

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

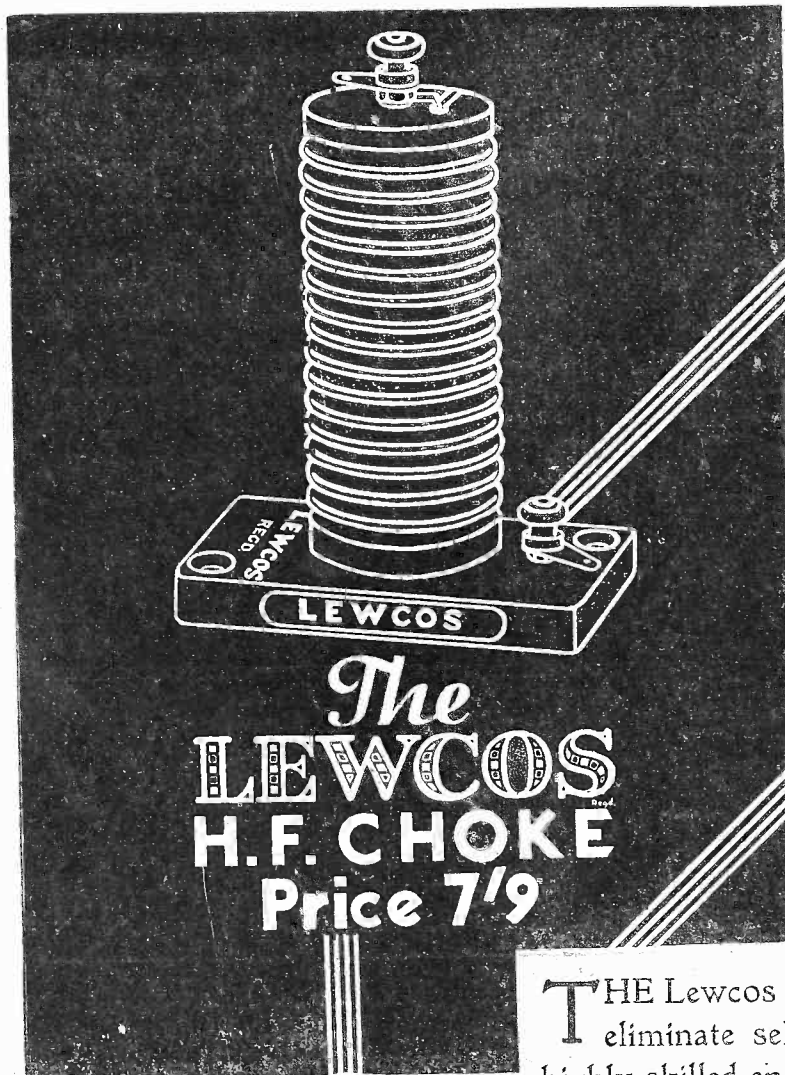
SEE
INSIDE

ALSO THIS
WEEK

THE GERMAN GIANT

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





MADE BY
MASTER-
CRAFTSMEN

The
LEWCOS
H.F. CHOKE
Price 7/9

THE 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.

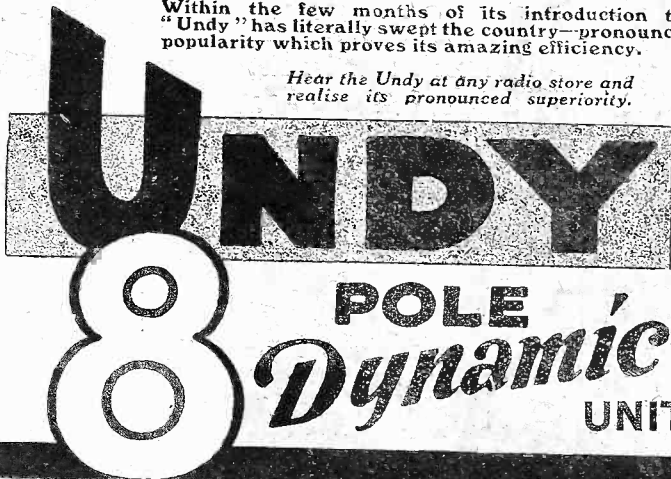
This extreme sensitiveness ensures the maximum result from every receiver, however small and removes the necessity of high-power final stage valves, with the consequent saving on power whether from batteries or mains.

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

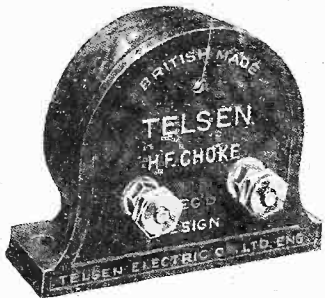
Hear the Undy at any radio store and realise its pronounced superiority.

Pat. No. 336930.

Pat. No. 336930.



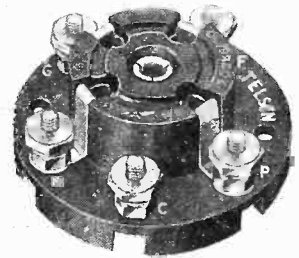
VIVID REPRODUCTION!



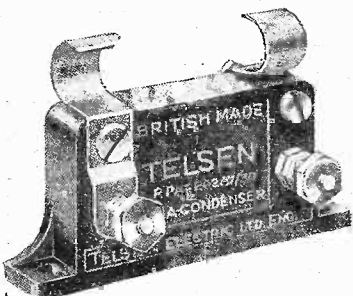
TELSEN H.F. CHOKES. Designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in genuine Bakelite. Inductance 150,000 microhenries. Resistance 400 ohms. Price 2/6 each.

Reproduction is astoundingly DIFFERENT when Telsens 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 Telsens reliability and vivid reproduction CANNOT BE MATCHED!

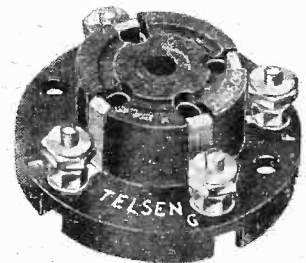
See that your Set incorporates Telsens Components!



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. 2028750-0003 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.



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

TELSEN COMPONENTS

Dept. of Telsens Electric Co., Ltd., Birmingham.

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-latching, 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?

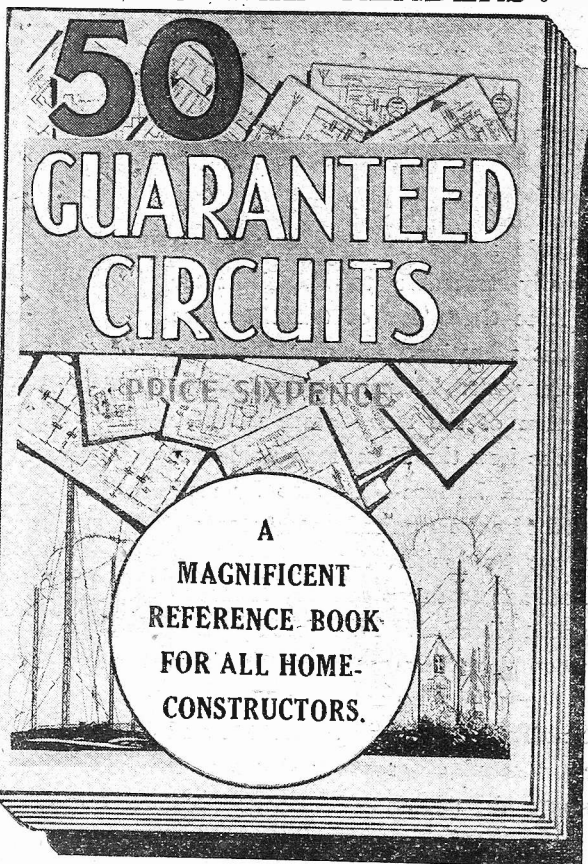
A complete break-away from standard design is always refreshing, and you will find the "L.S. Three" more than comes up to your expectations of a real novelty in radio receivers. The whole thing is built inside an ordinary cone loud speaker, and... but you must read the whole story in "M.W." this month.

"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 Multiacher-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 Konigsberg'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



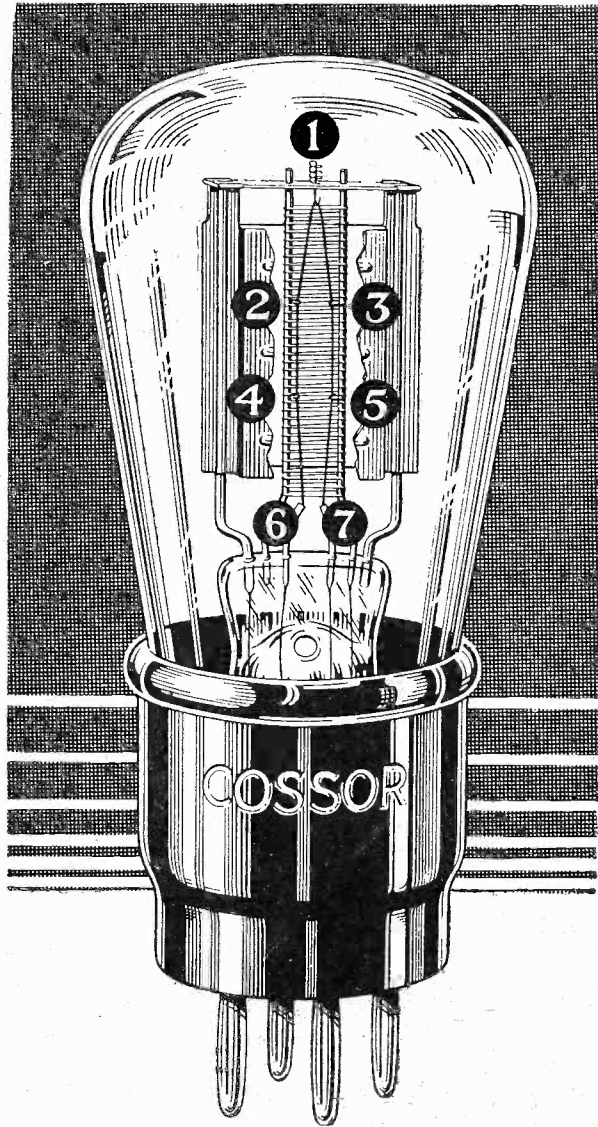
Pointing out one of the finest gift-books ever offered to the public—the Free 50 Circuit Book presented with the January "Modern Wireless."

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

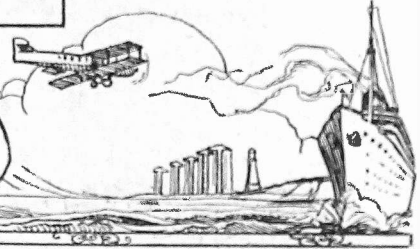
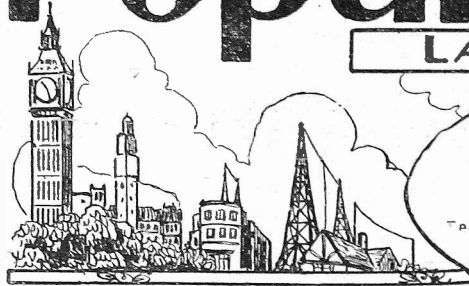
DEFINITELY FREE FROM MICROPHONIC NOISES

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

♡ 7120

Popular Wireless

LARGEST NET SALES



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 Sir OLIVER LODGE, F.R.S.
 Chief Radio Consultant:
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 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."

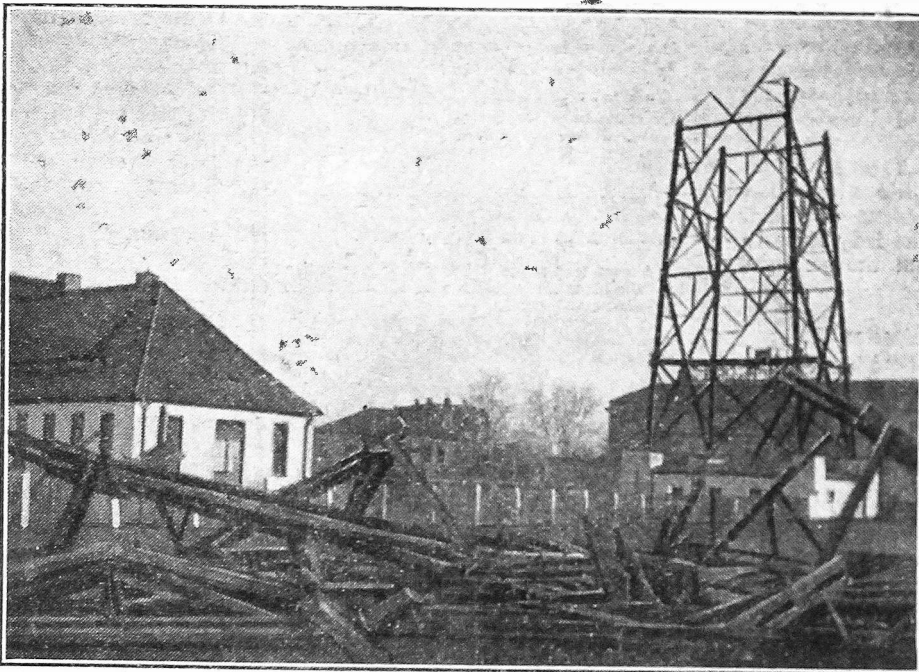
IF the B.B.C. announcers read the "New York Times" eulogies of them, the air must have been clamorous with the ping of flying waistcoat buttons, sartorial sacrifices to self-satisfaction. Says Noo York, "The British announcers have become the politest and best-informed men in England; at the microphone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

ICALL 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.E.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 electric 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.E.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.

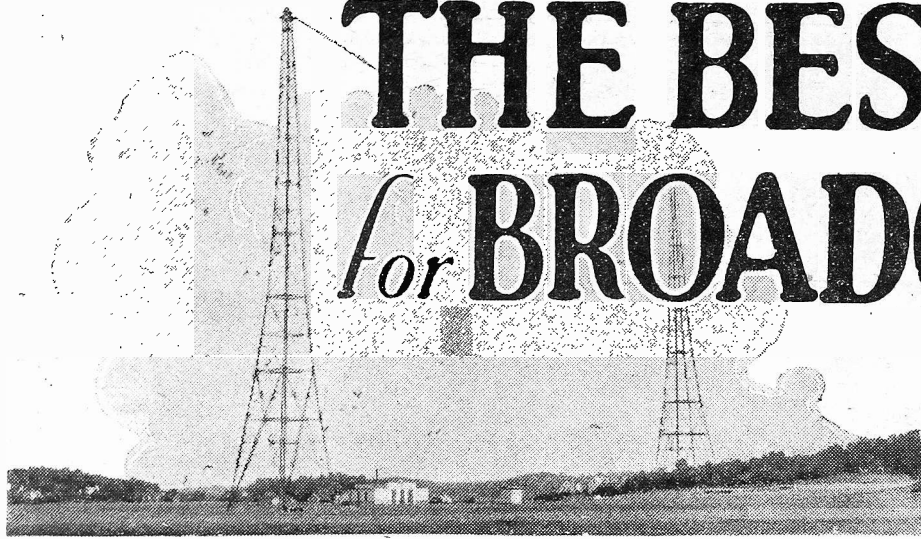
Looking Ahead.

HARDLY have I done broadcasting my good wishes for Christmas than in goes the jolly old quill again, to come up dripping with dittoes 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.

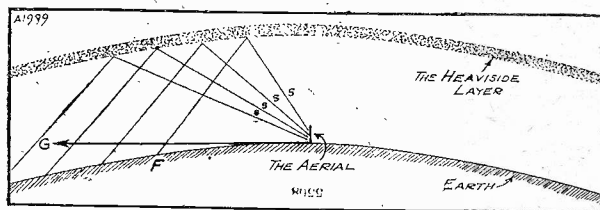
ground ray (at intervals). But if the wave were longer the ground ray is stronger (see previous article). But the space ray strength is independent of wave-length and so the point of intolerable fading is moved further away from the station when the wave is longer and the ground ray stronger.

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 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.

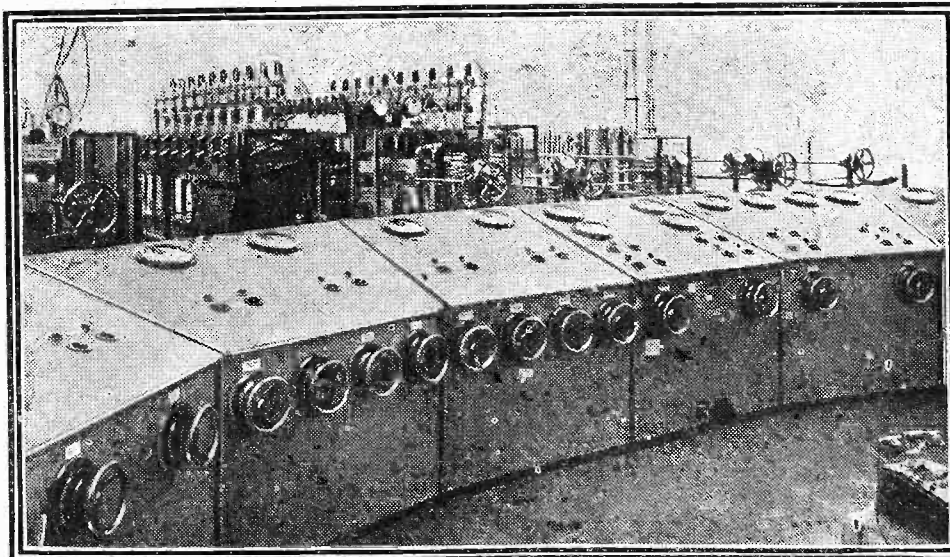
Munich's aerial masts, only 80 metres in height, were blown down by a storm towards the end of November, and they were of wood—in fact, the first wooden masts ever to be used by a broadcasting station.

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 Löffelstelz.

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.

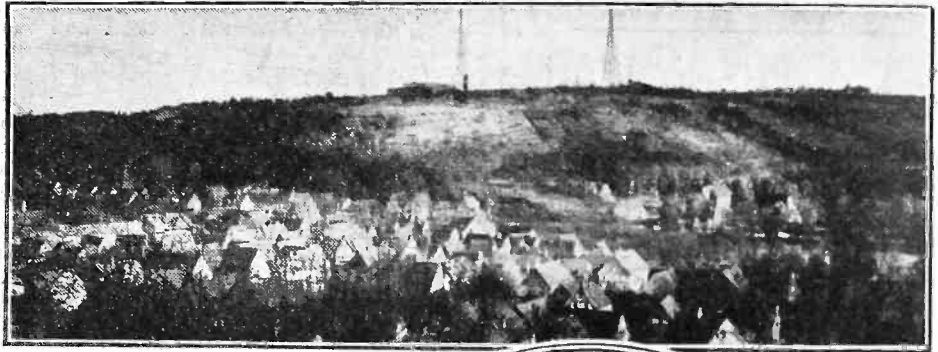
An imposing machine hall completes the layout of the station. Only half of it is occupied at the moment, space having been left for the necessary machines if the power requires increasing.

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?

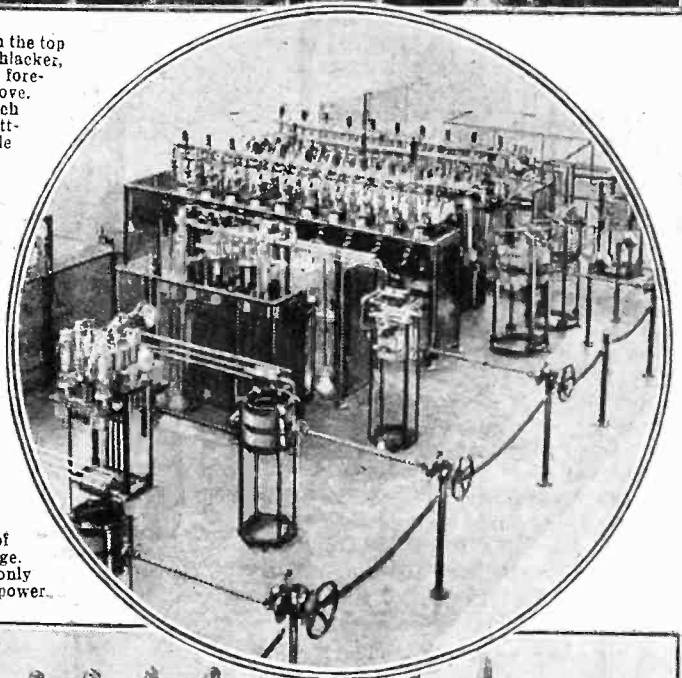
Should this prove insufficient, I understand that an agreement exists to the end that Strasbourg will then exchange waves with Bordeaux Lafayette, to prevent mutual interference. Of course, selective sets can keep them apart, but local Strasbourg and local Mühlacker listeners with older apparatus may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

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

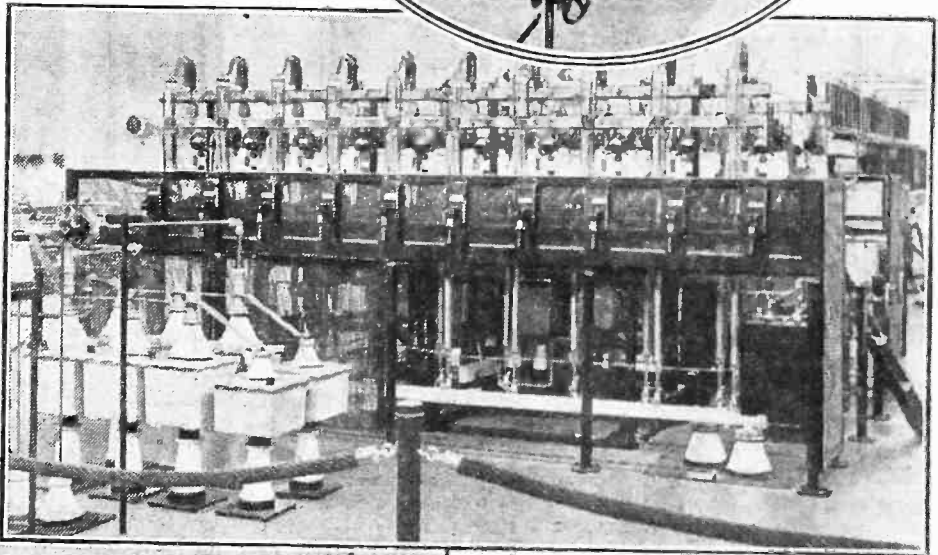


The new station is situated on the top of a hill just outside Mühlacker, which can be seen in the foreground of the photograph above. The masts of the station (which is about midway between Stuttgart and Carlsruhe) are visible on the horizon.

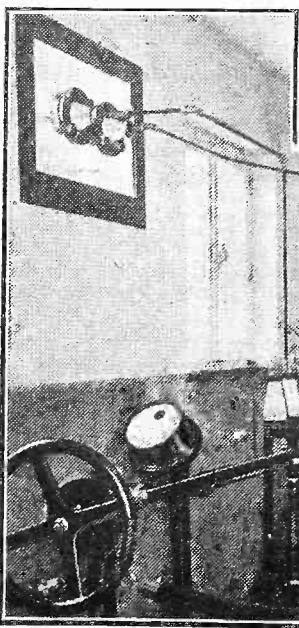
SOME VIEWS OF GERMANY'S FIRST REGIONAL STATION.



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.

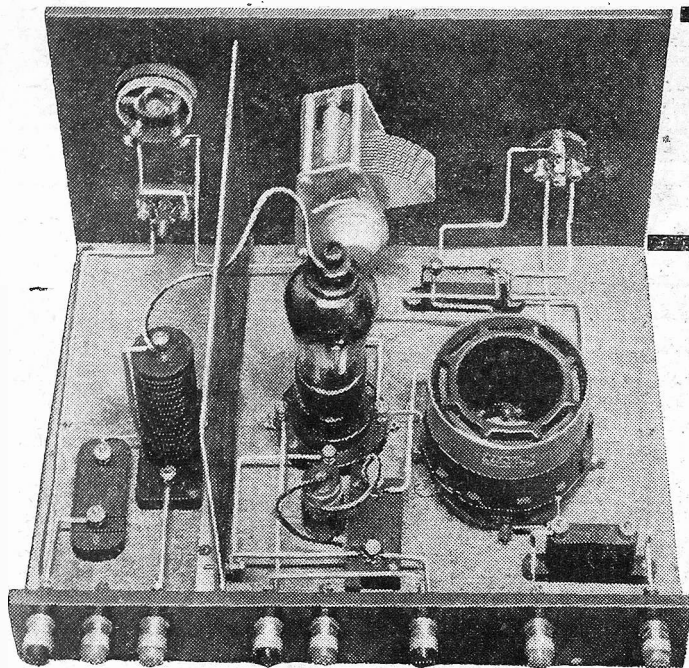
They have so many other interests to consider. So it fell into the hands of amateurs. From all accounts, they had a hard time, but quite an amusing time.

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.

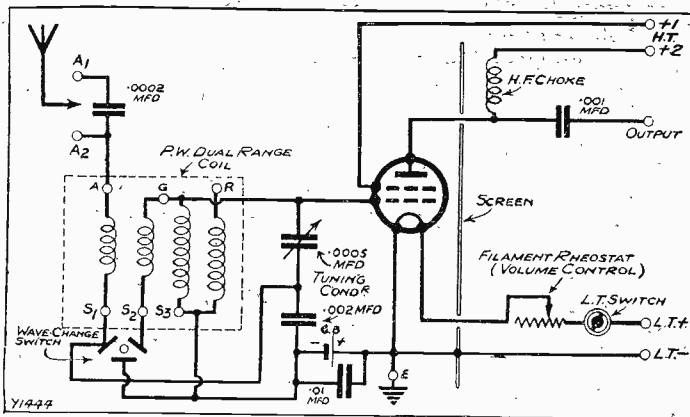
What that unit will do is plenty, to lapse for a moment into the lingo of the talkies, but in brief its function is to give your set the two qualities which are absolutely essential for real genuine "DX" work.

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, Igranic, 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 Igranic, Lissen, Benjamin, Ready Radio, Keystone, Bulgin, Wearite, Lotus, Red Diamond, Junit, Pioneer, Magnum, Ormond, etc.).
- 1 Fil. rheostat. (Wearite, or Lissen, Igranic, 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, Igranic, 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, Igranic, Lotus, Benjamin, Lissen, Clix, Bulgin, Junit, etc.).
- 1 H.F. choke (Lewcos, or Ready Radio, Telsen, Varley, Igranic, 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 Igranic, Clix, Eelex, 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 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.

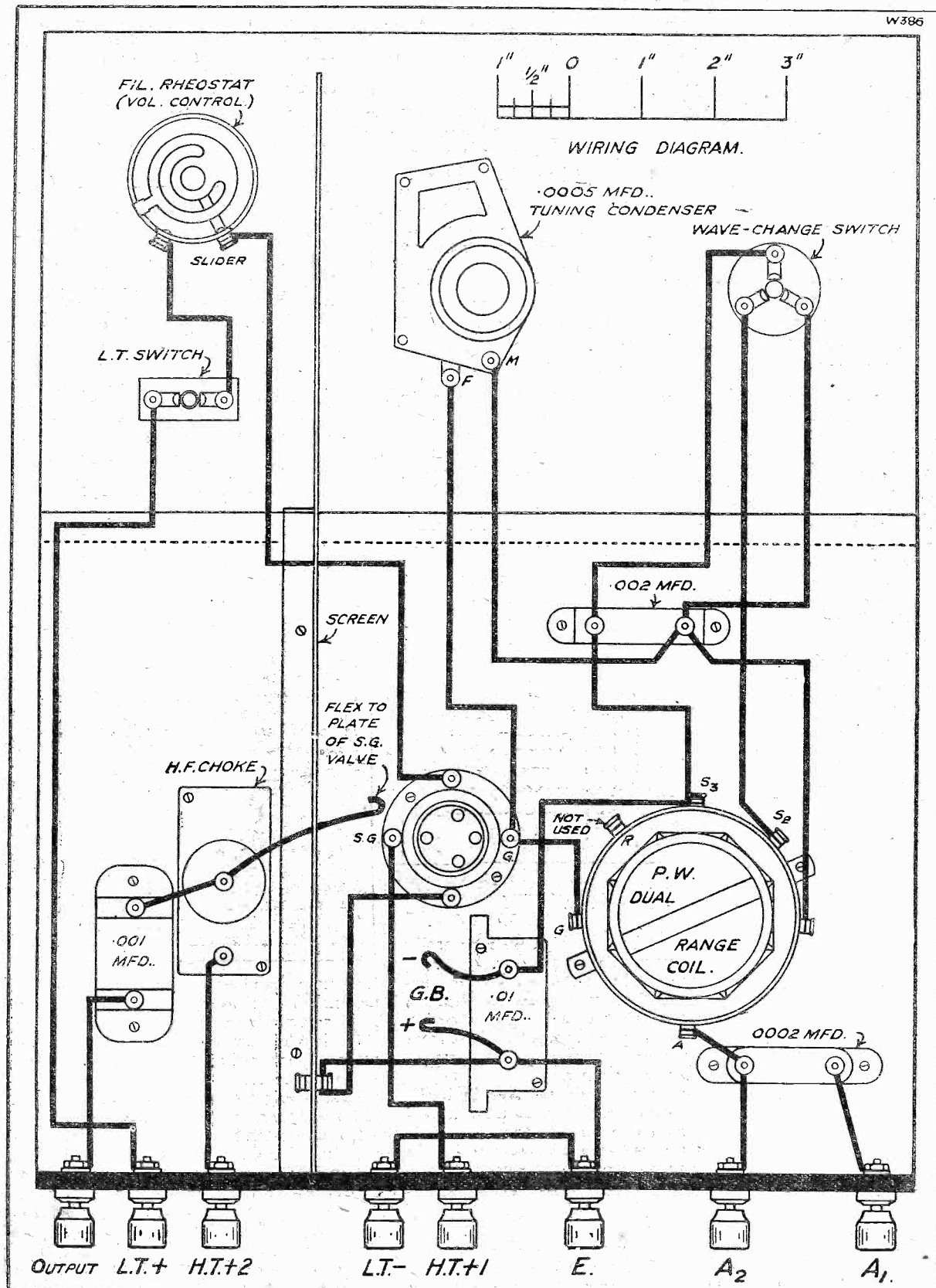
The latter takes the form of a filament rheostat operating on the S.G. valve, and it is to be noted that this should be of a resistance suited to the filament voltage of the valve you are going to use.

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.)

NOTHING MUCH IN IT—BUT PLENTY COMES OUT!



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.

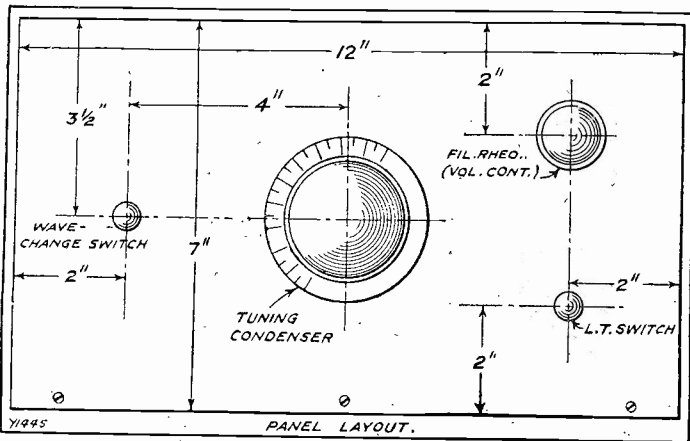
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just to cut the H.F. unit out of circuit when receiving the local.

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

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 A₁ for normal use, but try it also on A₂.

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-

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.

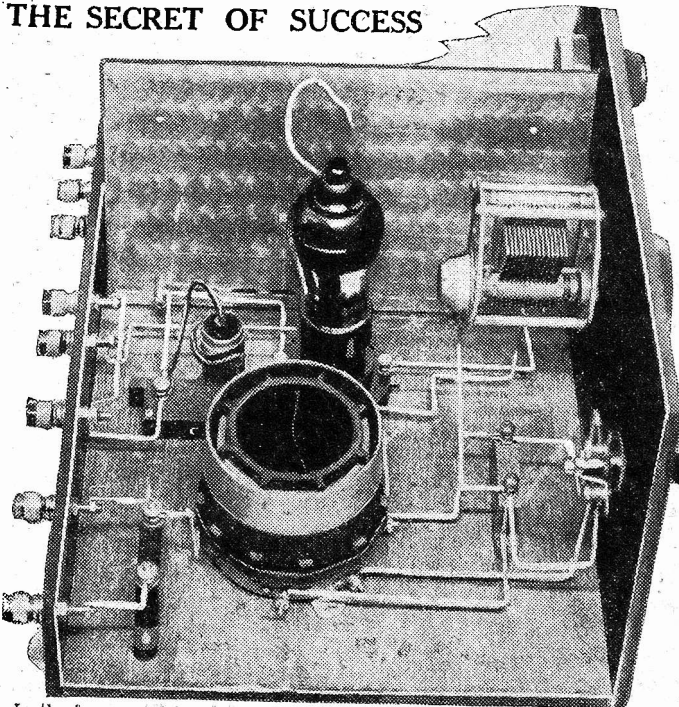
To terminal H.T. +1 apply 60 to 80 volts, adjusted later for the best volume. This is best done on the weakest distant station you can find.

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.

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.

RADIO ODDS AND ENDS

Copper-plated steel screws are now available to constructors, and being rufless 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

MOST 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!

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.

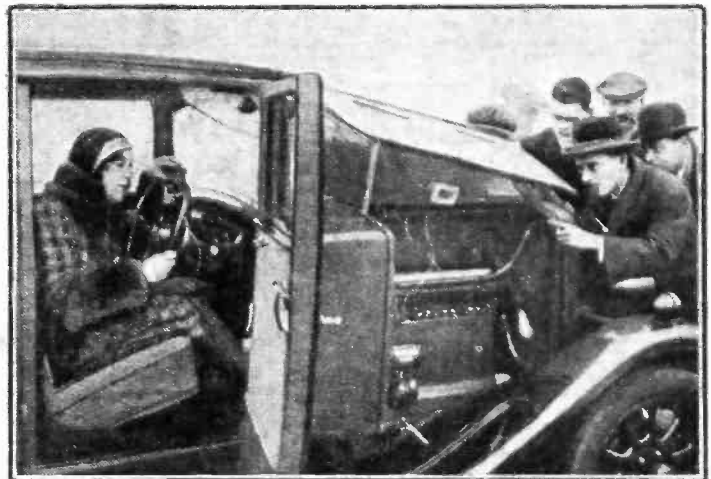
Preliminary reports for the first seven months indicate that by the end of 1930 this total will rise to at least \$28,000,000."

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.

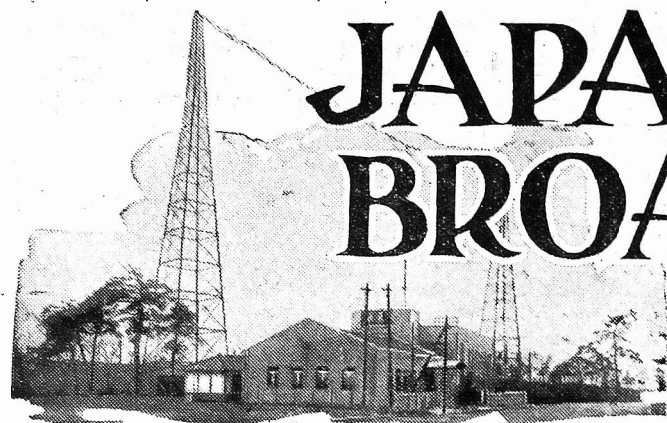
NEXT WEEK

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.



RADIO 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. broadcasting 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 defector 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 32.08 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.

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,

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.

REPRODUCTION.... THAT MAKES YOU VISUALISE

The Apache

TENSE REALISM



The Apache—that dance of life ... and death ... full of tense movement and changing moods ... now gay ... now grim ... holds the audience enthralled! and TELSEN ... that greatest of all Radio Transformers ... gives reproduction that is so vivid ... so absolutely realistic ... that when such music is broadcast ... a mental picture ... clear ... lifelike ... REAL ... is unconsciously formed in the mind!

The outcome of many years practical radio experience, TELSEN Transformers are built on sound radio engineering principles—they will stand and have stood the TEST OF TIME. Put life ... reality ... into your set!—Get greater volume ... greater purity ... with

TELSEN

TRANSFORMERS

“ACE” TRANSFORMER - 8/6

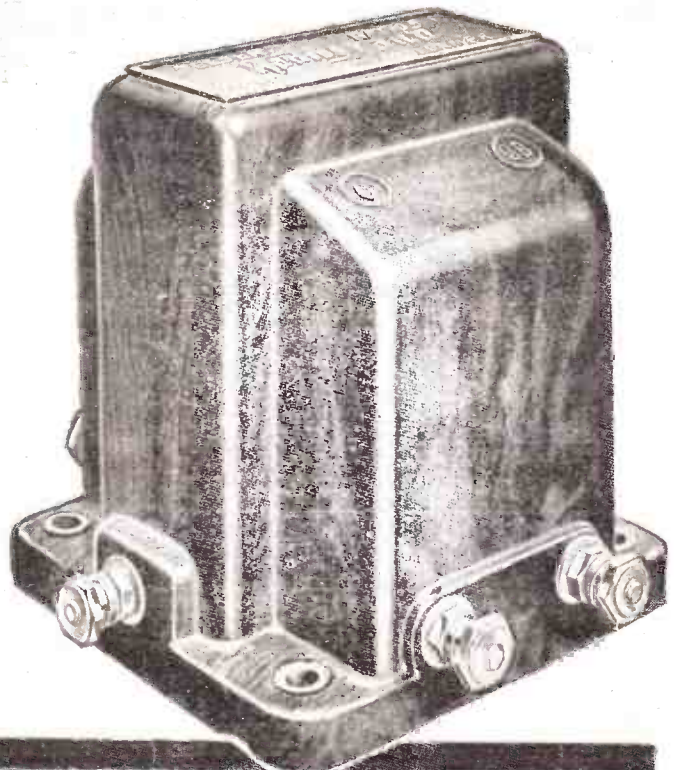
Ratios 3-1 and 5-1.

“RADIOGRAND” - - - 12/6

Ratios 3-1 and 5-1.

“RADIOGRAND” - - - 17/6

Super, Ratio 7-1.



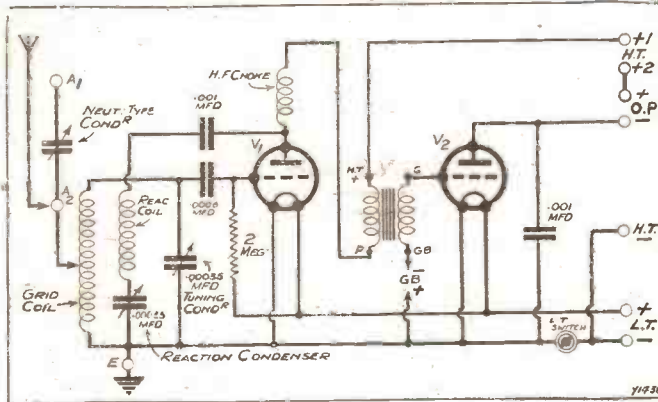
"THE GLOBE-TROTTER!" When a small set like this gets a big name like that you can be sure there is a good reason for it. And nowadays, when the ordinary two-valver receives Continental stations quite easily, a "Globe-Trotter" must be capable of covering enormous distances if it is to be worthy of its name.

Well, this set is a *real* globe-trotter. It thinks nothing much of crossing the Atlantic, and getting a programme from America if the local station's fare is not to its liking.

Five Continents!

Europe, Asia and Africa are all within its scope, and it even gives you a sporting chance of getting Australia—12,000 miles away. How's that for globe-trotting?

FROM 20—2,000 METRES



The circuit was chosen very carefully, for the set is intended not only as a short-waver, but as a general-purpose receiver as well.

Yet it is quite a simple set, not at all expensive or difficult to build. And you can probably guess the reason for its remarkable range? Yes—it is a short-waver!

For some people the term "short-wave set" covers a whole world of mystery. They think it means very special low-loss construction, special apparatus, and terribly tricky tuning. And—not unnaturally—they are a bit afraid of it.

ONLY A FEW PARTS REQUIRED

- 1 Panel, 12 in. x 7 in. (Red Seal, or Lissen, Goltone, Becol, etc.).
- 1 Cabinet, with baseboard 7 in. deep to fit (Pickett, or Cameo, Osborn, Lock, etc.).
- 1 On-off switch (Ready Radio, or Lissen, Goltone, Lotus, Bulgin, Igranie, Benjamin, Red Diamond, etc.).
- 2 0.0035- or 0.003-mfd. variable condensers (Formo, or Lotus, Igranie, J.B., Ormond, etc.).
- 2 Single coil holders (Lotus, or Igranie, Lissen, Wearite, Keystone, Magnum, Red Diamond, etc.).
- 2 0.001-mfd. fixed condensers (T.C.C. and Lissen, or Ediswan, Telsen, Ferranti, Dubilier, Igranie, Ready Radio, Mullard).
- 1 0.003-mfd. fixed condenser (Dubilier, or Telsen, Lissen, etc.).
- 1 2-meg. grid leak and holder (Dubilier, or Lissen, Igranie, Ferranti, Ediswan, Mullard, etc.).
- 2 Sprung type valve holders (Igranie, or Telsen, Lotus, Benjamin, W.B., Lissen, Bulgin, Clix, Dario, Junit, etc.).
- 1 Short-wave H.F. choke (Magnum, or Igranie, Wearite, Keystone, etc.).
- 1 L.F. transformer (Lissen, or Telsen, Igranie, Varley, Ferranti, R.I., Lotus, Mullard, Leweos, etc.).
- 1 Neut. type condenser (Bulgin, etc.).
- 1 Terminal strip, 12 in. x 2 in.
- 10 Terminals (Ealex, or Igranie, Clix, Belling & Lee, etc.).
- Screws, wire, flex, clip, etc.

It really is time that this old bogy was laid by the heels, and buried once and for all. For short-wave reception is *not* a branch of conjuring. It is the perfectly natural and easy outlet for the man who wants to reach out into *real* distance.

There is no mystery about it. Just the simple technical truth that short waves will "carry" over distances that would be hopeless for ordinary wave-lengths.

In other words, it isn't so much the set or the parts in the set that are so remarkable. All the "wonder" in this short-wave work lies betwixt one aerial and the other—and that journey in space really is wonderful! But the man who owns the set need not bother two hoots about that part of it unless he wants to!

"Thin Coils."

He has a set that looks just like any other set except for small differences. (The coils look a bit thin, for instance, but nobody need mind that.) And he operates that set in very much the same way that an ordinary set is operated.

This "Globe-Trotter," as you will see, has two dials on the panel; the one on the left for tuning, and the other for reaction. Below them is the on-off

switch. Nothing very remarkable or difficult about that part is there?

Radio Paris and 5 X X.

Looking at the photographs which show the back of panel you find a similar state of affairs—everything quite straightforward and above-board. In fact, looking it over, it seems a simpler-than-usual set. Certainly nothing to be afraid of in the way of construction.

As a matter of fact, the set conforms so closely to standard design that if you plug-in a pair of ordinary coils into the coil holders you can carry on with ordinary reception. And if you plug-in long-wave coils you can go up and listen to Daventry 5 X X, Radio Paris, and the other long-wave favourites. But, nevertheless, it is a real "hot" short-waver.

Put a 4-turn coil in the outer coil-holder, and another 4



A short-waver par excellence, this two-valver is a real globe-trotter. As the following article puts it. "The set thinks nothing much of crossing the Atlantic and getting America. Europe, Asia and Africa are all within its you a sporting chance of getting Australia." A simple

Designed and Described by the "P."

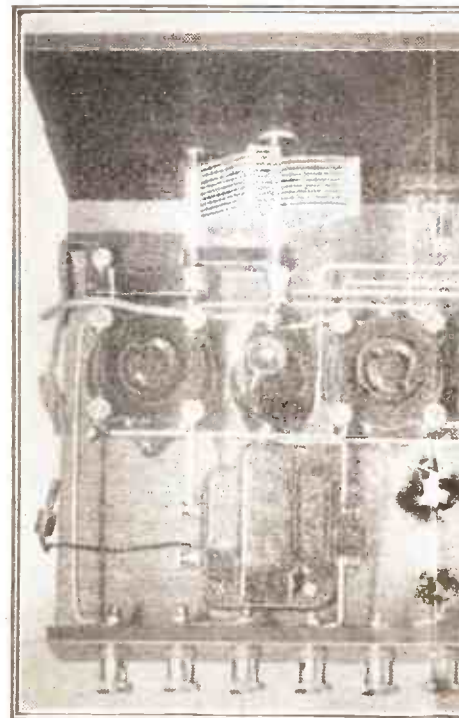
or a 6 in its companion holder, and you can scour down below the 60-metre mark. You can pick up programmes from places you never heard of—some of them at loud-speaker strength, too!

Special Considerations.

It is true that the tuning needs a little more finesse than that on ordinary waves. But isn't it worth it? Why stick to one continent when a set like this gives you four others up your sleeve?

Let us look over the diagram and see just what

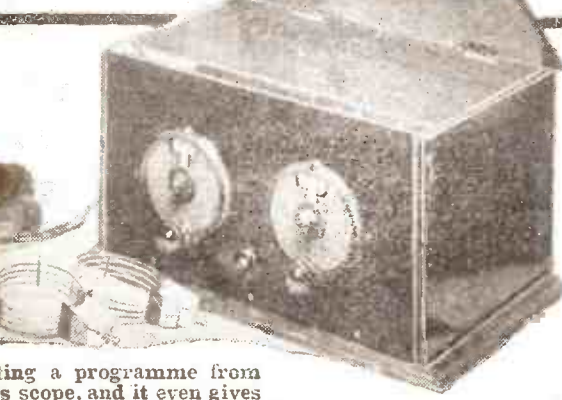
ORDINARY WAVE-LENGTHS



The "Globe-Trotter" is just as effective on its medium frequencies. It is, in fact, a

A REMARKABLE TWO-VALVER THAT

TROTTER



ing a programme from
s scope, and it even gives
ple-to-build, easy-to-operate set.

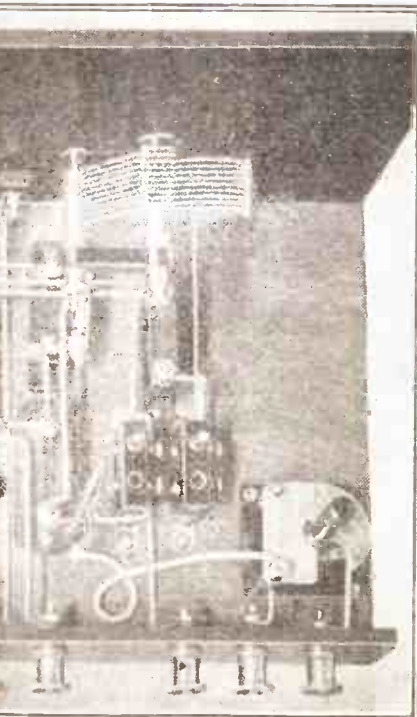
W." RESEARCH DEPARTMENT.

the various parts are for, and where the special short-wave features come in. The theoretical diagram shows the circuit, and we will begin at the aerial (left).

There are two aerial terminals, you will note, with a neutralising-type condenser joined between them. If you connect the aerial lead to the lower one you obviously cut this small condenser out of action, and that is where you want it for ordinary and long wave-lengths.

When going over to short waves the aerial lead is joined to the upper aerial terminal, and then

LENGTHS AS WELL!



m and long wave-lengths as it is on the ultra high most versatile little set.

the condenser is in circuit and ready for use if it is wanted.

Its purpose is to help you to get smooth and reliable reaction, for sometimes a short-wave set will oscillate nicely, except in one place on the dial, and there you find a sort of "dead spot." How ever much reaction you give it it "sulks" just there: but you will find that this tendency can be overcome entirely by altering the neutralising-type condenser's setting a little.

The Coil Tappings.

Generally you don't need to touch that condenser at all—just set it about half-way round and leave it. But if a "dead-spot" develops on the dial all you have to do to remove it is to re-adjust this small condenser mounted on the baseboard. Simplicity itself.

Coming from one side of this neutralising-type condenser is a flexible lead with a clip on the end. For ordinary waves that clip goes on to the X-coil tapping. (Try it on different tappings in turn to see which gives you the required blend of strength and selectivity.)

But when you work on short waves the coils have no X-tappings. Instead they consist of only a few turns of bare wire. The clip then enables you to tap anywhere that you like along the bare wire—you will soon find which position gives best results, under any given conditions.

Tuning.

Still considering the diagram, the next point of interest is that the "Globe-Trotter's" tuning condenser is a .00035, instead of the more usual .0005 mfd. This value was chosen specially for this set, because a .0005 is really too big for short-wave work, whereas a .00035 is nearly as good on ordinary or long waves as a .0005.

It certainly does not cover quite such a wide band of wave-lengths. But if you have a good selection of plug-in coils, you can reach the upper part of the tuning range by using the next size larger coil. While on short waves there is no doubt about the advantage of having a .00035 or .0003 instead of a larger value for tuning.

This point of the size of the tuning condenser is worth stressing, for even with a good slow-motion dial .0005 is too big for easy handling on very low wave-lengths.

Very Simple Construction.

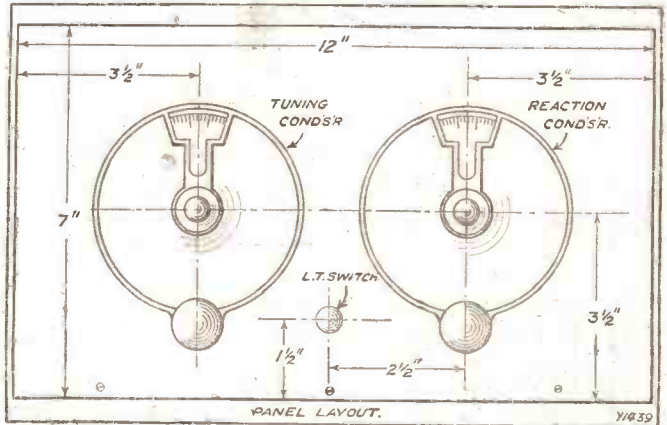
We have been able to go into the foregoing considerations in some detail because there is no need to say much about actual construction, etc. It is simply a case of getting the components named, mounting and connecting them as shown, and then exploring all the wave-lengths you wish for.

The valves can be either 2-, 4- or 6-volters, the first one (detector) being of the H.F. or special detector type, and the second a small power valve, if a loud speaker is to be used.

For 'phone work—and 'phones are usually much better for real long-distance reception—an L.F. type of valve will be better than a small power valve.

The L.T., H.T., and G.B. batteries will, of course, depend on the requirements of the valves chosen, and usually a 9-volt grid-bias battery will be employed, with an H.T. battery of not less than 100 volts. (For loud-speaker work a somewhat higher value is better.) The coils required are.

THE CONTROLS ARE VERY SIMPLE

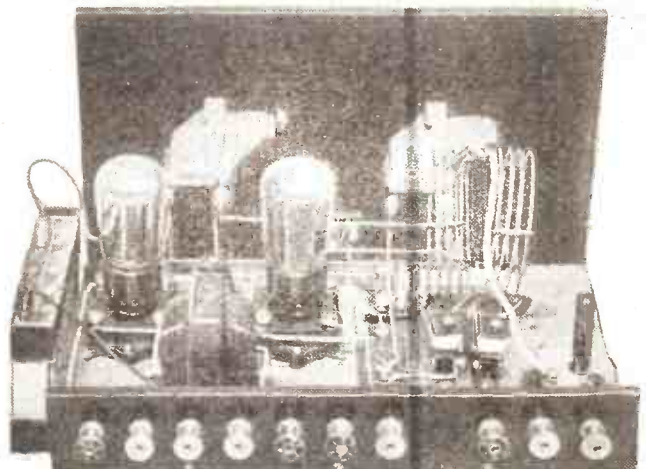


Easy handling is one of the main features of this remarkable little set.

For long waves, No. 250X and No. 100 reaction. For ordinary waves, No. 60 or 75X, with No. 50 for reaction.

(Continued on next page.)

READY FOR AUSTRALIA!



Ordinary plug-in type short-wave coils are employed, and the "neut" type condenser in the aerial circuit enables dead spots to be avoided.

AT COVERS ALL WAVE-LENGTHS

THE "GLOBE-TROTTER."

(Continued from previous page.)

For short waves you need a set of S.W. coils, the ranges covered being (approximately) 19 to 35 metres with No. 4, and No. 4 or 6 reaction: 30 to 60 metres with

No. 6, and No. 6 or 9 reaction; and 50-90 metres with a No. 9, and 6 or 9 reaction.

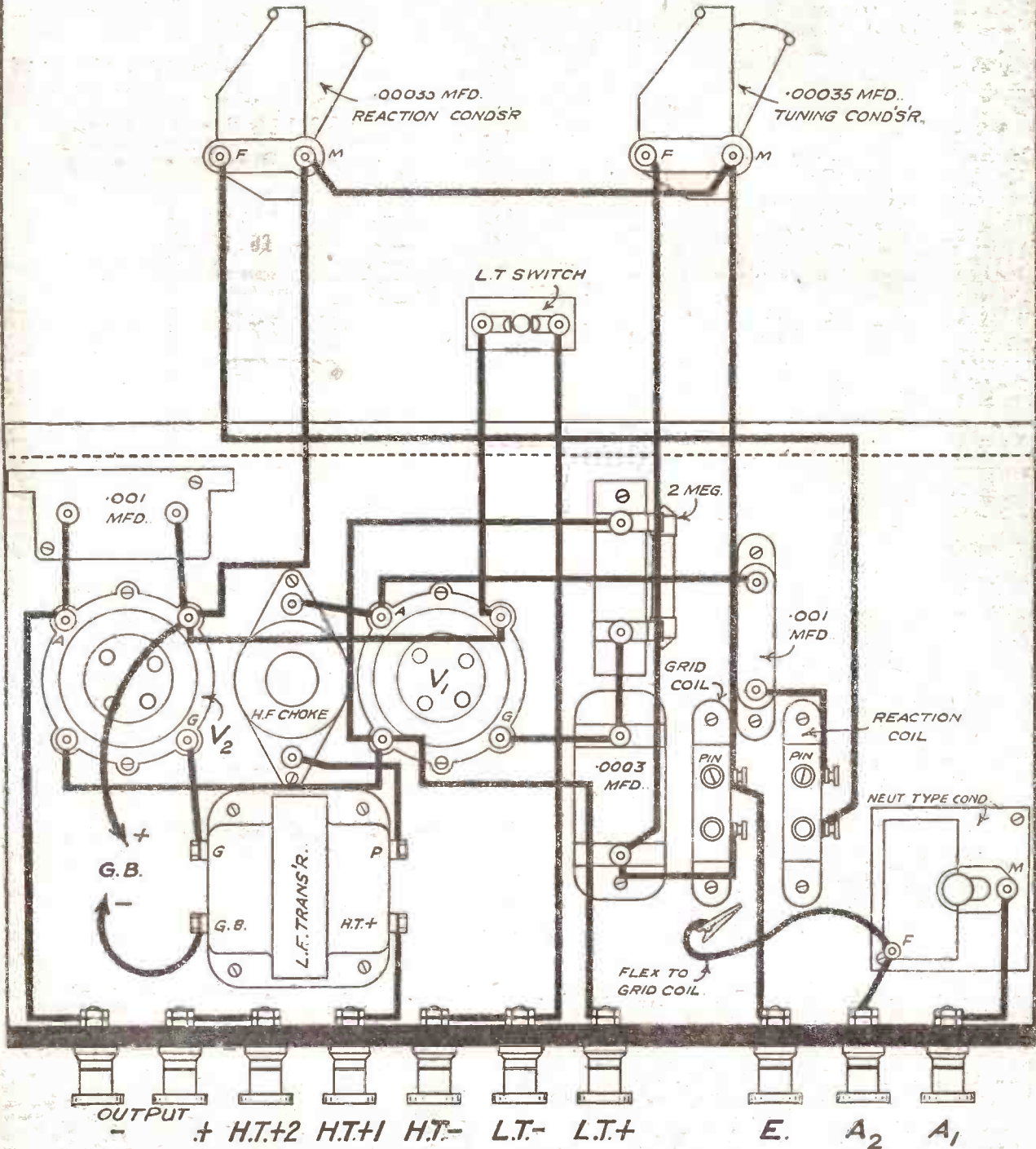
On short waves it is worth noting that distance is no criterion of signal strength. Sometimes very distant stations come in "with a thump," whilst a few minutes later they may fade out to a whisper!

That is one charm of the short waves—you can never be quite sure of what will happen there. And, if, in addition to ordinary reception you have a hankering after long distance, and you like a touch of the out-of-the-ordinary, you will find the "Globe-Trotter" an ideal pal to go a-voyaging with.

V18C



WIRING DIAGRAM.



The wiring is quite straightforward and there are no snags whatever in the building of the "Globe-Trotter."

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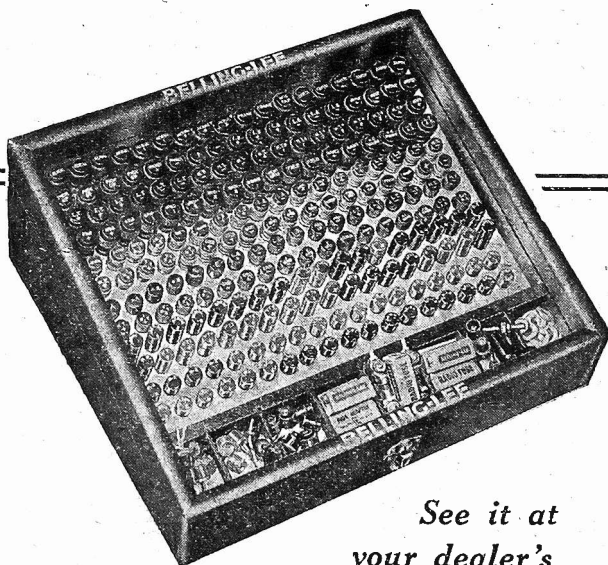
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FOR EVERY RADIO CONNECTION

Advertisement of Belling & Lee, Ltd., Queensway Works Ponders End, Middx. E.W.G.

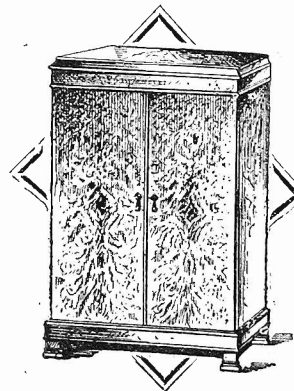
Well! Who Was Right?

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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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?

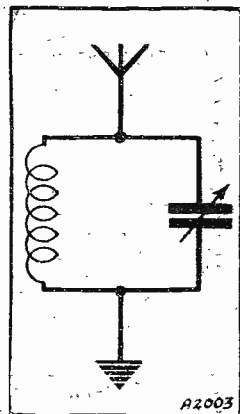
If you are, the small aerial makes no difference in comparison with the condenser. Is that not right?

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.

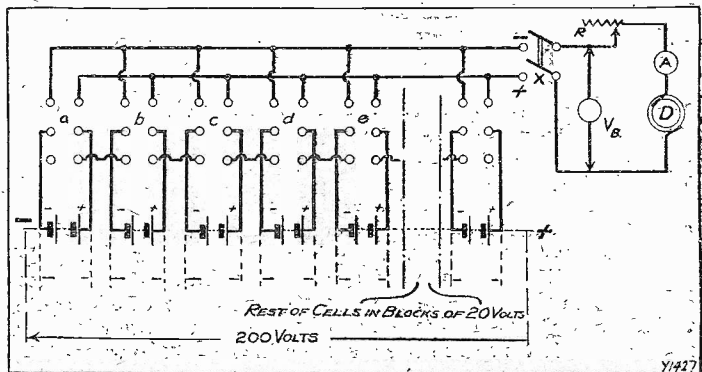
* * *

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. — you know how sensitive high-frequency valves are to screened grid and H.T. 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.

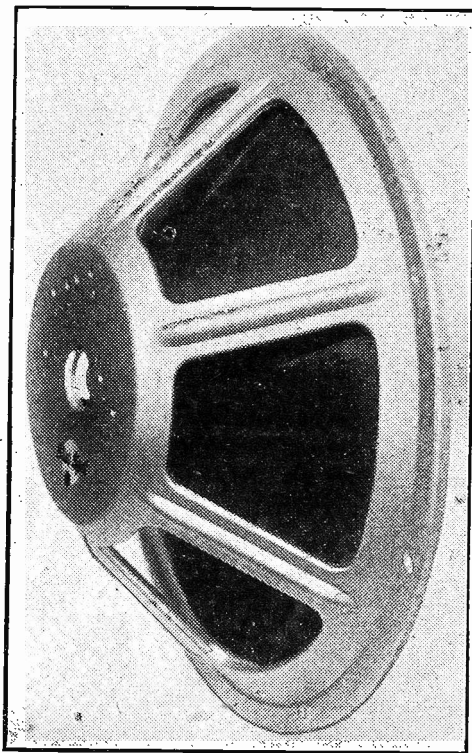
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



NEW BLUE SPOT UNIT.

THE British Blue Spot Co., Ltd., say that many people have written to them from time to time pointing out that it is not always convenient to incorporate large chassis in their cabinets. They have therefore produced a new chassis, which is known as The Special Chassis, to



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.

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.

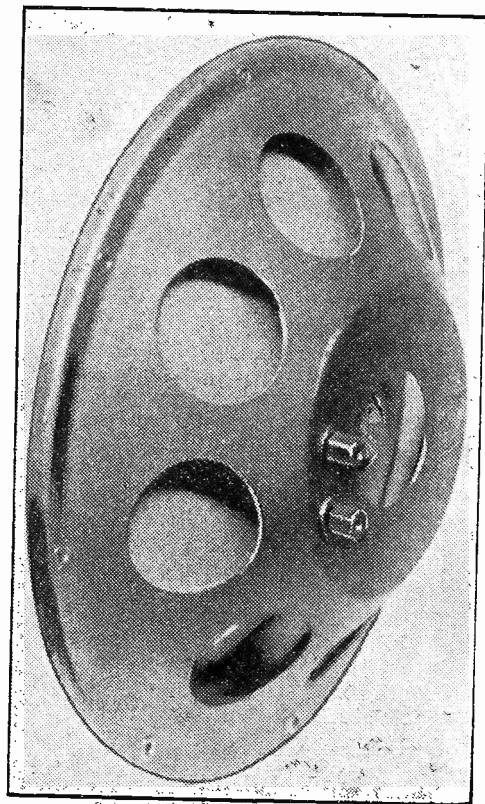
Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

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.



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



-BUT CHANGE TO PERTRIX

PRICES:

60 v. Standard,	8/-
90 v. " "	11/9
100 v. " "	13/-
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120 v. " "	25/6
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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.

This year many more will change—change because they *know* they will be getting more for their money.

Why not be one of them—your dealer will tell you the most suitable type for *your* set.

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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 would 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 set about 17s. 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, Marzara, 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.

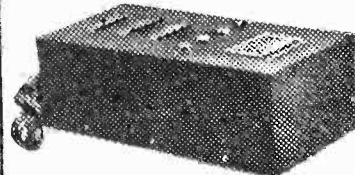
I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud-speaker strength. As I am writing we are hearing in Arva from Rome. My last set cost me about £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 5G B. 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, C. D. N.

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

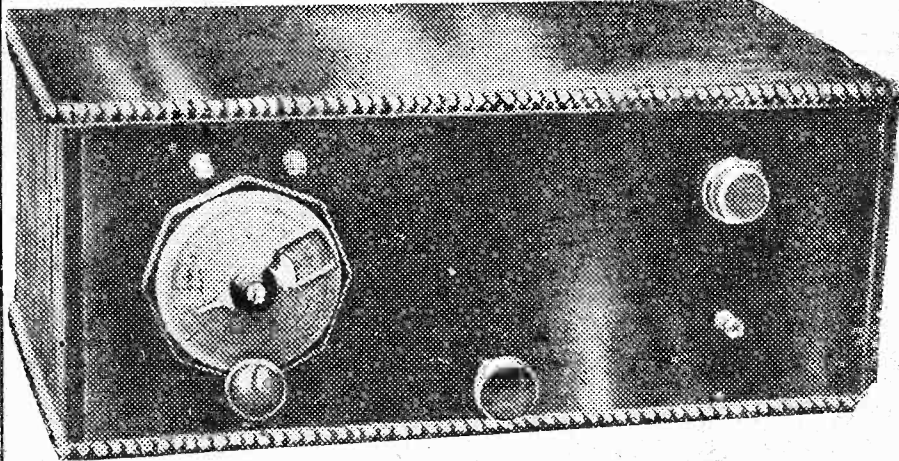
THE NORTHAMPTON PLATING CO. SUPER A.C. ELIMINATOR



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 milliampères, 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, 18 x 7	6/11	12/6 100 Volt H.T. Battery	8/11
5/- Ebonite for same, 12 x 8	3/-	7/6 Volume Control	3/11	7/6 Aluminium Panel 18 x 7	3/11	5/6 2 Volt Accumulator	3/6
5/11 Transformer	3/6	7/6 H.F. Choke	3/11	17/6 Dual Coil for M.M.3	12/6	2/- Accumulator Carr.	11d.
4/6 .0005 Variable Condenser	2/11	2/6 Daventry 5 G B Coll	1/3	Triotron Dull Emitter Valve	4/11	4/6 Neutralising Condenser	2/11
2/- .002 Condenser	1/3	10/6 6 Volt Amplion Valve	3/11	5/- Cycle Tyre	2/6	4/- Reaction Condenser	2/6
1/8 .0003	10d.	12/6 Cone Unit	6/11	2/6 Cycle Tube	1/3	5/- Diff. Reaction Condenser	2/11
1/- Grid leak 2 meg.	10d.	12/6 Cone Speaker Cabinets	7/11	6d. Panel Transfer	3d.	2/- Loud Speaker Cord	11d.
1/- Anti-Mic. Valve Holder	9d.	2/- 12in. Cone Speaker Frets	11d.	6/6 Double Reading Voltmeter	3/11	2/- Phone Cord	11d.
2/3 Rheostat	9d.	3/- 15in. Cone Speaker Frets	1/11	Triotron Super Power Valve	6/6	6/- S.L.F. Condenser	3/11
2/- Indoor Aerial	9d.	7/6 Old Corsor Type Coils	3/11	15/- Titan Coil	9/11	21/- D.C. Eliminator, 15 M. amp. A.C.	17/6
5/- Earth Tube	1/6	15/- Old Corsor Type Cabinets, 21 x 7	7/11	9/- 60 Volt H.T. Battery	4/11	£4 A.C. 20 Milliamps	59/-
10/- Guaranteed Phones	4/11	Ebonite for same	3/11			17/6 Electric Iron. Weight 5 lbs.	7/11
3/6 S.M. Dial	1/11					30/- Cone Speaker	9/11
						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.

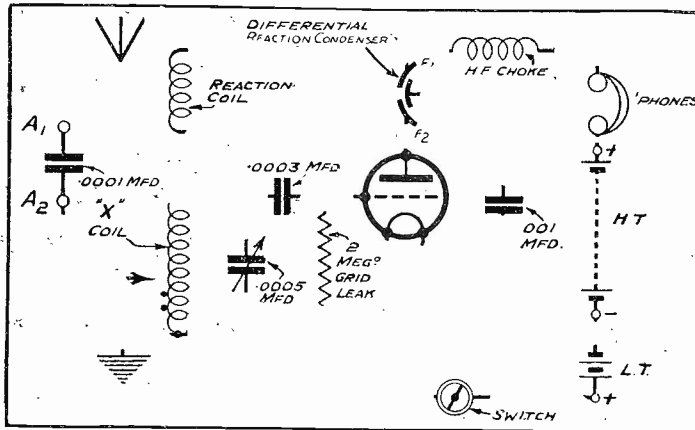
It should, however, be remembered that unless the set's output is filtered long loud-speaker wiring should be carried out by someone qualified for such a job, and it is obviously very unwise to have live wires running outside the set and over the house.

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.

L.S. Extension Leads.

L. M. E. (Bournemouth).—"I am going to put in a loud speaker, and in the houses of a couple of my friends I noticed that the leads to the loud speaker are long flexible ones.

HALF YOUR MONEY BACK INTO YOUR POCKET



From the moment you start using TUNGSRAM Barium Valves in your set you will save money. Yet you will get vastly improved performance. For TUNGSRAM Valves cost considerably less than any other valves of similar quality you can buy—and they are so economical in use that battery costs are less. TUNGSRAM Valves have a longer life. They will give to your set greater selectivity, longer range, perfect tone, and increased volume. TUNGSRAM Valves give you better performance at less cost.

2 v. and 4 v. Screened Grid, 13/-; 4 v. A.C. Screened Grid Valves, 16/-; L.F., 5/6; H.F., 5/6; R.C., 5/6; Power, 7/3; Super-Power, 8/-; A.C. Indirectly Heated H.F. and L.F., 9/6 each; A.C. Directly Heated Power, 9/6 each; A.C. Directly Heated H.F. and L.F., 7/9; Rectifying Valves, 10/- each; Tungram Photo-Electric Cells Nava E., £2:17:6; Nava R., £3:3:0.

For full particulars of the Tungram range write to Department V. 104.

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TUNGSRAM ELECTRIC LAMP WORKS (GT. BRITAIN), LTD.,
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MAKERS OF THE FAMOUS ELECTRIC LAMPS.

Branches:—Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Manchester, Newcastle, Nottingham and Southampton. Lamp, Valve, and Glass Factories in Austria, Czechoslovakia, Hungary, Italy and Poland.
I.F.S. Organisation Tunggram Lamps and Radio, Ltd., 11, Burgh Quay, Dublin.

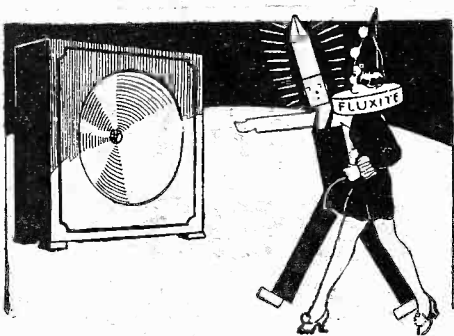
EASY TERMS

WE supply the following Radio Apparatus on deferred terms. We carry adequate stocks and can give prompt delivery.

- NEW HEAYBERD A.C. ELIMINATOR KIT C.150.** Complete kit of parts for building an H.T. Eliminator, including steel case. Output, 25 M.A., 150 volts. 3 H.T. tappings. One variable. Cash Price £3 16 0
Or 7/6 with order and 11 monthly payments of 7/-.
- NEW EPOCH PERMANENT MAGNET MOVING-COIL SPEAKER UNIT.** P.M.66. Cash Price £5 15 0
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- NEW COSSOR EMPIRE 3 KIT.** A considerable advance on last season's 3-valve Kit and at a lower price. Cash Price £6 17 6
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- N.K. FARRAND INDUCTOR.** Loud speaker unit, quality of reproduction almost equal to a moving-coil speaker. Cash Price £3 10 0
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- B.T.H. PICK-UP AND TONE ARM.** One of the best pick-ups available. Cash Price £2 5 0
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- CAIRNS & MORRISON'S HOME RECORDING OUTFIT,** including special Microphone Pick-up. Descriptive Leaflet on request. Complete Kit. Cash Price £4 12 0
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- NEW BLUE SPOT 66R UNIT.** The finest balanced armature movement on the market. Complete with large Cone and chassis. Cash Price £2 10 0
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LONDON RADIO SUPPLY CO.,
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Telephone: National 1977.



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The reliable pair,
Famous for Soldering,
Known everywhere!
If there's trouble with
Wireless,
Loud Speaker or Set,
Just call US to help
you—
You'll be glad that we
met!"

See that Fluxite and Solder are always by you—in the house, workshop, garage—anywhere where simple, speedy soldering is needed. They cost so little!

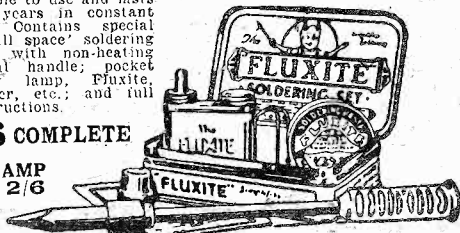
but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; RADIO, odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special 'small space' soldering iron with non-heating metal handle; pocket blow lamp; Fluxite, Solder, etc.; and full instructions.

7/6 COMPLETE

or LAMP only 2/6



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ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

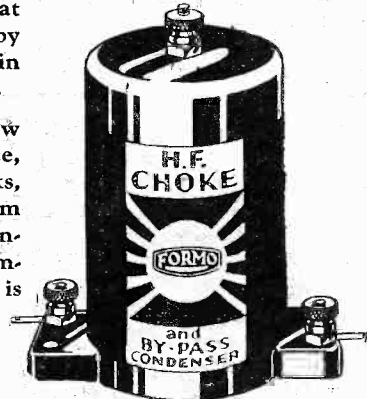


Now!
**REPEAT SENSATIONAL
SUCCESSSES WITH THE
SUPER PERFORMANCE
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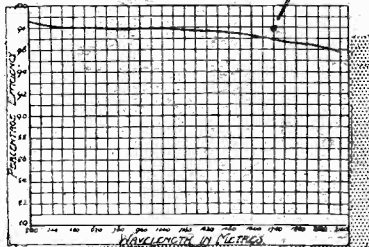
WITH BY-PASS CONDENSER

Every superlative feature that has always been aimed at by manufacturers is embraced in this moderately priced unit.

High inductance value, low self capacity, low resistance, free from resonance peaks, and blind spots. Uniform efficiency and in fact, a wonderful product that will improve any set in which it is installed.



There's nothing to beat this!



FORMO H.F. CHOKES
with By-pass Condenser
Price 7/6d.

- Type A. For use in detector anode circuit.
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Bring your receiver up-to-date and enjoy increased efficiency by fitting this new choke. From all good dealers. Ask for folder "P.W."

ARTHUR PREEN & CO., LIMITED,
Golden Square,
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BUY YOUR RADIO WHERE YOU

**SEE THESE
FORMO
Displays**



The Sign of the Best Dealers Everywhere

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 'Radiano 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 "Radiano 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-

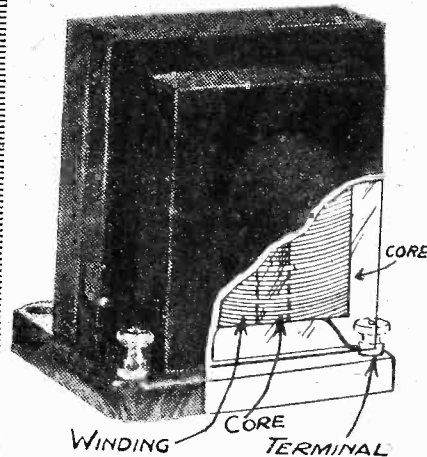
"INSIDE" INFORMATION.

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.

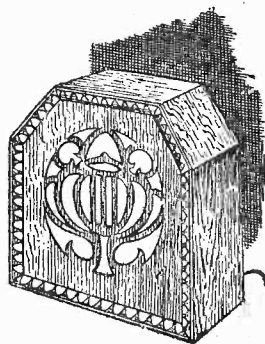
It will be seen that the theoretical symbol (above) also conveys the essential idea of the winding on a core.



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.

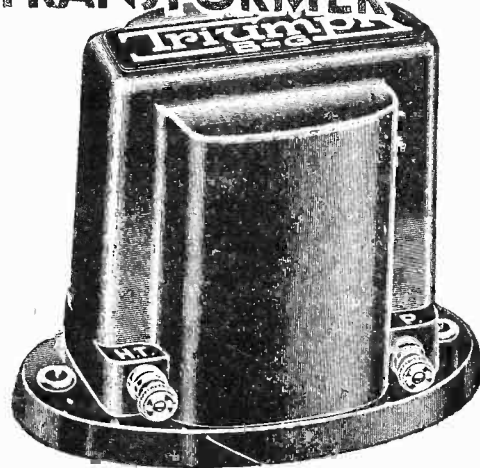


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Ratio 3½ to 1, Price 6/6. 7-1 Ratio model, 12/6. From all dealers of repute or direct from the manufacturers.

BRITISH GENERAL

British General Manufacturing Co., Ltd.,
BROCKLEY WORKS, LONDON, S.E.

DOES FOG AFFECT RADIO?

DOES 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.

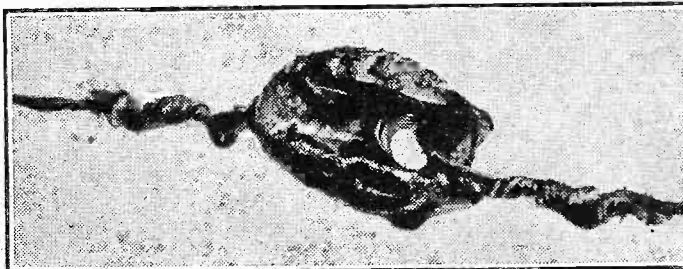
Naturally, prolonged fog is, at any rate, bound to have an indirect effect upon reception if only in view of the fact that a sooty fog not only gets the aerial, the insulators and the lead-in system into a thoroughly wet condition, but that it also results in their becoming covered with a tenacious deposit 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.

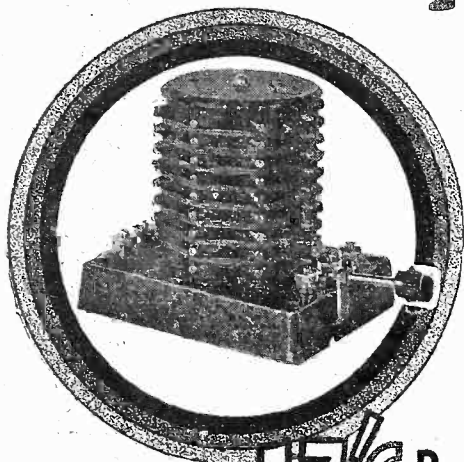
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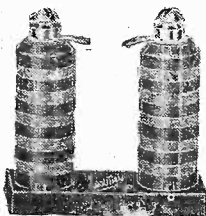
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FOR THE LISTENER.

(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 light-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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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.

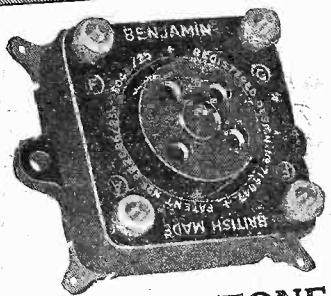
From the examples which I have chosen—and experimenters will agree that these are fairly representative ones—you see how very difficult it is to give a definite answer to an apparently simple question with regard to radio considerations.

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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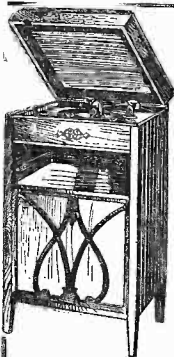
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TECHNICAL NOTES

(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.

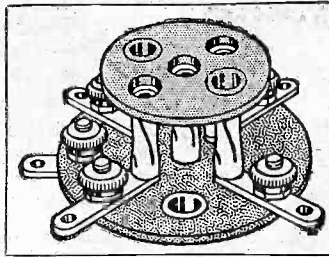
But even this method has its own particular drawbacks, the obvious one being that the loud-speaker is not intended to work when lying in a horizontal plane, and the volume of sound is distinctly less than when the speaker is directly facing the audience.

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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"I would commend it to all short-wave enthusiasts. I myself use one of these holders with great success on a frequency of 58,000 kc. p/sec., and shall be using it for Trans-Atlantic tests upon this frequency."

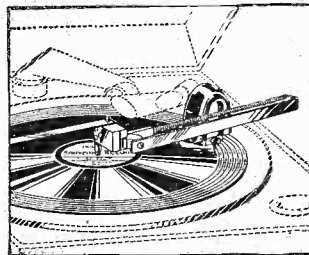
The Head of a Municipal Physical Laboratory writes:—

"The two samples of the 5-pin type I have examined both show an insulation resistance of over 100 megohms, and, as the amount of dielectric used is very small, the dielectric losses must be a minimum. It is a pleasure to see a valve holder in which a great chunk of bakelite, giving large dielectric losses is not used."

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Modern valves do not require sprung valveholders. Because of the Resilient Sockets used in the Clix Valveholder, it is the only one giving perfect contact with SOLID as well as all other types of valve pins. Descriptive leaflet Free.

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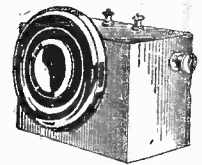
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THE NEW COIL "D.X." UNIT.

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TECHNICAL NOTES

(Continued from previous page.)

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REMEMBER!

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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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- Coss or Empire Melody Maker Kit.** 1931 model, S.G., Detector and Power. Cash price **£6 17s. 6d.** With Order **10/-**
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 - Other voltages and capacities available, detailed prices on application.
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 D.C. Resistance 400 ohms. Inductance 25 henries.
 Maximum D.C. 30-60 milliamperes.
 Size 2 x 2 1/2 x 2 1/2" high.
 List No. DY25.



12/6

These four components are the immediate response to latest developments in valves, wavelengths, and mains power uses. They are lowest in price consistent with fitness for purpose and the standard of service guaranteed by the makers—one of the oldest established component and set manufacturers in the industry.



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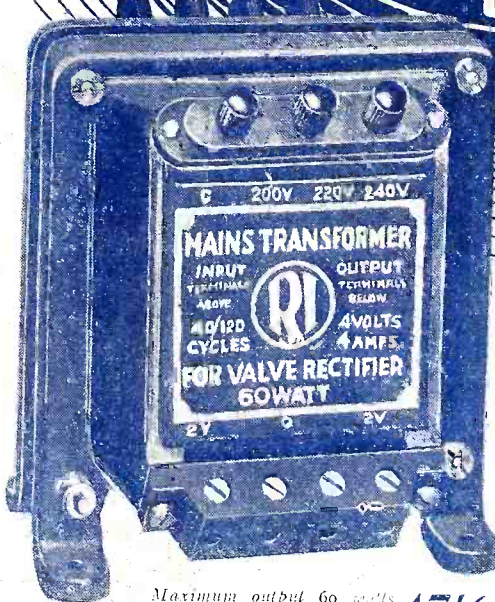
The New
"POPULAR WIRELESS" AND "MODERN WIRELESS" DUAL RANGE COIL.

No more wavelength troubles.

These coils, perfectly manufactured and laboratory tested on the wavemeter and inductance bridge ensure best results and save the trouble of winding and assembly. Remember the makers name on this coil is your surest guarantee of highest efficiency. List No. BY20.

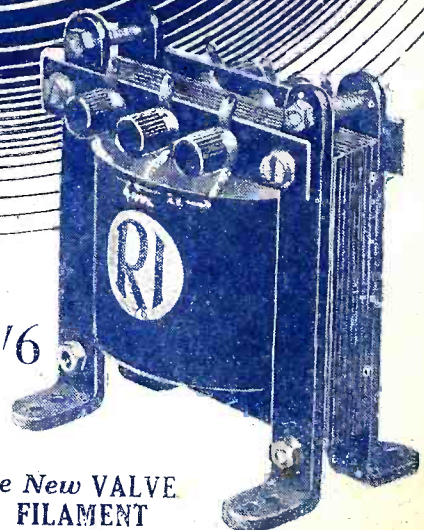
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60 WATT MAINS TRANSFORMER.

A well designed, Robust Component.
 The latest development in mains transformers for modern mains valves. A fine robust component suitable for A.C. mains 100, 120 volts or 200, 250 volts, 40-100 cycles.
 250-0-250 volts, 60 m.a. for H.T.
 4 volts C.T.—2 amps. rectifier valve filament.
 4-v. C.T.—4 amps. for indirectly heated valves.
 6-v. C.T.—3 amps for directly heated valves.



Maximum output 60 watts.
 Size: 4 1/2 x 4 1/2 x 5" high.
 List No. EY24.

47/6



17/6

The New
VALVE FILAMENT MAINS TRANSFORMER.

Supplies the heater element of A.C. indirectly heated valves and other 4-volt filaments. Converts receivers using H.T. mains into all-electric in conjunction with A.C. valves.
 4-volt C.T.—4 amps. Size: 2 1/2 x 3 x 3 1/2". List No. EY25.

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MY RADIO CAREER—By ARIEL (See Page 825)

Popular Wireless

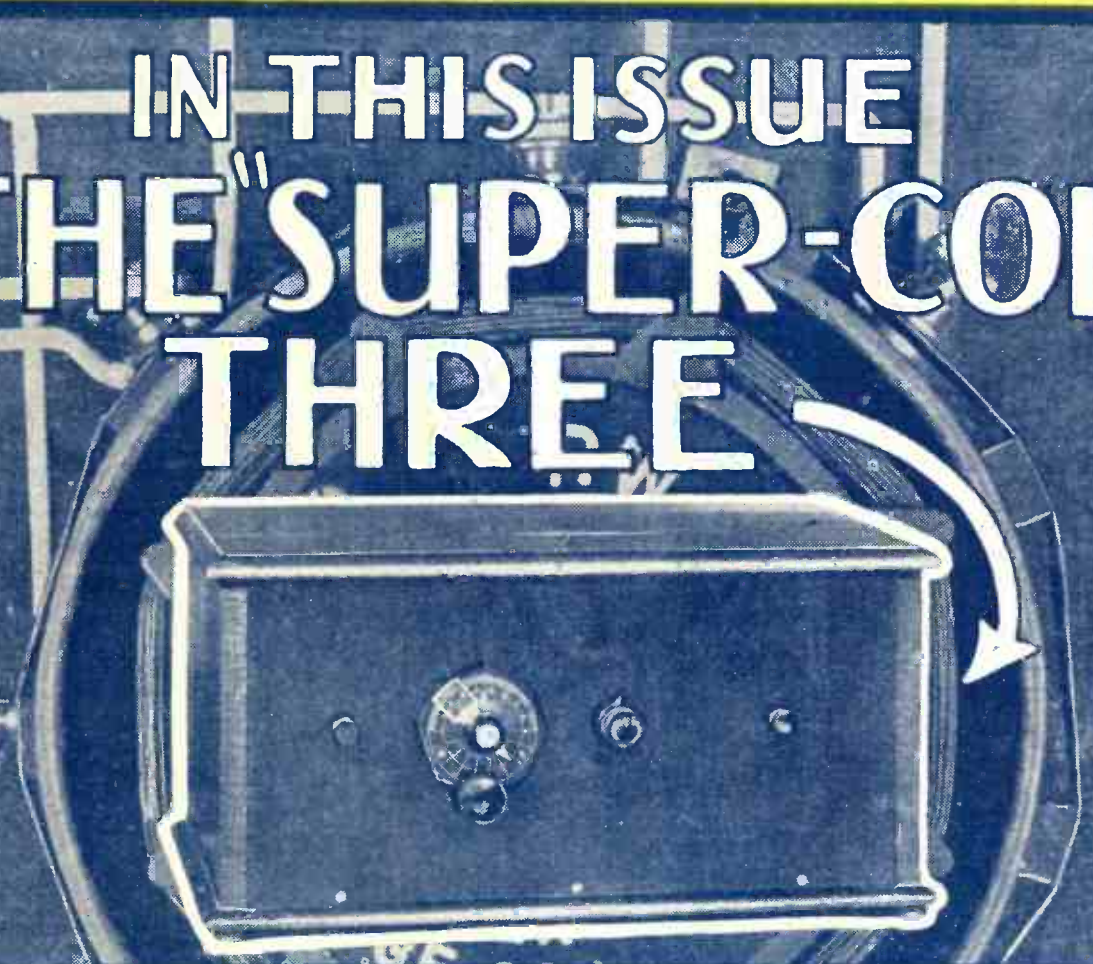
Every Thursday
PRICE
3d.

No. 449. Vol. XVIII.

INCORPORATING "WIRELESS"

January 10th, 1931.

IN THIS ISSUE
THE "SUPER-COIL"
THREE



AND DON'T MISS THESE EXCEPTIONALLY INTERESTING AND INFORMATIVE FEATURES

ARE OUR VALVES TOO GOOD?—By VICTOR KING

FULL CONSTRUCTIONAL DETAILS OF THE "OUTER-CIRCLE" CRYSTAL SET
QUALITIES AND QUANTITIES—By G. V. DOWDING, Associate I.E.E.

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LONDON

An irksome task eliminated

No more Coil Changing with this NEW LEWCOS ACHIEVEMENT

The
Lewcos Twin
Two-Pin Base
Price 12/6

Ref.: T T P B.

Many users, both expert and amateur, testify that the Lewcos Two-Pin Coils have reached a standard of efficiency on which it would be difficult to improve, but another device to eliminate coil changing when Two-Pin Coils are used has recently been perfected.

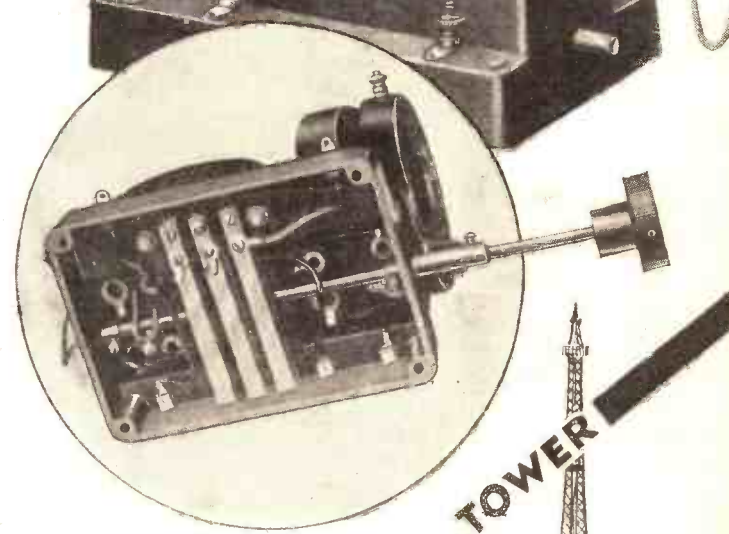
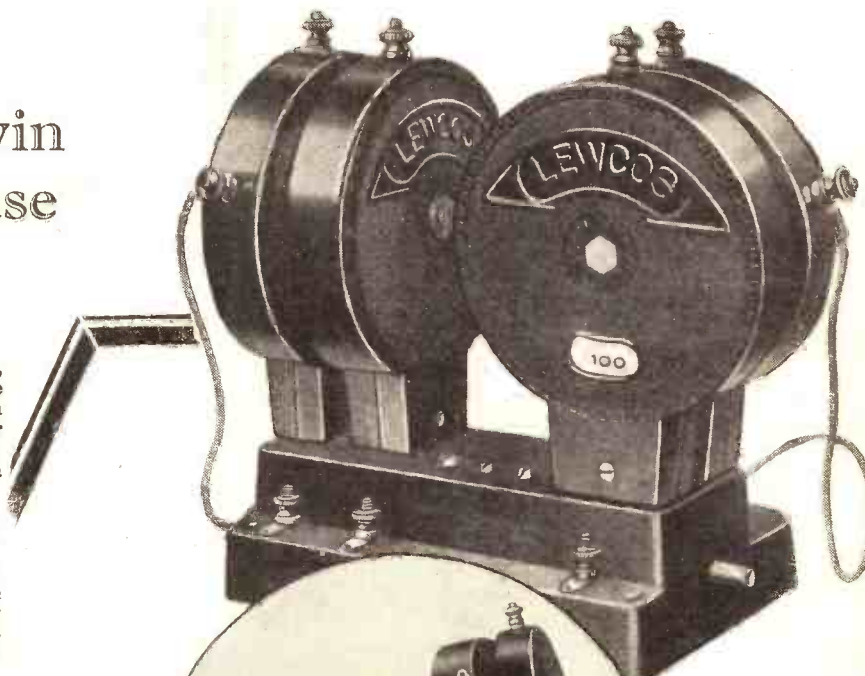
With this new Lewcos achievement you can switch from the Medium Broadcast Waveband 235-550 m. or to the Long Waveband 1,000-2,000 m. by the turn of a knob. The twin sets of coil holders are arranged at right angles to each other in order to prevent damping by the coils not in use.

This useful component comprises a moulded base containing switching apparatus conforming to telephone practice, viz. cam-operated blades with silver contacts.

Its robust design, high-class materials and workmanship ensure efficiency.

Recommended Coils for use with the Lewcos Twin Two-Pin Base:
60 X 40 C.T.
250 X 100 C.T.

Specially suitable for circuits such as the "Magic" series described in "Popular Wireless."



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REPRODUCTION..... THAT MAKES YOU VISUALISE

The drama

WITH ALL ITS INTENSITY

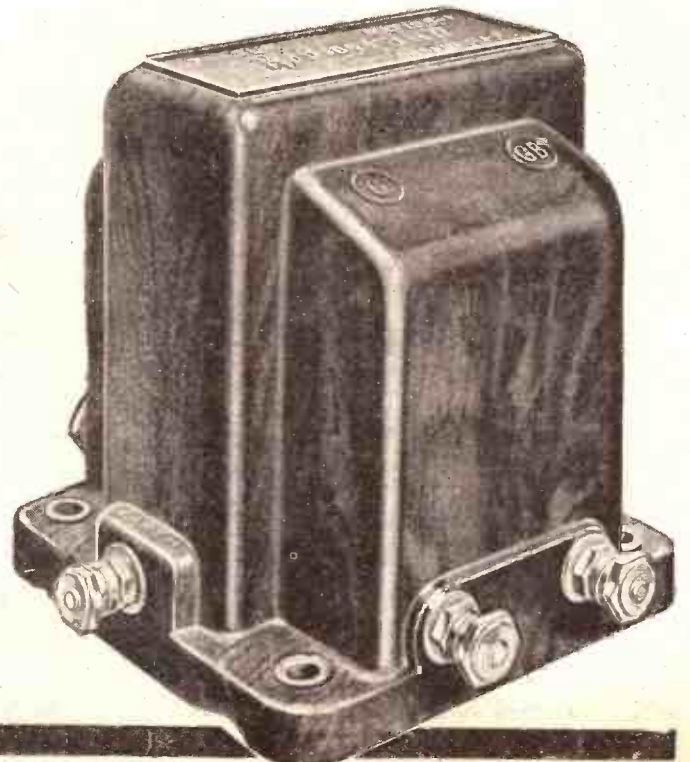
has invaded the "Mike" which seizes on every sigh—every sound and utilizes them to grip our imagination to hold our interest TELSEN that most sensitive of all radio transformers reproduces each sound each echo with such vivid, lifelike realism that one is mentally transported to the actual scene!

Telsen Transformers are built on sound radio principles, tried and proved. Their inclusion in your set will mean greater purity greater volume a REALISM of reproduction you have never experienced before!

Make your set LIVE—with

TELSEN TRANSFORMERS

- "ACE" - - - - - 8/6
Ratios 3-1 and 5-1.
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Ratios 3-1 and 5-1.
- "RADIOGRAND" - - - 17/6
Super, Ratio 7-1.



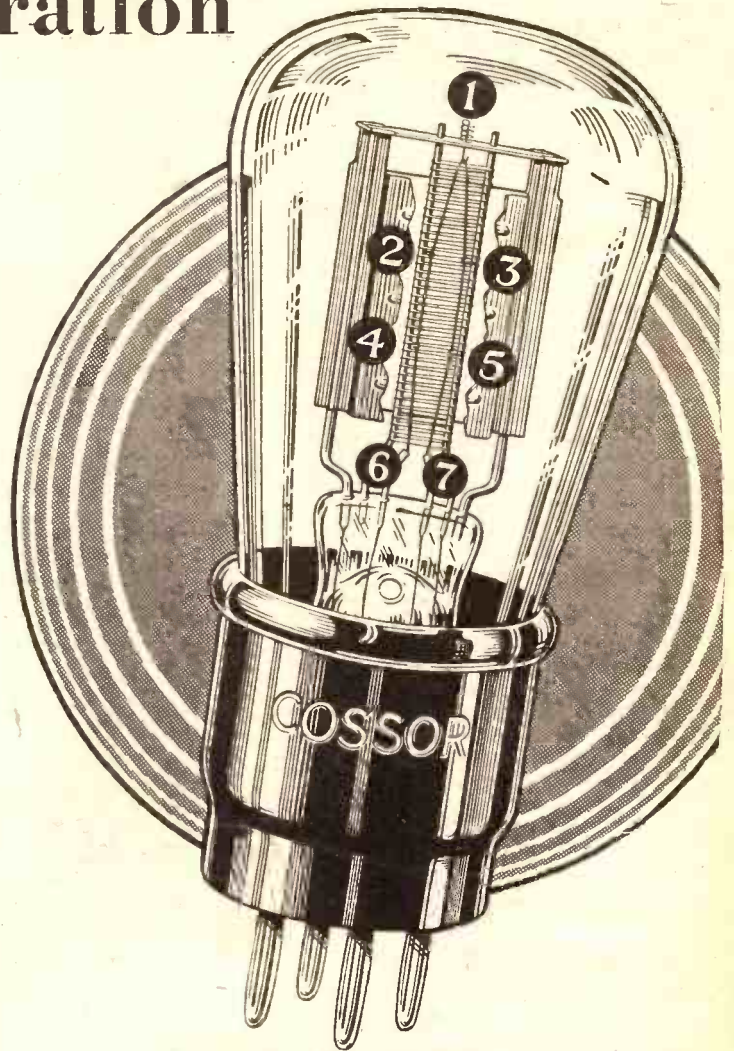
Seven point suspension definitely prevents filament vibration

—the primary cause of
microphonic noises

The cause of microphonic noises in a Receiving Set is generally to be found in a faulty Detector Valve. Usually it is due to filament vibration. The new Cossor Detector Valve (210 Det.) has been specially designed to overcome this fault. Filament vibration is rendered impossible by a new method of seven point suspension. The diagram shows the four insulated hooks which secure the filament in position and damp out any tendency to vibration. The use of this "steep slope" Cossor Detector Valve not only eliminates microphonic noises, but ensures great volume with exceptional purity of tone.

The New Cossor 210 DET.,
2 volts, 1 amp. Impedance
13,000. Amplification Factor
15. Mutual Conductance
1.15 m.a./v. Normal working
Anode Voltage **8/6**
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THE NEW
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DEFINITELY FREE FROM MICROPHONIC NOISES

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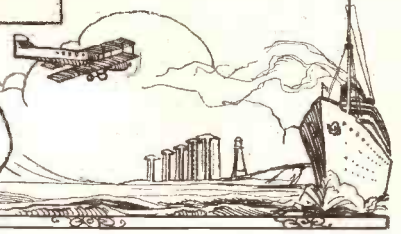
Popular Wireless

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NOISE ON THE NATIONAL.
1930 HOWLERS.
IN NELSON'S DAY.
BUSH TELEGRAPHS.

RADIO NOTES & NEWS

"PROGRESSIVE" SETS.
ALF'S BUDGET.
SUPER NOISE.
CRYSTAL RESULTS.

Oscillation and Vegetation.

THE man next door has been trying to make me believe what he does, namely, that broadcasting has improved the growth of the plants and grass in his garden. I wish I could convince him that he is playing with a fallacy, but he merely points to a gooseberry bush or a sunflower and says that it is healthier than it was before—as if nothing but radio could bring that about! Well, all I will say is that radio must be fine for slugs and weeds—mine get bigger and bonnier every year.

Noise on the "National."

HAS anyone else noticed the queer rhythmic noise on the "National" wave-length (1554.4 metres)? It comes in short bursts of about a second's duration, and occurs about every other second. It sounds like the tearing of calico, but slightly less strident. I know of nothing of that frequency which my set can pick up here, and the noise is not heard on the London Nat., Reg., or Midland wave-lengths. It is a pest of the first water, and all the more maddening because it is so perfectly regular.

Our 1930 "Howlers."

