Popular Wireless

3d

SPECIAL CHRISTMAS NUMBER

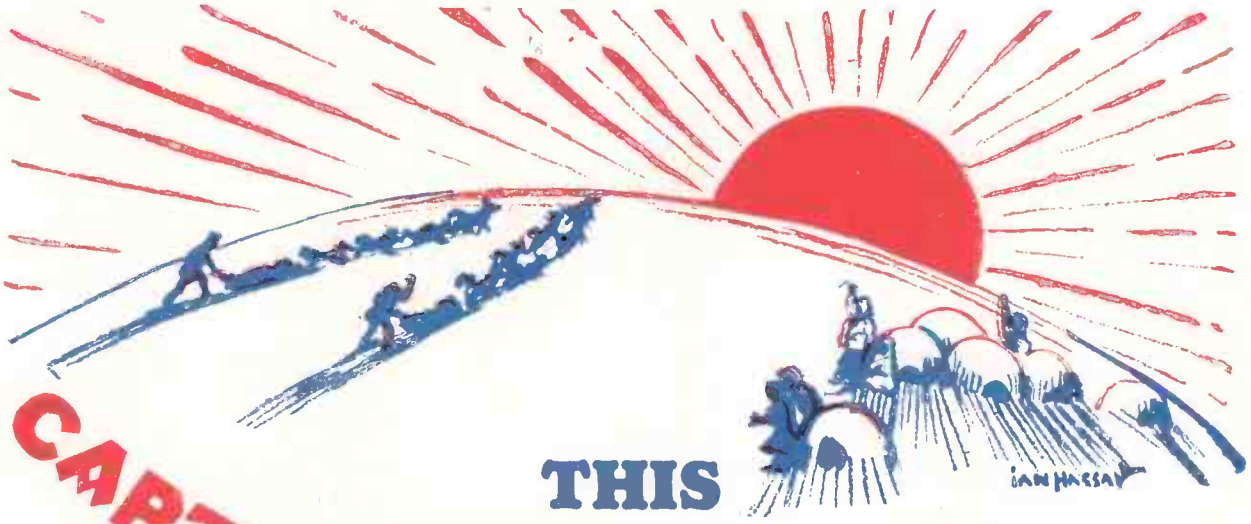
Dec. 6th, 1930.
No. 444. Vol. XVIII.

Registered at the G.P.O. as a newspaper.

An Unsurpassable BILL OF FARE for "P.W." Readers

YOUR SET AT CHRISTMAS - - - By G. V. Dowding
TELL THE WORLD THE TRUTH - By Capt. Eckersley
SOME RADIO CHRISTMASES - - - - - By "Ariel"
XMAS RADIO 'XPERIMENTS - - - - - etc., etc., etc.

Also: A SPECIAL ILLUSTRATED RADIO-GIFT SUPPLEMENT



THIS CHRISTMAS

CAPTURE THE SPIRIT OF DISTANT FRIENDS

We, on our little island are not insular-minded at any time, but at Xmas time especially, our spirit lives with distant friends, seeking to capture their surroundings and mode of life. This we can do through the medium of Radio which brings speech and music from the ends of the earth into our homes.

In order to clarify and increase volume of reception it is essential to use the finest Radio components—Lewcos components—which are famous for their extraordinary powers of selectivity. Every Lewcos component lives up to its manufacturer's world-wide reputation for "perfection in every detail."

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Actual Size.

THE LEWCOS H.F. CHOKE

PRICE - 7/9

The terminals are arranged one at the top and the other at the base of this Choke to eliminate the risk of additional self-capacity in the wiring of the receiver.

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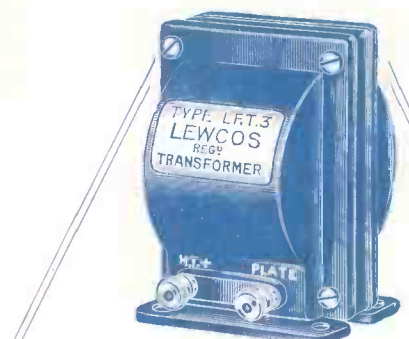

