaker does not happen to have any quality of shrillness in the upper register; this sometimes is present but not very often.

### Adaptability of Valves.

In view of the advantages of a pentode valve (when used under proper conditions), many people jump to the conclusion that the pentode is simply a kind of couple of super-power valves rolled into one, and that all you have to do is to dispense with a couple of power or super-power stages and substitute the pentode. The truth, however, is nothing of the sort.

With the pentode you certainly obtain a considerable amount of power output for one stage but, as I have emphasised, everything turns on the suitability of the conditions in which the pentode is to be used, and unless you know sufficient about the pentode to be quite certain that you have the right conditions, you would be much better advised to keep to power valves.

In short, the pentode may be described as a temperamental valve, and is not nearly so adaptable as the ordinary straight power valve, consequently the same liberties cannot be taken with it.

From the examples which I have chosen—and experimenters will agree that these are fairly representative ones—you see how very difficult it is to give a definite answer to an apparently simple question with regard to radio considerations.

Almost invariably, if you deal with the question conscientiously, you are obliged to preface your reply with the remark that "it all depends upon the conditions," and this is why people seeking advice from their radio friends are so often perplexed and apt to get the impression that "no two experts seem to agree with one another!"

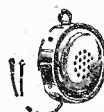
### Portable Set Problems.

At first sight the advantage of a portable or so-called portable receiver is that it can be carried about from place to place, but as a matter of fact it has been ascertained that only a very small percentage of people who own portable receivers (or portable gramophones either, for that matter) ever carry them about any further than from one room to another, and then only very occasionally. The real advantage of the portable set is that it is self-contained, and as a rule, requires neither aerial nor earth.

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

One of the incidental advantages of the self-contained receiver is that it can be turned about so as to bring the plane of its frame aerial into the best position for receiving the desired station and for rejecting unwanted stations.

This seems all very simple, but when the frame aerial is enclosed within the receiver, so that the receiver as a whole has to be rotated in order to rotate the aerial, a peculiar difficulty arises. It is just this, that by the time you have got the set in the best position for the aerial, it may be in the worst position for the loud speaker. You may, in fact, find that the set is so placed that it is very inconvenient for listening.

### Aerial Position.

This difficulty can be got over by picking up the set bodily and shifting it to another part of the room, when the orientation will be the same but the loud-speaker will be facing in a suitable direction. But it is obviously altogether inconvenient to have to cart the set about in this way, and some other simpler method must be found.

The difficulty mentioned has been got over in a very simple way by some portable-set manufacturers by providing for the independent rotation of the aerial, the rest of the receiver remaining fixed. This can be done by mounting the aerial upon a door of the cabinet so that it can rotate in a horizontal plane remaining itself throughout in a vertical plane.

### Another Possible Solution.

Even this method is sometimes open to objection, because if the frame aerial has to be rotated through any considerable angle, and if it is of any appreciable size, it is apt to strike surrounding furniture or other objects which is very inconvenient. However, it is much preferable to moving the set itself about from one place to another.

Another solution of the difficulty is to mount the loud-speaker in a horizontal position—for instance, in the top of the cabinet of the receiver. In this case clearly the receiver as a whole can be rotated without making any difference to the loud-speaker.

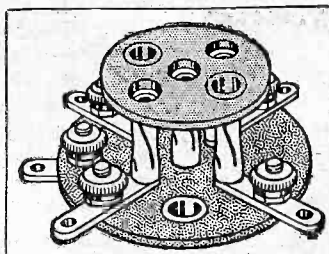
But even this method has its own particular drawbacks, the obvious one being that the loud-speaker is not intended to work when lying in a horizontal plane, and the volume of sound is distinctly less than when the speaker is directly facing the audience.

### Voltage Dividers.

When arranging for the provision of different voltages from a unit by means of resistances, on the potentiometer principle, with different tappings, it sometimes seems a little difficult to determine the total shunting or potentiometer resistance to use and the points from which to take the tappings.

In the case of an ordinary potentiometer arrangement, where the total resistance is high enough to ensure only a very small current being drawn from the source, and where the current taken from the tappings is very small compared with the main current, we can assume that these tapped currents

(Continued on next page.)