I ALWAYS try in the New Year to give you a few of the best "Howlers" of the old one. How are these? "Edison invented the gramophone by means of an electric lamp." "Marconi used to hear across the Atlantic although the B.B.C. wasn't started then. He heard with co-hearers." "A kilocycle is like a kilderkin, only really electricity per second." "Wireless is two kinds, bands and S.O.S. When it is S.O.S. it is not amusement but commercial." "Polarity is what a needle points to if it points due North." "Inductance is what they do to new curates in old churches." "Frequency means often; the greater it is the longer the velocity and the smaller the meters."

I Reform.

HOLY thoughts induced in my mind by Christmas, Boxing Day, New Year's Eve, New Year's Day, and bismuth tablets, have caused me to resolve that during 1931 I will treat the Sunday "experts" kindly. That being so, all I can do is to tell you this one and pass on to the next topic without more comment. The radio scientist of a very well-known Sunday

paper, commenting solemnly on a letter which he had received, said that he had not tried the tip himself but he had been told that if an S.G. valve burns out it will continue to function if the aerial is connected to its top terminal.

In Nelson's Day.

WE think ourselves mighty fine fellows, with our telegraphs, both wire and wireless, and often wonder how our great-grandpas managed without them. I am a Nelson "Fan," and have read an

enormous amount of books about him and his career, and I read with great interest all I can find about long-distance signalling in his time. Would it surprise you to know that they could on days of clear weather signal by semaphore from London to Portsmouth in about ten minutes? They used to relay the signals, in a special code, from hill to hill—and the jumps were not many, either.

The "Bush" Telegraphs.

AS a professional signaller I sometimes like to puzzle over the wonderful method by means of which certain African natives convey news to a distance. Everyone knows that they bang on hollow logs of wood, but what white man knows the code which they use? I have questioned missionaries in vain; the thing is a carefully guarded secret, yet nobody ever catches a native teaching it to another. However, I have met a man, a telegraph engineer, who has often observed this telegraphic tom-tom in action and he gives his opinion that the sounds or combination of sounds represent not letters but ideographs such as are used by the Chinese and Japanese; very crude, compared with our methods—but remarkably effective. Not all the wisdom is the white man's even yet.

UNDER THREE FLAGS



This Japanese picture shows the scene at the broadcasting of the ratification of the London Naval Pact last year, when Japan's Premier, Mr. Hoover in Washington, and Mr. Ramsay MacDonald in London, were linked for a world-wide broadcast.

The Yale-Harvard Catfight.

PERHAPS you can recall the B.B.C.'s broadcast of the Yale-Harvard football match last year. I switched off after five minutes; a fearful pandemonium! Direct reception of the racket from K D K A was clearer, and W. G. (W. Norwood) tells me that he achieved this—on a "P.W." set, of course. He could hear the referee's whistle and the "soft" drinks gurgling down the throats of the spectators. W. G. is satisfied with our "Magic" Four, as are many of his friends, and indeed I don't know how the technical department hope to beat that "Magic" series.

Twenty-One Years Ago.

JUST about twenty-one years ago I climbed to the very top of the Port Said lighthouse and foregathered with men of Lloyd's radio station there. A hot climb, forsooth, and one which I would not now undertake for a prince's ransom. If I remember aright, I dined on boiled eggs and

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

beer! Alas, my departed youth! Afterwards we walked in the desert sands and discussed wireless circuits—as they were then; mainly coherers and relays! Though “earths” were mighty important matters in those days—and broadcasting was scarcely dreamed of. Fleming valves were only just becoming to be understood in telegraphic circles. And I suppose that Armstrong, Eckersley, and Appleton were students then.

The “Progressive” Series.

J.W. (Brighton) asks us for a “second edition of the ‘Progressive’ Four, using plug-in coils and standard parts—in one article with a layout.” All cut and dried, so to speak. That one of our sets is deemed worthy of a re-issue does not surprise us, though we say it ourselves—as shouldn’t. In fact, the same brilliant notion had already occurred to Mr. Dowding, and the necessary ideas for bringing out a “Progressive” on the most modern lines are already incubating. It is hoped that the result will be revealed to you some time this year.

The “Key” in Canada.

A DURHAM man resident in Regina, Saskatchewan, tells us that he is very pleased with the results which he gets on the crystal receiver described in the “Key to the Ether,” using an indoor “sausage” aerial of No. 24 D.C.C. wire. After the “local” (CKCK) has closed he receives KOA (Denver) and WBBM (Chicago), which is quite a nice bit of cats-whiskery. The rest of his letter is a comparison of B.B.C. programmes with those of Canada and the U.S.A., and the B.B.C. is not favoured, because of its chamber music. (*heah! heah!*), symphonies (*well—I dunno!*) and its “talks.”

Alf's Budget.

WELL, if it isn't our Alf of Middlesbrough again! I heaved a sob some weeks ago because I hadn't seen his violet ink for a long time; that moved him to pour out *eleven quarto pages*, for the study of which I must take an extra day off at once. So sorry I referred to you as a Mason, whereas you are a Mann! That's a couple of things which no woman can be, my dear chap! It is very hard luck for an energetic person like Alf Mann, a radio enthusiast—and an expert on broadcast receivers—to be unemployed, and I wish him a turn of luck in the New Year. When I have explored his letter I will revert to it.

Super-Noise.

ACCORDING to a writer in the “News-Chronicle,” some scientists are now using their ingenuity for the purpose of producing noises with notes far beyond audible frequencies, by means of making quartz crystals vibrate. It is said that they have got up to 280,000 vibrations per second and have succeeded in killing a frog with the row. What martyrs are frogs! It is stated, further, that no use has been found for these sound-waves. So they killed a frog! Scientists are searching for a method of turning the apparatus to some practical account. Meantime—the supply of frogs is wellnigh inexhaustible.

The Intervening Signal.

DOUBTLESS the B.B.C. had—or would say that it had—the soundest of reasons for fixing on the tick tick sound which now sometimes enlivens intervals between items. What an opportunity missed! What woeful paucity of imagination! When I first heard the new signal I thought that it was caused by someone tapping in the house; this thought was justified by the fact that the boy had recently come into possession of a coconut! A deadly, dull, prosaic signal, without originality, beauty, or even the virtue of outstanding ugliness!

“Automatic Station Finding.”

OUR article under this heading published some weeks ago has brought a testimonial from W.V. (Plymouth), who states that he has used the method for over four years. He fixes his dials (of cardboard) in position on small blocks of wood which rest on top of the cabinet. The pointers are

SHORT WAVES.

“An infrequent spot of leave and the British wireless programmes are effective remedies for home sickness.”—Daily Paper. We understand the B.B.C. think this might have been better put.—“Pictorial Weekly.”

Our neighbour's small son recently constructed a wireless set incorporating remote control.

The trouble is that this is more often remote than control.

Referring to a Moscow English broadcast which took place recently, an M.P. asked: “Is the Foreign Secretary aware that it can be received on an ordinary crystal set?” And we always thought Members of Parliament were accurate people!

A.: “Which radio component is most like a beauty parlour expert?”
B.: “A transformer, I suppose.”

“Radio is not yet out of the cradle,” we read in a contemporary magazine. We should think not, judging by the amount of howling still going on.

THE SECOND CHILDHOOD HOUR.
Although I've always longed for Fame,
The Fates refuse to take the hint;
I used to pine to see my name
(Like those of novelists) in print . . .

While every child is mentioned now,
The Public has not heard my name.
And night by night I sit and glower
With envy through the Children's Hour.

But, ah! forgive me for my sins!
Although my name will ne'er precede
That thrilling cry of “Hull-lo Twins!”
The world shall hear it yet, indeed!

I'll strive in every way I can
To be a centenarian!
“Daily Mirror.”

needles, fixed with a drop of sealing-wax to the centre of the scale on the moving dials, or, when the condenser dials are fixed, to the moving pointer. The sample station dial he sends us has two parallel scales, for “long” and “medium” wave-lengths. This method saves a lot of time, and one day, no doubt, makers of sets will incorporate blank scales—renewable!

Down Our Alley.

BEING a home-loving, domesticated and well-tamed chap, I find much humour in the continuous stream of young feminine parties which passes through our kitchen under the guise of domestic servants. As the one we harbour at present seemed likely to stop more than a month—I call her

Antigone Persephone Sidebotham, for short—I rigged up once more the small set which I got last year for Argemone Hypatia Coke-wort—the one with bingled ginger hair. After listening to the Foundations of Music for seven minutes, Antigone said, “Er—jist as *yew* like, sir—but could we 'ave Morrie Shevaleer or a mandoleen—or sutthink?”

Looking Back.

WE have all survived another year and another Christmas. Touch wood! What a year and what a Christmas! In August I was sun-bathing and pronouncing Life good. In September I was afflicted sore with ailments many and painful. In November I was “hand-picking” my rock garden clear of fallen leaves. At 2.15 on Boxing Morning I was standing on a table, on one leg, trying to bite my own ear, for a bet! A superb mixture—1930.

Crystal Reception Extraordinary.

K. B. (Branksome) reports that having been temporarily deprived of his beloved “Economy” Three, he hooked up a simple crystal receiver, using a home-made coil, by means of which he received the Rome programme on three consecutive nights, beyond all doubt. He has also received Turin and Radio Paris. From what he says it appears that we must discount any suggestion of re-radiation, so that his feat seems to be exceptionally good—though as I do not hear much about crystal work nowadays I cannot be sure. Any remarks, please?

Exzitement for Zummerzet.

FROM the dear old West Countree comes rumour hand-in-hand with Romance, no less than a story that the village of Kilve in Somerset has been startled out of its rustic calm by tests which were made there with a view to the erection of a Regional station. Kilve is the place where some seven years ago the presence of a bed of oil shale was revealed by borings. So that it is not impossible that a B.B.C. station may be built on oil, so to speak, and the engineers will have something to amuse themselves with when off duty.

“Soft” Valves?

IN contradistinction to the British Arctic Expedition, which cabled to Mullards' saying that their valves couldn't be smashed, the University of Michigan Weather Station in Greenland is cut off from news of the world until the spring because all its receiving valves have “gone west.” Those polar bears are notoriously clumsy! Something big must have happened for the whole of their stock of spare valves to be written off, and one can only hope that nothing of importance will happen, in which case they won't miss much.

Grand Opera.

SO Mr. R. M. Ford, who brought a suit for an injunction to restrain the P.M.G. from paying the B.B.C. £17,500 as a subsidy for Grand Opera dropped it (with costs!) because he said he had practically succeeded, though perhaps not in a legal sense. Not even in a Pickwickian sense, I am afraid. What a pity that Mr. Ford, who has such a highly developed sense of public rights, does not champion us in something serious and more worth while. Still, one admires his pluck.

ARIEL.



MY RADIO CAREER

BY ARIEL

NAPOLEON and Shakespeare had been dead for some time; Homer and Socrates were little more than memories. It was evident that something had to be done about it, especially as Newton and Faraday had left the scene. Accordingly I was born, quite definitely and irrevocably, about five-thirty of an autumn afternoon, just about the time the muffin-man jangled his way down the High Street of the little Kentish town of F——, on to which looked the diamond-paned windows of the room which resounded to my earliest yelps.

"Private Broadcasting."

At the age of seven months I moved to London, my parents accompanying me, together with my worldly possessions which consisted of one much-chewed "dummy," a milk-bottle, a wicker-work cradle and a quantity of fine napery. In those days, I believe, broadcasting was privately controlled and was really very well done.

For example, when my brother, aged four, dropped me, aged six months, into a pail of "size," the news was broadcast throughout the town in less than an hour by the laundry-woman!

I found a London of horse-drawn trams, "bustles," dragging skirts, whiskery men, crossing-sweepers, no girls in the City, "penny-farthing" bicycles and "closing-time" midnight, opening time being early in the morning. Queen Victoria was very much "the Queen." Huxley was preaching evolution and R. L. Stevenson was becoming a star in the literary firmament.

Early Radio Experiments.

I saw the old Queen drawn to her Jubilee and to her burial—I stood on a lemonade-bottle in St. James's Park—and I well remember the news of Huxley and Stevenson's deaths, and in the same year, 1894, I think, I went to a gathering called a soiree where I saw a man ring a bell by wireless; he also transmitted music to various parts of the hall, where it could be heard in single earphones.

I do not know how he did this, because I was too young to twig his apparatus, but he inspired me to foresee the remote control of balloons, or airships, by electrical means, for the very next day I began to design the apparatus which I imagined would accomplish that; chiefly a bichromate battery and bits of tin!

I used to stage complicated electrical experiments, always with my faithful "bichromate," in the cellar of our house, the results of which were always negative

In response to many requests, we asked ARIEL to write an account of his radio career, and the following article is the result. Although our contributor, wayward as ever, has not confined his remarks strictly to his subject, we have allowed the irrelevant matter to remain undisurbed, as we have no reason to believe that it is inaccurate or that it will be unwelcome to our readers.
—EDITOR.

burnt a bonny hole in the kitchen-table, a mahogany article which is now my property. My small son never tires of the story of the Great Burn! Let me catch him making explosives! Luckily, "conkers" are in!

At school I fell in love with chemistry—and a fat girl named Hodge, whose brother was my form-mate. When I kissed her at the back of the corn-chandler's she turned nasty; and I loved hydrochloric acid all the more thereafter.

My Career Becomes Variegated!

I learned a lot of unrelated facts about sound, light, and heat, and a few about electricity—we rubbed sealing-wax on cat-skin, and so forth—but chemistry held me her bonds slave, and still does, though I have strayed from her door.

I was in the middle of a University training in chemistry when an explosion in the parental bank-account flung me into the world to earn a living—and the best thing that ever happened to me was that.

First, I went as chemist to a manufacturer of oils and greases, and learned all the ways of the common rat. Then I migrated and spent some time in analysing cement, coal, sand, water, gas, etc., being legged out of my job on account of a "merger."

After that my career became variegated. I took up bacteriology and dropped it quickly. I did not mind handling bottles of cholera germs, but when I was asked to fool about with horses' blood—said blood to be extracted from a live horse by me, I quit. Whenever I went near that horse it behaved as though it hated me! So I let it keep its blood!

Thin Times!

Thin times! Peddling hair-restorer; selling books! For three weeks I clerked for a West-end draper, but at the end of that time I was reduced to jelly by the wax model ladies and fairly took to my heels.

Then I adventured into biology, studying at the Regent Street Poly. and other places, meantime keeping the books of a local printer, for bacey money. I messed his books up, but I know more about the

(Continued on next page.)

except in regard to the wear and tear of my zincs!

Then I absent-mindedly left the battery on open circuit while I went to Dover for two weeks, and on my return—where were the zincs? After that I turned my energies to the compounding of gunpowder and

RADIO ON RAILWAYS



I little thought that I should live to see radio develop to such an extent as is illustrated by this photo of listeners in the Leeds Express.—"ARIEL."

RECORDING NOISE

How much "noise" does your set make—how loud is the reception you obtain? The amounts of sound from a set or from other sources can be accurately recorded by means of a new invention described below.

By Dr. A. GRADENWITZ.

THE fighting of noise in workshops and houses has for some time been one of the outstanding problems of industrial hygiene. Though instruments for ascertaining the intensity of sounds have been devised by many, these have been invariably based on an individual appreciation, i.e. comparison with a "standard" noise, or else on analysis of sound records, and, accordingly, they were hardly suited for the purposes of actual practice.

An Automatic Summary.

The Thorybometer or Noise Recorder, designed by Prof. H. Dold and Dr. H. Thiele, of the Hygienic Institute of Kiel University, is an instrument automatically "summarising" the amount of noise developed within a given time and, for the first time, providing accurate figures for individual appreciations such as "little noise," "much noise," etc.

An ordinary carbon microphone is used as the sound collector. As direct gauging of vibrations by electric means, because of the small energy concerned, would have been difficult, a suitable amplifier was provided, the amplified vibrations being made to operate a sensitive relay working as rapidly as possible.

How It Works.

The best means of adding up all amounts of currents produced in a given length of time was found to be by the familiar electrolytic gas method—the Coulometer.

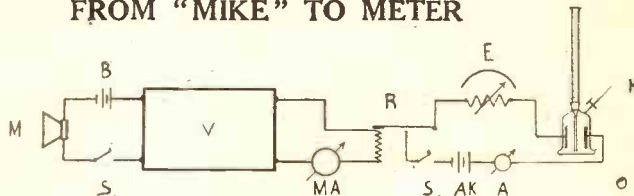
In the diagram M is an ordinary carbon grain microphone, current from the battery B flowing through it and an input transformer (not shown in the figure) of the sound amplifier V, as the switch S_1 is closed. The amplifier is of the ordinary type used in wireless, with 2 or 3 special high-magnification stages.

The amplified microphone currents will actuate the highly sensitive relay R. MA is a milliammeter for checking the working of the amplifier.

The relay is, on the other hand, through the switch S_2 , and the accumulator AK connected up to the ammeter A, the oxyhydrogen Coulometer K and an adjustable resistance E, controlling the sensitiveness of the apparatus.

Whenever the microphone is affected by any sound the microphone circuit is traversed by an electric

FROM "MIKE" TO METER

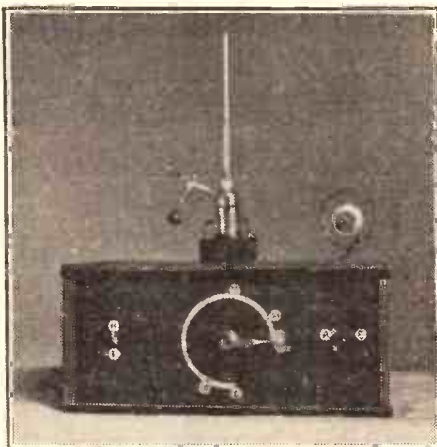


How the connections of this novel noise recorder are made from "Mike" to measuring instrument.

Apart from obtaining the total noise, an actual analysis can, of course, be effected by inserting a galvanometer or any other suitable apparatus.

The noise recorder described has been submitted to comprehensive tests, and has been found fully suitable for the purpose. It might be used as well in gauging the acoustic strength of wireless receivers, loud speakers, etc., but so far it has not been applied to such use.

WATCHING THE SOUND



The whole outfit can be housed in a small box, the microphone and coulometer being placed outside as shown. The amount of noise is shown by the level of liquid in the coulometer.

"MIKE" MILEAGES

The distance between Brookmans Park and Savoy Hill is approximately 17 miles.

The distance from Moorside Edge to Piccadilly, Manchester, is approximately 22 miles.

So badly do land-lines distort that middle C on the piano would be received at Brookmans Park many times stronger than the top notes on the piano, if the land-lines were not "corrected."

"MY RADIO CAREER"

(Continued from previous page.)

works of the lower animals than I do of my own species, and I would dissect a frog, against time, with anyone, even now!

I wrote a lot of technical stuff, all about oil and its ways, and conducted the correspondence pages of a now defunct technical journal devoted to oil and lubricants generally. I used to write the (alleged) letters one week, and the (alleged) replies the week following. My first printed article was dated 1902 and I got half-a-crown for it!

All this time, and no radio! Well, radio didn't amount to much for some years after Marconi came to England; it had a hard struggle for recognition and for business.

As a matter of fact it was chronic catarrh which shoved me into the radio business in that I saw chances of getting abroad to warmer, drier climates.

Those chances "came off," and I have seen my fill of the tropics and "furrin' parts" generally. I have seen battle, murder, and sudden death a' plenty, quite apart from the Great War, and I like a quiet life now—like journalism. Ye gods!

I saw the birth of the valve, of the direction-finder and of broadcasting, and I saw the Beam as a baby—a tiny Beam aerial being marched up and down a corridor at Marconi House.

Matter of Routine.

I have been nearly drowned in a December sea, I have escaped death by a few feet from a falling radio mast; I have seen a man's brains on my laboratory floor and I have been married once. I once trod on a British princess's foot and said involuntarily, "Sorry!" and I have sat in a Chinese shop

in order to escape a storm of Chinese bullets outside.

Not much radio romance in all this! That is because professional radio work becomes a mere matter of routine, of tinkering at engines and batteries, of hoisting aërials and hunting the wicked, broken connection.

A Fascinating Game.

Broadcasting, in which you, friends, are so interested, is to the commercial radio engineer a sort of playtime occupation, at least, in so far as reception is concerned. But it is the most fascinating game—after love-making—in the world, and I hold myself lucky to be associated with it, even in such a humble capacity as your weekly commentator.

And now, my radio receiver, my gramophone, my perusal of the newspapers and the lucubrations of their experts, my garden and my observations of life and society in general—all at your service.

The "Outer Circle" CRYSTAL SET



Here is a crystal set that caters for the man who wants all the punch he can get in his 'phones. Employing an unusual circuit, with plug-in coil and a compression condenser, it makes many a more expensive set "take a back seat and sing small"! Read all about it in this article by the "P.W." Research Department.

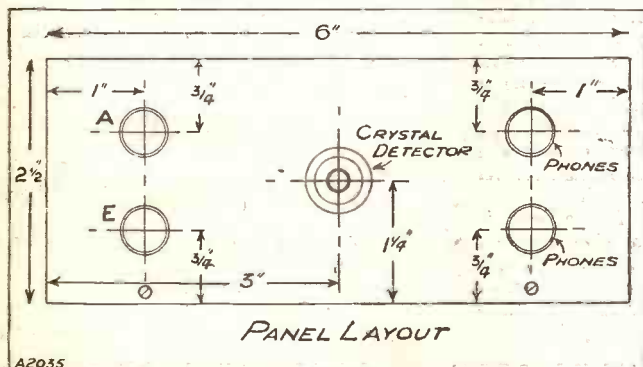
MOST readers of "P.W.," opening these pages and glancing at the above title will undoubtedly want to know why this set was called the "Outer Circle." Well, we admit it does seem to

scores of letters from readers who live "on the outer circle." This term has nothing to do with the London District or Metropolitan Railways—it simply means on the outer circle of a broadcasting station's service-area.

ends of the coil, placed where they will be influenced by every vestige of the voltage, are the leads to the detector and 'phones.

Such an arrangement is capable of giving definitely louder and clearer signals than the more usual condenser-and-coil-in-parallel circuit. There is more "kick" in it, more work for the detector to do, more power for the 'phones to handle.

THIS PART WON'T TAKE LONG!



The little panel is marked as shown, and carries the crystal and the four terminals.

Everybody knows nowadays that if you live close to a broadcasting station, almost any old kind of aerial and set will pick up the programmes. But the further out you live the more careful you must be to get good strength of reception.

Speaks With Real Vigour.

Consequently, on the outer fringe of a broadcasting station's service area, a set of this kind puts up a performance out of all proportion with its size. Bigger and more costly crystal sets arranged on a less suitable circuit will simply whisper, where the "Outer Circle" is able to speak up with real vigour.

And the set is so easy to build, and so inexpensive, that anyone can test its merits (Continued on next page.)

And, if you happen to live miles and miles away, right on the outer circle—where the "local" station hardly deserves the name of "local"—well, if you are going to use a crystal receiver there, you will need a special kind of set; a set that is guaranteed to get every ounce of power that can be obtained.

The little receiver described in these pages is exactly such a set. It makes the most of every m.e. of power that it picks up.

And we ought to emphasise the fact that its loud results are no fluke—unexpectedly discovered and taken advantage of. Nothing of the kind. The "Outer Circle" gives extra loud results because it was designed to do so.

be an out-of-the-ordinary title—and that is exactly why we chose it. For the "Outer Circle" is an out-of-the-ordinary set!

On the Fringe.

Perhaps we had better explain it right away and then you will be able to see how well that title is justified. This is how it all came about.

Every day of the year among the many hundreds of letters we receive, there are

THE PARTS FOR THE "OUTER CIRCLE."

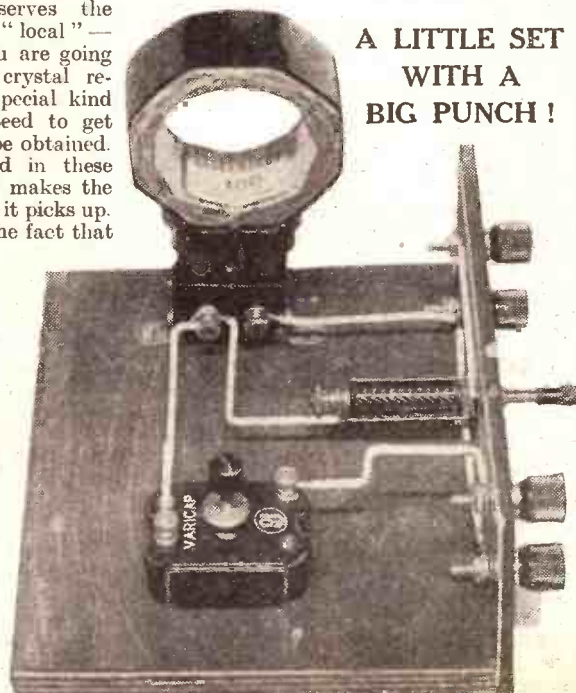
- 1 Ebonite strip, 2½ in. × 6 in.
- 1 Baseboard, 6 in. × 5 in.
- 4 Terminals (Belling-Lee, or Eelex, Igranic, Clix, etc.).
- 1 Crystal detector (Red Diamond, or R.I., Brownie, etc.).
- 1 .001-mfd. (max.) compression-type condenser (R.I., or Lewcos, Formo, Lissen, Polar, etc.).
- 1 Coil holder (Lotus, or Igranic, Bulgin, Lissen, Keystone, Wearite, Magnum, Red Diamond, etc.).
- Wire, screws, etc.

Unusual Circuit.

Look at the circuit diagram and you will see that the arrangement is not the usual one. Instead of the tuning condenser being joined across the coil, as usual, it goes in the aerial lead, where it effectively tunes the aerial-earth circuit to the wave-length being received.

When the received signals come along they surge up and down between aerial and earth, building up the signal voltages across the coil. And at the

A LITTLE SET WITH A BIG PUNCH!



Nothing could be simpler—just the base and the small panel, with parts as shown. But it gives extremely strong results for a crystal set!

THE "OUTER CIRCLE" CRYSTAL SET

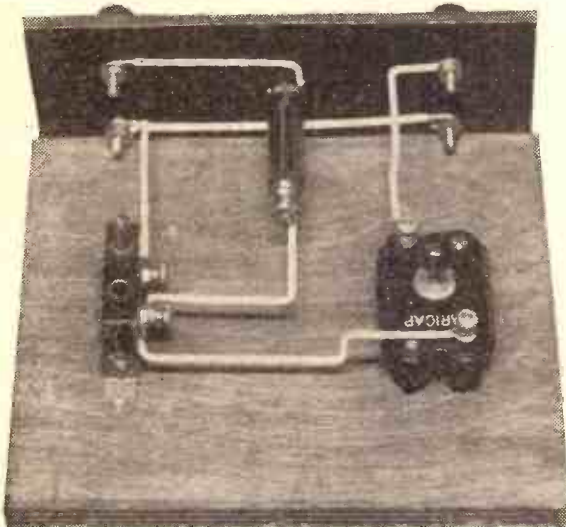
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without difficulty. (You have only to glance at the photographs to see that even the veriest tyro in set building has an interesting and easy task to make the "Outer Circle.")

A Straight Question.

"But," the wily constructor will say, "if this circuit is so superior, why doesn't every 'P.W.' crystal set have it? Why use the other arrangements at all, if this one gives the greatest strength?"

SOLDERING NOT NECESSARY



You can solder the connections if you like, but there is no need, and anyone who can handle a pair of pliers properly can make the electrical contacts practically perfect.

A straight question, deserving a straight answer. And the answer is "selectivity." With all its advantages, the "Outer Circle" has one distinct disadvantage—it is not very selective.

We are being perfectly frank about this shortcoming. But, on the other hand, we don't want you to suppose that the set is going to be hopelessly "flat" and untuneable. It is nothing of the kind.

What the Set Did.

Perhaps we can best put it in the form of the results obtained. We first tested the "Outer Circle" at our City offices, 15 miles from Brookmans Park twin-wave station, and this is what it did (on an indifferent and low-efficiency aerial, used for pretty stiff tests).

1. Gave the London Regional programme at a strength greater than usual, with no trace of the National.
2. Gave the London National programme, also at greater-than-usual strength, and with no trace of the London Regional.
3. Gave the Daventry National programme (5 X X) at greater than the usual strength, when a long-wave coil was plugged in.

Now a really "flat-tuning" crystal set would have mixed the Regional and National

programmes a little, tested under the above conditions. And, of course, the nearer it was worked to the station the stronger would be the mixture.

In view of the above-mentioned complete separation we cannot call the "Outer Circle" a really "flat-tuned" set.

When You Are "Very Local."

On the other hand, we don't disguise the fact that when used nearer a twin-wave station (or with a bigger aerial) its power-pulling qualities would irresistibly tend to pull in both programmes at once. For such situations the crystal set user must have a certain degree of selectivity, and in bad cases use a set like the "Crystatube" ("P.W.," No. 438) or the "Crystachoke" ("P.W.," No. 445).

But for those who live on the outer fringe of a station's area—say 20 or 30 miles or so from Brookmans Park (or from Moorside Edge when it is working on full power, and at proportional distances from the other B.B.C. stations) a set of the type shown here is ideal.

The fact that it isn't "sharp" is no drawback, and its added strength is always welcome.

Not Critical.

It is not a bit critical about its components, either, and any good crystal and pair of ordinary phones will suit it. But the coil should be a good one, and, of course, you need the best possible aerial and earth system you can get if maximum results are to be obtained.

The size of the coil is not easy to give exactly, because it varies with the aerial used. It will be somewhere between 35 and about 60 turns for ordinary

waves, and a 250 for long-wave reception.

A good plan would be to make your own plug-in coils, as described in "P.W.," No. 415, for then you can be sure of getting the exact best size. Failing that, remember this good old rule:

"The smaller the aerial, the bigger the coil." So if your aerial is very long, use a 35; if it is very short use a 60 (or even a 75). And if it's between the two, use an intermediate value.

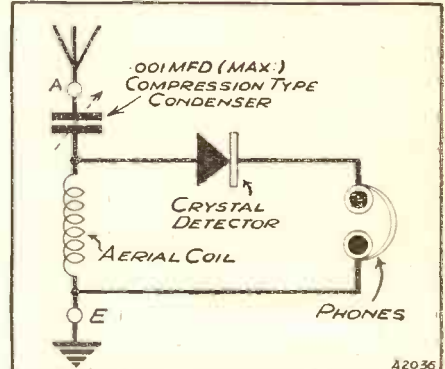
Made in No Time.

It would be almost an insult to try and tell you how to make the set, for the photographs, etc., show the whole thing. It won't take much longer to make than to read about.

You will see all about the parts in the separate list, and the wiring diagram shows you how to "place" them and wire them.

There is no need to solder the connections unless you like to do so. But if you use screwed-down connections be sure to make really good clean, tight contacts.

A CIRCUIT FOR STRENGTH



The unusual strength is due to the unusual circuit. Note the position of the .001 condenser.

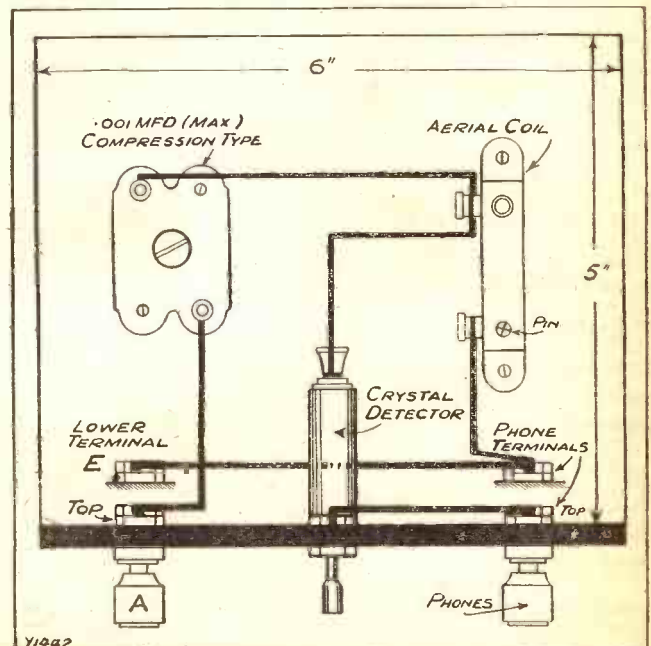
With those few simple instructions we can leave you to get acquainted with the "Outer Circle," one of the very smallest, simplest, and strongest little sets that have ever been presented to the public in "P.W."

"FROM ALL STATIONS."

It has been suggested that the B.B.C. should run its own land-lines between stations, instead of hiring them from the Post Office.

Underground cables are sometimes used between London and Leeds for S.B. work, but most of this class of work is carried out on overhead lines.

YOU'LL SOON "GET ROUND" THE CIRCLE!



As this sketch shows the wiring is absolutely easy, and you can have the set working in next to no time!

THE BEST WAVE for BROADCASTING

By

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



I THINK that I have demonstrated fairly conclusively in previous articles that the present waves allocated for broadcasting purposes are highly unsuitable.

Thus the "medium" wave station, whatever its power, has a service area no greater than 20 to 50 miles to 100 miles radius, whereafter fading and distortion seem inevitable. Ingenious tricks may overcome the trouble to some extent, but we are inevitably faced by limitations.

Increasing the power of the stations does not alter (as I showed in my last article) the true service area boundary, because the point of intolerable fading occurs at a place independent of the power of the transmitting station.

An Unreliable Ray.

The space ray is appreciable up to very large distances. But the space ray can never be relied upon for service. True, in certain cases, we may listen to far away stations via the space ray for even 20 minutes at a time, but inevitably they slowly fade away, become distorted, and so die. Later they live again. This is not service.

The space ray is appreciable up to very large distances. The space ray can be relied upon for interference! If it would stay as strong as it does when it interferes, we might rely upon it for service. As it is, its sole function is to produce awful interference on the local station.

Who has not heard the thin piping tone of the heterodyne all through a concert? Who does not know the irritation of that harsh whispering due to the neighbouring station? Who can give one a receiver capable of "holding" a foreign medium station over a worth-while period without its neighbour butting in?

It is a very serious state of affairs even when the local station is interfered with due to the ever-increasing power of neighbouring stations. What is to be done? Here is some discussion upon what might be attempted.

What Might Be Done.

Firstly we might give better wave-lengths for broadcasting. But if the same number of broadcasting stations are to exist after as before the change we shall need to occupy every wave-length between 250 and 2,000 metres! It is asking a lot.

We should have to ask *inter alia* the removal of ship communication, aircraft,

In the third and last article of this series Capt. Eckersley deals specifically with D.X. reception, and proffers a plea for a greater concentration on selectivity in receivers.

(3). SERVICE FROM DISTANT STATIONS.

communication and direction-finding services to other wave-bands. It is thought that the shipping might conveniently occupy lower wave-lengths because their shorter waves over water only suffer the same attenuation as a 2,000-metre wave over land. (At least, in theory.)

But direction-finding services are forced to use the longer waves. And aircraft are land craft when considering wireless transmission. I mean aircraft fly over land, therefore the wireless waves they emit pass over land. In sum it would be fairer to all concerned to make some readjustments, but we cannot expect broadcasting to obtain every facility it wants regardless of other wireless interests.

Secondly, we might ask wireless receivers to concentrate more upon selectivity. In my opinion the selectivity question requires

far more profound study than it has received (in the general commercial design), and we must congratulate Dr. Robinson on seeing the fundamental requirements of the modern receiver.

I speak under the possibility of correction, but I do fail to see how it is possible to obtain greater selectivity without some sacrifice of quality. Adhering as I do to the theory of side-bands, and expressing my thoughts in these terms, I say that if, as we can daily appreciate, the side-bands of one station overlap those of another, the only possibility of the elimination of this interference is to "lop" the side-bands of one.

A Reception Problem.

This can be done either in the transmitter or the receiver. It is preferable that the latter should do the cutting since there will always remain those so near to powerful transmitters as to be able to enjoy the benefits of the full spectrum.

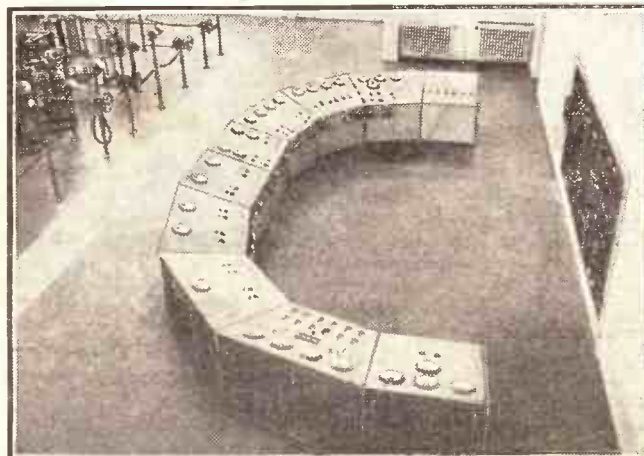
It strikes me that the elimination of interference between one station and another must be a problem in reception. To-day we see all sorts of expedients, but more of that anon. I pin my faith more and more to the super-heterodyne (as typical of a well-known method) or something novel such as the Stenode radiostat.

In sum it cannot be expected to achieve the desirable selectivity by using tuned circuits which alter their constants five- or ten-fold over the frequency gamut and leaving the user one adjustment! It cannot be expected to get perfect quality if conditions of transmission make it imperative to obtain selectivity by cutting off upper side bands.

If the first solution is adopted and the second follows in some sort, the wanted variety in programme material will unquestionably increase. In extending service area by using longer waves it will be more likely that a given listener will find himself in the service area of several rather than one or two stations.

(Continued on page 855.)

JAMMING THE LONDON PROGRAMME



The controls of the new German Giant, Muhlacker. This is the station that has been causing interference with the London Regional programme.

LATEST BROADCASTING NEWS.

THE "TALKS WAR."

MODERN MUSIC—ANOTHER SERIAL THRILLER—STUDENTS RAID GLASGOW, etc.

THE somewhat anxious denials of a "Talks War" hardly carry conviction. The truth seems to be that, although the B.B.C. does not contemplate any drastic change of policy or attitude towards talks and education, there is in progress a thorough reconsideration of methods.

There has been a feeling that the "Talks" Department has been working too much on its own, with the result that its plans have left out of account the larger aspects of entertainment policy. The obvious method of correction was to bring the Talks Department administratively into line with the other Departments, Music and Productions.

Steps to this end have been taken. The staff of the Talks Department have not recognised either the need for or the desirability of the changes, and there has been a good deal of bitter comment and some altercation.

It is understood, however, that the position is improving and that the changes are not likely to involve resignations. There can be little doubt that the programmes will benefit, as long as the new measures of supervision and co-ordination are applied with intelligence and sympathy.

Admiral Carpendale Abroad.

Vice-Admiral Carpendale, C.B., of the B.B.C., has gone to Switzerland for the winter sports. The gallant admiral, now a well-known figure on the Continent after five years of the presidency of the International Union of Broadcasters, has become an adept at another branch of winter sport. Already a ski-or of skill, he has now become a highly competent skater, and will soon be "pot-hunting" in this as well.

"Modern Music."

An attempt to explain what modern composers are aiming at will be made in a new series of talks, entitled "New Friends in Music," which is to begin in February. Six composers—Bax, Holst, Debussy, Strauss, Sibelius and Vaughan Williams—will be taken at the outset, but the list will gradually be extended to include Bartok, Hindemith, Stravinsky, Schönberg and others.

The speakers include Dr. Adrian Boult, music director to the B.B.C., Mr. Percy Scholes, formerly the B.B.C. music critic, Dr. Malcolm Sargent, and Constant Lambert, himself a product of the modern school.

Meanwhile, the fifth season of B.B.C. contemporary music concerts begins to-morrow night (Friday, January 9th) with a programme of Schönberg's music, with the composer paying a special visit to England to conduct.

There are signs of more "modern music" in the programmes this year.

Another Serial Thriller.

Dorothy L. Sayers, Clemence Dane, Agatha Christie, Freeman Will Crofts, E. C. Bentley, and Anthony Berkeley are the contributors to another serial detective story which is to be broadcast to National listeners.

The story will be given in twelve instalments, each author contributing two, and the first will be heard next Saturday, January 10th. About twenty-five minutes will be allowed for each broadcast.

Students Raid Glasgow.

No one knows quite how the Glasgow programme will turn out on Friday even-

ing, January 16th, because on that night the local students are raiding the studio and will commandeer the microphone to boost their efforts of the following day on behalf of local charities. This is an annual affair, and youth must be served.

Past experience, however, has proved that the students put up quite a good programme of songs and instrumental numbers, all of which call attention to the main object of their visit. Last year Glasgow citizens contributed no less than £17,750.

A Mayor's Programme.

The Lord Mayor of Cardiff, the Mayors of Swansea and Newport, and the Chairmen of the Barry and Caerphilly Urban District Councils have all sent their favourite musical items for inclusion in a programme to be broadcast from the Cardiff and Swansea transmitters on Friday evening, January 16th.

All the items will be selected by prominent people living on the Welsh side of the channel, a sort of reciprocal arrangement to a similar programme chosen by distinguished people in the West Country, which was broadcast towards the end of November.

NEXT WEEK

THE "THIRTY-SHILLING" TWO

*for the man
who wants
real value
for money.*

ALSO

**"BEHIND THE
MICROPHONE,"**

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

and

**AT HOME WITH
LEONARD HENRY.**



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.

In the Doldrums.

I AM writing these notes in that doldrum which lies between Christmas and New Year. I confess that I found the Christmas programmes a relief. It was holiday stuff.

It was agreeable and entertaining stuff. It was a god's-mercy to have a week's listening without "Liberty," "World Downfall," "A1 and C3," and the rest of the University Extension Course generally.

I knew that at whatever moment I switched on I should hear something amusing, something that would take me out of myself; and I said to myself a dozen times, "This is what wireless ought to do all the year round!"

I suppose it couldn't. I suppose that probably we should grumble if it did.

St. Hilary.

It would be churlish to criticise the Christmas feast. I had my disappointments. The broadcast from St. Hilary was one of them.

I listened to it because I had been told from all sides that it would be the "pièce de résistance," the plum of the pudding. Frankly it bored me terribly.

I like Christmas in a bucolic setting; but the children on my doorstep sang their carols much better than the little choir at St. Hilary, lustier, merrier. Besides, I like my carols to be sung, in popular music, not to ecclesiastical music, which is all very well when properly rendered, but rather distressing when poorly done.

The whole thing seemed to me to be unimaginative and uninspired. This is my solitary grumble; and I only make it in order that Cornwall may not get swelled head!

Pantomime.

The best thing in the Christmas programme, in my view, was the "Little Red Riding Hood" pantomime. I congratulate Mr. Ernest Longstaffe.

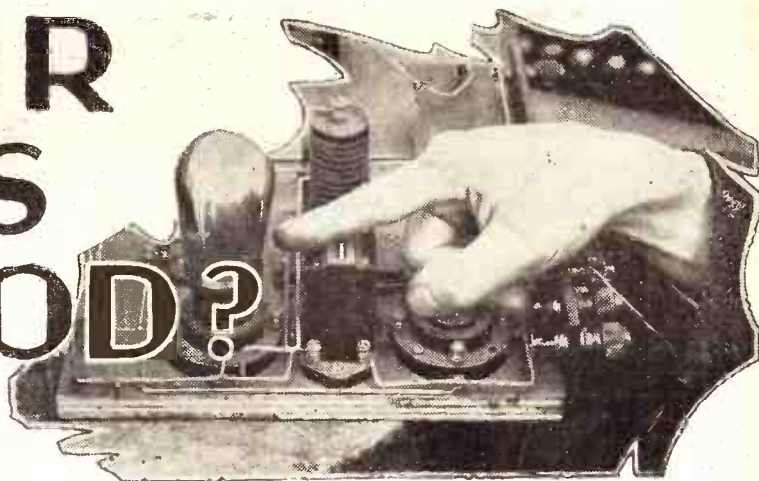
It was brisk, bright, tuneful, amusing, and went with a swing, as if everybody in the studio was enjoying it as much as I was. Leonard Henry was in his best mood. Alma Vane was delightful in the name part. Michael Shaw made a great Wolf.

And it was very pleasant to hear Jessy Tandy's voice again, safe home from America. A very good little show indeed.

(Continued on page 848.)

ARE OUR VALVES TOO GOOD?

By VICTOR KING.



A very famous radio engineer discusses the two opposite principles of set design that obtain in the United States and in this country respectively. It is a challenging, outspoken article, that will undoubtedly arouse a certain amount of controversy. While we do not agree with Mr. King in everything he says in it, we are bound to say that we endorse the major part of it.

THE other day I was speaking to a radio engineer who has recently returned from an extended business trip to the United States. During the course of a very interesting conversation, he gave me his impressions of American radio in general and American set and accessory design in particular.

Among other things, he said that undoubtedly the super-het. was regaining its popularity over there. It also appears that, far from the mass production of radio receivers killing home construction, the home assembly of sets seems to be increasing, some of the greatest of the firms having now joined in the supply of kits.

I asked him what he thought of the standard of quality achieved, and he gave it as his opinion that the best of U.S. outfits compare somewhat unfavorably with the average high-class British productions in that respect. On the other hand, it seems that there is a more widespread use of moving-coil loud speakers and that the sets are, on the whole, more powerful and more selective.

But the most curious fact of all is that, stage for stage, the American set still lags far behind British equivalents. Americans do not go out for the highest possible amplification per valve, and, in fact, their valves are mostly far less efficient than ours.

Why It Is.

I expect you all know the reason for this. In short, the ether conditions in the States demand great selectivity. In that country a set is reckoned a pretty poor affair if it cannot tune to one "channel." A

"channel" is the width allowed to a broadcasting station—10 kilocycles.

In order to achieve this selectivity they employ a large number of high-frequency stages, each with its tuning circuit. Thus eight-valve sets are as much used as are three-valve sets in Britain.

Obviously, if you have four stages of high-frequency amplification, it is not necessary that the valves should be of the "high-magnification" varieties. There is nothing to be gained, and quite a bit to be lost, if you go above a certain degree of amplification.

All-Mains Driven.

An eight-valve hook-up may sound a terrific affair to us, but it must be remembered that practically all American sets are all-mains driven. Again, owing to the "low-gain per stage," it is possible to take liberties in the way of packing the components together into astonishingly small spaces, etc., that would otherwise be quite impossible.

Now turn to British radio practice. Here we seem to have the diametric opposite.

Components, accessories, and circuits are all apparently designed with the primary object of getting the most possible out of every part of an outfit, the tendency being to reduce the number of valves where and when possible, instead of to increase them.

Which system is the better? I would not like to give a definite answer to this, although I do feel that we are more nearly on the right track than the Americans.

The multi-valve method makes selectivity easy to achieve, while it also introduces greater freedom into set design. That is to say, one does not work so near the danger point of spill-over through instability. On the other hand, a greater number of components have to be used additionally to a larger number of valves, and that means more things to "break down" and develop faults, and more possible sources of distortion.

I feel that if we can get the necessary selectivity and the necessary sensitivity with fewer valves and fewer components, so much the better. That way, too, ultimately lies a saving of money, both in initial outlay and running costs.

"Note-Mangling" at Each Stage.

At present our more efficient smaller sets may not be much cheaper than the larger and less efficient American sets (I use the word efficient in reference to amplification), but that is surely because we have not yet developed our commercial radio to the extent that they have in the States, and because we have not yet quite reached the goal of super-magnification super-simplicity in commercial-set design. But there is no reason at all to believe that we have achieved the limits of our progress in this direction.

My view, and I give it for what it is worth, has always been that the fewer the electrical processes the radio energy has to undergo the better. Take an ordinary kind of three-valve set by way of example. You might first of all have a high-frequency valve. Now, no valve can be perfect, so there will, for some reason or other (I do not need to go into details), be distortion at that point.

An H.F. coupling follows, and here further distortion will occur. Then comes the detector valve to add its distortion. If there is an L.F. transformer you will get a certain amount of note-mangling in that, however good its specification looks on paper.

(Continued on page 856.)

"MIKE" ON A MOTOR-BIKE



One of the new motor-cycle wireless units recently placed in commission by the 47th Divisional Signals. The special two-wheeled trailer containing a complete transmitting and receiving station is attached to a standard motor-cycle.

A YEAR'S WORK AT SAVOY HILL

Some Reminders of the B.B.C.'s Technical and Programme Achievements during 1930.

IN a review of its work during 1930, the B.B.C. states that technical progress has been well maintained and sufficient experience has been accumulated of regional broadcasting since a full service of alternative programmes was introduced at Brookmans Park, in March last, to justify an optimistic view of the future of dual programme transmissions.

Work on the North-Regional station, which is situated on the hills above Slaithwaite, near Huddersfield, has continued throughout the year and regular test transmissions will be heard shortly. A site for the Scottish regional station has been chosen at Westerglen, three miles south of Falkirk in Stirlingshire. This new station will be built as part of the B.B.C.'s regional scheme. It will eventually replace the existing low-power transmitters at Glasgow, Edinburgh and Dundee.

Ratifying the Treaty.

Rapid progress was made during 1930 with the construction of the future headquarters of broadcasting in Portland Place, London. The building will contain some twenty studios, ranging from small ones for talks and news, to a super-studio capable of accommodating an audience of a thousand in addition to a full orchestra and chorus.

Constant liaison has been maintained by the engineering staff of the B.B.C. with Government and broadcasting engineers on the Continent and in the United States of America, and considerable progress has been made in the relaying of programmes. These relays have included, for example, the linking of German, Belgian and British broadcasting stations for international concerts; several broadcasts from Geneva on the work of the International Labour Office; the relaying of the Salzburg Festival to mark the extension of Continental relays to Austria, etc., etc.

Among the outstanding technical accomplishments of the year was the relaying of addresses by President Hoover, Mr. Ramsay MacDonald and the Japanese Prime Minister, Mr. Hamaguchi, on the occasion of the ceremony of Depositing the Ratification of the London Naval Treaty in October. Those addresses were relayed on a large scale to listeners in America, Great Britain and Japan.

Leading Sporting Events.

The new headquarters of the Scottish region were opened at Queen Street, Edinburgh in November, 1930. The building incorporated a studio larger than any existing at that time in Great Britain, one feature being a theatre in which vaudeville, plays, and concerts may be performed, while a large audience can watch as well as listen from the galleries and floor.

In view of the special steps taken throughout the world to ensure the transmission of the King's speech at the opening of the London Naval Conference in January—the Post Office telephone service, all B.B.C.

transmitters, the Canadian beam service and trans-Atlantic and continental cable and telephone services being brought into requisition—the royal message of peace and goodwill may be accounted the most important outside broadcast of 1930. Of almost equal importance was the broadcast of the King's speech in opening the India Round Table Conference in November.

The leading sporting events of the year, including the University Boat Race, the Grand National Steeplechase, the Derby, the St. Leger and the Tourist Trophy Motor and Motor-Cycle races, were reported by the microphone, as well as the F.A. Cup Final. The All-England Tennis Championships were broadcast daily from Wimbledon.

POLLY'S LITTLE PROGRAMME



A young visitor to the Bristol Zoo inducing a friendly bird to contribute a few items to Cardiff's children's hour broadcast.

Important broadcasts of religious ceremonial included the Thanksgiving Service for the Preservation of St. Paul's Cathedral, attended by the King and Queen, in June, and the Memorial Service to the dead of R.101, also held in St. Paul's. The Armistice Day Service from the Cenotaph was relayed in accordance with yearly custom, and the Christmas Day service at Canterbury Cathedral was also heard by listeners throughout the country.

Numerous speeches by the Prince of Wales were relayed from public dinners, and His Royal Highness was also heard from a studio at Savoy Hill. The Prime Minister made a number of appearances before the microphone, as well as the Chancellor of the Exchequer, Mr. Philip Snowden, Mr. Baldwin, Mr. J. H. Thomas, Mr. Lloyd George and Mr. J. R. Clynes, in connection with public functions. Two further outside broadcasts which may be singled out for special mention were con-

cerned with the arrival of Miss Amy Johnson at Croydon, in August, and her welcome by the late Lord Thomson, and the arrival from Canada of R.100.

The principal musical event of the year was the formation of the new Symphony Orchestra of 115 players organised on such a basis as to be easily divisible into various smaller orchestras, so as to meet the whole of the needs of broadcasting, whether of symphony concerts, operas, light opera, popular orchestral music, chamber music, musical comedy, etc. This new orchestra's debut, in October, under the conductorship of the B.B.C.'s Music Director, Adrian Boult, was a memorable occasion.

The Symphony Concerts.

Of outside symphony concerts, the year has seen the second half of last season's series at the Queen's Hall, under the conductorship of Sir Thomas Beecham, Sir Henry Wood, Sir Edward Elgar and, as guest conductors, Ansermet, Scherchen and Casas. Among the artists who appeared were Szigeti, Bartok, Walter Frey, Arthur Catterall, Lionel Tortis, Landowska, and several outstanding British singers. There was also the remainder of the series at the People's Palace (six out of the eight concerts), under the direction of Sir Landon Ronald and Percy Pitt.

The Promenade concerts at the Queen's Hall, under Sir Henry Wood's popular conductorship, proved an unusually attractive series to the public, and the continuation of the British night on Thursdays enabled seventy-eight interesting British works, many of them contemporary, to be heard in the course of the concerts.

Notable Names.

The present series of symphony concerts at the Queen's Hall on Wednesday evenings have been given with the new Symphony Orchestra at its full strength and have been well attended by the symphony concert-loving public. The conductors this year were Adrian Boult, Sir Henry Wood, Sir Landon Ronald and Scherchen, and the principal artists who appeared at these concerts were Suggia, Rubinstein, Busch, Schumann, Bartok, Moisevitch and Lamond; also a number of principals of the orchestra, including Arthur Catterall, the leader. The National Chorus and the Philharmonic Choir have both taken part in concerts.

One of the outstanding broadcasts of the year was the relay of Toscanini's concert from the Albert Hall on June 4. Other symphony programmes, apart from the B.B.C.'s own series, were relayed from the Hallé, Reid, Scottish, Liverpool Philharmonic and City of Birmingham orchestras.

These are but a few of the achievements of the programme builders at Savoy Hill during the past year. There were many others, to which reference must be held over till next week.



Radio Strides Ahead

ALTHOUGH 1930 has not brought to the surface many developments that can be ranked as revolutionary, it has certainly produced a far higher standard of radio efficiency than that in force twelve months ago.

There is an all-round improvement, whether one judges by the cost of the simplest type of loud-speaker set, or by the performance of the best receiver money can buy. Present prices are such that no listener need count loud-speaker reception too dear, whilst the man who can afford it can purchase greater selectivity and higher quality than ever before.

Mass Production.

In the main these things have been made possible by the use of mass production methods in manufacture, by a fall in the cost of raw materials, including valves, and, as a side issue, a reduction in the scale of patent royalties. At the same time makers have paid more careful attention to the technical details of circuit design.

Finally, the efficiency of the modern valve, particularly of the S.G. and Pentode types, has been improved beyond all recognition.

The mains-driven receiver leads the way in all-round performance, principally because of the constant voltage and unrestricted current which can be drawn from the mains, as compared with batteries. Nevertheless, it has a comparatively restricted market, owing to the fact that so many listeners are still outside the areas served by electric supply companies.

The Inductor.

In loud speakers there are also one or two interesting innovations to record. The magno-dynamic type of moving-coil speaker, though not exactly a novelty, has been greatly improved in operation and compactness, owing to the enormously powerful cobalt-steel magnets now available. The Farrand Inductor Dynamic instrument, on the other hand, is a distinctly new type, which may be regarded as a compromise between a moving-coil and moving-iron speaker.

Instead of moving towards and away

We have not yet reached the "saturation point" in licence figures—that is evident by their steady growth—and the technique of wireless also maintains an uninterrupted progress. Here is a really readable review of the "highlights" of technical radio during 1930.

By **CARDEN SHIELS.**

from the magnet pole-pieces, like an ordinary diaphragm or reed, the armature of the Farrand speaker is arranged to vibrate in a plane parallel with the pole-faces. It is propelled in both directions by magnetic force, and does not depend upon a spring reaction. The quality of reproduction is very similar to that given by a moving-coil, the bass register being well in evidence.

The Stenode Radiostat.

The electrostatic type of speaker has not yet made its presence felt on the market

circuit, of which so much has been heard of late. This new receiver claims to have achieved a standard of selectivity hitherto considered impossible.

Through a "Shaping Circuit."

Briefly, it claims to receive programmes separated only by a few hundred cycles in frequency. This, if true, drives a coach and four through the generally-accepted theory of side-band modulation, and should make room in the ether for ten times the number of transmitting stations now in operation.

Without being unduly conservative in outlook—for this is a dangerous policy in radio science—such a statement is bound to arouse a certain amount of criticism. The Stenode circuit utilises a super-heterodyne receiver to feed the incoming signals through a very narrow "gateway" which is controlled either by means of a piezo-crystal or by a phase-reversing oscillator.

The emerging signals are then passed through a "shaping circuit" to restore their musical balance.

The principle is certainly ingenious in its conception, and deserves to succeed. The proof of the pudding lies, however, in the eating, and one can only wait and see to what extent the Stenode circuit will supersede its other competitors in the field of selectivity.

Curing Fading.

In connection with the selective reception of distant programmes, one difficulty still to be overcome is that of "fading." Efforts are now being made to eliminate this bugbear by the use of an automatic volume-control device, designed to regulate the degree of amplification of the first H.F. valve in an inverse sense to the strength of the incoming wave.

A part of the received signal is separately rectified and the rectified current is then used to control the bias on the grid of the first H.F. valve. When the incoming carrier-wave weakens, the negative bias is lessened, so that the valve amplifies more powerfully, to compensate for the falling-off in signal strength.

(Continued on next page.)

SUCCESSFUL YEAR FOR SHOWS



Many highly successful Wireless Exhibitions were held in various countries during 1930. Above you see President Doumergue visiting the one in Paris.

here to the same extent as in Germany. The necessary biasing voltage is now conveniently drawn from the electric mains, whilst from the point of view of economy in manufacture it compares very favourably with its older rivals.

Then there is the Stenode Radiostat

RADIO STRIDES AHEAD

(Continued from previous page.)

the signals grow too strong, the negative bias on the first valve is automatically increased and the volume cut down accordingly. The "control rectifier" is inserted before the detector valve, so that it does not affect the degree of modulation, or introduce any other form of distortion.

It may be thought that there is now little scope for further improvement in the thermionic valve. In spite, however, of the high amplification factor and all-round "figure of merit" of the latest types, there are signs that we are only on the threshold of future valve development.

Future of Television.

The multiple valve in which several stages of amplification are housed in the same bulb is at present being extensively exploited abroad, particularly in Germany. So far, this type of valve has been left severely alone in this country. Sooner or later it must come to the fore, and prove a powerful factor in reducing still further the cost of multi-valve sets.

Another interesting possibility lies in the development of the photo-electric cathode, in which the filament battery will be replaced by a source of light. The photo-electric type of valve, fitted with a light-sensitive cathode or grid has, for instance, an obvious application in television.

There is also reason to believe that the cathode-ray tube may soon open the way to a new system of television, unhampered by the use of mechanically-moving discs, and capable of producing programmes of real entertainment value. Whatever may be said as to the merits of the Baird system,

domestic mains. In short, the cathode-ray tube opens out new prospects for television.

Beam Radio Progress.

Apart from broadcasting, remarkable progress has been made in the use of ultra-short radio waves, particularly in connection with so-called "beam" systems. It is now possible not only to transmit telegraphic code messages at the rate of 200 words a minute, but simultaneously to use the same beam waves to carry a telephonic message, without any trace of interference between the two systems of communication.

Experiments are also being carried out in connection with the transmission of speech between England and America over a submarine cable. This has always been considered impossible owing to the distortion caused by the relatively enormous capacity of the submerged wire—but developments in the use of new "shaping circuits" (designed to restore the distorted speech to its original form) promise to remove these difficulties and add another direct speech-channel between the old world and the new.

RADIO REALISM

A novel scheme for two loud speakers.
By C. P. ALLINSON, A.M.I.E.E.

EVER since moving-coil loud speakers first occupied my attention I have sought diligently for one which would give me what my somewhat critical ear requires in the way of an absolutely even frequency response.

First of all, however, I had to make sure that my amplifier was doing its work correctly, and this accordingly was redesigned and rebuilt. Further improvements were made from time to time as new information came to light on various points on low-frequency amplification, everything was done that could possibly be done to make sure that the output from the receiver was faithful and free from distortion.

The Solution.

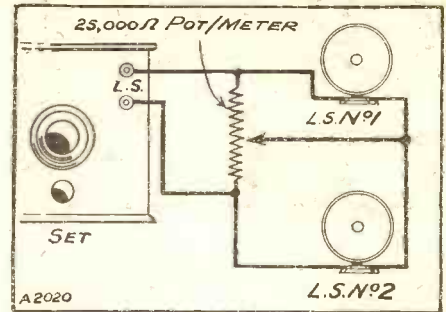
Different types of loud speakers were tried in conjunction with various forms of output transformers or chokes, and, although the quality

obtained from the set was of a very high order, there still seemed to be something lacking.

A couple of months ago I had occasion to carry out some comparative tests with two moving-coil loud speakers, which I found varied considerably in response characteristics. One had an excellent base response, though the suspension was stiff enough to prevent wobble and pumping.

The other speaker was somewhat deficient

COMPLETE CONTROL



By varying the position of the potentiometer slider the power can be divided between the loud speakers in any proportion.

in the lower frequencies, but had a remarkable upper register. It gave a wonderful rendering of brass and woodwind, and also enabled me to get more natural reproduction of speech than I had previously obtained.

It struck me, therefore, that if I could run these two speakers together and mix them in suitable proportions with some kind of control, according to the type of transmission being reproduced, I ought to get something that would be as near to the ideal that could be obtained.

Adjustable Balance.

I first of all connected the two speakers in series in the ordinary way, and at once it was evident that a very great improvement in reproduction had been obtained.

Next I connected the potentiometer as shown in the diagram, so as to enable me to vary the output of each speaker. It will be noticed that the potentiometer is connected across the whole of the output from the receiver, and the two speakers connected in series across it. The centre point between the two speakers is connected to the slider.

You will see that by moving the slider up and down the potentiometer, any desired proportion of the output from the receiver can be applied to the two speakers respectively. By this means a transmission which requires accentuation of the upper register can have the loud-speaker system adjusted to suit it by moving the slider of the potentiometer to that end of the resistance which is connected to the loud speaker having the bigger output on the lower frequencies, and so reducing the output from this speaker.

It is necessary, of course, that the potentiometer should have a suitable resistance—that is, its resistance should be high compared with the impedance of the two speakers in series when taken at a high frequency.

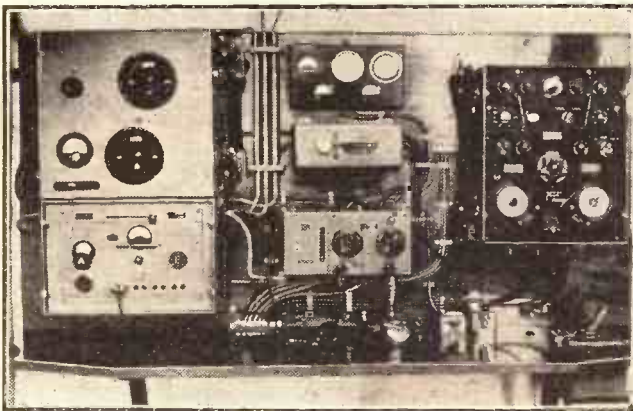
I tried out different values very carefully with the slider disconnected to see what effect the mere disconnection of the resistance would have on the output from the speakers.

"Far In Advance."

I found that it was quite feasible to use a 25,000-ohm resistance without detriment to the faithfulness of reproduction, and, although this may appear to be a somewhat low value, it has been found perfectly satisfactory in actual practice.

I certainly consider the results given by these two speakers used in conjunction with each other is far in advance of that obtainable with a single-coil speaker. It is important that the two speakers be correctly positioned in the room.

RADIO ON THE D.O.X.



The powerful radio set fitted to the giant flying ship D.O.X. Can you see the two tapping keys, the microphone and the pair of telephone receivers on the desk?

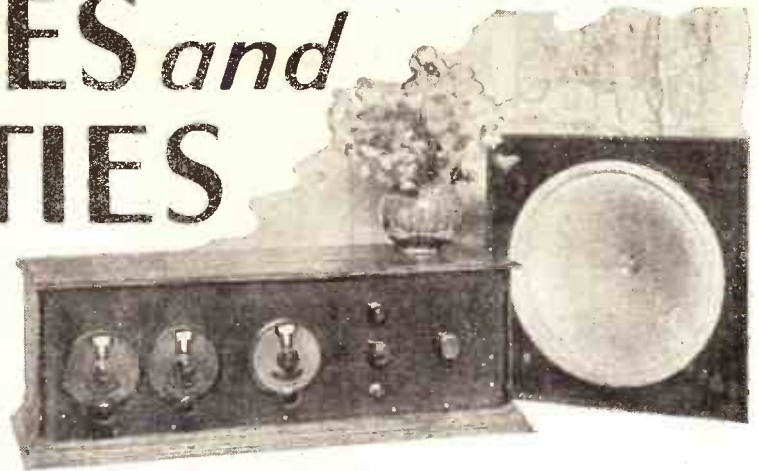
it must be admitted, in spite of the facilities given by the B.B.C. television, that it has not so far proved a commercial success.

At the present time experiments are being made, both in this country and abroad, with cathode-ray tubes for transmitting and receiving moving-picture effects by wireless. There is no reason why a cathode-ray tube need cost any more than a mains-driven valve, whilst the necessary operating voltage can easily be drawn from the

QUALITIES *and* QUANTITIES

By
G.V. Dowding

Associate I.E.E.



I AM one of those who believe that complete realism in radio reception is neither necessary nor even desirable. Now, don't misunderstand me. I do not contend that we should not aim at making our receivers perfect reproducers of all the audio frequencies. I think we should strive very hard to do that.

Nevertheless, I also hold the view that realism, as literally interpreted, belongs only to the broadcasting end of the ether. But I will advance my argument in detail later. First of all I must reproduce a part of a letter I have just received from Victor King, who, by the way, is just completing a short vacation on the continent. He writes:

"Really, You Surprise Me!"

"I have just read your short article in the November 22nd issue of 'P.W.' Really, G. V. D., you surprise me; for once in a while I find myself entirely disagreeing with you. Your point, if I understand you correctly, is that the B.B.C. should transmit 'super-realistically' just for the sake of living up to a traditional standard of concert values.

"But surely there can be an *art* of broadcasting just as there is an art of painting. In painting the artist who is an artist, and not a miserable copyist, endeavours to let you into his mind: to show you in colours his reactions to some particular aspect of nature. If his picture includes the sky, he doesn't attempt to introduce all the stars known to astronomers; he doesn't even try to place the stars in their exact positions in accordance with the astronomical calendar. So long as he gets over with his main effect, he is satisfied to leave out irrelevant details.

"And so with broadcasting. Surely, if the same apparent tone colours can be handed to the average listener by forty musicians as by one hundred and forty, an orchestra of the latter size is just one hundred musicians too large.

"As for the necessity of the B.B.C. beating every other musical organisation in the size of its orchestras in order to keep its dignity, that, in my opinion, dear

Is "realism" at the reception "end" of radio possible? Should the B.B.C. fake their transmissions? These and other vitally interesting questions are the subjects of a friendly argument between Mr. Victor King, the well-known radio engineer, and "P.W.'s" Technical Editor, which is recorded in the following article.

G. V. D., is pure bunk. The job of the B.B.C. is to hand out pleasant noises to its subscribing listeners, not to compete in the world's philharmonic markets.

"Remembering the limitations of even the best of radio receivers (and of the best radio transmitters), what on earth is there to justify orchestras of Queen's and Albert Hall dimensions? To appreciate such things you must hear them in the original.

"Even if a reception outfit could deal faithfully with *perfect transmissions* of such items (and these don't and may never exist), who wants the faithful acoustic replica of a one-hundred-odd strong symphony orchestra blaring away at full strength in one's drawing room? And don't

"Why, for goodness' sake, shouldn't the B.B.C. realise all the practical limitations of the medium through which they work and turn these limitations into practical advantages? Disregarding the handful of musically-minded people of leisure who attend all their public concerts (and even tens of thousands are handfuls when measured against the millions of listeners), there seem to me no valid reasons at all why the B.B.C. should not face the facts and develop their music along microphone instead of public concert-hall lines.

Imagination?—Bunk!

"You also say that something should be left to the imagination, and that the average listener harking to his thin, ghostly echoes, likes to let his imagination dwell on the bright lights and serried ranks of musicians. Bunk, again, my dear G. V. D., and I know you won't mind me saying that, for it is at least an expression of honest conviction.

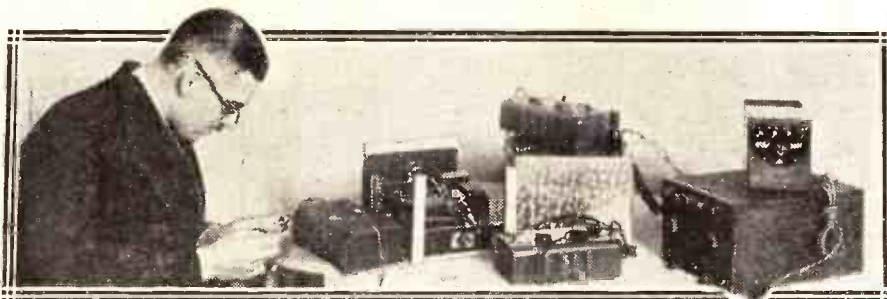
"Let me quote the cinema as an example of the adaptation of old material to a new technique. At one time, the cinema johnnies were all out for realism. If a battleship had to be sunk to provide a spectacle in the illustration of a story, then, by jimmy, a battleship was sunk, even if it entailed the loss of millions of dollars. But they soon found out that it was, in truth, money thrown away. And what do they do now? They put magnifying lenses on a toy boat in a tin bath when they want the picture of a naval tragedy!

"And no one can say that they do not get over every bit as well by their scientific faking as they did with their stark and, as history has proved, unnecessary realism. I contend that the B.B.C. have yet to learn this lesson and that they will spend many thousands of our money before they inevitably do learn it.

"The new orchestra is costing them a hundred thousand a year, I believe, and they must spend two or three times that on other similarly unnecessary things. I

(Continued on next page.)

THE DESIGNER OF MANY FAMOUS SETS



Victor King, designer of the popular "Vi-King" and "Explorer" series of sets. His views expressed on this page, and his special article on page 831 of this issue, reveal him as a keen investigator and critic of modern radio practices.

forget, although I need hardly remind you of this, that full strength is absolutely vital in the preservation of correct tone values.

"Keyhole Listening."

"No, G. V. D., radio reception is, and must always be, a kind of keyhole listening—diminuendo applied in a straight line! Given this first essential distortion, and distortion it is, what is there against an intelligent application of the remaining principles of art to broadcasting?

QUALITIES AND QUANTITIES

(Continued from previous page.)

maintain that they could please the majority of their listeners just as much, if not more, by leaving the great wide spaces, and by concentrating on studio technique. There is no reason why they should herald to the world all the artistic subterfuges in which they indulge any more than do the cinema people. When they release a "super production" for the cinemas they don't tabulate their fakes and say "the great chariot scene is all cardboard, and the thousands of square miles of prairie are really only hundreds of square feet of scenery," etc., etc., etc.

Synthetic Symphonies.

"So why should the B.B.C. orchestra be aught else except a studio unit of tens, so disposed in regard to mikes and echo rooms, etc., as to get over with every bit as good an effect (if not better) than a hundred or more musicians puffing and scraping in an external arena?"

"Surely such a technique would exercise the imaginations of listeners much more than unnecessary realism? The B.B.C. does a little faking now, they would be starkly unpractical realists if they didn't, so why shouldn't they pursue that policy to its logical conclusion?"

And so concludes the missive from Victor King. And I must say right away that I find myself in agreement with a very great deal of what he says. Where he and I differ most is in regard to detail rather than the main theme of "Quantities Versus Qualities."

But Victor King is, in my opinion, making one very fundamental mistake. He is misinterpreting the *raison d'être* of our B.B.C. I, for one, do not think that the only job of the B.B.C. is to make pleasant musical noises.

As I see it, the main task confronting the B.B.C. is to bring its listeners into the closest possible contact with all that is best in the way of entertainment by sound. Regarding music, and that is the department of the B.B.C.'s activities that is under discussion, we, or at least I, want them to "tap" into everything good that is going.

Those Outside Broadcasts.

If a wonderful Symphony Orchestra with a wide-world reputation arrives from some other country, or a famous American dance band starts at a London café, I want the opportunity to hear it. Obviously, one cannot always go along and listen to the original thing, but the next best way is to hear it by radio, despite the distortion that is inevitable.

And I do not think that the inevitable mangling that all transmitted material gets completely kills individualism by a long chalk. If it did, no one could tell the difference between, say, the broadcasting of a Jack Payne's combination and that of the Gleneagles Band. But you can't if you've anything at all in the way of a set. I'm not saying the Gleneagles Band

wouldn't sound as good via radio with less instrumentalists used in a different way, but there you are, it isn't going to arrange itself specially for radio!

Not a Noise Factory.

The day the B.B.C. decides to turn itself into a mere noise factory will be a black day for listeners. Fortunately, there is little possibility of that happening.

If the B.B.C. is to go outside for much of its material, and it would be failing in its duty if it didn't, then it is only fair that it should have material of its own that is as good as, if not better than, anything similar anywhere else. Otherwise, it would be in the subservient position of a mere carrier of goods.

It is vital that a national enterprise should have dignity. The B.B.C. must either be a mere microphone or a body of recognised entertainment and musical standing. There can be no half-way condition. To develop studio technique, irrespective of the external and independent world of

A VERY NICE TRIO



Gene Gerrard, Ivy Tresmand and the Mullard "Orgola," the three principals in "Little Tommy Tucker" at Daly's Theatre.

affairs, would be to rob the corporation of ninety per cent of its vitality.

Victor King instances the cinema in the furtherance of his argument. I think the cinema is an argument against him. The cinema takes in the whole wide world. It makes use of everything it can turn its lens on. It is true that houses of cardboard are often used, and that behind the colourful walls of a gaudy drawing-room scene, there are often bare boards and perspiring carpenters. But you can take it from me that faking is not the be-all and end-all of a cinema director's existence.

To get a first-class street scene, film companies have been known to collar a part of Broadway New York during a rush hour. They can do those things in America!

Coming nearer home, I am sure that everyone knows that Hyde Park has been the scene of film drama!

The cinema has developed its technique on moderately sane lines, and it is on similar lines that the technique of broadcasting is apparently developing. An intelligent mixture of the true and the fake, with as little of the latter as is possible.

Why Analogies Fail.

But, as Sir Oliver Lodge has so wisely said, no analogy is complete or it becomes the real thing, so do not pursue the comparison between the cinema and broadcasting too far. When television arrives, then the two arts will tend to become much more sympathetic than they are at present.

Victor King has challenged me on that point I made regarding the imagination of listeners. Where we differ is in this: I maintain that listeners like to let their imaginations play around the realism that is centred in the origin of many of our transmissions, whereas Victor King, apparently, thinks that listeners would be just as diverted in trying to picture exactly the fakes concerned with a synthetic broadcast.

Victor King is too scientifically minded if he really thinks listeners want their programmes in the form of radio conundrums.

But I fancy Victor King is more concerned with the subject as a topic of debate than as one of practical politics!

Anyway, it is unlikely that the R.B.C. will be influenced by what either of us says, and it will continue to give us what it thinks we *ought* to like, not what it thinks we *do* like!

YOUR RECEIVER

Some Useful Tips for Home Constructors.

In order to get good reproduction of the bass notes, it is important that the inductance of the low-frequency transformer primary should be high.

One of the advantages of shunt feeding a low-frequency transformer is that by removing the D.C. component the effective inductance of the primary is at its maximum.

Instructors at the Heston aerodrome use wireless to communicate with pupils who are making solo flights.

With the advent of high-power stations and bigger valves, the frame aerial is returning to popularity.

A good way of mounting a frame aerial is to employ a heavy duty jack and plug, via which the contacts can be made.

Before mounting a wave-change switch, make sure that its contacts are strong, if you want to get maximum results from the receiver.

Never stand a grid-bias battery on live wires, terminals, etc., but instead mount it securely by means of a strip or strap, both for economy's sake and safety.

CAPT. ECKERSLEY'S QUERY CORNER



Some questions and answers of general radio interest that will aid you in your radio reception.

When the Switch Burns—Saturating a Choke—Charging H.T. Accumulators—The Use of Stranded Wire for Coils.

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.

When the Switch Burns.

B. D. A. (Highgate).—"I have built a mains receiver, and find that reception is gradually decreasing in strength. A careful examination of the set shows that the on-off switch contacts are badly burnt, thus making a high-resistance contact. Is there any method whereby this burning could be prevented?"

Well, you know, there ought to be ways of handling the power of a wireless set through a switch when in power stations breakers are undamaged when breaking circuits carrying tens of thousands of kilowatts. Surely it's merely a question of using a decent switch somewhere in the feed to the set.

I have used electric light switches, or electric fire power switches and new or ordinary quick break snap switches for "on and offing." Ask your electrician locally for a quick break switch to handle a big cluster of lights, say, and you'll be easily covered against any difficulty—even if you have a particularly greedy set.

* * *

Saturating a Choke.

J. W. (Carshalton).—"In connection with output filter chokes, I understand that the inductance becomes less when the anode current is increased.

"Is this correct? If so, why does this happen?"

A choke has inductance because the magnetic flux created by a current through the choke links the turns of wire wound over the iron.

The more flux linking the turns the more back E.M.F. created in the choke (when the current through the winding is trying to increase or decrease), and thus the more flux in a given design of choke the greater the inductance of that choke.

If there were no iron core to a choke it would still have inductance, but the iron enables the currents in the winding of the choke to create more flux than if there were an air core. But the influence of the iron on the production of flux varies with the amount of steady magnetisation it experiences due to a steady current in the windings.

If the iron is strongly magnetised by the steady current flowing into a valve in the choke filter output circuit then its influence in creating extra flux is the less as it is more strongly magnetised. Therefore its inductance is the less (up to a point)

as the D.C. flowing through the choke winding is greater.

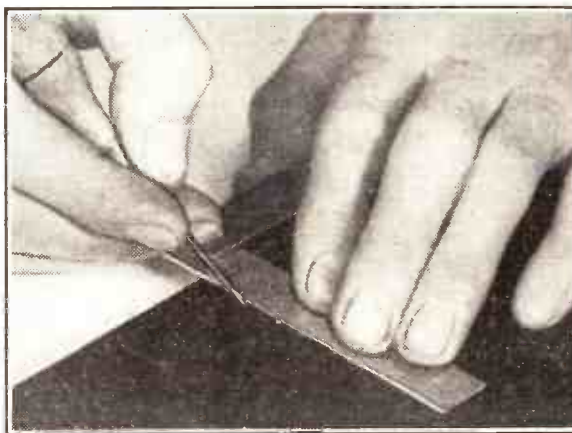
It is one of the great advantages of transformer output with push-pull connection that the core of the transformer is *not* magnetised by the steady but mutually cancelling D.C. feed.

* * *

Charging H.T. Accumulators.

H. D. (London).—"I have a battery of H.T. accumulators of '5,000 milli-amperes' capacity, giving a total of 140 volts, and for which the local electrician charges me six shillings for re-charging.

MAKING HIS MARK!



These bands belong to a wise guy! He doesn't mark his panel with partially-conductive pencil, but uses an improvised scriber and a square along the edge of the panel.

"The D.C. mains are now available at my residence, for which I pay approximately fourpence per unit. Would you please tell me if it would be cheaper for me to recharge my own accumulators, or would the local electrician's charge still prove more economical?"

But you do not tell me the voltage of your D.C. mains! Nor do you tell me if you pay a power rate, which is usually cheaper than a lighting rate.

Let us make some assumptions. Your mains, let us say, are at 220 volts. You pay 1d. a unit for power. You require to charge at 25 amperes for 20 hours, say. The total cost will be 0.1 x 5 x 220 x 1 divided by 1,000 pence. I make this 1.1 pence every time you re-charge.

At 240 volts and 4d. a unit it would cost 4.8 pence.

Your local electrician appears to make a fair profit even if he supplies all distilled water!

* * *

The Use of Stranded Wire for Coils.

L. D. (Blackheath).—"I notice that the majority of inductance coils used in modern sets are wound with comparatively thin wire, but I have always understood that by using thicker wire, or stranded Litz wire, it is possible to reduce the H.F. resistance, and so increase the efficiency of the receiver.

"Since this type of wire is so little used nowadays, is it that designers no longer

think that the slight extra gain in efficiency is worth while in comparison with the bulkiness of the coils and the extra cost entailed by the use of thicker wire?"

Yes! You are quite right, but may I expand your ideas a bit. The idea of stranded wire is to decrease high-frequency resistance by having a wire which is "all surface."

High-frequency currents stay on the skin of a conductor—stranded wire is designed to be all skin.

But as you approach high frequencies the stranded wire begins to play tricks on you, and because one strand is slightly different in length, inductance, resistance from

another, circulating currents start up and losses are worse than if the wire were not stranded. Stranded wire is not useful under a wave-length of about 500 metres.

But for practical receivers with all sorts of losses of other kinds it's no use building very low resistance coils. The use of reaction avoids that necessity in practical design for one thing.

And then with high-frequency magnification the magnification of the screened-grid valve, even with relatively inefficient coils, is so great, and the instabilities introduced if it were greater would be so pronounced, that it's not really worth while in practical commercial work to worry.

The use of stranded wire is more likely to be a drawback than a blessing.

You are right also in stressing bulk as a consideration.

IT is always amusing in so progressive a science as radio, to watch the prophets getting to work and deciding what is going to happen, because one hasn't long to wait to see whether they are right or wrong.

Ever since the arrival of the screened-grid valve they have had a specially busy time predicting that the three-valve set of the detector and L.F. type was about to die out. Three-valvers, said they, would all be of the H.F., detector and L.F. variety, because the S.G. valve had made such a tremendous improvement in this combination.

Extreme Simplicity.

Which just goes to prove what a dangerous thing it is to make prophecies in radio!

distance reception, for which purpose it is admittedly superior.

The detector and L.F. receiver, on the other hand, remains more attractive to those who value its extreme simplicity of construction and operation and lower cost, both in components and valves. For domestic use it is unquestionably more suitable, by virtue of its single tuning dial, and this is a weighty point to many.

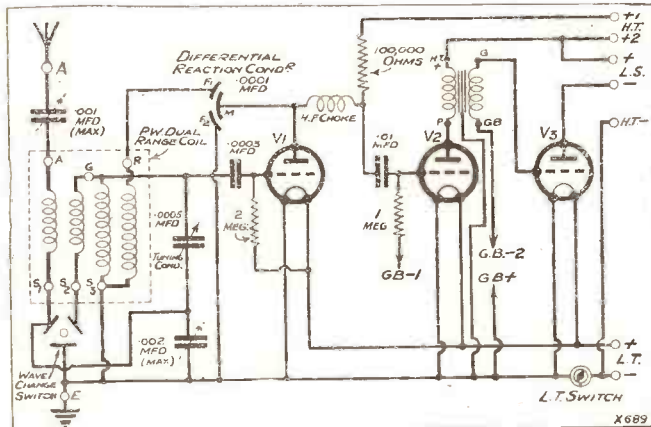
Fine for Foreigners.

Of course, if it had not made considerable progress in the direction of better long-range properties, it probably would have died out right enough, but the point is that it has progressed.

Modern circuits, improved coils, better systems of wave-change switching and so on, have transformed it pretty thoroughly of late, and so it is not far behind its competitor even as an out-and-out long-distance set. A modern receiver of the L.F. type can give a very good account of itself on the foreign stations if it is provided with anything like a decent aerial.

The truth of the matter is in all probability that the two types will go on for some time to come serving their respective purposes. They are really quite distinct instruments,

THE SECRET OF SUCCESS—



—is the new "P.W." dual-range coil, by which long- and medium-wave tuning can be obtained with maximum selectivity and sensitivity.

The detector and L.F. set is not dead, and seems to show no signs of dying, but on the contrary appears to be in the best of health.

What the prophets forgot, of course, was that equally great strides were being made in perfecting this type of receiver also. It has kept up right on the heels of its rival, and to-day there seems little change in their relative popularity.

Just as always, the "three" with a stage of H.F. appeals most to the man whose keenest interest is in ultra-long

appealing to different listeners, and there is no earthly reason why one should be regarded as superior to the other.

We ourselves are strong believers in the merits of the detector and L.F. type as a general-purpose receiver, and we always make it a prominent member of our winter season's programme.

The New Coil.

This year our sets of this kind have been based very largely on the use of our new high efficiency dual-range coil. This component in itself, of course, is a sufficient basis for a complete line of sets of a standard of performance well above the standard previously achieved.

In previous members of the series, however, we have not depended entirely on the new coil to make them attractive, but have provided them with additional special features.

For example, there was the "Interchange" Three, in which the dual-range

The P.W. "SUPER COIL" TUNING

Here is a really fine loud-speaker set, which unlike many receivers that provide big volume is capable of picking up distant programmes with the greatest of ease. It owes a large part of its wonderful efficiency to the new "P.W." dual-range coil—the Super Coil.

Selectivity and sensitivity are difficult qualities to combine together, for if you have one you often lose the other, but in this set, thanks to the coil, these two invaluable properties have both been retained in very full measure.

coil was mounted up on a standard six-pin fitting, so that it could be pulled out of its socket and replaced with a short-wave coil when desired. Thus you had a set with modern high-efficiency wave-change switching between the medium- and long-range wave ranges, and coil changing for short waves.

The "Contradyne" Cure.

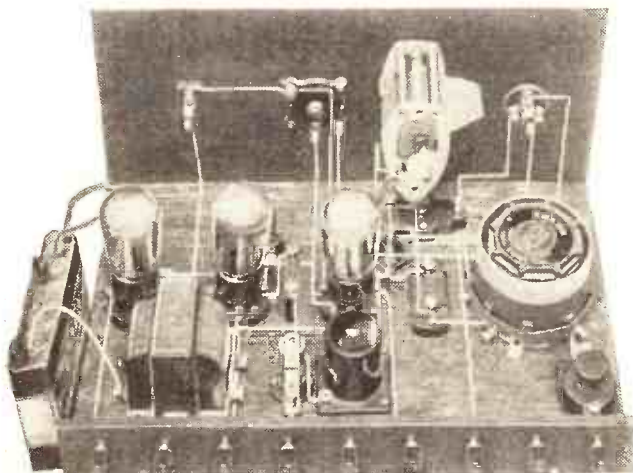
Then there was the "Contradyne" Three. This was a particularly interesting receiver in which the normal fine performance ensured by the new coil was backed up by the "P.W." "Contradyne" device.

THE FOLLOWING ARE THE COMPONENTS

- 1 Panel 14 in. x 7 in. (Goltone, or Lissen, Red Seal, etc.).
- 1 Cabinet with baseboard 9 in. deep to fit (Cameo, or Keystone, Pickett, Lock, Kay, Osborn, etc.).
- 1 .0005-mfd. tuning condenser (Lissen, or Dubilier, Lotus, J.B., Igranic, Polar, Formo, Ready Radio, Ormond, Burton, etc.).
- 1 Slow-motion dial if condenser of plain type (Ormond, or Igranic, Ready Radio, Lissen, Lotus, Formo, Brownie, etc.).
- 1 .0001 mfd. or larger differential reaction condenser (Ready Radio, or Lotus, J.B., Lissen, Igranic, Polar, Dubilier, Ormond, Magnum, Parex, Wearite, etc.).
- 1 L.T. Switch (Ready Radio, or Igranic, Lotus, Goltone, Benjamin, Bulgin, Lissen, Keystone, Red Diamond, Junit, etc.).
- 1 3-contact wave-change switch (Bulgin, or Ready Radio, Wearite, Magnum, Keystone, Red Diamond, Ormond, etc.).
- 1 "P.W." Dual-Range Coil (R.I., or Wearite, Ready Radio, Magnum, Parex, Goltone, Keystone, etc.).
- 1 .001-mfd. max. compression-type condenser (Leweos, or Lissen, Polar, R.I., Formo, etc.).

YOU MUST HAVE COMPONENTS IF YOU WANT GOOD RESULTS

ON THE LONG WAVES



"Brookmans" coupling is employed on the long waves and is adjusted by means of the compression-type condenser placed near the tuning condenser.

LISTEN TO THOSE FOREIGNERS



By The
"P.W." RESEARCH DEPT.

The "Contradyne" scheme, as you may remember, acts as a complete cure for the old and well-known nuisance of interference from the local station on long waves. This feature, therefore, made the "Contradyne" Three an ideal set for localities very close to a B.B.C. station where such interference is prone to be serious.

Not Always Necessary.

Now we come to the turn of those readers who live at some little distance from their local station and so do not need the assistance of the "Contradyne" device.

COMPONENTS THAT YOU WILL REQUIRE.

- 1 .002-mfd. (max.) compression-type condenser (Igranic, or Formo, etc.).
- 1 .0003-mfd fixed condenser (Dubilier, or Telsen, Lissen, Ferranti, Ready Radio, T.C.C., Ediswan, Igranic, Mullard, Watmel, etc.).
- 1 .01-mfd. fixed condenser (T.C.C., or Lissen, Dubilier, etc.).
- 2 Vertical type grid-leak holders (Dubilier, or Bulgin, etc.).
- 1 2-meg. grid leak (Dubilier, or Lissen, Igranic, Ediswan, Mullard, Ferranti, etc.).
- 1 1-meg. grid leak (Dubilier, or Lissen, etc.).
- 3 Sprung-type valve holders (Lotus, or Telsen, Igranic, Lissen, Dario, W.B., Junit, Bulgin, Benjamin, Clix, etc.).
- 1 H.F. choke (Dubilier, or Lewcos, Telsen, Ready Radio, Varley, Lotus, R.I., Keystone, Wearite, Magnum, Parex, Watmel, Igranic, etc.).
- 1 100,000-ohm anode resistance and holder (Igranic, or Lissen, Varley, Dubilier, Mullard, etc.).
- 1 L.F. transformer (Telsen, or Ferranti, Lissen, Igranic, Varley, Mullard, R.I., Lotus, Lewcos, etc.).
- 1 Terminal strip 14 in. x 2 in.
- 9 Terminals (Belling & Lee, and Eelex, Igranic, Clix, etc.).
- Wire, Screws, Plugs, etc.

VALVES ON THE LOUD SPEAKER

Unfortunately it was not possible to design the "Contradyne" Three in such a way that the "Contradyne" coil could just be left out by those who did not want it. Certain slight but important modifications, chiefly in the long-wave aerial coupling condenser, are required when this is done, so we thought it best to produce an entirely separate design.

No "Frills" Whatever.

That is what we are presenting this week in the form of the real hot-stuff "Three" you see in the illustrations to this article.

What we have tried to do was to produce a really high-efficiency set of the general-purpose type, with just those refinements you need under practical conditions, but no "frills" whatever. We wanted it to be as simple and utterly straightforward as we could possibly make it, without sacrificing one scrap of efficiency.

The result is a receiver of sterling performance and really noteworthy simplicity, fully up to the high standard of results set by the "Contradyne" Three in every respect except just one, i.e. the ability to exclude local station interference on long waves.

This naturally follows from the omission of the "Contradyne" device, the idea being that those who live in the "danger zone" should build the "Contradyne" Three, while those in other localities should be able to benefit by the greater simplicity of the present instrument. At the same time it should be noted that this set is far less prone to suffer from such interference than receivers of the older type.

On Long Waves.

This valuable feature is the outcome of the use of "Brookmans" aerial coupling on long waves, which in itself is almost a cure for this kind of interference. We have never said very much about the virtues of this remarkable new development, by the way. But it is actually almost as important a contribution to the improvement of receiver performance as our new dual-range coil.

Not merely does it reduce very greatly the chances of interference from the local station on long waves, but it

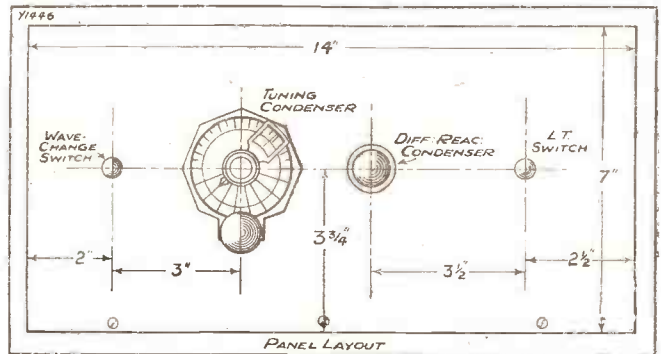
produces a definite increase in general efficiency on the long-wave range as well.

"Brookmans" Aerial Coupling.

As a direct result you can take it that it is safe to use this receiver in all situations more than about ten or twelve miles from a "Regional" station or about four or five miles from an ordinary main B.B.C. station.

Well, so much for the general ideas underlying the design of what we consider to be one of the very best receivers in our programme for the season. An inspection of

PLENTY OF PROGRAMMES

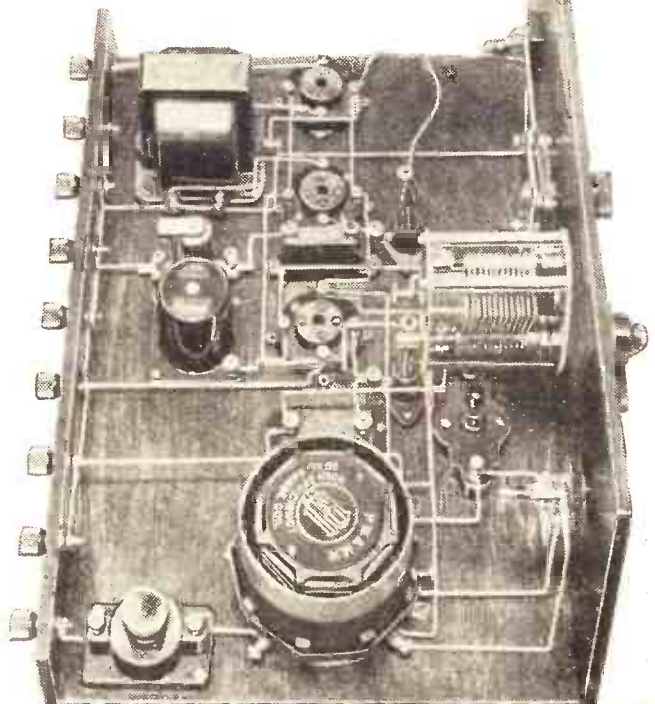


Whether on long or medium waves you are sure of plenty of programmes at good loud-speaker strength.

the circuit diagram will show you how it differs from the "Contradyne" Three, that is, the modifications made to secure satisfactory functioning on long waves when the "Contradyne" device is omitted.

Chiefly you will note that the condenser which provides the "Brookmans" aerial coupling on long waves is (Continued on next page.)

PACKED WITH POWER



An end view of the set, showing how the coil is situated in regard to the other components in the aerial and grid circuits. This is very important if the maximum is to be got out of the set.

THE "P.W." "SUPER-COIL" THREE.
(Continued from previous page.)

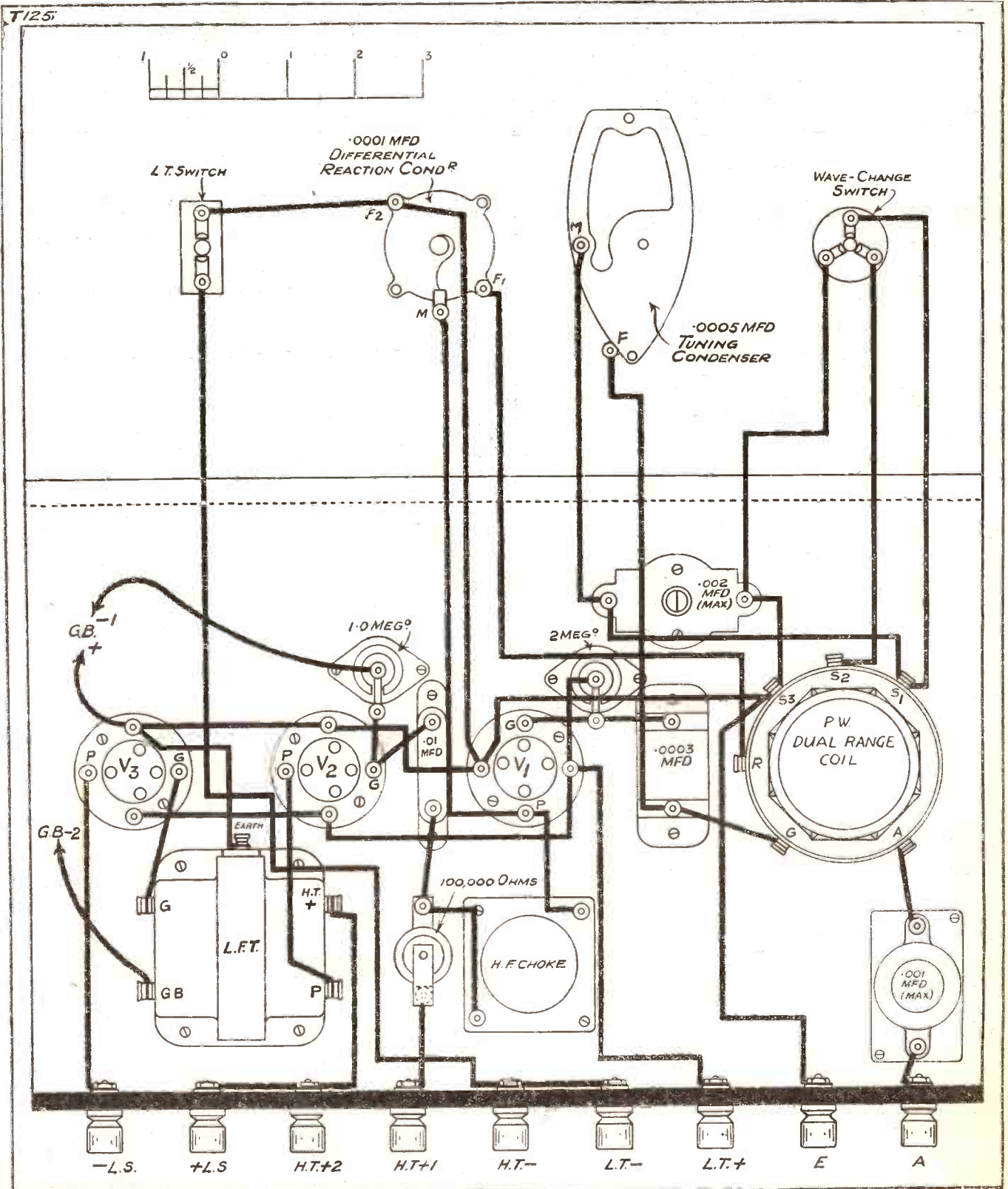
now of the adjustable compression type with a maximum capacity of .002 mfd. This

enables you to adjust the aerial coupling on long waves to suit your needs.

The setting of this condenser under working conditions is very simple. At maximum (knob fully screwed down) you get the greatest long-wave selectivity, but by reducing the capacity a little you generally get better strength (on long waves), and a little testing will enable you

to find an excellent compromise. This control works on long waves only. Notice that there is another selectivity adjustment which works on both medium and long waves. This is the compression-type adjustable condenser of .001 microfarad capacity in series in the aerial circuit. It should be kept near its maximum setting

(Continued on page 855.)



No soldering is necessary in the construction of this set. Every connection can be taken to a terminal, as shown in the above diagram.

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5/9

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READ AT A GLANCE

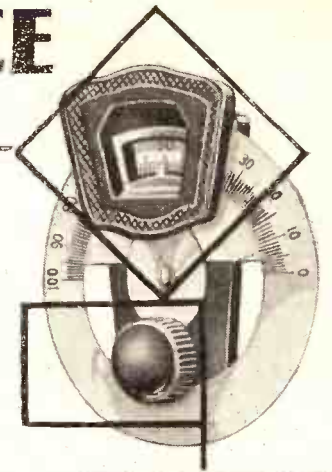


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Telephone: National 1977

THE "MAGIC" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I think you will be pleased to hear further about the "Magic" Three. About a month ago I altered a four-valve set to your "Magic" and was astounded at the results.