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THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED,
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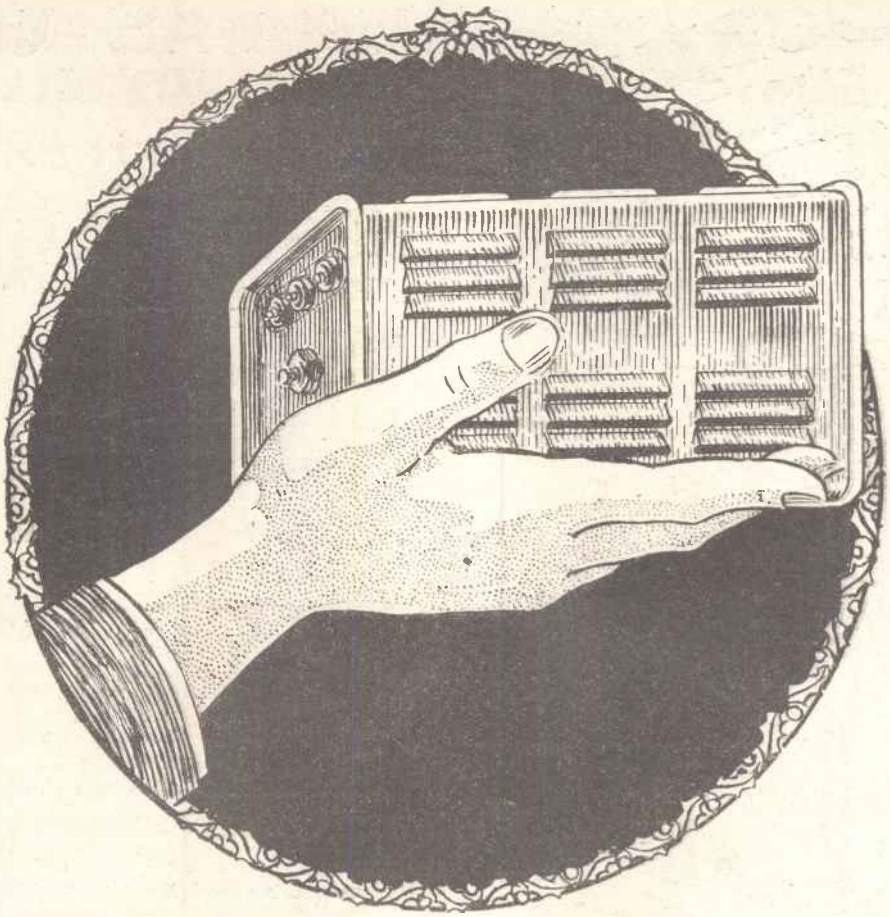
LARGE STOCKS OF LEWCOS RADIO PRODUCTS HELD AT ALL BRANCHES.



If he is going to build an A.C. mains receiver . . . or would like to run his set from the mains . . . give him a Westinghouse Metal Rectifier this Christmas

IT will give permanent pleasure in better reception; it will save him money by requiring no replacements or renewals; and it will add to his leisure by needing no attention.

Obtainable from all good radio dealers. Prices from **15/-**

Our forty-page booklet, "The All-Metal Way, 1931," will give you full information concerning the most suitable type of rectifier for any particular purpose. Send your request for a copy, together with 3d. in stamps, to:

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A better thought—

Buy an "Atlas" this Xmas!

This Year's Olympia winner, and the most comprehensive range in Mains Units

Chosen by experts as the finest Mains Units at Olympia, 'ATLAS' Units are the ideal Xmas presents for yourself and friends. They are the acme of perfection in service, reliability and economy, and are fully guaranteed for twelve months.

No matter what the set is, or whether A.C. or D.C. is in the home, the "ATLAS" Range provides a model to meet them.

ALL-MAINS UNIT MODEL A.C. 188. This is the model which was placed first in the "Wireless World" Olympia Competition. A combined H.T. Battery Eliminator and L.T. Accumulator Trickle Charger, it provides the ideal All-Mains facilities for any set—Standard or Portable—from one to five valves. Two variable Tappings 0/100 and 0/120 Volts, one fixed 150 volts. Output 150 Volts at 25 m/A. L.T. Trickle Charger caters for 2-, 4- and 6-Volt Accumulators. Cash price, £6, or 10/- down and balance in easy monthly payments.