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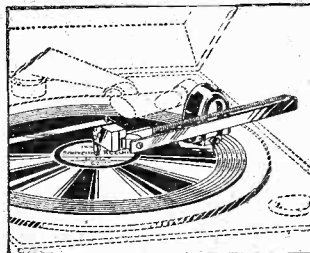
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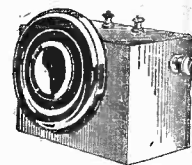
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## TECHNICAL NOTES

(Continued from previous page.)

will have no appreciable effect upon the potential-gradient of the potentiometer.

The problem in that case is very simple, and the voltage between one end of the potentiometer and a tapping is simply proportional to the resistance between the two.

In the case of an H.T. unit, however, the current taken from the tappings may easily be comparable with the current through the main resistance, and consequently we cannot assume at all that the conditions are similar to those in an ordinary potentiometer. Indeed, the current in one of the tappings may easily be more than half the total current output of the unit.

### Calculating Tappings.

The first section of the resistance—that is, the part between the positive output terminal of the unit and the first positive tapping—will carry the current which goes to the first tapping and also the current which goes on to the second, and any subsequent tappings and to the negative terminal of the unit.

If we know the voltage-drop between the positive terminal and the first tapping and the total current including an allowance of, say, 10 m/a for the steady potentiometer current, we can immediately determine (by Ohm's law) what must be the resistance between the positive terminal and the first tapping.

Now, if we proceed on from the first tapping to the second tapping we know the voltage difference required between these two and we know that the current passing through the voltage divider at this part (which may be called the second section) is equal to the total current minus the current which has been taken off at the first tapping.

Knowing this current in the second section of the voltage divider and the potential difference between the first and second tapping, we can again immediately determine by Ohm's law what must be the resistance between the first and second tappings.

### Current in Different Sections.

If there are only two tappings the third section of the voltage divider will be the "return" from the second tapping to the negative terminal of the unit. The current in this third section is the 10 m/a we decided upon and from this we can determine immediately, by Ohm's law again, the resistance which must be included in the voltage-divider between the second tapping and the negative terminal of the unit.

### The Total Resistance Necessary.

These three resistances added together give us the total resistance of the voltage divider, and the individual values of the three separate sections show us where to take off our tappings.

Of course, instead of being arranged in series in the form of a voltage divider resistances may be arranged separately for different tappings, in which case the resistance for any particular tapping is found simply by determining the current required in that tapping and the voltage drop necessary from the positive terminal of the unit to the tapping in question.