With an outside aerial 50 ft. long and 40 ft. high I received over 40 medium and long-wave stations, the loudest of these were 5XX, Radio Paris, 5GB, London Reg., Manchester, Hilversum (298.8 m.), Oslo, Rome, Langenberg, Frankfurt, Stuttgart, Toulouse. The others I got at good phone strength and medium-loud-speaker strength.

With an aerial 15 ft. long in an attic I received the above stations at slightly reduced volume, and also about 60 short-wavers.

The short-wavers include Radio LL (61 m.), Prague (58), Zeesen (31.38), P.C.J (31.4), Lyngby, Denmark (31.6), Bergedorf (52), Vienna UOR 2 (49.4), Schenectady W 2 X A F (31.48).

Quebec (Canada) calling Bridgewater (Beam), Bridgewater replying, Austrian Beam, London calling G 2 I V (Majestic) March 27th, Majestic calling G 2 I A (London) March 29th, London calling Leviathan, Yacht Elettra calling Buenos Aires.

I also received the following amateurs: 2BY London, 2J8 Scotland, 2LK, 2LY London, 2TZ, 5B1 Birmingham, G5BZ, Croydun, 5CJ, 5CM, G5DZ Croydun, G5GC Liverpool, G5GK, G5GY Croydun, 5JO, G5JOK, 5NW Dundee, G5IZ Cowes, I.O.W., 5OK, G5ZN Birmingham, 6IT Scotland, G6LY Blackpool, 6OY, 6RG Scotland, 6TY, G6XK.

Belgium 4DJ, 4MG, 4MJ, 4OZ, 4PO, Brussels 4FZ, Holland 4LY, France 8JS, F8AX, Denmark OZLB, Ireland G15D, also EAL and E4IG.

I think Majestic is G2IV, and often calls up London G 2 I A, also I have heard London calling up Leviathan on 52 metres.

Yours truly,
A. R. N.

Doncaster.

The Editor, POPULAR WIRELESS.

Dear Sir,—I made up the "Magic" Three some time ago, and I want you to know I have made several "P.W." sets, but I find the "Magic" beats them all; and also would like you to know I have fixed up an arrangement for tuning the reaction from the tuning dial. I use an Ormond S.M. dial. I have taken out the split pin and fitted a length of hollow brass with a washer on top for driving the brass dial. I then fixed my reaction condenser on the baseboard and fixed a length of brass from the spindle through the hollow brass and main knob to another smaller knob. I find this makes no difference to quality, no L.F. howling, much easier to handle, and is quite easily done with one hand, as well as giving the set the appearance of only having one dial.

Yours truly,
W. MORRIS.

Lochee, Dundee.

CORRESPONDENCE.

THE "MAGIC" THREE

THE "CLEAR-CUT" CONE—IS THIS FAIR?—USING A PICK-UP, ETC.

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

THE "CLEAR-CUT" CONE.

The Editor, POPULAR WIRELESS.

Dear Sir,—The staff of POPULAR WIRELESS deserve the everlasting thanks of the wireless public for having given to them the "P.W." Clear-Cut Cone, and the Clear-Cut instructions for making it. I converted my 18-in. double linen cone speaker in an hour or so, leaving sufficient linen to act as strips for suspending the cones.

The result is that I now have a speaker better than any I have ever heard before. The absence of any damping effect and the brilliance and naturalness of production are remarkable.

I am using a Wates' Unit with the Magic Four Set. What more can one desire? Again thanking you. I am,

Yours faithfully,
K. HARRIS.

S.W.18.

IS THIS FAIR?

The Editor, POPULAR WIRELESS.

Dear Sir,—I am a regular reader of your paper. I was wondering if any other of your readers have had my experience? A neighbour wrote to the Secretary, G.P.O., London, and complained that I was interfering with his reception. He gave my name, and the Secretary G.P.O. wrote to me telling me that my licence would be taken away if I continued to do so. This does not seem a fair way to deal with the matter, and no inspector called until two weeks later, and then only at my request. It seems that all you have to do if you are wireless jealous is to write G.P.O. The inspector gave good advice, and I am now on probation. The inspector stated that he had been sitting in complainant's home and had heard no howling. So all your readers will know what to do if they have not the best set in the road.

Respectfully yours,
FRANK CROSS.

Southampton.

USING A PICK-UP.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to an article in a recent "P.W." showing a method of connecting a gramophone pick-up to a wireless set, I thought you might be interested in the way I made the connection.

I fixed a wall plug to the side of the wireless cabinet, one wire from which went to the grid of the detector valve and the other to the grid-bias battery (1½ volts neg.). The leads from the pick-up were connected to the "plug" itself (a volume control can be fitted here, but mine is in the set itself). The action of placing the plug in position cuts off the radio and puts the pick-up in circuit without interfering with anything inside the set.

Maybe the above will interest your readers. "P.W." gives me many an interesting hour.
Yours truly

A. W. SCOTT.

REGARDING MAINS UNITS.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to a recent letter you published of Mr. A. Lefevy, I heartily endorse his remarks re the guesswork of the popular H.T. units.

I myself have one of the well-known makes of D.C. eliminator feeding a three-valve straight R.C. transformer coupled set, built for quality, with two S.P. valves in parallel driving a standard M.C. speaker. The detector, a P.M. 1A, and the first L.F. valve, a P.M. 2, get their H.T. from a common tapping, viz. 0-120 variable—separated as they should be. Violent motor-boating takes place, and alternatively with suitable resistance for the first L.F. it becomes unstable and loses the brilliance of reproduction. Originally only one S.P. valve of world-wide fame was in the last stage, but a few days connected to the power socket put quiet to that, although it was biased to 33 volts.

This valve got so exceedingly hot that, after ten minutes running, Captain Eckersley himself would not convince me that that valve was working normally. Much correspondence passed between me and the makers of the valve and the unit. From the former I gathered that their valve wouldn't take this power socket, and from the latter that with my mains voltage (230) the power socket was giving approximately 175 volts.

I question that to this day. However, two valves in parallel of a good make (although cheaper) with greater impedance, solved the heat trouble, but I'm still at a loss to know what H.T. they are exactly getting.

I hope this letter, if published, will help to bring about some improvement in these units which is long overdue.

Yours faithfully,
CLAUDE H. REDNALL.

Chiswick, W.4.

SHORT-WAVE NOTES

By W. L. S.

What about the eleven-year cycle?

This is borne out by the wonderful receiving conditions for broadcast between 200 and 500 metres which have been prevailing, almost without a break, since last August or September. After all, in 1922 the amateurs were working with the United States on 150 metres, with transmitters and receivers very much inferior to those used in these enlightened days, so that if "DX" is difficult or impossible on the ultra-short waves for a bit, it will still be attainable on the others!

And now, after all this philosophising, to something more concrete. First, if there is anyone in this country who has not by now logged LS X of Buenos Aires, will he please write and tell me?

The "Weekly Five."

I am simply snowed under with details of reception from readers, and shall have to acknowledge them all collectively! The popularity of this new station is, I suppose, due to the fact that he is the first genuine South American broadcasting station that

has been receivable at any strength over here.

For the "weekly five" I have chosen the following:

- K I O, Kauhuku, Hawaii, on 65 metres;
- P K S A N, Soerabaya, Java, on 49.7 metres;
- P P U, Rio Brazil, on 49 metres;
- D D D X, ss., "Bremen," on 39.7 metres;
- and C G A, Drummondville, Quebec, on 26 metres.

My experience during this past week has been that anything above about 28 metres has been abnormally strong (this applies to all parts of the Globe), whereas everything below this, with the exception of W 2 X A D, has been poor.

An Interesting Journal.

I have before me as I write a copy of "Radio-R E F." the French publication corresponding to the R.S.G.B.'s "Bulletin." It is published monthly, runs to some thirty pages, and is full of interesting short-wave articles.

Our neighbours across the Channel have nothing to learn from us about short-wave work, judging from the contents. If anything, they are better served with special short-wave components than we are, although they probably have not the advantage of the comparatively low-priced components that abound on our market which, while not made for short-wave work, are quite suitable for it.

HAVING now left 1930 safely behind, perhaps I may be permitted to suggest to 1931 that it behaves itself a little better for our purposes than did its predecessor! For of all the "dud" years I can ever remember, from the point of view of short-wave radio, 1930 heads the list. May we never have another like it!

By the end of this year we shall be in a position to see whether there is anything in the theory of the "eleven-year cycle," for, if there is, it will be even poorer than 1930: Nineteen thirty-two will be about the same as 1931, after which we may hope for an improvement back to the 1930 standard. A cheerful outlook, indeed, and one, I hope, which we shall not need to face.

An Undeniable Fact.

Personally, I am not a believer in the "eleven-year cycle" business, although it is an undeniable fact that since 1926 short-wave conditions have gone very considerably downhill. I am rather inclined, though, to attribute this to freakish groupings of the areas of high barometric pressure, and to generally curious weather conditions.

Whatever happens in the future, one thing seems to be certain, judging from findings during the past few years, the worse the conditions below 40 metres become, the better will they be higher up. In other words, when the wave-lengths round about 10, 20 and 40 metres are behaving very poorly, 80 and 160 metres and, probably, the broadcast waves as well, will be abnormally good.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

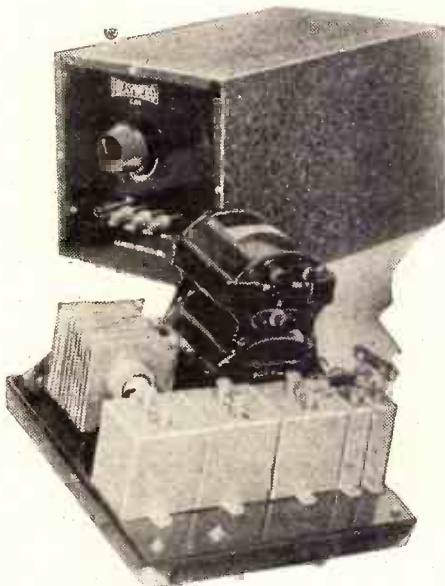
Tested and Found—?



A MAINS UNIT KIT.

F. C. HEAYBERD & CO. recently sent me one of their C150 mains unit kits. The price of this kit is 76s., and it very easily makes up into a first-class A.C. mains unit capable of an output of 25 milliamps at 150 volts.

It has three tappings, one providing a variable output between 60 and 80 volts, another a fixed 120 volts, and a third a fixed 150 volts. The complete unit is obtainable built up ready for use at 86s. A



The assembled Heayberd Mains Unit.

handsome metal case is provided and a bakelite panel carries the H.T. 1 tapping adjusting knob and the output sockets.

If you want to run A.C. valves they will give you a 4-volt 4-amp. output at 8s. extra. This Heayberd mains unit appears to me to be a first-class proposition. It is obviously safe and simple in operation, while its outputs are in every way up to specification.

Messrs. Heayberd are responsible for a very large proportion of the mains components used in modern constructor assemblies. The reason for this popularity of their products is to be found in their high efficiency price ratios. And this latest venture is as good as anything they have hitherto done.

IMPORTANT PRICE REDUCTIONS.

S. G. Brown, Ltd., announce a series of great reductions in prices. In cases their sets are reduced by as much as £10, while their constructors' kits are down to extremely attractive prices. By the way, S. G. Brown's are arranging hire-purchase terms on all their products. "P.W." readers should make a point of securing the latest literature supplied by this firm, in which the new prices, etc., are detailed.

THE WATES A.C.4 ALL-MAINS RECEIVER.

I wonder if the Standard Battery Co. will ever change its name. I suppose it is such a widely known name that the principals would hesitate to take such a step. But what about the Standard Radio Co.? That sounds pretty good, and has a strong flavour of the original about it.

I am moved to make these remarks because I have just been testing the Wates A.C.4 All-Mains receiver sent to me for this purpose by the Standard Battery Co. They also sent the pedestal loud speaker on which the mains set stands to form a very attractive combination.

The first thing that struck me about the Wates set is the efficiency of its smoothing, for smoothing is, on the whole, poorly carried out in most commercial mains sets. By the way, I wonder how many of our British manufacturers would care to specify a "hum factor," as do quite a number of American concerns?

However, a silent background is of no great value if the set hasn't sufficient sensitivity to bring in stations and is not able to achieve a comparative freedom from distortion. The Wates A.C.4 passes muster on both points, and I think it can be lined up with the first three on the market—you can guess what makes those are!

The Wates A.C.4 uses an S.G., and its programme-pulling powers are good. The loud speaker, of course, has a Wates "Star" unit and gives impressive results.

A RIPAUT H.T. BATTERY.

I have quite a string of H.T. batteries undergoing tests in the Research Department. None of these is having a constant discharge test. I do not believe in this, as I recently explained in a short article in "P.W."

I have always considered that the only honest test for an H.T. battery is to make it do the sort of work that

it has to do in the hands of listeners. I had my initiation into this necessity fourteen or fifteen years ago.

We used to secure H.T. batteries for the R.A.F. according to certain specifications which included a milliampere-hour capacity. But in actual practice we found that temperature changes, corrosion effects, paste depreciation, etc., had just as much vital bearing on the life of the battery as the

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.

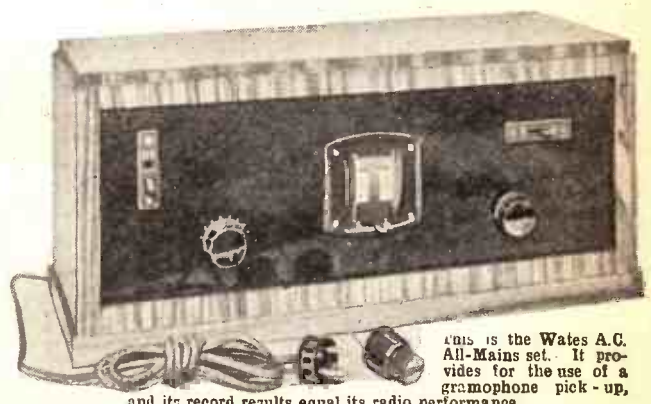
thickness and expanse of the zinc used in the cells.

For instance, we would find that a certain make of battery might prove quite capable of giving current for 200 hours continuously, but would be quite incapable of giving an aggregate equivalent when used over a period of months.

There certainly are other considerations than those of mere zinc consumption that bear on the useful life of a battery and which are not tested by "constant discharges." It will be unnecessary for me to enumerate these in detail, for I have referred to them several times before. The reason for this reference to the subject is the arrival of one of the new British Ripault standard capacity 99-volt batteries.

I have always found Ripault batteries to reach an excellent standard, and I have had them on slow and steady discharges for periods up to two years. A close examination of this new Ripault product reveals nothing that can lead to a falling off from that standard.

Further than that I would not care to go, although I know it makes the report a wee bit incomplete!

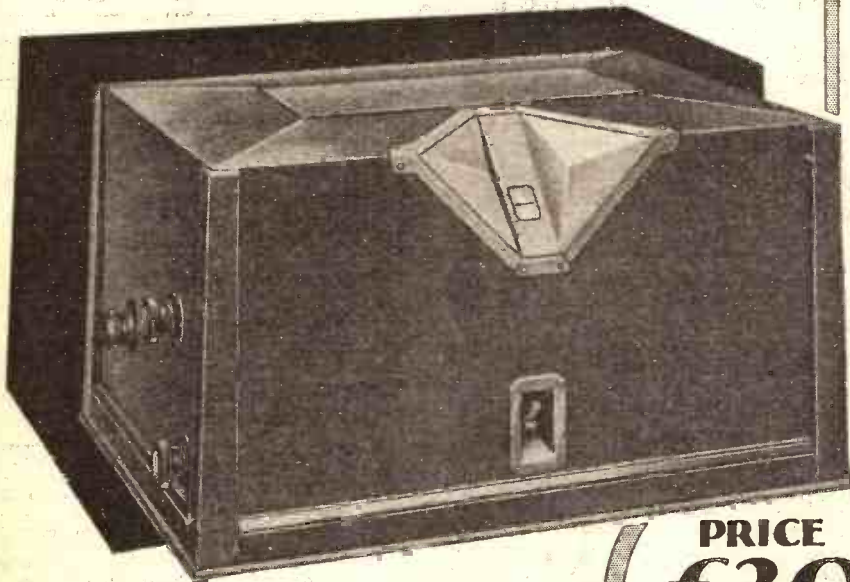


This is the Wates A.C. All-Mains set. It provides for the use of a gramophone pick-up, and its record results equal its radio performance.

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ENJOY THE DELIGHTS OF PERFECT, LIMITLESS RADIO

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All that is best in radio comes to you in full measure through this powerful GECophone Receiver—a range of stations practically without limit, brilliant tone, rich volume and a never-failing reliability. Choose it for sheer quality—for its simple tuning control—for its handsome appearance. The ideal set for gramophone reproduction.

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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. Little, 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 would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

THE "NEW-COIL" TWO.

JIMMY (Exeter).—"I am thinking of making the 'New Coil' Two, as described in 'P.W.' November 15th issue. Would it be all right to use a wooden panel and not an ebonite one?"

"Also, is the Torex transformer suitable for use with this circuit?"

You can certainly use a wooden panel for the "New-Coil" Two. But make sure that it is really dry, well-seasoned wood.

Also be careful when mounting your condenser, etc., that you do not damage it, on account of the fact that usually wood is thicker than ebonite would be. The thin ply woods are all right, and probably all your parts will easily be mounted on anything up to "quarter-inch thickness."

But if the wood is thicker than that you will have to exercise care with all the panel-mounting components. One way of doing it is to get a piece of thin three-ply wood, and with this make small panels to let in holes in the main panel, where components are to be mounted.

Or, of course, ebonite could be used in this way. If you have a piece of scrap ebonite of suitable size. So far as efficiency goes you would find the wooden panel quite all right provided you take the precaution of seeing that it is dry.

The transformer you mention will be perfectly suitable.

THE "MAXI-POWER" FOUR.

T.C.C. (Notts).—"I have made up your 'Maxi-power' Four and get poor results. Having wired everything to the blue print, it has got me worried."

"I can get long waves, but it is very poor, and nothing at all on short waves. Everything seems to be dead when I change over from long to short."

"Could you kindly tell me where I should be likely to find the trouble?"

If you have not made some little mistake in wiring up, you have certainly got a dud component or something of the kind, as the set cannot fail to work with proper apparatus when connected as shown.

To test every component is going to be a bit of a job, especially as apparently you have not had much experience at this kind of thing. So if you know anyone else who has built this set we should say that the easiest way out of your difficulty would be to get them to have a look at it for you, and see if they can find any place in which you have gone wrong.

Failing that you will have to test out the different valve circuits separately, and although this is very easy to anyone experienced in this kind of thing, you may find it a little difficult; especially as great care must be taken not to let the H.T. get at the filament!

The first thing to do is to cut out the H.F. valve altogether to see whether the fault is in this stage. All you have to do in order to do this is to take the aerial off the terminal at present in use, pull the H.F. valve out of circuit altogether (taking care to see that the flex leads are placed out of harm's way

when not in action), and leave the H.T.+1 plug out of the H.T. battery.

By the way, do not forget that when changing over any wires in the set you should ALWAYS disconnect the H.T. negative lead from the battery while you are interfering with the wiring, etc. And when you have completed the alterations look out carefully to see that all leads are carefully bent back and do not touch any screens, other wires, components, etc., before you put the H.T. negative back into the battery, and bring the set into action again.

As the set is arranged at present, the condenser C5 ('001 mfd.) is connected on one side to an H.F. choke and to the plate of the screened-grid valve. Undo this connection and place your aerial lead on that side of the '001 condenser, leaving the choke and lead to the screening-grid valve's plate free for the moment.

The other side of the '001 condenser is left joined to L4, and the fixed vanes of the differential reaction, so that what you have now is an aerial coming straight to the detector stage, cutting the screened-grid valve out altogether. Connect up your batteries as usual (with the exception that you do not need H.T.+1 at all for this part of the test), and see what your results are like now.

You should get plenty of stations at loud-speaker volume even like this, for the set will then be a detector and two low-frequencies. But if you still get very little or nothing you can assume that the fault is not in the screened-grid stage, but is something in the detector or the low-frequency.

So carefully disconnect the batteries again, and join up the screened-grid stage as it was formerly, and then prepare to test the detector and the following stages.

(You see the idea? If once you can get part of the set working, you will know where to look for the fault.)

Having made sure that all your connections are replaced as per the blue print, and that the screened-grid stage has been put back correctly, you can turn the set into a high-frequency and detector, merely by removing the 100,000-ohm resistance from its clips and placing the loud speaker (or telephones) there.

A loud speaker can be used, but 'phones would be better, as an H.F.-Det. set is not really intended for operating a speaker, but merely for long-distance reception on 'phones.

Whether you use speaker or 'phones here, do not forget to see that after the 100,000-ohms resistance has been taken out of its holder, the telephone or speaker leads are clipped securely across this, one on each side, before the H.T. leads are put back into the battery.

Now operate the condensers and reaction, etc., as usual, and you should receive lots of stations, though this time not at very great strength, because all the low-frequency amplifying part of the set is out of circuit.

In fact for this part of the test it would be best if V3 and V4 were pulled out of their sockets and laid aside until the testing was completed.

Should results with the first two valves prove to be unsatisfactory you will know that your trouble probably has nothing to do with V3 and V4 (nor any of the parts belonging to those valves, i.e. L.F. transformer, grid leak 2, and condenser C6, etc.), but the fault can now be searched for in the detector stage, using that stage alone.

One of the switch contacts or flexible leads may be causing the trouble. But if you cut certain of the valves out as suggested above, you will know which part of the circuit to look at for the trouble.

Your letter does not say if you have built any other sets successfully, but if you have we think that you could safely proceed on the lines given above to find the fault for yourself. If, however, you have not

constructed other sets, and you are a little uncertain of the directions given above, we think you had better call in an experienced friend to do it for you, or else get a dealer to undertake the job.

It is not at all difficult to anyone of experience, but might easily be beyond the powers of the novice.

The whole point is that you have either a wrong connection, or else a completely dud component, and that by means of testing stage after stage in this way it is possible to find the fault without expensive testing apparatus.

But we cannot emphasise too much that *great care must be taken*, for it is very easy to burn out a valve unless you are accustomed to altering the wiring of a set. So unless the foregoing is perfectly clear we should certainly get someone of experience to undertake the tracing of the faulty component for you.

A DIFFERENTIAL QUERY.

A. T. C. (Doncaster).—(1) "Is it a fact that all differential condensers are on when they're off—i.e. are they oscillating in the off position? I have a wireless friend who says they are oscillating all the time."

"(2) He also says that the B.B.C. always uses H.T. wet accumulators for talks and music, never off electric current."

"(3) Also, is a neutralised H.F. better than the screened-grid circuit?"

(1) No; your friend has got it all wrong. The differential type of condenser actually tends to steady a badly-spaced or wrongly-arranged set and, if used in such a set, it will generally minimise or stop any tendency to constant oscillation.

(2) The B.B.C. uses a lot of wet accumulators, etc., because of their convenience in certain circumstances, but in other cases it uses the mains, and is constantly doing so.

(3) No; in ordinary use there often isn't a great deal to choose between them as far as results go, but the S.G. valve (which doesn't need neutralising) is undoubtedly better and more scientific than a valve which has to be neutralised before it will amplify properly.

THAT CHRISTMAS CRACKLE!

Many thanks are due to all the readers who sent in suggestions to help R. W. T., of Beckenham, whose trouble was outlined in "P.W." No. 446 (December 20th, 1930).

Such a large number of letters was received that it was impossible to answer all separately, but the senders are hereby thanked for the

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.

sporty spirit in which they rallied round to help look for this fault.

A somewhat amazing feature of the correspondence was the number of readers who had exactly the same fault, but who cured it in totally different ways!

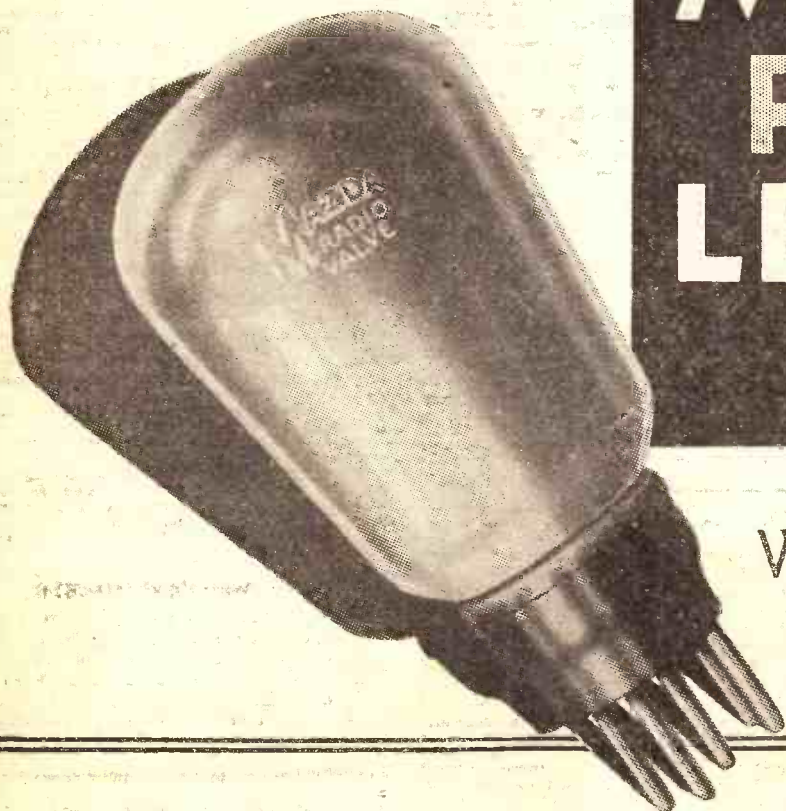
A few typical extracts from such letters are reproduced below:

From W. J. C. (Plymouth).—"R. W. T.'s trouble was mine, exactly. I don't know anything about 'values,' but all the intermittent crackling stopped when I used a 20,000-ohm resistance in place of 100,000 ohm. The crackle stopped like magic, and I hope my experience may be of some service to you.

(Continued on page 848.)

MORE POWER LESS HUM

WITH THE ...
AC/PI



The MAZDA AC/PI

CHARACTERISTICS:

Filament Volts	4.0
Filament Amps (approx.)	1.0
Max. H.T. Voltage	200
Amplification Factor	5
Anode A.C. Resistance (ohms)	2,000
Mutual Conductance (mA/V)	2.5

PRICE 17/6

There is no need to use a directly heated output valve in your all-mains set—with consequent risk of hum and the additional inconvenience of having to provide a separate L.T. winding on your transformers. Use the AC/PI—the finest output valve ever developed for all-mains sets, a valve which gives a huge output at only 200 volt H.T.!

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Radio Division:
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Showrooms in all the Principal Towns

EDISWAN

FOR THE LISTENER,

(Continued from page 830.)

Plums in the Pudding.

We were all Jack Horners, and there were plums for everybody. I drew two on Christmas Day: the Brass Band from the Callendar's Cable Works, and the Roosters. I thought that both these turns were very good.

The Vaudeville hour on Boxing Day was one huge plum, plums within plums; with Evelyn Laye coming unexpectedly to the microphone—a very charming surprise—Max and Harry Nesbitt with their ukuleles and their droll songs, the Third Golf Skit, which I thought a little masterpiece and beautifully played, and Clapham and Dwyer at their best.

Indeed, I so thoroughly enjoyed this hour that Mr. Harold Nicolson, who followed with a dollop of gloom, was unable to depress me.

Creeps.

Creepy ghost stories are very difficult to pull off. They never come off, I think, when the tellers of them are obviously trying to make our flesh creep. Mr. Felix Aymer was at fault in this. He had a fine story, but he overdid it.

He overdid it extremely well; but it would have been more effective if he had told it with more naturalness and restraint. After all, the really creepy thing is that which comes to you so quietly, and so much as part of your natural circumstance, that it gets you pale and palpitating before you realise that it is there.

Hawking Holly.

Mr. Kelly, the rag-and-bone man of earlier fame, provided the Dickensian touch. He told us how he had spent his Christmas Day, hawking holly and mistletoe.

He is a very refreshing fellow. I'm glad that spontaneous woman kissed him at his barrow. He deserves all that comes his way.

Hardly had he finished when New York burst in; an earnest, high-pitched voice delivering a sort of lay sermon. In spite of technical deficiencies it sounded the true Christmas note of goodwill, and seemed to bring peace on earth appreciably nearer.

"King's Horses."

A little time ago I had the pleasure of saying what a rattling good song this is. Broadcasters evidently share that view, and have put it in their repertoires. I have heard it already goodness knows how many times, rendered by different artistes! Don't spoil it, folks!

Talks to Come.

I see that Mr. J. C. Squire is coming back with a series on the "Enjoyment of Literature"; he will be widely welcomed. Another promising little lot is on "Marriage—Past and Present," by Prof. Malinowski. My own private and greedy eye is upon Mr. Lowes Dickinson, who will talk on the Dialogues of Plato on Sunday afternoons.

And to the joy of innumerable listeners both Sir Walford Davies and Mr. Vernon Bartlett, like prodigal sons, will return to the studio.

Hely Hutchinson.

In the absence of Sir Walford, Mr. Hely Hutchinson has deputised in the Musical Talks. It was not an easy thing to do.

Mr. Hely Hutchinson is a young man. He tackled the job with modesty and a

competence which must have surprised many. His success in this part is a big feather in his already much-feathered cap.

Viscount Cecil.

The turn of the year is the hopeful time; and although Lord Robert Cecil spoke in measured words, he was evidently hopeful of the World Conference on Disarmament which will meet shortly at Geneva.


The success of the Conference, said Lord Cecil, depends upon the people of the various countries taking part in it. He put the responsibility on to our shoulders. I wish he had been a little more explicit on this point.

I myself, for example, am in favour of disarmament; but exactly how am I going to bring that to bear on the conference? I do not quite see.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 846.)

I had previously tried different components for almost everything, but without success. All I got was crackle (and the wife's cackle on retiring to rest in the early hours of the morning). I work the receiver from the mains, and it is giving every satisfaction now."



**AN
R.C.C.
UNIT**

comprises an anode resistance (left), a coupling condenser, and a grid leak.

If the anode resistance becomes faulty (old age will sometimes be sufficient) it causes crackles.

If the coupling condenser springs a leak, you get H.T. on the grid of the next valve, accompanied by bad distortion and high anode current.

and clear as with a perfectly new battery. When I switched on I could hear no broadcasting for about two minutes—crackling only. Then it would suddenly burst forth and be as good as one could desire; then it would plop, and then crackle only for about twenty seconds, and so on. I just pass this on in case it might help R. W. T., as when I put in a newly-charged battery it is as good as one could wish."

From G. R. P. (Abingdon).—"If R. W. T. has electric mains in the house, let him first look to his fuses. In my case, the crackle commenced whenever a light was switched on in house or shop, and occasionally during the passing of heavy traffic. Tell him to put in fresh fuses, and see they are well screwed down and no straggly ends. A switch that does not go over with a firm click, but seems loose to the touch, should be suspected. I hope he has found the trouble ere this, though, as it will be too late for Christmas!"

KNOCKED OUT BY THE LIGHT SWITCH.

F. G. C. (Ipswich).—"A friend of mine has a three-valve set run by batteries. He has electric light all over the house.

"If the set is running and the light is switched on in any of the other rooms, the reception goes nearly off. Could you give any reason for that?"

No; but we have known of similar unusual cases. F. G. C. Although we were unable to be sure of the

cause without seeing the set, we suggested on one previous occasion that a fixed condenser in the earth and in the aerial lead (a small 0.001 or so, if a large one is not obtainable) might stop this.

We also suggested that a short and more direct wire for the aerial lead-in could be used, and after this and the condenser had been inserted, we were informed that the set was then O.K. The fading effect had disappeared and reception was quite O.K., except for the occasional little clicks when operating a switch.

Such clicks are very difficult to cure entirely, so we should not bother about them; but we think you ought to try the above-mentioned idea of the condenser, as it is very easy to do so.

Failing this, a counterpoise earth might prove effective, although this is rather troublesome; and, of course, we cannot be sure that it would be effective.

A SURPRISE FOR THE PARTY.

D. J. S. (Great Totham, Essex).—"I should like to have a little fun at the party with my wireless set, and am wondering if I could rig up a mike and surprise our guests by giving them a few remarks through the loud speaker.

"Could I use a pair of headphones for a microphone, or must I have a proper one with dry cells and output transformer? Could you let me know the connections?"

Much depends upon your set, but if it has two low-frequency transformers, you can probably do without any extra apparatus at all, except an extra loud speaker or an extra telephone earpiece.

All you have to do is to cut out the radio part of your set by disconnecting the detector-to-first-L.F. coupling (probably the primary of the first low-frequency transformer) and place across this the additional speaker or telephone earpiece.

When the set is switched on, it will be found that if this improvised "mike" is spoken into, the voice will be reproduced at the loud-speaker end, considerably magnified, so that by disguising the loud speaker as a "ghost" some very extraordinary and amusing effects can be obtained.

THE BIG NOISE.

B. F. S. (Sutton, Surrey).—"Can you explain away the following? My 'Magic' Three was working well at good volume. A portable set I have (five-valve) was giving a strange singing note.

"I could find nothing wrong, so decided to try the valves. I changed over the Mullard H.F. from my 'Magic' Three, and found it would not work in the portable, whilst the Mullard H.F. from the portable kicked up the most unholy row in the 'Magic' Three circuit!

"No sign of music, only an infernal noise by the side of which the noise of a cross-Channel aeroplane engine at fifty yards is like dead silence!"

"The 'Magic' Three's H.F. valve appears to be a 'dud,' although results from the 'Magic' Three are really quite good. With the same valve in the portable set not a sound comes through. My 'Magic' Three circuit includes Ferranti A.F.5 transformer 3½/1, followed by a Brandes transformer.

"A ½ meg. res. across the secondary of either transformer does not make any appreciable difference to the row when the valve from the portable set is put in the 'Magic' circuit."

"It certainly is a queer state of affairs as you describe it, B. F. S. We are wondering if it may not be more an alteration of conditions than an alteration of valve. In other words, do you not think it is possible that when changing over the valves one of them failed to make contact in the circuit at all?"

This, of course, would mean that one socket was "in the air," and in such a condition the circuit might give rise to an enormously loud buzz, which would be cured if proper contact were made at the valve pins. If you are in the habit of switching off your set when changing over valves (everyone ought to do this!), you might not notice that even without a valve at all in the detector holder the set will sometimes howl as described by you.

Should this be the sort of fault from which you are suffering, it would probably clear up at once if the valve is carefully placed in position so that grid, plate and filaments are all making connection properly. It would seem as though one of them must be "in the air," for otherwise it is most unlikely that two valves of the same type should give such very widely differing results.

It often happens that the correct insertion of a valve is a difficult matter in a portable set, owing to the lack of space. If, however, this is not your trouble, and the change-over was exactly as you thought it was, with proper contact being made all through, we are afraid we are unable to explain it; for even with proper testing apparatus it might take some time to track down the cause of a queer case like this.



BUILD IT YOURSELF!

The day of the troublesome H.T. Battery has gone! To-day the man who requires a smooth, steady and powerful supply from the Mains installs one of the famous HEAYBERD BATTERY ELIMINATOR KITS

Already assembled in handsome Metal Box these Kits require wiring up only. They embody the latest form of Westinghouse full-wave rectification, and are fitted with three H.T.appings, one of which is variable.

A. C. MODELS

C. 120 120 volts @ 20 ma. 69/6.	Wired and Ready for Use 10/- Extra.	C. 150 150 volts @ 25 ma. 76/-
C. 175 175 volts @ 25 ma. 82/6.		C. 200 200 volts @ 30 ma. 90/-

D. C. MODEL

D.C. 150	52/6
----------	------

No soldering—all screw terminals.
L.T. 4 volts 4 amps. supply 8/- extra.

Send postcard for Special List profusely illustrated with photographs and diagrams showing how to construct in the most simple manner your own powerful Eliminator as described on Page 844.

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No More Wavelength Troubles



Get this coil at your usual radio dealer. If you have any difficulty please write to us direct, giving, if possible, your dealer's name and address.

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HIGH EFFICIENCY

DUAL RANGE COIL

No more trouble with wavelengths! These coils, perfectly manufactured and laboratory tested on the wavemeter and inductance bridge, ensure best results and save the trouble of winding and assembly. Remember, the maker's name on this coil is your surest guarantee of highest efficiency. List No. BY.20

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5 YEARS of Radio Progress

by this

NEW SUPER

Performance



Type A.—For use in detector anode circuit.

Type B.—For use as a coupling device between H.F. and detector valves.



CHOKER

WITH BY-PASS CONDENSER

Sensational Development

The introduction of the Formo Choke will mark the beginning of an entirely new perfection in reproduction for thousands of set owners.

The performance of an H.F. Choke is the key to the tuning of your set. After fitting this new Formo, the difference in reception is amazing. It has been wound with an extremely high inductance (250,000 M. Henries), has the low self capacity of 2.0 micro-microfarads, a low resistance of 600 ohms. and is fitted with a condenser for by-passing unwanted frequencies to earth.

Distortion and fierce oscillation are banished, giving a delightfully smooth reaction that makes tuning a new delight.

Increase the range, selectivity and performance of your set by fitting the new Formo Choke. Obtainable from all good dealers, price 7/6. Send for folder "P.W." :— ARTHUR PREEN & CO., LTD., Golden Square, Piccadilly Circus, W.1. FACTORY : Crown Works, Southampton.

BUY YOUR RADIO WHERE YOU



SEE THESE FORMO Displays



The Sign of the Best Dealers Everywhere

TECHNICAL NOTES

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

The "Contradyne."

MOST listeners who are located fairly close to a high-power broadcasting station on the medium wave-band will have noticed that on the long-wave scale (or the lower part of it) there is a tendency for the spreading of the signals from the local station, and this interferes, sometimes quite seriously, with the reception of certain foreign transmissions.

For instance, the Motala and Hilversum stations are particularly liable to be interfered with in this way, and as these are two popular foreigners the effect is often very disappointing for listeners.

This trouble can be overcome by means of the "P.W." "Contradyne" principle applied as a separate unit, as described in various of our preceding issues.

D.C. Problems.

The foregoing remarks are prompted by an examination which I have just been making of a well-known all-electric three-valve receiver in which an absorption circuit is fitted for the same purpose.

The set in question is very selective, and the amplifying circuits very efficient, in consequence of which, together with the absorption circuit, the set is able to

receive quite a number of stations, and operates well even under comparatively adverse conditions.

I may mention that the particular set which I have been trying out is designed to operate on D.C. current which, as you know, is not usually so easy to cater for as alternating current.

At first sight you might think that the designing of an electric receiver would be simpler for D.C. than for A.C. current, but in fact, the opposite is the case, A.C. being so flexible and adaptable.

In this present receiver a single high-

several times as great as the consumption for a similar A.C. set.

Some A.C. sets, for instance, will work for anything up to fifty hours on a single unit of electricity, whereas in some D.C. all-electric sets the hours-per-unit may be as low as ten, or even five. Considering the advantages of a really satisfactory D.C. all-electric receiver, however, the question of current consumption is not very important.

Using Extra Condensers.

There are many places in the radio receiving circuit where by-pass con-

"P.W." PANELS. No. 1.—YOUR PANEL.

It need not be of expensive ebonite, as dry wood is a good insulator.

One difficulty with a wooden panel is that it may be too thick for condensers, etc., to be attached; but a small piece of ebonite can be let into a wooden panel quite easily.

Discoloured and "grey" matt panels can be restored by a little oil rubbed on with a soft cloth.

Unwanted holes in a panel can be filled with black sealing-wax or shoemakers' heel-ball.

A bent panel can be straightened by softening in warm water and placing between weighted, flat boards.

frequency amplifier is used, and a special valve as a detector; this detector valve gives a very high magnification, in consequence of which R.C. coupling can be employed on the low-frequency side. A pentode valve (of the Mazda "power" type) is used as output valve, and gives plenty of volume, together with the "bright" quality of reproduction for which the pentode is well known.

With D.C. all-electric sets there is usually a tendency for the current consumption to be rather heavy. It may, in fact, be

condensers are really necessary. In fact, so many points are there that it would not be very easy to enumerate them all.

In addition to this, conditions often arise where a by-pass condenser may be used although it is not absolutely essential. The skilful and experienced set-builder has learned the different points to put in by-pass condensers, and where these are carefully attended to they may make in the aggregate all the difference in the world to the operation of the finished receiver.

(Continued on page 852.)

LIFELIKE REPRODUCTION!

The recipe for perfect radio reception is a simple and well-tried one—**REJUVENATE YOUR SET WITH TELSEN COMPONENTS!** With many features patented, and efficiency built into them, Telsen Components give unequalled volume and purity of tone, and keep their **Maximum Performance Throughout their Long Lives!** Fit them, and you will realise why they are so popular among both **Technical Designers and Enthusiasts!** **YOUR SET DESERVES**



TELSEN H.F. CHOKES. Designed to cover the whole wave-band range from 1 to 4,000 metres, extremely low self-capacity, shrouded in genuine Bakelite. Inductance 150,000 microhenries. Resistance 400 ohms. Price 2/6 each.

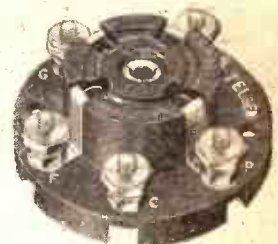


TELSEN FIXED (MICA) CONDENSERS. Shrouded in genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/30. .0005 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.



TELSEN FOUR-PIN VALVE HOLDERS. 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.



TELSEN FIVE-PIN VALVE HOLDERS. Price 1/3 each.

TELSEN COMPONENTS

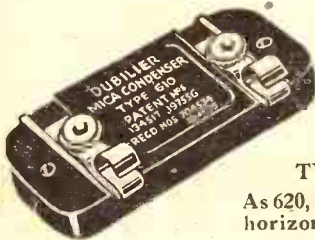
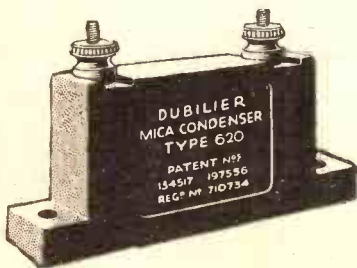
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*Dubiliers
make a
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for every job!*

TYPE 620

For use in radio circuits where comparatively small capacity is required. Arranged for vertical mounting.

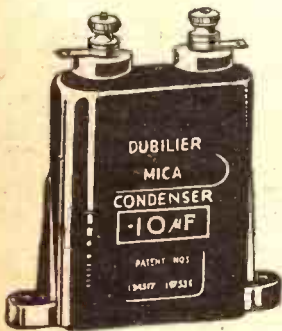
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As 620, but arranged for horizontal mounting.

PRICES 1/8 to 3/-



TYPE B775

Primarily designed for resistance coupling, but suitable for use in other circuits where a comparatively large capacity, capable of withstanding several hundreds of volts, is required.

PRICES 3/- to 37/6

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FOR ALL-MAINS RADIO**

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Why have the trouble—the worry—the expense of batteries and accumulators if your house is on the mains? Why risk missing a specially good programme because the "battery's down again"?

Our booklet, "The All Metal Way, 1931," gives complete information as to the most suitable type of rectifier for converting any battery-run set into an all-mains set.

If you are buying a mains set, make sure that it incorporates the Westinghouse Metal Rectifier—most of the good makes now do. If you are building such a set, send for the forty-page booklet, "The All Metal Way, 1931." It is written by our technical staff and contains informative sections on radio sets, eliminators, battery chargers, moving-coil loud speakers, etc. (Please enclose 3d. for your copy.)

Prices of the Westinghouse Metal Rectifier are from 15/-.

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Please send me your forty-page booklet, "The All Metal Way, 1931," for which I enclose 3d. in stamps.

PLEASE WRITE IN BLOCK LETTERS.

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P.W. 10/1/31

**TWO WONDERFUL
VALVES**

*Highest Efficiency
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Slope .. 2 Ma/V
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Slope .. 2.3 Ma/V
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Steep Slope, low impedance, splendid volume, beautiful tone. Wonderful reproduction of the bass notes.



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Best way to all Stations

TECHNICAL NOTES

(Continued from page 850.)

By-Pass Condensers.

By-pass condensers are broadly of two types, those used for the by-passing of H.F. currents and those for by-passing L.F. currents.

Approximate values are often given for the capacity of the by-pass condenser for any particular point in the circuit, but sometimes it is convenient to be able to make a rough-and-ready calculation of the *minimum* capacity which will be suitable. It is obvious that if you simply bung in a condenser which you are certain has far greater capacity than that required, you will be on the safe side, but condensers, even more than many other radio components, cost money.

To put in a condenser which you know is many times too big is like going to the electrician's shop and buying 50 yards of flex—to be on the safe side—when, as a matter of fact, you have a fair idea that all you want is a few feet!

The Minimum Capacity.

The *minimum* capacity for a by-pass condenser can, as a matter of fact, be determined fairly simply on the basis that the reactance of the condenser should be at least 1-10th of the resistance or reactance which it has to by-pass. Many tests have been carried out in this ratio, and it has been found quite efficient by-passing.

In considering the reactance of the condenser, of course, you have to bear in mind that this increases as the frequency decreases, in fact, the two are inversely pro-

portional to one another. For this reason, a very small condenser may be suitable for by-passing H.F. current, whilst a much larger one is useful for properly by-passing low-frequency currents.

In determining the minimum capacity which must be used for any particular case we should consider the most "difficult" frequency, and that will be the *lowest* frequency with which we have to deal.

Question of Reactance.

The reactance of a condenser is equal to the numeral 7 divided by 44 times the frequency times the capacity (that is, if the

capacity is measured in farads); if the capacity is in microfarads the reactance will obviously be 7,000,000 divided by 44 times the frequency times the capacity.

For instance, suppose a resistance of 10,000 ohms is to be by-passed for a frequency of 120 cycles; substituting the values into the above-mentioned relation we find that the required capacity to give a reactance of 1,000 ohms (that is the 1-10th of the resistance to be by-passed) works out at 1.46 microfarads, which is quite a fair-sized condenser for a radio receiving set (a 2-mfd. condenser is, of course, indicated). This is due to the low frequency (120 cycles).

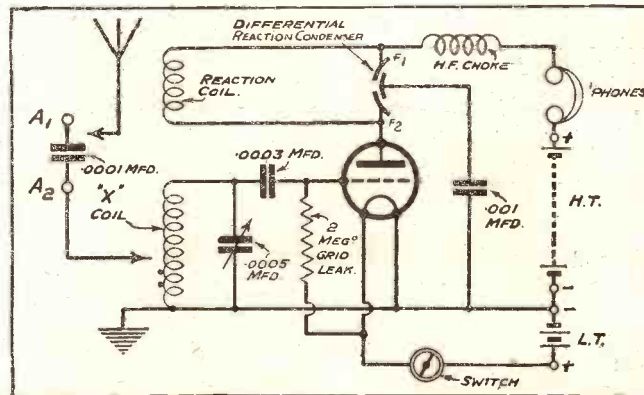
Effect of Frequency.

For the same conditions but with a frequency of 1,000,000 (wave-length about 300 metres) the capacity works out at roughly 0.00016 microfarad.

In the same way the minimum capacity of condensers for by-passing a resistance or impedance for any particular frequency can very readily be worked out, and by taking just a little trouble in this way you may save yourself the expense of an unnecessarily large condenser for any particular purpose.

(Continued on next page.)

POPULAR "WIRELETS" No. 27



Here are the connections for last week's "Wirelet," showing how to connect up a simple one-valve, using an X coil and differential reaction condenser.

REPLACE YOUR OLD CONDENSER

with -

POLAR IDEAL

Here is a unique opportunity for you to save 2/- and to modernise your set. Substitute your old type condenser with a Polar "Ideal" or a Polar "Ideal" Drum Control. These condensers have the finest Fast and Slow Motion Drive on the market to-day and are regarded as *the standard* of high-class design.

OUR OFFER. Take your old condenser, any make or type, to your Dealer and he will supply you with one of the Polar "Ideal" condensers listed below and allow you 2/- from the list prices quoted.

POLAR "IDEAL" with knob dial, .0005, 12/6; .0003, 12/-.

POLAR "IDEAL" Drum Control, right or left hand, .0005, 15/-; .0003, 14/6.

WINGROVE & ROGERS, Ltd.
188-9, STRAND, LONDON, W.C.2
POLAR WORKS, OLD SWAN, LIVERPOOL

SPECIAL EXCHANGE OFFER

This offer holds good for January and February. Take advantage of it now. Put new life into your set.

Scrap the ancient—
 use the modern
POLAR CONDENSERS



TECHNICAL NOTES.

(Continued from previous page.)

Playing Position.

What is the best angle between the surface of a gramophone record and the needle when in playing position? Most people simply set the needle in a "slanting" position and leave it at that, but the enthusiasts have often argued about this question of needle-angle and many believe that the angle not only has a bearing on the question of faithful reproduction but a still greater influence upon the wear of the records.

Although it may seem strange, some people advocate the use of the needle in a vertical position, that is, actually at right-angles to the record surface. The reasons for this are, firstly, that this is the position in which the recording stylus or needle is held when the record is being made, and consequently the reproducing conditions are then to this extent the same as the recording conditions and secondly, that the needle is believed to fit better into the track when held vertically and to pick up the various tones and overtones more effectively, and also to be less liable to jump or to wear against the sides of the track.

Minimising Wear.

At first sight it rather "goes against the grain" to place the needle in any but a "trailing" position, but I often hear from readers who make a practice of using the needle in a vertical position that this gives them better results and minimises the wear upon their records.

I am afraid it is one of those points which every user must decide for himself, but there is no harm in selecting a particular record and using the needle always in the vertical position for that record so as to see how it gets along.

A simple test of this kind will soon tell you whether (with your soundbox or pick-up at any rate) there is any advantage to be gained in this way. Incidentally, some soundboxes will not permit of the needle being shifted from the slanting position.

Choke-Filter Output.

Following the reference I made recently to the question of the resistance of moving-coil loud speakers, I have been asked whether it is better to use a low-resistance speaker of this kind with an output transformer or to use a choke-filter output circuit and a high-resistance moving-coil speaker.

This question, like so many loud-speaker questions, is difficult to answer. For one thing, it depends upon the relative efficiency of the choke-filter circuit or the transformer (whichever you happen to be using) and that of the proposed alternative arrangement.

One obvious point is that the resistance of the speaker may determine the mass of the moving coil, although it is not very clear whether my correspondent refers to the resistance of the operating coil or the resistance of the field winding.

Relative Efficiency.

Of course, if the resistance of the field winding is referred to, this has nothing to do with the question of the output stage of the receiver. The difference between, say, a 200-volt winding and a 6-volt winding is simply a question of convenience in obtaining the magnetising current and provided

(Continued on next page.)



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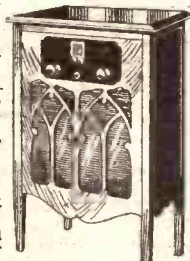
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TECHNICAL NOTES

(Continued from previous page.)

you obtain the same magnetic flux across the gap it is immaterial what voltage you use.

It should be possible to obtain perfectly good results by both of the above-mentioned output arrangements and any variations in the results will be due rather to variations in the efficiency of the choke-filter or transformer than to the principle involved.

Filament Efficiency.

A writer in "P.W." some little time back gave a very interesting account of the use of rare metals in connection with radio apparatus, and pointed out how the development of radio had been mainly responsible for bringing many of these metals out of the realm of scientific curiosity and into that of commercial application.

One of these metals is tantalum, which at one time was used for the filaments of electric lamps and has also, since the advent

TECHNICAL TWISTERS

No. 43. REACTION. CAN YOU FILL IN THE MISSING LETTERS?

Reaction is taking place whenever energy in a valve's circuit is transferred back into a preceding circuit.

The reaction effect can be obtained through different kinds of coupling, and can be arranged either to or to the original flow of current.

Most sets employ a for reaction coupling, but back-coupling effects can be obtained across a or a or an

In the normal condenser-controlled reaction the coupling between and circuits is by means of a and the condenser merely controls the amount of current flowing in the coupled circuit.

Last week's missing words (in order) were: Valve, Red, Plus, Choke, Condenser, Transformer.

of radio, been used in sheet form for the anodes of radio valves. Tantalum, however, is too expensive to use for the electrodes generally, and as regards the filaments of valves and electric lamps, it has now been superseded by tungsten.

Although valve filaments are sometimes made of other metals, tungsten is practically universally used for this purpose, largely owing to the fact that it can be readily treated with oxides, so as to render it highly emissive electronically at a comparatively low temperature.

Tantalum is a very convenient metal for use in electrolytic rectifiers, and although for the purposes of rectification it has now been superseded by the copper-oxide "dry" rectifier, nevertheless it enjoyed a considerable vogue not more than two or three years back. Even yet a number of amateurs use it for rectifying purposes.



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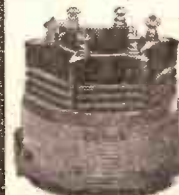
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THE "P.W." "SUPER-COIL" THREE.

(Continued from page 840.)

(knob fully screwed down) for normal purposes, but still higher selectivity can be obtained by reducing it somewhat.

We have just examined the photos and diagrams in search of any constructional points requiring explanation, but they really seem to make the whole job perfectly clear, so we will go on to the necessary working instructions.

First of all you want three valves, and these are the suitable types. For the detector (V_1), a valve of the H.F. or "Special Detector" class, for V_2 one of the "L.F." type, and for V_3 a power or super-power.

Very Simple Switching.

The L.T. battery will be of 2, 4 or 6 volts, according to the filament voltage rating of the valves chosen, and for the H.T. supply you want a 100, 108 or 120-volt battery, preferably the latter. On terminal H.T. +1 apply from 50 to 80 volts, adjusted for the best reaction effects on a distant station. Grid bias, of course, must be adjusted according to the valve makers' instructions.

The adjustment of the two-compression type of condensers we have already explained, and it just remains to tell you how to use the wave-change switch. It is very simple. Push the knob inwards for long waves, pull it outwards for medium waves.

A final hint. A set like this will produce a tremendous volume of sound on the local station, and care must be taken to avoid bad quality due to overloading. Set the .001-mfd. compression condenser to minimum (knob unscrewed to the limit of its effective travel), keep reaction at minimum (knob turned fully to the left), and de-tune a little if volume still too great.

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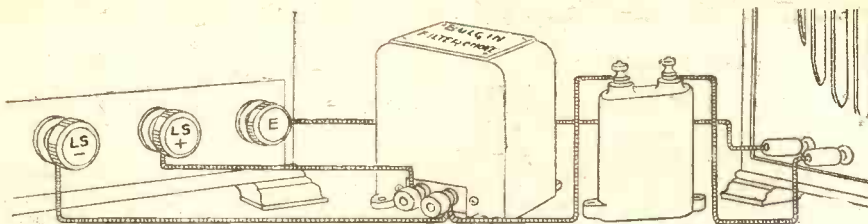
(Continued from page 829.)

We may then find ourselves no longer under the necessity of submitting to the autocracy of the local station. We shall have true service conditions from the distant. This could greatly enhance the pleasures of broadcasting. Broadcasting to-day suffers from the dead hand of programme monopoly. Stimulus seems to have vanished with the coming of success. More and more people are wanting sets to listen to foreign programmes in consequence.

Variety is Essential.

Yet foreign programmes are not easy to receive; they fade, they are jammed. They use unsuitable waves and receivers are not sufficiently selective.

Variety of choice is nevertheless essential to the listener. As a curious corollary all the broadcasting organisations of Europe are pressing for better facilities. If they obtain what they are asking for, service areas will embrace other countries. We shall then have a better and greater variety. Even the B.B.C. delegation is still pursuing the international policy I so long ago initiated. May they succeed!



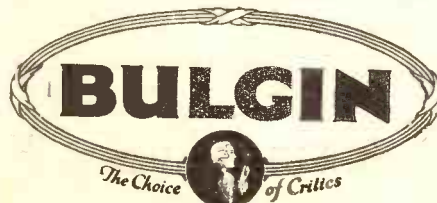
Simplicity itself

To fit a Filter Choke

Just connect the choke across the output terminals of the set—connect the output minus terminal to one side of a large fixed condenser (1 mfd. or more): the other condenser terminal is then connected to one terminal of the loud speaker, while the return lead from the loud speaker is connected to any convenient earthed point.

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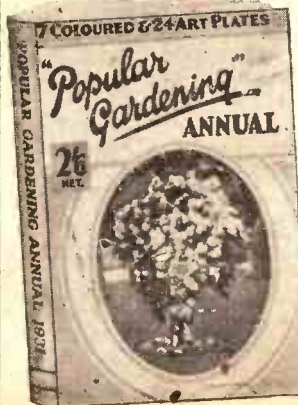
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ARE OUR VALVES TOO GOOD?

(Continued from page 831.)

Of course, the L.F. valve will add its quota of distortion, and so will the loud speaker. A black picture? Yes, but a perfectly true one, although I am bound to say that with modern apparatus the distortion at any one point may be so slight as to be almost negligible.

Nevertheless, it must be to our ultimate advantage to reduce the components of a radio set just as much as this must be the ultimate policy in radio transmission—when an enlightened listening public calls for better quality broadcasts. At present, of course, reception lags a deal behind transmission.

Too Good for the Sets.

In the development of anything there is bound to be a good bit of over-running. We have this in our radio in the shape of the firms marketing sets whose valves are too good for the circuits, components, or layout design.

You get, for example, three-valve receivers that are hopelessly inselective and terribly unstable merely because they are using valves that are contributing far more amplification than the outfit can stand up to. Stations come in and jam each other in the one or two tuning circuits without the use of any reaction (a little reaction works wonders in decreasing damping and improving selectivity!), and the moment the H.T. battery develops an ohm or two of extra resistance the outfit goes into L.F. oscillation.

There might even be a high-pitched whistle present all the time. The uninitiated put this whistle down either to the broadcasting station or to an overlapping effect in the ether, whereas it is, of course, an audible evidence of violent instability.

One is inclined to think at times that the valve people are going ahead a little too fast. We can make use of their very fine valves in first-class designs, but they do show up alarmingly the weaknesses of the "poorer brethren" among sets.

And when you bring in the mains and take advantage of the higher voltages and currents there available for H.T., many of these outfits dissolve into nothing but howling generators of L.F. squeals.

But while there are people who can live up to these very efficient valves, it would be, in my opinion, a dull fellow who said that a halt in valve development should be called.

Constant Research.

There are quite a number of commercial sets that can make real use of modern British valves, but there are many more that can not. I think the reason for this is that, whereas for years there has been intensive research into the design and manufacture of valves, set designing has been conducted on rather haphazard lines.

"P.W." has a staff that does nothing but carry out research of an intensive nature into set design all day, every day.

That is the only way to succeed in the production of first-class dependable designs. Sooner or later the whole of the radio industry will settle down to do its job properly in the same way. Already many of the bigger concerns have their research staffs hard at work all the time, but there are many smaller fry who leave their set-designing in the hands of one or two technicians with no real qualifications.

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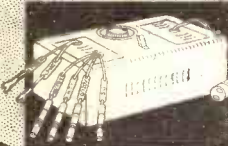
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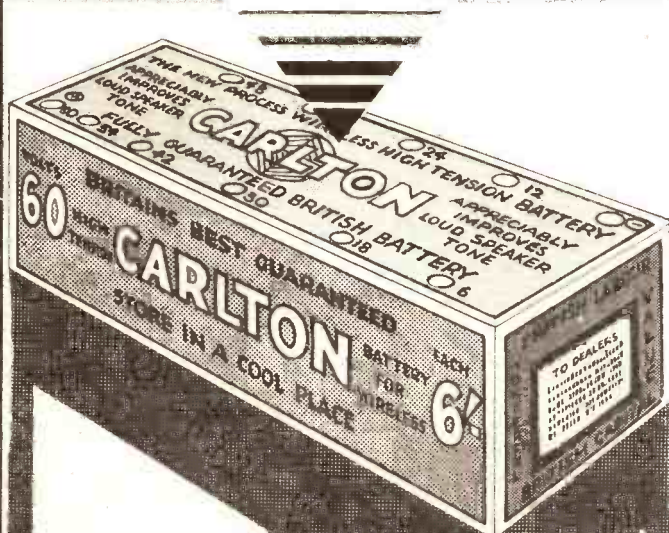
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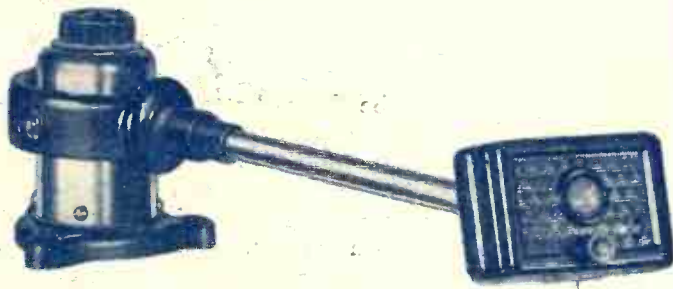
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Blue Spot 88, the world-famous pick-up, gives a new meaning to gramophone music. Until you obtain this pick-up you are depriving yourself of the best reproduction of your records. Ask your dealer for a demonstration and you will be both delighted and amazed. Wonderful reproduction has not been obtained at the expense of record wear. Blue Spot 88 has been designed to reduce wear to the absolute minimum and is counter-balanced and runs on ball bearings. But study its novel features at your dealers. **PRICE 63/-**



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BEHIND THE MICROPHONE—By CAPT. ECKERSLEY (See Page 863)

Popular Wireless

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January 17th, 1931.

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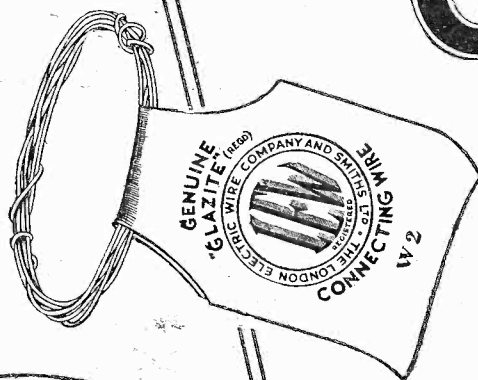
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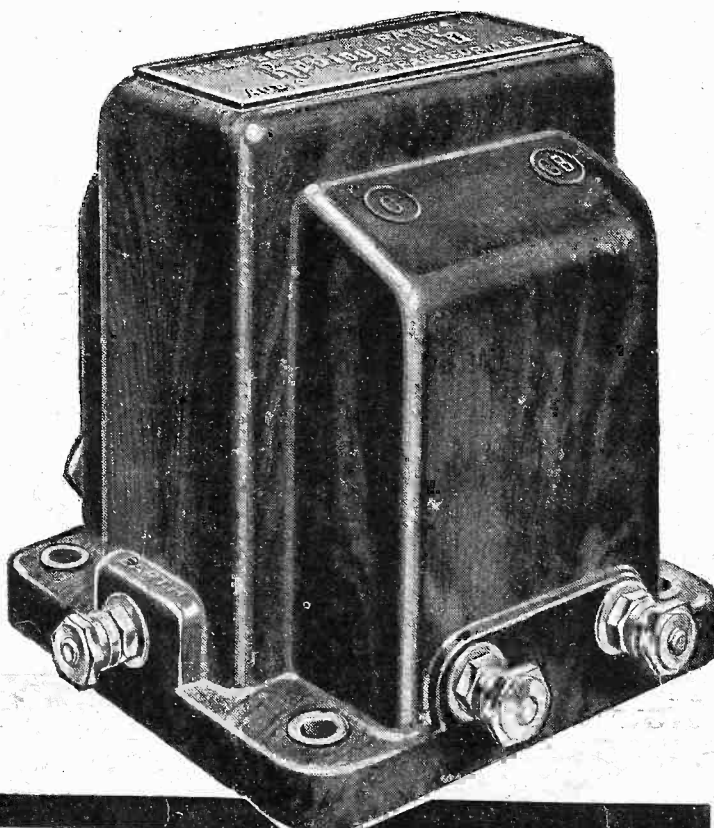
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THE FEBRUARY

WIRELESS CONSTRUCTOR

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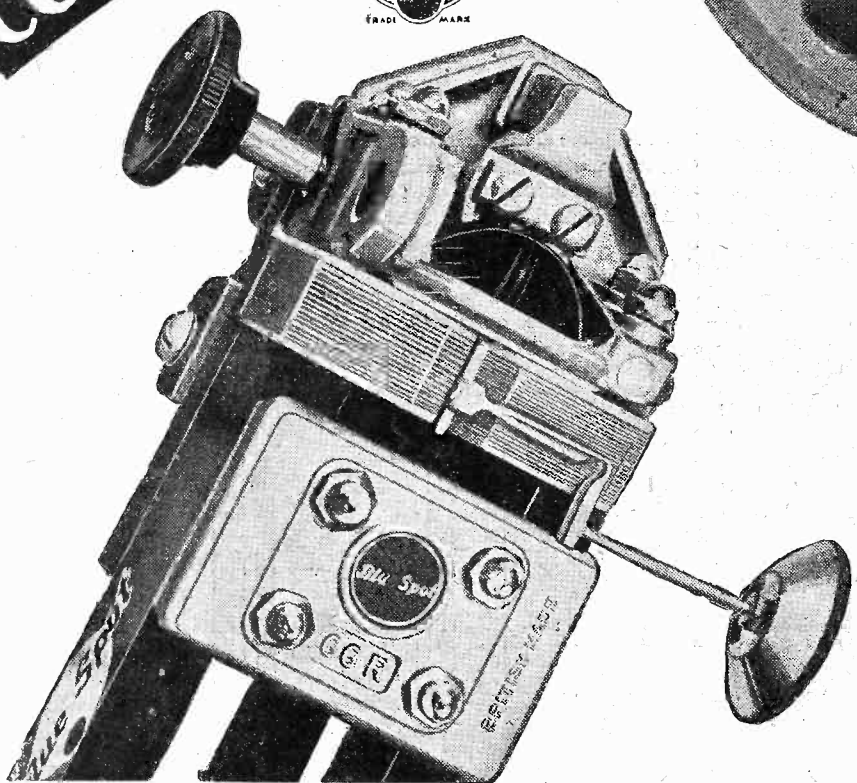
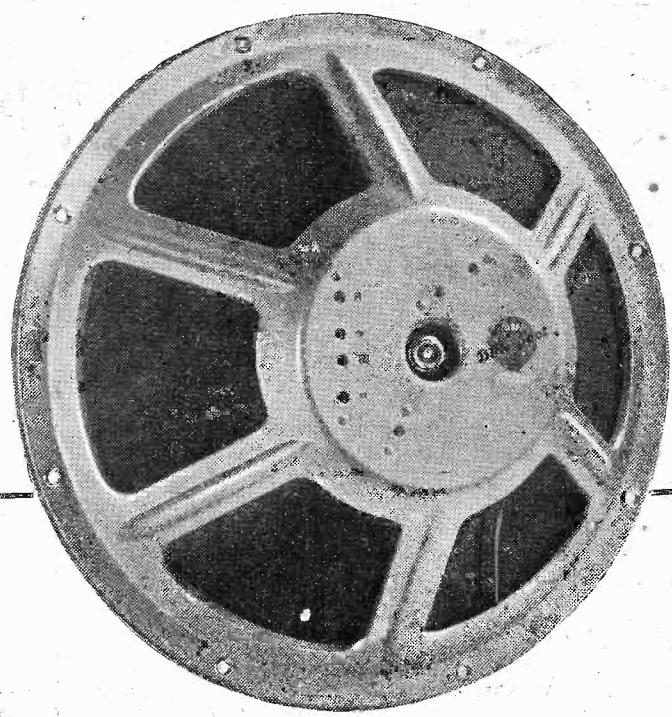
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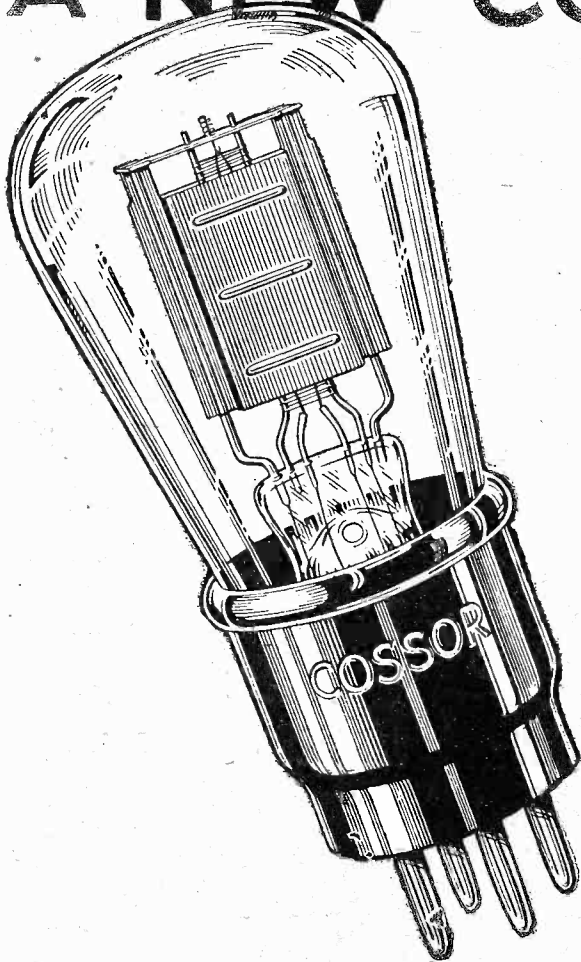
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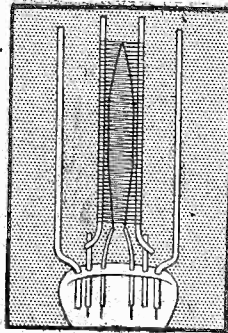
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210 H.L.

A NEW COSSOR VALVE

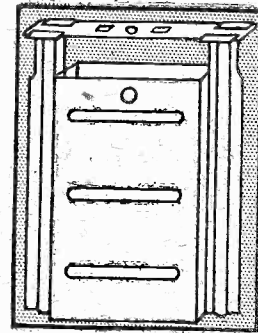


DESIGNED especially for more efficient H.F. amplification in non-screened grid Receivers, the new Cossor 210 H.L. possesses features of vital interest to all users of that type of Set. Amongst these may be instanced its special grid current characteristics. By the complete elimination of grid current in this valve a remarkable degree of distortionless H.F. amplification is ensured without the necessity of employing grid bias. As a result the Cossor 210 H.L. can be worked under the most efficient operating conditions—its amplification unimpaired by the effect of bias. Because of this and because of the other special features of the Cossor 210 H.L. detailed below the use of this new valve will effect a considerable increase in the efficiency of any non-screened grid Receiver.



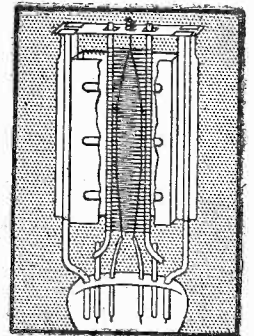
SEVEN POINT SUSPENSION

Practical experience has shown that the Cossor 7 point suspension system definitely eliminates microphonic noises. The system is employed in the support of the exceptionally long filament of the Cossor 210 H.L.



MICA BRIDGE MOUNTING

Permanent alignment of the electrode system is ensured by a stout mica bridge which forms an integral part of the anode assembly. When finally secured in position the whole structure becomes one interlocked unit.



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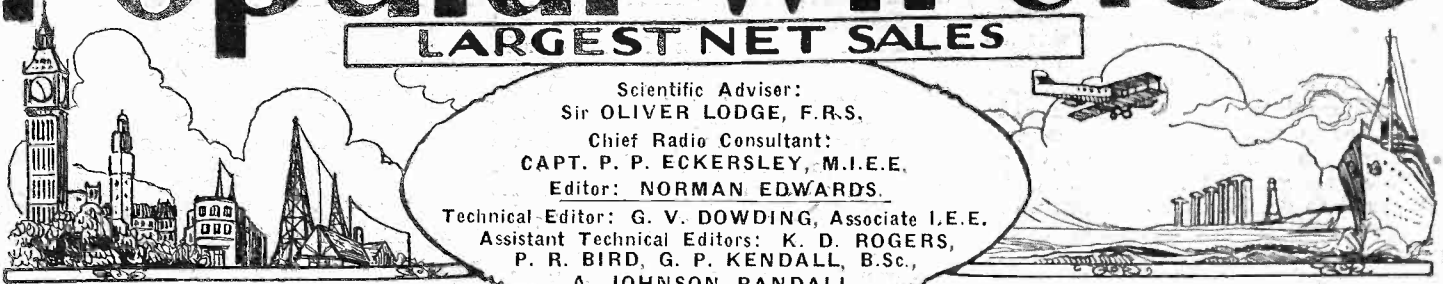
The new Cossor 210 H.L. 2 volts, 1 amp.
 Impedance 22,000. Amplification Factor 24, Mutual Conductance, 1.1 m.a./v. Anode voltage 75-150. Price **8/6**

Be sure to get one of our novel, circular Station Charts, which give identification details of nearly 50 stations with space for entering your own dial readings. Ask your dealer for a copy, price 2d. or send 2d. stamp to us and head your letter 'Station Chart P.W.'

THE NEW COSSOR 210 H.L.

Popular Wireless

LARGEST NET SALES



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**ARIEL'S ALMANACK
THE SCOTTISH
REGIONAL.
WELL SATISFIED.
THE INTRUDER.**

RADIO NOTES & NEWS

**RADIO SALESMEN.
DOES IT PAY?
TWO NEW ONES.
ON PROBATION.**

I Am Deserted.

RAUDIO and I have in my house always been lone dogs. The Girl Person's interest in radio has been limited to an occasional grunt of satisfaction at a piece of music. The Lady Person is in another world so far as the technique goes; radio is music and suchlike diversions made by a box of lamps. Only the Boy has stood by me and searched Europe by dial—and now Christmas has won over his allegiance to chemistry and I am being cornered on every possible occasion so that I may explain the secrets of copper sulphate or other lump of nastiness.

"Ariel's" Almanack.

JANUARY: Mr. Bach will oblige with some more cantatas.

February: Work on the foundations of music will continue, and some prehistoric semi-quavers will then be unearthed.

March: Sir J. Reith will drop a pronouncement relating to his plans for raising our mental stature.

April: Kipling will continue his non-broadcasting on "How the Army got its naughty words." Mr. Bach will cantata as before.

May: B.B.C. will broadcast interview between Carnera and Cissie. Announcer will catch his jaw on a nail whilst pronouncing Saskatchewan.

June: A well-known quintet will blossom into an octet. Sunday programmes will begin at four-thirty and Mr. Bach will protest.

More "Old Moore."

JULY: B.B.C. will subsidise Mr. Bach and pension Honegger off. Mr. Stravinsky will write to the "Daily Mail" about it.

August: Mr. Newman, the musical critic, will overhear a television test and declare it to be one of Bartok's finest pieces.

September: B.B.C. will send a mis-

sionary to Billingsgate and announce an S.B. of the Oxford Dictionary as corrected by the Head Pronouncer.

October: A careless workman will drop a crowbar through those Foundations and nobody will hear it touch bottom. B.B.C. will subsidise Scotland, to ensure bigger and better Burns.

November: A trianglist from the studio in the wine-vaults will put his wrist out of joint and get transferred to Fishing Forecast Section, sub-section Hake.

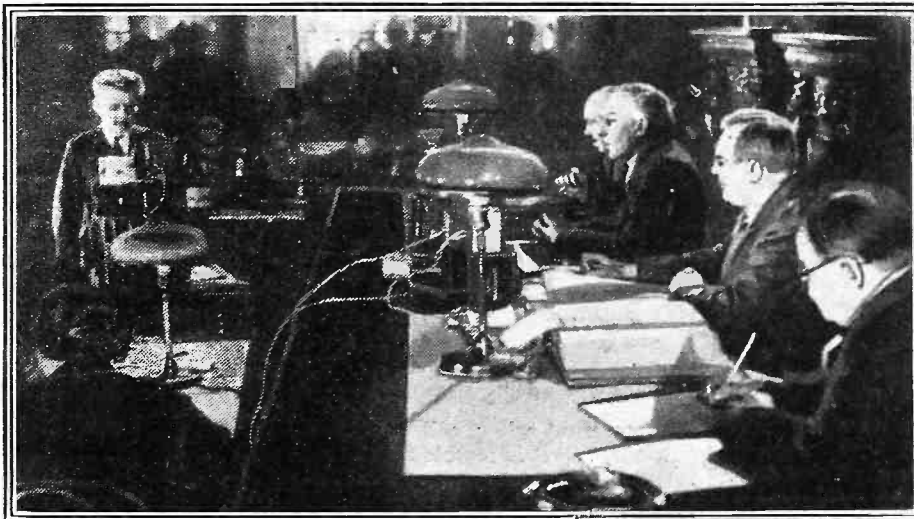
December: Death of Bach. Bartok buys bigger hat and writes a cantata.

Queries by All.

OUR prolific correspondent, Mr. Mann of Middlesbro', wants to know about:

1. A station on the 60 m. band which frequently refers to "Robat" but sounds like Russian.
2. A station on 45.8 m; call-sign FN, gives Russian speech and no music.
3. Call-letters of the Amsterdam commercial telephone station working Bandoeng on 25.6 m.
4. S. American station working Paris on 23 m. (Qy: Rio or B. Aires? Ed.).
5. Call letters of German commercial telephone station on 18.5 m. Can anyone oblige, please?

THE MICROPHONE AT A TREASON TRIAL



Standing on the left is Professor Ramzin, the chief of the eight professors recently tried for plotting against the Soviet Government. Another microphone is shown in front of the President of the Supreme Court. (Right.)

Luck Was With Him.

A MANOR PARK reader (who forgot to sign his name) tells of a crisis and how he passed it in safety by a somewhat desperate remedy. His L.T. battery chose to run down in the middle of a programme to which extra-special visitors were listening. It was too late at night for him to get another accumulator and so, in despair, he tapped off a couple of cells from a flash-lamp battery which had already seen service elsewhere and actually got good results for one and a quarter hours. He deserved his luck for being saucy enough to tempt it.

chance your arm and go straight for the "Regional" Four? Listen to a Bradford man's unqualified approval of this set. "This set is absolutely a 'knock-out' and stands alone. Selectivity, tremendous power and pure in tone; nothing more can be desired. The set is streets ahead of anything I have listened to; it does not play at getting stations, it gets them quite as loud as the local. Kalundborg, Motala, Daventry, Paris, Huizen, and at least 35 stations on the short waves."

Now then, ye doubters!—What more than that do you want?

(Continued on next page.)

The Scottish Regional.

THE B.B.C. has selected Westerglen, three miles south of Falkirk, Stirlingshire, for the site of the projected Scottish Regional station. The new station will be similar to the London and Northern Regionals and will be the third transmitter built under the B.B.C.'s Regional scheme. It will replace the low-power stations at Glasgow, Edinburgh and Dundee. Good luck tae it!

A Satisfied Constructor.

IF amongst all the circuits available you wallow in doubt as to which one to tackle, why not

RADIO NOTES AND NEWS

(Continued from previous page.)

Too Precious to Waste.

THE "Morning Post" publishes a story from someone who called at a farm in Airedale and finding the outside deserted knocked at the farmhouse door. On entering he found farmer, wife, daughter and two farm hands shrouded from head to foot in towels, all plucking Christmas geese like mad, to the accompaniment of an orchestra via radio. "Aye!" said Giles, "we used to do this in t' barn, but we've just gotten t' wireless and we couldn't let it be wasting in t' house, so we've all come inside."

Ariel at Portland Place.

REALLY, we are overwhelmed! Famous as "P.W." is in every part of the globe where radio men are found, we little expected that the spirit of "P.W." would be immortalised in sculpture. Yet that is what is being done, for there's going to be a carven figure of Ariel, representing "Wireless" on the new B.B.C. building in Portland Place. The sculptor, Mr. Eric Gill, is already busy with his mallet and chisel. I hope that he will make a better job of my classic features than does my daughter when she sketches me!

The Intruder.

THIS Stuttgart obligato to the London Regional is certainly a Number One nuisance, especially when the Stuttgartians applaud or when some Teutonic gentleman gets "all worked up" before the microphone. I stood it for about a week and then I decided to put in some fancy work on the set. Eventually I managed to reduce the interference to almost a negligible quantity by means of loosening a coupling and de-tuning slightly. Nevertheless I could cheerfully dispense with my German friend, for I can still hear his sibilants!

"Some Radio Christmases."

THANKS to those who have expressed themselves so prettily about my Christmas article. It aroused special interest at Catterick Camp amongst "Royal Signals," a push of whose members with experience of China have not known rain in the north between October and April. This was twenty years ago, and I assure W. H. P. that it rained on the coast for a week. Even in Shanghai I have known it rain at Christmas-time for days together.

The Supply of Radio Salesmen.

W. H. P. then goes on to level questions at me about radio salesmen, whom he has evidently found to be somewhat sketchy in technical knowledge. The growth of the "trade" has outstripped the supply of technically informed salesmen. That is not to be denied; but as is well recognised it is being remedied as fast as possible, notably by the Marconiphone people. The best technician is apt to be a poor salesman; pure technics do not sort very well with the commercial mind, I have found. I was trained as a technical analyst, and when, during my lean times, I tried to "travel" in hair restorers the results were zero, nil, nix. I couldn't sell a plank to a drowning man! All the best of luck to W. H. P. and the Signals.

Does Broadcasting Pay in U.S.A.?

THE radio authorities in America questioned twenty broadcasting organisations who had sought permission to increase the size of their stations. Ten disclosed an average annual profit of about £5,800 each, whilst the remainder confessed to an average annual loss of £10,800 each. It also came out that the average rate for the use of a 5-kw. station during the evening is £62 and that only 30 per cent of the time of the twenty stations was paid for; hence the desire to increase the publicity value of their broadcasts by enlarging the possible number of listeners.

Two New Ones.

LIFT these with thanks to the "Telegraph and Telephone Age." The father of six daughters, while reading a telegram announcing the arrival of a seventh girl, looked up to the top of the form and read the telegraph company's slogan,

SHORT WAVES.

"How marriage changes a man! When we were engaged Philip used to call me his little crystal set, and now he says I'm an everlasting loud speaker."—"The By-stander."

"ICELAND BROADCASTS." "Our own often leaves us cold."—"Daily Mirror."

"During Sir James Jeans' talk on stars, I became so accustomed to thinking in millions and of phenomenal heat that when he finished and I found that the fire was nearly out, it seemed such an insignificant matter that I almost overlooked it," writes a contributor in the "Manchester Evening News."

THE NEW VERSIONS.

Where there's a will, there's a loud speaker.

A long talk turneth away listeners.

It is understood that a farmer has written to the B.B.C. claiming that he has a musical cow, and offering its services for broadcasting. But would listeners appreciate such sweet MOO-sic?

FURTHERING THE CAUSE.

We read in one of the Sunday newspapers that a certain gentleman recently made his wife run up and down stairs at the B.B.C. so that listeners might hear the effect of the exertion on her heart, which by means of amplifiers and a relay was made to ring an electric bell.

"MAKING WHOOPEE!" The small boy next door trying to tune-in his new wireless set.

"If you want a boy, call Western Union." Secondly: "It is reported that the crowds round the telegraph offices during the recent eclipse of the sun were Scots sending Night Letter Telegrams! (N.L.T.'s are cheap rate messages sent during the night.—Ed. "P.W.")

Explaining Away Bartok.

IN February the B.B.C. begins a series of "talks" called "New Friends in Music," which is to be an attempt to "explain" the newer school of music to what the B.B.C. admits is a body of puzzled listeners. The list of new friends who are to be explained away includes Bartok, Hindemith and Stravinsky—all names which most of us will associate with ridiculous bursts of discord and/or eccentric composition. I do not see the name of Honegger, but I have no doubt that his "explanation" will be given. Surely we do not wish music to be explained; it doesn't sound any better afterwards, does it?

The Newest Thriller.

IF you want something quite novel in the detective story department get yours by radio; on Jan. 10th the first instalment of a story which is to be written by six well-known detective story writers was read by the B.B.C. Each will write two instalments. Before leaving the subject of detection may I appeal to any sleuth who reads this to tell me why the B.B.C. announcer at ——— called "vehicle" "vaikul" the other evening?

On Probation.

LIFE for me would be duller if the Federal Radio Commission of the U.S.A. packed up. It publishes some of the most useful and amusing statistics which one could find, in addition to patrolling the American ether. Thirty-one stations were placed on probation the other day, mostly for the sin of running off their assigned wave-lengths; one got the bird for "sponsoring" cancer cures, another for putting up socialist agitations, and another for pushing monkey-gland treatment. I trust that among the cardinal sins the Commission will include the broadcasting of "That's Okay by me, Chief!"

Remote Control.

WHAT I asked for quite two years ago appears to have been worked out at last by the Radio Corporation of America, who have produced a remote control device better than any others of which I have heard. The control panel is furnished with buttons and all one has to do is to select a programme, press the proper button—the receiver does the rest. A duplicate set of buttons is fitted for control at the set. The new apparatus adds about £13 to the cost of the set, so that the extra convenience is evidently designed only to keep the "idle" rich idler.

A New Trade.

OUT of the welter of new things created and old things destroyed by radio broadcasting, there stands in bold relief the fact that the microphone is pre-eminently suited to certain types of plays. All that remains is to perfect the technique and find the playwrights who can produce matter which will "go over."

Young men who aspire to affluence, if not to fame, might do worse than try their pens in this direction, for who knows what Pinero's and H. A. Jones's may be amongst them? The field is already invaded, for during the period March, 1929 to September, 1930, about one-third of the plays broadcast by organisations belonging to the Union Internationale de Radiodiffusion were specially written for the microphone.

Amos 'n' Andy.

THE B.B.C.'s re-broadcast of these white niggers on December 31st was O.K. as regards strength, but unsatisfactory as to quality. There was a lot of "blasting" or fading, which rendered it somewhat difficult to follow. I do not think the day of transatlantic broadcasts has yet come, though I believe that by Beam wireless they would be quite good.

The National Broadcasting Co.'s New Year's message was very plain and very cousinly. The same to U.S.A., and many of 'em.

ARIEL.

BEHIND THE MICROPHONE

BY CAPT. P. P. ECKERSLEY, M.I.E.E.



Our Chief Radio Consultant tells you some of the exciting and often humorous incidents that have occurred behind the scenes of broadcasting with special reference to earlier days at Writtle, where, it can truly be said, he initiated British broadcasting. In the next few weeks further articles by Capt. Eckersley, in which he will record intimate, amusing and exciting incidents (some made public for the very first time) will appear in "P.W.," and new readers would be well advised to place an order for "P.W." so as not to miss them.

"GIVE us this day of rest that we look back upon the way we have come, and forward to the summit whither our way lies." So spoke a voice and speaks it still to 150 boys and girls every Sunday morning.

I have few days of rest, but a long train journey forbids me more normal employment, so what better than to remember some of the past and write it as it throws its pictures upon the screen of a sensitized mind?

It's a long road we have come, and past each overhanging bluff negotiated we have seen still the encumbered path leading upwards to new and more formidable difficulties.

THE "MAN IN CHARGE"



A photo of Capt. Eckersley taken while at work as Chief Engineer of the B.B.C.

The summit is lost in the mists of the future, the past already lies far below us; here clearly lit by the sunshine of memory, there half hidden in the shadows of disappointment.

And many friends have been found and lost, some fickle and tricky, eager to lead in the easy places, missing when roping together is imperative: some very true and loyal and still with us, some given up, some new ones who have quickly climbed behind us the trail we have made.

Those Golden Voices!

Back there in 1919 I recollect the milestone Chelmsford, with H. J. Round and W. T. Ditcham and Arthur Burrows, the latter having equally fine "modulating" voices. Yes, we did not so much worry about whether people came from Public

Schools in those days; it was a question of the ratio of R.M.S. value to peak in the resultant disturbance they made.

If such a ratio is expressible as directly proportional to the content of rare metals, then Ditcham and Burrows were fittingly described as having "golden" voices.

Chelmsford was really the first British station to do broadcasting. It had a power of 15 kilowatts, its aerial was carried on 500-ft. masts, and it used a wave-length to-day described as "long," so it was as effective, as to carrying power, as many existing European stations.

Where Is That Record?

A number of journalists in Rome took down an accurate record of speech radiated here in England. And that was 1919!

I hazard a guess that we in England can claim to have started high-power broadcasting before even the Americans. Dame Nellie Melba sang from the station.

A packing shed was unpacked and a piano hired, and even a carpet put down—subsequently disdained because no singer will stand on a carpet to sing. It is understood that an enthusiast in Paris made a gramophone record of the resulting reception.

It would be interesting indeed, if it had been kept, but one wonders if, being an enthusiast, the owner later destroyed it. Because, of course, quality then was not what we call quality to-day.

No negative on any grid, high-impedance valves, some soft, loud speakers which snarled rather than sang, and the high tension for reception only about 50 tired volts! But Chelmsford was the first landmark.

The P.M.G.'s Bombshell.

Unfortunately, initiative was discouraged in this country by official action, and the then Postmaster-General ordered us to close down because we were "interfering with the other services." Incidentally, I admit the indictment of being one of those who was not sorry: a strong harmonic interfered seriously with aeroplane wireless on which subject I was then chiefly engaged.

Chelmsford ceased to be a name in the world of wireless, peace fell upon the ether, all was silent except for the chirping of the c.w. birds and the faint oscillations of regenerative receivers.

The amateurs of England (to whom the workers pray?) woke us from our sleep crying "Up and onwards,

sluggards! Give us telephony, we are bored with Morse!" Their cry went up, not once but three times, and they beat with their heterodynes upon the portals of bureaucracy and these too woke crying "What is this about telephony? Why —?"

"Two Emma Tock."

But the amateurs were persuasive and at last permission was granted for the Marconi Company to start a station addressed to amateurs. This station was erected and took its more popular name from a village hard by Chelmsford, its official designation being 2 MT—on which combination of letters one can weave many *jeux des mots*, but I will refrain. I was intrinsically bound up with "two emma tock Writtle," and many are the stories I could tell you. A few will surely suffice.

For instance, the opening night! I will not, I hope, be insulting the intelligence of my more technical readers by drawing attention to the fact that the values of the components of electrical circuits have a distinct bearing upon their overall performance.

There is a condenser, for example, which

(Continued on page 892.)

BRITAIN'S FIRST BIG BROADCAST



Dame Nellie Melba singing from the Chelmsford Station—an historic radio event referred to by the author.

PROGRAMME PEAKS

A review of broadcasting progress during the year 1930, with special reference to the high-lights that found most favour with the listening public.

THE year 1930 saw the production of a microphone drama which sets a definite standard for the future, "Brigade Exchange," a German war play, by Ernst Johannsen, which was produced by Howard Rose, marks the peak of dramatic accomplishment so far.

The microphone play showed signs during the year of becoming shorter in length than ever. "Brigade Exchange" and "The Flowers are Not for You to Pick," one of Tyrone Guthrie's plays specially written for broadcasting, took less than an hour each, whereas some two years ago the average time of a broadcast play was an hour and a half, as witness "Carnival" and "Lord Jim."

Vaudeville ranked among the most favoured programmes of 1930, and three such programmes were given weekly as a rule. The list of variety artists who were heard during the year included scores of names which are familiar on the stages of theatre and music-hall. Series of vaudeville acts were arranged by Albert de Courville and Philip Ridgeway.

Many Distinguished Artists.

Among many distinguished artists who have given studio recitals may be mentioned Suggia, Gerhardt, Chemet, Supervia, Pouishnoff, Solomon, Landowska, Hinnenberg-Lefebvre, Myra Hess, Marie Hall, Marcelle Moyer, Miriam Licette, and Gunther Ramin. Most of the principal European string quartets have taken part in programmes, including the London String Quartet, the Brosa, Kutcher, Stratton, and other British quartets; the Pro Arte, Kolisch, and Prague. Other ensembles that have been heard are the London Wind Quintet, the English Ensemble, the Philharmonic Trio, and the Quintet Instrumentale de Paris.

On the religious side the year has been notable for the beginning of a system of contrasting or alternative services made possible by the development of the Regional scheme in the south. From March 16th onwards it has been possible on certain Sundays to offer the listener a choice of two different types of service, one on the National wave-length and one on the Regional. Such a choice is not offered more than twice a month, since the second Sunday is still devoted to St. Martin-in-the-Fields, without alternative, and the fourth Sunday is as it has always been, shared among the stations as a National broadcast.

Sunday Appeals Success.

In connection with the Week's Good Cause appeal on Sunday evenings, the scheme by which the B.B.C. offered to act as almoners and to receive lump sum contributions to be distributed piecemeal over the year, or any period, was further developed, and the contributions were considerably extended. The B.B.C. has received over £1,000, and is now able to distribute a sum of £20 weekly to the main appeal of the week. Individual appeals resulted in the raising of generous sums from listeners, the few that can be

cited here being the following: St. David's Home for Totally Disabled Soldiers and Sailors, £1,376; St. Francis Leper Guild, £1,357; Church Army, £1,194; Metropolitan Hospital Sunday Fund, £1,122. A National Police Court Mission appeal realised a sum of £1,500, and amounts of more than £800 were received by the Kensington Council of Social Service, the Royal Association in Aid of the Deaf and Dumb, and the Heritage Craft Schools, Chailey.

Important Talks.

Although no party political talks were broadcast in 1930, several series were given on political and economic subjects. During the Imperial Conference in London, talks by the Prime Minister of Great Britain and by three of the Dominion Prime

broadcast from Geneva by British Government delegates.

Among the many series of educational talks arranged by the Central Council for Broadcast Adult Education, the following were outstanding: "Science and Religion," a symposium to which the contributors included Dean Inge, Professor Samuel Alexander, the Bishop of Birmingham, Professor Malinowski, Sir J. Arthur Thomson, and Sir Arthur Eddington; "The Stars in Their Courses," by Sir James Jeans; "The Study of the Mind" and "The Mind of a Child," by Dr. Cyril Burt; "To-day and To-morrow: A Philosophy of Freedom," by Professor John Macmurray; "The World and Ourselves," a series of international conversations in which representatives of Great Britain discussed national differences, habits, and political outlook with France, Germany, the United States of America, Russia, Turkey, and Italy; "Bird-Watching and Bird Behaviour," by Professor Julian Huxley; "The Progress of Music," by Dr. George Dyson; "The Dark Continent," a symposium on Africa; and "The Youth of Industrialism," by Mr. H. L. Beales and Mr. R. S. Lambert.

Three National lectures were broadcast in 1930: "Tendencies in the Field of Physics," by Sir J. J. Thomson; "Law, Ethics, and Legislation," by Lord Hewart of Bury; and "Monetary Policy," by Mr. Reginald McKenna.

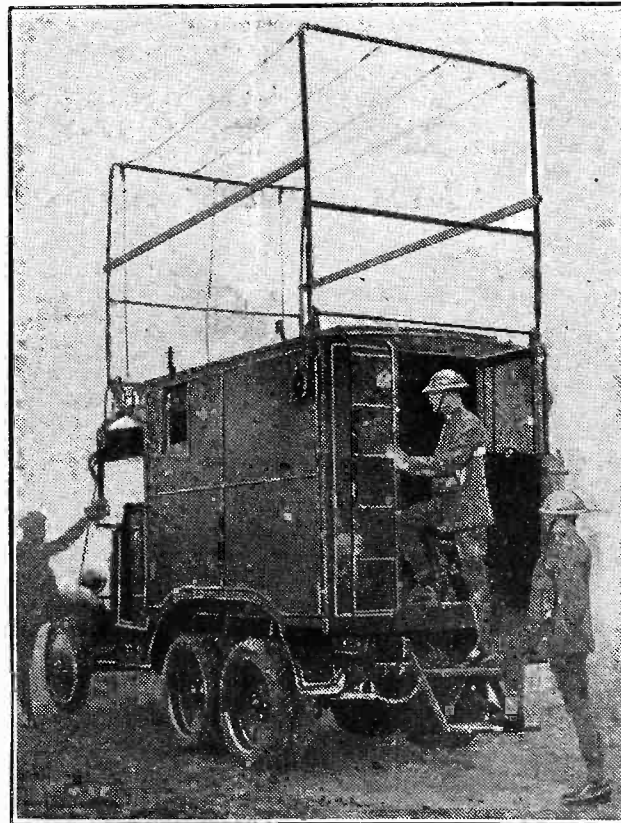
Many experiments in discussion, dialogues, and conversations have been tried, and considerable advances have been made with the technique of this part of the programme. Readings of prose and poetry have retained an important place in the programmes.

Pamphlet Popularity.

Group listening has grown steadily. During the year more than seven hundred listening groups have heard wireless talks. This extraordinary development is largely due to the co-operation of Area Councils and Local Committees. The circulation of the Programme of Broadcast Talks, which is issued three times a year, and contains details of the serial talks arranged in advance, increased enormously during 1930; in the autumn of 1929 80,000 copies were published, and in the autumn of last year 125,000 copies were needed. The Talks pamphlets' circulation

also increased from an average of 10,000 in the autumn of 1929 to 16,000 last autumn. Summer schools were held at Saltburn in association with the W.E.A., and at Harlech, at which sessions were devoted entirely to various questions of group leadership and group listening.

THE LISTENING LORRY



A scene at Aldershot when members of the wireless section of the Royal Engineers held a Field Day in which their transmitting and receiving lorries played an important part.

Ministers were broadcast. A series of talks on "Trade Within the Empire" was given, to which contributions were made by Sir Arthur Salter, Sir Basil Blackett, Mr. F. L. Macdougall, Lord Beaverbrook, and Sir William Beveridge. Two talks were given by Sir John Simon on "The Problem of India," following on the publication of the Simon Report. The Chancellor of the Exchequer gave an explanatory talk on the Budget. During the Session of the League of Nations Assembly, weekly talks were

THE COMET?

MAGIC WAVE-CHANGING

If you are the fortunate possessor of a "This Year's 'Magic' Three" set (described in "P.W.'s" March 1st and March 8th, 1930), you can now very easily introduce panel wave-changing without affecting the set's ordinary or short-wave efficiency in any way. Full details are given below by A. JOHNSON-RANDALL



THE "Magic" Three, undoubtedly one of the most popular designs evolved by the "P.W." Research Department, is very readily adaptable to wave-changing. And the great success of the "P.W." "Dual-Range" coil has brought in hundreds of requests from enthusiastic "Magic" owners asking for details of the alterations required in order to insert this coil unit into existing receivers, in place of the present plug-in coils.

A Problem Solved.

Now the "Magic" Three as it stands is suitable for any wave-length because it is a relatively simple matter to take out the plug-in coils, and to insert others of larger or smaller sizes, according to the wave-band it is desired to receive signals upon. For instance, it is easy for the "Magic" owner to experiment on the short waves by employing a set of special short-wave inductances.

It was for this reason that the extra aerial terminal, A₂, and a small neutralising-type condenser were included in the design.

If the standard "Dual-Range" coil is inserted in the "Magic" Three, the set is no longer suitable for short-wave reception, and therefore becomes a two-wave-band receiver.

A number of readers have pointed out that they do not mind this, since they use the set chiefly for reception on the medium and long wave-bands, thus they are prepared to sacrifice the short-wave advantages to obtain the benefits of wave-change switching.

There is, however, a simple solution to the difficulty, because the dual-range coil unit can be mounted upon a six-pin adapter, and plugged straight into a six-pin base.

Coil Construction Details.

Full details of this modification to the "Dual-Range" coil were given in the November 29th issue of POPULAR WIRELESS in the description of the coils for the "Interchange" Three receiver. Particulars of the construction of a suitable short-wave coil unit were also given.