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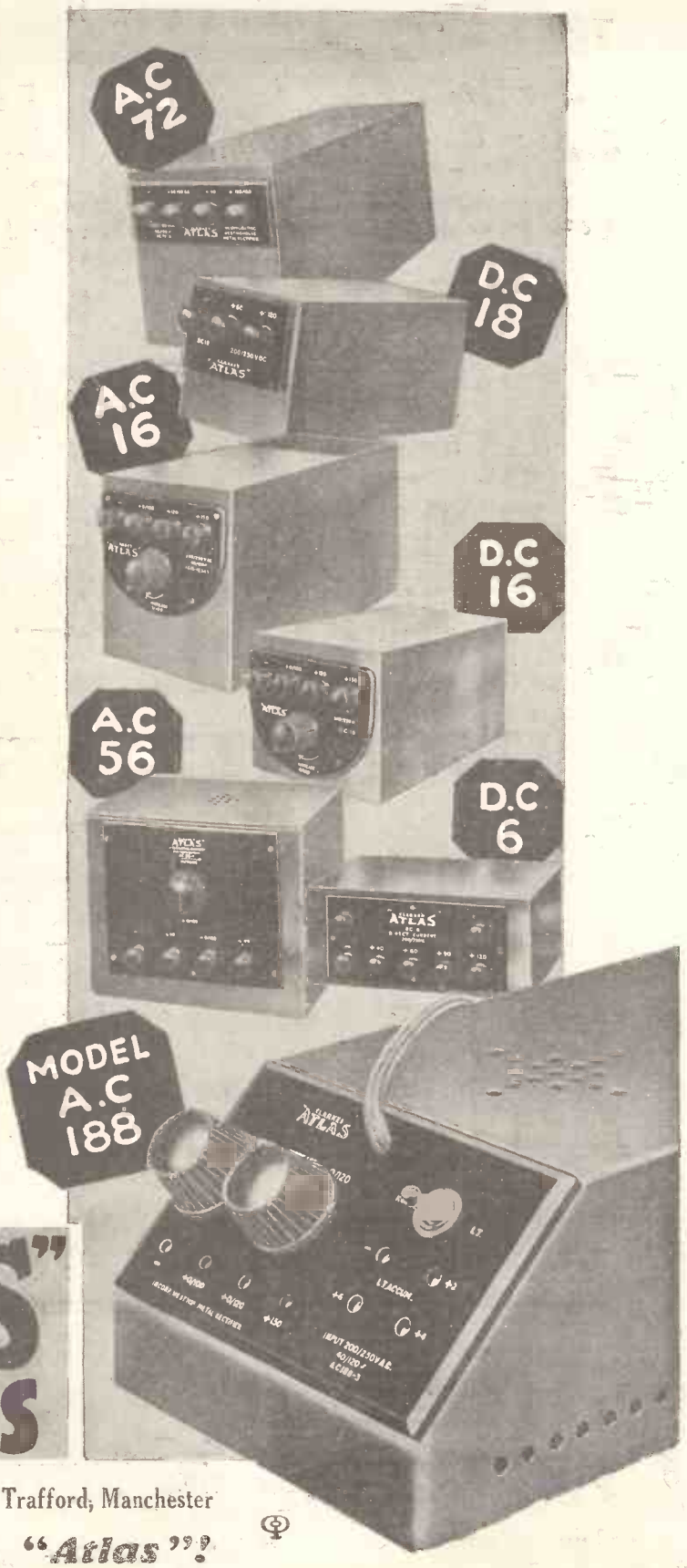