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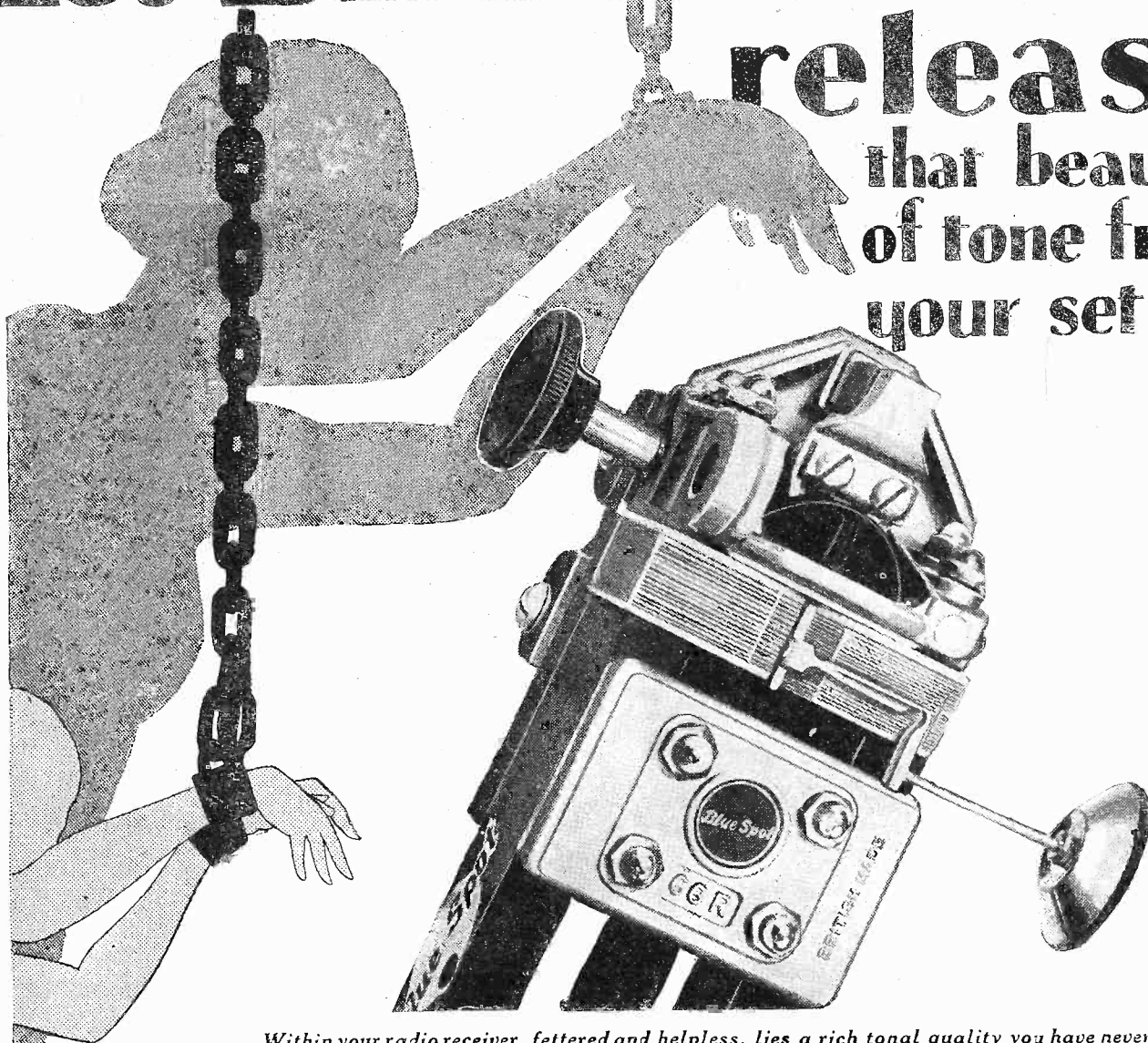
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12/6



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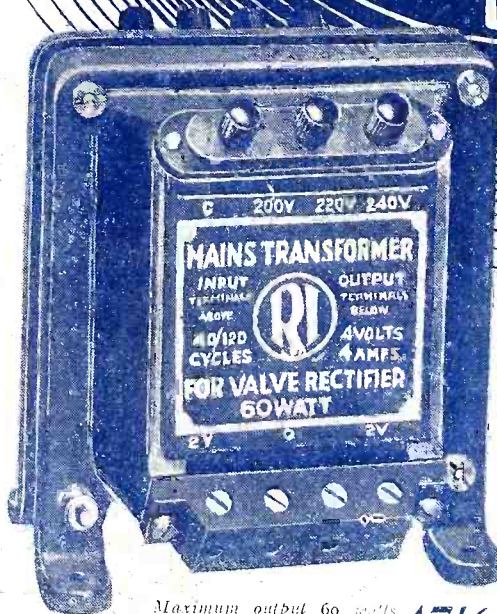
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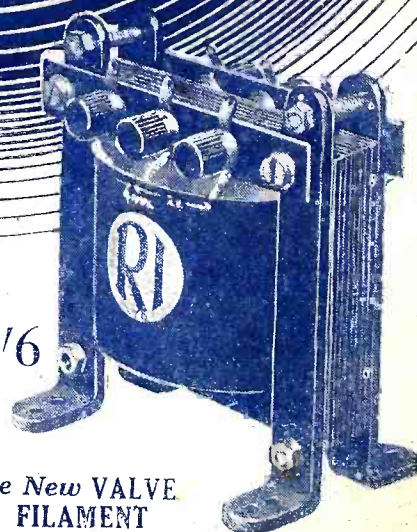
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