Thus in the case of the "Magic" Three it was decided to employ the "Interchange" Three scheme in order to retain all the advantages of plug-in coils, giving the best and most modern type of high efficiency wave-change circuit for ordinary broadcast work, or in a few seconds, a perfectly normal short-wave arrangement, with the wave-change switch and its wiring put

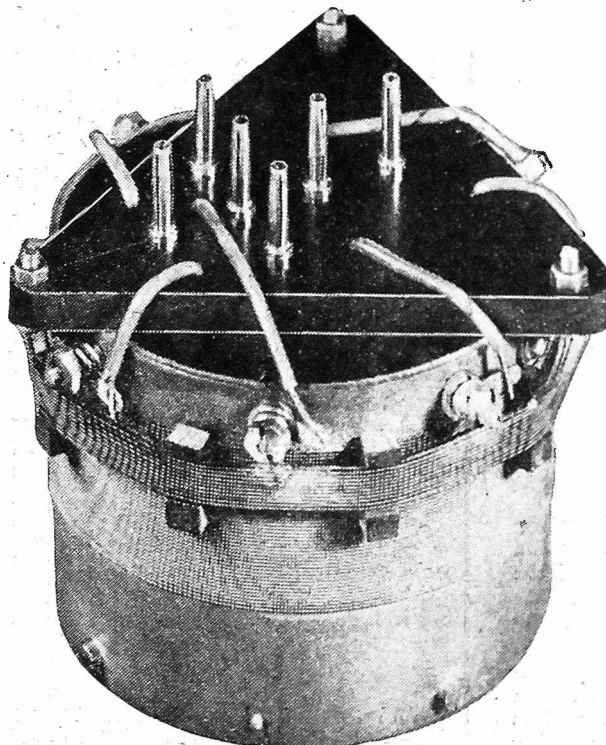
right out of circuit. Readers can obtain back numbers of the November 29th issue from the Back Number Department, Bear Alley, Farringdon Street, London, E.C.4. price 4d. post free.

Those who wish to make the dual-wave unit for themselves will find a reprint of the constructional details in the "Radiatorial" columns of the December 13th issue of POPULAR WIRELESS.

Moreover, the coils can be obtained ready wound from a number of firms which advertise in "P.W."

And now let us see what we have to do in order to bring the "Magic" Three right up to date.

SHORT-WAVERS STILL AVAILABLE



The "P.W." Dual-Coil Unit is mounted on a six-pin base, so you get panel wave-changing for the ordinary waves, and, by changing the unit, you can still go right down to the very short waves.

First of all, it is necessary to remove the two coil holders, L₂ and L₃, that is the two coil holders in which the X and reaction coils are normally inserted. Next, the panel must be drilled to take a three-contact wave-change switch of the type

used in all the "P.W." wave-change circuits employing "Dual-Range" coils.

A suitable type of wave-change switch is one with three contact springs of equal length. When the switch knob is pulled the metal contact at the end of the plunger joins all three springs together, and when the knob is pushed in the three springs are insulated from each other. The knob is pulled out for the medium waves, and pushed in for the long waves.

Placing the Switch.

Now, what about the position of the wave-change switch on the panel? This is not very critical, but appearance counts for something, and a good place for it is just below the .0005 tuning condenser C₄.

With regard to the coil unit itself, the components on the baseboard at the detector end of the "Magic" Three are not in any way crowded, and with the two coil holders removed there is a good deal of room to spare. If necessary, one or two of the components, such as grid condenser C₂, the potentiometer, the grid leak R₁, and the valve holder V₁ can be moved a little to make more room.

The Wiring.

The six-pin coil base, and the .002 compression-type variable condenser are mounted in accordance with the general scheme shown in the wiring diagram. Note particularly the alteration in the leads to the reaction condenser.

One side of the H.F. choke will now go to M on the differential condenser C₆ instead of to F₂. F₂ goes to 2 on the six-pin base or S₃ on the coil, and also to the wave-change switch, the .002 compression-type condenser and to L.T.—.

F₁ goes to pin No. 6 on the six-pin base, or to R on the coil unit.

Hence, in commencing the new wiring, the three leads from the differential condenser should be removed altogether, including the wire from the point on the F₁ lead to P on the valve holder V₁.

(Continued on next page.)

"MAGIC" WAVE-CHANGING.

(Continued from previous page.)

The rejector circuit requires no alteration, with the possible exception that the existing flexible lead from S_1 may need lengthening. The whole of these alterations can be carried out in a single evening, and the tuning is identical with that of the old "Magic" Three.

Handling the Change-Over.

The "Dual-Range" coil is plugged into the six-pin base and the knob of the wave-change switch pulled out for the medium wave-band. The clip at the end of the flexible lead from S_1 is attached to terminal 1 on the six-pin base. Remember, a crocodile clip is necessary, because this lead has to be attached to a point on the short-wave winding when the short-wave coil is inserted in the six-pin base in place of the standard "Dual-Range" coil.

THE EXTRA PARTS NEEDED

- 1 Six-pin coil base (Lewcos, or Magnum, Wearite, Formo, etc.).
 - 1 .002-mfd. (max.) compression-type condenser (Formo, or Igranic, etc.).
 - 1 Three-point wave-change switch (Bulgin, or Red Diamond, Wearite, Ready Radio, Ormond, Magnum, etc.).
- Coils : See text.
Wire, screws, piece of flex, etc.

The operation of the rejector is not affected.

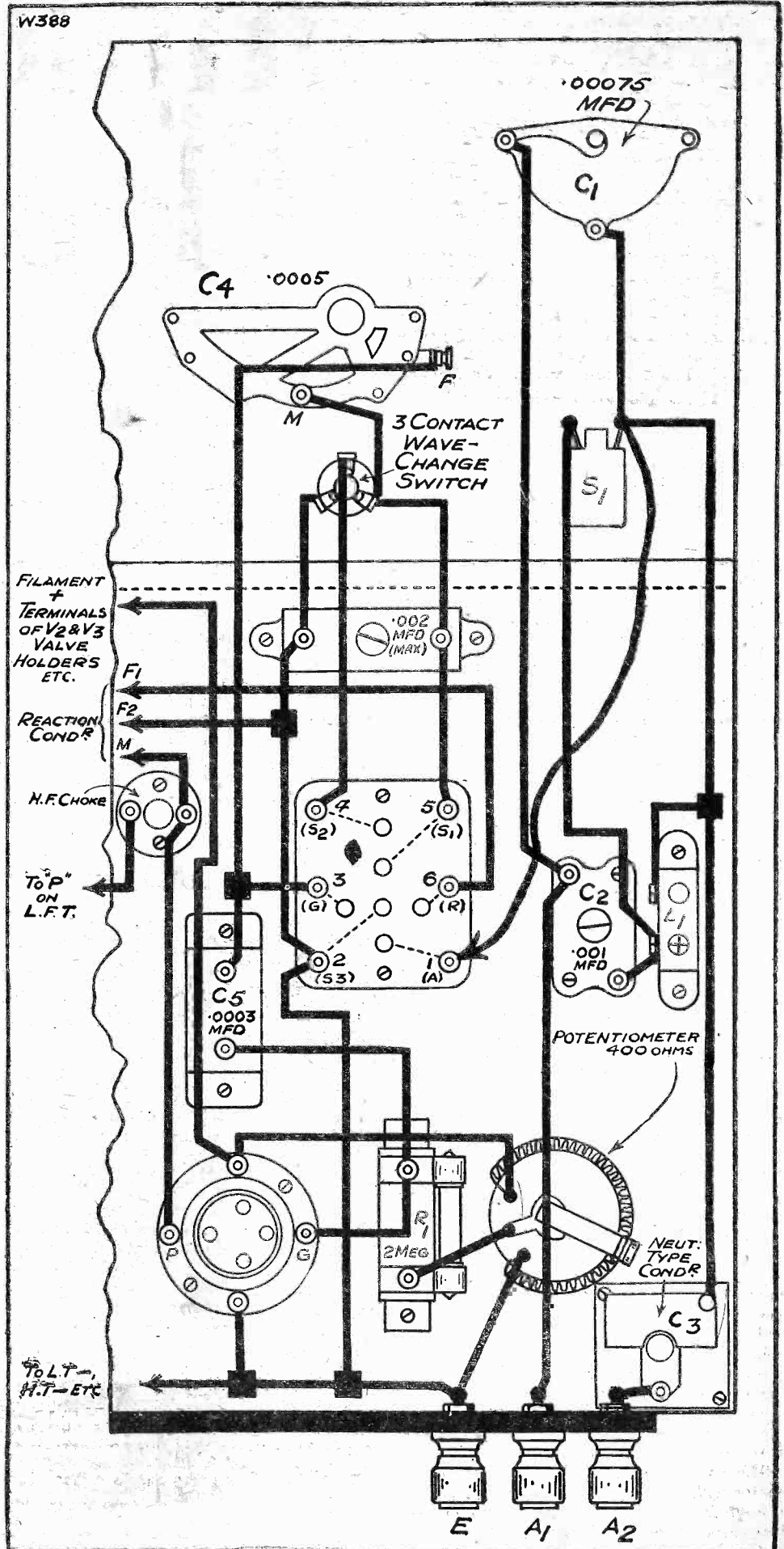
With regard to the compression-type condenser, this gives a range of capacity values between .001 and .002. With the adjusting knob screwed right down the maximum value is obtained, and this gives the weakest coupling.

Therefore, when the wave-change switch is pushed in for the long waves for the first test this compression condenser should be varied from maximum to minimum until the best results are obtained.

Short-Wave Adjustments.

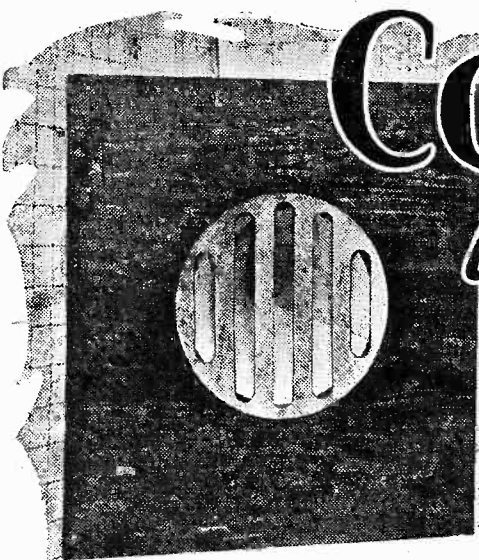
Next we have the operation of the set on the short waves. The "Dual-Range" coil is removed, and in its place is inserted the little unit described in the November 29th issue of POPULAR WIRELESS. The aerial lead is connected to terminal A_2 instead of to A_1 as for the medium and long wave-bands. The flexible lead is removed from terminal 1 on the six-pin base, and is attached to certain points on the winding of the short-wave coil. This gives you your adjustment of aerial coupling.

Since you will already have carried out a certain amount of short-wave work prior to the modification, you will know that the neutralising-type condenser should be kept at maximum, that is, with the moving plates fully engaged with the fixed, and reduced if difficulty is found in getting a satisfactory control of reaction.



If you compare this new wiring with the aerial and detector end of the blue print, you will see that the alterations are quite simple and straightforward. Blue prints of the original "This Year's Magic" Three are still available at 7d. post free. (Number 55.)

Completing the "Clear-Cut"



Here are some practical suggestions as to methods of mounting the "Clear-Cut" Cone described and hints for getting from it the best possible results.

IN our last article we told you how to make the actual chassis portion of the "Clear-Cut" cone speaker, and now we come to the question of mounting it up for use. This is decidedly important, for to get proper reproduction of the bass notes you must use it in conjunction with a baffle of suitable size and type.

By the way, the use of the free-edge principle does *not* prevent you from getting a full proportion of bass. It is sometimes thought that since with a free-edge cone you cannot get a completely soundproof joint between the cone and the baffle, there must be a serious loss of the lower frequencies.

The Free Edge.

It is true that a small gap must be allowed between cone and baffle all round the edge, since if they touch a buzzing sound is apt to result. If this gap is reasonably small, however, there is no loss of bass which can be detected by the ear.

Quite a large gap must be used before there is a falling off which can really be heard. So long as it is not more than perhaps a quarter of an inch there is no need to fear any lack of bass.

What you *will* notice with the "Clear-Cut," of course, is the lack of the dull and boomy tone so often heard from speakers of the cone type. When bass is really called for the "Clear-Cut" reproduces it, but it does not turn everything it possibly can into "imitation bass" as so many do.

Method of Mounting.

Now, about this baffle business. What you want first of all is a good solid board, not less than about $\frac{3}{8}$ in. thick, and preferably $\frac{1}{2}$ in. It's not a sounding board or anything of that sort, and it must be thick enough to be quite "dead." We ourselves used a board 1 in. thick, but this is not really necessary from the strictly practical point of view.

As to size, about 20 in. square serves the purpose excellently, although you can come down to about 14 in. square with only a slight loss of bass. The baffle you see in the photo measured 21 in. \times 23 in.

The round hole in the middle any carpenter will cut for you if you don't possess a keyhole saw. Its diameter should be $\frac{3}{8}$ in. larger than the diameter of the mouth of the front cone. There are likely to be slight variations in the cone when made up

by different people, so put it mouth downwards on a flat surface, press down gently, and measure it as accurately as you can.

The dimensions given provide a gap of $\frac{1}{8}$ in. all round the cone, which we have found quite harmless. The chassis is to be so mounted to the back of the baffle that the edge of the front (main) cone comes a little way through the thickness of the baffle.

For this purpose three small panel brackets (brackets with one arm 3 in. and one 2 in. are suitable) can be used, and the photo shows one of them. Just a little care is needed in fitting these to get the cone nicely centred in the hole.

Having got the chassis on to the baffle, you have an unwieldy object which requires support. One scheme is to fit it with feet and stand it in a corner of the room, so concealing the "works" behind, and some may prefer this.

We rather prefer a speaker mounted a little higher, so we fitted ours up so that it could be hung in the angle of a corner from the picture rail. Behind the baffle we attached a right-angled wood framework to fit the corner of the room, and we hung the speaker by cords going up from this to hooks in the picture rail (or the wall, of course).

Fixing the Frame.

A photo shows this wooden frame pretty clearly, and you will see that it is made of six strips about $1\frac{1}{2}$ in. \times $\frac{3}{4}$ in. in section. Lengths will depend upon the size of baffle you decide upon, but it is very easy to make a full-size drawing before you start and measure the sizes off from this.

Get a sheet of paper large enough for the job (the kind the domestic authorities use for covering shelves, for example), and you will find the drawing quite easy to make if you remember that there is a right-angle at the back of the framework.

The angle at the back is stiffened up with two strips of the same wood (now you see why we mentioned six in all), but a single piece of thicker square-section wood (say, $1\frac{1}{2}$ in. \times $1\frac{1}{2}$ in.) could just as well be used. Length about 12 in., but this, again, can be altered to suit your own ideas.

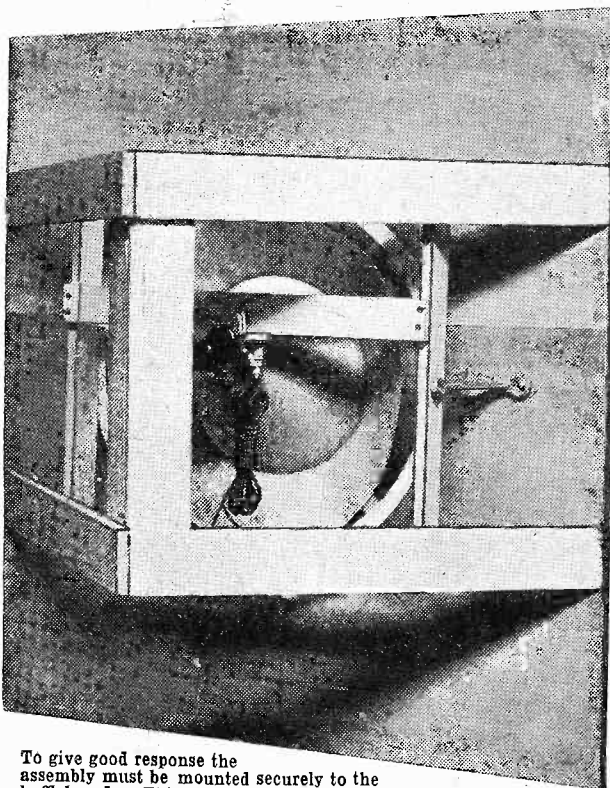
Side Supports.

The four side strips, of course, must be bevelled where they are fixed to the baffle. The fixing is done with screws going through them at a bit of an angle into the baffle (a good thick baffle makes this quite easy if you drill the holes first).

Here are the sizes of the original side strips, which you may find helpful as a guide: Two $14\frac{3}{4}$ in. over all (i.e. including bevelled-off end) and two $14\frac{1}{4}$ in.

Now a final hint. The chassis can quite well be fitted into the ordinary kind of cabinet if desired. The easiest way is to cut a sort of dummy baffle to fit inside the front of the cabinet, and mount the chassis on this with panel brackets as before; then screw the baffle into the cabinet.

LOW AND HIGH NOTES!



To give good response the assembly must be mounted securely to the baffleboard. This picture shows how ordinary panel brackets can be used, and it also illustrates the side supporting-pieces which enable the loud speaker to fit into a corner of the room.

LATEST BROADCASTING NEWS.

THE TELEVISION POSITION

BETTER TALKS—A BOXING BROADCAST—A LONDON HIGH-LIGHT—BURNS' NIGHT PROGRAMMES.

THERE is no present intention on the part of the B.B.C. to begin a series of transmissions by the new H.M.V. process of Television. The indications are that the Baird transmissions may be rearranged so as to come on at more convenient times, and with less frequency than last year. It is believed also that the B.B.C. engineers will soon take a hand in the effort of trying to develop television, first of all by the Baird method.

Better Talks.

The struggle over talks at Savoy Hill has concluded in a way which most listeners will cordially approve. There is to be much more flexibility of arrangement in future. Also, talks will have to compete with music and drama and vaudeville in terms of genuine entertainment value.

It is not anticipated that there will be any reduction in the volume of talk or in the determination to carry on with the adult education policy; but it is hoped that many talks will be improved in "human interest" and showmanship.

Another advantage, too, will be the introduction of controversy, political and economic. It may be ungracious to criticise in the face of these far-reaching improvements, but it is perhaps a pity that the B.B.C. does not yet have the courage to allow religious controversy, and also to admit alternatives on Sundays.

A Boxing Broadcast.

Here is a piece of advance news for the sporting fraternity, the ladies as well as the men who take an interest in fisticuffs and complain that broadcasting does so little—amounting in the aggregate perhaps to almost nothing—to foster what they prefer to call "the noble art."

On Monday, February 2nd, Bert Kirby, holder of the Lonsdale Belt, is fighting Jackie Brown for the fly-weight championship of Great Britain, at Belle Vue Stadium, Manchester, and arrangements have been made to describe the fight in the form of an intermittent running commentary.

This description will be broadcast as part of the National programme, and will, of course, also be radiated from all Northern Stations. The contest, which begins at 9.45 p.m., is to go on, failing a knock-out or premature stop, for fifteen rounds, each of three minutes. It is intended to describe the preliminary scenes and the first few rounds, after which there will be music from the studio for about ten minutes, and then more details of the progress of the match and a description of the next few rounds.

This method will go on until the fight is decided, descriptions of the contest alternating with studio music. The evening will conclude with a relay of dance music from the Midland Hotel, Manchester, so that from 9.40 p.m. the whole programme will emanate from the Northern Region.

A London High Light.

Reminiscences of her girlhood days and of her life at the Imperial Ballet School, where she was for eight years, and later of her experiences as première danseuse at the Imperial Russian Court, will be told by Madame Karsavina in a talk in the series "Yesterday and To-day," which is to be heard by National and other listeners on Friday, January 23rd.

On the same evening Tommy Handley, who has not been heard for some time, is to make a welcome reappearance before the microphone in a vaudeville programme together with Gillie Potter, Mabel Constanduros and Michael Hogan. Joan and Nancy

"doings" will be supplied by Scotland, but Scotsmen outside their own land will hear them via the National wave-lengths.

Dr. James Devon will preside over the special programme which he has arranged of songs, readings, comments, observations, and other things, which are to be contributed by Robert Burnett, the Scottish baritone, and David Stephen.

Burns' Night Celebrations will also be heard on Monday, January 26th, when the proceedings of the Cardiff Caledonian Society's dinner are relayed from the Cardiff City Hall. They will include speeches by the Earl of Dumfries, President of the Society, who will propose the loyal toasts, and by Mr. J. A. Hammerton, the well-known author and editor,

NEXT WEEK:

A REGIONAL BROOKMANS REJECTOR

— ALSO —

The "Station-Change" One

—a set that switches over from one programme to another without re-tuning. Ideal for the old folks!

ALSO

AT HOME WITH

TOMMY HANDLEY

Allen-Brown, Edgar Fairchild, and Robert Lindholm, the Bayan Singers, and Jack Payne and his B.B.C. Dance Orchestra.

Burns' Night Programmes.

January 25th, Burns' Night, this year falls on Sunday, so that the official recognition in the broadcast programmes will take place on the night before. As usual, the

guest of the evening, who will propose "The Immortal Memory." The toast of "The Lassies," proposed by Mr. Ronald Macintosh, will be responded to by Dr. Mollie Foyle Churcher.

FOR THE LISTENER

By "PHILEMON."

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is served up.

What's in a Name?

In looking over the programme of Talks the other day it occurred to me that the B.B.C. might do worse than take a leaf out of the book of the more popular kind of journalism and try to find more attractive titles.

Presumably they wish these talks to be heard by as many as possible; but such a title as "The Enjoyment of Literary Forms" is enough to put anybody off. It did indeed put the announcer off; for he gave it as the "Enjoyment of Literature."

Anybody who knows Dr. Delisle Burns will know that some extremely interesting talks will emerge from the packet with the rather dull label, "Contacts Between Peoples of To-day." Is there really any harm in dressing the shop window?

Poetic Licence.

In Mr. J. C. Squire's first talk on the "Enjoyment, etc.," he referred to Tenny-

son's "Break, break, break," as being one of the finest lyrics in the English language, and immediately proceeded to misquote it! Oh, these literary editors!

Who Wants Broadcast Plays?

The result of a referendum in a certain popular paper on the question of what listeners like best in the programmes was that Popular Music and Vaudeville win. Classical Music and Talks are placed; while Plays and Chamber Music are among the "also ran."

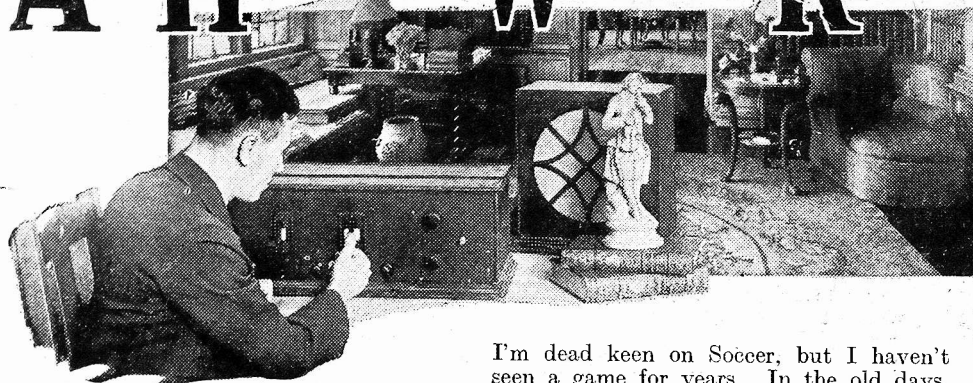
I was surprised to find plays so low in the list. It cannot be that plays are not popular. It may be that the right sort of play has not yet been discovered.

Personally, I regret that so many of the plays broadcast are tragic ones; and others (like the Shakespearean plays) have to be cut down so severely that they really lose most of their character and quality.

(Continued on page 893.)



AT HOME WITH RADIO STARS



A further article in our series of exclusive and intimate sketches of famous broadcast artistes. A popular comedian tells how he discovers his humorous material
7.—LEONARD HENRY.

"WELL, here you are," said Leonard Henry. "This is what you might call my sanctum—where I work on those rare occasions when I'm at home. You'd better describe it for myself. I'm afraid I never look at it, personally. It's never cleaned (not by me, at least), and I generally have so much to do when I am here that I don't stop to survey the scene, as it were. You'd better describe it for yourself."

Unfortunately it is practically impossible to describe Leonard Henry's sanctum! It is all books, manuscripts and sheet music, with a certain amount of untidiness which is the natural result of the burning of much midnight oil. The *pièce de résistance* is a typewriter on which Leonard types all his own manuscripts for broadcast sketches and revues, while standing above a pile of music is a toy stuffed cat.

A Lot of Hard Work.

Cats are his mascots, as you will know if you have ever seen him on the stage.

"It's no use you asking me what I do at home," cut in Leonard before I had time to get a notebook ready, "because I just don't. Every day, Sundays included, is a twelve-hour day for me. Either it's rehearsing at the B.B.C., preparing new songs, new patter or devising new stage turns.

"I have found that since I took up broadcasting, about four years ago, my stage work has increased enormously—which, professionally speaking, isn't at all unpleasant, of course, but it means a whole lot of hard work.

"I expect you think I'm swanking when I honestly tell you I don't know what the general arrangement of my own 'den' is like. But I only come in here when I have a new tune to work out or a humorous sketch to type. Sometimes some humorous patter will suggest itself while I am coming home from a broadcast, or from a show, and then I dash in here and put it into type before it's forgotten.

No Time for Hobbies.

"And other times, when there is a special demand for something new, ideas simply just won't come, and I pace up and down tiger-like" (he demonstrated the tiger-like pace!) "scratching my pate and worrying the old brainbox until it devises something." "So it's no use me asking if you have any hobbies," I inquired.

"No harm in you asking," said Leonard, "but the very thought makes me weep.

I'm dead keen on Soccer, but I haven't seen a game for years. In the old days, when I was with Charlot at the Prince of Wales Theatre, there were times when we didn't have Saturday matinees, and then I was able to go down and watch the Corinthians, and I'd cheer like blazes.

Listening to Others.

"But not now. In the broadcasting humour line you have to be constantly on the alert, and, as I say, I honestly haven't had a free Saturday for years: certainly not for this past year. Ah, how I'd like to go and see the Corinthians—or the Hamlets. The captain of the Hamlets is a friend of mine, and he's always begging me to see them.

"I think you can safely put me down as a 'sportist,' as the French say; but not an active sportist."

"And what about wireless," I inquired, feeling that Home and L. H. really hadn't much in common. "Have you a—"

"Have I a wireless set? Oh, how many people have told me I ought to buy a wireless set and listen-in sometimes to other

artistes, suggesting that in that way I might myself be then worth hearing! And I have to tell these rude folk that I have a wireless set: a five-valve portable.

"I bought it, one time when my mother particularly wanted to hear me (she feels that way at times) and couldn't be at the studio, so she heard me on the portable: and since then she's used it a lot. But I never get time to use the thing, at least not often."

"Anyway," I suggested, "it might be interesting if you were to hear other artistes at times, particularly humorists."

"To be strictly accurate," said Leonard, "it was only a few weeks ago that I heard Clapham and Dwyer on the wireless—on this portable—although I have known them for years and have, of course, often been with them actually in the studio; and it seems strange to hear old friends on the wireless for the first time. The same applies to Stainless Stephen, whom I heard radio-ly for the first time recently, and to Mabel Constanduros."

Regarding a Rumour.

"Don't you ever listen to foreign stations?" I queried, whereupon Leonard scratched his head and shifted his pipe from one side of his mouth to the other.

"If you call Radio Paris a foreign station," he said, "then the answer is in the 'infirmary.'"

"I heard Radio Paris last week—for the first time—when they were doing some gramophone records. Poor stuff. I suppose they put over the better concerts in the evening, when I can't hear them."

"What about chemistry?" I inquired. "Is there any truth in the rumour that you started out in life as a chemist? And do you still play about with 'stinks'?"

"Now we touch on ancient history," said Leonard with a smile. "I am an old Alleynian, and in those days I studied chemistry with the idea of going in as a manufacturing chemist. I went in all right, and came out with a jerk.

How He Started.

"An impromptu explosion (I was at the bottom of it, and literally at the top of it) in the lab. one day put an end to that as a career, and I had to go away to the seaside to get over the effects.

"There I made friends with a visiting concert party, started being a 'funny man,' and now here we are. I've never turned back to the 'stinks.' The only chemical change I seek to make nowadays

(Continued on page 892.)

"UNCLE LEONARD"



A recent photograph of the famous comedian whose breezy broadcasts delight millions of listeners.

SHORT-WAVE NOTES

A page of information of particular interest to short-wave enthusiasts, in which various forthcoming organised tests are discussed.

By W. L. S.

REGARDING my none too complimentary remarks last week on the subject of 1930 and the radio conditions pertaining thereto, a member of the "P.W." staff has taken me to task for "speaking irreverently of the dead," and expressed the opinion that I shall already be unpopular with 1931. Should 1931 also prove a bad year, therefore, I am to expect all the blame to be thrown on me, as far as "P.W." is concerned. I sincerely hope that the necessity will not arise, and 1931 has already shown itself very favourably disposed.

On the first day of the New Year I logged stations in all continents, and on the third I heard several Australians (just after midday) coming over with a strength that they have not touched since 1928—at least, not while I have had the 'phones on. So hats off to 1931!

Buenos Aires Again.

"L. H. S.," of London, informs me that the reason why L I M M, the famous Italian telephony station, has been off the air is that he is now in the United States. A very good reason, too. "L. H. S." has logged V R Y, Georgetown, British Guiana, on 43.5 metres, at good strength. For the power used (200 watts) this is not bad going.

Reports of Buenos Aires telephony continue to flow in. This station has certainly made his presence felt, and the remarkable thing is that conditions have not been right for reception of South American amateurs for months. When they are right they simply pour in, and one cannot help wondering what sort of noise L S X would make then.

"S. C. G.," of Swindon, is the first to write me regarding reception of Radio Budapest on about 70 metres. He finds his strength equal to that of Rome on 80.

I fairly admit having been caught napping this time; 70 metres has never been a very lively wave, and I simply have not thought of listening there. If the programmes are as good as those on the 550-metre wave this station should be worth receiving.

British Empire Radio Week.

The Radio Society of Great Britain has arranged a "British Empire Radio Week" in February which, with the aid of decent conditions, should afford a good opportunity of logging some real DX. So keep your ears open from midnight on February 21st, until the same time on the 28th, and perhaps you will hear some parts of the British Empire that have not yet agitated your diaphragms.

A trophy is being awarded to the station in the British Empire scoring the highest number of marks during the week; the marks are awarded for the numbers of contacts with stations in various parts, and the wave-band on which the contact is made will also be taken into account. All amateur bands are open.

Following on this we have the A.R.R.L.'s Fourth International Relay Contest, run on the same lines as in previous years, affording

listeners a chance of logging unprecedented numbers of U.S.A. and Canadian stations.

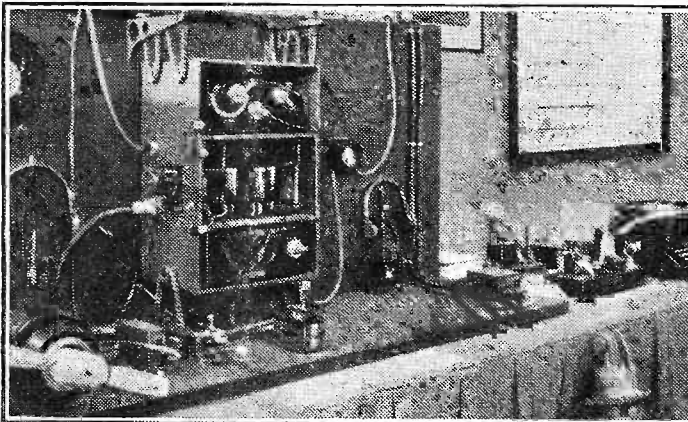
And lastly (most illogically) I will mention that the R.S.G.B. 10-metre tests are now in full swing, each Sunday during this month being occupied in this way. All records for the minimum amount of sleep will be broken, as several of the more enthusiastic entrants will keep watch for the whole twenty-four hours.

"B.B.C. Quality."

I am glad to see from the January issue of "QST" that the 160-metre 'phone man is thought quite a lot of in the States. Over here the DX merchants that never emerge above 40 metres are rather apt to belittle mere 'phone work across London, or between Yorkshire and Bedfordshire.

Many of them realise for the first time

A COMPLETE AEROPLANE INSTALLATION



This is a complete transmitter and receiver for use on aeroplanes, which was shown at a recent exhibition. The wind-driven generator can be seen on the extreme left, and it will be noted that the set itself is suspended by means of rubber bands.

when they try it out that it is just as difficult to put "B.B.C. quality" 'phone across London as it is to work Australia on the key. Vide the extraordinarily small number of really first-class 'phone stations that one hears on the amateur bands. The "second-class" variety is coming on in numbers now, and all credit to the owners, but unfortunately the majority of it is anything up (or down) to about "tenth-class" still.

In this I am being hyper-critical, but by "first-class" I mean a transmission that is literally indistinguishable from the B.B.C. transmissions, and not land-line transmissions at that!

Short-Wave Set Design.

When one takes stock of the extraordinary progress in the design of broadcast receivers during the last few years it seems rather strange that the average short-waver is not much better than its three-year-old brother. From the point of view of results I am afraid my own isn't, but it certainly is an improvement on the old one for "handlability."

I should like to see the completely screened chassis as the standard design for short-wavers, with one tuning control (ganged if necessary) and a mains plug. Then we could say that we had been doing something.

One of the chief troubles in the path of all-mains short-wavers seem to be the queer variation in the character of the mains in different parts. I have made one that has gone perfectly well at my house but has been impossible to use on account of mains hum at a friend's place at the other side of London. Likewise, I have met one that I could not get to function properly, but that someone else did.

Why Not Rome?

Given enough time to worry about with the set and get everything "just so," there is no reason why anyone should not be able to make a mains-operated short-waver eat out of his hand, but for a mass-produced article it is a very different tale.

"G. B." of Honiton, is awarded the palm for the strangest phenomenon of the week. He hears amateurs in vast numbers on the 80-metre band, but has never yet heard Rome, and is very annoyed because I keep making allusions to his great strength on this wave!

Are you sure, "G. B.," that you are not all mixed up in harmonics, and that the amateurs you heard were not on 160 metres? It seems very strange that you should hear none on 160 and lots on 80, for conditions are usually vice versa. Otherwise, I have nothing to suggest except that you are completely screened in some way from that direction.

The five weekly stations are:

H B 9 X D, Zurich, Switzerland, on 86 metres;

H R B, Honduras, on 48.62 metres (Tuesdays, Thursdays, Saturdays and Sundays);

W N C, Ocean Township, N.J., on 30.77 metres;

Z L W, Wellington, N.Z., on 27.3 metres;

and L S H, Buenos Aires, on 14.5 metres.

STATION INFORMATION

When connecting two of its transmitters by land-line the B.B.C. always employs two circuits, the better one being the music line and the other a stand-by control line.

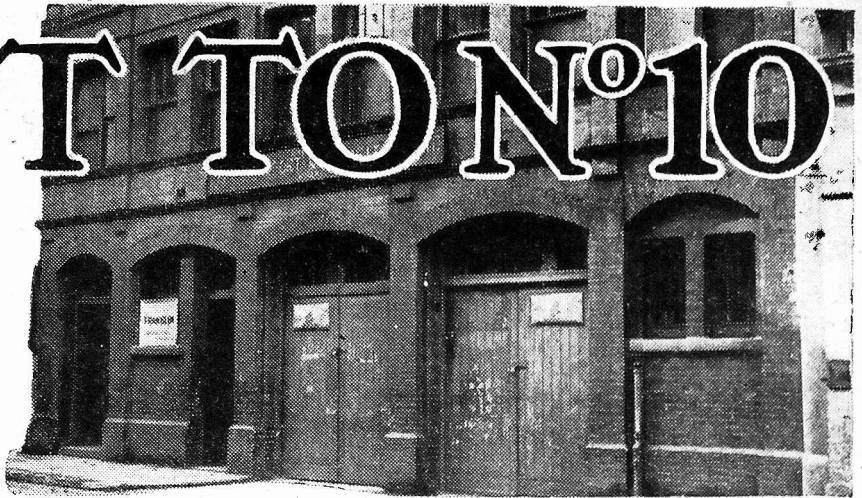
Vienna is one of the Continental stations that has been carrying out experiments with relaying foreign (including English) programmes.

If you write to the Katowice (Poland) station about their transmissions, your reply comes over the microphone in the French language.

A VISIT TO N°10

No, this is not the description of a call on the Prime Minister, but details of a "look-in" at the B.B.C.'s latest studio.

By OUR OWN CORRESPONDENT.



NO. 10 STUDIO is the converted warehouse on the South Side of the Thames, near Waterloo Bridge, which is used for the new Wireless National Orchestra. (This orchestra has so many players that no studio at Savoy Hill is large enough for it.)

It is reached via a long narrow flight of stone steps running down from Waterloo Bridge Road, and after the dingy, dark street in which the building is situated, the bright and comfortable interior of the studio comes as a pleasant surprise.

It has a colour scheme of light green and pale yellow. The brick walls are painted in the latter colour, the iron girders, woodwork, and the thick carpet which covers the floor being green.

The Soloist's Mike.

The studio is about 20 or 25 feet high, and the ceiling is draped with cloth.

The illumination is particularly good, being provided by a number of hanging bulbs with plain white fabric shades. These numerous lights, the bare girders and painted walls, all combine to give the effect of a miniature Exhibition Hall like that at Olympia.

I arrived a few minutes before one of the Sunday night programmes was due to start, and as soon as I was seated I looked round for the microphones. There were apparently only two, one suspended just above the conductor's platform, and the other on a stand a little to one side. This, I later found out, was for the purpose of "picking up" the soloist.

As zero hour arrived everyone took their places, looking perfectly calm about every-

thing, and the conductor (in evening dress) stepped to his dais. The next moment the red lights, one at each end of the studio, flashed on and off, and the announcer called, "Quiet, please!"

Now the red lights were glowing steadily, and a familiar voice began, "The first item on our programme, etc." No louder than for ordinary conversation, it was not as clear, where I was sitting, as it comes through on the loud speaker.

Without any fuss the concert was in full swing, and I was making comparisons with the same orchestra coming over on my loud speaker. What conclusion did I come to, you ask?

Well, personally, I do not think the effect from a good loud speaker on a good set is much inferior to the reality. The instrument which seemed to me to be most different was the flute, and naturally we can do with more power on the very low and extra high notes. Still, the difference is nowhere so great as some would have us believe.

Coats off!

Dead silence reigned during the break between one movement of an item and the next, and I thought of the many homes where a similar silence must have reigned.

I also thought, strangely enough with some slight annoyance, of the sets that had been switched off or ignored. The orchestra was working hard and enthusiastically; the conductor and many others being in their shirt sleeves.

I am told that many people can appreciate so-called "highbrow music" better when they can see the orchestra than when they hear over the radio. I think the reason is because they can see the conductor.

He seems to give life to the complicated melodies (forgive me for putting it thus, because I cannot honestly consider myself even a novice at highbrowism). Under his magic wand the music becomes knit together and almost thrilling.

Those Radio Drums.

Here, I think, is one of the ways in which television will help a lot. If the experts can televise just the conductor alone, I shall be satisfied.

In between the items the red lights were extinguished, which gave me a welcome chance to cough, and settle myself in a new position.

Quite a number of the players retired for some of the items, and I swear that for the life of me I should not have known it had I been listening-in. But no doubt there are those who can tell such differences even on the loud speaker.

The last item arrived with surprising quickness. It contained some drum beating which was almost terrifying, and seemed to shake the building. I wondered how my loud speaker at home was standing it, but was assured later that no unusual quantity of bass was noticed.

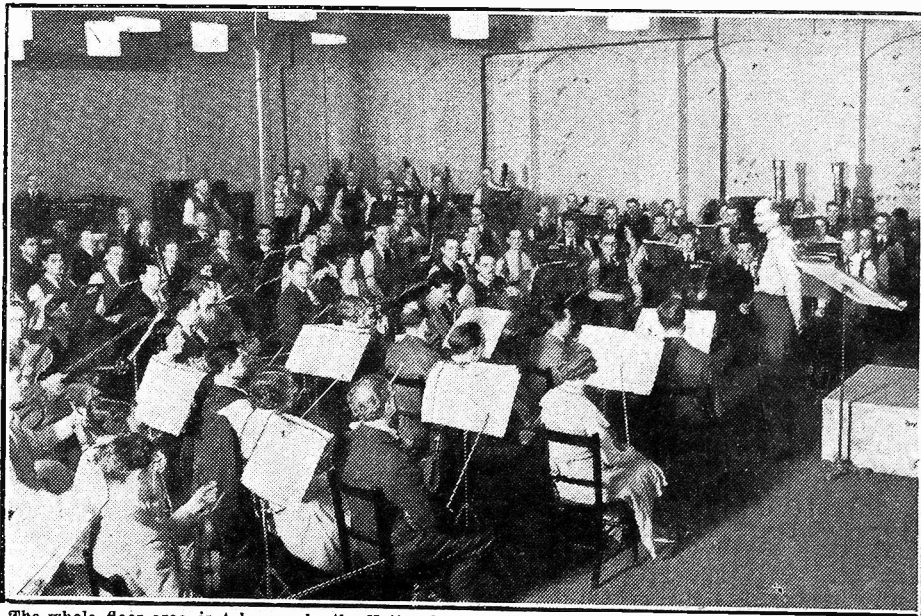
Well, well, perhaps the radio drummer works harder than the stick twiddler in an ordinary orchestra because he is the furthest away from the microphone.

"Appealingly Informal."

Even the orchestra thoroughly enjoyed the playing of the soloist, for they began clapping him before the red lights died out. This may have been intentional, or the announcer may not have been quick enough with his switch.

With the words, "That concludes our programme for to-night, with the exception of the Epilogue, which will follow in a few minutes," I realised it was time to go. I was sorry to leave the studio, and I think the orchestra also will be sorry to leave it when their new quarters are ready at Portland Place. There is something appealingly informal about No. 10.

THE ORCHESTRA READY FOR THE RED LIGHTS



The whole floor area is taken up by the National Orchestra, except for that required around the walls for two or three rows of chairs and a number of settees.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



FOR THE HANDY MAN.

DID you know that you could braze without heat? It appears that you can braze either iron or steel by taking a quarter of an ounce of fluoric acid, one ounce of steel filings, two ounces of brass filings, and applying these ingredients, well mixed up, to the parts to be united.

You then clamp the pieces together and put them on one side until they are thoroughly set.

This is just one item I haphazardly noted in the 190 pages that comprise Calvert's Mechanics' Almanack, published by John Heyward, Ltd., at 6d. It is full of invaluable workshop stuff, and there are innumerable useful tables, etc.

READY RADIO.

Messrs. Ready Radio have published an excellent catalogue covering a specially chosen range of sets and accessories, that they can supply from stock either for cash or on out-of-income terms.

NEW OSRAM VALVE.

The following extracts are from a letter I have received from Messrs. G.E.C., Ltd., regarding two new Osram valves that are now available:

Proof of the fact that the production of valves designed specially for battery-set owners is not affected by the growing popularity of those intended for use with A.C. mains sets, is furnished by the introduction of new and improved types having characteristics far in advance of those previously available. Research and experiment proceeds without intermission, and as a consequence both the efficiency and reliability of these valves show a marked advance on those formerly representing the standard of their particular class.

A striking instance of this advance in valve quality is revealed by the two new loud-speaker power valves which have just been added to the Osram range. One of these valves has been designated the L.P.2, and the other the P.2, designations which will indicate to those who have become familiar with present-day nomenclature that they have both been made for use with 2-volt accumulators; in the one case, the L.P.2, as a very high efficiency small power valve, and in the case of the P.2, as a super-power valve.

A review of the characteristics of these two remarkable valves will at once show that the manufacturers of the L.P.2 and the P.2 have advanced an important step in valve evolution.

The L.P.2 makes an ideal loud-speaker power valve for portable sets or for any 2-volt battery sets where the highest amplification is required with the lowest possible H.T. current consumption.

For an impedance of only 3,900 ohms, the remarkably high amplification factor of 15 has been attained, equivalent to a mutual conductance of 3.85 ma/volts. The Osram L.P.2 is the first 2-volt valve in the world to attain such remarkable characteristics.

The L.P.2 is specially recommended for sets where one stage only of L.F. amplification is used, and as a loud-speaker valve in the "Osram Music Magnet 3" or kindred 3-valve sets.

The Osram P.2 is a super-power valve specially designed to provide extreme sensitivity, superb quality of reproduction, and to handle the greatest undistorted volume with the lowest possible H.T. and

L.T. current. (The L.T. current is only one-fifth of an ampere.)

It can be used as a super-power valve either in portable sets (particularly with 2 stages L.F.), or in any 2-volt battery-operated set.

The low impedance value of the P.2, viz: only 2,150 ohms means that full loud-speaker strength reception on both local and distant stations can be secured without harshness or "blasting" together with a better reproduction of the bass notes. In addition, the very high mutual con-

ductance of 3.3 ma/volt means that nothing is lost in sensitivity by the low impedance—so often the case with super-power valves.

The Osram P.2, like the Osram L.P.2, sets a new standard in 2-volt power valves for broadcasting purposes.

APPROXIMATE DATA.

	Osram P.2	Osram L.P.2
Filament volts	2	2
Filament currents	.2	.2
Maximum anode volts	150	150
Amplification factor	7.5	15
Impedance	2,150	3,900
Mutual Conductance	3.5	3.85

It remains only to say that I have tested the Osram L.P.2 and P.2, and find that they are indeed excellent valves. The mutual conductances reveal the very high efficiencies they achieve, and the 3.85, in the case of the Osram L.P.2, is quite marvellous.

The P.2 takes a hefty input, and you can indeed achieve a sufficiently powerful output to work a large moving-coil speaker really well. Two-volt enthusiasts will assuredly have to admit that their interests are being very adequately pursued by at least the G.E.C.

The two new "Osrams" give them a real chance to obtain that kind of performance that until very recently has been thought entirely impossible for anything outside the 6-volt range.

FORMO CHOKE UNIT.

The new Formo Choke Unit comprises an H.F. choke and a .0002-mfd. condenser wired in series with three terminals brought out for external connections.



A batch of "P.W." Dual-Range coils being given wave-length tests at the R.I. factory. All the "P.W." coils made by R.I. are tested for inductance and wave-length.

The use of a bypass condenser with an H.F. choke is, of course, no novel scheme. You will have seen it in several circuits. (The .0002 fixed condenser is joined between the plate of the detector valve and L.T.(-), but the combination of the two vital components in one unit such as is the case of this Formo production is, I think, quite new.

The price of the article is 7s. 6d. and its component parts are efficient, but it must be pointed out that the unit can only have its special applications. Used in a "P.W." circuit in which our dual-range coil unit figures, it is liable to interfere with the reaction effect rather than improve it, so, for that reason, we are afraid we cannot recommend its use except when it is definitely and specifically recommended, or in a circuit in which the combination of .0002 bypass and an H.F. choke are shown.

Since penning the above I have learnt that there are now two types of these units available: Type A "For use in detector anode circuits," and Type "B" for use "as a coupling device between H.F. and detector valves," but I haven't yet examined them closely.

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.

A NEW AMPLION LOUD SPEAKER.

The Amplion loud speaker A.B.41 does not carry a new type number, but the present models are greatly improved. The new A.B.41 has an entirely re-designed unit.

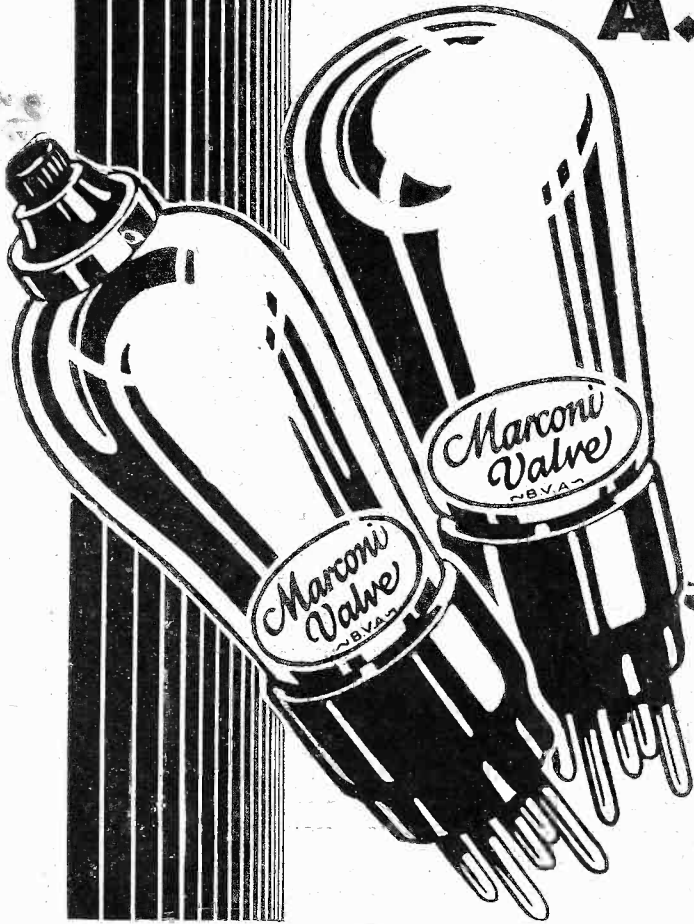
It will be remembered by many readers that the Amplion A.B.41 was given a favourable report in these columns

some few months back. The improved A.B.41, the one that is now on the market, is definitely superior and constitutes a distinctly attractive proposition. We recently received one for test and find it greatly improved—good though was the original.

A MARCONI VALVE LEAFLET.

Marconiphone Co., Ltd., have prepared a supplement to their recently issued valve catalogue, containing full details of the new series of Marconi 2-valve valves.

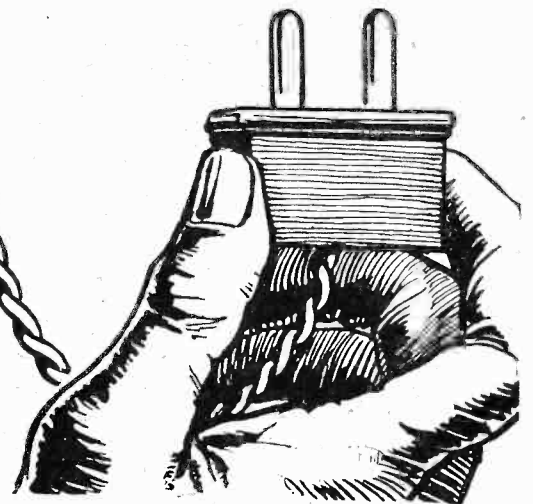
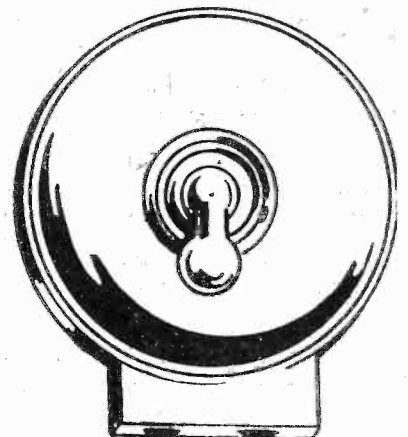
The Finest of all A.C. Mains valves



For all-electric radio of the highest efficiency, for unfailing reception and a perfect background of silence—the improved series of Marconi indirectly heated A.C. Mains valves stands supreme. High conductivity, rigid construction, mesh anode to prevent over-heating and grid emission, exceptional vacuum, and, above all, a long useful life—every feature, in fact, which is desirable in modern receivers is included in this range. There are types for the improvement of every set.

EXCEPTIONAL CHARACTERISTICS

		Amp. Fact.	Imp.	Mut. Conc.	Price.
MS4	Screen grid	550	500,000	1.1	25/-
MH4	General purpose	35	16,000	2.19	15/-
MHL4	Detector & L.F. amplifier	20	8,000	2.5	15/-
ML4	Power	9	3,000	3	17/6



Public Testimony

D.E.R. VALVE No: R.11307.

"I purchased the above valve several years ago, I think about six years, and unfortunately yesterday I dropped it on the floor, breaking the filament but not the glass bulb, thus ending a life of an old reliable friend. Its last position was the detector stage of my short wave receiver, and in this position it worked splendidly. I am certainly going to purchase another Marconi valve. . . . I am writing this letter as a mark of appreciation to your valves, and I thought you might be interested in this report, seeing that the valve has been in continuous use for six years or more. . . . A truly wonderful valve I can only describe it as."—G. W., Stockport.

Expert Testimony

Marconi engineers, who have at their disposal unequalled resources of research and manufacture, have long realised that if really practical benefit is to be derived from high theoretical efficiency in a valve, it is imperative to unite every useful feature in a perfectly balanced design—no single factor must be emphasised to the detriment of practical performance. All Marconi Valves are practical interpretations of theoretical ideals; they contain just those features which, being properly united, will ensure the best all-round results and highest effective efficiency. The soundness of this principle is conclusively established by the fact that Marconi valves are used by the B.B.C., Imperial Airways, Trinity House Beacon Stations and Lightships, Empire Wireless Communications, Large Passenger Liners, etc.—a unique tribute to their unequalled performance and dependability.

MARCONI VALVES

USE THE VALVES THE EXPERTS USE

L.F. COUPLING UNIT

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.

Price **6/6**

Also supplied Centre Tapped.

QUICK MAKE AND BREAK SWITCHES

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Retail Prices from

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DUAL RANGE COILS FOR ALL POPULAR WIRELESS CIRCUITS

Price **15/-** each

as used in

"EXHIBITION" 4

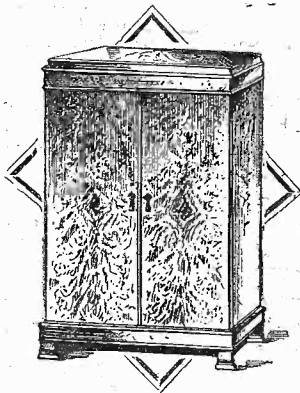
"EMPIRE" 2, 3 and 4

"EXPLORER" COILS,

Low Range **7/6** Dual Range **12/6**

"CONRADYNE" COILS, **7/6**

A POPULAR OSBORN READY-TO-ASSEMBLE RADIO CABINET



MODEL NO. 220.

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.

PRICES:

MACHINED READY TO ASSEMBLE—Oak 65/-; Mahogany 70/-; Walnut 80/-; ASSEMBLED READY TO POLISH—Oak 85/-; Mahogany 90/-; Walnut 100/-; ASSEMBLED AND POLISHED—Oak 105/-; Mahogany 120/-; Walnut 135/-.

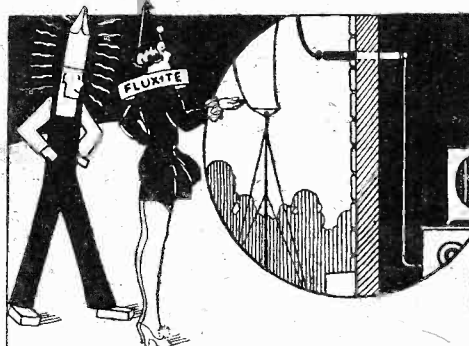
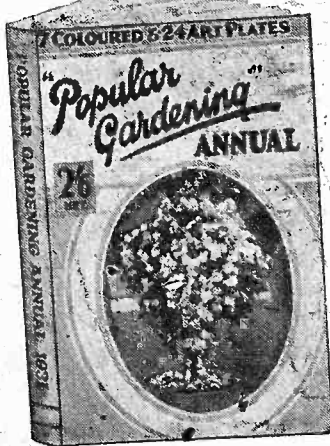
All models carriage paid. Send for 56-page illustrated catalogue. Send 3d in stamps.

CHAS. A. OSBORN (Dept. P.W.), The Regent Works, Arlington St., London, N.1. Phone: Clerkenwell 5095. And at 21 Essex Road, Islington, N.1. Phone: Clerkenwell 5634.

For Gardening Friends

There is no happier gift for gardening friends than a copy of POPULAR GARDENING ANNUAL. This very useful book is an illustrated budget of information for amateur gardeners. It contains an immense amount of information, seven coloured plates, and twenty-four art plates from photographs and diagrams.

Now on Sale - **2/6 net**



"We're Fluxite and Solder—The reliable pair, Famous for Soldering, Known Everywhere! When fixing up aerials—perfection we're seeking; So we solder the connections to prevent any leaking."

See that Fluxite and Solder are always by you—in the house, workshop, garage—anywhere where simple, speedy soldering is needed.

They cost so little but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; Radio; odd jobs in the GARAGE—there's always something useful for Fluxite and Solder to do.

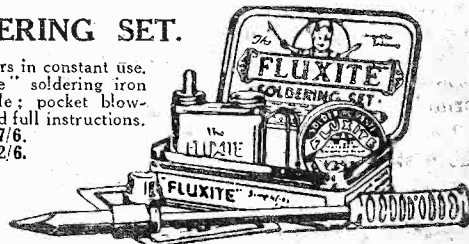
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Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

All Hardware and Ironmongery Stores sell Fluxite in tins. 8d., 1/4 and 2/8.

FLUXITE SOLDERING SET.

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc.; and full instructions.

COMPLETE 7/6.
or LAMP only, 2/6.



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ALL MECHANICS WILL HAVE

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IT SIMPLIFIES ALL SOLDERING

CAPT. ECKERSLEY'S — QUERY CORNER



Some questions and answers of general radio interest that will aid you in your radio reception.

Calculating Home-Made Capacities—
Controlling Loud-Speaker Volume—
A Simple Scratch Filter

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

Calculating Home-Made Capacities.

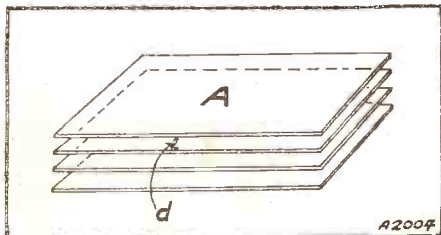
M. O. (Leicester).—"I wish to try my hand at making some fixed condensers. Will you please give me a simple method of working out the various capacities—one not involving a knowledge of mathematics."

What do you mean, "not involving a knowledge of mathematics?" You must surely want a formula?

And you can work this out if I give it you? I assume so.

If you have n flat plates of area (A) and distance apart (d) as shown in my figure,

HOW MANY MFDS?



This sketch illustrates the method of calculating capacity from plate dimensions, etc.

then the capacity is given by the formula.

$$C = 0.0885 \frac{E A (n-1)}{d} \text{ micro-microfarads.}$$

E is the dielectric constant which has a value 1 if the space between the plates is filled with air.

If you are to use grease paper, mica, etc., you must find out from the maker the dielectric constant and use it in the above formula. All dimensions in the above formula are in centimetres.

I am sorry if this is too involved, but it's the best I can do!

* * *

Controlling Loud-Speaker Volume.

A. W. D. (Plymouth).—"My four-valve receiver (H.F., Det., and 2 L.F.) is employed for gramophone reproduction as well as for radio. The pick-up is inserted in series with the grid lead to the detector valve.

"Although a volume control is fitted across the secondary of the first L.F. transformer, this does not give sufficient control. Is it advisable to use two valves

only, or would it be quite in order to fit a further control across the actual pick-up?"

It's perfectly feasible to use an extra volume control on your pick-up, of course. But do be careful about these volume controls.

It rather horrifies me to hear of a volume control across a transformer unless the transformer was designed to take load, and unless the volume control works as a potentiometer. Is it not possible to get from full to 0 (and does one want more?) by using a potentiometer volume control? And make the resistance large and don't overload the transformer. (You can get excellent controls, graded logarithmically and having a very high resistance.)

* * *

A Simple Scratch Filter.

R. D. (Weymouth).—"I have constructed a first-class radio gramophone amplifier, which gives excellent results from a pick-up, except for what I consider is an avoidable needle scratch. In order to remove the noise I intend fitting a scratch filter to cut off at about 4,000 cycles.

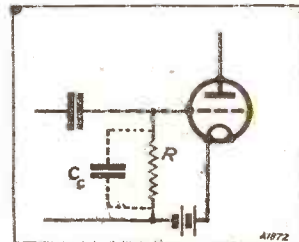
"Can you please suggest suitable values of parts and recommend the best position for the unit, either in the pick-up leads or in the anode circuit of the first L.F., which is resistance-capacity coupled? Suggestions will be very welcome."

There are very many ways of achieving cut off of the higher frequencies. Here are a few. A condenser right slap across the pick-up is often used. That's a bit crude in theory, but in practice—well, perhaps I have a poor ear! Then, again, take any grid circuit, thus: C_c is the condenser in parallel with the resistance.

Now, the impedance of a condenser is the reciprocal of the frequency $\times 6 \times$ the value of the condenser

in farads. As the frequency increases, the impedance of the condenser goes down, is smaller, in fact, so, as shown, it tends to short circuit the resistance R at the higher frequencies. By proportioning R and C you can get varying degrees and points of cut-down.

CUTTING OUT SCRATCH



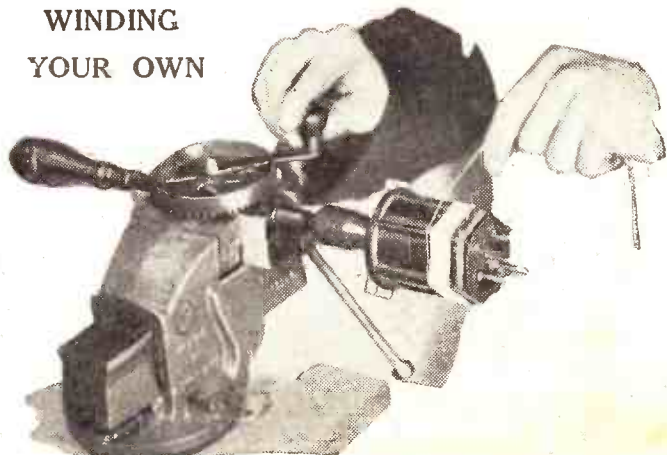
The circuit recommended to R. D. (Weymouth) by Capt. Eckersley.

Suppose R is 200,000 ohms. Suppose we want C_c to play a large shunting effect at 4,000 cycles, compared with 1,000 cycles. What value of C_c ? Working it out, the value of C_c is 0.001

mfd. to make its impedance at 4,000 cycles $\frac{1}{4}$ th of R i.e. 50,000 ohms. At 1,000 cycles, of course, the value will be equal. The curve will fall all the way. This ought to meet your needs. There are other filter circuits, but the one suggested is very simple, and you can adjust C_c and R empirically to find your best result.

But cutting out scratch will also mean you will lose a certain amount of brilliance, due to high note loss.

WINDING YOUR OWN



You can save a lot of time and trouble by using your hand-drill and vice as a "lathe" for coil-making.

ONE of the most gratifying changes we have seen in radio of recent years has been the steady and progressive fall in the prices of all types of components at the same time that the quality has been

those of a year or so back, and prices of practically every one have moved a long way in the right direction.

The general lowering of costs has resulted, too, in the appearance of complete receivers

of all types at prices which would have seemed incredible a couple of years ago. Indeed, the reduction has gone so far that it is sometimes argued that it is cheaper to buy a set than to make it!

Quality Counts.

In some types that may be true, but the comparison is very difficult to make correctly, because it is always open to question whether the commercial set and the equivalent home-built design are really of equal quality. The higher cost of the home-constructed job is so apt to be due to the use of better components and a more elaborate and efficient circuit.

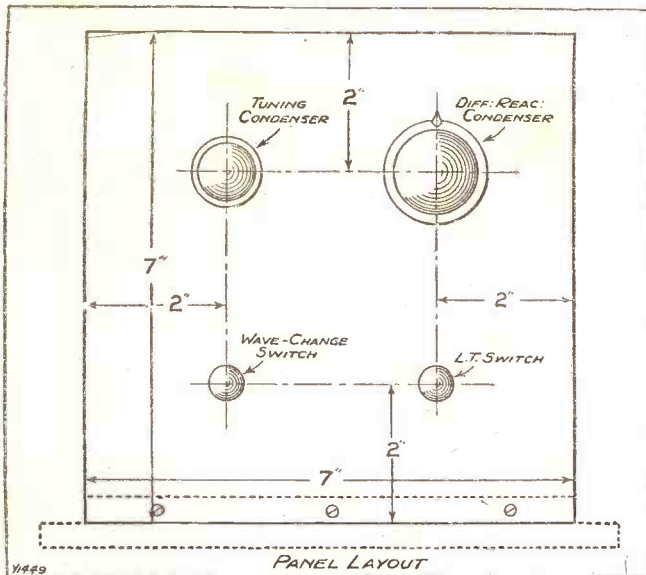
At the same time it must not be forgotten that the set manufacturer does not pay anything like the price for his components that the rest of us do, even if he buys them at all. Very often, of course, he produces them himself in bulk at a cost which is a mere fraction of the ordinary selling price.

The advantage he gains thereby may well enable him to offer a complete set of strictly equivalent quality at a price fully comparable with that of a set of parts for the home-made receiver. Of course, this applies chiefly to sets of the smaller type. In the bigger ones there is so much work that home-construction can as a rule effect a real saving.

Results First.

It is well to remember, however, that much of the low cost of the commercial receiver is due to the fact that the designer has made strenuous and persevering efforts to cut down expense at every possible point, seeking to achieve efficiency by the ingenious use of few and inexpensive parts alone, as far as he can. Now in this there is a hint for the rest of us.

HOW THE CONTROLS ARE PLACED

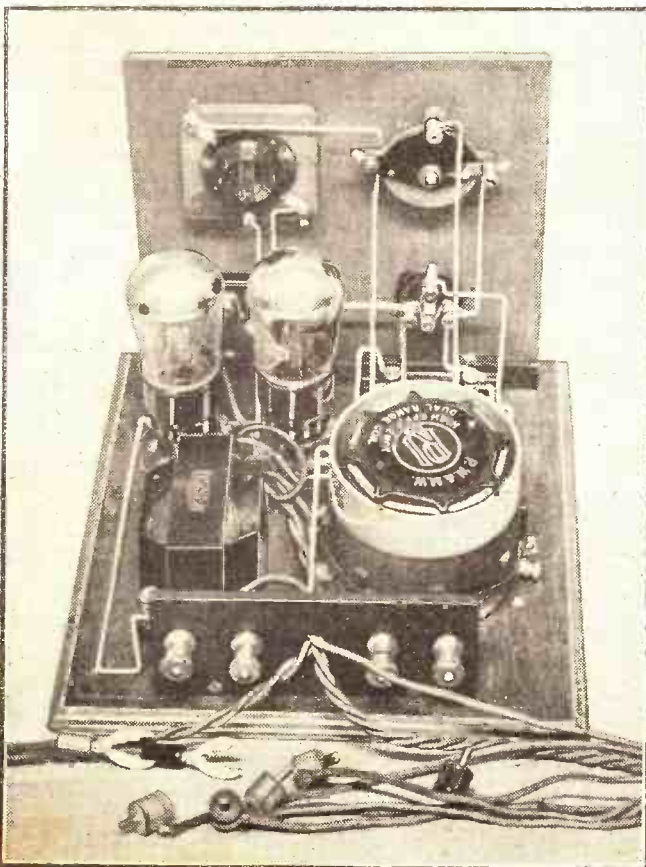


The dotted lines at the foot of the panel denote the baseboard, which is also the bottom of the cabinet

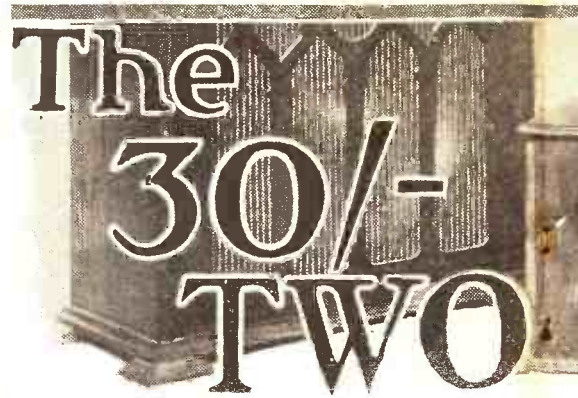
improved. There are regrettable exceptions, but on the average the components offered to us this season are far ahead of

that the set manufacturer does not pay anything like the price for his components that the rest of us do, even if he buys them at all.

COMPACT AS WELL AS CHEAP



Flex leads to the batteries save money, and so does the '0005 mfd. solid dielectric condenser used for tuning.



Thirty Bob! That's all this remarkable two-valve set has been kept as low as possible—and it's really low, in terms of efficiency. The 30/- Two is an up-to-date wave-change demon for distance, as well as capable of providing

Designed and Described by the "P.W." R

POPULAR WIRELESS sets, of course, are always designed with one eye kept closely on the cost question, and within the limits imposed by the conditions under which we work we try to proceed very much as the commercial designer does.

High Efficiency with Low Cost.

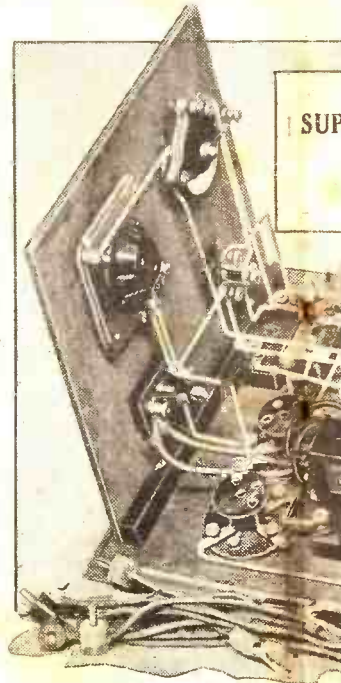
We cannot go so far as he can, to be sure, because we are limited to standard parts such as our readers can obtain easily, and by the fact that our sets must be perfectly easy to make without elaborate tool equipment, but we can and do go a long way.

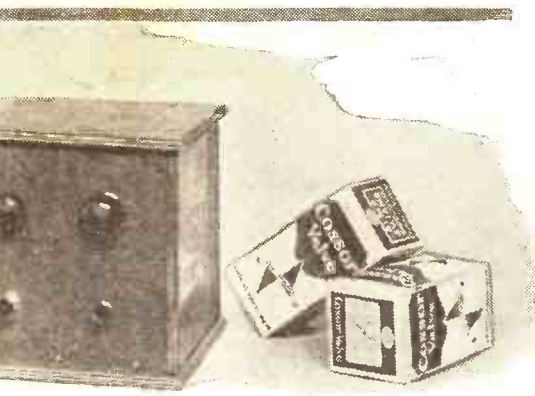
As a result we believe we can say in all modesty that our line of receiver designs has set a new standard of high efficiency and low cost.

It was to demonstrate what can really be done even within the limitations imposed by home-

HOW TO SPEND YOUR

- 1 .0005-mfd. solid dielectric condenser (Ready Radio "Brookmans" type, or Burton, etc.).
- 1 .0001-mfd. or larger differential reaction condenser (Igranic, or Lotus, J.B., Ready Radio, Ormond, Polar, Lissen, Parex, Magnum, Wear-ite, etc.).
- 1 On-off filament switch (Ready Radio, or Bulgin, Igranic, Benjamin, Goltone, Lissen, Lotus, Red Diamond, Junit, etc.).
- 1 Three-point on-off wave-change switch (Bulgin, or Ready Radio, Red Diamond, Ormond, Wear-ite, Magnum, etc.).
- 1 .0003-mfd. fixed condenser (Ready Radio, or Telsen, Lissen, T.C.C., Dubilier, Ediswan, Ferranti, Mullard, Igranic, Watmel, Magnum, Formo).





...ver costs to make. But though the price has n't it?—not a jot has been sacrificed in the way change set, using the new "P.W." Coil, and is a ing excellent local loud-speaker reproduction. esearch and Construction Department.

construction conditions, that we undertook to produce the 30/- Two. Here we have applied our usual methods intensively, but there is more in the design than that.

As a rule we content ourselves, when choosing components for our sets, with picking out specimens of good quality and indicating a number of other satisfactory makes in our lists of alternatives. It is thus left to the reader to decide upon such makes as suit him as regards price.

Only Good Components Used.

By exercising a little judgment and going through catalogues he can, if he takes the trouble, cut down the cost of any set considerably. It is just a matter of picking out components of satisfactory quality, and of as low price as one can find, for each position in the set.

To show how very effective this process can be we have applied it to the 30/- Two, with rather surprising results, as you will have gathered from its very name. So far as most of the components are concerned we have chosen those makes which are readily available at most dealers, conform to the modern standard of quality, and are lowest in price.

There are one or two exceptions in the list, however, where we have not chosen quite the cheapest to be had. This was done in order to allow a small margin for variations on the part of other constructors without exceeding our thirty-shilling limit.

Possibly Less.

Now let us just explain how the price we have mentioned is arrived at. If you build the set with the makes of components mentioned first in each case in our list, make the dual-range coil yourself (see "P.W." for Oct. 11th, 1930 or Dec. 13th, 1930) and adopt our scheme of a stained ply-wood panel and simple home-made case, the total cost of the receiver will come well under thirty shillings.

If you decide to use a purchased coil unit (as we did in the original) the cost will come out a little over this figure. Accordingly we have adopted a sort of average of thirty shillings in indicating the cost in the title of the instrument.

Good Performance.

Now there is a point we want to make particularly clear, and that is that there has been no "cheese-paring" in the design of the set. Its low cost is due to three things: careful choice of components, special method of construction, and a circuit so designed as to call for only a small number of parts.

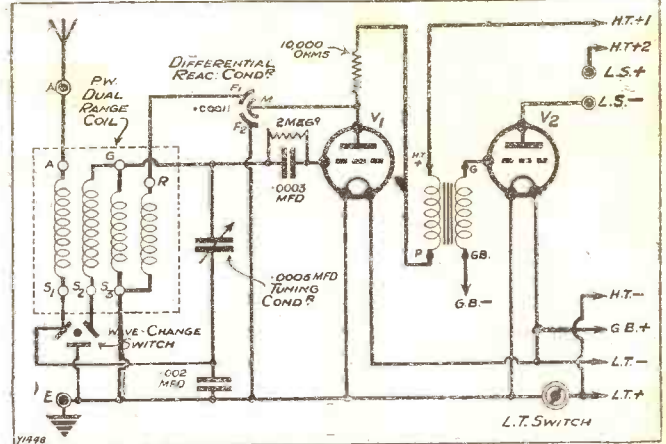
Performance has most definitely not been sacrificed. On the contrary, it is very good indeed, and no one need have the slightest misgivings on that score. Selectivity is good, and sensitivity to even the weakest signals is right up to the high standard set by our

series of designs incorporating the new "P.W." high-efficiency coil.

Novel Cabinet and Baseboard.

Now for the special inexpensive method of construction. Its effect is simply to enable you to dispense with the usual

A REALLY UP-TO-DATE CIRCUIT



One of the latest "P.W." wave-change Brookmans circuits is employed, giving full punch on both local and distant stations.

ebonite panel and bought cabinet, and it is quite an easy job if you are at all handy at woodwork. Of course, you can use the (Continued on next page.)

THIRTY SHILLINGS.

- 1 002-mfd. fixed condenser (Lissen, etc.).
- 1 2-meg. grid leak (Lissen, or Dubilier, Ferranti, Mullard, Ediswan, Igranic, etc.).

- 2 Valve holders (Clix, or Lotus, Bulgin, Igranic, Lissen, Benjamin W.B., Junit, Eurlon, etc.).

- 1 "P.W." Dual-Range Coil (R.I., or Goltone, Ready Radio, Wearite, Magnum, Parex, Keystone, etc.). See text.

- 1 L.F. transformer (Lissen "Torex," or Igranic, R.I., Telsen, Lotus, Varley, Mullard, Ferranti, Lewcos, etc.).

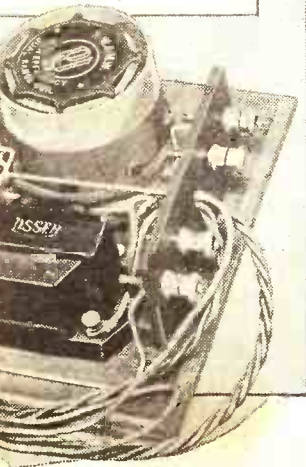
- 1 10,000-ohms spaghetti resistance (Bulgin, or Magnum, etc.).

- 1 Terminal strip, 5 in. x 2 in.

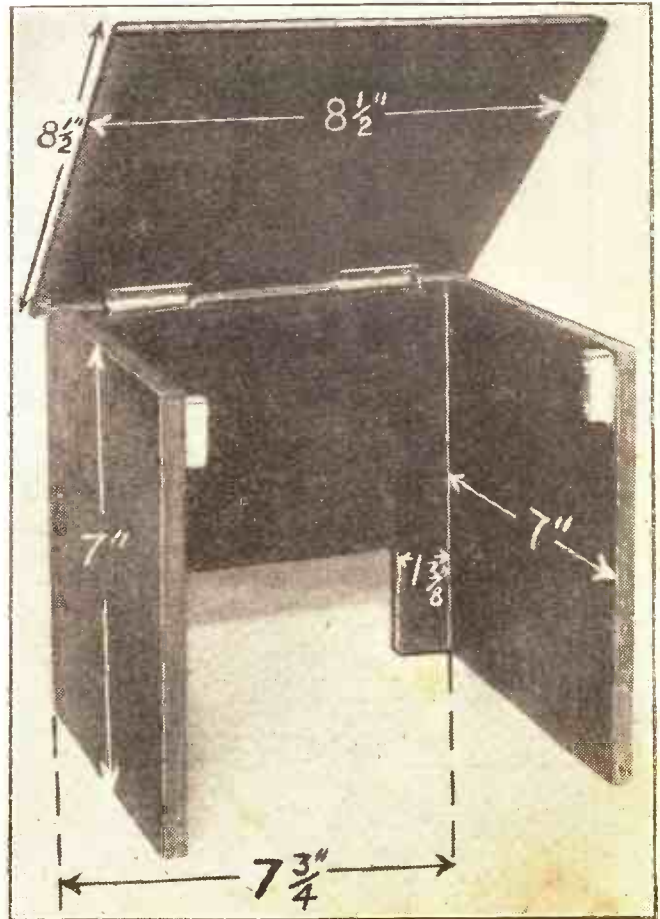
- 4 Terminals (plain type).

Materials for panel, cabinet, etc.

**—SIMPLY SIMPLE—
—SIMPLY SUPERB.**



MAKE THE CABINET AT HOME



There is nothing difficult in the cabinet construction, the bottom of which is used as a baseboard. The necessary dimensions are shown in this photograph.

THE "30/-" TWO

(Continued from previous page.)

ordinary panel and baseboard if you like, with a corresponding increase in cost. Even so, the set will remain remarkably inexpensive.

To represent the usual panel we used a piece of ply-wood, 7 in. X 7 in., and it looked particularly well when given a coat

of varnish stain. This "panel" is attached to a base-piece which is to form the bottom of the cabinet. This base measures 8½ in. wide by 8½ in. deep, with bevelled edges.

The "panel" is attached to it by means of screws into a wooden fillet 7 in. long and about ½ in. X ½ in. section. When fixed the front surface of the panel should be ½ in. back from the front edge of the base.

On this base and panel you build the set in just the usual way, and you will note that one of its merits is extreme neatness and compactness. At the back a piece of ebonite (5 in. X 2 in.) is fixed with another wooden fillet, and this carries the aerial, earth and loud-speaker terminals.

Method of Connecting Batteries.

There are no battery terminals, the battery connections being in the form of flex leads emerging through a hole in the middle of the terminal strip. The strip, by the way, is placed so that it comes ⅜ in. from the rear edge of the base, measured in the same way as the panel.

The case or cabinet proper is a sort of box with no front or bottom, and it fits down over the set, its top taking the form of a hinged lid. It is made of any available material, preferably mahogany or other hardwood, about ¾-in. thick.

When the set is finished the case is fitted over, and secured by screws passing up into its edges through the base-piece, access to the interior of the set being obtained thereafter through the lid. A rectangular piece must be cut out of the back to allow for the terminal strip, and it is as well to provide fillets inside at the front for the panel to fit against.

No Soldering is Necessary.

The dimensions of the case are given in one of the illustrations; and from this you will be able to work out the sizes of the pieces of wood you will require. It is very easy to make, and a coat of stain, or varnish stain, will make it look quite presentable.

The construction of the set proper you will find is very simple, and the diagrams make it all quite clear. Note particularly that no soldered joints are called for.

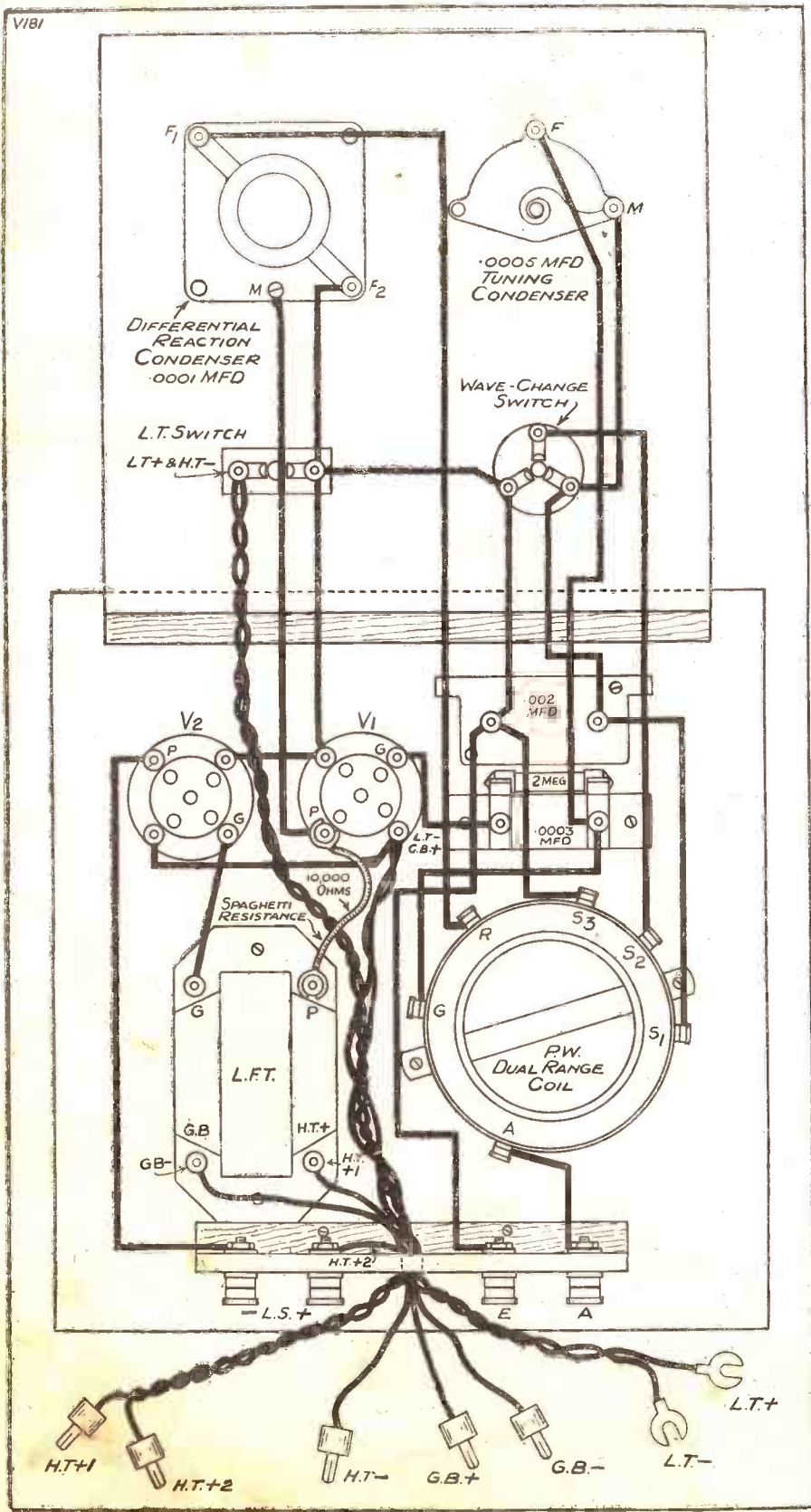
Note, too, where the battery flexes come off. These are the points: L.T. negative and G.B. + come off the detector valve holder (V₁), and L.T. positive and H.T. - from the L.T. switch. H.T. + 1 comes from one primary terminal of the L.F. transformer, and H.T. + 2 from one loud-speaker terminal. Finally, G.B. - comes off one secondary terminal of the transformer.

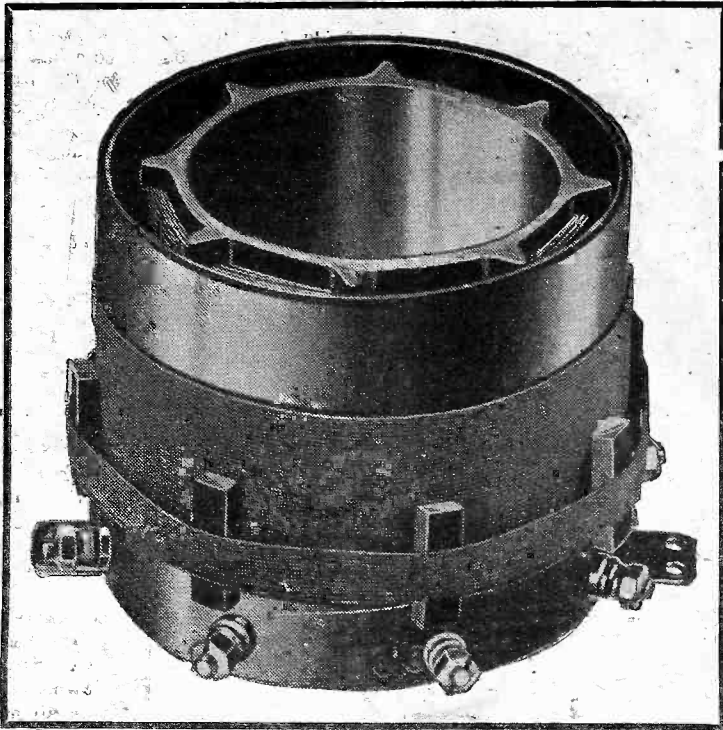
A Simple Set to Use.

The length of these leads will naturally be arranged to suit your own requirements, and ordinary flex is a suitable material. It is as well to finish the further ends with battery plugs and spade terminals (the latter on the L.T. leads).

For the detector you want a valve of the H.F. or "special detector" type, and a small power for the second socket. Try the H.T. + 1 plug in sockets giving from 60 to 80 volts, noting which gives the smoothest reaction, and put the H.T. + 2 plug in the highest voltage socket.

Push the wave-change switch inwards for long waves, pull it outwards for medium. If you are very near to your local station, put a .001-mfd. (max.) compression-type condenser in series in the aerial lead.





BIG

PRICE

REDUCTION

**"P.W."
DUAL RANGE
COIL**

10, Moorland Crescent,
Clitheroe,
Lancs.
17.12.30

Dear Sirs,

Will you kindly forward me your latest catalogue that I have seen advertised in "P.W."

I might state that the "P.W." Dual Range and "P.W." Contradyne coils I purchased from you some short time ago are giving entire satisfaction and that they arrived in good condition owing to your splendid packing. Yours truly,

Signed R. H. WHALLEY.

The above original testimonial can be seen at our offices.

The high efficiency coil which is used so successfully in many "Popular Wireless" & "Modern Wireless" Circuits. Contains medium and long wavelength windings and reaction. Gives high selectivity and eliminates the usual "dead-end" losses. Suitable for most modern circuits. Fitted with two brackets for simple baseboard mounting. No coil is dispatched from our Works without a broadcast test.

**NOW
12'6**

"THIRTY SHILLING" TWO RECEIVER

1 ReadiRad '0005 mfd. Brookmans Condenser	s. d.	2 Telsen 4-pin valve holders -	2 0
1 ReadiRad '00015 Differential Reaction Condenser	3 6	1 ReadiRad "P.W." Dual Range Coil	12 6
1 ReadiRad Filament Switch	5 0	1 Lissen Torex L.S. Transformer	5 6
1 ReadiRad 3-point wave-change Switch	10	1 Link Resistance 10,000 ohms	1 0
1 ReadiRad '0003 mfd. fixed Condenser with Clips	1 6	4 Brass Terminals	6
1 ReadiRad 2 megohm Grid Leak	10	1 Terminal strip drilled 5 x 2 Flex, Wander plug, screws, etc.	1 6
1 Telsen '002 mfd. fixed Condenser	1 0		£1.17 0

Complete Kit of Parts including ready-wound dual range coil.

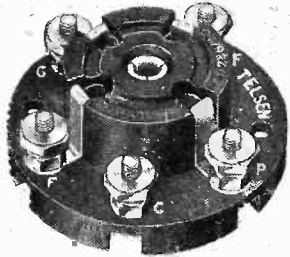
Ready Radio

159, BOROUGH HIGH STREET,
LONDON BRIDGE, S.E.1.

Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST

Ready Radio (R.R. Ltd.), 159, Borough High Street, London, S.E.1.

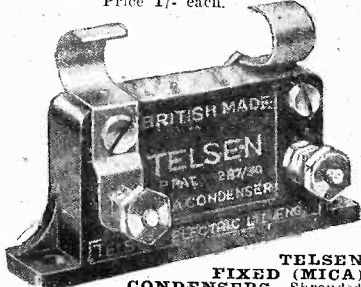
"NO DOUBT ABOUT IT"



TELSEN FIVE-PIN VALVE HOLDER. Price 1/3 each. (For details, see opposite.)



TELSEN GRID LEAKS. Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out, and are unaffected by atmospheric changes. Not being wire wound, there are no capacity effects, and they will not deteriorate or disintegrate.
1, 2, 3, 4 or 5 megohms.
Price 1/- each.



TELSEN FIXED (MICA) CONDENSERS. Shrouded in genuine Bakelite, made in capacities up to .002 u.F. Pro. Pat. No. 20287/30. .0005 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.

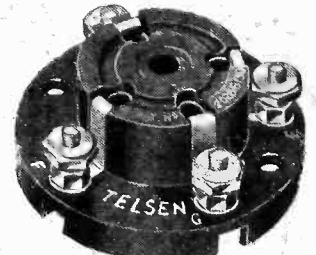
Telsen Components have achieved their remarkable popularity because of their exceptionally high standard of quality and great performance. This is instantly apparent in any Telsen-equipped set, the tone and power of which is so much above the ordinary. You hear enthusiasts everywhere advising, "Fit Telsen and be sure of getting the best results. They cost no more!"

STOP AT YOUR DEALER'S TO-NIGHT FOR

TELSEN

COMPONENTS

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.



TELSEN H.F. CHOKE. 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.



A
good item
on any
programme

Player's
please

It's the
Tobacco that Counts

N.C.C.899

EASY TERMS

WE supply the following Radio Apparatus on deferred terms. We carry adequate stocks and can give prompt delivery.

NEW HEAYBERD A.C. ELIMINATOR KIT C.150. Complete kit of parts for building an H.T. Eliminator, including steel case. Output, 25 M.A., 150 volts. 3 H.T. tappings. One variable.
Cash Price .. £3 16 0
Or 7/6 with order and 11 monthly payments of 7/-.

NEW EPOCH PERMANENT MAGNET MOVING-COIL SPEAKER UNIT. P.M.66. Cash Price .. £5 15 0
Or 11/- deposit and 11 monthly payments of 10/6.

LISSEN 2-V. SET. Battery model including valves. A reliable Regional Receiver. Cash Price .. £3 10 0
Or 5/6 with order and 11 monthly payments of 6/6.

NEW OSRAM MUSIC MAGNET 4 KIT. A first-class long-distance receiver incorporating 2 H.F. stages, single dial tuning.
Cash Price .. £11 15 0
Or 16/- with order and 11 monthly payments of 21/-.

NEW MULLARD ORGOLA 1931 3-V. KIT. High grade complete kit of parts including valves and cabinet. Cash Price £8 0 0
Or 10/6 with order and 11 monthly payments of 14/6.

NEW COSSOR EMPIRE 3 KIT. A considerable advance on last season's 3-valve Kit and at a lower price. Cash Price £6 17 6
Or 10/- with order and 11 monthly payments of 12/6.

N.K. FARRAND INDUCTOR. Loud speaker unit, quality of reproduction almost equal to a moving-coil speaker.
Cash Price .. £3 10 0
Or 5/6 with order and 11 monthly payments of 6/6.

B.T.H. PICK-UP AND TONE ARM. One of the best pick-ups available. Cash Price .. £2 5 0
Or 5/- with order and 9 monthly payments of 5/-.

CAIRNS & MORRISON'S HOME RECORDING OUTFIT, including special Microphone Pick-up. Descriptive Leaflet on request. Complete Kit. Cash Price .. £4 12 0
Or 8/- with order and 11 monthly payments of 8/6.

NEW BLUE SPOT 66R UNIT. The finest balanced armature movement on the market. Complete with large Cone and chassis. Cash Price .. £2 10 0
Or 5/- with order and 10 monthly payments of 5/-.

LONDON RADIO SUPPLY CO.,
11, Oat Lane, Noble St., London, E.C.2.

Telephone: National 1977.



IT is extremely difficult to criticise the results given by a radio receiver. I mean scientifically; not in the "that sounds pretty good" sort of way. The only accurate method is to take its "overall" amplification curve. And just to give you an idea of the complexity of this I will briefly describe it.

You feed a range of known frequencies into the set, and I must not forget to add that you must know exactly the proportion of energy carried by each frequency. Near the loud speaker you place a calibrated condenser microphone, and this is coupled to a valve voltmeter.

Very Expensive Apparatus.

The apparatus required is of a very expensive character, and it takes a skilled engineer to handle it. But there is a simple scheme for gauging approximately the quality of the output from your loud speaker, and if you have a fairly musical ear so much the better.

All you have to do is to identify the musical instruments in an orchestra that is being broadcast, and see how easily or how difficult it is for you to follow them. If it is possible to spot them, and they retain their distinctive, individual characters, you can reckon your set is a good one. And you will be able to gauge the degrees of efficiency with which the set deals with the upper and lower frequencies by the manner in which it handles high and low-pitched instruments.

"Hashed-up."

On a very poor outfit, an orchestra or a band sounds like one hashed-up medley of noises, while on a good set the harshnesses and resonances give way to clean definitions of the various units.

Naturally, when the

* * * * *

If you can puzzle out the instruments of a small orchestra, and you know what frequencies those instruments cover, you have an excellent starting-point for building up a true estimate of how good, or bad, a set really is. In this article a scheme that enables you to acquire the necessary knowledge in a pleasant manner is interestingly described.

By G.V. DOWDING, Associate I.E.E.

* * * * *

band or orchestra is playing "ensemble" parts—all the instruments joining in and no one "starring" solo—you must not always expect to be able to take every one in turn and immediately identify it, although, after a while, you will be surprised how easy it is to go a long way towards it—on a first-rate outfit.

At this point I can hear some of you saying, "How on earth can we, who do not know the difference between an oboe and a tin-whistle, hope to do these things?" (On the other hand, there will,

of course, be at least a few readers of "P.W." who will know more about this particular subject than I.)

Broadcasting gives one many opportunities of acquiring the necessary experience, and once you start you will be surprised how simple and how fascinating it is.

The best plan is first to tackle the small combinations, using well-known instruments.

A Good Example.

Jerry Hoey's band is frequently broadcast from the Piccadilly Grill Room, and that is an excellent one to begin with. Here you have in one group a piano, a banjo, and drums.

All these are generally used to supply the rhythm, the "um-pum, um-pum, um-pum" part and, anyway, there can't be many people who are unable to say that that is a piano, that a banjo, or those are the drums, when they hear them at work. In passing, I don't expect it is more than a minority that have sets on which Jerry Hoey's drums get through at all!

Jerry Hoey makes great use of a piano-accordion in his combination. This is like a large concertina in appearance, except that it has a sort of miniature piano keyboard.

It gets over with the effect of a small organ, and provides a fullness, a rich background to certain passages of music. The only high note stuff that is heard providing the melodies are the tenor saxophone and the violin. It won't be hard for you to tell which is which out of these, will it? If you cannot distinguish between them you can reckon your set requires polishing up.

There remains in Jerry Hoey's band only one of those huge fiddle things to contribute deep grunts. But take careful note

(Continued on next page)

SOME INSTRUMENTS YOU HEAR



A typically equipped dance band. On the extreme right you see a trombone. To the sitting violinist's right is a trumpet player and then three saxophonists. Note bunch of four clarinets standing vertically on the floor. From left to right they are alternately of wood and all-metal construction. A banjo player is standing at the back.

TELL-TALE TONES

(Continued from previous page.)

of those grunts. If you can honestly say that they sound like the scrapings of a string instrument and not like the "whoops" of a wind instrument, give your set high marks.

At the other end of the scale, contrast the notes provided by the saxophone and the fiddle, for the one is "wood-wind" and the other "string." The measure of real, vital individuality each retains provides an index of the quality of your set.

There is another little band that broadcasts quite often and which provides a fine contrast with Jerry Hoey's bunch. This is Jack Padbury's Cosmo Club Six. The melodies in this instance are generally contributed by a fiddle and a trumpet. There is no saxophone, whereas Jerry Hoey has a saxophone and no trumpet.

Trombone "Grunts."

Jack Padbury's bass "grunts" are given by a trombone, and he has no string bass. Jerry Hoey, you will remember, has no trombone. Keep these facts well in mind, for they provide cast-iron standards.

Drums, banjo, guitar, piano and piano-accordion complete the Padbury combination. Two of the musicians apparently operate the last four between them, so that only two out of the four instruments are heard at any one time.

I don't think the least musical of you can honestly say that it is impossible for you to dig out the eight or nine instruments I have mentioned. And once you are thoroughly familiar with them you will have no difficulty in analysing intelligently bigger dance bands.

For instance, you will find that both the

ascends the scale. On its lower notes it is very mellow and full. It then goes rather dull, finally emerging on its upper register, first with a round, bright tone, developing at its uppermost limits into a decidedly shrill, almost piercing, tone.

By the way, don't forget that there are seven or eight different saxophones, running from the bass, which can grunt as low as the bass trombone, up to the soprano, which

not reckoned usually to alter its character. But sometimes "mutes" to give queer effects like high-pitched laughter, etc., are employed. I fancy Sid Bright's trumpets are muted rather more than most, but it is a common stunt. The megaphone affairs that are sometimes fixed to clarinets do not often change things much from a radio point of view.

A "muted" trombone is sometimes to be heard in Ambrose's Mayfair Orchestra, doing quite tidy little solo bits.

So much for the dance bands, but what about the more "serious" stuff? Well, here it is, in cases, much easier and, in cases, much harder to dig things out. When you come to an outfit like the new B.B.C. orchestra, there are no solo instruments in reality—you have practically every kind of instrument in common use, while most are played in bunches.

Thus, there are no less than thirty-six

violins and most of the time a group of twenty will be playing identical notes, while a second group of sixteen do likewise. You will easily identify these violins, but it is practically useless struggling with the eighty or so other instruments because they include so many that are rarely, if ever, used in other combinations. Why, they've even got a euphonium, four bassoons and four oboes in that new B.B.C. orchestra!

Now and then various of the popular instruments are billed to solo in radio vaudeville and other programmes—thus you get Teddy Brown broadcasting a saxophone solo, etc. These solos will help you no end, providing you take careful note of how the various instruments sound. If you are a radio-gram enthusiast get one or two solo records—they form excellent testing material apart from anything else.

A Useful Group.

In conclusion, I must point out that this article is by way of a supplement to two other of my articles, "Down Among The Tubas" and "On the High C's," which appeared in "P.W." Nos. 441 and 446 respectively. Now those two articles showed where the low-toned instruments usually scaled down to, and where the high-toned instruments went up to, so the three contributions together pretty adequately cover the ground.

There is just one point I must not forget to bring out, and that is this. I have given an outline of the construction of various of the dance bands that broadcast, but it happens sometimes that changes are made and new instruments introduced or existing ones dropped, so I cannot guarantee that my notes will be strictly accurate by the time these words appear in print.

And by way of a P.S. I must further explain that I have not concentrated on dance bands because I consider they are the most important combinations, but because they are generally small affairs as compared with concert orchestras, and because their instruments are conveniently mixed.