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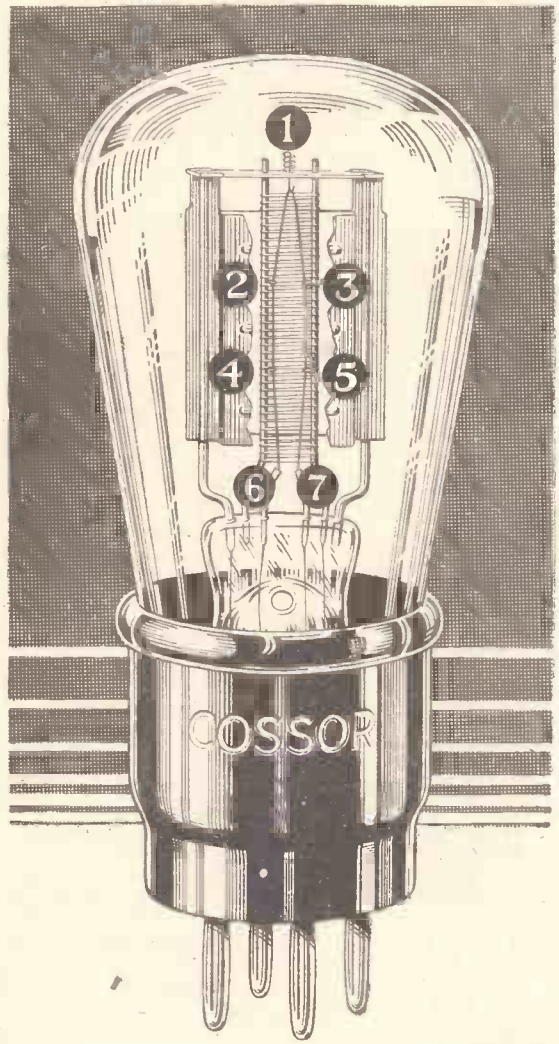
Have the best—get an "Atlas"!

Seven point suspension *definitely prevents* microphonic noises



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—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 M.W."

THE NEW COSSOR DETECTOR VALVE

DEFINITELY FREE FROM MICROPHONIC NOISES

♡ 6827

Popular Wireless

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Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors: K. D. ROGERS,
P. R. BIRD, G. P. KENDALL, B.Sc.,
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OUR XMAS NUMBER.
NIGHTINGALE—OR NOVELTY?
FIVE-METRE EXPERIMENTS.
WOULD-BE RAIDERS.

Radio Notes and News

BIRTHDAY NOTES.
THOSE EARLY DAYS.
THE "TALKIE" MYSTERY.
B.B.C. AND SAFETY FIRST.

A Word To You.

TO all readers, buyers, borrowers and partisans of "P.W."; to radio men, women, boys and girls all over the world, professional and amateur; to crystal set users, valvers, short, medium and long wavers, to those who get "——" at L.S. strength at any time, on two-valves, and to those who confine themselves to the real facts; to the fellows who let me down lightly and those who examine my remarks with a microscope, and to the "earthed" aerial men, the no "earth" men, the all "earth" and no aerial men, and Uncle Tom Cobleigh and all—A right merry Christmas!

Our Christmas Number.

I LIKE Christmas Numbers; they generally have such a red and warm, cosy, jolly Dickens-y look, and somehow they bring back to my somewhat sophisticated imagination a reminiscence of the thrill of my boyhood's Christmases. May you derive the same benefit, my friends. I should like to have my own Christmas Number, therein to run wild wi' ye for a space, but that sort of thing happens only in the dreams of journalists who have celebrated not wisely but too well the "putting to bed" of their papers. Ah, well, to business! Did you notice Mr. Baxter's question on page 516, Col. 1 of "P.W.," November 22nd? "Do we want Bass?" Certainly—failing champagne or—ginger wine!

The Last of It.

HERE'S the last section of blessed old 1930 now about to distinguish itself and Christmas is bearing down upon us with a rapidity equalled only by that with which quarter days approach. Lift attendants are becoming embarrassingly polite and my small son is beginning to ask heavily-veiled (but very transparent!) questions about small radio sets, meccanos and sich. I suppose that the B.B.C. is importing a special Yuletide shipment of jazz-and-jump bang-and tootle from the U.S.A.

Nightingale—or a Novelty?

MENTION of the B.B.C. reminds me that the "Wireless and Gramophone Trader" has announced that in response to suggestions from the radio "trade" the B.B.C. intends to attempt to occupy the intervals between items by radiating an automatic musical signal. Such a signal will prevent excitable folk from thinking that their receivers have flapped out, and sending for a plumber to put them right. What will the signal be? A snatch of nightingale or something which no broadcasting administration has thought of? I suggest the first few bars of Beethoven's Fifth Symphony.

Early Editions of "P.W."

THE flux of letters enclosing early numbers of "P.W." or specimens of our first free booklets continues. Touching as are these tributes from our readers, we do not wish to open an emergency section of this office in order to deal with them; we are now quite convinced that in those strenuous and, in many ways, chancy and difficult days, we wrought (not past tense of "write"!) well, and better than we knew. That gives us confidence for the future. Meanwhile, no further evidence is required, thank you all very much. Bless my soul, what a snappy crowd you are! We merely breathe a thought into the air and lo!—the avalanche! Don't any of you *ever* sleep?