BROADCASTING FROM CIRO'S CLUB.



Sydney Kyte's band includes violins, trombone, trumpet, saxophones and clarinets.

can rival the highest-pitched clarinet. Nevertheless, all the members of the saxophone family share the common saxophone character, which you will soon learn to recognise. And the same applies to the three or four different clarinets that are used.

After a while, you will find it fairly easy to differentiate between brass and woodwind units. The trumpet and the trombone are, of course, brass, and clarinets and saxophones are woodwind, although there

MARIUS B. WINTER AND "HIS BOYS"



Here is a band that has been doing a lot of broadcasting lately. And you will see there is a trombone (extreme right), a string bass just behind and between the two trumpets. On the left are three saxophonists at work, but they also have violins and clarinets on the ground before them.

saxophone and the trumpet figure in quite a number of bands. An example is to be found in Sid Bright's Piccadilly Players, where we have very evident trumpets and a strong saxophone section. Sid Bright has a string bass and no trombone. There are other bands, notably Billy Cotton's Ciro's Club Band, which employs two or more saxophones, with some of these alternating with clarinets.

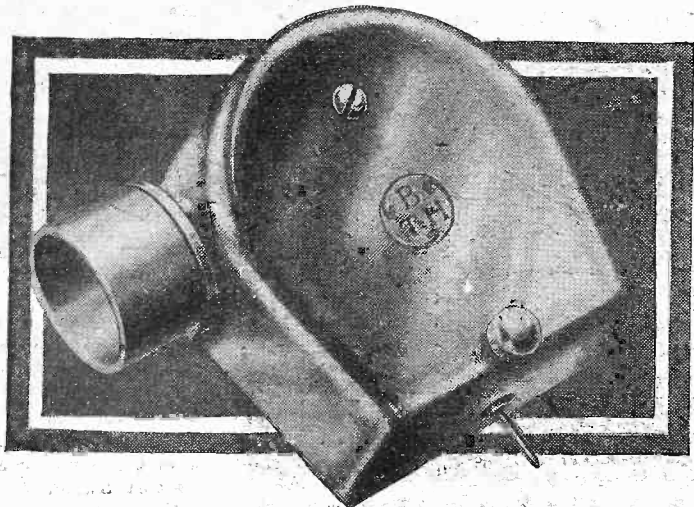
But the clarinet is easy enough to recognise by its changing character as it

are some all-metal clarinets. This is all supposing your set is a good one.

There is one thing that is liable to lead you astray unless you look out for it, and this is the trick of fixing adaptor devices to certain of the instruments.

"Mutes" are quite commonly used for saxophones, trumpets and trombones, although I think it is the trumpet that is "muted" more than any other instrument, but I may be wrong here. Anyway, "muting" softens an instrument and it is

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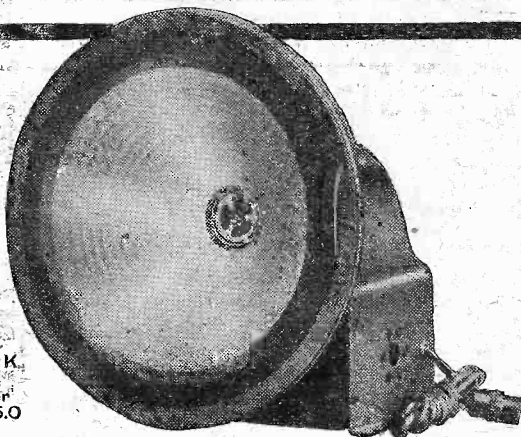


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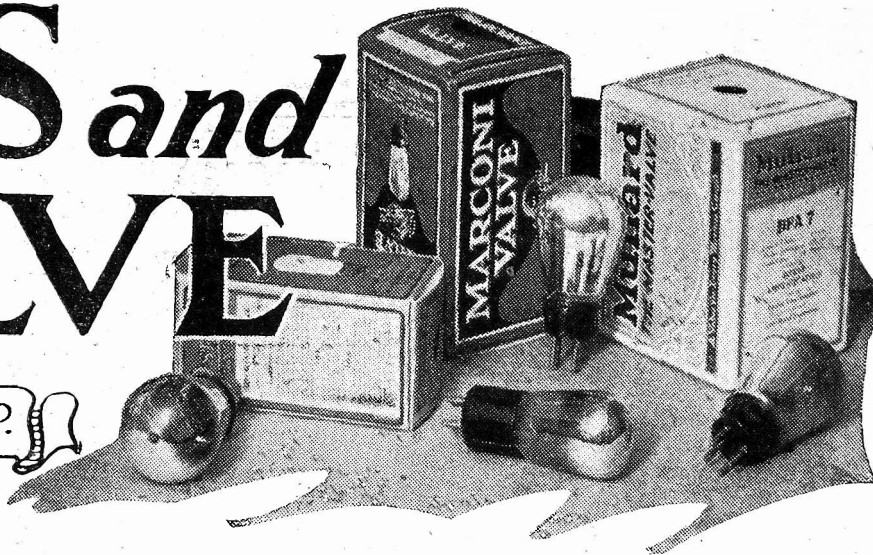
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EDISWAN

W.124

OHMS and the VALVE

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



ONE of the fundamental laws of electricity, as we all know, is called Ohm's Law; and it states that the current which passes through a (solid) conductor is proportional to the electro-motive force and inversely proportional to the resistance.

Whilst Ohm's Law applies with considerable accuracy to many types of conductors, it does not apply strictly to *all* and there are some kinds of substances which definitely do *not* obey Ohm's Law.

Generally speaking, ordinary metallic conductors at ordinary temperatures (the temperature question is very important) obey Ohm's Law fairly well, but if the electro-motive force is such as to produce a current which raises the temperature of the conductor considerably, then it is most probable that the resistance will increase and consequently the current will not be accurately represented by Ohm's Law, if we take, for the value of the resistance, the value which the conductor had when it was cold.

Exceptions to Ohm's Law.

In most metallic conductors the resistance *increases* as the temperature is raised, but there are some substances in which the resistance actually *decreases* with the rise of temperature; an example of such a substance is the filament of a Nernst lamp.

When we get away from solid conductors into the realm of liquid and gaseous conductors we find that the exceptions to Ohm's Law become more pronounced. This is particularly the case with the conduction of electricity through gases, or where the current is carried by electronic emission as in the case of an ordinary wireless valve.

In the case of the valve the electrons, as you know, are emitted by the hot filament, and are driven across to the anode by reason of the high-tension voltage existing between these two electrodes.

The actual anode-current is carried through the valve by this electron emission, and it is obvious, therefore, that the total current which can pass is equal to the current represented by the filament emission.

The Saturation Point.

No matter how great a voltage we apply between the filament and the anode, we cannot cause any more current to pass than the total emission of the filament.

Consequently the maximum current which the valve (under definite filament conditions) is able to pass is called the "saturation" current. If the filament of

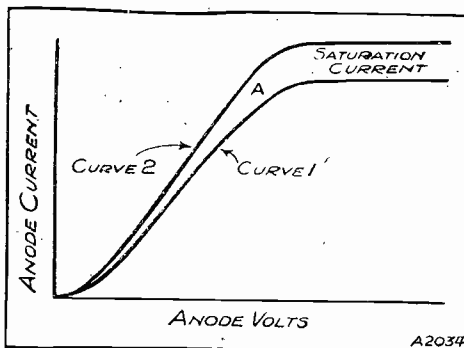
A simple and readable explanation of one of the most interesting things connected with an ordinary valve.

a valve (two electrode) is switched on and kept at a definite temperature and if then gradually increasing voltages are applied between the filament and the anode, you will find that the anode current will rise slowly at first, but will soon become roughly proportional to the anode voltage—that is to say, increases in the voltage will produce proportionate increases in the anode current.

Where Current Changes Stop.

This relationship will continue until the anode voltage reaches a certain value, when you will begin to notice that further increases in the voltage do not produce corresponding proportionate increases in the anode current.

SEE WHAT HAPPENS?



This drawing illustrates diagrammatically what happens when the temperature of the valve's filament is raised. A higher value of anode current is obtainable with the same H.T.

As the anode current is still further increased, the disproportion becomes more pronounced, that is, the anode current fails still more noticeably to increase to the expected extent.

Finally, you will reach a value of the anode voltage where still further increases in this voltage do not produce any increase at all in the anode current. This means that the whole of the emission from the filament is being driven across to the plate and consequently the "saturation" current has been reached.

If you look at the diagram you will see the shape of the curve (Curve 1) showing

the relationship between the anode current and anode voltage, and you will notice that, after passing the point A, the curve flattens out and becomes parallel to the horizontal axis.

A Very Useful Characteristic.

How can we bring about an increase in the anode current in these circumstances? The answer is that we can increase the anode current by *raising the temperature of the filament*, so that the actual emission is increased.

This larger total emission will, however, pass through precisely the same type of variations (as shown in Curve 2 of the accompanying figure), and the only essential difference between the two curves is that the anode current for each value of anode voltage is larger for the higher filament temperature.

You will notice from the diagram that if the valve is brought to the condition marked A, *increases* in the anode voltage can produce little or no effect, whilst *decreases* in the anode voltage will produce a pronounced effect.

It is upon this peculiarity or bend in the characteristic curves of a valve that the particular properties of the valve depend.

If the valve simply obeyed Ohm's Law as, say, a length of copper wire does, it would be impossible for us to use the valve as a detector or amplifier, and therefore we have to thank these remarkable peculiarities or eccentricities in the conductive behaviour of the valve for its enormous usefulness in radio work.

ITEMS OF INTEREST

Short Waves—American Calls—Australian Stations.

On very short wave-lengths of from 10 to 15 metres, long-distance transmission is best carried out in direct sunshine.

Recent research has shown that short-wave transmission is powerfully affected by spots on the sun.

All American broadcasting stations announce their call signs every fifteen minutes except during radio dramas. (This is by ruling of the Federal Radio Commission.)

There are approximately 32 stations either built or projected in the Commonwealth of Australia.

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CORRESPONDENCE.

THE "P.W." "CLEAR-CUT" CONE

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for any information given.—EDITOR.

THE "P.W." "CLEAR-CUT" CONE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have made up two of the "Clear-Cut" Cones given in "P.W." No. 447.

I find, as you say, brilliance and naturainess, and, in my opinion, only a moving-coil could ever hope to beat it. I am now eagerly waiting for the particulars of the baffle to complete the speaker. (This appears in the current issue.—ED.)

My unit is one of the original Hegra type, and is well fitted for the job, and with 200 volts on the last valve and choke filtered the speaker does not chatter.

I would like to mention also that I made up two "Crystatube" sets, taken from "P.W." No. 438. For size and simplicity it is simply wonderful, both in volume and selectivity. I was even able to work an old Amplion R.39 horn speaker on an outdoor aerial. One is working in Hammersmith on an indoor aerial of 40 feet of Electron wire quite successfully.

Wishing your paper every success.

I am, yours faithfully,

Bedford Park,
W.4.

R. A. MARTER.

THE "CHEF D'ŒUVRE"

The Editor, POPULAR WIRELESS.

Dear Sir,—Once again, congratulations! The "Exhibition" Four was a good—very good—proposition; the "P.W." new coil a vast improvement on the "Titan" and an intriguing little fellow to play with.

But the "Chef d'Œuvre" is a gift from Heaven.

By the way, I was asked in a popular wireless store the other day, "What's this run on 24 and 26 D.S.C. wire mean? You are the fourth in succession." I referred the inquirer to your good selves and suggested that an intelligent perusal of your pages

would probably result in an equally intelligent anticipation of public demand, and enable one to purchase, obtain, or acquire such accessories and components as wire of the dimensions specified, and 3 spring wave-change switches, etc., without searching over half the City of London, only to be told that the required article was out of stock.

One suggestion I would make is to put in a local on-off switch for the S.G. valve. For the lower wave-band so far as London National and London Regional are concerned—at 10 to 15 miles from these stations anyhow—ample volume is available when the S.G. valve is switched off and tuning adjusted slightly. Even Midland Regional is received here in this way at pleasant loud-speaker strength, all this on two valves.

In passing, just a word of appreciation for the "Progressive" series you ran some time ago—the ideal for the "Man in the Street." I was asked to prescribe some modification of the circuit (2-valve) the other day, but suggested that perhaps since for ordinary purposes there could be nothing gained by a

change of circuit, a new detector valve should be tried—it was, and the result left nothing to be desired from the point of view of an ordinary English station listener. It pulls in quite a few others also. Anyhow, if it—the Progressive—is not quite a chef d'oeuvre it provided a very useful hors d'oeuvre to a feast for the "Fans."

Sincerely yours,

H. V. FIELD.

Hornchurch, Essex.

THE "Q & A" SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—About the beginning of 1928 you published the details of a set called the "Q and A" Three. I built that set, and until now it has done far more than you told me to expect.

With new high-power stations on the Continent, it is a little too "unselective," and so it is going to be scrapped, but before it is, I thought you would like to know what a 1928 set did on its last calibration during November.

(Here follows a list of 28 stations, eleven being marked "Good"—Ed.)

Those stations marked good are generally reliable, and mostly louder than the London National, which varies very considerably from night to night, and is sometimes hardly worth listening to.

Being very lazy, I have not searched the long waves so much, and only spent part of one night on them when I received: Huizen (fair); Radio Paris (fair); Daventry National (good); Eiffel Tower (fair); Kalundborg (fair); Oslo (doubtful).

The coils, by the way, were, on the medium, 60X (tapped at 1), 60, 50, and 100, 200, 150 on the long waves, and the aerial 80 ft.

Thanking you very much for a good set, I remain,

Yours sincerely

Southend-on-Sea, Essex. DONALD W. OSBORN.

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MODERN WIRELESS

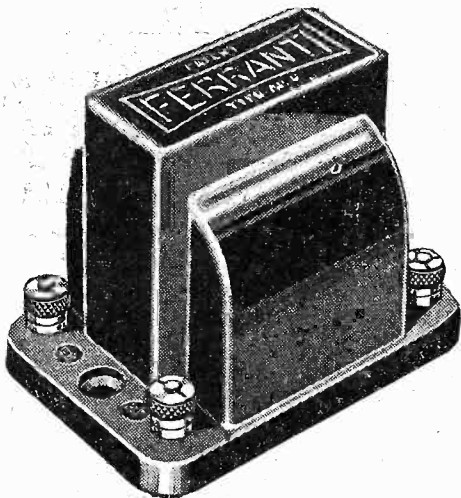
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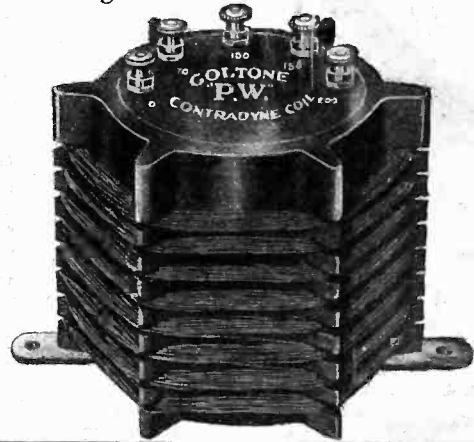
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The Uplands
Nr. Newport, Mon.
Dec. 10th, 1930.

Dear Sirs,
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Yours truly,
(Signed) Lewis H. Holland.

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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 would be well advised to obtain permission of the patentees before doing so.

QUESTIONS AND ANSWERS

OSLO ON LONG WAVES.

H. J. H. (Southampton).—"I notice the Oslo station has taken the Hilversum wave-length, with a power of 75 kilowatts.

"I have tried for this station on the high wave-lengths, but cannot get a sound of it. What is the cause of it? I could always get Hilversum on 1,071 metres, working with much lower power, but Oslo is a washout.

"And yet the programme power and wave-length is published. Perhaps you could enlighten me on this?"

The chief reason that you heard Hilversum and cannot hear Oslo on the long wave-length, even when he is working with increased power, is the great difference in distances between these places and your aerial.

Hilversum is only 232 miles from London, whilst Oslo is about 720 miles. The strength of a station's signals falls off very rapidly with distance, and, in addition to that, we have the fact that the Hilversum station is situated in flat country, with only low-lying land around it, whilst Oslo is in a mountainous situation which is notoriously bad from a wireless point of view.

Oslo has been experimenting a little with power, etc., and some readers have reported very good

reception on the new wave-length. So we think it is quite likely that you will, in the end, hear him, though reception at such distances as this is very uncertain, even on the comparatively reliable long waves.

A READER'S REACTION TROUBLE.

Here is an interesting account of an unusual fault, and its cure, contained in a letter to the Editor from a Kensington reader, who sent it in the hope that it might help others.

"I have had reaction trouble of late with the 'Economy' Three, which I was able to trace after testing valves, coils, transformer, R.C. unit, grid leaks, fixed condensers, wiring, H.T. and L.T. batteries, also G.B. battery, wander plugs, and lastly variable condenser, and differential condenser.

(Continued on page 890.)

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.

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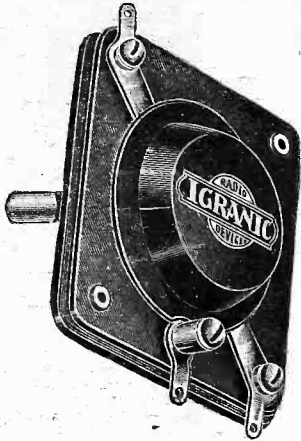
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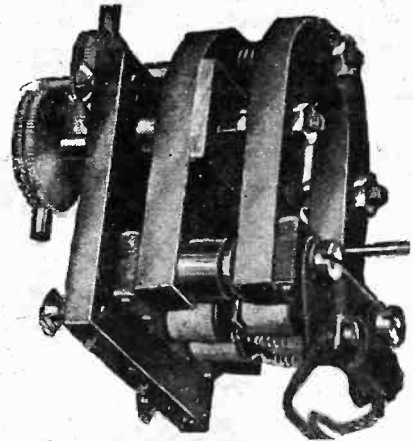
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*The Amazing Claim of
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It has recently been announced from [America that a scientist has produced life by treating dead matter electrically.] Of course, the claim has been made before, but in all these cases later and fuller investigations have shown that life was already in the matter treated.

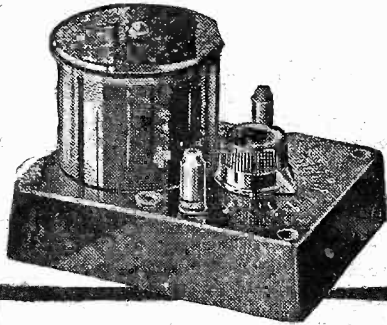
This revival of the attempt to produce life is interesting, but thoughtful people will remain sceptical unless confronted with undoubted evidence. The matter is dealt with in an interesting and readable manner by Mr. George F. Morrell, F.R.A.S., in this week's issue of THIS AND THAT. Order a copy from your news-agent at once and read Mr. Morrell's article.

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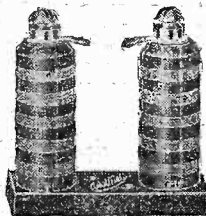
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IMPERIAL WORKS, HIGH STREET,
EDGWARE, MIDDLESEX.

M.C.18

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 888.)

"On going to test the last-named, by luck I knocked the panel of the set and to my surprise it burst into oscillation. I turned back the differential condenser and advanced it again, but the set would not oscillate till I tapped the panel with my hand, then it burst into oscillation again.

"I switched off, took out the differential condenser, looked at it, but could see no trouble, so I took it to pieces, and to my

"I have halved the aerial, reduced it, and clipped it until it resembled a rat's tail dangling from the terminal.

"The set has always delivered the goods from the foreigners, but never without the annoying escort of the local station. Often the local has been reduced to a whisper, and the foreigners coming in at good loud-speaker strength, gradually the local would become louder and louder, then finally dominate.

"Up would come the foreigner and do a similar performance. This see-saw, catch-as-catch-can wave-grip is very amusing!

"Other times the Continentals are loud and clear, but the moment you leave go the tuning knob it screams. Evidently the personal touch is necessary.

"Other times the foreigners come in groups, all hugging the one wave-length at various distances. This magic set has them butting into one another like cross-talk comedians. It is 'come one, come all,' without favour.

"It is also subject to moods. It will whistle, chirp, scream, howl, and roar like a Zoo broadcasting.

"The wave-trap is sacred ground. Touch the condenser knobs and it howls at you. It is only my sceptical nature that keeps me from believing that the thing is brutally human.

"Sunday night, after the Epilogue, the set is at its best. The Continentals come in with their merry music and bright tunes. (Calvin has lost his influence over there, which is different from the spirit that Knox about Scotland!)

"I am anxious to cut the local station, as the programmes have reached the acme of boredom, both National and local. Could 'P.W.' not suggest something really effective and cheap to put me above the blasts of those London concerts where dynamite is used instead of crotchet and quavers?

"I have a strong liking for my set. It has a punch like Carnera, and I want to reach out, but the local station won't let me!"

Oh, dear, P. F.! You are in a mess, aren't you? We are not at all sure whether it is quite as bad as you make out, or whether you have been unable to resist the temptation to describe your troubles picturesquely.

However, let us suppose you are quite serious about it all, and that your trouble is that nothing you have tried will cut out the local station. There are several possible causes for such a state of affairs.

The chief of them can be numbered under the following heads: an unsuitable (non-selective) aerial-earth system, poor spacing in set, poor quality tuning coil or tuning condenser (or both), direct pick-up on the coils, and local interference.

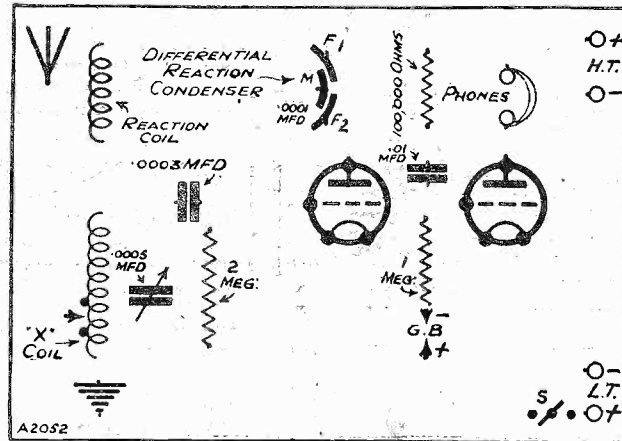
You do not say about how far your house is from the Glasgow station. If you are less than about one mile from it, it is quite probable that the whole trouble is due to direct pick-up on the coil.

This simply means that the distance is so short between you and 5 SC that the coils themselves are acting as an aerial and picking up the broadcasting. Consequently, nothing that you can do to the aerial itself will stop Glasgow coming in.

(Continued on next page.)

POPULAR "WIRELETS" No. 28

A DET. L.F. WITH R.C. COUPLING.



The "components" shown above are those for a straight detector and low-frequency amplifier employing resistance-capacity coupling and differential reaction. Can you "wire up" this circuit?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

surprise (and I expect yours when you read this!) I found black grease between the fixed and moving plates.

"I cleaned it off with clean rag, put it together again, put it in the set and switched on Oh, what a difference!

"I had to drop down 20 volts H.T. on the det. valve, and my word, it goes A1 now. (I have written to the makers about it, and they were surprised, and sent me a letter of regret.)"

A SELECTIVITY PROBLEM.

P. F. (Glasgow, N.).—"What can I do with the local station? Do what I may, it will come in; wave-traps, separators, and rejectors are of no avail.

"My set, the 'Magic' Three with all refinements, seems glued to the local station, Glasgow. My experience for over a year with all the gadgets offered by 'P.W.' for selectivity is a washout.

"Even the 'Contradyne,' that stout little fellow, isn't stout enough for the job, and as aerial traffic cop. the unwanted waves rush past him. The set is an excellent local station getter; all round the dial it thunders in. In fact, the dial isn't big enough to accommodate its scope.

"P.W." PANELS. No. 2.—YOUR AERIAL.

The wire should be of copper or other high-conductivity metal. (Phosphor-bronze and silicon-bronze, are excellent.)

Multi-stranded wire such as 7/22 is better than single-stranded wire of equivalent thickness.

There is no advantage in having several aerials parallel, a few feet apart and connected together at the lead-in, unless space is very restricted.

It is important to keep the aerial wire spaced well away from wet slates, roofs, walls, gutters and other conductors.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

To cure this trouble it is necessary to screen the coils with some form of metal shield.

You soon get a good idea if this really is your trouble by cutting out the aerial altogether and listening to see if you get the broadcast at more than weak strength without any aerial at all.

If so, you may be pretty sure that you will have to adopt some form of simple screening to cut out the programmes that arrive by direct pick-up in this way.

Of the remaining possible causes of the fault we rather favour the local oscillator as being your particular trouble, and this would account for the erratic effect you mention.

As you know, local oscillation is a simply hopeless thing to get over unless you can find out where it is coming from and use gentle persuasion; and if you come to the conclusion that this is the cause of your trouble, the best thing you can do is to write to the B.B.C.

If you find that disconnecting your aerial altogether and tuning the set without it results in the Glasgow signals going down to practically nothing at all (which is a sign there is no direct pick-up on the set), you should certainly be able to cut the programme right out by means of the Brookmans Rejector, if it is properly made.

We have tried this device in sight of the Brookmans Park aeriels (and Brookmans Park is a much more powerful station than Glasgow, with very much stronger jamming), and even on a simple circuit it was quite efficacious. But the simple instructions regarding operation, etc., must be carried out properly, and, of course, the components must be of decent quality.

If you are still unlucky for some reason—which we certainly do not anticipate, neither from our own nor readers' experiences—you could try the more elaborate and more expensive plan of getting extra selectivity by means of an extra aerial coil and tuning condenser, as referred to a few weeks ago in these columns in reply to E. J. S. (Cassisbury) ("P.W." No. 442, November 22nd, 1930, issue).

CURING INSTABILITY.

M. T. S. (Stretton).—"I get a bit of harshness on certain loud passages and when a little reaction is being applied, which I am told is through L.F. instability. I should like to fit an anti-motor boating device if you can give me the connections and components."

You need a resistance of 20,000 to 40,000 ohms and a large fixed condenser, 2 or 4 mfd.

The detector's plate lead which goes from the H.T.+ to the primary of the L.F. transformer should be broken. The resistance is inserted between this H.T.+ terminal and the L.F. transformer primary, and a lead is taken from the side of the resistance which is now joined to the primary, to the large condenser.

The other side of this condenser is then connected to H.T.—(or to any other point that is earthed). If desired the whole gadget may be made up as an external unit instead of being incorporated in the actual wiring of the receiver.

We are not sure, however, that your trouble is instability, as from your description it might be caused by overloading of the last valve, or by a rattling from a partly-loosened loud-speaker part, such as a clamping nut.

TRICKLE CHARGING FROM D.C.

W. R. C. (King's Lynn).—"I have been wondering if an accumulator could be charged from D.C. mains without any great expenditure.

"I recall in the past seeing that the negative main can be found by immersing the two wires with a resistance in circuit in water, the terminal showing the most bubbles being the negative. I suppose the negative would go to the negative terminal on the accumulator?"

"It would be interesting to read an article on charging accumulators from D.C. mains by this method as an article one of your contemporaries published required batten holders and board, and the lights apparently were simply wasted. The idea enclosed seems much more easy to wire, and using the water method of polarity makes it less complicated."

It is quite practicable to use a single lamp in series with the accumulator for charging. But while you are about it there is no need to go to even this trouble!

All the lights in the house can safely be used to charge the accumulator, if the "charging board" is wired in the earthed main. We ought, however, to repeat our usual warning that to interfere with the mains is likely to infringe the electric light company's

(Continued on next page.)



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It has probably never crossed your mind before. You have thought of batteries as "Technical" things—always regarded them as something "mysterious." The exact opposite is the case. Study the pictures on the left and you will see how really simple it is. You will need no expensive "plant" or machinery—only a few simple tools and hand presses. You need have no special accommodation—a start can be made upon your present kitchen table. The children can help you.

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You may know nothing about Wireless or Electricity—it doesn't matter in the slightest. We will tell you how to do it—FREE. After receiving our instructions you can start right away to manufacture! And the work is intensely interesting as well as easy; more fascinating than making your own Wireless Set! The saving is huge—an

average worker can complete a 60-volt H.T. Battery in 2 hours at a cost of 2/3 approximately! Compare this with Shop Prices!

MAKE YOUR FRIENDS' WIRELESS BATTERIES—AND MAKE MONEY!

Consider what this means to you. Not only can you SAVE money on your own batteries, and get BETTER results, but directly your friends know of them they will want some, too! Thus, you can begin to build up a Profitable Spare-Time Business and reap a Golden Harvest from the Wireless and Electrical Market. Many men are already making comfortable EXTRA incomes in this Pleasant, Easy Way.

There's MONEY in it—big money if you are energetic and anxious to get out of the rut! What could you do with £300 a year?

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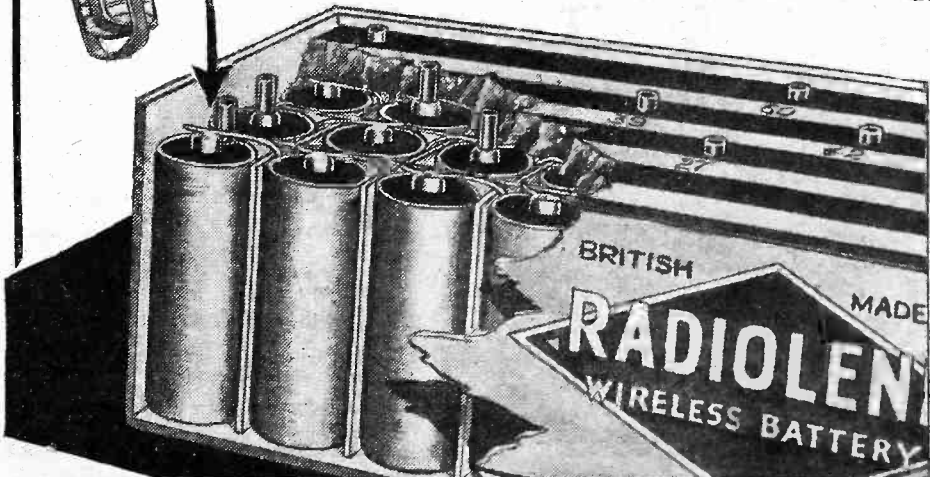
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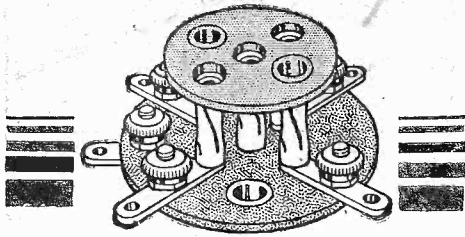
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"Popular Wireless," 17/1/31



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writes: "The two samples of the 5-pin type I have examined both show an insulation resistance of over 100 megohms, and, as the amount of dielectric used is very small, the dielectric losses must be a minimum. It is a pleasure to see a valveholder in which a great chunk of bakelite, giving large dielectric losses, is not used."

Modern valves do not require sprung valveholders. Because of the Resilient Sockets used in the Clix Valveholder, it is the only one giving perfect contact with SOLID as well as all other types of valve pins. Usual H.F. losses entirely eliminated. Sockets air dielectrically insulated and self-aligning. Impossible to blow valves.

Type B for baseboard mounting

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- 4 pin Model without screw terminals 8d.
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

regulations unless the alteration is carried out by a qualified electrician.

In any case, you will probably find that the electric light company should be advised of any such alteration before it is carried out.

To use the house lamps for trickle charging, all you need is a double-pole double-throw switch of suitable protected type, the centre contacts being joined in series in that main lead which is earthed. Two of the outer contacts are joined together so that when thrown over to this position the ordinary mains connection is restored and the circuit is exactly as formerly.

The other two outer contacts on the D.P.D.T. switch are taken to two insulated terminals to which the battery that is to be charged will be connected. The negative of the battery must go to the negative side of the leads, and when the switch is thrown over to this position all the current which is used in the house for lighting, etc., passes through the accumulator and charges it.

There is no difference on the light bill because you are not using any more current than formerly! but actually you do pay for the charging, by means of a very slight and unnoticeable reduction in the brilliance of the lamps.

Properly fitted by a qualified man such a circuit is perfectly safe. If used regularly, and the accumulator is in good condition, the ordinary requirements of the household will usually keep it well charged for a long time, without any other care.

It may need an extra charge very occasionally, if

AT HOME WITH RADIO STARS.

(Continued from page 869.)

is when I try to tickle people pink in broadcast comedy!"

While talking, Leonard had been turning over one or two pieces of sheet music, and in doing so he knocked down a pile of books. A big one fell at my hand, and I picked it up. It was on Christian Science.

"Why, what's this?" I asked. "I didn't know you were keen on Christian Science."

"Actually I'm not," said Leonard, readily enough. "But Laddie Cliff (I understudied him and used to write his humorous material) was once a keen Christian scientist; he may still be, unless he has fallen by the wayside."

"It so happened that one week when I was in the middle of writing an important sketch for him, and was doing several acts and broadcasts myself, my father was taken ill and died. Naturally I was very cut up about it, and it was really a big strain to prevent that sudden blow from interfering with my work; and stage work cannot stop, you know."

The Model Trombone.

"To cut a long story short, Laddie Cliff helped me through my troubles, and I found his philosophy very comforting. He gave me that book on Christian Science, and I only wish I had more time to go in for that kind of thing and make a study of it."

And as he said that he gave me the famous Leonard Henry smile—just that merry twinkle of the eyes which I cannot bring myself to think shields a too-serious mind.

Just as I was leaving, he unearthed from behind the typewriter a model trombone.

"I can get three notes out of this," he said. "Pip, pip, PIP. I've just bought it for sixpence. You wait. I'll have a deuce of a lot of fun with this!"

And I believe he will! That's what Leonard Henry is like at home.

BEHIND THE MICROPHONE.

(Continued from page 863.)

blocks off the high-tension from earth, but is designed to pass the high-frequency currents. It has not only to pass high frequency, but also to "stop" the low. Just before zero hour this carefully chosen condenser broke down.

In a great hurry, and with all that "wind up" feeling I was to find so familiar in later days, we substituted another, but 100 times too big! The programme went out. There cannot have been a modulation frequency above 1,000, there cannot have been a depth of modulation beyond 20 per cent.

But something went out! No! We were not satisfied, although we pretended to be. We treated indignant letters from amateurs with an uneasy hauteur. We investigated, waved neon tubes, W. T. Ditcham came up and investigated and waved neon tubes, we all investigated and said it must be all right, and knew it was not.

Two programmes later, H. L. Kirke found it and we yelled! A yell composed of part horror, part joy, part shame—it's very difficult to yell like that, but we did a lot of very difficult things in the early days! Let me tell you more later on.

TECHNICAL TWISTERS

No. 44.

Electro-Motive Force (E.M.F.) CAN YOU FILL IN THE MISSING LETTERS?

The unit of electro-motive force is the

It is the force required to make one flow through a resistance of

An instrument capable of measuring electro-motive force is called a

The E.M.F. of the ordinary dry-cell is

Last week's missing words (in order) were: Plate (or Anode), Grid, Assist, Oppose (or Impede, or Hinder), Coil, Capacity, Resistance, Impedance, Grid, Plate (or Anode), Coil.

little "juice" is used, but if an electric iron or similar equipment is used it is quite likely that the trickle charging will be sufficient to keep it permanently up to scratch.

IMPROVING THE EARTH CONNECTION.

G. R. L. (Bromley, Kent).—"Back in the summer I saw in 'P.W.' a stunt about running the earth lead through a ventilating brick. At the house I was living in at the time there was no brick suitable, but since then I have moved, and now I would like to try it."

"My earth wire is only eleven or twelve feet long, from the earth terminal to the side door through which it passes to the flower-bed, but I find that almost under the corner where the set stands there is a ventilating brick. This would certainly be quite a bit shorter, but I cannot see the method of passing the wire through the brick. How is it done?"

The ingenious stunt to which you refer was simply an account of how one wily "P.W." reader shortened his earth wire by drilling a small hole through the floor board on a line with the ventilating brick, and passed a string through the hole, allowing it to hang down under the floor.

Then, by means of a bent wire passed through from outside the ventilating brick he picked up the string, tied the earth wire to the inside end, pulled it through to the garden, and thus made a short and satisfactory earth lead direct from the set, through the floor and ventilating brick.

FOR THE LISTENER.

(Continued from page 868.)

It is all very difficult; and I hope that those who are responsible for these productions will not be discouraged.

"Comedian, Know Thyself."

Amateur actors are always advised to steer clear of "West End successes," partly because they invite comparison, and suffer by it—I also think that comedians, who are not yet first-rate, might be advised to avoid songs which are great "successes."

For example, "Happiness Pie" is a fine song, and is superbly rendered by Layton and Johnstone. I heard them sing it from the Palladium the other day.

I also heard it sung twice in the three following nights by others. Comparison was inevitable; and rather disastrous to the "would-be's."

A song should be sung because it suits the singer's style, and is within his power; it is dangerous to sing it for no other reason than because some other singer has made a hit with it. Comedian, know thyself!

Joffre's Broadcast Tribute.

The B.B.C. may be depended upon to rise to the occasion, especially if it be a solemn occasion! There was a simple dignity about the tribute which General Maurice paid to the memory of Maréchal Joffre, which was entirely becoming.

He was a brave soldier, and much beloved as a man by all who knew him. His strength lay in his judgment of men; his weakness, a lack of imagination.

His imperturbability stood him, and us, in good stead in those early anxious days; and the enviable pinnacle of his fame is that he will always be associated with the Marne where the rising tide of defeat was first turned.

Diamonds and Ethiopia.

Major Trevor took us down a diamond mine, and the Baroness Ravensdale conducted us through the coronation ceremonies of the Emperor of Abyssinia. It was interesting to compare the different methods of these two descriptive reporters.

Major Trevor, simple, direct, matter-of-fact, and without any attempt at flourish, made a scene live; Baroness Ravensdale, with a much more highly coloured and emotional narrative, rather confused her picture. Simplicity scores every time.

I saw the mine, but I did not quite see the coronation. I saw the diamonds on the sorting table, but I did not quite see the jewels on the Ethiopian princes.

Major Trevor got his effect because he was not anxious to make it; the Baroness missed a good deal of her's through a wish to be impressive.

The Flute.

I like the flute. I like Albert Fransella playing the flute. Whether he is playing a valse or a cavatina, it sounds like birds in a wood; and I get lovely images of trees and glancing sunlight and wet leaves.

Unemployment.

I commend to you the talks on this very pressing and difficult subject by Professor Henry Clay. He has a sympathetic voice, a lucid style, and knows what he is talking about.

In my "fat" days I sometimes smoked a cigar called "Henry Clay."

He was just as good as the cigar!

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P.W. 17/1/31

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TECHNICAL NOTES.

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

HOW MANY H.F. STAGES?

One Stage Usually Sufficient—The Extra Grid—Neutralising—Limit of Efficiency—Use of a Third Grid—Secondary Emission—Magnification Factors—Changing Over—Improving the Receiver—De-coupling—Voltage Dropping Resistances.

EXPERIMENTERS and constructors who are tempted to go in for screen-grid high-frequency amplification, and who have, of course, been previously used to ordinary straight H.F. amplifying stages, are often puzzled to know whether they should confine themselves to a single stage of screen-grid H.F. amplification or whether they should try a couple of stages.

One Stage Usually Sufficient.

This depends a good deal upon conditions, but you may take it that in general a single stage of screen-grid H.F. amplification will be sufficient. You have to bear in mind that the magnification factor of this valve is enormously higher than that of the ordinary straight H.F. amplifier.

For instance, in the old days, a high-frequency amplifier might have an amplification factor of perhaps 15 or 20, and although two or more could be used, coupled by H.F. transformer or tuned-anode arrangements, the amplification was not very tremendous; in fact, it fell very far short of calculations.

With the screen-grid valve the position is very different and, as I say, owing to the enormous amplification theoretically obtainable, and even allowing for a considerable discount from this in actual practice, one stage is ample for the vast majority of purposes.

The screen-grid valve, judging from letters which I receive from readers, still seems to be something of a mystery to them, and, owing to the little extra circuit arrangements involved, people are often deterred from using it. There is no serious reason why this should be so, however, and in point of fact the screen grid is extremely simple in principle and by no means difficult to operate in practice.

The Extra Grid.

The essence of the screen-grid valve, of course, is the introduction of an additional or second grid which is interposed in the valve between the ordinary grid and the anode. Perhaps it may be useful to many of my readers if I just indicate briefly what is the function of this extra grid.

You know very well that one of the main drawbacks, or should I say limitations, of the ordinary straight H.F. amplifier is the internal capacity between the grid and the anode. This capacity has a similar effect to ordinary capacity reaction and places a limit upon the value of the amplification factor which can usefully be given to the valve; if the amplification factor is unduly raised the valve simply sets into oscillation by reason of the capacity effect between the plate and grid which, as I say, produces reaction.

Neutralising.

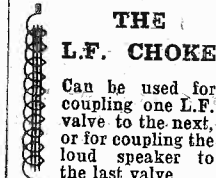
This trouble has been known for a very long time, and, as most of you are well aware, it has been overcome by means of a neutralising condenser employing the so-called neutrodyne circuit. The neutrodyne arrangement is perfectly satisfactory and

very simple, but the screen-grid valve produces the same sort of effect—only better, and permits of very much higher amplification factors.

By putting in the extra grid between the ordinary grid and the anode, the oscillation current (or capacity current, as it is sometimes called), which previously was liable to be set up between the grid and anode, is intercepted by the second grid, and so the oscillation is prevented.

Of course, the extra grid, or "screen grid," is connected to an electrode passing through the valve, and is usually connected to a high-tension voltage tapping. I should mention that the screen grid only screens the anode and the ordinary grid *within the valve*, but the reaction between these two electrodes may still take place at other parts *outside* the valve, and therefore it is very

desirable to screen them from one another outside the valve altogether.



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Limit of Efficiency.

In considering the screen-grid valve you might think that the limit of efficiency had been reached when

the extra grid had been interposed between the ordinary grid and the anode, so as to cut out capacity reaction. But whilst it is quite satisfactory and, in fact, remarkably efficient for high-frequency amplification, you will notice that some of the emission current, on its way to the anode, will be trapped by the extra grid or screen.

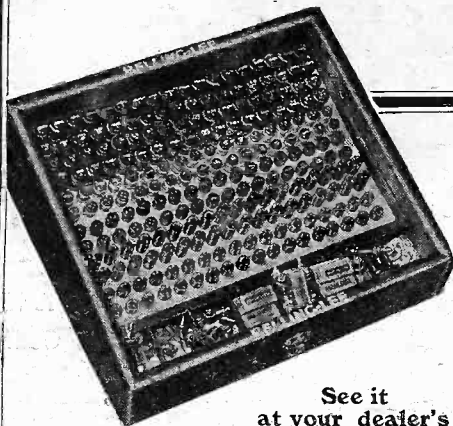
This is not all, for the anode itself emits electrons when the valve is in operation, this being what we may call "secondary emission" and due to the bombardment of the anode by the electrons from the filament. Now some of these secondary electrons will pass away from the anode to the screen, whilst the electrons constituting the emission or anode current are passing towards the anode.

Use of a Third Grid.

Consequently in the space between the screen grid and the anode we have electrons passing in opposite directions, which state of affairs naturally reduces the efficiency of the valve altogether, in addition to the fact that a small current, sometimes called the "screen current," is actually being lost in the screen grid itself.

Therefore, it occurred to valve designers to interpose an additional grid—that is, a
(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

third grid, this time between the screen grid and the anode. This grid is connected (inside the valve) to the filament, and it has the effect of preventing the passage of the secondary current mentioned above, or at any rate of limiting it to a small part of the region between the anode and the screen grid.

Secondary Emission.

The effect of this additional grid is to increase the output of the valve very greatly, and inasmuch as the valve now has five electrodes, it is called a "pentode."

Since the additional or third grid is connected inside the valve to the filament, no additional contact outside the valve is necessary, and so the pentode has the same five external connections as the screen-grid valve. In fact, we may regard the pentode as being in effect a screen-grid valve which has been modified internally in such a way as to reduce its impedance and enable it to handle a much greater power output.

Magnification Factors.

I have dealt at some length with the screen-grid and pentode valves, because I receive many queries from readers on this subject, and before leaving it I should perhaps remark upon a point which is most frequently raised, and that is the question of using a pentode valve instead of an ordinary power or super-power valve. The point about the pentode valve is that, whilst it is designed for low-frequency amplification and gives a fair output, its magnification is quite large.

This means that it will give the greatest output of which it is capable with a comparatively small input, but it does not mean that you can then increase the input and obtain corresponding larger output, because the valve simply becomes overloaded. The great point to bear in mind about the pentode is that it is an economical and efficient valve if you want magnification at a single stage from a small input to a reasonably large output.

But if, on the other hand, it is large output that you want—larger than the pentode can give without distortion—then you will be better advised to turn your attention to L.F. amplification in the ordinary way by means of L.F. and power stages.

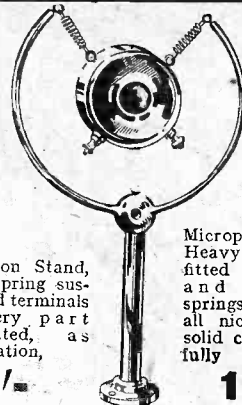
Changing-Over.

I suppose one of the most frequent queries one gets lately in connection with radio receivers relates to the change-over from battery operation to mains-operation. You might think that this was a perfectly simple matter, involving nothing more than the substitution of the unit for the battery.

But in actual practice, as often as not, various little incidental troubles arise and these, although not in themselves serious, are apt to be very perplexing and sometimes very disappointing to the owner of the set. For instance, you fit up a nice H.T. unit, designed to give 150 volts (whereas the old dry battery only gave 100 nominal and about 75 actual!) you rub your hands and look forward to the set standing on its head or doing something else really wonderful on the strength of the extra 50 volts.

(Continued on next page.)

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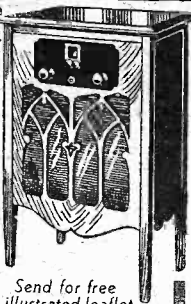
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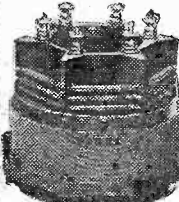
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TECHNICAL NOTES.

(Continued from previous page.)

Actually what you get may be nothing more than a succession of howls and motor-boating and, do what you will, nothing apparently will induce the set to behave itself as formerly.

Let us just look at the situation carefully and we will readily see what are the causes of the trouble.

Improving the Receiver.

In the first place, the mere fact that you are applying substantially increased voltages to the anode circuits and that you are thereby almost certainly obtaining a great increase in the efficiency of the set is in itself a reason why defects in the receiver—formerly unnoticed—may now make their presence very pronounced.

It is, I think, true to say that in a great number of receivers there is quite an appreciable amount of back-coupling at various points, and the only reason that this does not make itself evident is because it is kept in a state of abeyance, as it were, owing to the comparative insensitivity or efficiency of the receiver.

The moment you increase the efficiency of the receiver to any appreciable extent, out come the defects at once.

The foregoing is what we might call a general reason for the change in the behaviour of the set. It is not peculiar to the mains unit and the troubles might, in fact, come into evidence in just the same way if a couple of fresh H.T. batteries were installed giving the same H.T. voltages as the unit.

Now we turn to particular reasons, which are definitely associated with the unit, as distinct from the battery.

De-coupling.

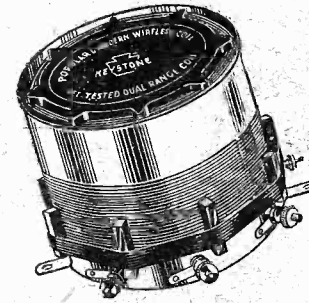
As you know, the unit often has the effect of causing back-coupling and howling in the receiver owing to the fact that it supplies the anode circuits of different valves; the back-coupling therefore takes place via the unit itself. It is true that this may and sometimes does take place even with a dry battery, but with a fresh battery of low internal resistance the effect is negligible.

Again you may say that in any case, even though there is a certain amount of coupling brought about by the connections to the unit, the set itself should provide sufficient de-coupling to overcome this. But there again, as I mentioned above, you come up against the fact that in many sets de-coupling is not sufficient, and this insufficiency of de-coupling is not in the ordinary way evident, owing to the fact that the receiver is being operated usually much below its maximum efficiency.

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The presence of resistances in the unit, which is the usual way of obtaining different voltage-tappings, produces in itself a liability to low-frequency oscillation or howling and, as I pointed out some little time back, it is very important that these resistances be properly by-passed.

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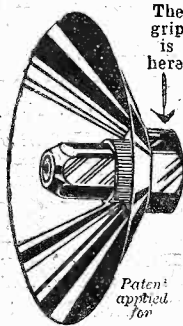
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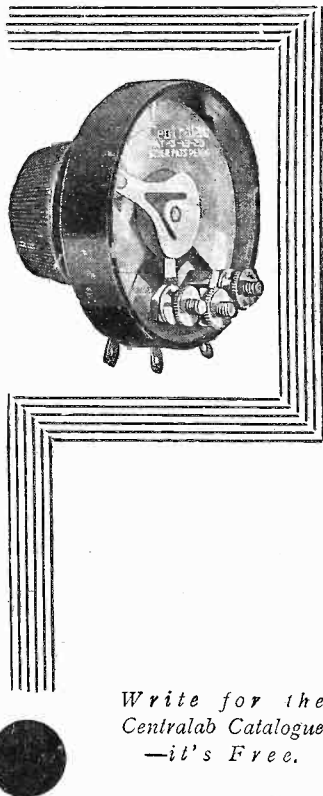


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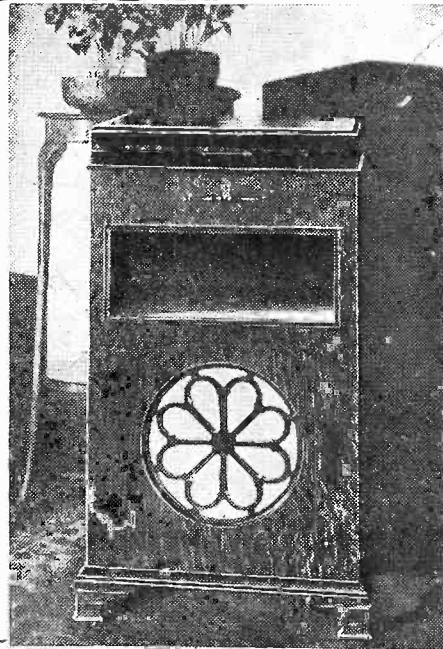
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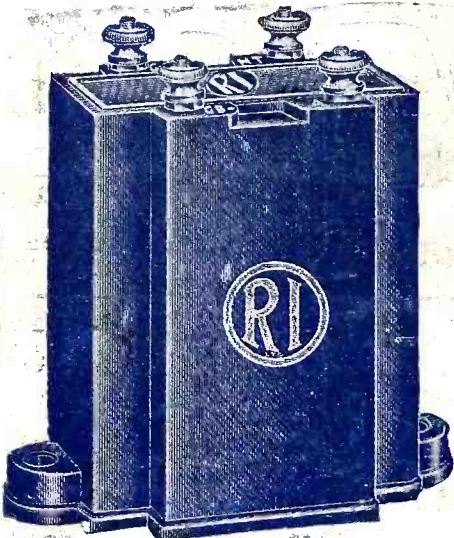
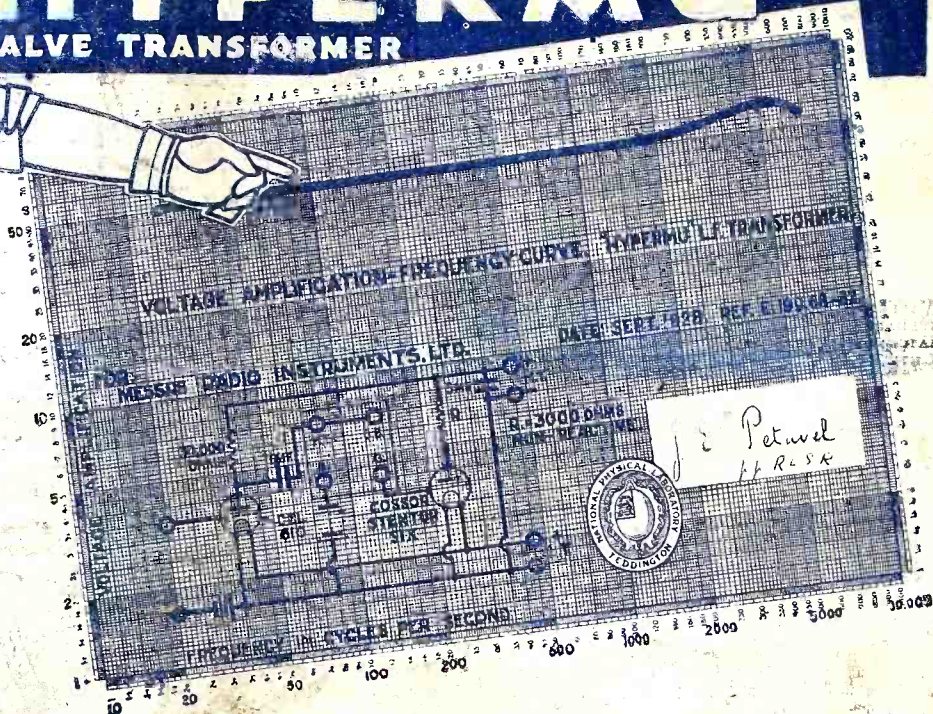


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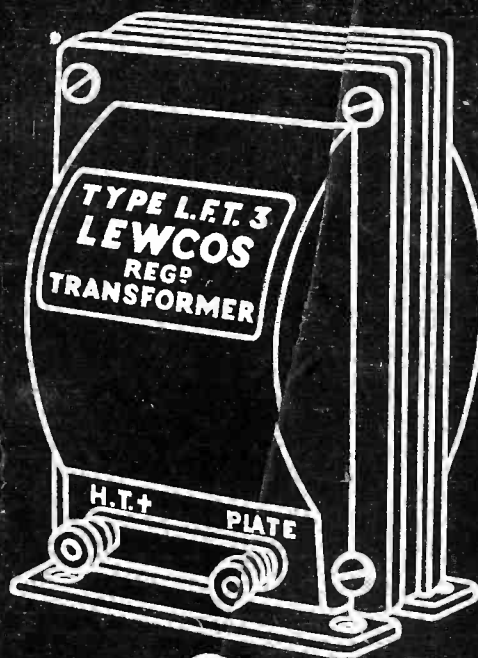


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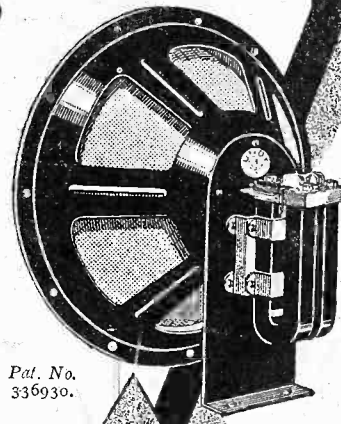
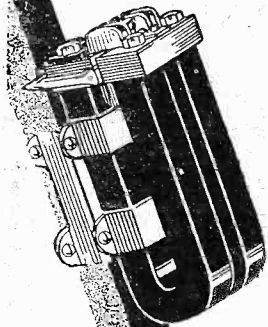
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Best way to all Stations

The Crucial Test



YOU have noticed the "pom pom" of the double bass in reception. This gives the rhythm to music, without which it becomes monotonous. There is also the rhythmic support of the other basses which, if absent in orchestral or band music, leaves it as uninteresting as a one-finger pianoforte recital. **Inferior transformers do not register these frequencies adequately.**

THE CRUCIAL TEST. Every R.I. "Madrigal" Receiver is tested at a number of points for frequency response from 50 to 6,000 cycles—the indicator shown in the illustration gives the measure of response at the various test frequencies. In a similar manner every "Hypermu" and



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L.F. INTERVALVE TRANSFORMER

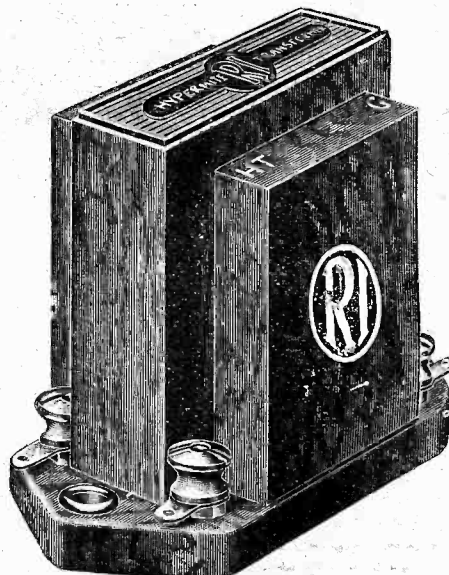
IS TESTED on the same frequency-response equipment, which is, in effect, a complete receiver, with the addition of an indicator as shown in the illustration. **THEREFORE THE TRANSFORMER HANDED TO YOU BY YOUR DEALER HAS ACTUALLY BEEN TESTED IN A COMPLETE SET.**

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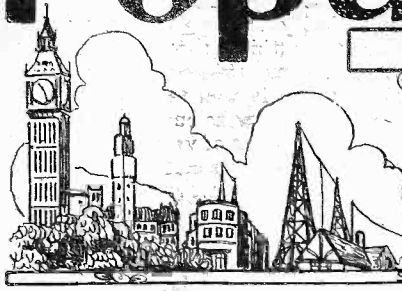
Primary inductance 85 henries. Ratio 4 : 1. Weight, 13 oz. List No. DY 15.

21/-

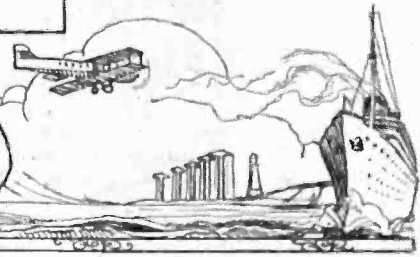
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BRAVO JACK!
SOCIETY NOTE.
CHI HOA! WHAT HO!
AND ICELAND, TOO!

RADIO NOTES & NEWS

TOO MUCH BRASS.
VALVE BARTERY.
HOW IT PANS OUT.
WHY "FRET"?

Bravo, Jack!

ANOTHER miserable confession! After eschewing dance bands for years I have at last tumbled down before Jack Payne's bunch of merry minstrels, and now look forward to hearing them. It may be weak and lowbrow of me, but at least I can claim the virtue of my candour in admitting my conversion, and I should hasten to point out that this little human flop of mine must by no means be taken to mean that I forswear my ancient gods, Beethoven & Co. Nunno! It's merely a proof of my catholicity of taste. So, bravo, Jack! But you'll have to do something for that shortness of breath which I observe when you make an announcement 'tween jazz and jazz!

Radio Society Note.

IHAVE been favoured with a copy of the 1930-31 syllabus of the Golders Radio and Scientific Society. It takes us to June 21st, and that alone is something to think about in this weather. And what a syllabus it is! Visits to Brookmans Park, Croydon Air Port, the N.P.L. and the H.M.V. works; a dinner, a dance and a D.F. competition; lectures, demonstrations and so forth. Someone at G.G. knows how to organise.

Can It Be Tried?

ILEARN that in Canada daily information is broadcast about unemployed people and what they can do, so that employers wanting staff can get quickly into touch with the men who want the posts. I really do not see why something of the kind cannot be done here—I have mentioned it before—especially as we should be quite willing

to sacrifice the School Talk or Foundations of Music for the sake of the unemployed.

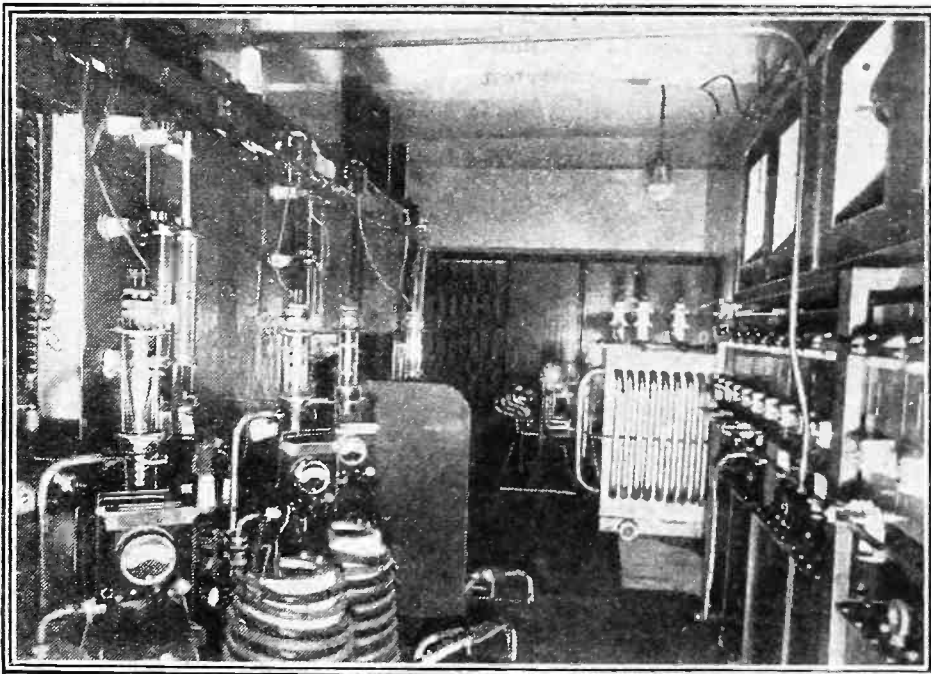
"Mike" Fright Vanished?

COLONEL BRAND, the handsome, urbane receptionist of the B.B.C., has resigned for lack of a job. No longer does the professor perspire, the singer twitter with stage-funk, or the comedian play castanets with his knees when he finds

no aural evidence—that away down in Indo-China, to wit, at Chi Hoa, near Saigon, there is a lovely, powerful short-wave broadcasting station, with a wave 49.1 metres long and a call-signal P K 3 A N. What could be nicer than that? Listen for announcements in French, English and Chinese: the Chinese you will recognise by its similarity to Japanese (Ha! ha!). In the intervals a bong on a gong will strike

the awful hollow of thine ear (Shakespeare nearly!). Well, who will be the first to write and tell me what the Chinese sounds like?

HAVE YOU HEARD ICELAND?



This view was taken at the Iceland broadcasting station, situated about 5 miles from Reykjavik on a hill-top 500 ft. above sea-level. The station will transmit its programmes on 1200 metres, and also work telegraphy to ships on 600 metres outside broadcasting hours.

And Iceland, Too!

THAT paragraph reminds me about the Iceland station which, as I write, is not in action, though from reliable accounts it may be expected "on the air" any day. Interception of this newcomer will not be easy in these parts as the wave-length will be 1,200 metres and the announcements will only occasionally be made in English. However, it is worth while keeping an ear cocked for it, as a curiosity for the log-book.

himself staring at the microphone. Familiarity has bred contempt. The only snag in the argument is that assuredly the B.B.C. does occasionally present newcomers to the microphone. Are we to understand that they derive vicarious courage from the "old-timers," or do the announcers support them on their way to and from the studio?

Chi Hoa! What Ho!

NOW then, you past masters of manipulation, here's a job worthy of your notice. They say—though I have

Gleaned from "the Trade."

ACCORDING to a trade paper a Southport dealer has adopted the slogan, "A home w/out radio is as bread w/out butter." That will remind many of us old 'uns of the early days of the phonograph, when we were told that "a home without a talking-machine is like a home without a mother." The same paper reports the disappearance of a portable gramophone from the shop of a Liverpool dealer—a magistrate, humorously enough.
 (Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

It is thought that someone just blew in, lifted the article, and calmly walked out with it. Very feasible! That's the simplest way of looting it is possible to conceive.

Too Much Brass.

I HEAR my Yorkshire friends cry "Impossible!" but they are referring to t'brass which makes the mare to go, whereas I allude to the brass bands with which we listeners are so frequently regaled by the B.B.C. As the "Northern Echo" truly says, "Their brassiness is too brazen." Many people, no doubt, "like a good band," they like the machine-like precision of the players and perhaps conjure up visions of happier and warmer days on the seaside esplanades. But I consider that they do not come over well and, in fact, are often repellent. A little less of them is all I ask.

Soldered or Attached?

IN an attempt to pander to my weakness for criticising newspaper wireless, for which effort I am grateful, N. W. (Falmouth) sits rather heavily upon some wretched scribbler like myself for advising readers to "attach" a wire to some terminal or other. He thinks that the word should be "soldered." A trifle strained, N. W., for a wire which is soldered to something is attached to it, and a wire which is attached to something may be soldered. However, I agree that soldering is the best way in most cases, though as an old-timer, I consider its importance to be overrated. Thanks for the anecdote about the uncle who asked why you don't run your set off the gas mains!

Valve Bartery.

N. W.'s letter is such a friendly thing, just like radio gossip over a pipe and a pint, that I'm going to cull some more blossoms from it. About three weeks ago, he says, the Regional afternoon programme stopped, when a voice said, "Hullo!" thrice. Did any other reader hear it? Well, all who were listening must have heard it; 'twas doubtless a slight hitch in connection with the landlines. As to a Valve Bartship, me lad, your 61 logged stations declare you to be a tophole ether-strainer, but "quality before quantity" is the slogan of the Order. I have not had an Honours List for many months; where are all the one- and two-valvers?

How It Pans Out.

NOTHING like hard facts for crushing critics. The B.B.C. Year Book gives percentage figures which are astounding. For example, we learn that during the past year 21.39 per cent of the National programmes was occupied by "Serious Music," and 18.3 per cent by "Light Music." Dance Bands took up 10.5 per cent. Query: Does a dance band play "light" or "serious" music, and is Beethoven's Seventh Symphony, which Wagner called "the apotheosis of the dance," serious or light, by B.B.C. standards? Oh dear! Here's "Pictures"—by which I presume is meant Baird's flickers—with 4.37 per cent as against "Drama" with but a meagre 1.88 per cent. The much maligned talks and readings took up only 9.1 per cent.

Public Radio Clock.

DOES Hythe, Hampshire, hold the record for being the first place to have a public radio clock? That is the claim which is advanced by the village, anyhow. The clock's face is 3 feet in diameter, and is electrically illuminated at night. It delivers the strokes of Big Ben and the six "pips" of G.M.T. through a loud speaker. It is automatically regulated by Big Ben. In addition to providing Hythe with this curiosity, the inventor runs a wireless exchange for over 100 subscribers. Good man!

Radio and the Metal Industry.

THE U.S. Department of Commerce issues some remarkable figures showing the debt of the metal market to radio. In the States more than three million sets are made annually, for which steel, the metal most widely used, is consumed to the

SHORT WAVES.

TELEVISION DISPUTE.

This must also be looked into.—"Daily Mirror."

We recently read of a man who connected an indoor aerial to four separate receiving sets and reproduced simultaneously four distinct broadcasts, each from a different country.

Ours sounds just like that, too.

USEFUL INFORMATION FOR THE HOME CONSTRUCTOR.

"A bolt is a thing like a stick of hard metal, such as iron, with a square bunch on one end and a lot of scratching wound round the other end."

"A nut is similar to a bolt only just the opposite, being a hole in a little chunk of iron sawed off short, with wrinkles around the inside of the hole."

"What particular qualification for broadcasting do you claim to possess?"

"As an actor, I am accustomed to perform before invisible audiences."—"News of the World."

A lady correspondent writes to say that her portable wireless set, which was leaking without her knowledge, has been responsible for burning a large hole in her new drawing-room carpet, and she asks whether we think she should claim compensation.

Well, she might put it to the acid test.

ATMOSPHERICS.

Mercury was a giddy young lad,
The fleetest scout that Olympus had.
I warrant that you could often find him
With a nymph on the pillow seat behind him;
So I'm not surprised if his noise and din
Should worry mere mortal listeners-in.

But Venus is gentle, as well as fair,
And, whatever our experts may declare,
I can't believe that our atmospherics
Are due to that goddess' wild hysterics.
Though there may be stories about her past,
She's a perfect lady from first to last.
—"Morning Post."

extent of 110,000 tons; more than 1,600 tons of this is in the form of nuts, screws and washers; the rest in bar and strip. Copper is taken to the amount of 12,000 tons; aluminium, 4,000 tons; tin, 1,800 tons; nickel, 1,500 tons, and zinc, 1,200 tons.

Radio Means Riches.

A REPORT from Canada states that the North Monaghan Council has ruled that the possession of a radio set will debar a resident in the district from receiving unemployment relief. Here is a new criterion of solvency indeed!

Those Wonderful Years.

H. A. C. (Leicester)—our Naval Correspondent who admired the navy's W/T but not its grub!—asked when the story of my radio career was to be published. A number of other readers showed a baleful curiosity to peep into my past. Well, I began to think that somebody is hoping to get some evidence against me and that I should do well to run over my history, in order to make sure that all my passages with the police of various countries were finally closed, before coming into print with my memories! However, the truth is now out!

Metallic Fret Covers.

A READER of Fleet (Hants) says that he cannot conceive how any material "west of the detector valve" could affect selectivity. Neither can I at the moment, though I am hoping to learn from W. H. F., who asserts that metallic covers on loud-speaker frets affect both selectivity and volume. Some possible screening effect in the case of portable receivers is the utmost which I can imagine, pending the receipt of more facts. Surely the hindrance caused by the fret and its covering to the free outward passage of the sound waves would be negligible. Anyone else want to speak?

The Changing World.

ONE of the most striking things in the present march of humanity is the rapid way in which the ancient peoples of the East are assimilating Western ideas and adopting Western methods. After Japan emancipated herself there was a long period of quiescence, and it took a world war to rouse the sleeping Oriental. All this because I have just heard that the King of Hedjaz and Nejd has ordered fifteen wireless stations from Marconi's, including one for Mecca. One thing remains, however. No unbeliever may enter Mecca, and so Marconi's have got to produce a Moslem engineer!

Programme Notes.

TWO notable persons worth hearing: On January 23rd Madame Karsavina will be heard in the "Yesterday and To-day" series, and on February 7th Sir Arthur Quiller-Couch, beloved as "Q" the writer, will speak at the Dickens Fellowship dinner. By the way, I am told that Mr. Arnold Trowell, who is Principal Professor of the violincello at the Guildhall School of Music, and who is playing on January 31st in a concert which is to be broadcast from Belfast, can take a fiddle between his legs and play a violin concerto. What a chance for television!

The School Gasometer.

THE programme of broadcasts to schools for the Spring Term is now ready and may be obtained free by anybody who is interested enough in the plot to ask or write for a copy. Oh, what a galaxy of heavyweights has been marshalled in array against the little nippers! How the kids will love to hear "Der Nibelungerheld" read in German and the talk on "The Cotton of the Sudan"! "Schools and Scholars in East Africa" will keep them from shuffling their feet, and Mr. Lloyd James on "English Speech" will make them love radio better and better every day.

ARIEL.

BEHIND THE MICROPHONE

BY CAPT. P. P. ECKERSLEY M.I.E.E.

In his second article our Chief Radio Consultant gives you some further amusing and interesting reminiscences concerning his pioneer days at Writtle.



I TOLD you last week some of the trials and tribulations of early days. I told you of the first broadcasts from Chelmsford and the first regular programme broadcasts from Writtle. I told you (and it is the first time it has ever been published) the dark story of the 100 times too big condenser.

Writtle—a long, low hut full of long, low people—suddenly finding fame for half a crowded hour of glorious life every Tuesday at 8 p.m. precisely. A chop and a beer at the pub, some six of us, and back through the mud, and the “dark” lantern showing us the way, overcoated and rather happy.

Through wet grass to the army hut, and then to crank up the engine. This is reluctantly coaxed from immobility to a shattering roar, the lights go up 10 T.U.'s and generators begin to squeak over.

Two Emma Toek!

Switch after switch chases power into the proper circuits, valves crinkle into a glow, high tension, and a sluggish meter shows us four magnificent aerial amps. (But never worship the amp, it's power that counts!)

Gingerly I pick up the microphone, gazing out across the field to the lighted orange window of the receiving hut 50 yards away. “Hullo, Ash! Hullo, Ash, is my speech O.K.? Hullo, Ash, O.K.? O.K.? O.K.? Hullo, hullo, 1, 2, 3, 4, 5,” ad lib.

And a bald head intersected by the bright bands of the telephones nods a welcoming “Yes”! The test is O.K. Shut down. Anxious eyes on the station clock (alarum, 5s.). Tick, tock, tick. Ready. On, O.K.? (Whisper)

Kirke nods, his eyes on every needle. “Hullo c.q. Hullo c.q. This is WRrittle calling; 2 Emma toek WRrittle. I hope you are hearing me, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Hullo!” And so on for a minute.

A One Man Opera

“Our programme to-night begins with two gramophone pieces played on H.M.V. record No. 37658192. Oh! Tolle Wollli. Sop. Edith Swinger with Orch. Patent No. 92315. disc stamp 77866666606.”

You've no idea how much reading matter there is on a gramophone record.

As time went on we became more ambitious. Lampoons, rhymes, plays, singers, gongs, noises off; the B.B.C. has never had a programme idea that had not its embryo conceived at Writtle!

Once the artistes failed. Fog! Dense fog! I was in London at 5.30, arrived Chelmsford by train 7.40, drove a motor-bike through the thick fog (and Ashbridge frozen with fear and cold in the side-car) right up to the

door, flinging myself on the microphone (at 8 precisely) and gave the whole programme myself! It was, I remember, an opera!

My reputation for leg-pulling got me one of the most amusing postcards of my life. A certain singer came to sing, and sang. The programme was reminiscent of some of the dirger Sunday type we are so familiar with to-day.

Even I became a bit depressed. My joy was in inverse proportion to my sadness of the night before, when next day someone wrote to say it was the best burlesque I had ever given!

The Louder the Clearer

And another singer who had the somewhat unscientific idea that the louder he sang the more clearly would he be heard in far-away Europe! The wish was perhaps father to the thought, because he had left a bride to come to our barbarous land. If the wish were father to the thought, it was at any rate factual enough to count upon the equipment—more power, outside a sergeant-major, I have never heard.

It was such a surprise, too, because his intentions were not revealed to us, due to the lack of a common language. Nor did his accompanist (who was, incidentally, very charming, and caused havoc among the staff) reveal anything of the plot.

Going All Out

It was the duty of one of us to hold a microphone in front of the singer. That night our trustworthy and well-beloved Kirke was chief microphone bearer. The opening bars were played. A whistling sound and the banging of windows heralded the singer's cataclysmic intake of breath, but Kirke and microphone went hurling backwards as the exhalations were caught in the powerful vocal chords of this tremendous lover.

Every needle of every instrument flicked hard over, the engine groaned, sparks flew from here and there, the staff was seen running for blankets to damp the microphone. I wonder did the waves ever so faintly titivate the charming ears of the far-away bride? At least, there was some fulfilment under the vaulted roof of the

Heaviside Layer.

Good days, dear days, and everything so new and untried and spontaneous. Wynn with a new doggerel, MacLarty with a new inductance, Ashbridge getting his circuits purer every day.

Vast, long, windy arguments putting volts and amps in their proper place, patient improvisations to measure things and a steady and growing knowledge. It was surely a fitting cradle for the two Chief Engineers of the B.B.C.

Excelsior!

But we spend too long in the Elysian fields; the stiffer climb awaits us, and we must leave the childish and vivid realities of the beginning, for the more breath-taking lower slopes where we started to carry that “banner with a quaint device to regions full of snow and ice?” (Is that right?)

Perhaps not. My style will, I am sure, improve as I begin upon that more serious matter “British Broadcasting.”

A STAR'S EARLY BROADCAST



The Prime Minister of Mirth broadcasting from the old Marconi House studio. Note the old-fashioned hanging microphone.

DARK DAYS AHEAD FOR RADIO

By THE EDITOR.

Until 1932 it seems little can be done to relieve the congestion in the ether, and yet more stations and more power are being thrown into the ether all the time.

It is interesting to note that some of the daily newspapers are beginning to wake up to the fact that a very serious broadcasting situation is rapidly reaching a climax.

The newspapers can be very useful in making the public, and more particularly the authorities concerned, realise that the recent trouble over the Mühlacker station was but a foretaste of what we must expect unless something is done, and quickly at that, to prevent, not only further "unlimited" congestion in the ether, but to devise some efficacious and international plan for the limitation of power of broadcasting stations.

Springing Up all Round.

Stations are not only springing up all over the Continent, but over-enthusiastic emulation of our own Regional scheme seems to have given many European broadcasting authorities a power complex of a most pronounced kind. What the upshot will be it is easy to forecast when we consider the following facts:

At the International Washington Conference in 1927 wave-length bands were allotted to the mercantile marine, commercial services, air-craft, etc., etc., including broadcasting.

The latter obtained a wave-length band between 200 and 545 metres and 1,340 and 1,875 metres. Experience has since shown—as many critics pointed out at the time, including writers in this journal—that the broadcasting allocation was insufficient: there was no adequate allowance made for expansion of broadcasting services throughout the world. The U.S.A. suffered first; now, it seems, it is Europe's turn.

To begin with, the so-called "short" band can accommodate only 106 stations; the "long" band can take seven. A total of 113. In practice to-day there are, approximately, 200 odd broadcasting stations in operation in Europe alone, and many more are shortly expected "on the air."

"Over Taxed."

Under the Prague plan, as our readers will doubtless remember, 26 European stations shared these "short" and "long" bands, but since the plan was agreed upon it has been broken a score of times: several new stations have crept into the broadcasting wave-length bands—where they have no right to be—and to make matters worse, power has been increased, with the same damning results as income tax—the ether has been, metaphorically speaking, "over-taxed." Net result—growing interference and an alarming indication of fast-approaching chaos.

Are we to wait until the next conference at Madrid, in 1932, before the responsible European broadcasting authorities get together and sort out the muddle which their own incompetence has resulted in? For their work at Washington was incompetent—subsequent facts prove that—the only excuse is that, if the individual experts did

agree and concoct a plan, their recommendations, although modified by the various governments concerned, have not been carried out with the necessary vigour.

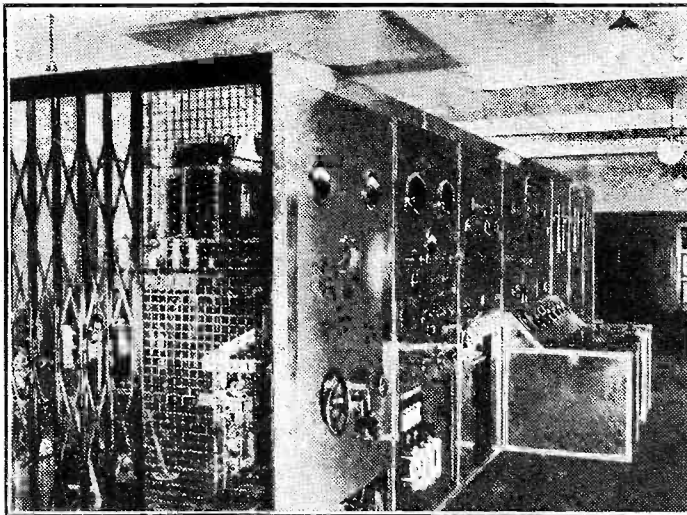
The Chief Offenders.

Well, who are the chief offenders? Undoubtedly Soviet Russia must be saddled with a large share of the blame. At Moscow, Archangel and elsewhere, stations have cropped up and have crept into the scheduled broadcasting bands, where there is no legitimate room for them. They have no right there; they should be kicked out.

It would take several pages to enumerate all the cases we have in mind; but apart from these "orphans" in Russia and elsewhere, it must be remembered that two new stations in Switzerland, one in Warsaw (of 158 kw.!), one in Prague (of 120 kw.!), a new Radio Paris (five times more powerful than the old one!), the new German regional station (plus seven more to come!), and a brace of Belgian 20 kw. "babies," will all soon be braying "on the air."

Heaven only knows what will be the result. Chaos is an overworked word—but we risk using it again. It meets our verbal requirements very well.

EVEN ICELAND JOINS IN!



A view of the big 16 kw. transmitter at Reykjavik, Iceland's new broadcaster.

Just as a final tit-bit, let it be remembered that the Soviet five-year plan allows for twelve new stations, of which one is reported to be rated at 500 kw.!

Ye gods! Mühlacker caused quite a row, but what sort of cacophony will there be when the above little lot get going?

Start at Once!

And don't forget—they will have to be squeezed in the 200-545 and the 1,340-1,875 band. The 'bus conductor's "move along, please," won't work a miracle.

The remedy is obvious! Immediate international consideration of the situation. Convoke an extraordinary meeting of the

Popular Wireless, January 24th, 1931.

delegates who will meet at Madrid in 1932—or better still, cancel the Madrid meeting and hold it *at once* in Paris, Berlin or London, and make a quick decision to:

1. Persuade governments concerned materially to enlarge the broadcasting wave-bands, plus rigid restrictions as to power, or

2. Eliminate the "orphans," restrict output of new stations, and enforce definite limitations for power of stations.

But, of course, nothing will be done until 1932—if then. Still, we shall have the morbid satisfaction of saying "We told you so."

"REGIONALISING" THE NORTH.

Preparing for the New Station.

THE "regionalisation" of North of England broadcasting involves more than the construction of the North Regional transmitting station at Moorside Edge. The B.B.C. is doing the job thoroughly. The programme staff at Manchester, Leeds, and Newcastle are hard at work on some really ambitious schemes of programme developments.

Prospects for the future of North Regional programmes are bright—if only Savoy Hill will not spoil it all by scrapping the Northern Wireless Orchestra at the end of March, as is threatened. Outside broadcasts in the North are to be properly organised by an "O.B." Department at Manchester.

The control-room at Manchester will act as control-room for programmes en route to Moorside Edge, but the "S.B." centre at Leeds is to be maintained, for the present, at any rate.

How Programmes Proceed.

At the present time programmes travelling between London and the North, Scotland, and Ireland, travel via Leeds, where there is elaborate equipment for switching, correcting the land-lines, etc. From Leeds lines run to London, Manchester, Sheffield, Bradford,

Hull, Newcastle, and Glasgow.

Belfast obtains its programmes via Manchester, and a submarine cable from Blackpool to the Isle of Man and thence to Ireland.

The only extensive underground cable at present used by the B.B.C. is that from London to Leeds, but it is hoped gradually to replace the overhead cables by underground ones, which are more reliable in bad weather.

The next step in this process of "going underground" will be when the North Regional station opens, for a new underground cable will be used to link Moorside Edge with Manchester and with Leeds.

H.M.V. TACKLES TELEVISION

Much has been done by research workers all over the world to bring television, an already accomplished fact, into the realm of practical politics, but there is still a long way to go before this branch of science becomes of use to the average man. The latest developments have come from an unexpected quarter—the great Gramophone Company's factory and research works at Hayes. An account of the system of television developed there is given below.

By OUR SPECIAL CORRESPONDENT.

IT is a long time since we have heard anything much about television, either in this country or abroad, and one is inclined to imagine that lack of news on the subject means lack of interest on the part of experimenters and research staff.

That this is not true is shown by the fact that a few days ago I received a telephone call from the Gramophone Company (H.M.V.), and to my utter astonishment

First of all he introduced me to the new photo-electric cell, of which H.M.V. are justly proud. It is a caesium photo-electric cell, and was being shown in connection with a talkie amplifier in a comparative test with an up-to-date commercial model of photo-electric cell of the potassium type.

A modulated neon lamp as the light source was being used throughout the experiment, and the light from this lamp was allowed to fall in turn on to the commercial photo-electric cell and then on to the H.M.V. caesium cell. A very marked difference in sensitivity and in the brilliance of reproduction was noticed immediately; as a matter of fact the H.M.V. cell gives 48.3 microamperes per lumen as against the 20 odd microamperes per lumen of the commercial cell, so it is a great advance.

I was then introduced to the real object of my visit, the demonstration of projected television. And here it must be explained that H.M.V.'s have tackled the question of television

from the *entertainment* point of view rather than from the "scientific wonder" aspect, and they have attempted to develop a system of televised cinematography that in the future might be exploited for use for the broadcasting of film of test matches, and other important public events.

The transmission of television of living objects is not being attempted at present, I understand, but there is no doubt that H.M.V.'s got over a very

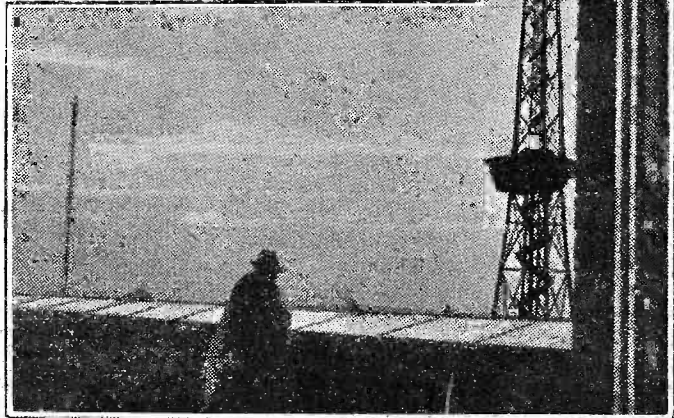
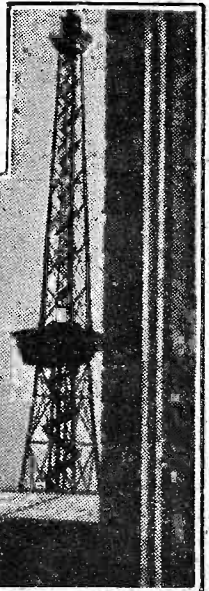
good representation of a film, projected on to a screen so that a large audience could see it.

Whether the system will ever be practicable from a radio point of view remains to be seen, because five channels are used, and this would mean five separate wave-lengths. So the present congested state of the ether would make it essential that short waves be used if radio were to be a medium of transmission of the H.M.V. system of television.

Land-Line Difficulties.

Land-line work on long distances on this system of television is also difficult, because under the scheme, as it was shown to me, a band of over 23,000 cycles per second on each channel was covered, necessitating not only a specially designed amplifier, but

(Continued on next page.)



WHERE IT BEGINS

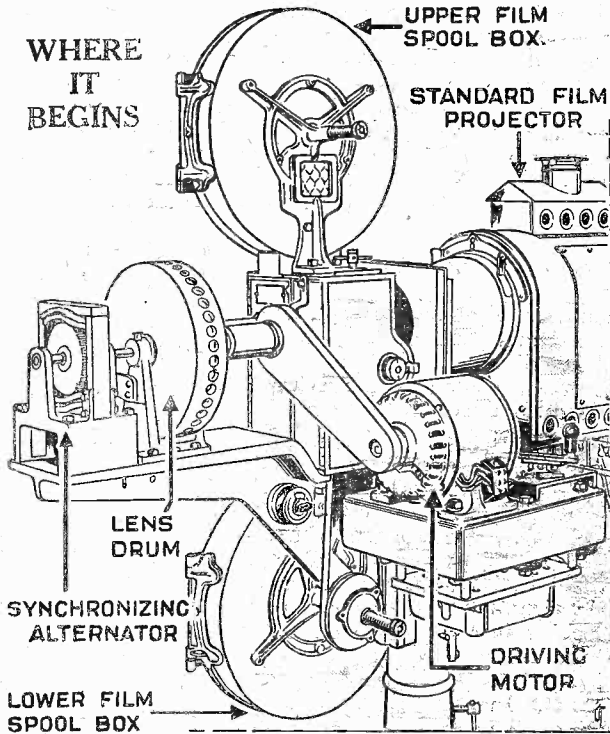


Fig. 1. The projector and scanning lenses which start the picture on its way. After "scanning" the picture elements are thrown on to—

the object of the call was to invite me to come down and see a new system of television which had been evolved at the H.M.V. factory.

I knew that the Research Department of the Gramophone Company had been doing a lot of work on the photo-electric cell, and I knew that they had developed a very efficient one, but I had no idea that they had been turning their attention to television in any shape or form.

The Entertainment Test.

So, therefore, it was with unusual interest that I made the short journey down to Hayes, where Mr. Dyer was waiting to show me round and to explain this development.

THE SECOND STEP IN THE PROCESS

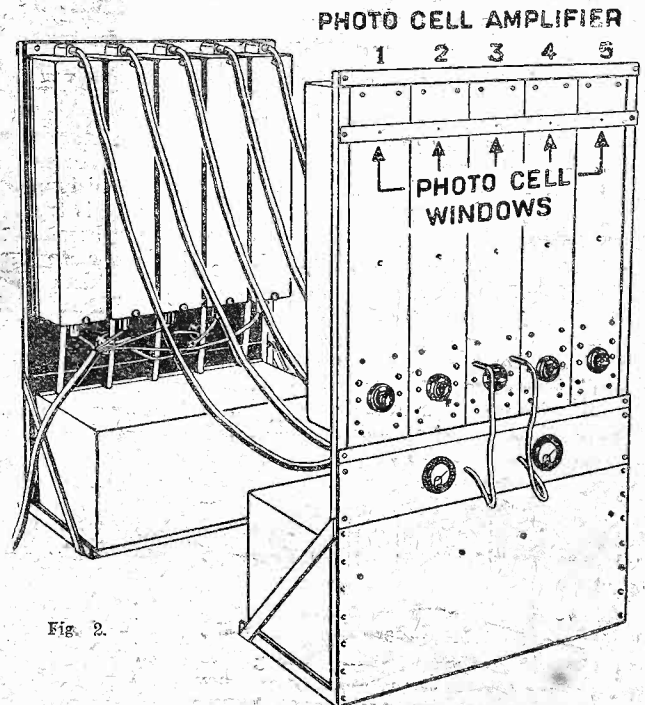


Fig. 2.

The five photo-electric cells and their accompanying amplifiers, which turn the light impulses into electrical pulsations.

H.M.V. TACKLES TELEVISION.

(Continued from previous page.)

highly efficient land lines. Over short distances results, no doubt, would be perfectly good, but over long distances it remains to be seen how much mutilation would be caused by land-line loss.

But let us get on to the technical description of the whole system, by which you will be able to judge for yourselves exactly how much has been accomplished, though as a means of assisting the formation of your judgment I should like to state that the pictures shown were perfectly clear and steady from the ordinary cinematograph point of view, though the blending of the five sections was not all that it might be.

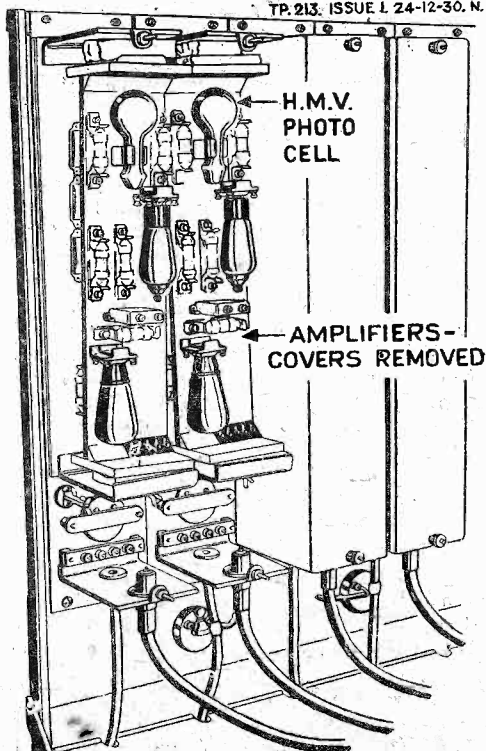
Like a Printed Photograph.

My readers are probably well aware that any system of television yet attempted has consisted of scanning the object to be televised at a rapid rate and in sending over in sequence very tiny portions of the picture by means of a series of tiny electrical impulses.

The result at the receiving end can be likened to a photographic block, as used in POPULAR WIRELESS, for any close examination of a printed illustration will disclose the fact that the picture is actually made up of an enormous number of small dots which vary in size and blackness. If there are a large number of these dots for a given area the texture of the picture is finer, and the correct tone is better achieved. If, on the other hand, there are few dots the picture is said to be coarse.

BEHIND THE SCENES

TP. 213. ISSUE 1. 24-12-30. N.



REAR OF PHOTO CELL AMPLIFIERS

Fig. 3. An interior view of the special photo electric cell and the first stages of amplification.

Now the detail attained by television depends on the number of impulses per second for a given area. If the impulses do not come fast enough then the picture will flicker and become blurred, and if there are not enough impulses per square inch then the detail will be lacking.

In each of the five sections of the H.M.V. television system there are over 23,000 impulses per second, which gives a very fine degree of definition.

Now we all know the principle on which the motion picture camera and projector operate, and this principle must be considered when dealing with transmission of moving objects by television.

It is based on the fact that the eye attempts to retain an image after the actual object has been removed. This is known as "persistence of vision," and no moving picture would be possible without this peculiarity of the eye.

In order to obtain successful projection about sixteen pictures per second or a little more are used on the ordinary cinema, when no flicker is noticeable. Occasionally one can reduce the speed down to about twelve pictures per second before the eye will notice flicker.

Therefore, it will follow that in a picture where there are perhaps ten thousand small dots, each of these small dots must be reproduced twelve times a second in order to give the transmitting image the illusion of moving, and still to make use of this persistence of vision to a sufficient extent to avoid objectionable flicker. In other words, 120,000 individual signals will have to be transmitted per second.

The General Arrangement.

This seems a lot, but it is a fact that a picture transmitted with 120,000 signals per second will be somewhat lacking in definition, and this is where the man who is trying to design a television system for broadcasting comes up against it. In order to restrict the frequency of the impulses to within the band allowable by broadcasting under the present system, the number of dots per second has to be reduced, and therefore the detail of the picture has to suffer.

H.M.V., however, decided to concentrate their efforts on achieving as perfect a picture as they could in order to ascertain how much entertainment value could be secured, and not primarily with any idea that the system might be used on broadcasting. Their argument is that without entertainment value television is bound to fail as a commercial proposition, and that unless the result of their researches provides entertainment it is no good tackling the problem at all.

The general arrangement of their system can be gathered from the sketches accompanying this article, but before discussing

these I must impress upon you two principal points which have been concentrated upon in the development of that system. One is that in order to get definition a large number of signals per second for a given area of the picture is used, and the second is that in order to get sufficient illumination for the image so that it can be said to possess entertainment value, some means of modulating a powerful light had to be found

THE END OF THE JOURNEY

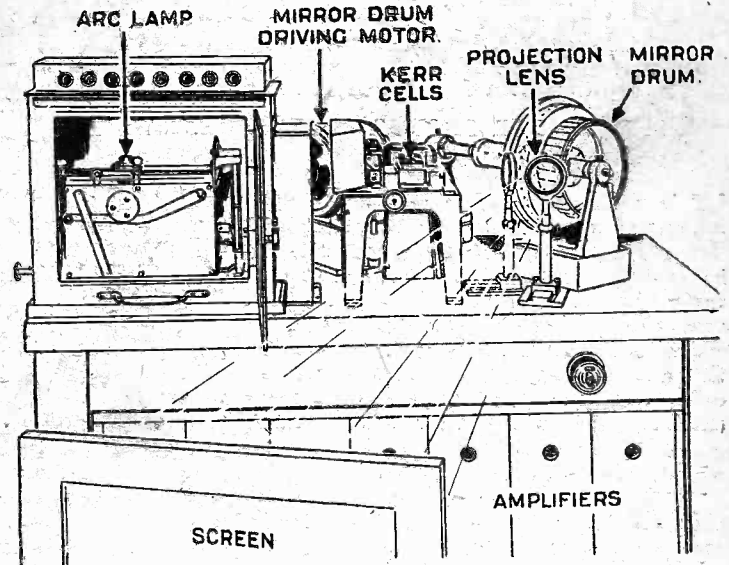


Fig. 4. Finally, the picture, in five sections, is re-combined by the modulated light from the arc lamps being reflected by a series of revolving mirrors on to the translucent screen.

A comparatively feeble illumination as displayed by glow discharge lamps (such as the neon type) which have frequently been used have not proved themselves sufficient. The Gramophone Company therefore set themselves the problem of employing the light from a powerful arc lamp, and designing apparatus that would actually control the light from this source.

In order to get definition a very large number of dots or points of light are employed, and in order to reduce the total number of dots per second the picture was divided into five sections, each section being scanned separately and the signals transmitted along a separate channel. The total scanning of the five sections is re-assembled on the receiving screen.

There are big advantages in using five channels, for in the H.M.V. system a modulation frequency of only 23,750 is required instead of five times that amount, and the design of low-frequency amplifiers capable of handling with anything like a straight-line relationship such high frequency, though not easy, is rendered more practicable.

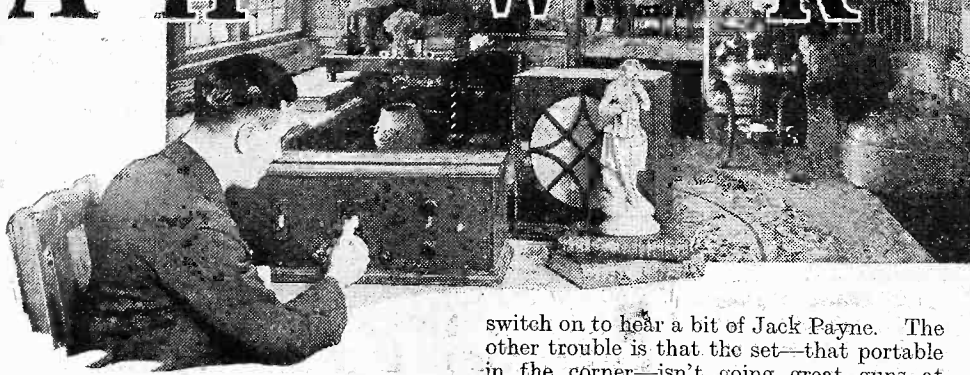
Five-Sectional Scannings.

Now let us look at the diagrams. As will be seen in Fig. 1 the film is passed through a cinematograph of the usual type, the light from it being reflected through a series of lenses on a revolving drum, which for every revolution completely scans the picture in five sections.

The light reflected through the revolving lenses is thrown upon five photo-electric cells, each taking care of its own section of the picture.

(Continued on page 931.)

AT HOME WITH RADIO STARS



One of the most popular of all broadcast artistes is the subject of this week's intimate and exclusive sketch.

8. TOMMY HANDLEY.

I MET Tommy Handley as he was coming home from Savoy Hill the other night, and we went back to his flat for a little chat.

"As a matter of fact," said Tommy, "this flat served as my bachelor quarters—and jolly convenient, too, being right in the centre of things—and after I plunged into the seas of matrimony we decided to keep it on, together with our real home out in the Big Open Spaces at Egham.

"When I'm rehearsing or playing before the microphone, or am doing any stage work, then you'll generally find me here, or down at the club; but at week-ends, holiday times and other times when there is no urgent work to be done, then off the wife and I go to rusticate at Egham. A nice little spot.

"Oh, but this flat has memories—bachelor memories, you know! Some of 'em we'd better forget, and others (by purging the worst bits) I have managed to turn to good account as 'copy' for the microphone. It's so difficult, sometimes, to think of funny things, and if it so happens that one's own life is and has been full of humorous experiences, then it's easier to think of a plot."

Radio and Gramophone.

"I see you're a gramophone enthusiast," I remarked, noticing that we were surrounded by small heaps of records.

"Rather," said Tommy. "Being a radio artiste myself, I often find that the B.B.C. is 'off the air' at times when I want to listen and can listen, and so the old gramo. comes in handy. There are records of all sorts there."

He was right. I glanced at one or two. There was a large pile of orchestral records of numerous makes: really highbrow fare. I picked up from another heap a record which appeared to have only one side. It bore a plain white label, and on closer inspection I saw that it was a test record of one of Tommy's own "all talking" items.

"Ah, that's one of my records," said Tommy. "There are some others there: and between you and me, or you and I (whichever you like), I don't think much of them. Yet people seem to like me on records! Of course, I've never heard myself on the wireless!"

"Do you listen in much?" I inquired.

"I expect I get my ten-shillings'-worth," came the reply. "My two troubles are that on most evenings I don't get home till the dance music is on; but I do sometimes

switch on to hear a bit of Jack Payne. The other trouble is that the set—that portable in the corner—isn't going great guns at the moment.

"And I'm no wireless expert. Time was when, in its pristine glory, it used to bring in the foreign stations, and on slack evenings I often amused myself by bringing in howls and atmospherics from Czecho-Slovakia. But not now. I'm busy on the stage with my show 'Hello! Folks.'

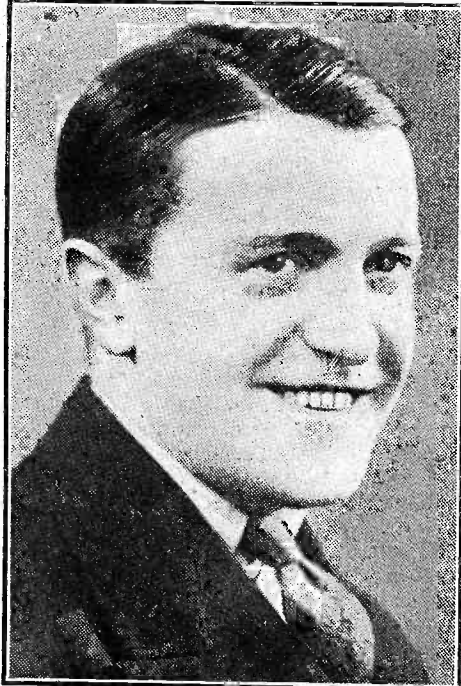
Back to the Mike.

"As you know, this consists of revue performed by well-known radio artistes, and you'd be surprised to know how much work there is in producing and carrying on with a stage show of that description.

"I shall be back at the microphone before your article appears in print, and there's no doubt about the fact that an occasional spell on the 'boards' keeps a radio artiste up to scratch. In some ways the stage is a harder test of an artiste than the studio, and although I shan't mind going back to the 'mike' (rather the reverse, in fact), I feel that this stage work is doing me good and giving new ideas."

"Ah! Ideas," I inquired. "Where do you find it easiest to think of new ideas for

A GRAMOPHONE ENTHUSIAST



An interesting fact elicited by our special representative is that Tommy Handley is an enthusiastic user of the gramophone.

broadcasts? Have you a room which you keep as a 'den' for your Muse?"

"Well, I've a room of my own," agreed Tommy. "You might say that it is vitally my own. I hate it even being dusted. That's one of my bachelor habits which I still preserve! But I don't know that that is the best place for thinking. I find stray humorous ideas coming to me in the bathroom, in the street, when reading the evening paper, and even when hunting for lost golf balls."

"Then you do get time for golf?" I ventured.

"Not so much as I did," explained Tommy. "While I'm doing this 'Hello! Folks!' review I have a few free afternoons, but when I'm doing my bit at the B.B.C. there is precious little daytime to spare. It's when I get back to Egham that I enjoy golf: golf—and the dog. I'm very fond of dogs. Mine's a smooth-haired terrier. You can keep all your Alsations!"

A Golfing "Record."

"Harping back to golf for a moment," I said, "what's your handicap?"

Tommy hesitated.

"Must we harp back to golf?" he asked pitifully. "If you want to say anything about my handicap—just say that sometimes it's more, and sometimes it's less."

I left it at that. After all, you can't cross-question a "star" in his own flat!

"There's one golfing record I do hold, though," said Tommy after a while. "It is a record for losing both ball and club at one hole!"

"It happened on a course down Wimbledon way, where there's a tough water hazard. It was a hot day, and I suppose my hands were slippery. At this water-hazard hole I took a mighty swipe, and away flew ball and club into the water! I waited at the water's edge for a while, like the knight who waited for the sword Excalibur to pop out of the waves; but my club didn't turn up, and my ball wasn't a floater, so I went straight on to the Nineteenth!"

"Are You Clubby?"

"I think that's enough for golf," I said. "What about other hobbies. Are you clubby?"

"Yes," said Tommy. "Savage Club-by. When I'm not at the flat, and when I'm not down at Egham, and when I'm not at Savoy Hill, then you may perhaps find me at the Savage Club with a few friends."

"I won't tell you that I never get any time to myself, or that I work a 24-hour day. But I will say that, like a doctor, I can never be entirely free from my work.

(Continued on page 930.)

LATEST BROADCASTING NEWS.

THE RETURN OF MR. WHITLEY
SIR HARRY LAUDER—
"LITTLE TOMMY TUCKER"—
STOP PRESS—WHY THE
PANTO BAN? Etc.

IN a few weeks now, Mr. Whitley, Chairman of the B.B.C., will be back from India to resume command at Savoy Hill. Among some of the problems awaiting his attention are the "talks" situation, the future of broadcast education and of relations with outside educational bodies, and the new Board to be appointed this year.

Presumably the Prime Minister will be guided by the ex-Speaker of the House on the subject of his colleagues for the remaining five years.

Sir Harry Lauder.

Sir Harry Lauder makes his fourth appearance before the microphone in this country on Thursday, February 5th, when he takes part in the National programme between 8 and 9 p.m. More than two years have passed since the great Scottish comedian was heard by British listeners, and during most of that time he has been abroad visiting New Zealand, Australia and the United States.

His previous broadcasts have all been of nearly an hour's duration, in fact, on one occasion he exceeded that time, which is not altogether satisfactory to either artiste or listener. It has, therefore, been decided that on February 5th, Sir Harry shall have two periods, each of twenty minutes, for his inimitable songs and patter, the remainder of the hour being filled with orchestral music.

"Little Tommy Tucker."

The excerpt from "Little Tommy Tucker" at Daly's Theatre which is to be broadcast on Saturday, January 31st, will include a scene in a B.B.C. Studio in which the heroine falls in love with the voice of an announcer—an event that has several times occurred in reality, although the B.B.C. makes a point of never disclosing such spivvy tit-bits of information concerning its domestic affairs.

As listeners will hear, the story in the excerpt ends with perpetual happiness between two people, which is one up on the B.B.C., because no announcer, as far as we know, can make so sweeping a claim as an outcome of his microphone duties.

Stop Press.

"Stop Press," a feature originated by John Watt, when he was a member of the productions staff at Belfast, and one edition of which has been presented from London since the author joined the staff at Savoy Hill, is to be given a second show on Tuesday, January 27th, for London Regional listeners and repeated two nights later for the National people.

"Stop Press" is really a miniature revue and one of the sketches is designed to give an indication of what a perfect "mix-up" would occur if our broadcasters "swapped jobs."

Can anyone imagine A. J. Alan singing a

comic song, or the Four Marx Brothers reading a news bulletin, which are among the burlesques? Those who heard the first edition of "Stop Press" will be pleased to learn that the sketch in which Miss Blimp swims the Hellespont and the play entitled "B.B.C. Exchange" are to be repeated.

Why the Panto Ban?

The third and final pantomime broadcast of the season for Northern listeners takes place on Saturday, February 7th, when part of the performance of "Jack and the Beanstalk" will be relayed from the Theatre Royal, Leeds.

The rub in this paragraph will be against the Southern listener who will wonder why on earth no pantomime relay has been included in the National or London

Regional transmissions this winter. Even Scotland, which professes its broadcast programmes to be more cultural than those of all other parts of the country put together, has had its pantomime relay.

Lots of theatres in and around London would be only too pleased to allow a broadcast, while it cannot be argued that the South is any more critical or more appreciative of good material than the North, or that the North is content with something inferior to what the South will tolerate.

Programmes of Promise:

"Bumpkin Pie"
 —Some Widdicombe Faire, written, composed and produced by Ernest Longstaff with additional songs by various authors and composers, reads like a tasty morsel for those who can listen to the National programme at 8 p.m. on Friday, February 6th.

Mr. Longstaff is so well acquainted with the intricacies of microphone work by long and successful experience that to-day anything from his pen can be cashed in as good. On February 6th the Revue Chorus and Orchestra will be conducted by Mr. Longstaff himself.

Another February broadcast from the London studios, which should also be well worth hearing, is "The Pursuit of Pleasure."



NEXT WEEK

"P.W." will introduce

THE £4 FOUR

A TOP-NOTCH
 SET AT
 ROCK-BOTTOM
 PRICE!

ALSO

THE "P.W."
FRAME AERIAL

COMING SHORTLY

LEONARD HENRY
 J. H. SQUIRE
 PHILIP RIDGEWAY

and others on
 "If I were the Governor of
 the B.B.C."

FOR THE LISTENER

By "PHILEMON."

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is served up.

A "Skit Inspection."

ONE of the most popular Saturday night items must be the relay from the Kingsway Hall; and when the Roosters are there, the fun is fast and furious.

They are not so good individually as they are all together; but all together they are as lively and as entertaining a party as anyone could wish for. Their Army sketch, entitled "Skit Inspection," seems so comfoundedly funny that I could scarcely hear it for the continuous roar of laughter. Even the laughter, with the fog still in the air, was good to hear.

The whole programme went with that sort of amateurish swing which is, when it is good, so very, very good.

The Schönberg Music.

Realising that I was going to be lowbrow on Saturday night, I braced myself and determined to be highbrow on Friday night.

I listened to the Schönberg music conducted by Schönberg himself.

I understand that the B.B.C. Orchestra had put in a good many hours at rehearsal; so that we heard the music just about at its best. It was queer stuff.

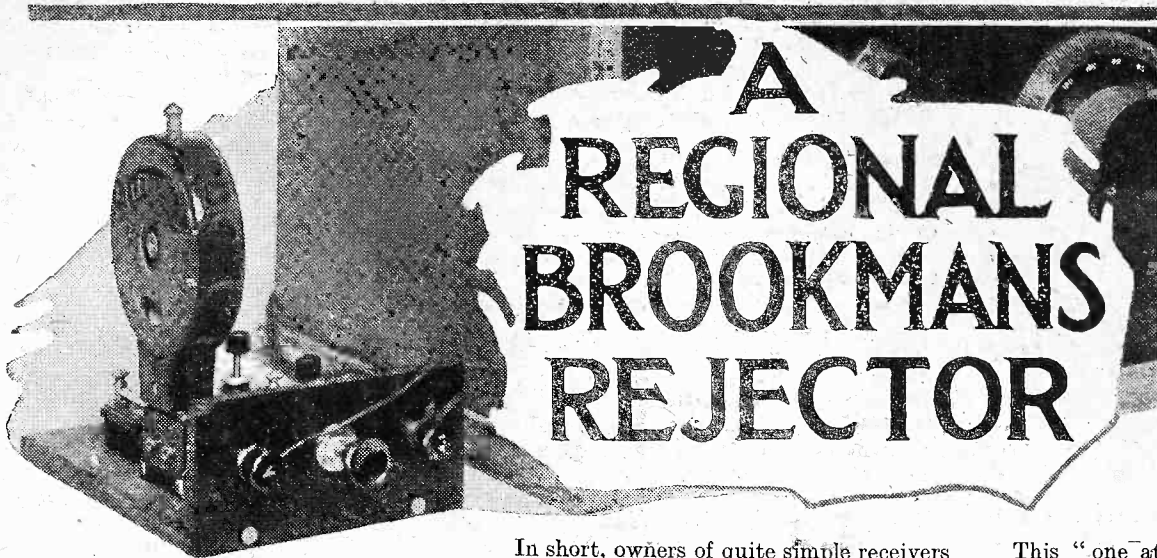
A girl seeks her lover through a wood, and finds his corpse. Apparently she goes mad. She goes mad for about half an hour. The music interprets that madness.

I should imagine that technically it must be an amazing piece of work, and will be doubtless fully appreciated by the technicians. As a piece of music, it confused and terrified me. Perhaps Herr Schönberg will take that as a compliment.

Talks by Women.

Women speakers have carried off the honours this week. If all those who contribute to the series "Yesterday and To-day" are going to be as good as Mrs. St.

(Continued on page 932.)



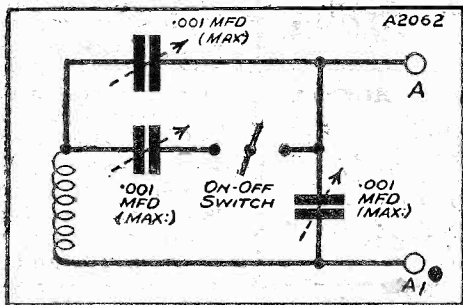
A REGIONAL BROOKMANS REJECTOR

A further version of the most famous interference-preventer in the world one which blots out one station and, in many cases, actually improves the reception of others. With the model described you can pre-set to two powerful stations and wipe either out at the touch of a switch.

By the 'P.W.' RESEARCH DEPARTMENT.

WE gather from correspondence received that a certain proportion of our readers are still experiencing difficulty in meeting the selectivity requirements of the Regional Scheme, and so we are

AN AMAZING FACT



It is hard to believe that any such device can work effectively without decreasing the sensitivity of the set. But the "Brookmans Rejector" does and, further, it improves the general selectivity, though the circuit is as simple as could be.

In short, owners of quite simple receivers in this area are going to be up against it just as we are here in the Brookmans Park area, and we want to urge them to make preparations in good time. Lots of us in the South were caught napping, and there is no reason why it should happen again now that we know exactly what is coming.

We understand that there is a population of some 600,000 in the area of expected intense difficulty around Moorside Edge, and amongst so many there must be a goodly number of "P.W." readers. It would seem, therefore, that we must devote a due amount of space to offering them real help as we can.

One obvious solution, of course, is to set to work in good time and build a modern highly selective receiver like the "Chef d'Oeuvre" Three, described in the Christmas number of "P.W." That, however, is a way out that will not appeal to some people, and to them we would suggest that they should try what can be done with the aid of a modern and efficient type of rejector.

This "one at a time" kind of rejector will also serve the purpose quite well in the real "agony area" if the receiver in use is of the more modern and selective type, and so only wants help over certain portions of the tuning range.

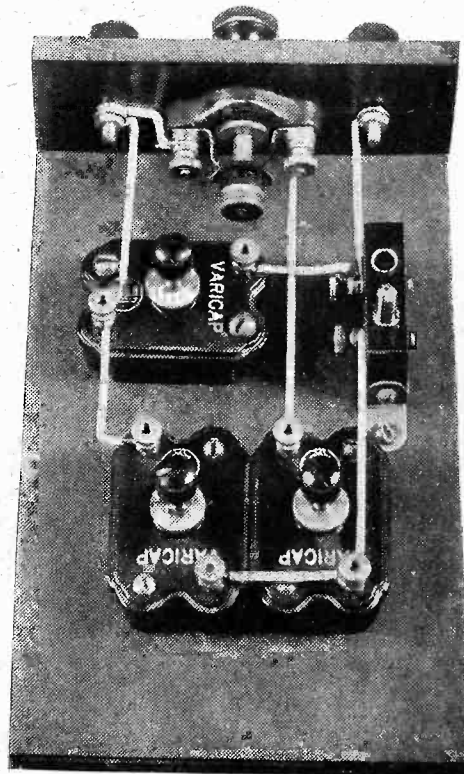
Unapproached Efficiency.

It seems to us, therefore, that this type of interference eliminator is the more generally useful, and so should receive the most attention. Accordingly we are describing the device this week in something of a "de Luxe" form, carefully thought out to make it as convenient to use as possible.

It is simple enough, for all that, and not at all expensive to make. It does its job, though, and those who have bitter memories of the behaviour of the early wave-traps will get a pleasant surprise when they come to try a modern rejector.

(Continued on next page.)

YOU CAN BUILD IT



It is nothing more than a very straightforward assembly of inexpensive parts.

making a special point of including some high-efficiency rejectors of various types in our programme for the season.

We have always in mind, too, the fact that the Northern Regional station will be opened ere long, and when that day arrives quite a lot of people are going to get a surprise.

We don't want to alarm our Northern friends unnecessarily, but they would do well to prepare for the event in advance. It is very difficult for them to imagine the acute interference which is set up in the neighbourhood of a Regional station, and those who at present use fairly simple receivers within a radius of some fifteen or even twenty miles of Moorside Edge should really think seriously as to what they intend to do about it.

The Northern Regional

They must make up their minds that their sets are going to have the greatest difficulty in dealing with the extraordinarily severe demands made upon them by Regional conditions. Not merely will they find that it is difficult to separate the two transmissions, and to tune in their favourite foreign programmes, but they will also discover what so powerful a station can do in the way of "breaking through" on long waves.

Trapping Two Transmissions.

The "P.W." "Brookmans Rejector," for example, is capable of performing the most remarkable feat of interference-elimination, and will always give great relief, if not a complete cure.

It will give relief, in the sense that it will shut out either of the two transmissions so thoroughly that one has to search carefully and tune it in quite accurately in order to hear it at all. It will thus solve the problem of mutual interference between the two transmissions.

Where it will fail is in cases where both transmissions spread badly round the dial so that to eliminate just one of them is not sufficient to permit foreign stations to be received. In these cases a double eliminator is required, i.e. a device which will shut out both transmissions at once, and leave the dial clear for foreign stations.

Such a gadget was described in "P.W." for December 13th, 1930 under the title of the "Double Trapper," and to this we would refer those readers who are situated less than about ten miles from a Regional station and wish to continue to use a simple type of "detector and L.F." receiver.

This, of course, is the area of real misery for the long-distance enthusiast. Further out things become easier and a single type of rejector usually furnishes all the assistance that is needed.

A REGIONAL BROOKMANS REJECTOR.

(Continued from previous page.)

Well, perhaps not just "a" modern rejector, but "the" modern rejector, which is that exclusive "P.W." idea, the "Brookmans" type. This, as so many of our readers know, is an interference-eliminating device of unapproached efficiency, and it quite definitely does not cut down the general performance of your set. In some cases it will even improve the results on all stations other than the one being rejected!

Very Easy to Use.

Just two little warnings, though; the kind of interference which it will eliminate is that produced by a powerful local station and no other. Don't expect it to cut out Morse, tram-car noises or atmospherics! Secondly, note that it is designed to work with "P.W." receivers, and may not go properly with some commercial sets or others not of our designs, because of different methods employed in the aerial circuits of these sets.

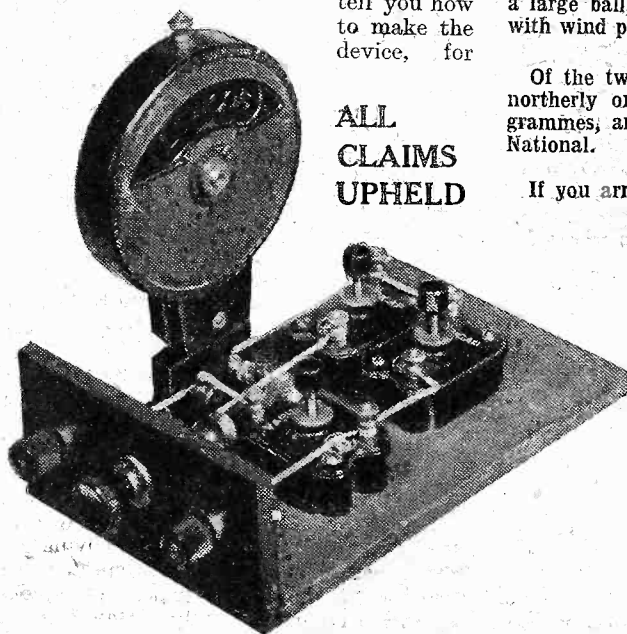
The one you have already seen in the photos is designed to enable you to use the "single" type of rejector with the maximum of convenience. It will reject either of the two Regional transmissions, but not both at once. To make it simple and easy to use, it is fitted with a little device which enables you to reject either transmission at will by moving a switch.

Too Simple for Words.

This will be found a great convenience in practical use, for the adjustment of a rejector is rather a delicate operation, and it is not one which you want to make every time you change from one station to the other. With the present scheme you set the rejector condensers once and for all and just work the switch as required.

It would probably be a waste of space to tell you how to make the device, for

ALL CLAIMS UPHELD



Inasmuch as this version is the original "P.W." "Brookmans Rejector" with the simple addition of the switch and another small condenser, the results must clearly be those about which so many "P.W." readers have enthusiastically written.

just observe its simplicity in the photos! A piece of wood, an ebonite terminal strip with a switch on it, a coil socket and three compression-type adjustable condensers, to be assembled and wired up, and that's all there is in the job.

How to use it is far more important, and this we will tell you in detail. First, you connect your aerial lead to the A terminal of the rejector instead of to the set. Connect the other rejector terminal to the set aerial terminal.

Insert a No. 50 plug-in coil (the size is important as a rule) in the rejector and proceed thus: put rejector switch to "off" and set nearest adjustable condenser to a medium value (start by screwing knob right down, then unscrew about three complete turns; not critical).

The rejector should be placed so that the terminals and switch are nearest to you. Then the right-hand condenser of the pair at the back is the one to be adjusted next.

RADIO ITEMS OF INTEREST

The North Regional—Grid Bias, etc.

The maximum current that can pass through the human body without serious results is about 10 milliamps.

The resistance of the human body varies with health, moisture of the skin, etc.; but the resistance from one hand to the other is generally of the order of 50,000 ohms.

The height of the Brookmans Park aerials is limited by Air Ministry regulations to 200 ft.

Moorside Edge Regional Station uses three steel lattice masts each about 500 ft. high.

The B.B.C.'s North Regional Station near Slaithwaite is situated about 1,000 ft. above sea level.

At Moorside Edge each 500-ft. mast rests on a large ball, which allows it to sway slightly with wind pressure.

Of the two aerials at Brookmans Park, the northerly one is used for the Regional programmes, and the one nearer London for the National.

If you arrange to switch over the grid of a power valve to a preceding stage, do not forget to alter the grid bias accordingly.

The power of the Langenberg (Germany) station is to be increased to 75 kw. next summer.

If you have not experimented with different needles for your gramophone pick-up, you should do so, as this often effects a noticeable improvement in tone.

A semi-variable condenser with a maximum of .001 mfd. in parallel with a 200,000-ohm variable resistance connected across a pick-up's terminals sometimes assists in cutting out "scratch."

Tune in lower-wave station on set, and adjust this condenser until you find the "rejection point" at which it vanishes almost completely. This is sharp, so adjust carefully. If you do not get sufficient elimination, reduce the condenser nearest the front a little and try again. In fact,

COMPONENTS AND MATERIALS.

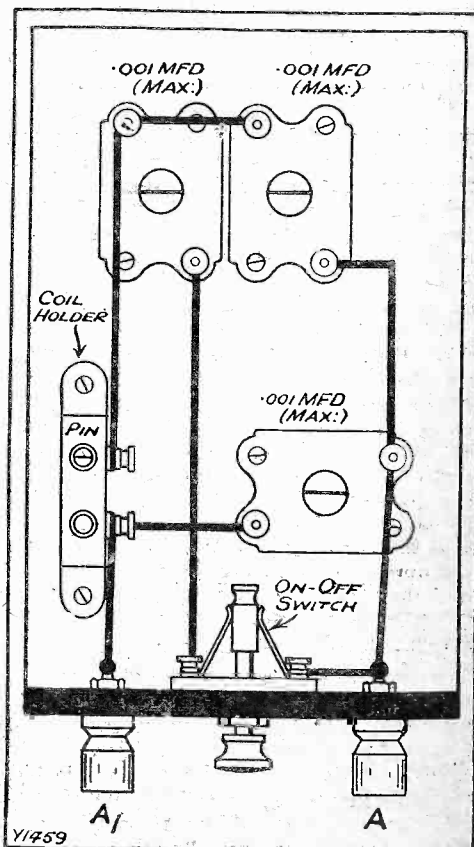
- 1 Terminal strip, 4 in. x 2 in. (any good insulating material).
 - 1 Baseboard, 6 in. x 4 in., about 3/8 in. or 1/2 in. thick.
 - 3 .001-mfd. (max.) compression-type condensers (R. I., or Lewcos, Formo, Lissen, Polar, etc.).
 - 1 On-off switch (Lissen, or Goltone, Igranite, Ready Radio, Benjamin, Bulgin, Lotus, etc.).
 - 1 Coil holder (Lotus, or Igranite, Wearite, Bulgin, Keystone, Red Diamond, etc.).
- A little wire and a few screws.

try the front condenser at several settings, and see which is the best, re-adjusting the right-hand near condenser each time, of course.

That being all settled, tune in the longer-wave station on your set, then close the rejector switch (pull knob outwards to "on" position). Now adjust the left-hand near condenser to the rejection point for the longer-wave station. Do not make any alteration in the condenser near the front while doing so; this must remain set.

With this second rejection point found the preliminary adjustments are complete and need not be touched again. In future all you will have to do is to put the switch "on" to shut out longer-wave station, or "off" to eliminate the other one.

REVITALISES OLD SETS



Even if your new Regional programme spreads over the whole tuning, this "Brookmans Rejector" will completely "kill" the interference.

CAPT. ECKERSLEY'S QUERY CORNER

Some questions and answers of general radio interest that will aid you in your radio reception.



L.F. and H.F. TRANSFORMERS—
RESULTS FROM A PENTODE—
TACKLING HUM.

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

L.F. and H.F. Transformers.

J. P. (Yarmouth).—"Does an H.F. transformer function in a similar manner to an L.F. intervalve transformer? That is to say, if the secondary of an H.F. transformer is wound with three times as many turns as the primary, is a voltage step-up of 3 to 1 effected as would be the case with an L.F. transformer of 3 to 1 ratio?"

In considering the difference between high-frequency transformer and low-frequency transformer one has got to realise two things. The first, that in a low-frequency transformer the connection is entirely dependent upon having 100 per cent coupling (or as near as possible) between primary and secondary windings.

This is done by using iron which makes an easy path for the interlinking magnetic fields. Iron cannot be used with high-frequency transformers for frequencies much above 100,000 periods per second, so that it is not easy to design a high-frequency transformer with 100 per cent coupling.

The second point to appreciate is that the self-capacities of the windings may produce all sorts of spurious effects upsetting both phases and amplitude of the inducing and induced currents.

If this is occurring it is not *a priori* accurate to state that the simple winding of three times as many turns on the secondary as the primary will produce three times the voltage on the secondary, but provided certain precautions are taken, and provided a large range of frequencies is not desired, the statement is not untrue.

One might put this another way by saying that provided aperiodicity is achieved, and provided the coupling is very tight, and provided the transformer is not expected to work into a considerable load, then the connection of the high-frequency transformer is to some extent analogous to that of the low-frequency transformer.

Results from a Pentode.

J. L. (Balham).—"I have recently replaced the small power valve in my two-valve (det. and L.F.) receiver by a Pentode valve with a view to increasing loud-speaker volume. The result has been somewhat disappointing, as there is hardly any increase of volume although there is a marked absence of bass notes.

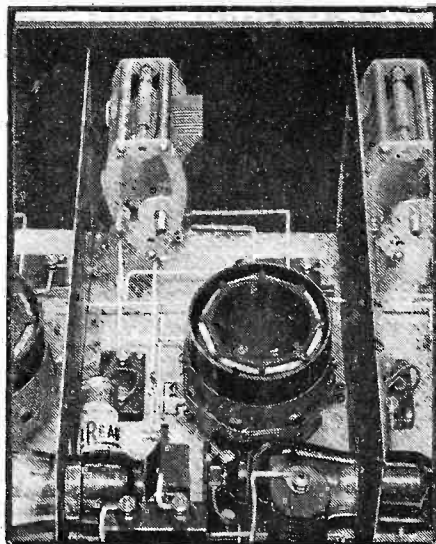
"It would appear that the mere substitution of a pentode valve for an ordinary

power valve is insufficient to achieve my object and I would, therefore, appreciate your advice as to what steps I ought to take in order to secure the increase in volume which I feel sure should ensue when a pentode valve is used?"

This is a typical case where the valve has been considered apart from the design of the circuits around the valve. You would not expect to make your 10 h.p. car go very much faster simply by fitting racing magnetos!

Racing magnetos, however, are worth while adapting to an engine designed for racing.

H.F. COUPLING



The "P.W." and "M.W." dual-range coil is a type of H.F. transformer, and here we see it used to couple together two stages of S.G. amplification.

Coming down to more detail, it is fundamental that a valve cannot achieve magnification unless there is some form of impedance in its anode circuit, and, more important still, that impedance has to have a greater or less value dependent upon the characteristics of the valve.

Further still, and in general, the greater the impedance of a valve the greater the value of the optimum impedance. A pentode valve is an extremely high impedance valve, and to get proper magnification the impedance in the anode circuit has to be very high before the valve can magnify to anything like its theoretical magnification.

A loud speaker, as such, has an impedance which varies over the frequency range: at 10,000 cycles it may have an impedance of 20,000 ohms, at 50 cycles it may have an impedance of only 1,000 ohms.

At 10,000 cycles, therefore, the pentode valve has achieved something like its theoretical magnification. At 50 cycles it has achieved hardly any magnification at all.

Thus the pentode valve with the loud speaker connected straight in its anode circuit magnifies the high notes but not the low. And as the high notes as radiated are very much more feeble than the low notes, the volume would not appear to increase in proportion to the theoretical magnification of the valve if the loud speaker is connected straight in the anode circuit.

I cannot explain, but only recommend the remedy, which is to design or have designed a loud-speaker transformer, one winding of which (the high resistance winding) goes in the circuit between the high-tension and anode, the secondary, or low resistance of which is matched to the loud-speaker impedance.

Tackling Hum.

T. R. (Hastings).—"I am greatly troubled with a humming noise which I believe is due to some electrical machinery near me. I have tried a number of dodges in my efforts to cut out this interference, but so far have been unsuccessful. Can you suggest anything?"

"My set is a detector followed by 2 stages of L.F. amplification, and I am using an outside aerial."

Remove the aerial from the set. Does the hum still persist?

If it does not you are unlikely to be able to remove it without treating the machinery (or the man in charge of it!) in some way.

Are you lighting your filaments from the mains, because if the hum is there when your aerial is removed this may be the trouble. In which case be sure that your grid leads come to the centre of a potentiometer connected across the valves.

Are grid leaks too high? What is quality like otherwise? Do you use a moving-coil loud speaker? Is your loud speaker too near the set and making it pong? Is your set vibrating mechanically. Have you a proper earth?

Answer all these questions and then write to the B.B.C.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

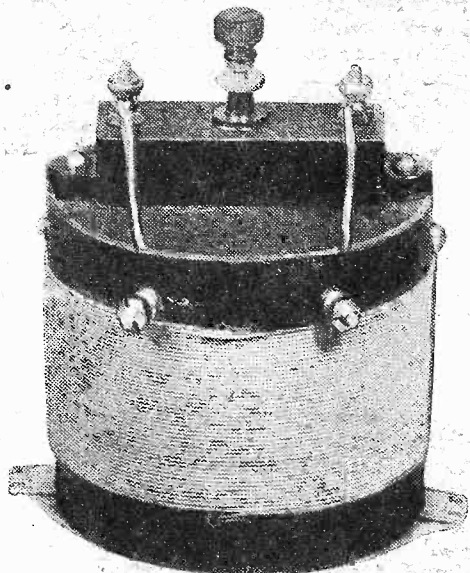
Tested and Found-?



THE FAMOUS "P.W." REJECTOR.

FOR the convenience of those who cannot or do not want to wind their own coils, Messrs. Ready Radio are selling the "P.W." "Brookmans Rejector" complete.

As they charge only 5s. 9d. for the device built exactly to specification, it constitutes a distinctly attractive line.



A "P.W." Brookmans Rejector made by Messrs. Ready Radio.

For any good wave-trap 5s. 9d. would be a small enough price to pay, but for the "P.W." "Brookman's Rejector" the figure seems almost trivial in comparison with what the little article will do.

Remember, it not only provides really effective trapping, but, unlike most similar articles, it generally adds to the sensitivity of a set by reducing its aerial load.

We have received samples of the Ready Radio "P.W." Rejector, and find that they are in accordance with our original specification, and that they are right up to standard in point of efficiency.

IMITATION BLUE SPOTS.

The British Blue Spot Co., Ltd., are extending a warning to buyers that a quantity of cheap imported articles are being passed off on the public as genuine Blue Spots. British Blue Spot, Ltd., point out that for their own protection the public should look for the Blue Spot trade mark (it appears in their advertisements from

time to time), and also ensure that the goods are packed in their standard packing which, in the case of units and chassis, is of yellow and two blues.

RADIO BARGAINS.

The latest list issued by Electradix Radios, Ltd., embodies an enormous amount of electrical and radio material priced at very attractive figures. There are numerous illustrations.

NEW FERRANTI RESISTANCES.

Ferranti Ltd. advise us that the following new additions to their range of wire-wound shunt-feed resistances are now available: 500, 650 and 1,250 ohms, with current-carrying capacities of 60, 60 and 50 milliamps.

The price of these resistances is 2s. 9d. each, without holders.

As Messrs. Ferranti point out, these shunt-feed resistances are particularly useful for obtaining automatic grid bias in A.C. mains receivers.

It is interesting to note that Ferranti's guarantee every one sold to be within 5 per cent of its stated value. Things like that inspire confidence. The 20,000-ohm sample sent to us for test purposes measures out with a figure of error of less than 1 per cent! For practical purposes that is entirely negligible.

I mustn't forget to add that the resistances are now being built into tubes of moulded bakelite which are practically fire-proof.

WHEN MAKING LOUD SPEAKERS.

I recently received a Tonax tone adaptor. This appears to me to be a very valuable little gadget for those who make their own loud speakers. It costs one shilling, and it comprises a small chuck that grips the reed drive, two cone-shaped aluminium washers and two coned felt washers for gripping the diaphragm. Two further washers of a flexible nature are provided, the use of which is optional. In cases, these last washers undoubtedly do improve results.

HANDBOOK FOR DEALERS.

Philips Lamps, Ltd., are distributing a handbook to dealers, so that each shall possess a permanent record of the particulars of Philips radio products. I should imagine that dealers will find this book of invaluable assistance to them.

LAMPLUGH DYNAMIC INDUCTOR LOUD SPEAKER.

One of the most interesting loud-speaker developments since the inception of the moving coil is the application of the inductor principle.

The inductor is an electro-magnetic movement, but the armature traverses a line

parallel with the pole pieces, and it is returned to its mean position by magnetic pull, and not by springs.

There seems to be no reason why you should not get moving-coil results with such a movement properly constructed. You have the freedom of travel necessary for properly balanced bass frequencies, a uniformity of sensitivity, and an absence of inherent reed or armature resonances within the audio range.

We have recently been testing a Lamplugh Dynamic Inductor Loud Speaker unit fitted

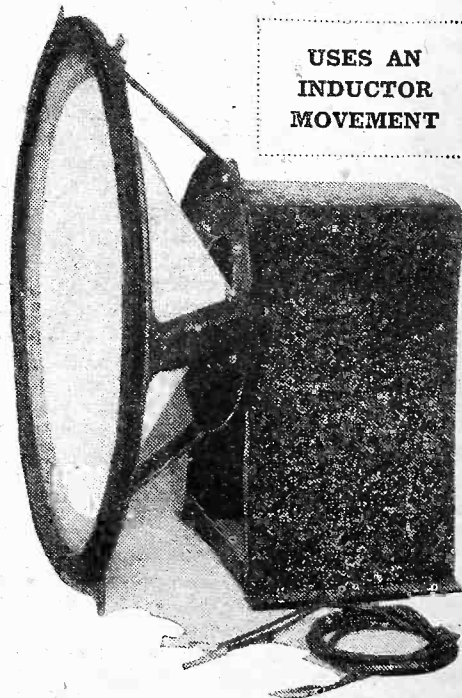
Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

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.

to a proper baffle (very important that) and must admit that the results were impressive. It is sufficiently sensitive to operate well with quite small outfits, and if it is provided with the proper input, a response definitely better than a few moving-coil speakers we have heard is given.

The bass is clean and full, and if the instrument has not quite the brilliance of the upper register of a first-class moving-coil loud speaker, you must not forget its much lower price and that it does not necessitate the use of the mains.



USES AN INDUCTOR MOVEMENT

This is the Lamplugh Dynamic Inductor. It requires only a baffle and cabinet to form the complete loud speaker.

REPRODUCTION..... THAT MAKES YOU VISUALISE

Vaudeville

STRAIGHT FROM THE SPOTLIGHT!



Each 'turn' complete in itself—different—the famous operatic singer is quickly followed by an equally famous dance band . . . by a popular comedian . . . by a musical burlesque . . . and so on through the programme.

Each item in its turn is so faithfully reproduced by TELSEN that one can scarcely refrain from applauding as each turn comes to a close.

The rapid tonal changes of so varied a programme are a severe test on your Set, but, when TELSEN TRANSFORMERS are incorporated, they only tend to prove the unlimited capacity of these famous components.

TELSEN Transformers are scientifically designed and built by expert radio engineers. Put one in YOUR Set . . . you will be amazed at the realism . . . the purity . . . and the greater volume. For real enjoyment, fit

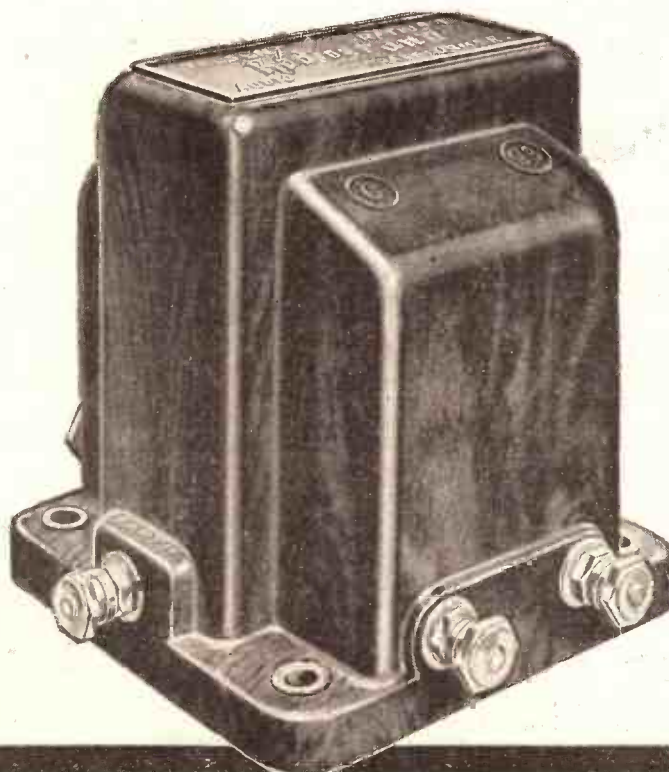
TELSEN

TRANSFORMERS

- "ACE" - - - RATIOS 5-1 & 3-1 - 8/6
- "RADIOGRAND" - - 5-1 & 3-1 - 12/6
- "RADIOGRAND" SUPER RATIO 7-1 - 17/6

The complete range of Telsen Components includes H.F. Chokes, Fixed (Mica) Condensers, Grid Leaks, Four and Five Pin Valve Holders.

For complete details and prices of these, see advertisement elsewhere in this issue.





Dubilier mica condensers are encased in a nice, clean, moulded bakelite box—but that doesn't mean a thing. Anyone can put up a product in a nice clean moulded bakelite box. What does count is what's inside.

Dubilier built condensers long before broadcasting began—condensers for scientific labs., condensers for high power radio stations, and what Dubilier's don't know about condensers isn't worth knowing.

Dubilier mica condensers ensure uniformity and permanence of results. If you buy a condenser bearing the name "Dubilier" you can be sure that inside is the finest condenser of its type obtainable.

PRICES

Types 610 & 620.

'00005 to '0009	-	-	-	-	each	1/8
'001 & '002	-	-	-	-	"	2/-
'003, '004 & '005	-	-	-	-	"	2/3
'006	-	-	-	-	"	2/6
'01	-	-	-	-	"	3/-

Types R775, 776 & 777.

'01	-	-	-	-	each	3/-
'02	-	-	-	-	"	3/6
'05	-	-	-	-	"	5/6
.1	-	-	-	-	"	8/-
.2	-	-	-	-	"	14/6
.25	-	-	-	-	"	18/-
.5	-	-	-	-	"	37/6

DUBILIER

CONDENSERS

Dubilier Condenser Co. (1925) Ltd.,
 Ducon Works, Victoria Road, N. Acton, London, W.3.

LANCHESTER'S LATEST!

ALL OUR SPEAKERS HAVE PERMANENT MAGNETS.

MOVING COIL HIGH IMPEDANCE SPEAKER

£4:12:6

Direct from your Set! No Choke or Transformer required.

Same appearance and standard of performance as our well-known Low Impedance model as listed at £4:4:0.

YOUR NAME.....

YOUR ADDRESS.....

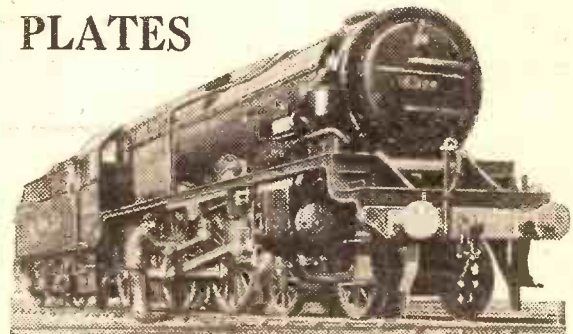
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L.M.S. ENGINE "Fury" and Folder for keeping the pictures

and another splendid picture every week for nine weeks, with—

MODERN BOY

Get Your Copy NOW! . . . 2d.



CUTTING CONES

Loud-speaker cones are not difficult to make if you follow the method explained in this practical article.

By H. T. SAVAGE.

HAVE you ever wondered why the diaphragms we use in our loud speakers are cone-shaped?

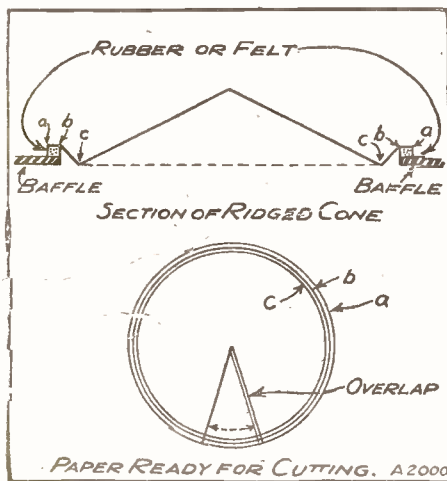
The answer can be given in one word—rigidity. For the cone is a remarkably rigid form of construction, as you can see for yourself if you take a paper cone and place it rim downwards on the table. In this position it will support a weight of several pounds placed upon its apex.

You will remember that that master of the science of stresses and strains, Sir Christopher Wren, supported the weight of the steeple, cross and ball of St. Paul's Cathedral upon a brick cone, the exterior dome being merely an ornament.

Increasing the Efficiency.

As a matter of fact, the theorists, with the aid of several pages of algebra, tell us that the ideal diaphragm would be a flat one, of infinite rigidity and lightness. There is, however, no material available which is rigid enough, and at the same time light enough, to be used in this manner. So for the present we must stick to the cone.

RIGID AND ROBUST



The cone is a very strong form of construction, especially if it is made with a ridge round the edge.

But in our loud speakers we do not place the rim downwards upon a table: the rim is supported by a ring of more or less flexible material, and if we could give the cone more rigidity, it would be desirable.

There is a way of adding to the rigidity of the cone without adding to its weight,

which greatly increases its efficiency, and incidentally adds to its appearance.

It consists of ridging the cone at its edge. Inscribe three circles with a common centre upon your sheet of cartridge or other paper, one half inch, or three-quarters of an inch separating the circles "a," "b," and "c" in the figure. Cut out along the line to the outer circle.

Quite an Easy Job.

Cut out the usual V-shaped segment (of which more anon), and glue the overlap. When dry, rest the cone on its side on a table, and score along the two remaining pencil lines with a blunt instrument. A small blunt screwdriver is satisfactory.

The ridge can then be formed by bending the paper along the lines, the innermost one first, bent downwards and outwards, and the outermost one in the reverse direction. It will be found to snap into place quite readily.

You can make small radial cuts for the easy spreading of the flange from the outer pencil line to the circle "b."

Fitting Your Own.

In the sketch I have shown as a mounting for the cone a section of sponge rubber, or of felt, but this is not necessary. I have found it very satisfactory; the usual rubber, leather, or cloth strip can be used, or the flange of the cone may be taken direct to the woodwork of the cabinet itself.

Those who wish to make a ridged cone to fit into an existing circular cavity in a cabinet or baffle-board should first draw a section of the required cone, full size, and measure the dimensions of one side, including the ridge and flange.

This will give the radius of the outermost circle required to be drawn on the paper. The two smaller circles are then drawn, and the paper cut out.

A Quick Calculation.

A measurement should be taken from "c" to "c" on the sectional drawing, corresponding with the two "c's," which are shown in the top sketch in the preceding column. After this has been done the difference between this measurement and the diameter of the smaller circle described upon the cone paper must be ascertained.

The difference, multiplied by 3 1/7th, will give the size (measured along the circumference of the inner circle) of the segment required to be cut out, less 1/4 in. for the overlap. Suppose, for instance, that the difference in size for a rather flat cone proves to be half an inch. Multiplying this

by 3 1/7 gives 1 1/4 inches. Remembering to allow a quarter of an inch for the overlap, it would then be necessary to cut out a segment measuring a trifle over an inch-and-a-quarter on the inner circle.

A ridge given to a cone in this manner stiffens the cone to a remarkable degree, enabling it to move all in one piece, responsively to the impulses received from the unit, and the "hinges" formed by the creases contribute to this desirable feature.

★ ★ ★ ★ ★

INTERESTING INFORMATION

★ ★ ★ ★ ★

Testing Sets—Practical Hints—Using a Pick-up, etc.

★ ★ ★ ★ ★

A pair of 'phones in series with a dry cell makes an exceedingly sensitive and satisfactory test device for checking continuity.

The potentiometer to which the grid leak return of the detector is taken is not intended as a volume control, though actually it does give the set extra sensitivity.

A very useful refinement which often enables the last ounce to be got out of a set is a .0001-mfd. fixed condenser, joined between the plate and filament of the detector valve. (But use a good one, for obvious reasons!)

Detector or L.F. stages in which fairly high anode resistances are used will always need far more H.T. at the battery plug than it is intended to apply to the valve, owing to the drop in voltage across the resistances.

A USEFUL SCHEME.

A pointed wooden skewer or broken lead pencil can generally be used successfully to start a small nut on an inaccessible thread.

If you spill acid on the carpet or clothes, neutralise it immediately with ammonia, soda, or bicarbonate of soda liberally applied.

When a pick-up is inserted in the grid circuit of a detector valve whistling and distortion is often caused by unnecessarily long leads.

Although conversations on the Transatlantic telephone may sound rather amusing, it is an infringement of your receiving licence to make these conversations public.

Several Continental stations, including Oslo and Radio Lyon, pick up and relay English programmes to their own listeners occasionally.

It may at first seem rather surprising that the Research Department, with a long, long line of successful one-valvers to its credit, should be introducing yet another set of this class to "P.W." readers. But we need make no apology for devoting space this week to the "Station-Change" One.

For this set is not an ordinary one-valver, but a specialised receiver for Regional conditions. It is a type of set which is sure to grow into great favour.

Simplicity the Keynote.

Simplicity is the key-note of it. All tuning troubles are abolished, and the owner can change-over from one programme to the other simply by means of a switch!

That switch—which can be seen on the left of the panel in the diagram below—has three positions. You can turn it right, left, or centre.

When it is placed in the centre position the set is switched off. If you turn it to the right you get one programme—say the Regional—and if you turn it to the left in comes the National programme instead.

When you have finished listening you turn the switch from which ever pro-

gramme you have been enjoying to the centre position, which puts the set "off" till you want it again. Could anything be simpler?

Easy Wiring.

The advantages of such a set to the old people, to a busy housewife, or to an invalid will be so obvious that we need say no more about them; but we can go straight ahead with our account of other points of interest about this remarkable little receiver.

No soldering is necessary. Like all the later "P.W." sets, this one is arranged for simple terminal-to-terminal wiring, so constructional skill is not required. Anybody can make it.

Another advantage of the "Station-Change" One is that no "stunt" parts are required, and that all the components are of the standard sorts which every dealer keeps in stock as a matter of course. Moreover, the set is inexpensive to build, as a glance at the list of components will prove.

Having thus cleared the ground with a brief account of some of its features, let us hasten to add that for all its simplicity it is not an uninteresting set to handle if you are keen on long-distance reception. The more experienced radio man will appreciate this from an examination of the theoretical circuit.

Sensitive.

Let us digress just for a moment to deal with this point. The "Station-Change" is based on a very popular and well-known circuit the "Hartley," a feature of which is that the earth connection goes to the centre-tap of the tuning coil instead of to one end of it.

This circuit won its way to general favour because of its excellent long-distance possibilities, and consequently a run round the Continental stations is quite within the scope of

THE "STATION CHANGE" ONE

An exceptionally neat little one-valve set, with simple switch on-off and wave-change control. The tuning can be pre-set for alternative station listening, while the set is also suitable for "DX" reception, its Hartley reaction circuit providing a high degree of sensitivity.

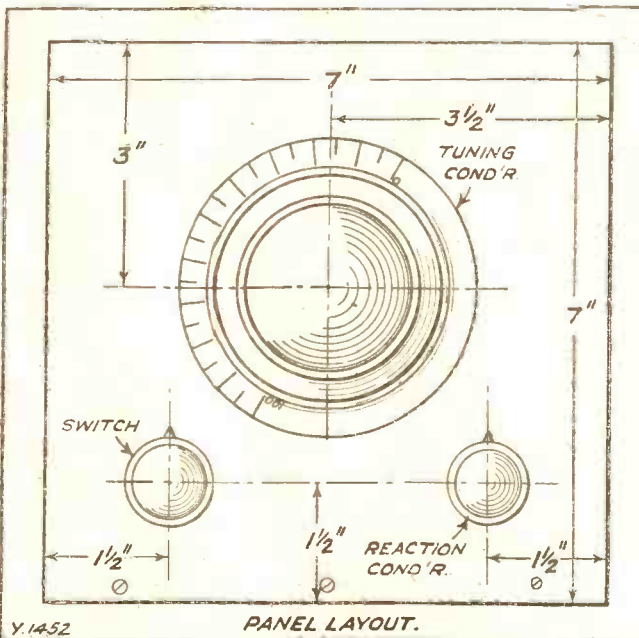
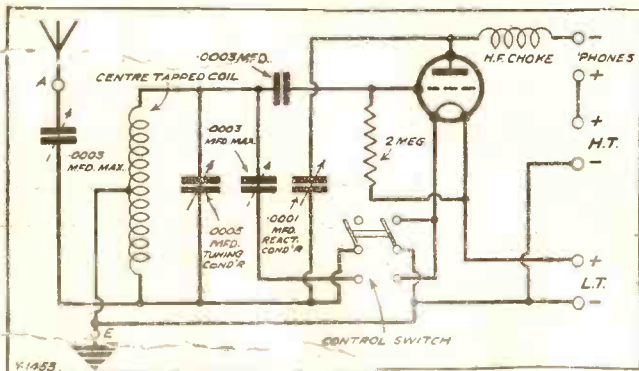
Designed and described by the "P.W." Research Dept.

this set. However, if it is to be used for long-distance as well as for two local programmes the tuning must, of course, be carried out as with an ordinary set. For such long-range reception the reaction must be used, and naturally this means a little operating skill.

Reserve of Programmes.

When employed in this way a dozen stations or so should be receivable on an average aerial, which is certainly a very nice reserve of programmes to have in hand if needed. And when the ambitious operator has finished reaching out, he simply

SIMPLE STATION SELECTION



At the top we have the theoretical circuit of the "Station-Change" One. Note the wave-change switch, which by virtue of its centre position also enables the filament to be cut off when the set is not in use. Below this diagram we see a sketch of the panel face, showing very clearly how extremely simple is the handling of the set.

THE FEW PARTS REQUIRED

- 1 Panel, 7 in. x 7 in. (Red Seal, or Goltone, Lissen, etc.).
- 1 Cabinet with baseboard 7 in. deep to fit (Camco, or Pickett, Osborn, Lock, Kay, etc.).
- 1 .0005-mfd. tuning condenser (Dubilier, or Lotus, Lissen, J.B., Ormond, Igranic, Ready Radio, Burton, etc.).
- 1 .0001-mfd. plain reaction condenser (Keystone, or Lissen, Ready Radio, Lotus, J.B., Ormond, etc.).
- 1 Double-pole double-throw switch (Wearite). (See text.)
- 2 .0003-mfd. max. compression-type condensers (Formo, or Lissen, Lewcos, Polar, etc.).
- 1 Spring type valve holder (Telsen, or W.B., Igranic, Lotus, Clix, Benjamin, Lissen,



A SMALL SET WITH A SURPR



re-sets the tuning condenser to its original position, and then the switch can come into play again, giving a choice of two different programmes with all the advantages of a turn-the-knob change-over.

A great many readers will be much less interested in these incidental long-distance possibilities of the set than in its ease of construction and operation. So let us turn to this aspect of the "Station-Change" One, and consider the various steps required to make it at home.

The first thing to do is to acquire the necessary parts, and these are listed separately, with

TO BUILD THIS LITTLE SET

Dario, Bulgin, Junit, etc.)

- 1 Single coil holder (Lotus, or Magnum, Igranic, Keystone, Red Diamond, Bulgin, Wearite, etc.)
- 1 0003-mfd. fixed condenser (Dubilier, or T.C.C., Lissen, Telsen, Igranic, Ready Radio, Ediswan, Ferranti, Mullard, Watmel, etc.).
- 1 2-meg. grid leak and holder (Dubilier, or Igranic, Lissen, Mullard, Ediswan, Ferranti, etc.).
- 1 H.F. choke (Lissen, or Lewcos, Telsen, Varley, Ready Radio, Igranic, Dubilier, R.I., Magnum, Wearite, Keystone, Watmel, Lotus, etc.).
- 1 Terminal strip, 7 in. x 2 in.
- 8 Terminals (Igranic, or Eelx, Clix, Belling & Lee, etc.).
- Screws, wire, flex, etc.

**ECONOMICAL
BUT
EFFICIENT**

ISINGLY BIG PERFORMANCE

alternative recommended makes. (The first names given in each case are the particular makes that were used in our own model.)

The positions of the panel holes are clearly shown on the panel diagram. The wiring diagram is drawn exactly to scale, so there should be no difficulty in copying our layout.

Final Steps.

Note that the valve-holder has its "G" terminal nearest to the panel, and that a supporting bracket is unnecessary, the panel being secured to the baseboard by three screws passing through from the front of the set.

By the way, if it is decided to cut out all soldering, be sure to get one of the new-type switches. The earlier ones have no terminals, but only pins for soldering to, and these are unsuitable for screw-down wiring.

When the components are securely mounted in place, the wiring is carried out as indicated by the illustrations, the various points which must be joined together being clearly shown by the heavy black lines in the big diagram. There is one flexible lead from the switch, and this is to be joined to the centre-tap on the coil.

When the wiring has been completed and checked over, the set is ready for test. For ordinary wave-lengths a 60-turn centre-tapped coil is required, the tapping terminal being joined to the flex, as already stated.

Apart from the set itself there are just the aerial and earth connections, the 'phones, the batteries and the valve. The better the aerial and earth the better the results, so any trouble expended on this part of the outfit is always well rewarded.

Any ordinary pair of 'phones is suitable, and the valve can be either a 2-, 4-, or 6-volter.

The Detector.

It may be a special detector valve, or one of the "H.F." type, or else an "L.F." valve, all these being quite suitable, the order of preference being as given above. The L.T. battery, of the same voltage as the

valve, need be only quite a small one as the modern valve takes very little current.

A small 60-volt H.T. battery will give ample high tension, and in fact there will be but little loss if a 45-volt battery is chosen instead. But remember that its negative plug should *always* be taken from the socket if the internal wiring of the set has to be touched, or if coils, etc., are changed, or otherwise there is risk of the valve being accidentally burnt out.

Now a few words about the preliminary adjustments. Starting with the batteries, etc., connected, and the switch in the "off" (centre) position, there should be a loud click in the 'phones when the switch is turned to the left.

Reaction (right-hand condenser) should be at minimum with the vanes "all out," but the selectivity condenser (the one on the baseboard that is joined to the aerial terminal) should be at its maximum, which is the screwed-right-down position.

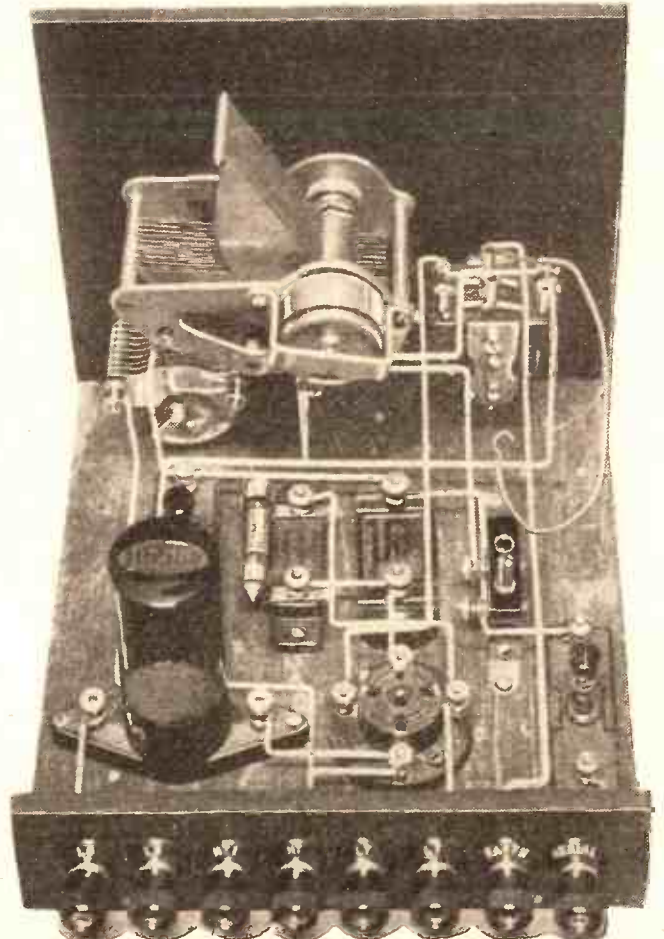
Tuning the Receiver.

Turn the main tuning condenser (centre of panel) until the local station's National programme is received. Note the exact dial reading, and leave the condenser "set" to this.

Should there be two programmes coming in at once you can separate them by slackening off the selectivity condenser a little. But always keep it set as near its maximum as is possible, as selectivity is

(Continued on next page.)

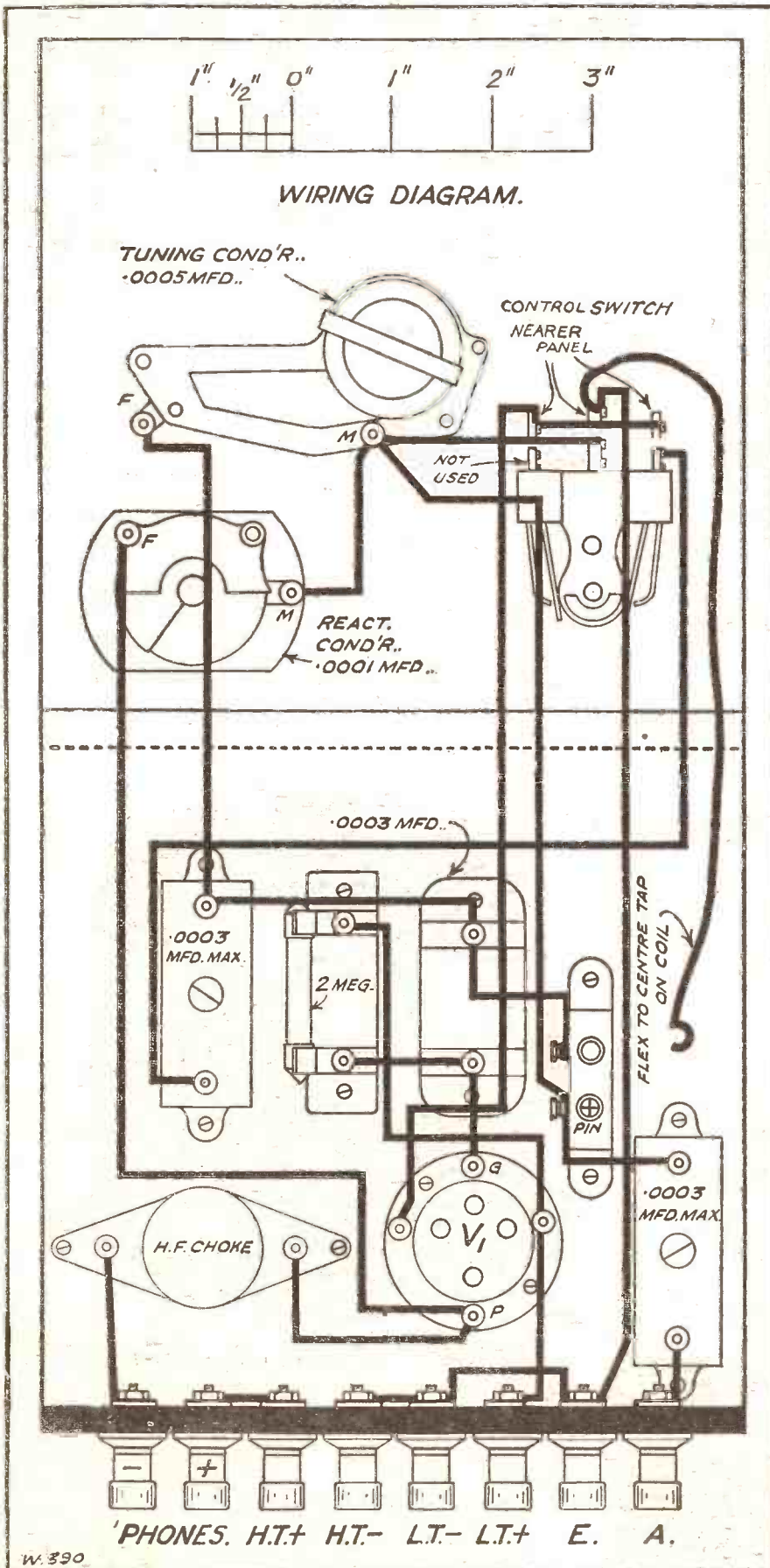
FEW PARTS—BUT PLENTY OF PROGRAMMES



Though there are few parts used in the construction of the set it is capable of pulling in a surprising number of stations, for it is not limited to the local.

THE "STATION-CHANGE"
ONE

(Continued from previous page.)



usually only gained at the expense of volume. Having got the National programme coming in at good strength, throw the switch over to the right, and tune in the Regional (or other chosen alternative) in the same way, but on the other variable condenser on the baseboard—the one next to the H.F. choke.

Use of Reaction.

When this has been properly set you get the Regional programme in the 'phones. The mere turning of the switch will then bring in either programme, and all the bother of tuning is finished.

Any two well-received stations on the same wave-band can be selected and switched in this way, but don't forget that the one with the lower wave-length (normally 261 metres in the London area, 300 metres in the North Regional area, etc.) must be selected with the switch turned to the left. Turning to the right then enables a second station with a higher wave-length to be brought in.

In bad situations or with poor aerials the reaction may be advanced a little to increase strength, but this is apt to spoil the quality and in unskilled hands it may interfere with neighbours, so normally reaction should be kept at its minimum.

NEXT WEEK

The "£4 Four"

Efficiency with Economy.

The set is not intended for loud-speaker work, but it is a good long-distance receiver when the switch is thrown over to the left, tuning and reaction then being operated in the usual way. After such use the main dial be reset for the two required programmes, and it is then ready for the usual change of programme simply by means of the switch, and without touching any of the other controls.

On the Long Waves.

Finally, a word about long waves. If a 250-turn centre-tapped coil is inserted in the coil holder the set will tune over the long waves, but at short distances from a powerful station there may then be a "local" background breaking through.

This, of course, could have been obviated, but it seemed hardly worth while complicating the set to do so because few people will want the National programme from 5 X X when they can get it from a twin-wave station.

Those who do not live within a few miles of a powerful local station can use the 250 size coil for 5 X X and Radio Paris, and other foreign long-wavers also can be received if desired. But the chief merit of the set is that simple switch-over from Regional to National, or vice versa, on ordinary wave-lengths. For this no long-wave coil is required, but the set will give strong, steady, and reliable service from two different stations without any bother of re-tuning. Anyone can operate it safely, for it is all done by a turn of the switch.

W. 390

As usual with "P.W." designs, no soldering is required in the construction of this set, and the wiring is of a very easy character.



READ WHAT THE PRESS AND PUBLIC SAY—

“ For the convenience of those who cannot and do not want to wind their own coils, Messrs. Ready Radio are selling the ‘ P.W.’ ‘ Brookmans Rejector ’ complete.

As they charge only 5s. 9d. for the device built exactly to specification, it constitutes a distinctly attractive line.

For any good wave-trap 5s. 9d. would be a small enough price to pay, but for the ‘ P.W.’ ‘ Brookmans Rejector ’ the figure seems almost trivial in comparison with what the little article will do.

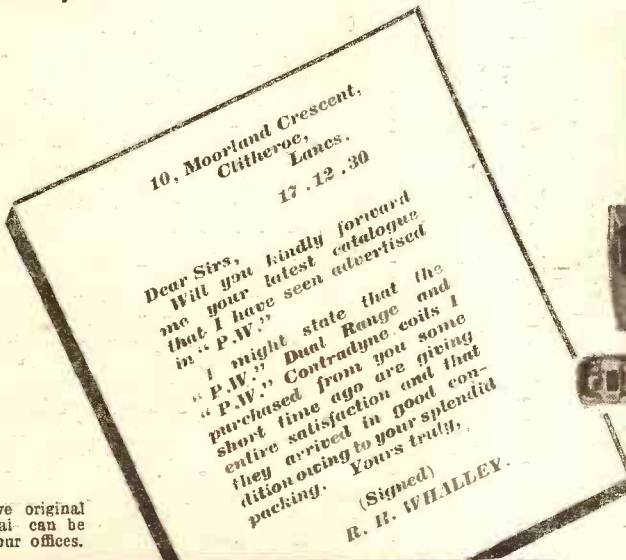
Remember, it not only provides really effective trapping, but, unlike most similar articles, it generally adds to the sensitivity of a set by reducing its aerial lead.

We have received samples of the Ready Radio ‘ P.W.’ Rejector, and find that they are in accordance with our original specification, and that they are right up to standard in point of efficiency.

‘ Popular Wireless,’ January 24th. ’

“ P.W.” “ BROOKMANS REJECTOR ”

CUT OUT THAT LOCAL
With the “ P.W.” Rejector. Specially designed by Ready Radio in accordance with “ Popular Wireless ” Specification. A really effective rejector. Post free. **5/9**



The above original testimonial can be seen at our offices.



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E.W.G.

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CORRESPONDENCE.

AN "ALL-WAVE" THREE

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for any information given.—EDITOR.

AN "ALL-WAVE" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—The article, "Next Year's Sets," by Victor King, in a recent issue of "P.W.," proved very interesting to me, especially the paragraph in which he deals with the wave-changing of the future.

At present I do not think a "household" set requires to operate on short waves. Certainly, it must operate on the medium and long waves, the change being effected by switches which should be operated by one control mounted on the panel.

In my particular case the family require such a "household" set, easily operated; while at times I like to explore the short waves. But two separate sets would be an unnecessary expense, also lack of space was another serious consideration.

My present set is a solution of this problem. It is an S.G., Det., L.F. set, the circuit diagram for which I enclose; and this may require a word or two of explanation.

The parts of the circuit within the double lines represent complete plug-in units, which fit into two six-pin bases mounted on the baseboard.

The two units which serve both L.W. and M.W. are shown as plugged into the set, and it will be seen only a movement of the ganged switches is required to change to either of these wave-bands.

Below, the two short-wave units are shown. These take the place of the former units when it is desired to work on the short waves.

Points of interest are the means by which the neutralising condenser only is brought into circuit when the short-wave coil No. 2 is inserted. Also, this latter coil is 16 turns of bare wire, with a tap for the earth connection, thus any size of grid coil between 4 turns (12 turns reaction), and 10 turns (with 6 turns reaction) can be used, covering a wave-band from 18 metres to over 70 metres, a further advantage of this system being that only the lower degrees of the tuning condenser need be used, permitting most efficient working.

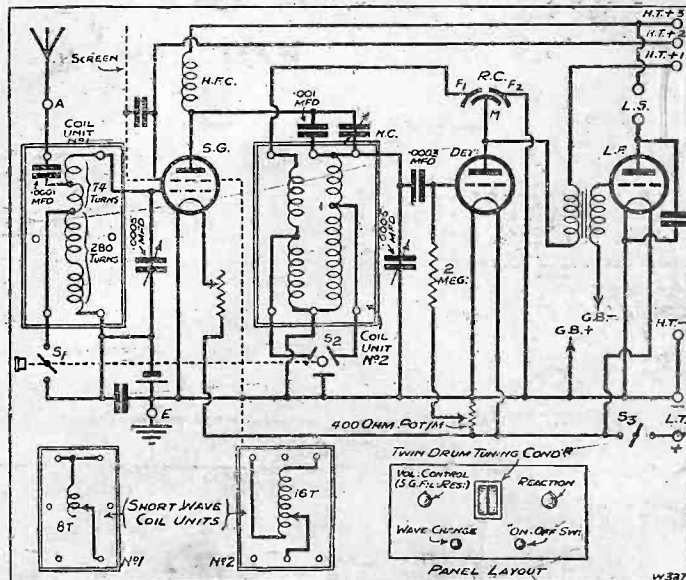
Incidentally, in designing this set I have been greatly helped by information collected from "P.W." For example, the L.W.-M.W. coil unit No. 2 is a "Titan" coil fitted with the necessary pins, and W.L.S.'s "My Screened-Grid Short-Waver" was taken as the basis of the short-wave circuit.

The only difficult part of the construction was the

matching of the long and medium wave coils, so that as a "household" set the twin drum dials may be rotated as one.

I have tried a second "Titan" coil in the aerial circuit, but only by complete screening could I prevent coupling between the circuits, and the screens prevented coil-changing without some difficulty.

A READER'S SWITCHING SYSTEM



This shows the ingenious scheme for wave-changing evolved by Mr. Hewitt, and explained in his letter on this page.

I trust this will interest other readers of "P.W." faced, perhaps, with the same problem.

Yours faithfully,
G. HEWITT.
Liverpool.

[Ed. NOTE.—It is interesting to note that Mr. Hewitt's letter arrived just after the issue of POPULAR WIRELESS, containing details of the "Interchange" Three had gone to press. The latter set uses a rather similar scheme, and employs the new "P.W." Dual-Range Coil, while our correspondent has employed different wave-change units.]

THE "CONTRADYNE" THREE.

Dear Sir,—Some time ago my friend and I had occasion to write you concerning Brookmans Park Rejector and old type Cossor circuit. You were kind enough to offer your assistance with further information. You gave us that assistance, but there was a difficulty about aperiodic tappings, and we decided to wait. We have now built your "Contradyne" Three, and I now want to congratulate and thank you for such a circuit. It is fine, especially on the medium waves. I have already identified eighteen foreign stations; there are others I can get, but as yet I am unable to fix them. We were not able to get the coils through the trade, so my friend made them himself, and he has made a beautiful job of them. Foreign stations come in louder than our local stations in some instances, on the medium waves, but I wish I could get more volume on the long waves. I can get six stations, but not sufficiently loud enough to be comfortable. Of course, I realise I am not giving the voltage you specify. At present I have only 100 volts (Exide accumulators). Both the tappings are on the H.T. 100. Mullard valves, P.M.I.A., P.M.I.L.F., P.M.2. Power 200 volts. Grid bias 6 and 9, but considering the reception on the other waves I am proud of the performance of the set. My family enjoy music from stations we were never able to reach before, and I want to say how thankful we are to you and your staff for the privilege we are now enjoying and greatly appreciate.

Please accept my thanks and best wishes.
Yours faithfully,
E. EVERTON.
Birmingham.

THE most interesting short-wave event of the past week or so is also, in my opinion, one of the most interesting for some years. I refer to the fact that on the 80-metre amateur band, in which interest has grown so rapidly, the United States stations have suddenly started pouring in, every bit as loud as they usually are on 42 or 20 metres.

Is it Correct?

This is proof that even if the "eleven-year cycle" business is correct (and this is only admitted at present by the doleful ones) there will still always be one wavelength on which DX stations can be heard and worked. For if 40 and 20 metres are dying down until their minimum is reached next year, or the year after, 80 metres should be improving correspondingly.

Looked at in this way, it seems quite clear why the first Transatlantic records were made and broken over and over again in 1923 and 1924 on the "long" short waves!

In response to several inquiries for full details of the receiver that I use myself for "keeping watch," I propose to describe it in some detail in a future issue of "P.W.," with the Editor's permission. It is no longer of the rapidly-changing variety, as I have at last found one that really satisfies my demands, and does not get on my nerves by means of silly little tricks that I cannot account for.

SHORT-WAVE NOTES

By W. L. S.
The United States Stations are pouring in!

It will probably disappoint those enthusiastic readers who have written me on the subject simply because it is so straightforward and conventional, but there may be a few novel points in it that I have overlooked!

I have received an interesting letter from a New York reader of "P.W." concerning short-wave reception on the other side, and in which are these points. First, W2XAF is very weak indeed. PCJ is hardly ever heard at all, and Zeesen is quite poor.

"With a Bang."

On the other hand, LSX (Buenos Aires) "comes through with a bang," and is also pretty consistent. It looks as if conditions are all right from north to south and very poor from east to west.

This reader, "G. L. P.," also gives me particulars of the "International Short-Wave Radio League," which, he says,

helped him on a lot when he started on the subject. If anyone would like to get in touch with "G. L. P." on the subject, I will forward letters to him.

He is also good enough to give the full address of the Buenos Aires station, for which I have already been asked many times. It is: Transatlantic Radio Corp., San Martin 329, Buenos Aires, Argentina.

And now the "weekly five." Readers do not seem to have been getting on very well with reception of the stations I have mentioned from week to week.

Have a Shot at Them!

Let us hope it is due to bad conditions and not to an epidemic of bad receivers! For this week I suggest:

- F T M, Sainte Assise, on 15.5 metres;
- V L K, Sydney, on 18.37 metres;
- U O T H, Vienna, on 27 metres;
- D H C, Nauen, on 29.47 metres; and
- J I A A, Tokio, Japan, on 38.1 metres.

I have logged four of them myself during the past month, so there should be no difficulty in finding them this time.

In addition to G2GN, the Olympic, G2GL, the Homeric, and G2IV and GFWV on the Majestic, working telephony to the shore, we now have the Bremen (call DDDX) and the Hamburg, both doing the same thing at irregular hours. All these boats work between 22 and 26 metres.

NOTES FROM THE NORTH

The opening of the North Regional station will revolutionise radio reception in the North of England. A review of 1930 and a prospect of the important developments of 1931 is given here.

IT is a safe prophecy to say that 1931 will be a record year for broadcasting in the North of England. As I write, the stage is set for the biggest event since radio first came to the North, and only some slight delay behind the scenes prevented the curtain being rung up before 1930 was out.

Trade Boom Expected.

Widespread public interest and curiosity has been aroused by the preliminary news and rumours about the North Regional station at Moorside Edge, and those who are aware of what is going to happen are eagerly waiting to see exactly how the new station will affect radio reception in Northern England and the North Midlands.

One result of this is a severe slump in the wireless trade. One of the biggest wholesalers of wireless apparatus in the North tells me that trade is "dead" because the public is afraid to buy.

"But," he adds, "as soon as the new station has been testing long enough for us to prove that modern sets can provide the requisite selectivity, there will be a rush to buy. I am preparing for a three months' trade boom."

There are, however, an astonishing number of people who are innocently unaware of the sweeping revolution which the B.B.C. is to bring about by the opening of the North Regional station.

Unaware of New Station.

Visiting a village in one of the Yorkshire dales recently, I fell into conversation with the Vicar, who proved to be a keen radio "fan." He told me that in his dale Daventry National was the only British station that could be received satisfactorily on a three-valve set.

A number of foreigners came in quite well, he said, and he asked me if I could advise any alterations so that he could get better reception of British stations.

When I suggested that he should wait until the new station at Moorside Edge was in full action he expressed surprise. "What!" he said, "are they opening a new station in the North?"

Giving the parson the credit of being the best-informed person in the village, I assume that this village will be taken entirely by surprise by Moorside Edge.

Better Programmes.

The surprise will be intense, for I myself verified the Vicar's report on local reception conditions, and after these poor conditions the change to powerful reception from a local station will be staggering.

This applies to the greater part of the North of England, for the areas served by the present low-power transmitters are restricted to a few miles round each, and most of the North has had to rely on 5 X X.

The revolution in the method of transmission will be accompanied by an equally important revolution in programmes, for which the B.B.C. has been steadily preparing during 1930.

The system under which the northern transmitters have sometimes relayed the National programme and sometimes broadcast local items has been far from satisfactory, for the programmes are often ill-balanced, taking a week as a whole, and when a local item is given it inevitably arouses the fury of the people who happen to be particularly attached to the National item it has replaced.

From Moorside Edge the National programme will be broadcast in entirety on 301 metres wave-length. Simultaneously the second transmitter, on 479 metres, will give what will be known as the North Regional programme.

Northern Talent.

Sometimes the Midland Regional and London Regional programmes will be relayed on this wave-length; but the B.B.C. has given its assurance that the major part of the programme will be of northern origin.

"ALL TELEPHONES, PLEASE!"



The use of radio on long-distance trains is becoming more and more common, particularly on the continent. The usual scheme is to hire 'phones from the steward on the train, here seen on his "round" of the carriages.

On this wave-length Moorside Edge will be literally the voice of the North. From the B.B.C. studios at Manchester, Leeds, and Newcastle, and by means of outside broadcasts from all over the North of England, the talent of the North and its manifold activities and interests will be brought "on the air."

During 1930 the North Regional staff of the B.B.C. have been steadily preparing for this fulfilment of their dreams, and the quantity of North country material broadcast by the Manchester and Leeds transmitters has been gradually increased, the idea being apparently to try it out on the dog.

For the dog—the radio listeners of those two great industrial cities—this was occasionally unfortunate, but generally speaking the North Regional programmes have now been completely rescued from the morass of mediocrity in which they wallowed.

Vast improvements were made in 1930 on the dramatic side. There is now a competent company of radio play-actors at the North Regional headquarters at Manchester, and in Mr. Victor Smythe the North Region has a producer who works like a Trojan.

Improved Revues.

The acting in North Regional plays has not yet attained quite that effortless sincerity, and the production has not been so entirely smooth-running as in the best of Savoy Hill's efforts during 1930, but very rapid improvement is going on, and in the presentation of a more homely type of drama than Savoy Hill provides Manchester can certainly give points to London.

Towards the end of 1930 radio revues produced in the North showed a marked improvement, particularly in the slickness of presentation. Northern vaudeville, on the other hand, has been disappointing, and needs energetically working up to the National programme standard.

Outside broadcasting in the Northern Region has been most enterprising, and I understand that plans have been made on an extensive scale for putting "outside" events of all kinds on the ether this year.

The Orchestra.

One of the happiest features of Northern broadcasting has been the delightful "microphone manner" which has been developed by the North Regional announcers.

Under Mr. T. H. Morrison the work of the Northern Wireless Orchestra, and the musical side of the Northern programmes generally from the Hallé Orchestra to the brass bands for which the north is world-famous, has maintained a high standard, and the most consistently satisfactory feature of the year's broadcasting in the North has been the work of the Northern Wireless Orchestra. For that reason the threat of dissolution which hangs over its head is especially deplorable.

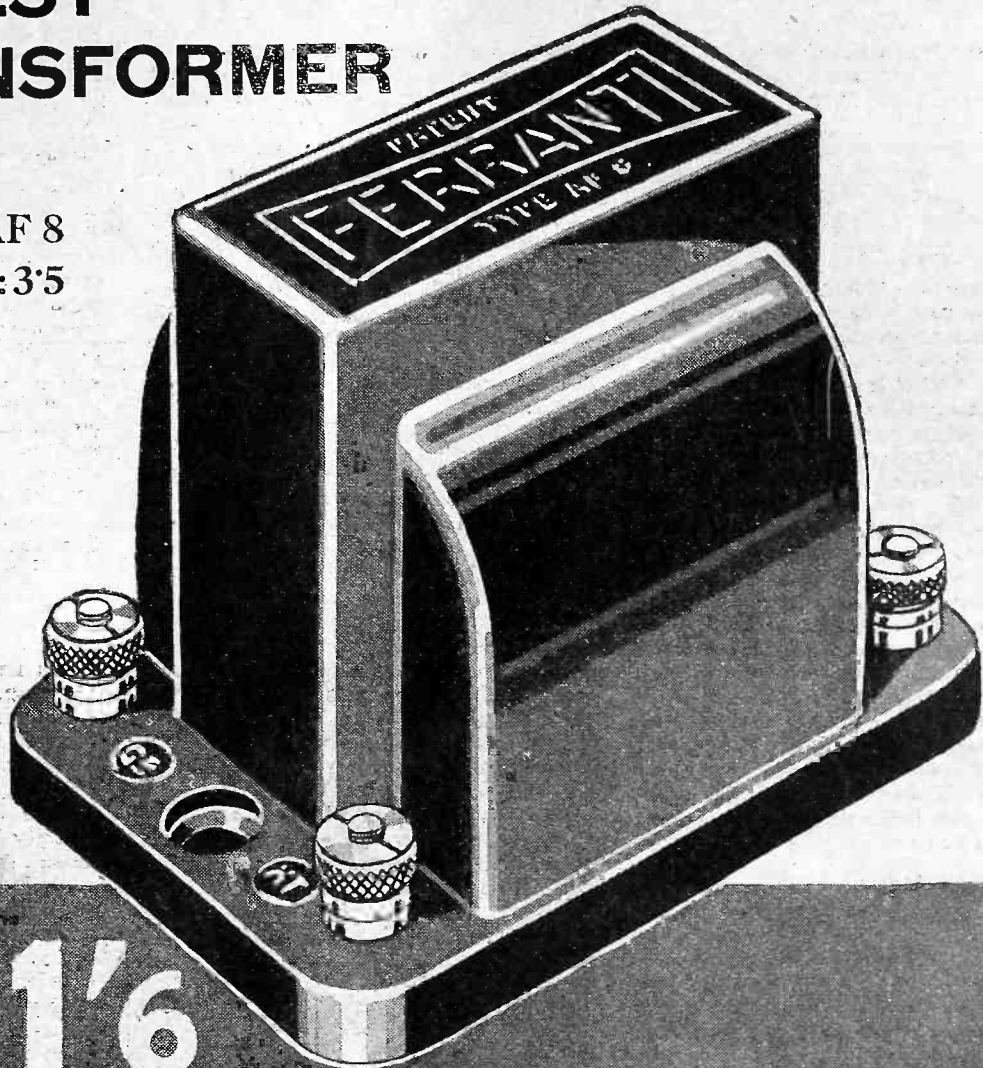
The Regional news bulletin is the worst feature of Northern programmes. The triviality and inefficiency of the B.B.C.'s local news service in the North is astonishing.

The North Regional staff is as keen as mustard, and reminds me of the early days of the B.B.C., when everybody was a pioneer, an enthusiast.

A great responsibility rests this year on the North Regional director, Mr. E. G. D. Living. To him, to his assistant, Mr. J. B. Clark, and to all who, in addition to those mentioned above, help to run Northern programmes, I send the wish that their programmes may improve in 1931 as much as they did in 1930. If they do, we shan't have much to grumble about next year.

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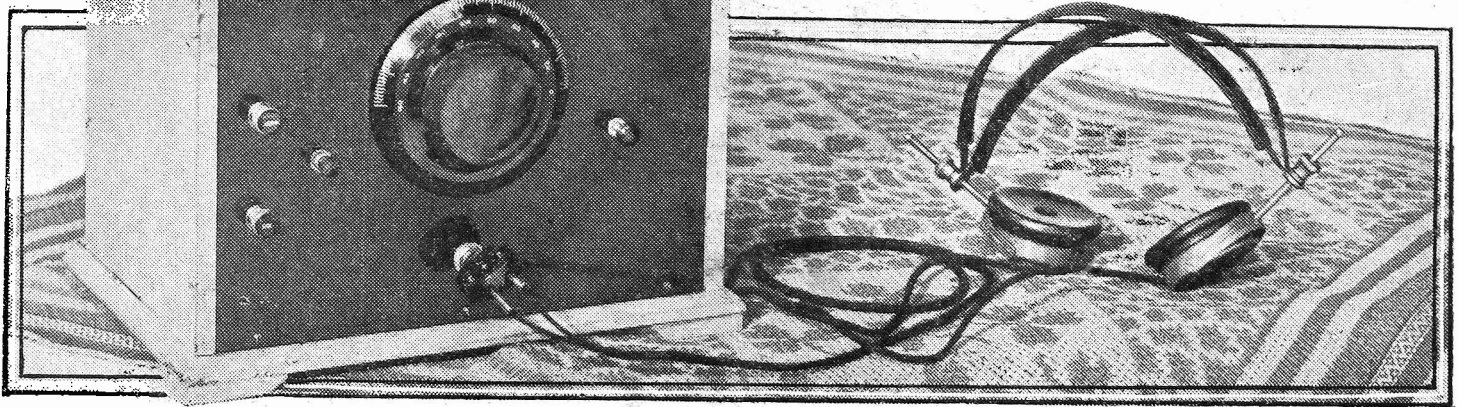
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MODERN CRYSTAL SETS



I FANCY that it is incorrect to speak of modern crystal sets in the sense that the sets themselves are modern. More truly the interpretation of the title of this article should be crystal sets that are used in modern times.

There has been little or no progress at all in the design of crystal detector receivers during the past twenty years. There has been, as with all things radio, a certain amount of improvement effected. For examples of these I would refer you to the structure of the detector itself—once a very shaky affair and now a moderately robust and reliable device. And, of course, "P.W." has played its part in the development of circuit twists that add quite a bit to the general effectiveness of crystal outfits. The "P.W." "Reactocrys" is a notable instance of this.

Fundamentally Unchanged.

However, despite all the foregoing, it is an undeniable fact that the crystal set of to-day is fundamentally similar to those of pre-war days. Compared with the terrific strides taken by valve apparatus the poor crystal looks as though it has been stuck right in the mud for ages.

At a point somewhere near the beginning of another year, it seems fitting that we should review the situation if only for the sake of those readers—a minority, perhaps, but a very enthusiastic minority—who still cling to the crystal as their only means of reception.

At one time valve users were the smaller section of the home-constructing public, but there is little doubt but that they now constitute some 90 per cent, or even more, of those that hopefully scrape the night ether.

Will the Valve Survive?

The reason for this is almost too obvious to mention. Valve apparatus offers unlimited scope for experiment, and it never stands still—there are always new avenues opening up, although here, too, progress is slowing down, but not to a standstill, I think. I confidently predict that the valve set of ten years hence will be a very different thing from those employed in this year of grace.

Indeed, I am not too sure whether the valve, as we know it, will survive. It has always been my impression, as "P.W." readers know well, that one day even the thermionic valve will meet a formidable

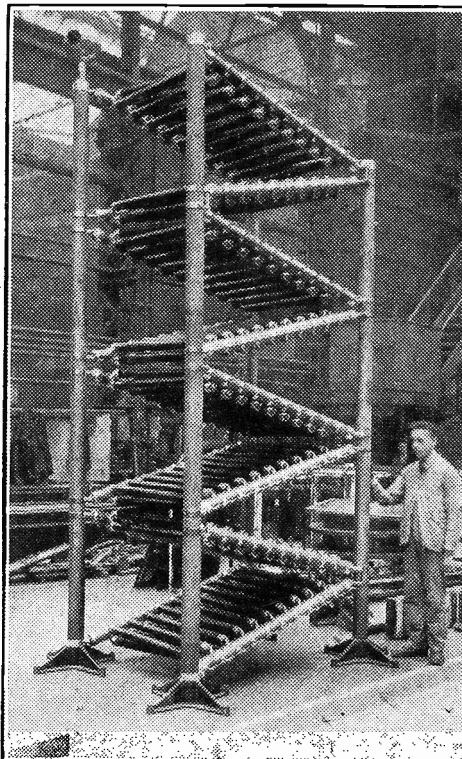
G. V. DOWDING, Assoc.I.E.E.

Advances some observations that will interest and hearten crystal enthusiasts and advises inveterate loud-speaker listeners to try telephone receivers as a fascinating experience.

rival in some electro-magnetic or electro-chemical principle. Maybe a young man reading these very words is destined to be the instigator of some such radio revolution.

It is a fascinating prospect to linger over in one's imagination. Conceive of the fame and fortune awaiting the man who comes along with a little sealed bottle, containing three electrodes and, let us say, a radioactive fluid, that would cost about fourpence to make and which would displace

800,000 VOLTS!



A bank of condensers built by Ferranti for use on 800,000 volts—just a few times greater than the pressure the condensers they make for your set have to stand!

any valve in any set, even one of those expensive mains valves. Think of the shock to the present generation of radio enthusiasts if all that could be done without resorting to any additional source of energy such as our present H.T. and L.T. supplies.

That Shut-In Feeling.

To return to the present hard facts, other factors that contribute to the decreasing popularity of the crystal set are the cheapening of valve apparatus and its much more social loud speaker in place of telephone receivers. Personally, I regret the waning use of 'phones. In my opinion, 'phones make for good listening. You see, when two ear-pieces are clamped over your ears extraneous noises, such as are always present in the house and within its immediate vicinity are to a great extent reduced. Good modern 'phones are light enough and quite comfortable to use—they don't make your head ache like those old heavy ones.

And you are able more easily to concentrate on what is coming to you via the radio. Someone enters the room, and the mere fact that you are wearing headphones tends to short-circuit their casual conversation. The illusions of a radio drama and other such broadcasts are generally more complete, too, in such circumstances, for you have the feeling that you are shut in with the radio, and not listening to it from a distance as with a loud speaker.

The Chummy Crystal.

There are many readers who have old crystal sets tucked away which they have not used perhaps for three or four years. I would advise them to get the sets down, dust them, and take a few broadcasts from the local via a crystal detector for a change. They will discover it is interesting!

There are no doubt thousands of you owning valve sets who listen on the short waves and even to distant medium wave broadcasters with 'phones, and I expect you will endorse my next observation. This is that the apparent closeness of contact that 'phones enable you to gain adds vastly to the interest of listening to those distant stations and makes them more "personal," as it were, than when you "tune in direct on the loud speaker."

And taking everything into consideration, there is a great deal to be said for the crystal set as a "chummy" companion to solitary listeners. And when I say

(Continued on page 936.)

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The finest value in the radio world to-day. A powerful and selective 2-valve set complete with valves for only 50/-. Gives you excellent volume and quality from Home and Continental Stations. Thousands of testimonials have been received in praise of the Double Two. As soon as you hear it you will be amazed at the wonderful volume, selectivity and quality. Until you have a Double Two of your own you do not know what a good two-valve set can do.

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RADIOTORIAL

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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. Lill, 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 would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

WAS IT THE CONDENSER ?

L. T. S. (Sittingbourne, Kent).—"For a long time I had been getting excellent results with an ordinary transformer-coupled last stage. Recently I thought I would try to "auto-choke" the transformer, and with this in

view, I bought a fixed resistance and condenser, connecting up according to the makers' instructions (enclosed).

"At first I was charmed with this arrangement, for it certainly did seem to give even better results than formerly. But now I have had a trouble which I cannot make out, and which bids fair to ruin my valve.

"What happened was that suddenly and with almost no warning, the whole thing gave distortion, nothing that I could do making the slightest difference to it.

"But what alarmed me was that I noticed that the milliammeter in the plate circuit of the

last valve immediately went up. So all I could do was to switch off and hope that the valve had not been hurt.

"All connections are sound and perfect, and there is no such simple fault as a broken grid-

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.

bias lead or bad contact in this part of the set. I am absolutely at a loss to know how such a fault could occur."

Everything points to a dud coupling condenser. Should the insulation of this not be perfectly satisfactory, the grid of your power valve will be affected by the preceding valves' high-tension.

Obviously this can take place by the H.T. causing current flow through the L.F. transformer, and decreasing the effective bias of your G.B. battery. With H.T. + "getting through" like this the power

(Continued on page 928.)

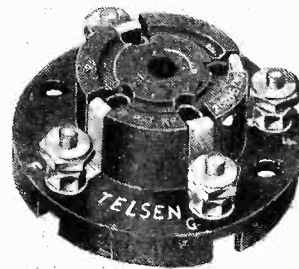
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of the superiority of Telsen Components is to be found in the fact that, apart from their continual inclusion in the most popular sets of the day, they are being bought by wireless enthusiasts in ever increasing quantities.

Components may look alike, but there IS a difference—a very big difference—in Telsen! MANY FEATURES OF TELSEN COMPONENTS ARE PATENTED, hence the remarkable improvement in performance when they are incorporated.



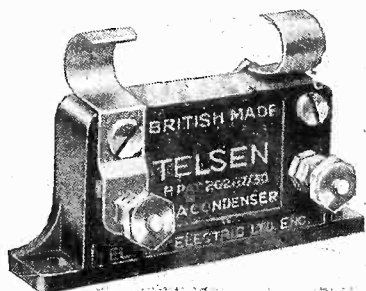
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TELSEN FOUR-PIN VALVE HOLDERS. Price 1/- each.



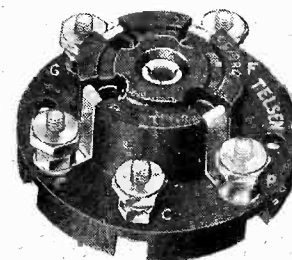
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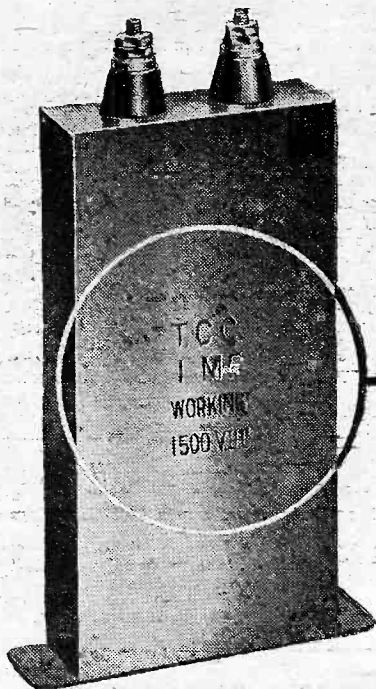
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Test Voltages or Working Voltages?

SOME condensers are marked in a misleading manner. They indicate test voltages, which are obviously so much higher than actual working voltages, you may believe you are buying more efficient and better insulated condensers. This is not necessarily the case. The old idea that the continuous working-voltage of a condenser was half its stated test voltage cannot now be relied upon, for Condensers of similar capacity and size have been sold stamped with varying test voltages, but with no indication of the working voltage. Do not take risks, therefore. See that the condensers you buy are definitely marked with their maximum **working** voltage. You will always find this on

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Model A.C.188 was first in the "Wireless World" Competition at Olympia, and is suitable for any set, Standard or Portable, and can be attached to either without the slightest alteration or replacement of valves.

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CLARKE'S
"ATLAS"
ALL MAINS UNIT

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 926.)

valve's emission would certainly go up as you describe, with possibly undesirable results to the valve's health. You should certainly have that condenser out, and test it with a milliammeter in series with an anode resistance. It should, of course, show only a momentary kick when H.T. is switched on but if it shows a steady reading you can be sure it is a dud one.

NOT A RUSSIAN.

P. M. (Warwick).—"I have heard it several times on Sundays and think it is a Russian station. During the service they sent out last Sunday evening there was a male voice choir. Was it a Russian?"

It could not have been a Russian station, if you heard it sending out a religious service, as the Russian stations do not broadcast anything at all of this nature.

FITTING AN R.C. STAGE.

S. G. T. (Huntingdon).—"With the H.F. unit in front of the detector and the two transformer stages, results are a bit too strong, and I would rather go out for purity."

"It is certainly very clear on everything but the loudest notes, but I think I am overloading a little and should like to use the transformer in another set if I could put a resistance in its place. I would like to use the R.C. unit I have on hand, but am not quite sure about the connections."

The alteration is a very simple one. All you have to do is carefully to disconnect the grid and grid-bias leads from the secondary of the transformer and the other two leads from the primary—all the batteries, of course, being disconnected from the set as usual when alterations to the wiring are being made.

With the L.F. transformer lifted out of the way, all you have to do is to place the R.C. unit in position, this being marked for the four leads. Usually there is a "G" mark, which means the grid lead, and "C" or "G.B." which signifies grid bias.

One of the terminals on the unit should be marked H.F. (or perhaps B+), and the final terminal is usually either marked P or A standing for plate or anode.

This lead usually goes to an H.F. choke if in a detector reaction circuit, or direct to the plate, if in the circuit of the L.F. valve.

TUNING A SHORT WAVE.

S. W. (Nr. Norwich).—"What are the chief points to watch for when handling a short-wave for the first time?"

With a short-wave set you require good slow-motion dials and with most novices the tendency is usually to turn them much too fast. It should be remembered that short-wave tuning is phenomenally sharp and it must be undertaken carefully.

The tuning dial must be rotated very very slowly, or otherwise the short-wave carriers will fail to appear. It is so easy to miss a transmission that short-wave enthusiasts nearly always wear phones, instead of using the loud speaker when tuning, just to make sure that nothing is overlooked.

At the faintest sign of a chirp or whistle tuning should be very carefully adjusted and reaction slackened off a little, so that the set is not quite oscillating. Often when condenser-controlled reaction is employed a slight variation of the reaction condenser will alter tuning enough to make a station disappear.

Therefore, both hands should be used, one for tuning control and one for reaction, and these two must be working together in perfect harmony. The tuning dial must follow up and down the carrier whistle which you are investigating, while the reaction is varied to the necessary degree.

Co-ordination between the two dials must be close if the various signals received are to be fully appreciated. Once you have got the hang of the thing you will find that short-wave tuning is really quite

simple, and far more exciting than operating an ordinary set.

NEW BLUE PRINTS.

T.S.E. (Southampton).—"My brother-in-law swore that it was a "P.W." Blue Print, all right, but it wasn't shown on the list you sent me in December. Are there other new ones, as well as this "Sharp Tune"? If so, what?"

Several additions have been made to the lists sent out last year, and all the following are now obtainable.

"P.W." BLUE PRINTS.

No. 57.—The "Sharp Tune" Two. A really simple all-wave set with a special selectivity control. Ordinary plug-in coils, wave range 20,200 metres.

No. 58.—The "Easy Change" Three. An efficient receiver using plug-in coils in a special wave-change circuit.

No. 59.—The "Three-Coil" Three. This is a high efficiency selective receiver, with an S.G. H.F. stage, which requires only three ordinary plug-in coils.

No. 60.—The "Maxi-Power" Four. Powerful and selective long-range reception, with wave-change switching and plug-in coils.

"M.W." BLUE PRINTS.

No. 10.—A D.C. H.T. Unit. A simple but highly-efficient H.T. unit for D.C. mains, with a special voltage measurement scheme.

No. 11.—The "Change-Range" One. A very efficient little single-valve set, giving all the advantages of wave-changing switching.

No. 12.—The "Separator" Two. A simple little detector and one L.F., with a wave-change rejector for dealing with "Regional" conditions.

No. 13.—The "Infer-Star" Three. A sensitive long-range receiver of exceptionally high selectivity.

(Continued on page 930.)

"P.W." PANELS. No. 3.—SWITCHES.

Before mounting a switch it is a good plan to examine it carefully to make sure that the springs are sufficiently strong.

The ordinary on-off switch has many useful applications; wired across a loud speaker it will cut it out of series with other speakers, or wired across a long-wave coil it will cut this out of circuit.

Special insulated switches should be used for bringing "mains" sets, units, etc., in or out of action.

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It now costs only £2 : 12s. : 6d. to electrify your portable — any portable — for D.C. Mains, with the new Regentone Combined Unit, Model II.