TO OUR READERS.

Once again we have the pleasure of presenting "P.W.'s" Christmas Number to our many friends. And once again we wish you —one and all—

A HAPPY XMAS.

So cordial are the relations between ourselves and our readers that this is no yearly formality, but a sincere expression of good will from "P.W.'s" Staff and

The Editor.

An All-Electric Ruse.

JUDGING from the tricks to which American traders resort I think that they must be going baldheaded from cudgelling their brains for new ways of scooping in the "dallers." The best wheeze I have heard of for some time is reported in an Australian "weekly" which says that an American salesman advertised, "Moving to the country; will exchange electric radio for a battery set." All that this ingenious man wanted was to find out the names and addresses of people who desired to have up-to-date receivers!

The Would-be Raiders.

IF the B.B.C. doesn't button up its pockets pretty tightly they will do it yet, those would-be raiders who have Causes in their bonnets and wish the B.B.C. to divert some of its funds from their legitimate uses. I am sorry to see that another Kite has just been flown, and by a more highly-placed person than Mr. Granville Barker, this time with "national opera" hanging from its tail. Oh, let us be wary, friends, and like the Irish orator say, "I smell a rat! I feel it in the air! I hear its footsteps approaching, in all directions, on horseback!"

Institute of Patents.

THIS useful institution has sent me a a copy of its syllabus of lectures for the coming winter; quite an interesting list of subjects, amongst which is sandwiched a debate (on January 15th) between Mr. D'Arcy Nassau, M.I.E.E., and Prof. Low, etc., on "Is Invention Useful"? It is a certainty that Prof. Low will be amongst the "Ayes," but I cannot understand how on earth an M.I.E.E. can possibly argue against the utility of invention as an activity of the human mind. Where would he be without it?

Five Metres Experiments.

HERE is a note of uncommon interest to short-wave enthusiasts. Mr. E. J. Reid (G 5 Q B), of 120, Mill Lane, London, N.W.6, states that every Sunday afternoon from 2.0 till 3.30, five-metre test transmissions are given by his station and by G 2 O L, G 2 B Y and G 6 X N. The transmissions are in Morse and telephony. Reports will be welcomed from readers in all districts and a stamped, addressed envelope to any of the above-mentioned stations will bring "details of a suitable circuit, which is both simple and inexpensive to build." *Five* metres, lads!

(*Continued on next page.*)

RADIO NOTES AND NEWS

(Continued from previous page.)

Our Amateur Historian !

MY reference to the tip for the deaf (the holding of a piece of celluloid between the teeth) has brought a note from A. B. (Glasgow), who says that an article in "Cassell's Family Magazine," about forty-five years ago, gave the same idea, with the difference that the afflicted of 1885 were recommended to clamp cardboard in their jaws. What a memory, eh ?

Programme Notes.

IN my opinion the B.B.C. commits an important error when it devotes a whole concert to the works of one composer. There was that Bach-y evening early in November and now. you will observe, we are to have from Leeds and Manchester, on December 7th, a Schubert-y evening. By the way, that item (National) entitled "Contrasts," appears to have the "makings" of a good number. Soap so ! I envy the naughty Cardiffers in that they are to hear Elgar's "The Kingdom," on December 7th. The general broadcast on December 9th of bits from old musical comedies, under the title, "Theatrescope," is one to bank on.

B.B.C.'s Birthday.

THE eighth anniversary of the formation of the British Broadcasting Company, the predecessor of the present B.B.C., let loose a flood of reminiscences, but I think that as my own recollections of the early days of broadcasting are largely composed of more or less "secret history," I will reserve them for my Memoirs ! I see that, according to the "Star" (November 13th), Eckersley used to shout, "Wait a minute ! The mike isn't insulated," and proceed to rectify the matter "by slipping a sixpence into the instrument." Pity they didn't get Eric Dunstan to correct that article before it was printed !

Those Early Days.