For A.C. Mains the new Regentone Combined Unit Model W.5.A. costs only £4 : 15s., or Model W.1.D (H.T. only), costing £3 : 7s. : 6d.

These new Regentone Mains Units fit inside any portable — they are suitable for all standard 2-, 3-, or 4-valve receivers.

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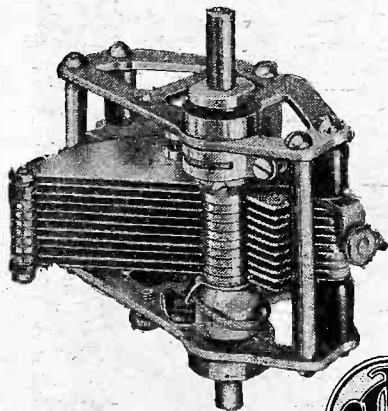
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No one could glance at a J.B. Condenser without being struck by its beauty of finish and its workmanlike appearance. Closer inspection shows all the accuracy, careful thought and attention to detail that have gone to make it what it is.

There is a J.B. Precision Condenser for every purpose. Illustrated here is the J.B. Universal Log Condenser, famous for rigidity and low loss construction.



J.B. UNIVERSAL LOG CONDENSER.
Centre Spindle Adjustable—for Ganging.

PRICES:

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The Westinghouse Brake & Saxby Signal Co. Ltd., 82, York Rd., King's Cross, N.1.

Please send me your 40-page booklet, "The All-Metal Way, 1931" I enclose 3d. in stamps.

THIS booklet gives complete instructions for building high- and low-tension eliminators; and there are chapters on Alternating Current and Rectification, Types of Electricity Supply, High-Tension Trickle Charging, Low-Tension Trickle Charging, Moving-Coil Loud Speakers, General Principles and Methods of Rectification, Smoothing, Transformers for Eliminators, Voltage Doubler Circuit, Voltage Dropping, Types of Rectifiers, etc.

If you are building an all-mains set, send for this forty-page booklet—the coupon, together with 3d. in stamps, will bring it to you by return of post. Or if you intend buying an all-mains receiver, make sure that it incorporates the



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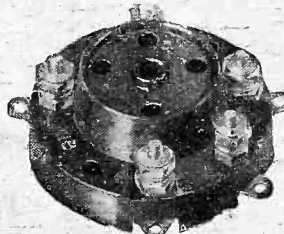
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GIVE YOUR VALVES A FAIR CHANCE



For all modern valves and in particular for Screen Grid Valves, valveholders with high insulation between sockets are essential. Use this W.B. Valveholder and ensure ideal valve-operation. It takes either 4- or 5-pin valves. Special spring contacts grip the valve-pins firmly. Screw terminals make soldering optional. It's wise to use W.B.—the valveholder with a reputation.

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BRITAIN'S LEADING SET-MAKERS USE VALVEHOLDERS

Whiteley Electrical Radio Co., Ltd., Radio Works, Nottingham Road, Mansfield, Notts.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 928.)

Will cope with the most arduous Regional conditions; incorporates one S.G. H.F. stage, with the famous "Star Turn" tuning arrangement for ordinary wave-lengths, and interwave coupling for long waves.

No. 14.—The "Multi-Wave" Three. An all-wave receiver, giving excellent results on short, medium, and long waves.

No. 15.—The "Drum-Control" Four. A high-efficiency four-valver with wave-change switching for plug-in coils.

No. 16.—The "Filter Tuning" Five. A simple but powerful and efficient long-range receiver. Normally

what I had always intended, and that is fit in an output filter circuit. What exactly will be the connections and extra components required? (The set is the 'This Year's "Magic" Three.')"

The additional wiring is very simple. You will need one good low-frequency choke with an inductive value of about 20 henries, one large fixed condenser of 2 or 4 mfd., and two terminals marked Loud Speaker for the new output.

The fixed condenser must be of really good quality and if you are using mains H.T. it should be one that has been tested at a much higher working voltage than that of your mains. In use it will have constantly to stand the full voltage of your mains and consequently any leakage here would be fatal to your scheme.

To wire up, examine the inside of your set and you will find that the plate socket of the last valve holder is connected to one of your loud-speaker terminals. The H.T. + of the battery is connected to the other loud-speaker terminal, and you must disconnect your external loud-speaker leads from these two terminals altogether.

In place of them wire up the low-frequency choke across this part of the circuit. The large condenser must be placed at some convenient spot close to the choke, and from one of its terminals a lead must be taken to that side of the choke which is now connected to the plate of the valve holder.

The other side of this fixed condenser goes to one of your new "Loud-speaker" terminals, and the other new "Loud-speaker" terminal goes to the L.T. - H.T. - earth, or other convenient point which is connected to earth.

This completes the alteration, but do not forget that after your loud speaker has been connected to the new terminals the loud-speaker adjustment (if any) may need alteration for sensitivity, as the plate current of the valve does not now pass through the windings.

YOU
can make
this test in your
own home



OHMITE
Anode
Resistances.

100 ohms to
500,000 ohms,

2/3 each

MEGITE
Grid Leak.

All values, 1
megohm to
5 megohms.

2/- each

Connect an Ohmite or Megite in series with a NEW H.T. battery and a pair of headphones, then observe the absolute silent functioning of the Resistance due to lack of molecular displacement, a feature of Ohmite and Megite Resistances.

Compare with any other resistance obtainable at the price and you will immediately endorse our claim that every Graham Farish component is the finest value for money obtainable.

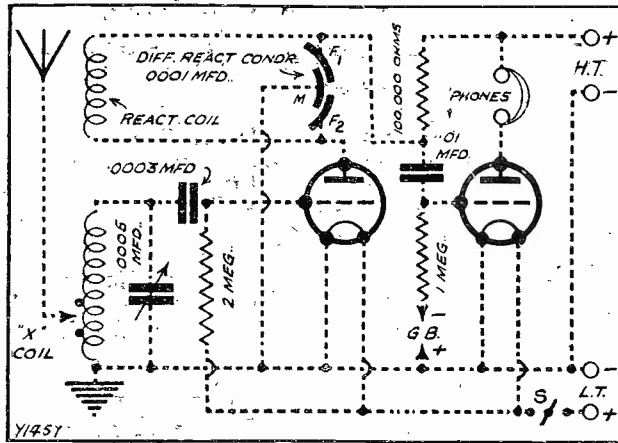
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POPULAR "WIRELETS" No. 28

A DET. L.F. WITH R.C. COUPLING.



The dotted lines above show the connections for a straightforward Detector and L.F. amplifier, using differential reaction and resistance-capacity coupling. (No special selectivity device is included, so the set is not suitable for use near a Regional station.)

employs only two tuned circuits. For high selectivity an extra tuned filter circuit may be brought in by the simple movement of switching.

A CRYSTAL SET FOR REGIONAL CONDITIONS.

J.N. (Watford).—"I always thought a crystal set could not cut out one twin and get the other till I heard your 'Crystachoke' at the scoutmaster's."

"Now I should like to try it here if you will give me connections (in words) and the details of making the coil."

The correct making of the coil is the main part of the set. The "former" is a piece of 3-in. diameter tubing, 3 or 3½ in. long, and on this you must wind 55 turns of No. 24 double-cotton-covered wire (or 50 of No. 24 double silk) in a single, close layer.

Start at the bottom and make tapping points for the aerial clip (twisted loops, later scraped bare, will do) at the 15th, 20th, 25th and 30th turns as you go.

In the lower end of the tube fit a wooden cross-piece in the usual way for purposes of mounting on the baseboard. Fix the cross-piece with small screws, passing through holes in the wall of the tube into its ends, and pass a larger screw down through it into the baseboard of the set.

The connections of the other parts are as given below: Aerial terminal to a flex lead and clip which is tried on the coilappings, 10 to 30.

"Earth" terminal is joined to the end of the coil nearest to the 10 tapping, to one end (it doesn't matter which) of the H.F. choke, to the moving vanes of the variable condenser, and to 'phones.

The remaining "phone" terminal goes to one crystal terminal, the other side of the detector being joined to the fixed vanes of the variable condenser, to one side of the .001 compression condenser, and to the free end of the H.F. choke.

The final connection is from the "60" end of the coil to the remaining side of the .001 condenser.

Set the .001 at its maximum, tune on the other condenser, and note results. Then reduce the .001 a little, re-tune, and again note results, continuing in this way until you find the best position.

A final word—don't forget to try the aerial lead clip on different taps, re-tuning each time, to see which is best for your own conditions.

FITTING A FILTER CIRCUIT.

T. B. (Eastbourne).—"Now that I have two loud speakers going I am forced to do

AT HOME WITH RADIO STARS.

(Continued from page 907.)

I've only to look at the advance lists of my forthcoming broadcasts to be assured of that.

"Each of those broadcasts means the provision of some new 'funny stuff'; and it is essential that it should be new. It must be the Tommy Handley type of 'funny stuff,' for if it is at all different, or after the style of some other broadcaster, then listeners say, 'Ah! Tommy's run dry of ideas. He's been listening in to Stainless Stephen and has pinched his style.' And, honest truth, I never do listen in to other people to 'pinch their ideas.'

"Often at the flat here I put on one or two of my own records, and stand that torture because I find that some old joke of mine, which I myself may have forgotten, sometimes suggests a new idea—perhaps a whole crop of new ideas.

"Just before I left for the B.B.C. to-day I was putting on some of my records. That is why the place looks like the 'Dis-Orderly Room.' And you can bet your best high-tension that Mrs. Handley, who, by the way, is known perhaps better as 'Jean Allistone' to listeners, is down at Egham, for she wouldn't have the place looking like this!"

"But," I said, "I suppose it often did, in your bachelor days?"

"Good lor, ye——" said Tommy, and then stopped. "Oh, no it didn't. You don't wring any confessions out of me!"

But, somehow, I think I have!

H.M.V. TACKLES TELEVISION.

(Continued from page 906.)

The output from each photo-electric cell is amplified by the valves in the sections shown in Fig. 2, and the signals from these are further amplified. Fig. 3 shows a closer view of the photo cell and amplifier section.

Fig. 4 gives a general idea of the receiving end. Here the signals are again amplified by specially designed amplifiers, and it is claimed that an amplification of nearly a million is obtained.

As the intensity of the transmitted signals will vary according to whether they are generated by light spots that are bright or dark parts of the picture, the light from the arc lamp, therefore, must be modulated in sympathy. This is done by a specially developed form of Kerr cell, a light-valve capable of operating at high frequencies and of handling a considerable amount of light.

No Rash Promises.

These special cells, as you will see in Fig. 4, are situated between the arc lamp and the revolving drum. This latter has on it highly polished mirrors which correspond exactly both in speed of revolution and relative position with the transmitting lenses.

The synchronising is very simply carried out by means of a special dynamo mounted on the lens drum of the film projecting shaft (Fig. 1) which energises a special form of control at the receiving end.

Whether anything will come of this system remains to be seen. At present it is an interesting laboratory presentation of television, and The Gramophone Company do not wish it to be taken as anything but a laboratory experiment at the moment.

They make no rash promises that it will ever come upon the market, but they consider that television is a vital necessity for the future and that it behoves anybody who can to carry out experiments in the subject. Consequently, the tests which have been undertaken at Hayes have been done not with the idea of raising a tremendous publicity shout, but with a view to H.M.V.'s contributing their quota to the world's scientific research on the subject of television as a possible future entertainment.

Which is Better?

The question in readers' minds that will immediately rise is "Is the H.M.V. system as good as the Baird?" There is no direct answer to this. It is entirely different in conception from the Baird system, and the two can hardly be compared.

The result of the H.M.V. system as shown to me is remarkably brilliant and clear; the sections do not blend quite properly—but it would be grossly unfair to both sides if I were to say "here are two systems of television; this is better than the other."

The future alone can show what will be the ultimate end of either system, and I do not intend to prophecy ultimate adoption for broadcast transmission of television programmes for either. We must wait and see.

It is interesting to note that, as a sequel to a demonstration at the Physical and Optical Society's Exhibition, Baird Television, Ltd., state that they have issued a writ against The Gramophone Company, Ltd., claiming infringement of a patent.

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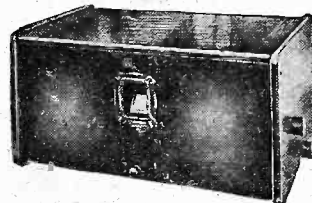
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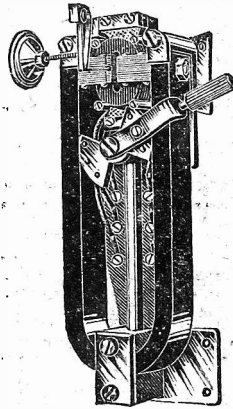
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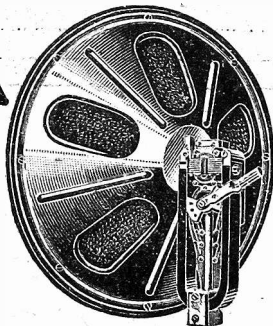
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FOR THE LISTENER

(Continued from page 908.)

Loe Strachey, then it is going to be what they call in the North Country "champion." With her delightful voice and charming manner, she spoke of the changing modes of travel. The bicycle, the motor-car, the aeroplane; she had journeyed in them all, and loved them all.

What Persia Looks Like.

The same evening, Miss V. Sackville-West gave what can only justly be described as an extremely brilliant account of "What Persia Looks Like."

Her pictures were full of life and colour. Her descriptive language was masterly in its words and in its restraint. I actually and really saw the Persian land.

There are to be other talks on Persia, in view of the Exhibition now open in London. It is said to be wonderful. Many of you will see it.

I shall. And those of us who see it will have in our minds the memorable impression which Miss Sackville-West gave us, as a background, of the country from which these amazing treasures come.

Who Killed Johnson?

The first chapter of "The Scoop" was interesting enough. But what to me was even more interesting was the very skilful and dramatic way in which Miss Dorothy Sayers read it.

It was a fine piece of reading. Miss Sayers has a kind of masculine voice which fitted well the raucous bustle and din of a newspaper office and she spoke the men's parts better than those of the women. The question now is: Who killed Johnson? But I am no good at that sort of thing. I should think that I must be the most gullible man alive, and in the course of this story I shall doubtless believe every single character, in turn, including Hemingway himself, to be the criminal. That's the fun of it.

Drama.

Mr. Val Gielgud, who is the director of dramatic productions, appealed to us to play our part in making radio drama a success. He asked for concentrated listening.

My heart fluttered a little when I heard him say that a play adapted by myself was to be produced next month! Forgive me! If I don't puff myself, who the dickens will?

Return of Vernon Bartlett.

This was a welcome return of one of the most valued and most popular of broadcasters. He was not very cheerful about the "Way of the World."

Apparently it was his opinion that this year would be the most critical year since the Armistice.

"Because things are so bad, they will be better," was his rather cold comfort. But there is a broad sanity and quiet reserve about Mr. Bartlett which steadies one.

**LOOK OUT FOR
THAT COMET!**

TECHNICAL
NOTES

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

Impedance Ratios.

I WAS talking some little time back about the relation between the impedance of a loud speaker and that of the output stage of the receiver. You know that in general the impedance of the external circuit should be larger than the internal impedance of the valve, a ratio of 2 to 1 respectively being often aimed at.

For this reason experimenters often try to arrange to use a loud speaker of very high impedance, sometimes altogether too high, and also to connect two or more loud speakers in series, when the speakers are of too low impedance individually.

Now although at first sight this seems to meet the conditions laid down, there is a snag in it, because when you connect the speakers together in series you not only increase their impedance to varying currents

but you also increase their ohmic resistance to steady currents.

In many receivers the anode current, which is taken by the output stage, passes through the loud-speaker windings, and if the resistance is greatly increased

(as it will be by putting two or more loud speakers in series) the anode current is cut down and consequently the efficiency of the output stage is also cut down, so that what you gain on the swings you lose on the roundabouts.


Alternative Arrangements.

In fact, in some cases, paradoxical as it may seem, it is actually an advantage to connect a couple of loud speakers together in parallel rather than in series. However, if you particularly wish to connect the loud speakers in series (and under proper conditions there is sometimes a definite advantage in this arrangement) you can do so by including an output choke filter between the receiver and the speakers.

In this case the anode current does not, of course, pass through the loud speakers, and therefore the difficulty mentioned above does not arise. I am assuming that the total resistance of the loud speakers is not enormously high, as even with the choke filter arrangements the ohmic resistance of the loud speaker does matter if it becomes very large. But there is a great deal more latitude than when the anode current is actually passing through the speakers.

When a power valve of rather low impedance is used in the output stage, if a choke filter arrangement is used you may find it advantageous to employ two speakers in series, even speakers having different characteristics, so that by the combination you get all parts of the scale fairly well covered.

(Continued on next page.)

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appear in nearly every valve set as the means of detection.

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In many circuits the leak is not placed "across" the condenser, as shown, but one end goes direct to L.T. +, or to a potentiometer slider.

TECHNICAL NOTES

(Continued from previous page.)

Equalising Frequency Response.

By the way, talking about the balance of different parts of the register, a great deal can be done to equalise the upper and lower frequency response by various circuit dodges in the receiver itself. There are many such little arrangements, and they fall broadly into two classes, those which have the effect of *reducing* the stronger parts of the register to the level of the rest, and those which have the effect of *raising* the weaker parts to the level of the stronger ones.

I need hardly say that the majority of such arrangements for producing a uniform response are of the former kind, that is, they simply suppress stronger parts to the level of the weaker ones. This is really the wrong way of attacking the problem, and is like weakening the strong links of a chain to match the weakest.

The Lower Register.

One of the arrangements I refer to is sometimes called tuned-transformer coupling. It involves the use of an L.F. transformer in a shunt-fed circuit, coupled to the anode of the valve by means of a condenser which may vary from about 1 microfarad down to 0.1 microfarad, a resistance of about 40,000 to 50,000 ohms being included in the anode circuit of the valve.

The effect of this arrangement is to increase the amplification in the lower parts of the register and if the condenser is made of a smaller capacity the part of the register which is affected goes higher up in the scale. The tuned-transformer coupling arrangement can then be made very effective.

On the other hand a somewhat similar result may be obtained by by-passing the upper register, if this is unduly strong.

Some Simple Dodges.

In the same way, just as the lower parts of the scale can be emphasised, so by corresponding arrangements the upper part may similarly be brought out more strongly. For this purpose, however, a choke and an anode resistance (of fairly low value) are put in series with the anode circuit of the detector or an L.F. valve. The impedance of the choke is greater the higher the frequency, so that the higher frequencies are more magnified; this arrangement has, as a matter of fact, been found exceedingly effective.

Naturally, it is much better to use a method which actually increases the weaker part rather than one which suppresses the stronger part because, in the latter case, after having suppressed the stronger part to the level of the rest, you have to find means to raise the volume throughout the whole scale.

Modern Valve Developments.

Improvements and developments in valves take place nowadays with such rapidity that there is an almost bewildering selection of valves from which to choose for any stage of a receiver. As might be expected, the most notable advances have been made in connection with valves designed to operate direct from the electric supply,

(Continued on next page.)



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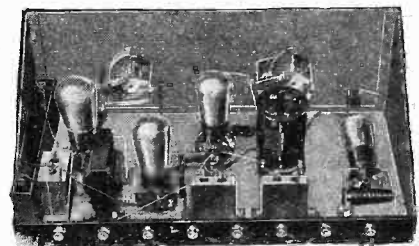
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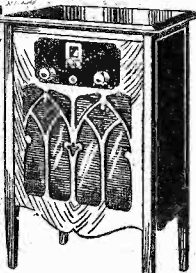
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TECHNICAL NOTES.

(Continued from previous page.)

but at the same time great improvements have also been made in battery-operated valves.

In the case of the Mullard indirectly-heated A.C. valves, an addition has been made to the screen-grid series by the S4VB valve, which has an amplification factor of 900, whilst its impedance is less than that of the previous S4VA. The extent of the reduction of the anode impedance is quite considerable, as you will see from the fact that whereas the S4VA has an anode impedance of 430,000 ohms that of the S4VB is about 250,000 ohms.

New Two-Volt Valves.

This valve has a standard heater which takes 1 ampere at 4 volts, whilst anode voltages may be applied up to about 200. The voltage for the screen grid should be about 75 to 100 volts, a condenser being connected between screen and earth, of a capacity of about one-hundredth of a microfarad.

When the screen voltage is derived from a mains unit it is important in the case of this valve to use a potentiometer, not a series resistance, for obtaining the intermediate voltage required.

Another interesting series of valves is the new Marconi 2-volt valves for which it is claimed that they give very greatly improved volume and tone, and have longer life as well as greater sensitivity which, of course, means greater range.

Amongst these valves are the screen grid (S2C), a valve for medium amplification (HL2C), another for low-frequency amplification (L2B), a power output valve (LP2C), and a super-power output valve (P2B).

A High Amplification Factor.

It is interesting to note that the power output valve LP2C has an amplification factor of 8, its mutual conductance being 2 milliamps per volt, and its impedance 4,000 ohms. It is particularly claimed for this valve that it is very economical as regards current consumption, and that exceptional quality of reproduction is obtainable without sacrificing volume on distance reception.

Incidentally, the Marconi 2-volt valve range now includes 14 types, so that there should be no difficulty in making the necessary selection for any particular set or type of circuit.

Current Economy.

The LP2 and the P2 are two new Osram valves of the G.E.C., the first being a power valve, and the second a super-power valve. The LP2 is particularly suitable as a loud-speaker valve for sets of the "two-valve" class, for portable sets and generally where economy in current consumption is a consideration whilst reasonably high amplification is required at the same time.

The P2, that is, the super-power valve, is naturally suitable for sets with a greater volume output. The voltage required on the anode is 150, the impedance of the valve being only 2,150 ohms, whilst the amplification factor is 7.5 and the mutual conductance 3.5.

(Continued on next page.)

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JARS (waxed), 2 1/2" x 1 1/2" sq. 1/3 doz. **ZINCS**, new type 10d. doz. Sacs 1/2 doz. Sample doz. (18 volts), complete with bands and electrolyte, 4/1. post 9d. Sample unit, 6d. Illus. booklet free.

Bargain list free.

AMPLIFIERS, 30/-. 3-valve set, 25/.

P. TAYLOR, 57, Studley Road,
STOCKWELL, LONDON

ELEX

SOMETHING NEW!
TESTING PRODS

Write for List No. T.7.

J. J. EASTICK & SONS, 118, Bunhill Row, London, E.C.1 Phone: Metropolitan 0314.

EUREKA L.F. TRANSFORMERS

Concert Grand 1st stage, 10/6d. 2nd stage 9/6d.

Baby Grand 1st. or 2nd. stage 8/6d. post paid

EUREKA MULTIPOLE DOUBLE THROW SWITCHES

2-pole 3/-, 3-pole 3/9d, 4-pole 4/6d. Pull Push 1/6d.

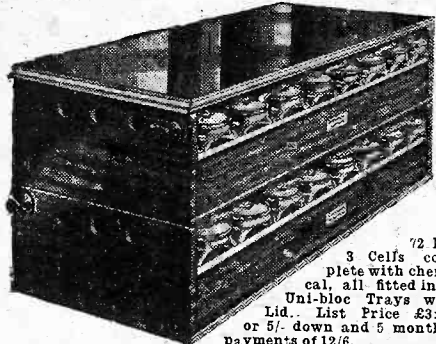
Write for lists. Sole manufacturers—
L. PERSON & SON, (Dept. 2) 53, Shaftesbury St., London, N.1.

Make
THE DAILY SKETCH
YOUR Picture Paper.

WHY WASTE



**MONEY
ON DRY
BATTERIES?**



72 No. 3 Cells complete with chemical, all fitted in 3 Uni-bloc Trays with Lid. List Price £3:4:0 or 5/- down and 5 monthly payments of 12/6.

Install the Standard Leclanche type battery (as illustrated) and enjoy the wonderful improvement in reception that this regenerative, high capacity power supply provides. Here are a few reasons why thousands are using Standard Batteries in preference to costly dry batteries.

1. Battery running costs are halved.
2. Reception is pure and absolutely free from distortion or background.
3. Battery will last a YEAR or more without attention.
4. 5/- down and the balance in easy monthly instalments of 12/6 IS LESS THAN YOU PAY FOR DRY BATTERIES WHICH AFTER A SHORT PERIOD ARE ONLY GOOD FOR THE DUSTBIN!
5. Unlike accumulators, no recharging necessary.

We advise free of charge the best type of battery to suit your receiver. Send particulars of number and type of valves without obligation to purchase. Obtainable from Halfords, Currys or Radio Dealers everywhere.

WATER

STANDARD WET H.T. BATTERY

The Standard Battery Co. (Dept. P.W.)
184/188 Shaftesbury Avenue,
London, W.C.2. M.B.

The Picture Paper with the MOST News
SUNDAY GRAPHIC

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality.)

Transformers 4/6, Headphones 4/6, all repairs magnetised free. Tested, guaranteed, and ready for delivery in 24 hours.

Discount for Trade. Clerkenwell 9069.
E. MASON, 44, EAST ROAD, N.1.

THE HALL MARK OF BETTER RADIO

MAGNUM

BURNS-JONES & CO., LTD. 25, NEW HIGH ST., LONDON, E.C.

TECHNICAL NOTES

(Continued from previous page.)

Temperature Coefficient.

I do not think it is generally known that the resistance of a metal wire (for example a valve filament or the resistance element of a rheostat) varies with the temperature. This effect is with some metals and alloys quite pronounced, and if a rheostat of such metal is running rather hot, the actual resistance may be quite a considerable percentage greater than when the metal was cold.

The factor which gives the rate of variation of resistance with temperature is known as the "temperature co-efficient." In the

TECHNICAL TWISTERS

No. 45.—FREQUENCY.

CAN YOU FILL IN THE MISSING LETTERS?

One circuit is said to be "tuned" to another when it is adjusted to the same

The of a tuned circuit depends on its and

Owing to the fine variation and ease of mechanical adjustment attainable is usually varied by means of an adjustable.

The frequency is the number of complete which the current performs in

To ascertain a station's frequency in its wave-length should be into 300,000.

Last week's missing words (in order) were Volt; Ampere, One, Ohm; Voltmeter; One and a Half Volts.

vast majority of cases the resistance *increases* with rise of temperature, although there are certain exceptional cases where the resistance *decreases* with rise of temperature.

Internal Structure.

Another factor which influences the resistance of metal is the actual state or internal structure of the metal itself. With fairly freshly-drawn copper wire, for instance, the metal is pliable, soft and non-brittle, but in course of time the metal will gradually become crystalline, and in doing so it will become harder and more brittle; at the same time its electrical resistance will increase.

This effect will take place simply with the passage of time, but it will be accelerated if the wire is exposed to certain conditions. For instance, an aerial wire left exposed to

(Continued on next page.)

**KEEP YOUR EYES
OPEN FOR THAT
COMET!**

USE GOLTONE

**COILS—
FOR
BEST
RESULTS**

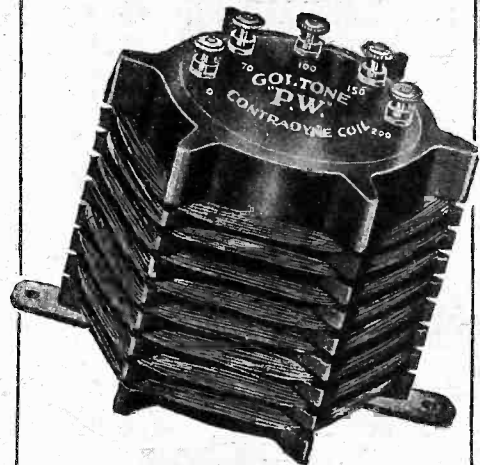
Specified and Recommended by "POPULAR WIRELESS" and "MODERN WIRELESS" For their various circuits.



"GOLTONE" "P.W." & "M.W." DUAL RANGE COIL

FEATURES. Extraordinary Selectivity, Clear Reception, Exceptional Efficiency. When operating on Short Wave, the Long Wave winding is paralleled, thus ensuring the avoidance of losses usual in other types of Dual Range Coils.

No. DW/12 . . . Price **12/6**



"GOLTONE" "CONTRADYNE" COIL

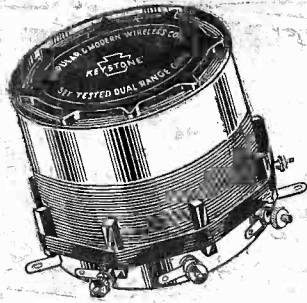
The purpose of this Coil is to eliminate Short Wave interference on lower end of Long Wave scale. Also provides protection against interference of local stations, giving purer reception.

No. R11/12 . . . Price **6/6**

Pamphlet, giving full particulars and First-Class Circuit using both these Coils, FREE on request. Obtainable from all Radio Stores. Refuse substitutes. If any difficulty, write direct.

**WARD & GOLDSTONE LTD.,
PENDLETON, MANCHESTER**

NO COMPLAINTS



TESTED for Wavelength Smooth Reaction Continuity. Finally SET tested for Stability.

Fully Guaranteed

THE KEYSTONE P.W. AND M.W. DUAL RANGE COIL

Wherever a P.W. Coil is specified insist upon the KEYSTONE. No other coil can give such selectivity or sensitivity on both wavebands. Made exactly in accordance with "P.W." specifications and fully approved.

A satisfied user writes:—"Many thanks for your prompt advice about my set, 'Chef d'Oeuvre.' I have now fitted the KEYSTONE P.W. COIL you supplied, and am pleased to say that the set is functioning perfectly. I am returning the other maker's coil and wish that I had fitted a KEYSTONE in the first place."

C.O.D. Pay the Postman Immediate Delivery

12/6

Contradyne coils also supplied, 7/6 each

PETO SCOTT CO. LTD.

77 CITY ROAD, LONDON, E.C.1
62 HIGH HOLBORN, LONDON, W.C.1

TECHNICAL NOTES.

(Continued from previous page.)

atmospheric and weather conditions will be affected, more particularly on the surface, in this way as well as in other ways and, inasmuch as the high-frequency currents travel in the surface layers of the wire, its efficiency may be quite appreciably interfered with. What is more important from a practical point of view, however, is that the wire may become brittle and in due course may break.

MODERN CRYSTAL SETS

(Continued from page 924.)

solitary, I do not mean only those who live alone, but also those who reside in a family circle which is, on the whole, unsympathetic to radio listeners.

An Unfailing Stand-By

There are no batteries to replace or get charged and no valves to burn out. The thing is practically everlasting, and if well made, with good materials, a change of crystal every two or three years or so represents the sole maintenance necessary. Within twenty miles of a Regional station you get comfortably loud volume in good telephone earpieces, sufficient strength, indeed, even for those who are rather hard of hearing.

And there will be two programmes between which you can alternate all the time. And there will be fewer parasitic noises such as are to be heard loudly on many valve sets.

The quality will be undoubtedly good, although it would not be fair to say that it will equal that of a good valve set. Nevertheless, it is undeniable that it must be greatly better than the response of the average valve set.

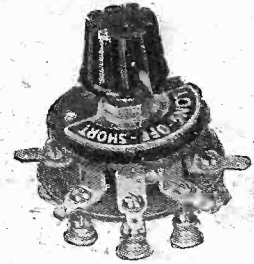
The crystal set also has its niche as the valve-set owner's stand by. If you have a little crystal set and a pair of 'phones packed away, you are guarded against any breakdown in your radio-receiving system. If carefully covered to keep out the dust, and stood in a dry place, a crystal set will not depreciate with the passing of the years. I have one at home that I made in 1913, eighteen years ago. It is not selective, and its silicon-steel detector is not as sensitive as the modern two-crystal combinations, but it can pull the local in with sufficient volume for all ordinary telephone receiver purposes.

Work a Loudspeaker

It provides a striking comparison with the "P.W." "Inductocrys" that stands beside it on the same shelf, and is a monument to the fact that the crystal set has advanced in detail if not, as I have already declared, in fundamentals.

The more modern hook-up enables me to separate the two Brookmans transmitters, and the volume is such that one wonders at times whether someone won't some day give us a loud speaker with a really decent input-output power ratio and enable crystal loud-speaker sets to become a complete reality.

That is another fascinating possibility, isn't it?



HEINZ!

There are 57 distinct parts in this Double Pole Rotary switch and each is designed and finished with the engineering precision and thoroughness implied by the name Benjamin. Catalogue No. 1142 describes the switch fully and gives circuits in which it can be used. Have you had your copy?

3/6

THE BENJAMIN ELECTRIC LTD.
Tarriff Rd., Tottenham, N.17
Tottenham 1500.

BENJAMIN

LET US QUOTE BEST MONTHLY TERMS

for anything you require in Wireless. WE SUPPLY ALL COMPONENTS, KITS OF PARTS for all Circuits, COSSOR EMPIRE MELODY MAKER, MULLARD ORGOLA, OSRAM 4, All Mains Sets, EKCO H.T. ELIMINATORS, Loud Speakers, etc.

EVERYTHING WIRELESS on EASY TERMS

CALL AT OUR SHOWROOMS or SEND A LIST OF YOUR REQUIREMENTS—our BEST MONTHLY TERMS will be sent BY RETURN. The P.D.P. CO., LTD. (Dept. P.W.) 46, WATLING ST., LONDON, E.C.4. 'Phone: Central 4468

EXACT TUNERS

250 to 2,000 metres. Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.C. for particulars and circuits—FREE. THE EXACT MANUFACTURING CO., Croft Works, Priory Street, Coventry.

REMEMBER!

"POPULAR WIRELESS" HAS THE LARGEST SALE OF ANY WEEKLY WIRELESS JOURNAL.

DX

TYPE

STANDARD PLUG-IN COIL

Sold everywhere from 1/-

DX COILS LTD., LONDON, E.8

"BROADCAST" Plug-in Coils

CHEAPEST AND BEST.

95 .. 10s	50 .. 1/-	125 .. 1/3	250 .. 2/-
30 .. 10d.	60 .. 1/1	350 .. 1/4	300 .. 2/3
35 .. 10d.	75 .. 1/2	175 .. 1/6	400 .. 2/9
40 .. 1/-	100 .. 1/3	200 .. 1/9	500 .. 3/3

Centre-Tapped Ed. extra. "X" Coils 9d. extra. ALL POST FREE. Trade Supplied.

G. BRICE, 34 Savernake Rd., London, N.W.3

"RED DIAMOND" SWITCHES

TRADE MARK

RED DIAMOND Robust Construction. Definite 'on' and 'off' positions. No shaking. Perfect contacts. Large terminals for easy fitting.

By n st

RD39 2 point .. 1/3 1/6

RD49 " dead spindle 1/3 1/6

RD37 3 point .. 1/6 1/9

RD47 " dead spindle 1/6 1/9

RD44 Radio-gram 3 point .. 2/- 2/3

As used for the "Wireless for the Blind" Crystal Sets.

RD40 2/-

By Insured Post 2/3 or 2/9 with shield.

Can be mounted on brackets or through panel. Once set always ready. Not affected by vibration. Each one is tested on broadcast before despatch.

Of all high-class Radio Dealers, or Sole Makers: JEWEL PEN CO., LTD., (Radio Dept. 46), 21-22, Great Sutton St., LONDON, E.C.1

YOU CAN BUILD A £40 GRAMOPHONE WITH OUR SCALE FOR 40/- DRAWINGS FOR 40/-

Book of instructions, 3d. Catalogue of Motors, Tone-arms, Sound-boxes, latest internal Amplifiers, Gramophones, or Cabinets Free. Cash or terms. V. BURT, 185, High St., Deptford.

A Gift for Every Listener!

This
Specially
Designed
**RADIO
MAP &
CHART**



Free with **ANSWERS**
ON SATURDAY

Specially designed for ANSWERS readers and printed in two colours on art paper, this map shows you the wave-lengths and call-signs of every important European broadcasting station. It will enable you to identify any station which can be tuned in on your set. With separate spaces on the sides of the map for the dial readings on your set, it will form a complete log chart.

Opera from Berlin and Vienna; famous orchestras from Paris—the lilting music of Spain—this map will enable you to tune in to any programme which your set can get with the least possible delay. It will double the pleasure of listening.

Don't miss this opportunity of securing this most useful and splendid gift.

£10
A WEEK
For LIFE
or £3,000 Cash
MUST BE WON
in a simple **NEW**
PICTURE
COMPETITION

ANSWERS

BRITAIN'S NATIONAL WEEKLY

On Sale
Saturday,
Jan. 24
2d.



The Guarantee of Greatest Efficiency

"Popular Wireless" and "Modern Wireless"

R.I. LTD. Dual Range Coils 12/6

HIGH EFFICIENCY

Laboratory Tested

The "Popular Wireless" of December 27th, 1930, said: "A great compliment has been paid to the new 'P.W.' Dual-Range Coil—Radio-Instruments Ltd. are producing it in quantities—every coil is given an independent test both for wave-length and inductance on every one of the windings. It is a hundred or so times superior in workmanship and finish."

Obviously, R.I. were expected to produce the best—they have done so in a TROUBLE-FREE coil that is wound, assembled and tested to a degree of accuracy unattainable by the amateur or maker of less repute.

Start Right by purchasing the R.I. Coil which you know will certainly cover the range of wave-lengths claimed for the circuit on which you are working.

Ask your Radio Store for R.I. Coils. In case of difficulty please write direct giving dealer's name and address.

Insist on R.I. Dual-Range Coils They're Best and cost no more



Tested on the Wavemeter



Tested on the Inductance Bridge

R.I. LTD., MADRIGAL WORKS, PURLEY WAY, CROYDON.

LARGEST RADIO CIRCULATION IN THE WORLD

Popular Wireless

Every Thursday
PRICE
3d.

No. 452. Vol. XVIII.

INCORPORATING "WIRELESS"

January 31st, 1931.



CONTENTS

A.C. VALVE DEVELOPMENTS

PREPARING A RIDGEWAY PARADE

By PHILIP RIDGEWAY

THOSE RADIO GIANTS

FULL CONSTRUCTIONAL DETAILS OF
THE

"FOUR-POUND" FOUR

HOW TO MAKE A FRAME AERIAL

STATIONS WORTH HEARING

Our cover photo shows you a corner of the telegraph room at the Giant Rugby Radio Station. Rugby communicates directly and indirectly with every corner of the World.



LONDON

An irksome task eliminated

No more Coil Changing with this NEW LEWCOS ACHIEVEMENT

Reg'd.

The
Lewcos Twin
Two-Pin Base

Price 12/6

Ref.: TT PB

SUITABLE FOR
CONVERTING ANY
EXISTING SET
USING 2-PIN COILS

Many users, both expert and amateur, testify that the Lewcos Two-Pin Coils have reached a standard of efficiency on which it would be difficult to improve, but another device to eliminate coil changing when Two-Pin Coils are used has recently been perfected.

With this new Lewcos achievement you can switch from the Medium Broadcast Wave-band 235-550 m. or to the Long Wave-band 1,000-2,000 m. by the turn of a knob. The twin sets of coil holders are arranged at right angles to each other in order to prevent damping by the coils not in use.

This useful component comprises a moulded base containing switching apparatus conforming to telephone practice, viz. cam-operated blades with silver contacts.

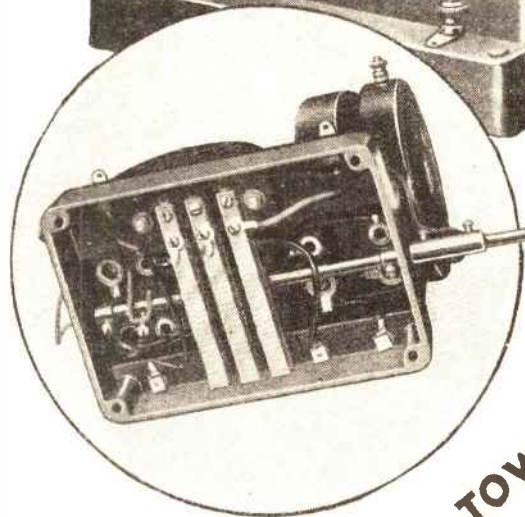
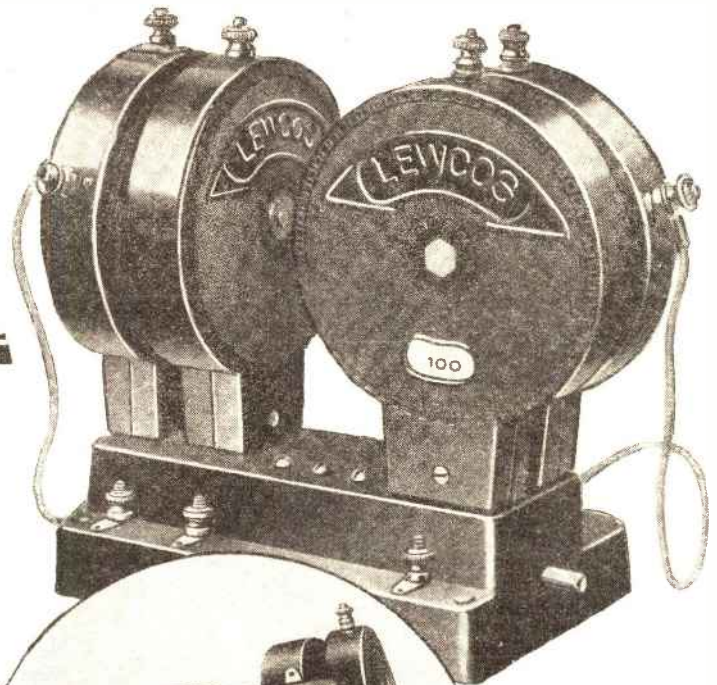
Its robust design, high-class materials and workmanship ensure efficiency.

Write for fully descriptive leaflet, Ref. R.69.

Recommended
Coils for use
with the
Lewcos Twin
Two Pin Base.

- 60 X
- 250 X
- 40 C.T.
- 100 C.T.

Specially suitable for circuits such as the "Magic" series described in "Popular Wireless."



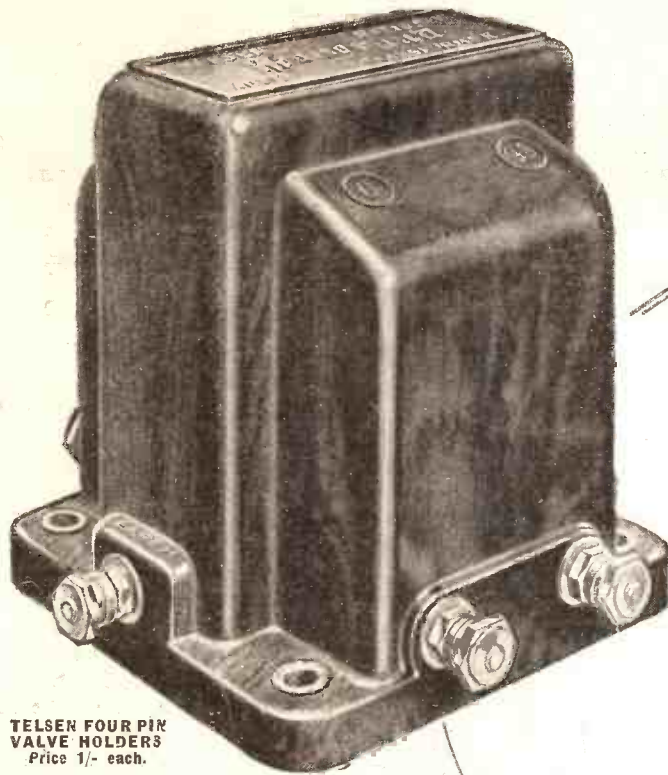
THE LONDON ELECTRIC
WIRE COMPANY AND
SMITHS LIMITED,
CHURCH ROAD, LEYTON,
LONDON, E.10.

We respectfully request the public to order through their local radio dealer, as we only supply direct to the trade.

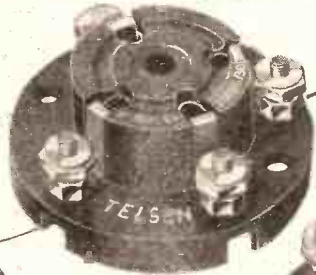
EIFFEL TOWER



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION



TELSEN FOUR PIN VALVE HOLDERS
Price 1/- each.



TELSEN FIVE PIN VALVE HOLDERS. Price 1/3 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.



TELSEN GRID LEAKS. Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out and are unaffected by atmospheric changes. Not being wire wound there are no capacity effects. Made in capacities: $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 3, 4, and 5 megohms. Price 1/- each.

TELSEN FIXED (MICA) CONDENSERS.

Shrouded in Genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/30. .0003 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts.—Price 1/- each.



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.

TELSEN L.F. TRANSFORMERS

"ACE" Ratios 3—1 and 5—1 8/6
"RADIOGRAND" 3—1 and 5—1 12/6
"RADIOGRAND" Super Ratio 7—1.. 17/6

Get these components ~ and be satisfied with your reception

No one is more critical of your set than yourself—Telsen will turn your criticism to appreciation . . . to renewed enthusiasm.

Where Telsen Components are incorporated, there is exceptional tonal quality—remarkable volume—vivid reproduction.

Follow the lead of experienced radio designers who consistently choose and advise

TELSEN COMPONENTS

ALL ABOUT THE FEB.

(ON SALE JAN. 31st.)

GREATLY ENLARGED NUMBER

THE LIGHT ORCHESTRA WINS

Why is it that, while all other musical combinations have come in for a great deal of criticism from listeners, the small orchestra has practically escaped such discussion?

This important question is answered by the leader of one of our most popular broadcast music providers.

Wrangles about music, as far as broadcasting is concerned, seem invariably to be between the lowbrow who has no time for anything but a dance orchestra playing jazz the whole time, and the highbrow whose soul is hurt by anything other than the latest work of some ultra-modern composer. And the truth is that these are by no means representative types; I doubt, in fact, if more than 10 per cent. of the total listening population could correctly be put into either category, for all the publicity they receive.

I am rather disposed to doubt if nine wireless listeners out of ten call themselves any sort of "brow" at all. They are just ordinary men and women who, if they are not completely tone-deaf, like listening to music which is creditably performed, which is not too exacting to the lay ear, and which is melodious. They are middlebrows, and they are the staunch but silent supporters of the small orchestral combination such as my own.

You will find the special article, from which the above is extracted by Victor Olot and entitled "What the Small Orchestra is Doing for Music," both provocative and interesting. (See page 224 of the Feb. "Modern Wireless").

"BOTTOMLESS" BROADCASTING

It is difficult to get a loud speaker to go down to 50 (or lower) cycles per second. Similarly, it is difficult to get good reproduction above 5,000 cycles, and for balanced listening it is no good having the very top without the bottom notes, or the bottom notes without the top ones. We want musical poise. If the speaker goes up well, then it should also go down well.

This is where some of the moving-coil

speakers fail. They go down well without going up properly

A brief extract from "Drowning the Drums," one of the many intensely interesting articles in the February "Modern Wireless."

ROUND THE STATIONS

RADIO BELGIQUE is arranging for both French and Flemish programmes from the Vellhem stations. Starting early in February, they will begin about 5 p.m.

LOOK OUT FOR THIS!

**50
MORE
GUARANTEED
CIRCUITS**

A FURTHER SELECTION
of specially tested circuits, covering a wide range of radio receivers, mains units, and many other useful devices.

Every circuit in this book has been built and subjected to stringent tests. Nothing has been passed as O.K. that has not proved its worth under average working conditions over long periods of test.

This book will prove invaluable to all readers of "Modern Wireless," and though complete in itself is a useful companion to the "50 Guaranteed Circuits" presented with last month's "Modern Wireless."

Keep it for Future Reference

PRICE SIXPENCE

Here is an illustration of the cover of the magnificent book given away with the February "Modern Wireless." It is an invaluable reference book for all constructors.

ATHLONE has now been definitely decided upon as the site for Ireland's new high-power station.

RADIO VITUS (Paris) recently debarred from transmitting from its new premises at Romainville, has resumed its activities at the old address in Paris.

BORDEAUX SUD-OUEST and **RADIO BEZIERS** have both applied to be allowed to use increased power.

THE SCOTTISH REGIONAL STATION is to be erected at Westerglen, three miles south of Falkirk. It will be similar to Brookmans Park and Moorside Edge.

RADIO PARIS is contemplating the use of a power of 60 kw.

All sorts of valuable information concerning the reception of foreign stations, handling "DX" receivers, and numerous practical tips are given every month in "The World's Programmes."

A RADIO THRILLER

Dare stared at the peculiar contrivance. It had the appearance of a very large cabinet gramophone, except that a small black funnel projected from it.

"Just a miserable mechanical parrot," disgustingly exclaimed Dare, aloud.

"Just a miserable mechanical parrot," agreed the machine—even more loudly.

Dare laughed, and the machine rather stridently echoed him.

"You want a little more bass," said the radio consultant.

"You want a little more bass," responded the machine.

There was a tap at the door, and Dare's office-boy entered bearing a card.

Dare glanced at it with some surprise, for it bore the inscription, "Inspector Blazer, New Scotland Yard."

What was in the wind? What peculiar adventures in the world of radio are to befall John Dare this time? Read the complete story of radio intrigue and crime in the February "Modern Wireless."

FORWARD!

. A more compact and efficient general-purpose four-valver would be difficult to produce, and its appeal to the eye and its comfortably placed controls would be hard to beat.

When we tell you that its dimensions are little over 1 ft. square and 7 in. deep you will begin to wonder what sort of arrangement has been employed to make it possible to get all the components in; and you may be surprised to learn that the circuit is quite a normal, efficient type of "M.W." scheme, and employs some of our latest and best innovations.

What is it all about? you ask. We will let you into the secret. This "compact four-valver" is the "Forward" Four, a complete departure from usual practice in home-Constructor's sets, and one that is distinctly competitive in appearance with the best commercial productions. It is fully described in the February "Modern Wireless."

HAVE YOU A GRAMOPHONE?

Or perhaps you use a pick-up? Whichever method of record reproduction you favour you will be interested in the various articles on radio-grams and gramophone records in the Feb. "Modern Wireless." "Recent Record Releases" in which a review of the latest records is given will be of particular value, especially if you are the owner of a radio-gram receiver.

There is also a very special article addressed to all interested in radio-gram sets: an article that should certainly not be missed.

"MODERN WIRELESS"

(PRICE 1/6)

WITH MAGNIFICENT FREE BOOK

"WHAT DO YOU THINK OF IT?"

Two members of the "M.W." technical department examining some components during the preparation of the data for the special review referred to below.



IN PASSING

"Now, this is the story of Lucinda Pennycomequick, who was formerly Lucy Madle of Cowkimble's Perfect Laundry. When she wedded her Bert a kind providence had rarely smiled upon a more perfect match. As Lucy's ma said, 'Our gal's a match for 'im, all right and no mistook.' Bert was an engineer's fitter, though he never explained exactly what he obliged engineers by fitting. A home-loving man, he was seldom absent from No. 3, Daisy Villas, Homerton, after working hours. He had a little shed, half workshop, half old curiosity shop, in which he used to spend the greater part of his evenings in the summer, making motor-cycles behave, mostly. At the close of play he would enter the wigwam and consume quantities of beer and the more esoteric parts of pigs and sheep, sometimes varied by the homely 'faggot' or the nourishing hake fried in nut-oil. Eden!

"Through all these scenes of humble domestic felicity Lucinda came and went; came home with the pig's trotters or went to the 'pickshers' with her Bert. But Marconi was at work in his laboratory and already the serpent was being hatched for the undoing of her Eden, and . . ."

What was the serpent? All home-constructors should read this veru human story of an enthusiastic radio fan.

THREE SPECIAL SECTIONS

are incorporated in the Feb. "Modern Wireless," and deal with aspects of radio that are of vital interest to all:

- (1) Provides a comprehensive review of modern radio components.
- (2) Gives details for making a complete series of loud speakers of quite new design.
- (3) Is a valuable technical review of the chief kit sets now on the market.

THEY WILL BE OF INTEREST TO YOU.

TRYING THEM OUT.



Testing out a large selection of loud speakers during stringent comparative tests carried out in connection with the trials of the new "M.W." system of "Inter-axial" suspension.

DO YOU USE THE MAINS?

If not, assuming you have electric light in your home, why not remedy that state of affairs? This is easily done either by building an all-mains set, or by making an all-power unit.

A magnificent three-valver, in two forms, for A.C. or for D.C., is fully described in "Modern Wireless" for February, under the title of the "Star-Power" Three. It embodies many of the latest "M.W." refinements, including the famous "Star-Turn" Selector, and is fully tested and guaranteed.

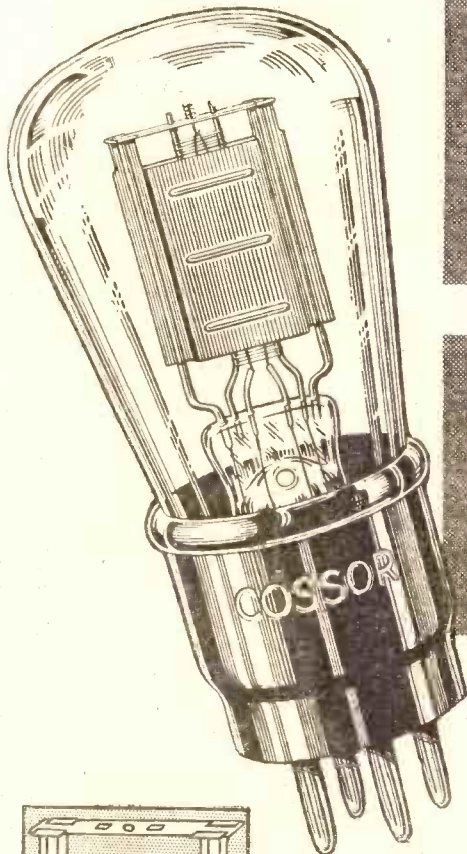
Or you may be thinking of building an "All-Power" Unit, one of which is described in the same magazine. This unit supplies H.T. and G.B. from the electric light supply, and by the addition of a simple L.T. unit can be made to provide all-mains battery-free set operation.

A SPECIAL SHORT-WAVER

Those who have had any experience of short-wave work will readily agree that even the best of normal short-wave receivers is definitely very much more difficult to operate than an equivalent broadcast set. Tuning is very much sharper, so that quite a delicate touch must be cultivated upon the tuning controls, reaction requires to be set in a similar accurate manner, and besides these matters there is always a tendency to hand-capacity effects, and the risk of such misbehaviour as threshold howl, "flat spots" on the tuning range, and so on. But the "M.W." Special Short-Waver has been designed to do away with this "trickiness" in short-wave sets; it is a set that makes searching on the ultra high frequencies as simple as on the ordinary wave-bands. Read all about it in the February "Modern Wireless."

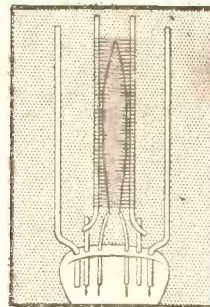
210

Specially designed for H. F. Amplification



H L

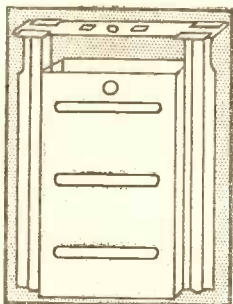
Incorporating all the most advanced constructional features the new Cossor 210 H.L. is of exceptional interest to all users of non-screened grid Receivers. To ensure complete freedom from microphonic noises the famous Cossor system of Seven Point Suspension is employed. To permit of greatly increased accuracy in the inter-electrode spacing and, therefore, of an unusually high standard of uniformity, the new Mica Bridge Mounting method of assembly is used. In addition to special grid current characteristics and other important improvements, the base is of an entirely new material on which the "Wireless World" reported, "we find the high frequency losses in the bases of both the two Cossor Valves here tested to be negligible." The use of the new Cossor 210 H.L. in any non-screened grid Receiver will considerably increase its efficiency.



SEVEN POINT SUSPENSION

Practical experience has shown that the Cossor 7 point suspension system definitely eliminates microphonic noises. This system is employed in the support of the exceptionally long filament of the Cossor 210 H.L.

The new Cossor 210 H.L. 2 volts,
1 amp. Impedance 22,000.
Amplification Factor 24, Mutual
Conductance, 1.1 m.a./v.
Anode voltage 75-150. **8/6**
Price

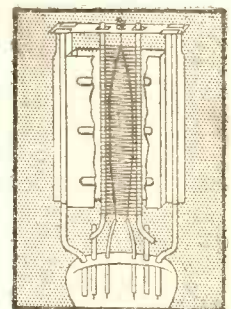


MICA BRIDGE MOUNTING

Permanent alignment of the electrode system is ensured by a stout mica bridge which forms an integral part of the anode assembly. When finally secured in position the whole structure becomes one interlocked unit.

THE NEW COSSOR 210 H.L.

Be sure to get one of our new, circular Station Charts, which give identification details of nearly 50 stations with space for entering your own dial readings. Ask your dealer for a copy, price 2d. or send 2d. stamp to us and head your letter "Station Chart" "P.W."



UNIFORM PERFORMANCE

The Cossor mica bridge construction permits no variation of characteristics due to differences in inter-electrode spacing. Complete uniformity of performance is therefore ensured between all valves of the same type.

Popular Wireless

LARGEST NET SALES



Scientific Adviser:
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 A. JOHNSON RANDALL.

NATIONAL NOISES
 DRUM SIGNALS
 DONE OR OVERDONE?
 A KNIGHTLY DEED

RADIO NOTES & NEWS

REAL SERVICE
 RADIO DOCTORS
 SCREENING HINT
 BELOW 10 METRES

Noise on National.

I AM relieved to find that I am not the only sufferer from that intolerable ether-storm on the National wave-length. Not that I wish others to share my woe; but because it is evidence that my trouble is not local, and between us all we may find and remedy it. I thank all those who have written about it, and in response to their letters I refer to the matter again, now, in the hope that the B.B.C. will be good enough to make sure that the cause is not the National transmitter—for that is what one's mind now fastens upon.

The German Invasion.

I SAID that I was able to eliminate the worst of the Stuttgart nuisance. Nevertheless, not only do I lose volume thereby, but according to my observations the blighter seems to shift uneasily in his "band," and is more audible on some nights than on others. Complaint grows in intensity, and the worst of the business is that the cure is not directly in the B.B.C.'s hands. I have no doubt that the German authorities will be courteous and even generous in the matter, but charity begins at home. Any way, this affair is a lively prognostication of what we may have when all the projected high-power German stations "get going."

Drum Signals.

W. J. M. (Edinburgh), for whose letter I am vastly beholden, tells me what I think is the best explanation possible about the method by which African natives signal over long distances by beating on hollow tree trunks. A missionary told him that the native languages possess a distinct rhythm; this rhythm can be imitated by the drum and translated into words by the hearer, much in the same way as the bugle may be perceived to say, "Come to the cookhouse door, boys," or as the yellow-hammer's song is translated as "A bit of bread and cheese." The idea seems feasible in the instance of a simple language such as I suppose many of the African tongues are.

Done or Overdone?

A WRITER in a Post Office journal tells of a lady who took her accumulator to a charging station in South London which is run by a real expert on storage cells.

When it was handed back to her she asked suspiciously, "Has this been done?" On being answered in the affirmative she said "It's quite cold," and proceeded to explain that at all the other places where it had been charged it was "always nice and warm." Of course, the temperature of an accumulator should not rise appreciably, so, if yours does, be sure that it is a sign of damage, and that the black-faced youth at the bike and gramophone shop has not much experience of matters electrical.

"MOVE ALONG THERE, PLEASE"



The movements of ships are graphically shown in this Berlin shipping office by a huge map of the world on which small model ships are placed. As news of a vessel's whereabouts comes in from the captain, the man in charge moves the ship with the long rod, which is to be seen in the picture.

The Theremin.

PERHAPS you remember the slight stir made by the adaptation to musical purposes of the howls of oscillating circuits which was introduced by Dr. Theremin. The thing now called the Theremin is "played" by waving the hands at it. I was interested to notice the other day in the list of one of the more important gramophone record makers, a notice about a record of pieces played on the Theremin. So it has invaded the musical world to that extent. If you are interested, why not hear this record? It may appeal to you and inspire you to become the founder of a famous Theremin Band!

Lightning Not an Enemy.

ALTHOUGH lightning discharges occasionally cause fatalities and always cause "x's," nevertheless, it should not be thought that lightning is man's enemy, even a radio man's! On the contrary it is said to be a beneficent manifestation, and Mr. K. B. McEachron, an American electrical engineer went so far as to tell the Kiwanis Club at Pittsfield, Mass., that it produces a hundred million tons of fixed nitrogen over the earth annually—which is gain for farmers.

Blessings of Radio.

THERE seems to be no end to the application of radio in general, and the valve in particular for the amelioration of the ills and deficiencies of the human race in this vale of tears and smiles, but I never thought that its blessings would fall with special refreshment upon that estimable but noisy class of workers, namely and to wit, the boilermakers. However, I learn from the "Crewe Chronicle" that these fellows are prone to deafness, so that a Mr. Fletcher, a man who does good things, has provided the Crewe Hightown Methodist Free Church, known as the "Boilermakers' Church," with microphones and all the paraphernalia for amplifying and distributing the sounds of the words uttered in the pulpit. May Mr. Fletcher never lose a rivet.

A Knight's Performance.

NOW and then a knight de la cat's-whisker fires in a letter just to remind us that carborundum-pyrites and company are still a going concern. As, for instance, that of E. T. (Bradford), who elevates his right hand and declares that for the last eighteen months he has received almost daily on a home-made crystal set, sans amplifier—Toulouse, Rome, Oslo, Langenberg, Radio-Paris, Eiffel Tower, Bradford (I should shay sho!), Manchester, Midland Regional, London Regional, Daventry, and several "other foreigners." Over and above these, Mühlacker comes in at great strength. Ah, me! Why buy S.G. valves? Sir, I envy you! I have to provide radio noise for four people *en famille*, plus a touch for Hermione Hypatia Sappho Binks in the kitchen.

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

An Unusual Phenomenon.

F. F. (Ravenscourt Park) heard something on the short waves which has "got him beat." A few Sundays ago, he says, he was listening to morse on 46.5 metres, and he was surprised to note that each dash and dot brought with it fractions of organ music and singing which, through the lucky incidence of a long dash, he was able to identify as a B.B.C. service. Well, miracles don't happen in radio, and I surmise that the 46.5 metres was a guess, because very close to that is the 8th harmonic of the London Regional station, which in all probability F. F. heard. Still, one does not often meet an instance quite like this.

Service the Criterion.

LONG ago the Americans discovered that, given goods equal in quality, the only way to score is by service. What is "service"? Let M. A. D. (Princes Risborough) speak, and then judge whether British firms don't understand it. His set struck work on the Monday before Christmas. He telephoned S.O.S. to the makers, D—, and learned that D—'s factory was closed for the week. In spite of that their representative called on Christmas Eve and put the set on its legs, which necessitated the replacement of a resistance and a valve, and the charge for all this was nil. Splendid! (Thanks for good wishes; ditto!)

Radio Doctors.

R. L. L. of Cardiff disagrees with my assertion that, accidents apart, a well-made set ought to need no attention except battery renewals. Perhaps I ought to add, and valve renewals. He has had transformer breakdown three times in six months in a new set made by a firm of world-wide reputation. Quite clearly something was not well made or is being used under incorrect conditions. But, in any instance, I was obviously speaking in general terms, and my case would not be disproved by a few exceptions. I wish R. L. L. better luck; those transformers really are good ones generally.

A Humble Enquiry.

"ARIEL" wants to know why so many of his estimable correspondents apparently assume that a spelling error is made every week by "P.W." and in order to correct us in a polite way address him as "Aerial."

Light by Wireless.

A MESSAGE from Canada, published in some of the newspapers here, states that a Mr. Richard Gee of Toronto claims to have illuminated a room for two hours in an experiment carried out with an aerial on the roof of a building. Hum! Pretty vague! I'd like to know who transmitted the power and from what distance from the receiver. The press agency embellished its message with, "Wireless light which will abolish night and darkness." Darkness, perhaps, but not night. Moreover, any visible white light would do that, so why bother about wireless? Perhaps the idea is to send light to the Esquimaux!

The Forbidden Pole.

VERILY, the ways of municipal councils are past understanding. When the ambitious grocer finally enters the local council something apparently goes wrong with his mind. I make a habit of noting the names of councils who fear overhead wires; I now have to chronicle the fact that a certain Town Council has forbidden the erection of a wireless pole on an allotment —ye gods!—

They have been listening to those people who assert that an oscillating aerial blasts vegetation and rots wood. No doubt the mayor is trying to grow a prize turnip —and is taking no avoidable risks!

A Screening Hint.

H. V.S., of Darlington, most of whose five pages are devoted to poetry, gives a hint which I gladly pass on to you. He had been bothered by a neighbouring set and aerial which affected his own set and took volume from his signals. So

SHORT WAVES.

MORE RADIO TALKS.

"Too bad for words."—"Daily Mirror."

"If you can't pacify the baby, put on the radio."

"Does that quiet him?"

"No; but the neighbours won't hear baby."

"—Answers."

A Wireless Announcer in Saskatoon, Canada, was recently attacked when broadcasting.

Why Saskatoon? asks the "Daily Mirror."

A lady correspondent writes to ask us the best way to get in touch with her nephew in Australia with her crystal set.

The only suggestion we can make is that she posts it to him.

"SELF-HEATING 14-mfd. Block. U.S. Condenser" runs an advertisement in a New York paper.

We might as well cancel that order for coal, and import a few of these new devices for our flat.

"What on earth were you thinking about, Herbert? I asked for a wireless licence, and you've brought me a dog licence."

"Sorry; but don't worry, sir, I'll put that right. I'll go out and buy you a dog."

"—Daily Express."

THE CHILDREN'S HOUR.

I hear in the harsh loud speaker

The patter of unseen feet;

And the voices of wireless uncles

And aunts start to bleat.

They wish us all happy birthdays,

And the long long list begins—

"Belinda and Bertie Buggins

Of Bermcndsey (Hul-lo, twins!)"

I would lock you up in the dungeon

Where the wicked uncles go,

But, on second thoughts, it is simpler

To turn off the radio!

"—Daily Mirror."

he procured some fine copper gauze, 24 in. by 8 in., and this he cut into two strips 4 in. wide. "I placed it," he says, "upon the 'cage' aerial, exactly opposite the place from whence I suspected the disturbance, i.e., one piece opposite the disturbed area, and the other exactly opposite, fixing them with copper wire to the top of the 'cage' aerial, close up to the insulators." No more disturbance!

It is not clear, however, whether he placed them vertically, horizontally—or how.

The Heavens Are to Blame.

DR. HARLAN STETSON, alleged to be an astronomer of Ohio University, says that wireless reception is adversely affected by the planets Mercury

and Venus, with the Moon an accessory after the fact, and the Sun as a stool-pigeon. These two chief culprits, M. and V., being electrified bodies, shower electrons on the Sun, causing sunspots, causing you to hear a lot of undesirable noises when you turn on your set. Oh, Venus! Still troubling men?

Below 10 Metres.

IF you are very short-wavy you don't take stock in anything above 10 metres, and will be interested to know that the Telefunken Company, which has an experimental station near Berlin, transmits twice a week, on Tuesdays and Thursdays, from 4.30 to 6.30 p.m. (G.M.T.) on 7.05 metres. Gramophone records are put over on these occasions, and sometimes a relay of the Berlin programme. I do not pretend to know about the odd .05 metre, but its a pretty bit of work, worth doing if you have a good wave-meter and a set with emaciated capacity and inductance.

A Short-Wave Brochure.

IN view of the hunger for short-wave news and information which rages amongst wireless "fans," and which not even the heroic efforts of W.L.S. can assuage, I will refer to the pamphlet entitled "Short Waves and Long Distances," which has been issued by Philips Radio. The first edition was gobbled up quickly, so if you do not want to miss the second edition I advise you to write at once to Philips Lamps, Ltd., 145, Charing Cross Road, London, W.C.2. There is no charge.

The Unavailing Crime.

A VERY welcomed Dover correspondent —will he put his initials in block letters, and no offence meant—tells a story of how a man who had made up his mind that his neighbour's set oscillated, stole out one night and cut the lead-in of the alleged offending aerial. The joke is that the victim had only a crystal set, had an uninsulated aerial, and moreover had laboriously removed all the rubber from the aerial wire, and was a "pirate" to boot. What a nest of crime! Edgar Wallace ought to be in on this!

More Pressing Needs.

THIS Dover soul augments my list of things needed during 1931, as follows: (1) A cure for fading. (2) Ten years for oscillating. (3) Grid leaks that don't burn out (*Mine never do!*). (4) Cheaper "juice." (5) "P.W." to be at least four times bigger, with more space for "Ariel" to fill up. (*Hardly the friendly touch, ses me!*). How do you like the list? Oh, Dover says that I ought not to hanker after a mains-driven "granmy," because the exercise of winding is good for me. No, sir! It makes me feel like Giuseppe the organ-grinder.

Timaru Talking.

TIMARU is in New Zealand, and from that far-distant place C. G. writes to tell us all about radio there. I fear that compared with the fruitiness of European and American ether that of N.Z. has but very few currants! However, the fellows there do their best to wring stuff out of the everywhere. C. G. with a screened-grid four-valve gets 25 stations on the L.S., fifteen of them being New Zealanders. He manages to hear a bit of the U.S.A. and Japan, too. All his components and batteries are of English manufacture. Good lad! Carry on!

ARIEL.

BEHIND THE MICROPHONE

BY CAPT. P. P. ECKERSLEY M.I.E.E.

Our Radio Consultant-in-Chief tells you in this third article how he and a small band of enthusiastic helpers started actively to develop British broadcasting.



I HAVE tried to give you some idea of the early days, pre-Writtle and Writtle. Now we come to the early days of the B.B.C.

About January, 1923, I got a letter from someone in "high circles" friendly enough to suggest that I should apply for the job of Chief Engineer to the newly-established B.B.C. The technical work of the B.B.C. had up to then been handled through the big companies who had agreed to erect the first stations. But the B.B.C. could not expect to rely upon them for ever, and it was decided to build up a technical staff entirely devoted to B.B.C. interests.

B.B.C. Blamed for "Interfering!"

So my letter of application went in. The resulting interview with the general manager of the B.B.C. was not my first. I had seen him once before, *apropos* of shutting down Writtle. You see, there had been a lot of complaint that the B.B.C. transmissions interfered with mine from Writtle!

Would not the B.B.C. shut down for half an hour on Tuesdays? The result of my first interview was that Writtle was to give way and retire in its own blaze of glory. My second interview was not so conclusive—my application had to go before "the Board."

Therefore February 2nd, 1923, found me sitting in Colonel Child's office in Marconi House gazing out on the traffic and wondering when that telephone would ring for me and what news it would bring. I got jumpy. It rang so often on Colonel Child's business.

And yet it rang in the end for me. I had got the job. When could I start? Tomorrow? At 9.30? And so I became the

Chief Engineer. Rather proud, rather humble, rather fearful, but full of excitement. I reported to the offices on February 3rd, 1923.

The offices were communal. Every typist (about 10), every executive officer (about

and its established position to-day very largely to the untiring efforts of negotiation and leadership of the general manager of the B.B.C. of those days. I wish broadcasting was not so important. I could not wish to work in happier circumstances than those which combine "a cause" and the leadership of Mr. Reith.

The opportunity to plan and to execute, to immolate ourselves only in the factual pursuit of an ideal instead of the irrelevances of "politics" (in its wider sense) is given to very few of us. I envy those to whom it is given.

It was once given to me. If it were well done it was because opportunity and enthusiasm worked together, and because there were no distracting irrelevancies which seem inevitably to beset big organisations. But this is all too general: you want the story.

How can I tell the story? Its a mosaic of small incidents building into one big pattern. My first job was to find a site for the London station; the existing one was unsuitable because transmissions jammed the Air Ministry wireless.

Those Early Studios.

I had also to help choose premises for Glasgow, and to that end Mr. Reith and I were hurtling northward in the night express. Again, there was three months accumulated correspondence to answer. There was the small matter of engaging a staff.

New premises for the London staff were wanted, and a few articles had to be written. Interviews with the press on technical matters, talks via the microphone, negotiations with important amateurs, took up some more time.

Three more stations had to be erected and opened, and all the accounts for material supplied to date to be checked, argued about and "O.K.'d" (and with Mr. Reith to look into one's O.K.'s this was no quick and easy pastime).

I slowly emerged from this ruck shouldering away masses of papers, struggling upwards for a breathing space, working
(Continued on next page.)

ONE OF BRITAIN'S FIRST ANNOUNCERS

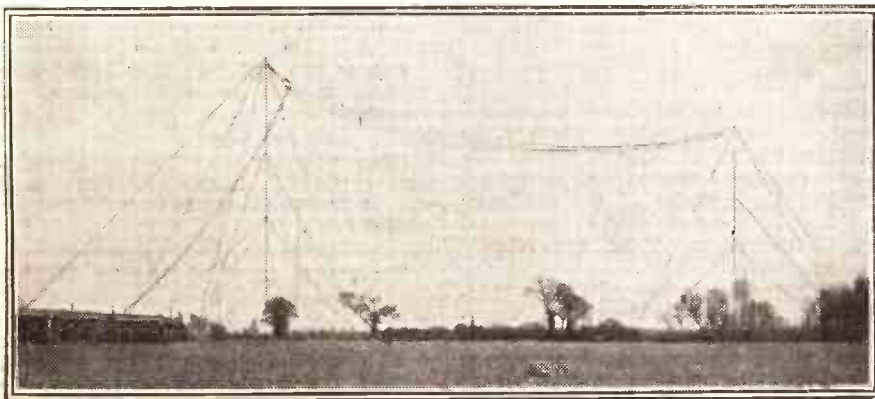


Mr. Arthur Barrows ("Uncle Arthur") photographed shortly after taking up his important post at Geneva.

4), every telephone (about 40), was packed into one room. Only the general manager was allowed a sanctum sanctorum to himself. This most resembled a cupboard. From the cupboard came our orders, stern, inexorable but, withal, kindly.

British broadcasting owes its importance

"THIS IS WR-R-RITTLE CALLING"



Here you see the Writtle station, which, mainly due to the efforts of Capt. P. P. Eckersley, achieved an extraordinary popularity and provided a wonderful stimulus for radio in the early days of broadcasting.

THE
"BROOKMANS REJECTOR"
A reader's very satisfactory and
interesting experience.

The Editor, POPULAR WIRELESS.

Dear Sir,—Up in the North here many owners of wireless sets are awaiting with mixed feelings the opening of the new North Regional station at Moorside Edge. We do not forget the experiences of Londoners and others when Brookmans Park began operations, and the cry that arose for an efficient wave-trap, and how successfully it was met by the experts of "P.W." with the "Brookmans Rejector."

Possessing, as I did, a good home-made wave-trap at the time, I did not experiment with the rejector, but in view of what is

To cut a long story short, all my foreigners came in as usual without any diminution in volume, and with seemingly better quality. But my biggest surprise, however, was that of being able to tune in Toulouse free of the local when the latter was working, a thing I had not been able to do previously. This was proof enough to me that the "Brookmans Rejector" was "the goods"!

Using an Extra Condenser.

Nevertheless, I was not quite satisfied, because if I cut the trap out of circuit for the local I got this at full strength on three valves, as I have no volume control on the panel. My old wave-trap was useful as a volume control also, as it was worked with a variable condenser, which allowed me to let just enough energy into the detector circuit for agreeable volume.

How could I make the "B.R." do this? The idea occurred to me—since the rejector is a capacity-controlled device—

stations is usually controlled by the reaction condenser.

Thanking you for such an excellent device as the "Brookmans Rejector."

I remain,

Yours truly,
"N."

Manchester.

BEHIND THE MICROPHONE

(Continued from previous page.)

thirteen hours a day, travelling, lecturing, talking, broadcasting, and, at last, finding a newer office and the nucleus of a hard-working staff to help in my labours.

But let's speak of the studio! Imagine a room about 20 ft. square hung with butter muslin, decorated with a pattern of dust. Microphones, balanced by counter weights, hang around and are pulled up and down, "to taste." Rehearsals, auditions and performances all take place in one room—which is often the engineers' control room, too. You might just as well fall over an accumulator as a piano.

I particularly recollect that about this time there was one of the many terrific newspaper attacks upon the B.B.C. This one headlined itself "the freedom of the air." We were to have freedom, and no more of this B.B.C. dictatorship.

"Lovely days."

Freedom to me then meant freedom for stations to interfere with one another, and I was wroth at this ill-considered attack. In an hour I wrote a play called "That Freedom." In two hours it was broadcast, with our people laughing like children.

Truth was given a few lines to say, and every time she spoke a harmonium played, (by Stanton Jefferies) slightly "off." I played the part of a newspaper editor. The actual editor deigned to snub me next morning. Lovely days!

**SOME ITEMS OF
INTEREST**

Pick-up Leads—L.F. Transformer
Connections—A.C. Filament Wiring.

Do not allow long pick-up leads to pass over any portion of the L.F. amplifier, or to run close to loud-speaker leads.

Instability with a gramophone pick-up can often be cured by earthing the tone arm.

One or two dud cells in a high-tension accumulator are sometimes sufficient to cause distortion.

Reversing either the primary or the secondary of the L.F. transformer often "irons out" a tendency to peakiness and jarring on certain notes.

The present power of Daventry 5 X X is 35 kw., but Radio-Paris is proposing to use 60 kw.

When building a set with A.C. valves remember that if twisted flex is specified for filament leads, this should be used, it being especially suited to this class of wiring.

GREAT SUCCESS SCORED BY A WIRELESS APPEAL



Clerks busy at the National Institute for the Blind with remittances sent by kindly listeners as a result of a Sunday evening Wireless Appeal.

shortly to happen here I thought I had better be prepared for eventualities in case my old trap let me down when the time came. So last week I hunted up my back copies of "P.W." and found several versions of the "Brookmans Rejector," and finally decided to make up the simple version given in "P.W." of March 15th last, especially as I had all the necessary materials by me.

In less than an hour the rejector was ready, and I at once tried it out. It was a decided success from the start, and the local station disappeared immediately on adjusting the screw of the .001 condenser.

The Biggest Test.

The biggest test, however, was to come. How about the other stations? Would it let them in? My first try was for 5 G B, and, to my delight, this came in at full strength at about a degree or so above its previous reading. So far, so good. What about the others?

why not add a small panel and fit it with a variable condenser, and shunt it across the .001? I carried out my idea straightaway, using a variable .001, an old reaction condenser. I started with this condenser at minimum capacity.

Volume Control Too!

On switching the set on again the local was slightly in evidence, but a touch on the adjustment screw of the .001 sent it "to sleep" again. I then found that as I increased the capacity of the condenser on the panel I could "fade in" the local to the desired volume without any difficulty whatever.

I can strongly recommend this arrangement, as it saves the trouble of transferring the aerial from one terminal of the rejector to the other, and has the additional advantage of acting as an effective volume control of the local station where there is no control on the panel. Volume of foreign

A.C. VALVE DEVELOPMENTS

A brief review of the present position of the mains valve which has done so much to revolutionise modern radio reception.

By K. D. ROGERS.



DURING the last few years valves have altered a very great deal. Their efficiency has rapidly been increasing, until to-day there is no doubt that the British valve is the best and most efficient in the world; in fact, it is so efficient that a large number of manufacturers seem to have difficulty in designing apparatus that is good enough for the valves with which it is used.

A few years ago nobody thought very much about using the mains to derive the whole of the power for a radio receiving set, but nowadays A.C. valves have so altered the complexion of things that anybody having alternating-current mains supply misses a very great opportunity unless he uses A.C. valves in his receiver.

Economical to Run.

Not only are these valves economical to run from the point of view of power taken from the mains, but they are tremendously efficient; a good two-valve A.C. set should give just as good results as the ordinary three-valve battery receiver.

That is saying something, I know, but A.C. valves are really in a class of their own as regards the magnification per stage which can be got out of them.

Just let us look at a few figures. The average A.C. detector valve has a magnification factor of 35 as against an impedance of anything from 10,000 to 15,000 ohms; whilst the first L.F. valve may be of the same type, or it may be slightly "larger," giving an amplification factor of something like 15 to 20 with an impedance round about 6,000 to 8,000 ohms.

"Almost Incredible."

The indirectly-heated screened-grid valve is really too well-known to need much discussion here, but I would like to emphasise that the A.C. screened-grid valve in a really efficient circuit can be made to give almost as much magnification as two really good battery valves, and will, moreover, be much more economical.

All the well-known valve firms have gone in for A.C. indirectly-heated valves, and though some of the firms also market directly-heated A.C. valves, there is usually no comparison between the two types from point of view of efficiency.

Recently the Mazda, and Marconi, and Osram groups re-issued their A.C. indirectly-heated valves, providing even finer characteristics than before. Mutual conduct-

ances are going up everywhere, and Mullards and Six-Sixty have reached the almost incredible mag.-factor of 1,500 and 1,600 with impedances of only about 430,000 ohms. This, as you will see from any catalogue of valves, is far and away above the efficiency obtained by the battery S.G. valve.

Then there is the Mazda A.C. Pen., an indirectly-heated valve which has an amplification factor of something like 95, and which is capable of handling quite a lot of power.

Mullards have some very fine directly-heated pentodes in the 24A and 24B, the former of which takes a grid bias of 21 volts at 300 volts anode, and the latter a bias of something like 35 to 40 volts at 400 volts anode potential. These are 4-volt filament valves having a filament consumption in the case of the 24A of .275, and in the case of the 24B (which is really intended for A.C. work) of 1 amp.

Messrs. Cossois have an extra valve in their A.C. series when compared with the other mains A.C. valves, for they have an R.C. type which has an impedance of 20,000 ohms, and an amplification factor of 35. The other firms simply go in for the screened-grid, H.F., L.F., and the power valves.

This R.C. valve is not an R.C. valve in the true sense of the word, for the impedance is quite low, and it makes an excellent detector or H.F. in a neutralised circuit.

For ordinary work, where the last degree of magnification is not needed, one would use the H.F. with 14,000 ohms and a magnification factor of 32 rather than the higher mag. valve for detector purposes.

But the A.C. valve will have to look to its laurels, for the 2-volters are gradually creeping up and the magnification factors and mutual conductances of some of the later of these wonderful battery valves rival the figures obtained with some of the A.C.'s.

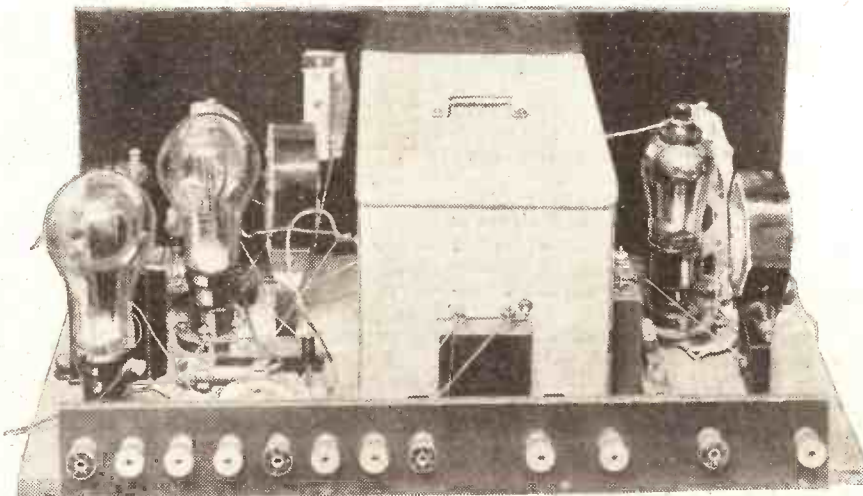
The Latest Rivals.

For instance, we have the Marconi L.P.2/C which has an impedance of 4,000 ohms and the surprising magnification factor of 8. Another remarkable 2-volter is the Mullard P.M. 2A, an output valve which has an impedance of 3,600 ohms and a magnification factor of 12.5. Some figures aren't they!

But I hear a rumour that a British indirectly-heated valve (this time intended for D.C. mains work) with a heater consumption of only .5 amp. is on the way, though I have no details of the characteristics.

Of the use of A.C. valves I can say nothing here, but I hope to talk further in a future article about the use of A.C. valves and the conversion of battery sets for use with this type of valve.

A TYPICAL A.C. THREE-VALVER



This is a quite simple three-valve A.C. set, using S.G., Det., and L.F. stages. The Det. and L.F. valves shown are of the older four-pin types, with the cathode terminal on the side of the base.

AS OTHERS SEE US—

By THE EDITOR

Some interesting details of the B.B.C.'s activities as represented—or rather misrepresented—in Canada.

A CANADIAN reader, living in Waterloo, Ontario, has sent us a rather interesting cutting from one of the Toronto newspapers. As the article is something of a curiosity, as well as an example of complete ignorance about the state of affairs of broadcasting in this country, we think it worth while reproducing it.

"Radio broadcasting in Great Britain under the Government-controlled British Broadcasting Corporation has reached such a low ebb through lack of competition that the system is likely to be dropped any day, according to Dr. C. D. Isaacson, New York music critic and radio programme builder, who has arrived in Toronto from the Old Country.

An Astonishing Statement.

"Dr. Isaacson contends that the programmes sponsored by the British Broadcasting Corporation are of an infinitely lower calibre than the commercially sponsored programmes in North America—that they are so bad, in fact, that the Government is at present contemplating relinquishing its control of the air.

"Certain interests in England are so sure that a Bill abolishing this control will be passed shortly, Dr. Isaacson states, that a commercial broadcasting company has already been formed and is waiting to take over the B.B.C. as a private enterprise.

"Failure of the British Broadcasting Corporation is due to two things, Dr. Isaacson states: First, to the fact that there is no competition in radio programmes and secondly, to the fact that the B.B.C. does not actually control the air. Broadcasting companies, he points out, have established themselves in Holland, and are at the present moment flooding the air with commercial programmes broadcast for British audiences.

"No practical use will be made of television for at least a decade, Dr. Isaacson predicts."

Sour Grapes?

In a covering letter our Canadian correspondent gives it as his opinion that "Maybe it is a case of sour grapes with the National Broadcasting Company, and wouldn't Mr. Aylesworth & Co. like to get their hands on the B.B.C., as they have on some of the Canadian stations."

Well, perhaps our correspondent is right! The article we have reproduced above is certainly an amazing example of how a visitor to these shores can get an entirely erroneous impression about British broadcasting.

One would have thought that any serious critic would have heard of the B.B.C.'s ten-year charter. In fact, Dr. Isaacson, instead of hitting the nail on the head has merely succeeded in hitting his own thumb.

Our article in last week's "P.W." entitled "Dark Days Ahead for Radio"

has resulted in a batch of correspondence which would take weeks to answer item by item. The majority of our correspondents are indignant that the present state of affairs in connection with wave-lengths, new stations of huge power, etc., should be allowed to continue, and they ask—some with considerable emphasis—what is going to be done about it?

An International Matter.

Well—we don't know. And that means that, up to the time of going to press with this issue of "P.W.," we have heard of no

"HAVE A HEART"



Leonard Henry, with his usual cheerfulness, is here shown transmitting his heart-beats via a microphone, so that all the people in a large hall can hear them.

steps being taken by the authorities seriously to cope with the situation.

It's no good blaming the B.B.C.: this is an international matter—an affair for governments.

We understand the B.B.C. is using all its influence to bring about some sort of international ruling about wave-lengths, power, etc., in connection with European broadcasting; but what the outcome will be it is impossible to say.

We don't advise our readers to send letters of protest to the B.B.C. in connec-

tion with this particular matter—they should send them instead to the P.M.G.

A Big Problem.

One of the most reliable and best informed radio critics in the newspapers, Captain Ernest H. Robinson, recently wrote in the *Observer*:

"The outstanding problem which must be attacked, and, if possible, solved, in the year that is now starting, is that of selectivity. Everywhere transmitting stations are increasing their power, or new high-power stations are replacing old ones. The recent severe interference at Mühlacker, the giant German 70-kilowatt station, with the London Regional transmitter, is only a foretaste of that which is to come. Within the next twelve months there will certainly be two or three more of these very high-power Continental stations at work, and our own Northern Regional twin station will also be working."

We agree that selectivity is still one of the big problems to be more completely solved, but tackling selectivity is but a small part of the remedy the other wants to-day. It wants a boss—either in the shape of a dictator or an international governing body, backed and authorised by the governments of Europe.

Action Needed.

Until international rules regarding broadcasting are thoroughly and exhaustively worked out, and then rigidly adhered to there will always be the bugbear of a congested ether and the risk of complete broadcasting chaos.

Some say the remedy will be forthcoming when the International Conference meets in Madrid in 1932. Perhaps; but we maintain that it will be too late—the evil is already pronounced: soon it will assume the aspect of hopeless and irremediable muddle. Action is wanted—at once.

TIME PLEASE!

European radio and the clock.

A very accurate time signal is sent out from Eiffel Tower, Paris, just before 9 a.m. and 9 p.m. daily on 32.5 metres.

Eastern European time is two hours in advance of G.M.T.

Central European time is one hour in advance of G.M.T.

Frankfurt (Germany), on 390 metres, is one of Europe's early birds, this station often being on the air at 5.15 a.m.



Those Radio Giants

TOWARDS the end of November South of England listeners were surprised to find that the London-Regional transmitter had acquired a very annoying background. The first German high-power station Mühlacker was on the air with 75 kw., and, according to the reports of some people, was said to be slightly over-modulated.

Over-modulation or not, 9 kc. divide London Regional from Mühlacker. The main question here is: Are 9 kc. enough to keep two high-power stations apart?

Who is Right?

Mr. Braillard, of Brussels Control Station, says "Yes"; our own ears on listening-in say "No." Who is right? Theoretically, Mr. Braillard is right, and practically, too. We are wrong. Or, rather, not we, but our sets.

We have too long been used to the lax tuning of inferior sets from five years ago. I hardly think that the situation in England will ever get quite as bad as it is at the moment, say in Paris, where it is only possible to enjoy reception with a frame aerial and a super-het.

But we certainly must bear in mind that within a very few months, and certainly before the end of 1931, Europe will be teeming with high-power stations.

It has been suggested that Mühlacker should be moved to another wave-length or that London's wave-length should be changed. But what will that do? It may

Our special European correspondent has something to say about the increasing congestion in the ether, with special reference to Germany's ambitious broadcasting plans. He reveals some vitally interesting facts concerning probable developments in that country.

help for a few months, but when the nine German giants of from 75 to 120 kw. are in operation (which is hoped for in Germany to be at the end of 1931), and when the two Swiss high-power stations, and also the Warsaw, Prague, Budapest, Vienna, Paris, Toulouse, Luxembourg, Stockholm high-power giants of from 60 to 160 kw. are on the air, what will be the use of such a wave-length change?

A Favourable Situation.

No, we must get used to the idea of having extra loud reception of Continental stations on two valves or less. Britain, after all, is geographically in a very favourable situation as far as distant reception of Continental stations is concerned.

Take Mühlacker, for instance. Local reception of Mühlacker fades out at less than 100 miles from the station. During daylight the station is reliable right up to 200 to 300 miles, but the moment darkness comes fading sets in badly.

It sets in just about 100 miles from the

station. This, I hear, is the worst fading zone. It seems to keep on fading right up to somewhere round 500 kilometres, and then comes the reflected wave alone, powerful, with hardly any fading; and Britain is just in that zone.

And with a great many of the Continental high-power stations it will be the same. Britain will be beyond the good daylight range but well within the fadingless reflected wave zone.

Fadingless may not be strictly correct, but, anyhow, British listeners will not find the stations roaring at one moment and vanished the next.

It seems rather a drastic suggestion, but I am afraid that we will have to completely revise our ideas of reception before long. Long outdoor aerials will have to vanish, unless one wishes to receive a medley of Strasbourg-London-Barcelona-Graz-Mühlacker.

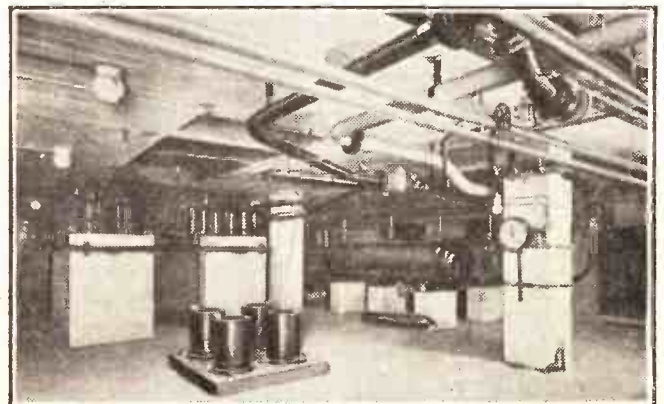
Extremely short outdoor wires, indoor aerials, or frame aerials, will be the demand of the future. On the other hand, makers of portables and self-contained sets will rejoice in the fact that they will be able to guarantee many more Continental stations and will be able to warrant *no interference*.

Try a Frame.

High power is good for the low-powered set, is good for the local listener if he is not too near the transmitter, but is distinctly bad for the man with a super set working on

(Continued on next page.)

THE FIRST HIGH-POWER BROADCASTER USING CRYSTAL CONTROL



Two views of the 75 kw. plant at Hellsberg—Germany's second high-power station. On the left you see the transmitter hall, and on the right the complicated water-cooling system. The water circulating in the valve jackets is again cooled by other water from outside.

THOSE RADIO GIANTS

(Continued from previous page.)

a large aerial and with tuning possibly dating from 1925.

On the other hand, the use of frame aerials has many advantages. Atmospherics are much less, local electrical disturbances not nearly so bad, and the number of high-power stations by the end of 1931 will certainly suffice even the most hungry station hunter.

Seven valves and a frame will hardly be necessary. I believe that a small frame and five valves will get any high-power station at full strength.

More "Ether Shakers."

The new German stations, apart from the two already on the air, will be Langenberg with 75 kw., Königswusterhausen with 75 kw., then further high-power stations in Saxony to take the place of the Leipzig and Dresden stations, one in Silesia instead of Breslau, one to replace Hamburg, and one in Bavaria near Munich.

Apart from these, the Frankfurt station's power will be increased, making it a medium-powered station; and Berlin may obtain a second high-power station to take the place of Witzleben. Germany, however, occupies twelve exclusive wave-lengths; and as the high-power stations will take up only nine waves, it has been decided to work a number of low-powered relays on single wave-lengths.

One net of single-wavelength working stations will be situated in Northern Germany (Hanover, Kiel, etc.), then the Bavarian relays (Augsburg-Nürnberg) will be operated on another single wave, and the Frankfurt and Cassel stations on a third single wave. Königsberg will be retained, and will work on an international common wave.

These are the official plans of the German Reichspost, and it is stated that they will be put into operation as soon as possible; also that it is expected to have the greater part of the new stations on the air by the end of 1931.

The Heilsberg Station.

Germany's second high-power station, Heilsberg, in Eastern Prussia, opened on December 15th. It was erected by the big German concern, Lorenz, of Berlin. It is notable for the fact that it employs crystal-frequency control.

This necessitates eight stages to build up the 75 kw. in the aerial. The modulation is brought in at the sixth stage.

The station operates on the former Königsberg wave-length. Within the first few months the aerial power will be further increased to 120 kw.

Heilsberg is a small town situated in the

very geographical heart of Eastern Prussia. The aerial masts of the transmitter are of wood and are 110 metres high.

The aerial itself is horizontal, being 25 metres long. The down lead ends in a feeder house, the whole being connected to the transmitter house 200 metres away; and the valve-cooling system is of the enclosed circulating type.

Mühlacker a Failure?

Reverting to Mühlacker, it is interesting to note that preparations are being made to continue in operation the old Stuttgart transmitter on an international common wave-length, because the signals from the new high-power station are so badly received. Though well heard over long distances, the new Giant has disappointed its local supporters and it has been suggested that its poor local results are due to its earth system.

This, it is said, is a shallow buried network, and does not reach "ground water" properly. Hence, it is argued that the ground wave is very poor.

HANDLING THE HUGE POWER



The engineer-in-charge at Heilsberg can switch on the transmitter and control the whole transmission from this desk.

FOR BRIGHTER REPRODUCTION

A Hint for Radiogram Enthusiasts.

It often happens that when a pick-up is being used to reproduce records, the tone is not quite as bright as when the records are played in the ordinary way by means of the soundbox. Generally, in other respects, the reproduction is distinctly improved.

Sometimes it is due to this improvement so far as the lower notes are concerned, that the results do not seem so bright. The effect is produced by the presence of decidedly more base.

In other cases it may be due to a falling characteristic so far as the overall amplification of the set is concerned. Whatever the cause, there is a little scheme worth trying which in the majority of cases will result in an improvement in the desired direction.

Quite often, also, an increase in volume will be obtained. The only component required is an ordinary L.F. intervalve transformer.

The two leads from the pick-up which usually are connected to the set are joined instead to the primary of the transformer, and two leads from its secondary are carried on to the set as though they were the original leads.

IMPORTANT NOTICE

Recent "P.W." set designs have created a tremendous demand for certain components, and in view of the importance of our readers using thoroughly sound and reliable apparatus, in order to get first-class results with their sets, we would urge them to pay the closest attention to the following points, which have been specially compiled with a view to assisting readers to locate faults in components. We would particularly ask readers to get in touch with us directly they have reliable evidence to show that any component purchased is faulty; and in particular where there is evidence to show that the design and general specification of, for example, the "P.W." Dual-Range Coil, have not been rigidly adhered to by manufacturers.

The following list comprises the important points you should look out for:

"P.W." DUAL-RANGE COIL.

1. Loose windings.
2. Terminals shorting on to medium-wave winding.
3. Reaction-Winding Reversed.
4. Tuned Winding Reversed.
5. Wrong turn numbers.
6. Wrong former dimensions.

CONDENSERS (Variable and Fixed).

1. Loose, finger-tight assemblies.
2. Wide errors in capacity.
3. Disconnected vanes.
4. Leaky insulation and even dead short-circuits.

ORDINARY COILS, Etc.

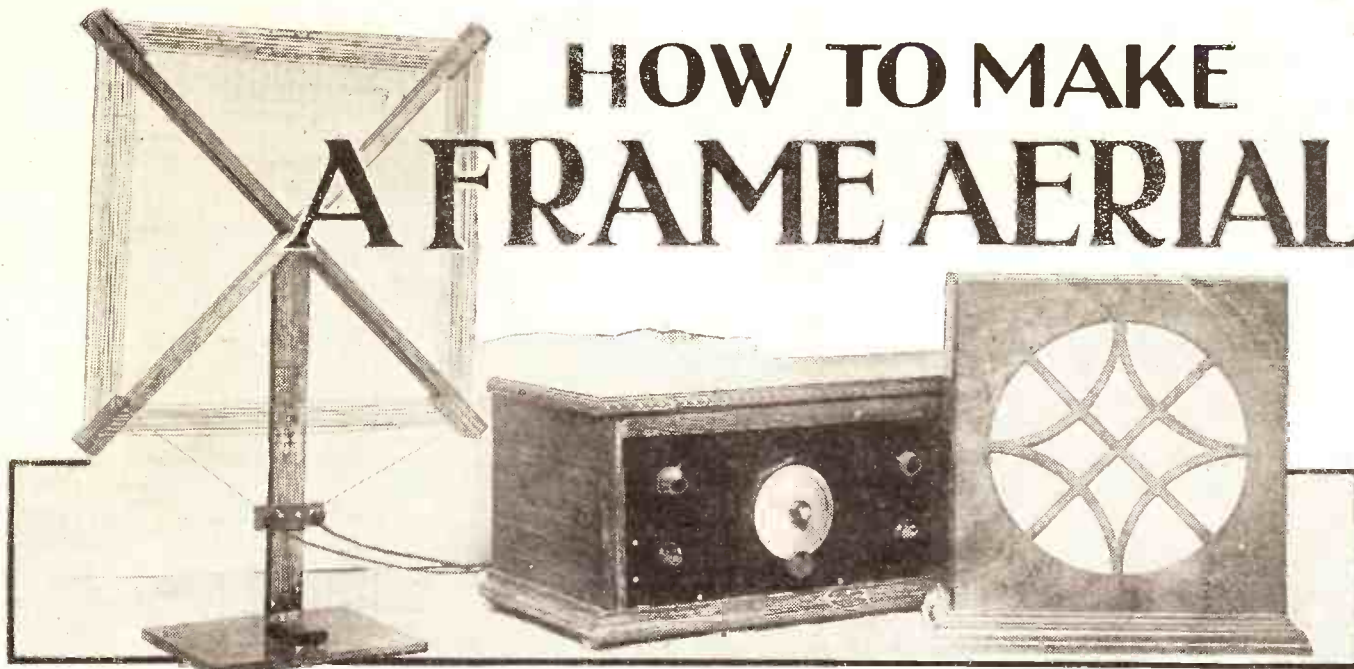
1. "X" coils wrongly connected to their plugs.
2. Coil holders with no connections to actual pin and socket.
3. Anode resistances and grid leaks with wide errors in values.
4. Broken connections, etc., in components with fine wire windings—this is fairly common in H.F. chokes; rare in L.F. transformers.