FUNNILY enough, the "Star" adds, immediately after the sixpence drops, "Now, of course, they have Brookmans Park." The connection is hard to discover. Well, I remember our excitement when the representatives of the largest manufacturers of radio gear went to interview Mr. F. Kellaway, then the P.M.G., and came back with an "all-clear" signal. There was sharp competition for the job of bossing the broadcasting company, and I well remember when the news came that "a chap called Reith has got it." We all said, "Who is Reith ?" We know now !

The Talking "Talkie" Mystery.

THIS is said to be solved. There was a fault in the "talkie" apparatus at the King's Hall Cinema, Newcastle, which resulted in the delivery of a radio programme to the astonished listeners. It appears that the Newcastle B.B.C. station is not far from the cinema, and as one of the valves of the "talkie" gear went wrong and began to act as a rectifier ; the signals from 5 N O found a happy home. So that's that !

SHORT WAVES.

Frost breaks wireless poles. The cold snap. —"Daily Mirror."

* * * *

Tom : Does your wife enjoy the wireless ?
Dick :- No ! You see, it's all listening.—"Answers."

* * * *

A woman at Stoke Newington told the Bench that her wireless set was not much good, as there was a sawmill next door.
Large numbers of people who have suffered from their neighbour's wireless sets are now ordering sawmills.

* * * *

A correspondent has written in referring to the "wireless poles" in POPULAR WIRELESS.
After many hours of hard thinking, we are wondering whether he can possibly mean "Ariel's columns."

* * * *

"The U.S.A. is the only important country where 'listening' is free," we read.
Not from distortion, anyway.

* * * *

Wireless sets that will operate under water have been invented.
So there's no need to worry about floods this winter.

* * * *

A contribution to the "Wireless Weekly" from an Australian reader :

If mighty wealth should come to me,
I'd try to buy the A.B.C.
I wouldn't stop, or stint my mun'
But I'd find a good Announcer for the Stadium.
This would give me great satisfaction
As the fights would then be some attraction.
Another thing I'd give a hand
Would be to sack that Dinner Band ;
Then I think the Licence Fee
Would willingly be paid to me.

The B.B.C and Safety First.

A DAILY newspaper which is devoted to the socialist idea (no prizes for detection !) reports that a Mr. John Tranum, a parachutist has proposed that he should ascend into (or near) the Heaviside Layer in an aeroplane, hurl himself into space and give a little chat by radio as he hurtles towards old man Earth. The B.B.C., after weighing the proposal, and the transmitter which Mr. Tranum is to take with him, declined to be a party to the hazardous undertaking !

I Want to Know.

I CONFESS ! I "put 'em up" and cry "Kamerad" ! I have been so tickled by my gramophone and some glorious symphonies, that I have, reely and trooly, neglected my radio set for—er—quite a while. Now I have turned a weird, futuristic four-valver into an all-mains screened-grid Three, with a bee-utiful new aerial—a broomstick on top of a lovely copper beech—and one of the almost but not quite moving-coil loud speakers. The result is that I can hear all the secrets of the B.B.C.—and I don't like 'em all.

This is What I Want to Know.

FOR instance, why should I have to listen to the faults of the respiratory and dental systems of the announcers ? Why does the B.B.C. broadcast (*a*) taxi-cab hoots ; (*b*) river-boat syrens ; (*c*) City clocks ; (*d*) the vibrations of the "top-plates" of its actors (as in "Pompey The Great," for example) ? The (so it sounded) expectoration of one announcer so alarmed my feminine grandparent that she appealed straightway to the memory of "dear Prince Albert," and I don't blame her ! Pray let us have a respectful distance between the human subject and the microphone. If that matter is not adjusted I shall have to sacrifice my screened-grid valve !