(Most of the above faults can result, in cases, in complete set failures.)

We are doing everything in our power to reduce the volume of faulty gear in circulation, and we are in close touch with the trade on this matter. We take these steps in the interest of our readers, though we must make it plain that we can accept no responsibility for faulty apparatus sold.

We urge our readers to select their receiver parts with the greatest care and discrimination, confining their purchases, where possible, to the products of old-established "P.W." advertisers having reputations for first-class, reliable components.

HOW TO MAKE A FRAME AERIAL



THE old saying about desperate remedies and desperate diseases must appeal with quite a new force to those who are so unlucky as to find themselves in the near neighbourhood of one of the new Regional stations.

It may perhaps be irreverent to refer to a situation produced by the B.B.C.'s beautiful new scheme as a disease, but there can be no denying the need for desperate remedies in the case of many listeners.

Cold Comfort.

It is cold comfort for them to be told to build a new and super-selective receiver, especially when they intend to listen chiefly to the two local programmes with only an occasional tour round among the foreigners. Any expedient which will provide relief without scrapping a set whose only fault is that it has not the exceptional selectivity needed, is worth trying in such cases.

Rejectors will do a great deal, and indeed, as a rule, provide a complete solution when a suitable type is chosen. For certain kinds of receivers, however, there is another way out which has some substantial advantages.

In other words, that much neglected device, the frame aerial. It used to be popular once upon a time when many of the more advanced constructors used super-heterodynes, but it has so gone out of fashion that only a very small proportion of present-day set-builders have tried it.

The general impression seems to be that unless the receiver is a very big one indeed, it will give no results at all on a frame, but that is not quite the truth of the matter. With a good frame quite a lot can be done with any efficient set possessing a screened-grid H.F. stage.

Clear of Jamming.

True, the set will not have the range and power it would display on a good outdoor aerial, but that is not quite the point.

Suppose that the set is being used so close to a "Regional" that it will not separate the two local programmes properly and practically all the foreigners are smothered in interference: might it not

Full constructional details of a frame practically anyone can build in a very short time at negligible cost. And yet it is surprisingly effective and with it good results are possible with quite simple sets. If you are jammed by the local this is the kind of thing you need.

Designed and Described by the "P.W." RESEARCH DEPT.

be better to use a frame and so be able to separate the two local waves with reasonable ease and get just a few of the stronger foreigners clear of jamming?

Worth thinking about, isn't it? It must be realised that the frame will give very considerably reduced volume (as a rough guide, it is not unlike reducing the number of valves by one), but the tremendous gain in effective selectivity may make it worth while.

Not merely is there the "directional property" of the frame, which will often enable two badly mixed-up transmissions to be separated, but there is also the fact that the actual tuning of a frame aerial is definitely sharper than that of the normal first circuit in a receiver coupled to an outdoor aerial. These two factors together lead to an increase in selectivity which is likely to surprise those accustomed only to "sky wires."

Sharp Tuning.

Very often you will find it possible to swing the frame round to such an angle that the interfering signal disappears, while the one you want can still be heard. You cannot do this with the two transmissions of a Regional station, of course, because they are both in the same direction, but here the inherent sharp-tuning properties of the frame are usually sufficient to give the desired relief.

Now let us be more definite about the type of set which can be expected to give satisfactory results, including the reception of a few foreign stations. We must be

quite clear about this, since we don't want to run any risks of misleading owners of sets too small to work effectively on a frame.

In general, a screened-grid H.F. stage will be required, so the most likely sets will be three- and four-valvers, with one and two L.F. stages respectively. A good "four" of this type will give quite a useful performance on a frame, while a "three" will require careful manipulation to yield very much in the way of foreign stations. A pentode in the last socket, however, will bring it up nearly to the level of a "four"

Set Must Be Stable.

The lucky possessors of receivers with two screened-grid stages need have no doubts. Such sets, if well stabilised, will bring in lots of stations on a good frame, if it is not badly screened in any way. (Beware of steel-framed buildings in this connection, likewise galvanised iron roofs, gasometers, and other masses of metal in the neighbourhood, because they generally "cast a shadow.")

We mentioned the question of stability just now, and this, too, requires elucidation. The point is that to make proper use of the simple type of frame aerial, you must disconnect the earth lead from your set, as well as the outside aerial.

Some powerful receivers are no longer stable under these conditions, and will oscillate, motor-boat, or go into a howl, especially if the H.T. supply is from a mains unit. Settle this point first of all, therefore. Take off your earth lead and see that the set does not then misbehave in any way.

Now, assuming that all is well, what about making up a frame aerial and trying it out? Have a look at the photos and diagrams on these pages, and you will find they give you almost all the details you want for making up a very simple but efficient one for the lower (or "medium") wave-band of about 200 to 550 metres.

Easily Made.

You will soon grasp the scheme of a wooden cross made with two arms "halved"
(Continued on next page.)

HOW TO MAKE A FRAME AERIAL.

(Continued from previous page.)

together in the middle, mounted on a wooden upright, with a substantial piece of wood for the base to make it stable. The windings are carried in slanting saw-cuts in four corner pieces of ebonite, in two sections in the same direction.

Winding the Frame.

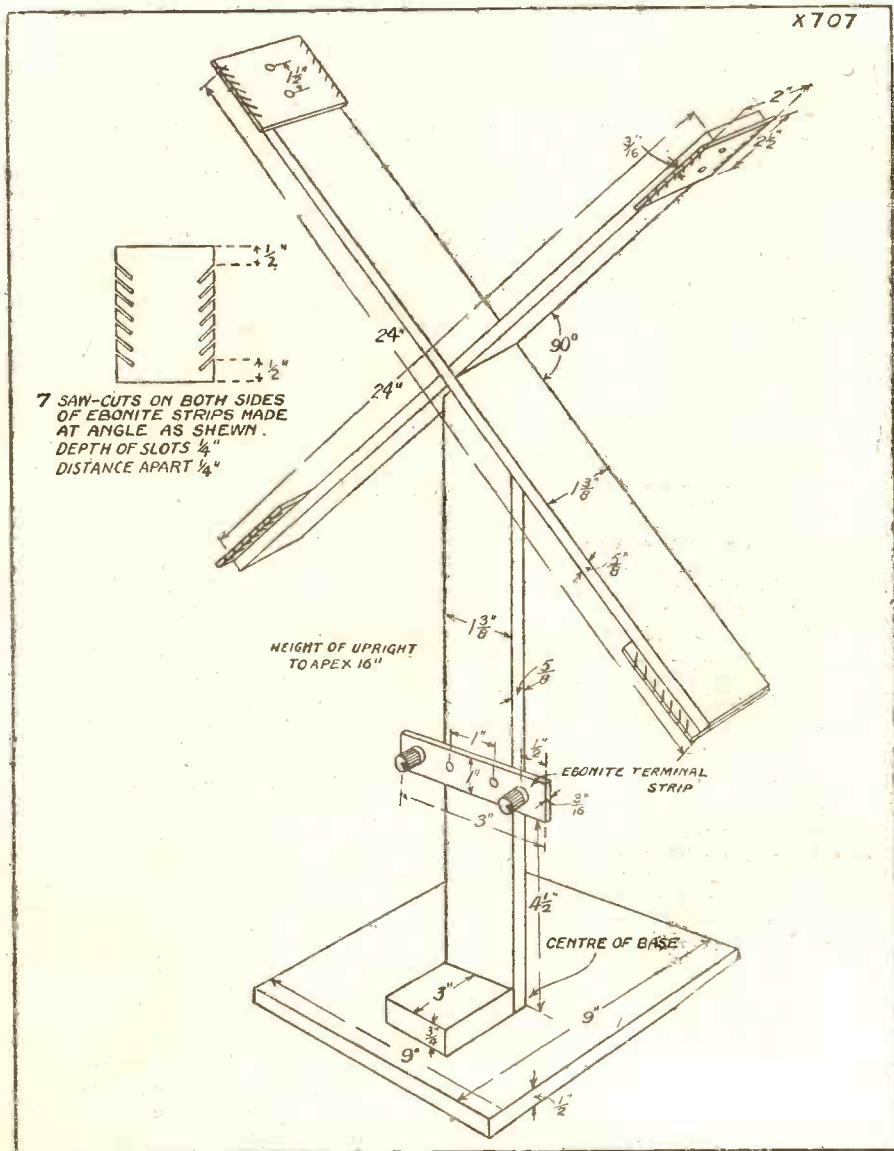
Any wire of about No. 20 or 22 gauge can be used, and we obtained rather a smart

the series of 14 slots so long as it forms one continuous winding in the same direction; but the following is a convenient method.

Secure the start under the left-hand terminal, then wind one set of saw cuts full, one turn in each, on the side of the frame nearest to you, working from the outermost set of cuts to the inner.

When you have filled the last (innermost) saw-cut, hitch the wire across on the same ebonite corner piece to the innermost cut on the other side thereof, and proceed to wind this side of the frame, gradually working outwards. When the saw-cuts have each received their single turn of wire, take the finishing end to the remaining terminal and your frame is done.

THE SIMPLEST POSSIBLE CONSTRUCTION



The structure has been simplified to the extent that only the most elementary woodwork is involved. And above you have in one diagram every vital measurement.

appearance with bare tinned copper wire. See that the turns are just nicely taut, and if bare wire is used, slip sleeving over the end leads if they tend to touch the windings. It doesn't matter how the wire goes into

COMING NEARER
AND NEARER—
THAT COMET

ADJUSTING YOUR LOUDSPEAKER

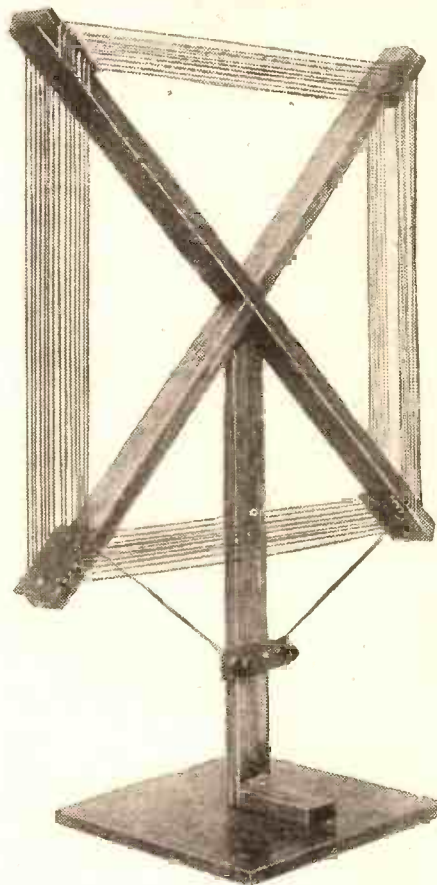
Avoiding Chatter and Dithering,
By A.S.C.

NEARLY all loud speakers are provided with a knob for adjusting the distance of the armature from the pole piece or pieces. If the gap is too small, chattering will occur when reception is loud, and if it is too large a loss in sensitivity will result.

The Correct Method.

The latter sentence applies, of course, to units which, like loud speakers with diaphragms, have the pole pieces all on one side of the armature. The correct method of adjusting them is to turn the knob so that the gap is as small as possible

HANDSOME APPEARANCE



It is quite handsome in appearance, as you can see while its efficiency is of a particularly high order.

without there being any chattering when signals are at their loudest.

With units of the balanced-armature type, there are pole pieces on either side of the armature, and therefore the correct position for the armature is mid-way between them. If it is too much one way or the other, chattering will result.

A click can be obtained in two positions on units of this type, namely as the armature comes into contact with either set of pole pieces. Therefore the knob should be adjusted so that it has to be turned an equal way in either direction before a click results.



PREPARING MY "PARADES"

by PHILIP RIDGEWAY

How the famous series of broadcast variety shows was planned, rehearsed and finally produced for the microphone.

I SUPPOSE that the ideals which move me in planning one of "The Ridgeway Parades" are really extensions of those which should govern any type of theatrical production.

Radio calls for a similar batch of virtues, somewhat intensified perhaps. Its appeal is possibly more intimate than that of a show in a theatre, but the broad principles behind it are roughly the same.

The Main Consideration.

One is deprived of the invaluable help provided by sight and by the emotional response of a large audience. This simply means that one's efforts to hold the attention of an invisible audience composed of all sorts and conditions of men and women must be correspondingly more intense and effective.

What is the main consideration at the back of my mind when I am planning one of my Parades? It is, I think, a vivid determination to convey atmosphere over the ether; to give an illusion of life, of reality. The necessity of being vital is of supreme importance. It is the most essential quality of any successful theatre show, talkie, or broadcast.

And it is not difficult to appreciate when one considers the conditions under which one broadcasts and the conditions under which listeners receive what is spoken into the microphone.

Ideal Listening.

Earnest people continually advise listeners to concentrate upon their listening. I have even heard it suggested that there should be in the home a reproduction as far as possible of the conditions which obtain in a theatre—lowered lights, perfect silence, concentration.

There may be a few listeners here and there who return earnestness for earnestness, and who do actually try to listen under circumstances such as these.

No doubt they reap the benefit of their pains. But I fully realise that for the great majority of those who look to their radio sets for occasional amusement this is indeed a counsel of perfection, and that the conditions under which they listen are necessarily far from those which a broadcaster would consider perfect!

Listening with the great majority is something which they do in the face of countless distractions. People come in and out of the room, and conversation flourishes while the loud speaker is doing its best to make itself heard. Nor is this all that broadcasters have, in the very nature of things, to contend with.

Even if a listener is doing his best to concentrate upon whatever is issuing from the loud speaker, the effort is far greater than it would be in a theatre. For one thing, he has not paid anything like as much as he would have paid in a theatre, and is therefore not so determined to get value for money!

For this reason alone, the hold upon his attention which the broadcast has is

"MR. RAMSBOTHAM CALLING."



Mr. Philip Ridgeway—alias Ramsbotham—the producer of the famous radio variety shows.

correspondingly less, and the tendency for him to allow his mind to wander correspondingly greater.

Thus any form of radio entertainment has to face a certain inevitable apathy on the part of listeners, quite apart from the serious initial disadvantage that its appeal is entirely aural, and must depend for its effect solely upon the appeal made to the listener's ear.

In view of all this, it should not be difficult to understand my insistence upon the necessity of atmosphere and vitality in any

broadcast with which I am connected. Of all necessary qualities these are, in my opinion, the most important.

The fact that I am half Spanish may be partly responsible for my ability, as I possess by nature an abundant amount of vitality, pep, and the rare gift of being able to transfer it. My mother is Spanish, and an ex-opera singer. This all helps.

But to say that vitality must be communicated over the ether is one thing; to define so intangible a quality, or to explain exactly how I believe I manage to put it over, is quite another.

Where "Mike" Scores.

What is this vitality? It is something which we all recognise when we meet it. Frequently it is present during the first performance of a play in a theatre and subsequently disappears because for the performers the play loses, through repetition, a certain magic of novelty which it at first possessed.

From this point of view radio scores, for no performance of any wireless show is ever repeated sufficient times for the players' initial interest to flag.

For radio the problem is simply to ensure that this precious vitality is present in one or, at the most, two performances.

Personally, I believe that with radio, as with other shows, the influence of the producer is the chief factor in providing that illusion of "life" without which any production falls flat.

Giving the Show Unity.

Let us consider for a moment my own methods in preparing one of my Parades. First let me make it clear that I believe that the producer's job is to produce—in the fullest sense of the word. It is not enough for him simply to exercise a fairly superficial influence upon the final stages of the production. His job is to give the show unity, which is another way of saying that his job is to give the show life.

The only sort of unity which he can give is to see that every detail of the show bears the unmistakable imprint of his personality. In my own case, I gather round me the necessary number of players, and work upon them so that the final production proclaims quite definitely the unifying influence of one mind.

I do not recognise the wisdom of allowing any one player to stand out above the rest, to be too individualistic in his performance, although as producer it is my job to get the

(Continued on page 972.)

A NOVEL IDEA.

The Editor, POPULAR WIRELESS.
Dear Sir,—Please find enclosed rough drawing of a practical idea for using your "dual-range" coil. It originated in this way.

I made up the coil in a new set for a friend, and, finding it good (very much so), I thought about converting mine. Now mine is a four-volt straight (Det. and three-note mag.) mains H.T. supply, all enclosed, very complicated with extraordinary good quality for local work. Foreign stations come in with tremendous strength, but local station's signal superimposed on a number of them.

I conceived the idea of this unit to replace my plug-in coil arrangement. A small hole is cut in the back of the cabinet (for the switch knob), and the whole unit, screwed on the inside back with four screws. After disconnecting the old system, I connect up the new and the job is done.

The only things required are a piece of ply 4 in. by 5 1/2 in., one "Ormond" three-wave switch, one .002 fixed condenser, and, of course, the "P.W." dual coil. This has saved me the trouble of taking down my set, and is easily removed for purposes of inspection.

I thought perhaps there are other readers of "P.W." who are in the same position, and this idea would help them out.

Does anyone want some good plug-in coils? Wishing you well.

Yours faithfully,
H. V. BINNEE.

Surrey.

THE "P.W." "CLEAR-CUT" CONE.

The Editor, POPULAR WIRELESS.
Sir,—I have built your "P.W." "Clear-Cut" Cone, and upon testing same was amazed at the quality of reproduction given, every instrument being clear and defined.

The high notes were of an unusual quality, and so good were the results given that I feel I must write to thank you for the pleasure it has given.

I am a regular reader of the "P.W." and have built your splendid "Magic" Three, and I must say the combination with this latest POPULAR WIRELESS success is good in the extreme, speech as well as music being excellent.

I wish you every success, and am keeping a sharp look-out for any more good things that may be coming along.

Yours faithfully,
HERBERT G. HARVEY.

Bristol.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having made the "P.W." "Clear-Cut" Cone, published in a recent "P.W." which cost 2d. for Kraft paper, I was surprised after about one hour's work at the result. I find it is equal in clearness to a linen cone I made a few weeks back, and far superior to most cones on the market, hoping

CORRESPONDENCE.

"P.W.'S" DUAL-RANGE COIL
THE "P.W." "CLEAR-CUT" CONE—
SHORT-WAVE RECEPTION

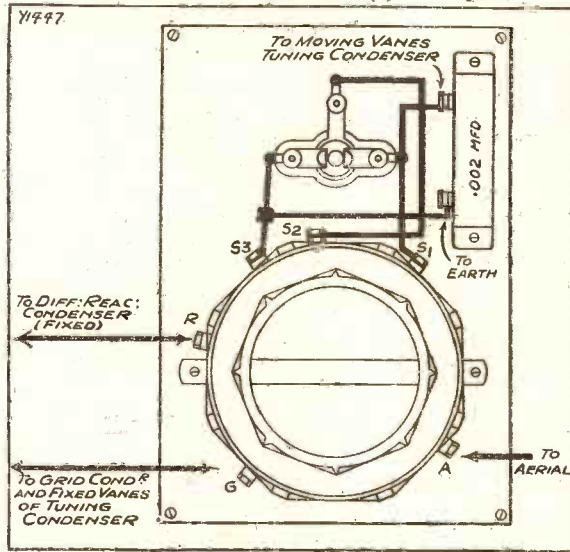
Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

other wireless enthusiasts will send you their versions of the "P.W." "Clear-cut" Cone.

Yours faithfully,
J. TAYLOR.

Winshill, Burton-on-Trent, Staffs.

REPLACING PLUG-IN COILS



A diagram of Mr. Binnee's "P.W." Dual Coil Unit.

SHORT-WAVE RECEPTION.

The Editor POPULAR WIRELESS.
Dear Sir,—I have seen frequent reference in POPULAR WIRELESS—a publication which I enjoy—to the inevitable fading of short-wave foreign stations at night. Whether or not it may be an exceptional occasion, I should like to place on record my experience last night (Sunday, January 11th) from 6 p.m. to midnight. Using a three-valve set in corporation a Triton H.F., a Mullard detector, and a Marconi power valve, and using two loud speakers in parallel (horn and cone) I received at good volume and without fading, throughout the period named, the following stations: Strasbourg and Konigsberg (only 1-7 kw. as loud as Muhlacker), Leipzig, Horby Turin, Bordeaux-Poulouse (R), Frankfurt, Berlin (W), Rome, Langenberg, Milan, Vienna, Budapest, and of course Muhlacker.

I put 100 volts H.T. across the H.F. valve, and 110 across the detector and power valve, G.B. at 7, and the L.T. was from a 2-volt accumulator.

Yours faithfully,
(Rev.) CLINTON DALY.

Epsom Downs, Surrey.

THE "MAXI-POWER" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir,—It gives me great pleasure to write an appreciation of that fine set, the "Maxi-Power" Four, which I have just installed. Your statement in October 11th issue, "Strength, Selectivity and Purity," aptly expresses the bare claims which could be very easily amplified.

I have adhered strictly to the specification, with one or two minor exceptions, and have inserted an L.F. choke and condenser as a refinement. Using 150 volts H.T. and only a power valve in the last stage, the results are splendid and, with only a few exceptions, no reaction is required. I am using "Lewcos" coils of the numbers given in your article.

I wrote you about a year ago re the original "Titan" Three of 1929, and whilst I rather regretted stripping this old friend down, the end has certainly justified the means.

On an indoor aerial (about 75 feet) eighteen stations have simply "fallen in" at a touch of the dials, so when I begin "searching" I expect the number will be much larger.

Again many thanks for a splendid receiver.

Yours faithfully,
FRED SYSON.

Highfield.

STATIONS WORTH HEARING

By R. W. H.

A special section for the "DX" listener.

THE purpose of these notes is to provide the long-distance enthusiast who explores the medium- and high-wave broadcast bands with information concerning the stations that are best worth his attention. I want to be of the greatest possible assistance to DX-minded readers, and I shall therefore be grateful for suggestions.

Though I cannot undertake to answer all letters by post I will deal in these columns with any that raise matters of general interest to the great band of ether searchers.

On the medium- and high-wave bands things are always happening. New stations come on the air but it may be weeks before a man hears of their existence, picks them up and realises what wonderful reception he has been missing.

Try This One.

Old stations not infrequently make alterations in their plant which enormously improve their strength and their quality at long range. A recent case in point is Brussels No. 1, operating on 509 metres, or 590 Kc. Since for a long time Brussels has not been worth trying for, many readers have probably not bothered about this station in recent weeks.

Just try to-night and you will probably have a surprise. The Brussels No. 1 station is still shown in the wavelength tables as using a power of only 1-2 kilowatts, but this is undoubtedly now an understatement, for

on most nights his signal strength is not far behind that of powerful fellows such as Rome and Strasbourg.

Another station which may open your eyes and gladden your ears is Lyons Doua, with a wave-length of 466 metres and a frequency of 644 Kc. And there are several more, often overlooked by the long-distance man, to which I would like to call your attention. Amongst these are Kattowitz (408 metres, 734 Kc.), Belgrade (432 metres, 694 Kc.), Gothenburg (322 metres, 932 Kc.), Bordeaux Lafayette (304 metres, 986 Kc), Kosice (293 metres, 1022 Kc), Bratislava (279 metres, 1076 Kc.), and Heilsberg (276.5 metres, 1085 Kc.).

All of these stations are easily found even if your set is not calibrated—I shall have a word or two to say on calibration as an aid to searching at another time. For Lyons Doua tune in the Midland Regional and search slowly downwards between 5 G B's settings and those for Rome.

Belgrade is found immediately below the

powerful Stockholm, whilst the settings needed for Kattowitz are about midway between those for Belgrade and Glasgow. To find Gothenburg tune in Strasbourg (you cannot help finding him) and slowly reduce the condenser readings. On the way down you may pick up Brussels No. 2 and Breslau. Once you have found Breslau, Gothenburg is just a "tick" below. Bordeaux Lafayette lies between Aberdeen and Cardiff, and Kosice is just below Hilversum.

For Heilsberg go first of all for the London National and then work slowly upwards. You cannot mistake the German transmission, which is by far the most powerful in that region of the medium-wave band. Bratislava lies immediately above.

A Practical Selection.

Here is a selection of medium and long-wave stations for your next tour round Europe via ether. Long Waves: Huizen, Radio-Paris, Koenigsvusterhausen, the Eiffel Tower, Motala, Kalundborg. Medium Waves: Budapest, Vienna, Milan, Brussels No. 1, Rome, Stockholm, Belgrade, Kattowitz, Frankfurt, Toulouse, Hamburg, Strasbourg, Brussels No. 2, Gothenburg, Bordeaux Lafayette, Kosice, Bratislava, Heilsberg, and Nuremberg.

I don't say that every one of these will be good on every night; on most nights, though, you will find that a big proportion of this list merits your attention.

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100v. "	13/-
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60v. Super	13/-
100v. "	21/-
120v. "	25/6
150v. "	31/-

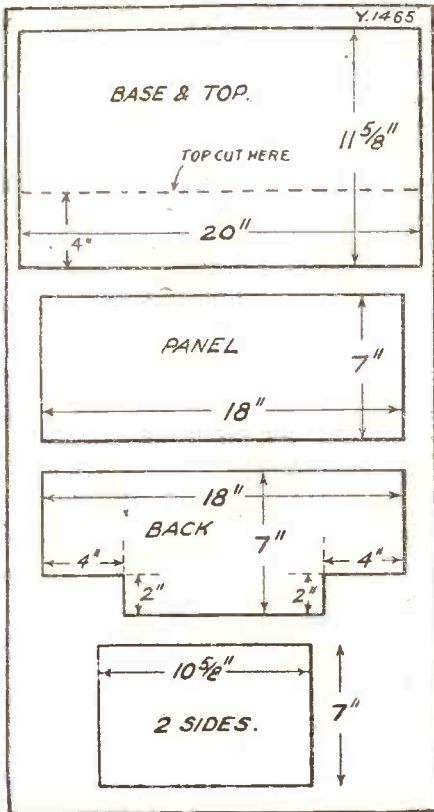


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OUR recent "thirty-dob" two-valver was something of an experiment. We had a very strong suspicion that a considerable proportion of our readers would like to see us apply our usual methods of cost-reduction still more intensively and see what could be done in an extreme case.

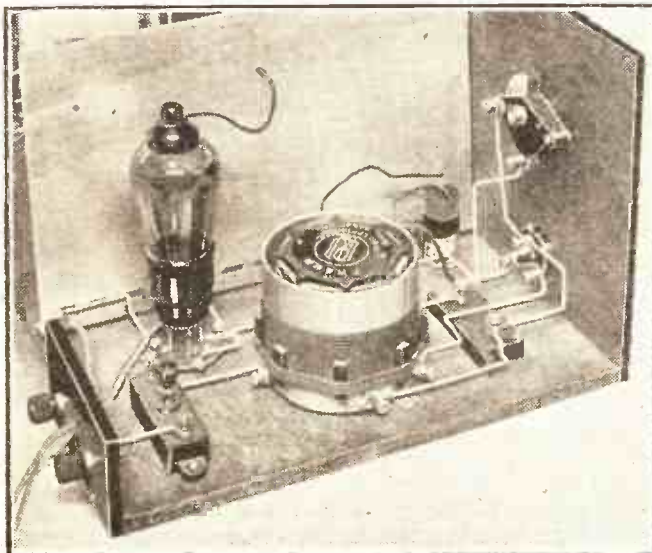
CUTTING THE CABINET



Here are the details for sizing-up the woodwork.

Accordingly we proceeded to try out the idea to see what the response would be. We felt pretty confident that we knew in advance, so we made plans for other receivers on the same lines, but we waited

WELCOMING THE FOREIGNERS



This is the S.G. H.F. valve, where every transmission gets a real boost before being detected.

first to see what our readers would think of the "Thirty-Shilling" Two.

Now we know, and we must confess that the response has surprised us. We expected a good many people to be pleased with the idea, but we were quite unprepared for the very large number who have actually expressed their approval, or for the extremely emphatic nature of their approbation.

Thus encouraged, we proceed to show how the same methods can be applied with like happy results to the much larger and more ambitious type of set. For this example we have chosen that useful long-range combination, the H.F. detector and two L.F. circuit with a screened-grid valve in the H.F. stage.

Efficiency and Selectivity.

As before, we must emphasise the fact that our methods of cost reduction do not impair the efficiency of the resulting receiver. Quite definitely, no "cheese-paring" whatever has been permitted, and the design is for a high-efficiency set of excellent performance, with selectivity and range right up to the modern standard.

The cost has been kept down purely by special methods of design and construction, choice of component parts of somewhere about the lowest price consistent with good quality, and great care in arranging the circuit with the minimum number of parts.

This latter feature is based on a good bit of actual experimental work devoted to ascertaining how a circuit may be simplified with advantage when due precautions are taken in the design in other directions.

The results we have obtained on these lines would be a bit of a shock to those who believe that complete screening and elaborate de-coupling and so on is essential to success in any large receiver! These precautions, to be sure, are necessary when special effects are to be obtained, but it is extraordinary how safely they can be omitted if the general design of the set be arranged accordingly.

How the Cost is Kept Down.

This is just one of the ways in which we have been able to bring down the cost of the "Four Pound" Four. Thought and perseverance have played their part all the way through in the devising of schemes whereby the desired effects could be obtained by simpler and more economical means than usual, always remembering that efficiency must not be sacrificed.

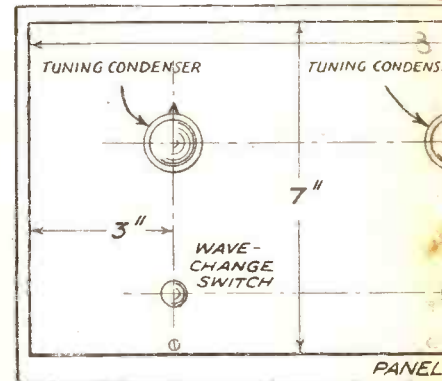
Even in quite small matters due thought has been given to ways of eliminating customary causes of expense. For example, observe the absence of the usual strip of terminals. There are only four terminals in all, two for the loud-speaker, and one each for aerial and earth.

All the rest are replaced by flex leads running from appropriate points in the wiring to the various batteries. Observe, for example, the two leads supplying H.T. to the plate and screening electrode of the S.G. valve. One of these comes off the H.F. choke and the other straight from the S.G. valve holder, and both pass through a hole drilled in the ebonite strip carrying the A and E terminals, so emerging at the back of the cabinet.

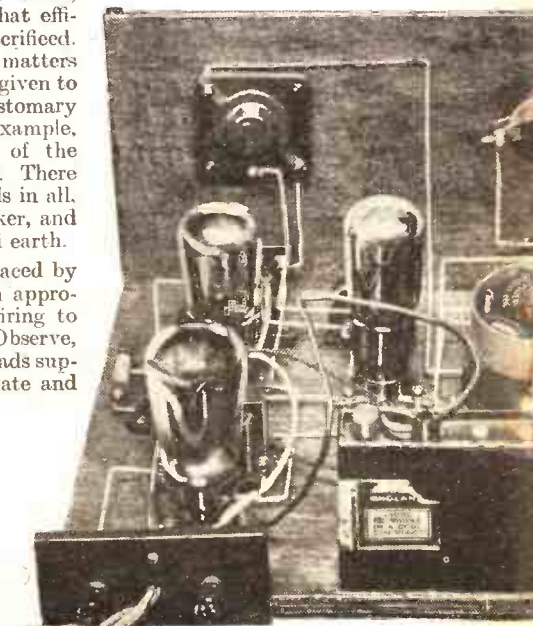


Here is a top-notch set at rock-bottom price and foreign.

By THE "P.W." RESEARCH AND



HOW THE PANEL COMES

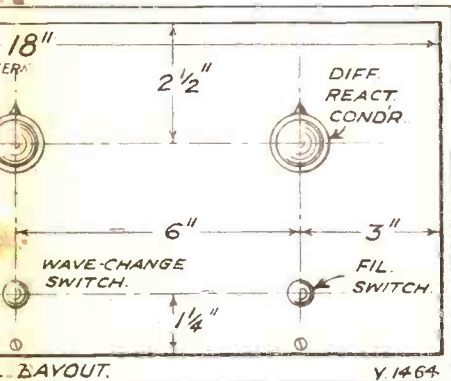


The panel drilling dimensions are shown in the top sketch, while

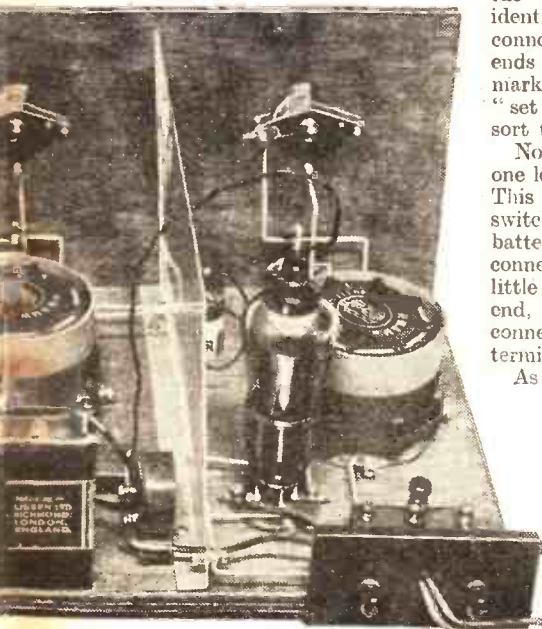


...ce, for quality loud-speaker results from home
...gn stations.

...ND/CONSTRUCTION DEPARTMENT.



...RONS ARE PLACED



...the photograph illustrates the parts as seen from the back of the set.

A practical tip about these two leads: don't be tempted to twist them together for the whole of their length. Just for a few inches will not matter, but more than that is apt to lead to oscillation of the S.G. valve. Just let them run separately to the appropriate sockets in the H.T. battery and all will be well.

Direct Connections for Batteries.

The other battery flex leads are taken in similar fashion through a hole in the second ebonite strip, i.e. the one on which the loud-speaker terminals are mounted. All these leads except one are connected to the circuit by being secured under the terminals of various components, etc.

This exception is the H.T.+2 lead, which supplies the detector valve. The end which terminates in the set has to be connected to one end of the 50,000-ohms spaghetti anode resistance, and here we were in a quandary for a few moments, remembering that no soldered joints are ever to be necessary in "P.W." sets.

However, we got round the difficulty in a very simple manner, as the wiring diagram shows. In the "L.S." terminal strip we drilled a small hole immediately above that through which the battery flexes pass. In this we inserted a small brass screw and nut, and clamped the end of the H.T.+3 lead there-under, along with the end of the spaghetti resistance.

Cabinet Details.

Another practical tip about the battery flexes: you cannot trace them through the twisted portion of the "cable" on the diagram, so to help you to identify them they have been marked where they are connected to the wiring. In other words, the "battery" ends are marked, and the same markings have been put on the "set" ends so that you can sort them out quite easily.

Notice, too, that there is only one lead for H.T. — and L.T. —. This flex comes off the L.T. switch, and when it gets to the battery end a battery plug to connect up H.T. — is put on a little way along. The actual end, of course, carries a spade connector to go on the negative terminal of the L.T. battery.

As in the first example of this type of set, a home-made cabinet is part of the scheme. but since it is a standard size, a bought one can be used if desired.

It is not nearly such a difficult thing to make as you might imagine, however, and if you are at all handy at wood-work we would certainly

advise you to have a try at it. You will quite likely find that if you take the dimensions with you the supplier will cut the various pieces of wood to size for you, and it is then a very simple matter to screw them together, fit hinges to the lid piece, and so on.

A suitable material for the cabinet is 3/4 in. mahogany, the baseboard for the set being the usual 3/4 or 1/2 in. ply-wood. (A separate baseboard is used for this set, unlike the "Thirty-Shilling" Two, which was built

WHAT THE FOUR POUNDS ARE FOR

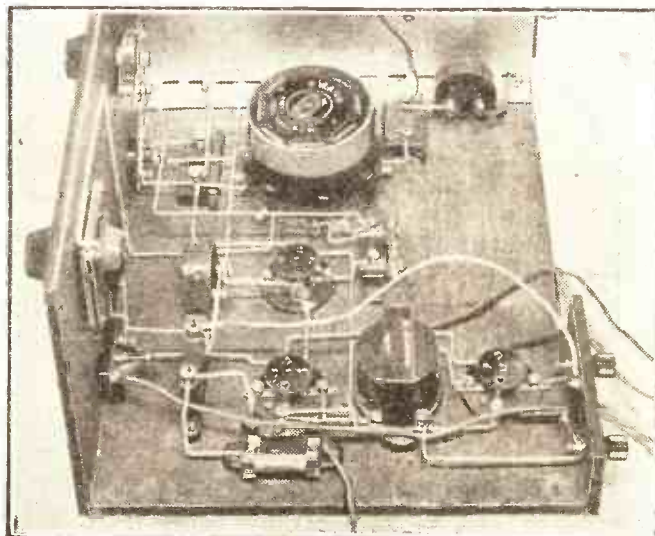
- 1 Cabinet and baseboard 10 in. deep. (See text.)
 - 1 Panel, 18x7 in. (See text and diagrams.)
 - 2 .0005-mfd. solid dielectric condensers (Ready Radio "Brookmans" type, or Burton, etc.).
 - 1 .0001-mfd. (or larger, up to .0002 mfd.) differential reaction condenser (Igranic, or Ready Radio, Lotus, J.B., Dubilier, Wearite, Lissen, Magnum, Burton, Parex, Polar, Ormond, etc.).
 - 2 3-point on-off type wave-change switches (Bulgin, or W.B., Ready Radio, Wearite, Red Diamond, Magnum, etc.).
 - 1 L.T. switch (Ready Radio, or W.B., Igranic, Lotus, Ormond, Benjamin, Keystone, Bulgin, Goltone, Junit, Wearite, etc.).
 - 2 "P.W." Dual-Range Coils. (R.I., or Wearite, Ready Radio, Magnum, Goltone, Keystone, Tunewell, Parex, etc.)
 - 1 .001-mfd. compression-type condenser (Formo, or Lissen, R.I., Lewcos, Polar, etc.).
 - 4 Valve holders (Clix, or Telsen, Igranic, Lotus, Benjamin, W.B., Lissen, Formo, Bulgin, Junit, etc.).
 - 2 H.F. chokes (Telsen or other good makes).
 - 1 .001-mfd. fixed condenser (Telsen, or Lissen, Ediswan, Dubilier, T.C.C., Igranic, Ferranti, Ready Radio, Mullard, Watmel, etc.).
 - 1 .01-mfd. fixed condenser (T.C.C., etc.).
 - 2 .002-mfd. fixed condensers (Lissen, etc.).
 - 1 .0003-mfd. fixed condenser (Ready Radio, etc.).
 - 1 2-meg. grid leak (Dubilier, or Igranic, Lissen, Telsen, Ferranti, Mullard, Ediswan, etc.).
 - 1 1-meg. grid leak and holder (Lissen, etc.).
 - 1 L.F. transformer (Igranic, or Telsen, Ferranti, Varley, Lissen, R.I., Lotus, Mullard, Lewcos, etc.).
 - 1 50,000-ohm spaghetti resistance (Magnum, or Ready Radio, Bulgin, etc.).
 - 4 Terminals (Belling & Lea, or Eelex, Igranic, Clix, etc.).
 - 2 Terminal strips 4 in. x 2 in.
- Screws, wire, flex, 10x6 in. screen, etc.

direct on the bottom of the cabinet.)

For the "panel" we used a piece of 3/4 in. ply-wood. If this is reasonably well dried out after being stained and polished it will

(Continued on next page.)

AT THE OUTPUT END



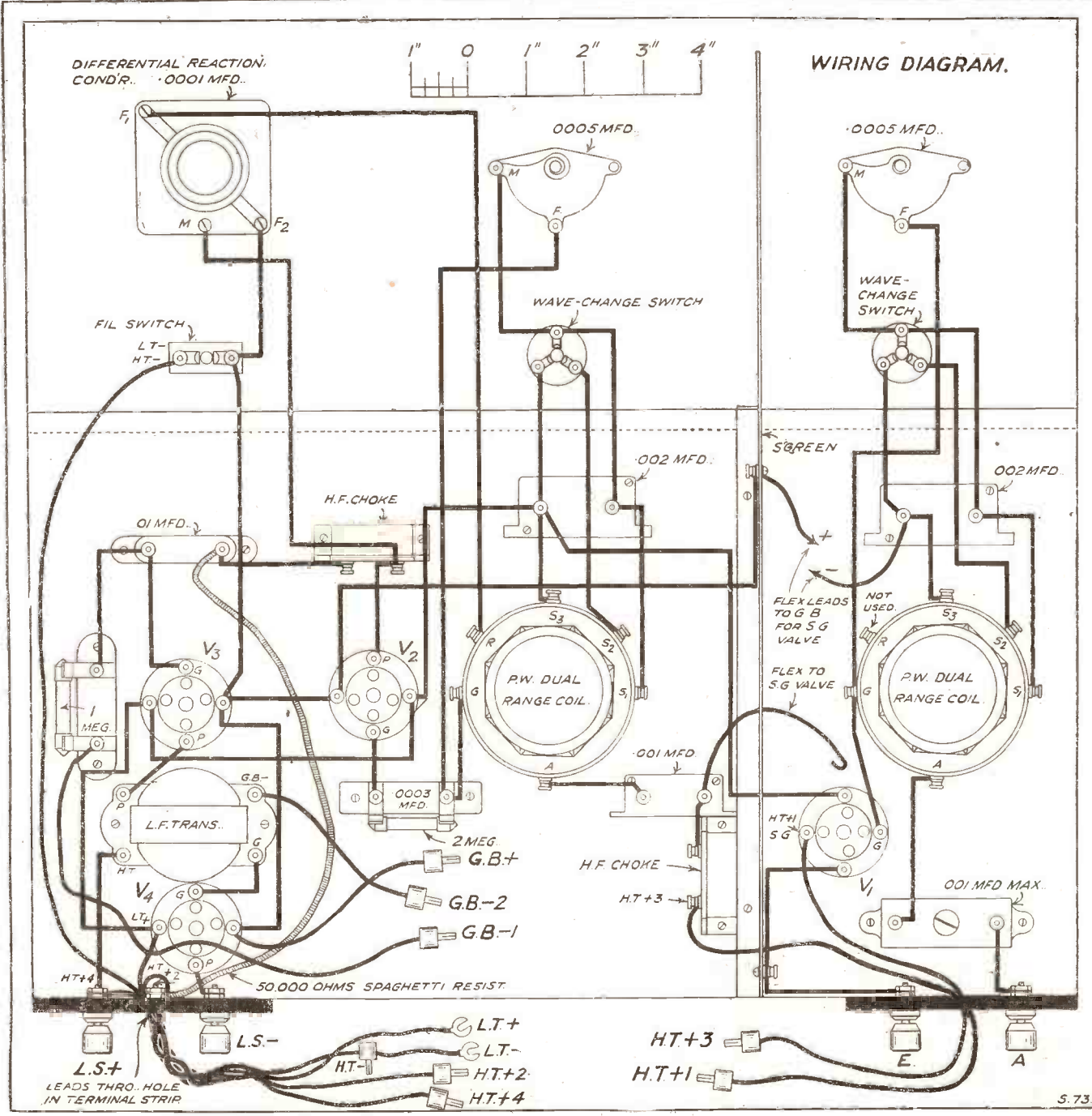
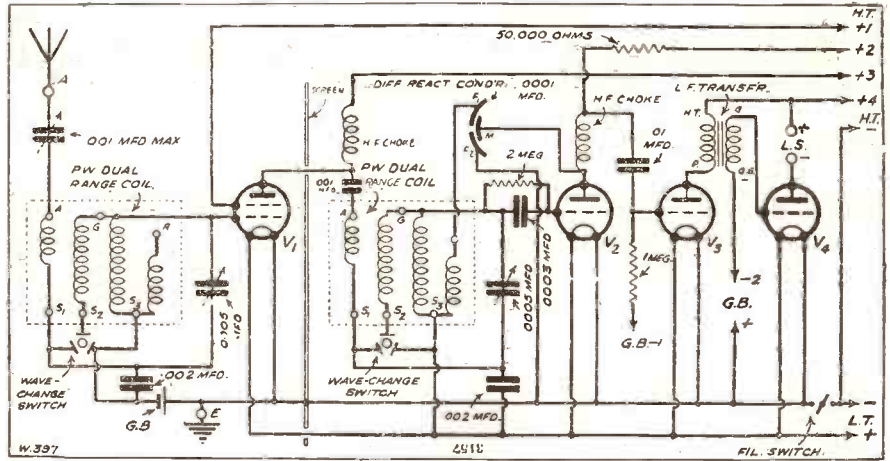
Taken from the low frequency end this view shows the detector and following stages.

THE £4 FOUR

(Continued from previous page.)

serve perfectly. Don't forget, by the way, to fit some "fillets" round inside the cabinet for the panel to fit back upon. It is finally held, and the whole set thereby secured in place, by some small screws going through it into the fillets.

Another factor in the low cost of the receiver is the use of the very inexpensive "solid dielectric" variable condensers for tuning. We have found these quite effective in practice, whatever the theoretical objections which may be raised. You will find operating details for this set in our "Radiotorial" columns next week.



A top-notch set at a rock-bottom price

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4 POUND 4

1931 OSRAM "MUSIC MAGNET" FOUR.

2 S.G. Valves, Det. and 1 L.F. One-knob control. Complete Kit of Parts with valves, oak cabinet and instructions. £11/15/0, or 12 monthly payments of 21/6.

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2 S.G. Valves, Power Grid, Detector and Pentode. Complete Kit of Parts with valves and cabinet. £13/12/6, or 12 monthly payments of 25/-.

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Screen Grid, Detector, Pentode. Complete Kit of Parts with valves and cabinet. £8/0/0, or 12 monthly payments of 14/8.

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1 Panel drilled to specification, 14 in. × 7 in. by 1/8 in.	4	6	
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1 ReadRad '00015-mfd. Diff. Reaction condenser	5	0	
2 ReadRad 3-point wave-change switches	3	0	
1 ReadRad on-and-off switch	10		
2 ReadRad "P.W." Dual Range Coils	1	5	0
1 Sovereign '001-mfd. G. type Compression condenser	1	6	
4 Telsen 4-pin sprung valve holders	4	0	
2 Telsen H.F. chokes	5	0	
1 Telsen '001-mfd. fixed condenser	1	0	
2 Telsen '002-mfd. fixed condensers	2	0	
1 T.C.C. '01-mfd. flat type fixed condenser	2	6	
1 ReadRad '0003-mfd. fixed condenser	10		
1 ReadRad 1-meg. grid leak and holder	1	4	
1 ReadRad 2-meg. grid leak	10		
1 Telsen "Ace" Transformer, 3-1 ratio	8	6	
1 Link Resistance, 50,000 ohms	1	9	
4 Belling Lee "R" terminals	1	0	
1 Terminal strip drilled to specification	1	6	
1 Special set Jiffilinx	1	6	
Wire, flex, wander plugs, spades, screws, etc.	1	5	
	<u>£4</u>	<u>0</u>	<u>0</u>

ADDITIONAL ACCESSORIES IF REQUIRED:

	£	s.	d.
1 Polished Oak Cabinet with 10 in. baseboard	1	3	6
4 Valves to specification (H.F., DET., L.F. and Power)	1	17	0

KIT A - £4 : 0 : 0

or 12 monthly payments of 6/6.
(Components as specified above.)

KIT B - £5 : 17 : 0

or 12 monthly payments of 10/8.
(Components as specified with 4 valves, as above.)

KIT C - £7 : 0 : 6

or 12 monthly payments of 12/10.
(Components as specified, with 4 valves and polished oak cabinet and baseboard as above.)

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Self locating.
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All vanes are interleaved with Bakelite, making shorting between fixed and moving vanes an impossibility. Supplied in capacities '0003 and '0005.

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Assembled ready to polish: Oak, 90/-; Mah., 95/-.
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All Models carriage paid.

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Cash Price .. £3 16 0

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CAPT. ECKERSLEY'S — QUERY CORNER

Some questions and answers of general radio interest that will aid you in your radio reception.



THE L.S. AND ANODE CURRENT—
LONG- AND SHORT-WAVE WORKING
—REMOVING ONE PUSH - PULL
VALVE—THAT EARTH WIRE.

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

The L.S. and Anode Current.

S. J. A. (Rochester).—"I have two loud speakers, both of the ordinary cone type. When, however, one of them is connected to the receiver, I find that the total anode current taken by the set (as measured by a milliammeter in the negative H.T. lead) falls by about six milliamps.

"The receiver is of commercial design and I do not know anything about the internal circuit arrangement. Should there be this difference in anode current consumption with the two loud speakers, or does the circumstances indicate inefficiency in one of them?"

It would seem to me that you have one loud speaker with a high resistance, another with a low resistance. You do not say what is the total feed to your set; is it 60 milliamps, or 10, or what?

The reduction of 6 ma. in 60 is nothing, 6 in 7 might mean a lot. My best advice to you is to let well alone if both speakers give you good results, as I assume they do.

Long- and Short-Wave Working.

J. R. E. (Clapham).—"I am at a loss to understand why a short-wave set should be any more trouble to operate than an ordinary broadcast receiver. The difference between the long waves, i.e. 1,000 metres, and the medium waves, i.e. 300 metres, is 700 metres, and yet I cannot notice any difference in the operation of the set.

"I am told that if I attempt to receive on 30 metres, and in this case there is only a difference of 270 metres, I must expect trouble in operating the set. Why?"

You are confusing relative quantities with absolute quantities upon the one hand, and you are not appreciating that frequency difference is not directly proportional to wave-length difference.

On the question of absolute quantities you must appreciate that a circuit might present no difficulties when working on 300 metres or 1,000 metres, or 10,000 metres, or 20,000 metres: in all these cases it might be perfectly suitable because small capacities would be swamped by large ones.

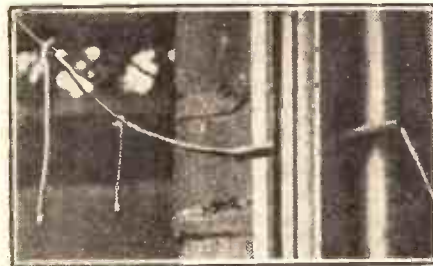
At 30 metres, however, you can appreciate that stray capacities might become more. You can drive a motor car at 10, 20, 30, 40 or 50 miles an hour and the behaviour of the car seems very much the same, but get up to 200 miles an hour, and there is an awful difference between 200, 300, 400 and 500!

Then, again, there is the question of relative quantities. You have taken the subtraction between the various wave-lengths, instead of their ratio one to another.

Thus the ratio of 1,000 metres to 300 metres is 3-1 but the ratio of 300 metres to 30 metres is 10-1, and as instabilities are proportional to some extent to the shortness of the wave, you will see that 300 metres might be three times as unstable as 1,000 metres, but 30 metres might be 10 times as unstable as 300 metres.

As a matter of fact, this is not quite true, but it gives you the principle. Incidentally and finally, I do not see why there should be the least trouble in operating a set on

A (D)RIPPING IDEA!



Those who have tried the idea of a 1-piece aerial and lead-in often complain that "when the stormy winds do blow" there is a tendency for wet to creep down to the set, and to impair the efficiency of the insulation. But here is a good way of getting over that trouble. One or two lengths of string or wire attached as shown will act as drains to run off the surplus water before it reaches the lead-in tube.

30 metres; it merely is a question of designing the set for that wave-length.

A detector and two note mags., which is, after all, a fairly standard set, is quite an easy proposition on this wave-length.

Removing One Push-Pull Valve.

F. G. (Plymouth).—"I have recently spent no little time and money in constructing a large gramophone amplifier with push-pull connected output stage. The set is intended for use with one of the recently introduced 'inductor dynamic' types of cone loud speakers and the two valves in the push-pull stage (which have been matched by the makers) are of stated 3,000 ohms impedance.

"The equipment gives tolerably good results, but I have been considerably puzzled to find that scarcely any noticeable difference in volume or quality ensues

when I remove either one of the push-pull valves from its holder. Is this in order, or does the circumstance indicate an error in setting up some part of the circuit?"

In answering your question, I have to take myself to task for the fact that I, too, have often found that removing one valve from a push-pull amplifier makes apparently no difference to the resulting volume or quality and that I have never asked myself why!

Certainly it occurs in a great many cases actually met with in practice. Obviously there is no reason why you should not get some volume when you remove one side of the push-pull stage.

What theoretical losses should there be? Obviously you are putting something like half the energy into the loud speaker, but the ear does not notice reductions in direct proportion in this way.

There is also the possibility, that if the high-tension supply is not very well regulated, the volts may rise and give one less than half the change. Of course, it is a very nasty thing to do, because all sorts of other unpleasant conditions are set up.

I should have thought that distortion would have been more manifest when one valve of the push-pull is removed, but apparently it is not, and I frankly tell you that I do not quite understand why.

That Earth Wire.

A. J. B. (New Eltham).—"Does it matter whether the earth lead is insulated or not? Some people say that you should use insulated wire, while others say that bare wire is quite O.K. Which is best?"

This depends if you are designing a really efficient aerial system or not.

Actually the earth wire should be taken down to the earth well away from any material object; or, with a less degree of finesse, it should be insulated. But it is useless taking all these precautions if the rest of the system is not studied in like proportion.

You may reduce your aerial resistance by 1 ohm perhaps, by taking great care that you add 30 ohms in a coil and so make no difference! Then you may have reaction which reduces the effective resistance twofold by moving one knob.

My advice is, leave it alone, insulated or uninsulated; it'll make little difference with a valve set or a crystal set with ordinary coils.

In transmission it's quite another story.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



A NEW L.F. CHOKE.

MESSRS. RADIO INSTRUMENTS are forging ahead in the application of nickel to radio. Their latest success is an L.F. choke having an inductance of 25 henries, which is able to carry 30 to 60 milliamperes.

Built into a beautifully moulded green coloured case, it is wonderfully compact. But of even greater interest to the average home constructor will be the price—12s. 6d.



The new R.I. L.F. and Smoothing Choke.

This new R.I. choke is bound to be widely used, for it is suitable for the output circuits of practically all reception outfits. Also it is just the choke to use in a mains unit if compactness as well as efficiency in smoothing is desired.

R.I.'s are labelling it an "Output and Smoothing Choke," for, as they point out, many constructors might not otherwise appreciate that it can be used equally well for either of the jobs.

NOVEL CONDENSER IDEA.

The scheme of fixing an additional terminal to a fixed condenser in order to facilitate resistance connections is not in itself a new idea. It has been applied for many years to fixed condensers of capacities likely to figure in grid leak and condenser arrangements.

But the Condenser and Electric Co., of Romford, manufacturers of the Filta bakelite condensers, are, I think, the first people to apply the principle to the higher capacity condensers, those such as are used in de-

coupling and other similar arrangements.

These special Filta's each have an additional terminal fixed to the side, and all three terminals have additional nuts, so that they can hold at least two wires independently of one another.

The three-terminal fixed condensers are available in .01 mfd., .5, 1.0 and 2.0 mfd., and they are particularly useful for combinations where those new types of spaghetti resistances are used, for they enable a shunt circuit or decoupling device to be wired up with the minimum of trouble and time, and, as the condensers are of vertical type, in the absolute minimum of space.

The fixed condensers as such are quite satisfactory. They are tested at 500 D.C. and they appear to be perfectly safe at a 250-volt working pressure.

FALLING PRICES.

Now is the time to buy radio apparatus, it is cheaper than it has ever been. Falling prices may, economically, be unhealthy from a national view point, but individuals cannot do better than seize their chances and buy, buy, buy!

For instance, look at those new Regentone Mains Units. Could better value for money be visualised?

A mere £2 12s. 6d. (little more than the price of a big H.T. battery) brings you a unit that, using D.C. mains, transforms your set into an all-electric outfit.

The new Regentone A.C. H.T. unit costs £3 7s. 6d., and the A.C. H.T. unit, plus charger, £4 15s. 0d. I've seen these units and find them as neat and well made as any other Regentone gear I've seen, which is saying a lot. Very shortly I will be able to include a full test report on this page, and I have no doubt but that it will be perfectly favourable.

TWO H.F. CHOKES.

B. & J. Wireless Co., of Stroud Green Road, London, N.4, recently sent us samples of two new H.F. chokes they are placing on the market.

There is a straightforward model at 6s., in which the winding is divided into 16 sections. It has a very low self-capacity, a high inductance, and tested out satisfactorily over a wide band of wave-lengths.

The other B. & J. H.F. choke retails at 4s., and is known as the "Bijou Binocular." It has two

windings, each sectionalised and each fitted with an iron core to step up the inductance.

It is a neatly constructed component and it enables a wave-band to be covered that is adequate for normal purposes.

A USEFUL BOOK.

The 1931 edition of the Wireless & Gramophone Trader Year Book and Diary should prove of invaluable assistance to manufacturers and retailers of wireless

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.

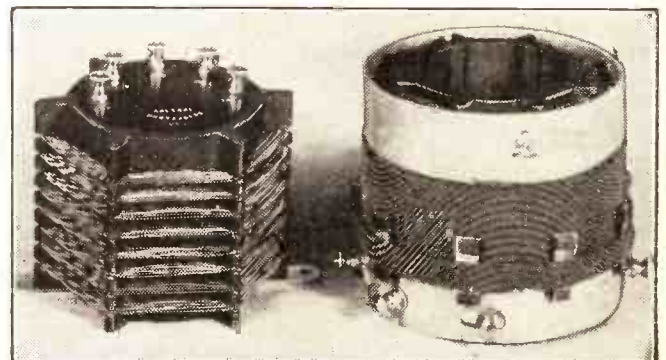
We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

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.

and gramophone goods every day throughout the year. The price is 5s. 6d. post free from the Trader Publishing Co., Ltd., St. Bride House, Salisbury Square, E.C.4. In this 1931 edition a new 16-page feature, entitled "Practical Service Methods," makes its appearance.

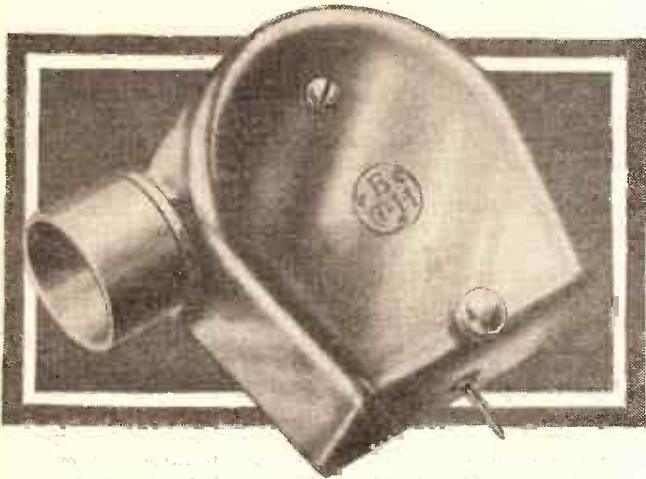
"CONTRADYNE" AND DUAL-RANGE COILS

The demand for these "P.W." coils runs into many tens of thousands per month—that is a fact I have established from my own personal inquiries. And it is only to be expected that the efforts of reputable manufacturers to meet such a demand should be supplemented by firms that are, to put it kindly, not so well equipped with machines and labour. I would, therefore, urge constructors to choose their makes with care. If such a scheme were practicable we'd like to test every one sold; we can't do that, so we have to leave you to use your own discrimination. In the meantime I've had samples sent me by Messrs. Ward & Goldstone, and these are absolutely to specification and are robustly constructed and well made generally.



The "Goltone" versions of our "P.W." "Contradyne" and Dual Range Coils.

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The B.T.H. Pick-Up is always used where perfect reproduction is vital. Experts are unanimous in their choice of Pick-Up. They have proved that the carefully balanced design of the B.T.H. Pick-Up ensures the finest reproduction with minimum record wear.

Your records cannot give of their best until they are reproduced with the aid of a B.T.H. Pick-Up. Fitting necessitates no alterations to your machine because the four adaptors supplied with the B.T.H. Pick-Up fit any standard tone arm.

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The B.T.H. R.K. Senior Reproducer was recently voted the best in competition with eight other makes of moving coil speakers—another instance of R.K. leadership. For over four years B.T.H. R.K. Reproducers have set the standard of first-class reproduction by which other speakers are judged. No other reproducers have such absolute fidelity, such infinitely variable volume without sacrifice of tonal quality. **Make your choice from the R.K. range.**

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LATEST BROADCASTING NEWS.

NEWCASTLE'S
WAVE-LENGTH— ABOUT BRASS BANDS —
NORTHERN FEATURES —
GEORGE A. BIRMINGHAM ON
THE AIR, Etc., Etc.

THE question of the future wave-length of Newcastle is causing a good deal of anxiety both at Newcastle and at Savoy Hill. At present Newcastle is working on 288.5, the National common channel.

There is, however, in Newcastle the impression that the B.B.C. has already committed itself to giving Newcastle an exclusive wave when the North Regional transmitters have started. The only exclusive wave that would be available then is the 200 metres now being used by Leeds.

If this were given to Newcastle it would be necessary to make considerable changes to all the receiving apparatus in the neighbourhood. Then again the service would be very limited. Another possibility would be the duplication of the North Regional wave, 479 metres, but this, of course, would mean the North Regional programme all the time, with alternatives on Daventry 5 X X for those with good sets.

There is further the possibility of going on as at present. This means the National programme all the time with no alternative until Slaithwaite gets going, and then only for those with good sets. It is altogether one of the trickiest problems which the B.B.C. has had to solve.

"The Factory."

The B.B.C. Symphony Concert on Wednesday, February 25th, will include an overture entitled "The Factory," which represents the activity of a steel factory in full blast. The work is by Alexandre Mossolov, a young Russian composer, and will be unlike anything in sound effects which the B.B.C. has ever attempted to broadcast.

About Brass Bands.

There is no truth in the statement that the B.B.C. intends to form its own brass band. There are far too many of these excellent combinations all over the country (and especially in the North), who are willing to appear before the microphone, for such a step ever to be contemplated, and the programme builders are making good use of such opportunities as occur to utilise their services.

On Monday, February 2nd, a programme by the Glazebury Prize Band will be relayed from Manchester to London Regional listeners, and on Friday of the same week the Wallsend United Collieries Band is also taking part in a London programme. Their concert will be relayed from Newcastle, where also, on Tuesday, February 10th, the Durham Shakespeare Temperance Silver Prize Band will play in the local studio, again for London as well as Northern listeners.

Northern Features.

Thursday, February 12th, will be Hallé night for listeners to the National trans-

mitter, when Brahms' "Requiem" fills the whole of the programme to be relayed.

During the same week Northern listeners will also hear a relay from the Liverpool Philharmonic Society's concert, when one of the principal items on the programme will be a tone poem written by Arnold Bax.

George A. Birmingham on the Air.

The Marquis of Bath and the Rev. Canon J. A. Hannay (George A. Birmingham) are among the speakers who will be heard by West Regional listeners on Monday, February 9th, when part of the proceedings at the Annual Dinner of the Society of Somerset Folk is to be relayed from the Berkeley Café, Bristol.

The Marquis, as Lord Lieutenant of the county, will propose the toast of "Somerset, Our County," to which Canon Hannay will respond. The relay will last from 9.40

to 11 p.m., and besides speeches, listeners will hear items by Olive Franks (soprano), E. A. Davies (baritone), Dan'l Grainger (Somerset dialect recitals), W. Irving Gas and Irene Gas (songs at the pianoforte).

"Shepherd's Hey."

"Shepherd's Hey," which is among the items in the City of Birmingham Orchestra's programme to be heard by Midland Regional listeners on Monday, February 9th, is based on one of the folk tunes which Percy Grainger learnt from Samuel Bennett, the old country Morris dancer and fiddler of Warwick.

Mr. Bennett, who is over sixty years of age, can play more than three hundred folk tunes on his fiddle, and "Shepherd's Hey" was in a batch which he performed specially for Mr. Grainger. Most listeners will agree that the setting to be heard on February 9th is really delightful.

Negro Spirituals in Scotland.

The programme for Scottish listeners on Thursday evening, February 12th, will be a little less cultural than usual through the inclusion of some Negro spirituals and old plantation songs sung by Mr. Martyn C. Webster, a member of the Radio-optimists, Mr. Neil Forsyth (baritone), and the Scottish Wireless Singers. Listeners will look forward to hearing these "catchy" tunes, some of which were the delight of music-hall audiences fifty years ago.

NEXT WEEK

THE "P.W."

SAFE-POWER CHARGER

ALSO
A SHORT-WAVE COX-DENSER.

COMING
NEARER
AND NEARER—
THAT COMET



FOR THE LISTENER

By "PHILEMON."

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is served up.

How Not to Do It.

I HAVE one bad grouse this week, and I'd better get it over. I have often asked through this column that the B.B.C. should choose its speakers, not merely because of their prominence as professors and experts, but also because they can talk interestingly and humanly on their subjects.

Sir Dennison Ross is an expert on Persia. Of his competence there is no doubt; he is an authority. But his talk on Persian History was lifeless and colourless both in matter and manner, and dull beyond belief.

Who wants a string of dead names and dusty dates? If anybody does, he can get the information from the Encyclopedia in the nearest library.

Competence, is, I agree, a *sine qua non* in a broadcaster; but competence is not enough; personally, I do not think it is the chief thing; the chief thing is living, human interest.

The wireless may be for instruction as well as entertainment; I do not object; but if the B.B.C. proposes to instruct us in history, it ought to know that history is not taught nowadays even in the elementary schools in the way in which Sir Dennison handed it out to us.

History is a living thing; even the history of Persia is a living thing; if you don't believe it, read Herodotus; but that talk was dead as the Seleucids themselves. So that's that. I feel a little better, thank you!

"The Path of Glory."

This play, written by Dr. L. du Garde Peach, pleased me very much. I do not think that it is the best type of radio play, but it was an amusing entertainment.

The author has a dry, satirical humour which he turned with excellent effect upon war-makers and peace-makers alike. The

(Continued on page 968.)

SHORT-WAVE NOTES

By W. L. S.

Where to listen for foreign amateurs is one subject dealt with this week, and another interesting item is an account of how six continents were received in three minutes.

I HAVE a number of letters this week to acknowledge, but will choose only those of general interest to mention on this page. First comes a Norwegian reader of "P.W." from Trondhjem, who regularly receives LSX, Buenos Aires, on "My Screened-Grid Short-Waver."

On January 10th, he reports keeping him at good loud-speaker strength until 3 a.m. The exact wave of LSX is, to the best of my knowledge, 28.98 metres. Many thanks, O. B. K.!

"L. W. J.," of Hertford, asks what wave-lengths French and English amateurs use. As other readers have asked similar questions at various times, I take the opportunity of making the position clear.

Amateurs of Europe.

In these enlightened days no country has a special wave-length for its amateurs. The amateur transmitters of all the world work together on the following bands of wave-lengths: 5.00 to 5.35 metres; 10.00 to 10.7 metres; 20.8 to 21.4 metres; 41.2 to 42.8 metres; 75 to 85 metres; and 150 to 175 metres.

British amateurs have a small amount "clipped off" each end of the bands, to ensure that a slight inaccuracy in a wave-meter will not result in a signal right outside the band.

British and French amateurs (as well as the other nearer Europeans) are to be found in the greatest numbers on the 41.2- to 42.8-metre band, and also, during week-ends, on the 75- to 85-metre band.

In reply to various queries regarding a circuit that will receive "My Weekly Five" at good strength, I am afraid I have not yet come across one, as I intentionally pick out two stations that I have never heard. This is in the hope that someone will claim to have heard them, and I shall then be able to ask him for a little advice about receivers.

Six Continents in Three Minutes!

It is sad to note that I have not yet had a single claim of reception of any of these "difficult" stations. My opinion of the general standard of short-wave receivers will fall rapidly unless some letters arrive very soon.

I have already promised, however, to give in full the circuit of my own receiver, on which at least three out of every group of five have been received.

"G. C. A.," of London, has surely broken all records this time. The feat to which I refer is that of receiving all six continents in three minutes! Commercial stations were received, naturally, but it is certainly most unusual to be able to hear all six continents in such quick succession.

It is more interesting because G. C. A. tells me that the stations were all within a band of a few hundred kilocycles. Here's another record to scramble for. Can anyone please claim reception of all the world in less than three minutes?

"R. W. S.," of Essex, claims membership of the "H.A.C." club. This august body has been so quiet lately that one might be pardoned for thinking it defunct.

It might be as well if I explained to new readers that "H.A.C." means "Heard All Continents" and refers to telephony transmissions only. About fifty of my readers have qualified for membership up to the present, but I am certain that with the advent of Buenos Aires there are several more prospective applicants.

To return to "R. W. S.," however, he refrains from giving me a list of stations

telephony in the near future. He also mentions a third one, LSG, on 15.2 metres.

Mr. Easter comments on the fact that the three "big noises" on the transatlantic liners have dropped their amateur call-signs and are now using the ships' own call letters. Thus, the Olympic is GLSQ, the Majestic GFWV, and the Homeric GDLJ. The station on the other side that works them is WOO on 23.36 metres.

The Weekly Five.

I am glad to note that G5SW is being received quite well in the States at this time of year, the best time being in the neighbourhood of midnight, G.M.T.

Now I shall have to leave the last half of Mr. Easter's letter for next week's notes, as we have to proceed with business! First, the "weekly five."

I suggest the following:

XDA, Mexico City, on 15.85;

EAJI, Barcelona, relaying Buenos Aires, on 19.0;

F.Z.R, Saigon, Indo-China, on 24.98;

SOME WISE MEN FROM THE EAST



These picturesquely-attired gentlemen are subjects of the King of Hedjaz, who has ordered fifteen wireless stations from Britain, one of them to be installed at Mecca.

received, as he is afraid it might fill the Short-Wave page completely. I am interested to note that he has received Buenos Aires on "about 13 metres." Presumably this is LSH on 14.5? He does telephony with Rugby.

"Trans-Radio, Buenos Aires."

My American correspondent, Mr. Fred Easter, from Cincinnati, has come to my assistance again with a lengthy letter full of interest. First, on the subject of Buenos Aires, he says definitely that the announcement is "Trans-radio, Buenos Aires." This clears the air of one misapprehension.

He also informs me that the purpose of the transmissions from LSX is to determine the reliable range of the transmitter, as it is going to be used for commercial

SUS, Cairo, on 32.8; and WSBN, ss. "Leviathan," on 87.5.

Last week and previously I commented on the good conditions that have prevailed throughout this year, early though I may be. This is confirmed by a letter from "P.H.D.," of Skegness, who sends a wonderful log of stations heard during the evening of January 2nd.

This ends up with five American broadcast stations, all in the neighbourhood of 50 metres, and all between R7 and R9! He says it was the best reception he has ever struck, and he has been a short-wave fan for 1½ years. So now what about this "eleven-year cycle"?

The more I think it over, the more I like my pet theory that conditions are *always* good somewhere or other!



All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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. Lill, 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 would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

AN OLD FRIEND ON LONG WAVES.

T. L. (Berkshire).—"I expect I ought to be ashamed of myself, but I am still using the 'Chitos' circuit with a 100-coil in the aerial, a .0005 condenser between grid and filament, and a 60-turn grid coil.

"The 10,000-ohms variable resistance in the plate gives a wonderful control of reaction and

my long-distance results on the medium-band makes me anxious to go over to long waves.

"Is there an easy way of doing this with the 'Chitos,' as I seem to remember it was not supposed to be a good circuit for long-wave reception?"

The "Chitos" circuit, as such, did not work very well on the long waves, although it was—as you say—extremely good for the medium band in its day. There is, however, a very easy way of converting it to the long waves which you might try, requiring as it does only another coil holder and one coil.

Mount this coil holder where its coil will not couple with the others in the set, and wire one end of it to the aerial terminal of the receiver and the other to the earth. Plug in a 75 or a 100-turn coil when receiving on long waves, and you simply pull this out of its

holder to change the set over to the medium band again.

KNOCKING OUT BOTH THE TWINS.

N. T. A. (Nr. Manchester).—"Thinking that Moorside Edge would soon be starting up, I had made up the 'Twin-Wave' Brookmans Rejector, but unfortunately the chap who made it up for me lost my book!

"I have got the little rejector, and it looks good. I have got the coils in it, but unless you tell me how to work it I am a bit in the dark. Apparently we shall need it badly in this district, so any hints you can give will be much appreciated."

You had better mark the controls as follows so that you can get the operations clear. Looking at

(Continued on page 966.)

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.

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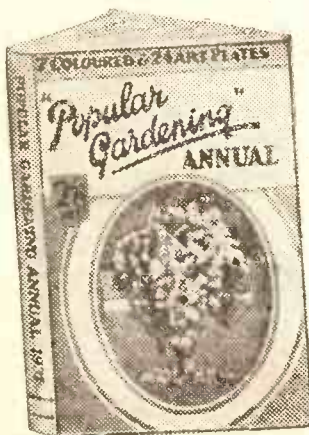
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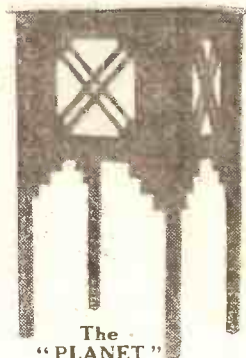
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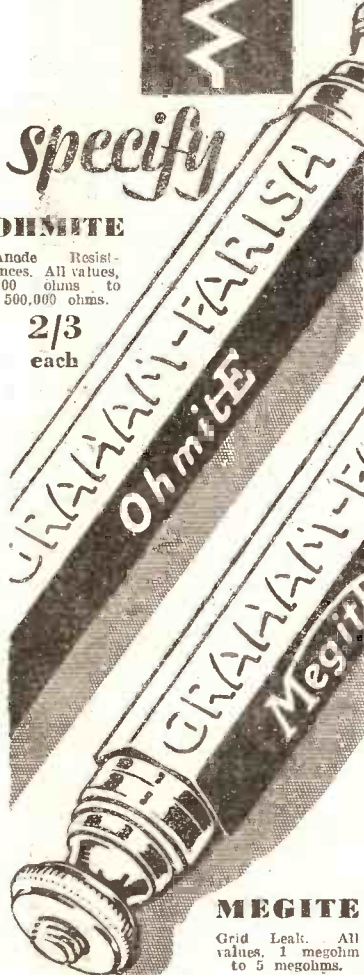


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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 964.)

the instrument from the front where the switches are, the left-hand terminal at the back will be called A1, and the coil beside it L1.

The other coil will be called L2, and the terminal beside it (right hand) A2. The front row of condensers and switches should be marked as follows, reading left to right: C2, S1, C1, S2, and C3.

Use a No. 50 coil in L1 and a 60X in L2. The coil L2 and condenser C3 make up one rejector, and this one should be used to eliminate the weaker transmission of the two which it is desired to cut out.

The remaining condensers and coil form the other rejector circuit, and are put in or out of action by S1. (S2 does the same for the first rejector circuit.) After the rejectors have been properly set they will almost completely eliminate the undesired transmissions, so if you want to hear Moorside you have to pull one or other of the switches to the shorting position so that it cuts the rejector out, and the desired programme then comes through at full strength.

By pushing the switch "off" the rejector is brought into circuit, and you will be able to search for foreigners even though their wave-lengths are close to the undesired transmission.

To connect up, remove the aerial from the usual terminal on your receiver to A1 on the unit. Connect A2 on the unit to the aerial terminal on your set, remembering that this lead should be kept as short as possible.

Now for preliminary adjustments, first of the circuit that cuts out (say) the lower wave transmission. Place S2 to its "outing" position (with knob pulled upwards) and push the S1 knob downwards. With the 50-turn coil in L1 set C1 to a minimum (moving vanes all out) and C2 to about a half-way position.

Now tune in the station on your set, and then turn to C1 and adjust it until you find the setting which causes the signal to go practically to nothing. You will find you can put C2 at various positions and then reset C1 to find the rejector point.

Usually the best combination is that at which C2 is very small and C1 large.

Now for the setting of the other rejector, which is the auto-coupled circuit to cut out (say) the longer wave-length. To tune in this station after pushing S1 downwards and pulling S2 upwards, with the 60-turn X-coil or similar coil in the L2 socket. Attach the flex lead to one of the sockets.

Later you can try each, resetting the circuit each time to see which is best. Detune your set so that the station is heard at rather reduced volume.

Next push S2 downwards and turn to C3, adjusting it until you find the rejection point where signals go down almost to nothing. Probably they will not disappear completely, because this type of rejector circuit is less effective than the other, but they should go down so much that they can only be heard when fully tuned in.

This completes the preliminary adjustments and all you have to do is to work the switches according to whether one or both transmissions should be cut out.

MORE STATIONS AND LESS INTERFERENCE.

G. L. T. (Barnsley).—"Up to now I have had good loud-speaker quality and almost enough strength, but I am afraid my old set will hardly stand up to Slaithwaite's two waves.

"As the aerial has got to be short and screened I can't make improvement there, and really I suppose I need a new set unless you can put me on to something I can add to my old one.

"What I should like, of course, would be to try an S.G. valve (present set is det., 2 L.F.), and if possible to use the 'P.W.' Dual Coil, with, as much of my old stuff as possible. Any hopes? Or does it mean a complete new outfit to get good separation?"

You can easily add an H.F. stage, using a screened-grid valve to a set of the type you have in action. See "P.W." No. 448 in which just the very thing you want was described under the title of "The New-Coil DX Unit."

Both selectivity and strength would be improved out of recognition by this, and it is neither expensive to build, nor to run. Moreover, you would not have to alter one wire inside your present set. Just the very thing, in fact.

A GOOD AMPLIFIER.

B. P. (Caterham).—"I have a 3½ to 1 L.F. transformer, as well as an output choke and condenser for L.S. circuit. What are the connections for a simple one-valve amplifier, using these and preferably volume control as well?"

"P.S.—Would a 10 in. by 8 in. panel be O.K.?"

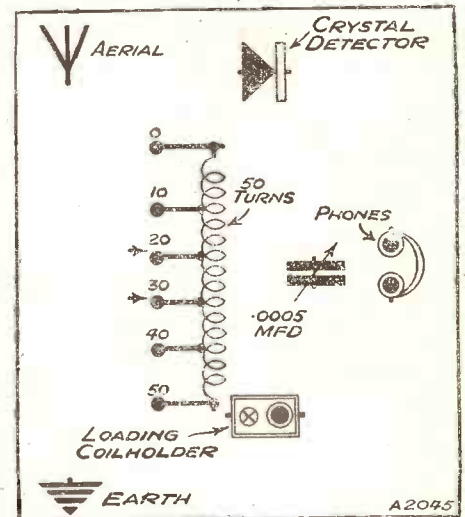
You can embody your transformer and choke as well as the panel in an amplifier of this kind, and we advise the use of a .5 meg. potentiometer as a volume control.

In addition you will need 9 terminals, an L.T. switch, and a valve holder, as well as baseboard, and such odds and ends as wire and screws.

The connections will be as follows: H.T.+ and "P" of L.F. transformer each to a terminal marked

POPULAR "WIRELETS" No. 29

A SIMPLE TAPPED COIL SET.



The "parts" shown above are those for a simple tapped crystal set, to work on long or ordinary waves, using a 50-turn coil wound on a standard 3 in. long former. A shorting plug is required to replace the long-wave coil when it is not in use.

"Input." "G" of the transformer to the grid terminal of the valve holder and to one end of the volume control.

The slider of this goes to a G.B. neg. flex lead, terminating in a black plug, and the remaining end of the volume control goes to "G.B." on the transformer.

You will need two L.T.+ and two L.T. neg. terminals, one of each for "Battery," and the others for "Set." The L.T.— (Battery) and L.T.— (Set) should be joined together, and to one loud-speaker terminal, as well as to one filament terminal on the valve holder. The G.B.+ (red) plug is also joined to these points by a flex lead.

The remaining L.S. terminal goes to the large fixed condenser (2 mfd. or so), and the other side of this large output condenser is connected to the "plate" terminal of the valve holder and to one side of the output choke. The other side of this choke goes to a terminal marked H.T. +.

Finally the L.T.+ (Set) terminal is joined to the remaining filament socket on the valve holder and to

(Continued on next page.)

"P.W." PANELS. No. 4.—THE EARTH.

The earth wire need not be insulated, but it should be as short as possible, running direct from the E. terminal on to the set to the earth itself. (See Capt. Eekersley's Query Corner.)

Usually the earth connection is best made to a water-pipe (rising main), or to a buried metal plate or rod.

When connection is made to a water-pipe an earthing-clip or other means of getting permanently good contact should be employed.

Aerial wire is suitable for the earth lead, but thin wire should be avoided.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

one side of the on-off switch; the other side of the switch being joined to the other L.T. (Battery) terminal. That completes the connections.

ERECTING AN AERIAL.

"STACK-AN TOE" (Cumberland).—"It will be my first attempt, so I should be glad of some hints about length of aerial, how to run it, etc."

The total length of the aerial from lead-in to the far end must not exceed 100 ft., and generally a very much shorter aerial is perfectly satisfactory. If you can raise it, say, 25 ft. or 30 ft. at the house end and run it to a mast which is about 40 ft. away, and 30 ft. or more high, you should get excellent and satisfactory reception.

Use a single and not double wire aerial, of stranded copper, or similar high conductive material, avoiding any breaks or joins, so that the aerial runs from the farthest insulator right down to the lead-in without a break, if possible.

Take care not to kink the aerial when putting it up, and use an adequate number of insulators of the type that will remain dry (even under severe weather conditions) over parts of their surfaces.

If you are going to use an aerial lead-in switch (and it is advisable to do so) make sure that the contacts of this are really firm and sound, and arrange that the whole switch is covered with some protective device, such as a box, to protect it from the effects of the weather. Be particularly careful not to take the lead-in through the window close to any metal, bearing in mind that the wire itself should not be within a foot of any wall, etc., except at the point where it enters the house, and here it should be well spaced away from conductive surfaces.

From a high-frequency point of view, which is that point of view with which the aerial is concerned, an aerial is not insulated properly unless it is spaced well away from adjacent conductors. If you lay an insulated aerial wire along a metal gutter-pipe, you have, in effect, a condenser, and some of your signal strength may easily leak away.

SHOULD H.T. BE SWITCHED-OFF?

"SOLOMON" (King's Lynn, Norfolk).—"The point that we have been worrying over is the simplest thing in wireless I should think. Switching off the H.T. and L.T."

"Two of us swear that H.T. can be completely disconnected from the filament and all danger of 'burn-out' avoided with an ordinary on-off switch. We have used it like that for years."

"But this blessed Yorkshireman sticks us out and says he saw in 'P.W.' it can't be done unless a 3-contact switch is used."

"Nothing we can say will shake him, so I am writing in desperation and will show him your reply. Please state it definitely in just a few words so that we can show him in black and white."

Alas, "Solomon," your non-de-plume is not a suitable one, for you are wrong! It does take a 3-contact switch to disconnect H.T. negative completely.

We presume that the battery leads are left connected to the set, and H.T. and L.T. terminals are joined together and to one side of the on-off switch. Your idea is that if that switch is "open" H.T. is disconnected completely from the filaments.

But is it? Remember that H.T. negative is still joined to the L.T. terminal, and this in turn has a lead going to the L.T. battery.

Now that battery is a low-resistance conductor, and a lead from its + terminal goes to the L.T. terminal on the set, and to the filaments.

So you see the H.T. neg. of the battery remains joined to the filaments in spite of the on-off switch, because there is a low-resistance connection through the L.T. battery.

To overcome that, and to disconnect H.T. completely you need a 3-contact switch of the type used for wave-changing. In this the three contacts are all separated in one position, or all joined when the switch is in the other position.

Now if one contact goes to L.T. terminal, one to L.T. filaments, and one to H.T. neg. the H.T. neg. of the battery is really disconnected from filaments to battery when the switch is off. There is then no danger of a "burn-out" through a short from H.T. to filaments.

When the switch is "on" all the points are joined together ready for working.

You cannot get these conditions with a 2-point on-off switch. However you wangle such a switch, H.T. remains joined to filaments through the L.T. battery. So the Yorkshireman was right!

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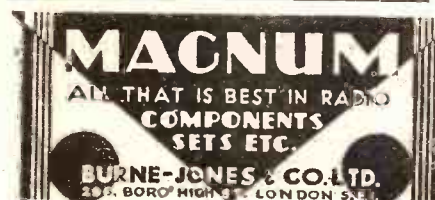
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See page 972

REMEMBER!

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FOR THE LISTENER

(Continued from page 962.)

team-work of the players was excellent; the crowd-work was even better; and Howard Rose, who produced the play, must be congratulated on his manipulation of the control panel. Keep your eye on L. du G.

"Brother Juniper."

This little play also, though at the other extreme, both of subject and method of production, was, in my judgment, extraordinarily well done by the members of the University College (London) Dramatic Society. I have rarely heard on the wireless such fine clear speaking, such simple and effective utterance. It was a little gem, and left a very pleasant savour in the mouth.

Victorian Prophets

Although Victorian furniture is becoming a fashion among collectors, most things Victorian are heartily despised by the present generation; especially its literature.

I therefore invite the attention of my readers to Mr. Bailey's quarter of an hour on Sunday evenings—with Victorian Prophets. It will confound some of you, and encourage others; and in either case will do you good.

Say what you like about it, it was a great age; an age of clear voices, noble singers, and great men. It is easy to criticise it; but are we producing anything that can beat it?

Serenade.

I like Mr. Hely-Hutchinson; and particularly do I like his idea of putting us to bed with an hour of pleasant, unexacting, soothing music. I hope that his little programmes, which he calls "Serenades," will become a regular feature.

Better than most things, music can put us at peace with all the world, if it is the right music; and to judge from his first programme. Mr. Hely-Hutchinson knows the right music.

So once a fortnight he will put his gentle foot on the rocker of the cradle, and give us, at any rate, one good night! It is a matter for gratitude that, while so many men try to disturb us, one man at least should try to give us rest.

The Cup-Tie Broadcasts

These broadcasts maintain their great popularity; and a multitude of listeners will be glad to learn that the semi-finals and the final of the Cup Tie are to be put on the air. With Mr. Allison in charge, I trust.

Bee in the Bonnet.

Mr. James Agate has a bee in his bonnet. He is angry because the playgoing people in London do not support serious drama.

Now that we clearly know his views on this point, it would be well to give the little bee a rest. I have felt lately that we sometimes get more of the bee's buzzing and less information about plays than we have some right to expect.

This is a pity, for many of us wait for Mr. Agate's cue as to what plays we ought to see.

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TECHNICAL NOTES

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

A Curious Mains Effect.


IF you are using an all-electric receiver, have you ever noticed how the A.C. background varies from time to time, I mean altogether apart from any adjustments which may be made in the controls of the receiver? I have often had this remarked to me by readers, and I have, of course, noticed the same thing myself frequently.

It appears to depend upon the quality of the A.C. supply and in some districts, where there is at all times of the day a heavy load upon the supply, you may not notice any appreciable variation. In districts, however, where the load fluctuates considerably, you will sometimes find that whereas the set gives perfectly good results, with scarcely any trace of background, during the evening hours, it may give a very pronounced A.C. hum in the morning or afternoon.

Of course, you may say that inasmuch as there is a pronounced A.C. hum under any conditions it indicates that the smoothing arrangements are not sufficient.

No doubt this is so, if you wish to go to extremes, but providing the receiver operates quite satisfactorily during the periods in which it is most generally used it seems rather unnecessary to go in for expensive refinements.

THE VARIABLE RESISTANCE



is useful in a great variety of circuits, particularly as a voltage-regulator in mains units and mains receivers.

For "power" work of this kind it is usual to employ robust windings capable of carrying the necessary current without undue heating.

Poor contact of the moving arm, is a common cause of "crackling" and similar noises.

Not the Receiver.

I mention this effect because sometimes readers of these Notes are very puzzled and imagine that there must be some intermittent trouble in their receivers which makes them behave differently at different times. Bear in mind that the electric supply is by no means always above suspicion, and the quality of the A.C. current may vary considerably from time to time.

Even the frequency and voltage will vary, although most power supply companies pride themselves on keeping the frequency constant to within at any rate 1 per cent. On D.C. mains I have sometimes noticed very great fluctuations of voltage.

Important Precautions.

Talking about the electric supply, I am often asked whether there is any danger in using a mains unit—I mean danger from electric shock or fire—and whether the precautions now taken by manufacturers of these units are sufficient.

The answer to this question is, broadly, that there is the same general danger in using a mains unit as there is in using any other device which is connected to the

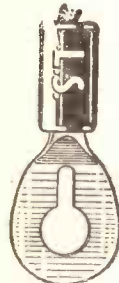
(Continued on next page.)

Wire and Forget with Clix

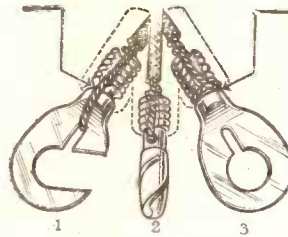
You have only to wire a "CLIX" fitment once because the Clix Patent Wiring Device makes perfect and lasting contact. Avoid inferior substitutes. Look at the illustrations below. See how the insulator, when screwed down, adds to firmness of contact.

Note how the wire is firmly clamped into the metal by the insulator.

Note the definite grooves or channels giving perfect metal to metal contact.



No. 5 Pat.
CLIX RING TERMINAL 2d.



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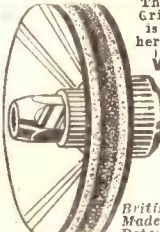
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No. 134

TECHNICAL NOTES

(Continued from previous page.)

electric supply, such as an electric iron or electric toaster. If the unit or component is not defective, and if there are proper fuses in the circuit, the danger from fire is negligible.

There is, of course, always the danger of electric shock to be considered, but with any good make of mains unit this danger is extremely small, because means are provided, either automatic or hand-operated, whereby the unit may be disconnected from the mains when you want to do any tinkering about inside it. In some cases the unit is enclosed in a box, the opening of the lid of which automatically disconnects both poles of the electric supply.

If the disconnection has to be hand-operated, however, you should always take great care to disconnect both poles before attempting to touch any of the interior parts of the unit. If you will observe this simple precaution you need have no fear whatever of getting an electric shock.

Unsafe Assumptions.

In the same connection I should perhaps mention that the so-called "neutral" pole of the mains is often a snare and delusion. In the case of D.C. supply sometimes the negative pole is earthed, sometimes the positive pole, and sometimes neither of these is earthed, when the so-called "three-wire" system is used.

The fact is that it is never safe to rely upon any of the poles or terminals of the supply being earthed, because the average amateur cannot be certain which terminal is earthed, and in any case, even if a terminal should be at earth potential at one time, it may have a very different potential at another time, owing to alterations at the supply end.

Always assume then for safety that every one of the electric supply terminals has a potential—positive or negative—in relation to earth, and that therefore a shock may be obtained as between any terminal and earth and also a short-circuit or a leak may take place in a similar way. If you always act on this assumption you are very unlikely indeed to run into any trouble from shock or short-circuit.

L.F. Instability.

A low-frequency howl in a receiver is a very common occurrence and may arise from quite a variety of different causes. An interesting case was mentioned in "P.W." some little time back, where a receiver was giving an ear-splitting whistle and, do what he would, the owner of the set could not discover the cause of the trouble.

He went over all the usual suspected causes—wiring, earth lead, batteries, and so on, but without success. The curious thing was that when the receiver was in some positions in the room it worked quite all right, but when it was in one particular place it gave all this trouble referred to.

Eventually it was found that some special covering of the table on which it was placed had an appreciable electrical conductivity, and this was acting as a capacity plate and producing instability by capacity coupling between stages of the receiver.

Loud Speaker Causes Trouble.

I expect many of you will have had an experience at some time or other similar to this. Generally it is some definite metallic

(Continued on next page.)

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Solid Alloy minimum. Fine Black Enamelled. Post Free.

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See page 972

VOXKIT JUNIOR (Reg. Design)

The Console Cabinet shown here takes panels up to 18" x 8", Baseboard up to 12". Speaker chamber 18" x 15" x 12". Height 3 ft., removable back, lift-up lid and silk-covered fret, best French polished figured oak. Packed and delivered free in England and Wales. Price 45/- (6 monthly payments of 7/11). Any speaker fitted for cost of speaker only.

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PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

TECHNICAL NOTES.

(Continued from previous page.)

object which, by its presence in the neighbourhood of the receiver, gives rise to the trouble.

I have known this kind of thing occur when a horn-type speaker, with a metal flare, has been placed near the receiver, and the effect was particularly bad when the loud-speaker was placed upon the top of the cabinet of the set.

One very peculiar case which came within my own experience was when a receiver was placed against a large mirror which was secured flat against the wall. Whenever this happened the instability was most pronounced; it was presumably due to the metallic covering on the mirror acting to produce a capacity coupling between different parts of the set.

All this only emphasises how important it is to bear in mind, when you have some mysterious trouble with the set, that the

TECHNICAL TWISTERS

No. 46.—SHORT WAVES. CAN YOU FILL IN THE MISSING LETTERS?

A short-wave station is able to serve listeners situated at a better than those in its own neighbourhood.

For this reason the B.B.C.'s short-wave station at is not picked up as well in this country as it is abroad.

Short waves are used for the Empire Beam wireless services to to and

Reflecting aerial systems are used by the Beam stations to concentrate the transmissions in one

Last week's missing words (in order) were Frequency, Frequency, Capacity, Inductance, Tuning, Condenser, Cycles, One second, Kilocycles, Divided.

source of the trouble may not necessarily be within the receiver, but may be due to some surrounding objects or conditions.

Local Crackle.

Following the recent reference in these Notes to different types of electric gramophone motor, I have been asked whether the "universal" type of electric motor, using a commutator, can really be relied upon not to produce interference when electrical reproduction is used.

You will remember that the induction type of electric motor is coming into increasing use for gramophone motors, owing to the fact that, as there is no commutator or equivalent, there can be no sparking. The induction motor is naturally limited to A.C., whereas the universal motor can be used, as its name implies, on A.C. or D.C. supplies.

Sometimes by very careful attention to the commutator and brushes of a universal motor you can get it to run without giving any crackling or interference in the electrical pick-up circuit, but the trouble is that

(Continued on next page.)



TRUE

NEEDLE TRACK

The Watmel Pick-up carrier, by its rigidity and accuracy of alignment ensures the electrical pick-up obtaining perfect amplification of the music only.

Reproduction is free from mush and needle scratch. By use of the tracking template supplied, the Watmel Pick-up Carrier can be set affixed with great accuracy and the wear on the records is largely reduced.

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THE WATMEL UNIVERSAL STANDARD ALUMINIUM SCREENING BOX

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Constructor: Should write his name and address in the margin, and post this advertisement in a ½d. unsealed envelope to:

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DX THE STANDARD PLUG-IN COIL
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PLEASE be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. THANKS!

TECHNICAL NOTES

(Continued from previous page.)

you never know when the commutator is going to develop slight sparking, particularly if it gets dust or oil upon it. Keeping the commutator clean, however, from dust, oil and so on, and the brushes well bedded down and adjusted, are what we may call "mechanical" methods of minimising the trouble.

Electrical Elimination.

The "electrical" method consists in a liberal use of inductances and condensers. These may be used in various ways, and, speaking generally, their purpose is very similar to that in a mains-unit.

For example, a choke may be introduced in series with each lead from the mains terminals to the terminals of the motor. At the same time, in parallel with this latter choke (that is, also across the motor terminals) a pair of condensers of fairly large capacity (say 2 mfd. or 4 mfd. each) may be connected in series with each other, the mid-point of the two condensers being then connected to earth.

Various slight modifications of this arrangement will suggest themselves, but you will see the broad idea. Of course, a great deal depends upon the severity of the trouble.

PREPARING MY "PARADES."

(Continued from page 951.)

best out of each player, within the limits of his own part. But successful, smooth-running team work, with the object of conveying one definite impression, is my first consideration.

Actually that vitality which I so much value must in the first instance come from myself. From me it passes to the players, thence to the listeners. It is a quite obvious drain upon one's nervous resources, leaving one tired physically and mentally.

The whole trouble with broadcasting is that the enormous amount of preparation and rehearsal necessary for a production which comes up to my own ideals seems out of proportion when one remembers the short time which it occupies in actual performance before the microphone.

Adequate Preparation is Necessary.

One or two performances is the rule, with revivals few and far between. In these circumstances the temptation to economise by skimping rehearsal and preparation becomes obvious and possibly hard to resist. Personally, I maintain that no show worth its salt can be produced without adequate preparation on the lines indicated above.

A show worth doing is worth doing well, and it must be done well, it must be vital, it must live, in order to conquer the unsympathetic conditions under which so many people are more or less forced to listen.

As far as my own Parades are concerned, I understand that letters from listeners stress the writers' feeling that they are actually in a theatre. This indicates that to a great extent I have realised my ideal.

I have never met in my experience of nearly a quarter of a century harder working and more delightful people than at Savoy Hill. Broadcasting, however, is as yet hardly out of its swaddling clothes. Much remains to be achieved.

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Transformers from 2/9; Wavemaster -0005, 2/6; Differential, 2/9; Midot -0005, 2/-; S.M. dials, 1/6; geared, 2/-; P.W. dual coils, 8/6; others from 5/-; Panels, 14 x 7, 2/6; 18 x 7, 3/-; S.W. coils, set 4, 5/-; Triotron valves, 4/6; Power, 5/6. All small parts in stock. Three-valve kits with cabinet, dual coil, 35/-; Two-valve, 24/-; Speaker kits from 12/6; Triotron units, 9/6; Millgate, 7/-; Bullphone, 6/6; and 9/- Guaranteed 5-v. portables, £6-10-0. Three-valve S.G. all-in-one sets, complete, £10. All goods new. Cash or C.O.D. Carriage extra. List free.

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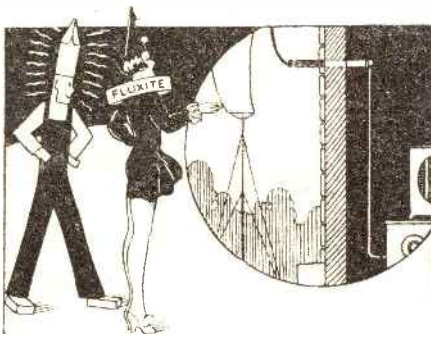
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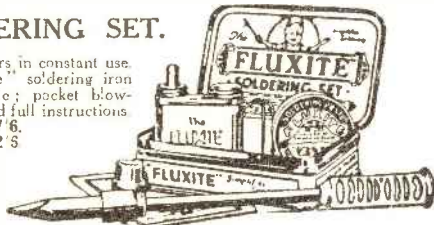
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COMPLETE 7/6
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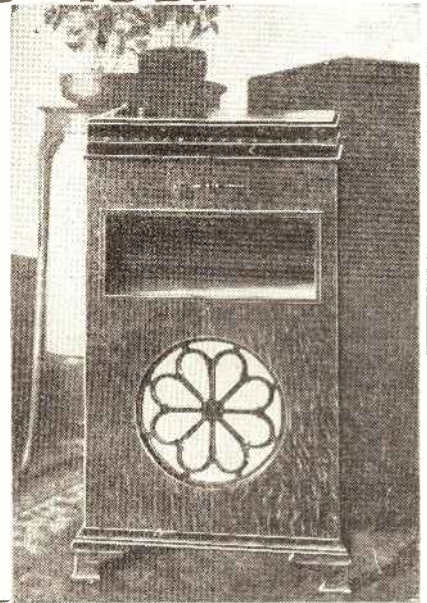
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