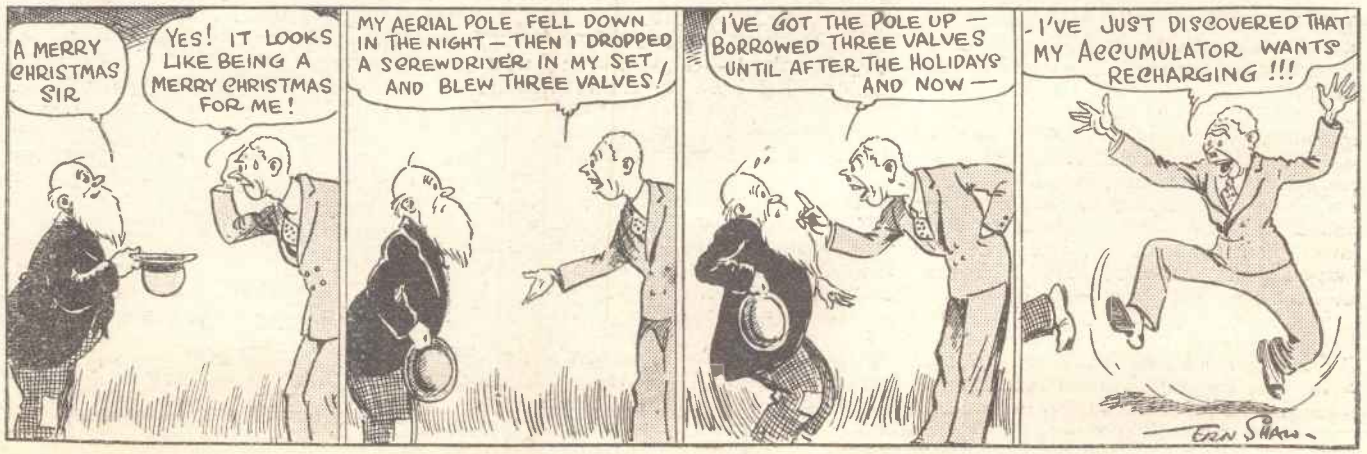
Despatch Riders' Re-Union.

IF you did your bit as an R.E. Despatch Rider in the late Great Unpleasantness, you will be glad of a chance to meet your war-time colleagues once again. That chance is coming, and a re-union is being arranged for the early part of the New Year.

The Hon. organising secretary is Mr. E. R. Gilbert—of "Gilbert" Ads. fame. He would like to hear from all war-time R.E. Despatch Riders, wherever they served—on camels in Mespot, on skis in Russia, or on a darned old bike in the Dardanelles ! Address : E. R. Gilbert, Esq., 14, Holborn, London, E.C.1. Forward the R.E.D.R.'s !

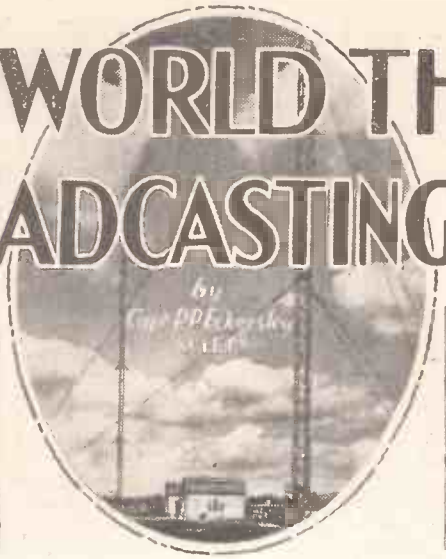
ARIEL.

MAKING SURE OF A REALLY MERRY CHRISTMAS!



TELL THE WORLD THE TRUTH
HOW BROADCASTING CAN HELP

Christmas is the time of peace and goodwill, not only in the home but between nations, and what better medium to spread the spirit of amity than radio? "Wireless could help a great deal to further international peace," says our Chief Radio Consultant.



". . . . I know many of the people in the B.B.C. do believe in Peace; I do know that the nation itself believes in it, if only it can be roused to give expression to that belief. So why not come into the open with a definite campaign?"

A CHRISTMAS article! Each year one is faced with the job of saying something relevant to Christmas and wireless. I have before taken the text of international goodwill and how wireless might help. I used to feel that there was some chance of wireless wanting to help, and the nations eager to catch the voice. Pure sentimentality? I am somewhat disillusioned, but still, that is all the more reason to return to the attack.

Why Not Plain Speaking?

What is it faces the wireless international union so often? "Propaganda inadmissible"—nation speaking war unto nation. Why is every word of a talk on international affairs weighed in the balance and if it is a good word relegated in favour of something more diffuse and mediocre? Why is it people are not allowed to speak the truth from their hearts? "Propaganda inadmissible."

But two thousand years ago the ideal of Peace on earth and goodwill towards men startled a listening world, and civilisation has been fighting about the idea ever since.

I am an engineer, and doubtless many think that I am presumptuous to write on any subject other than engineering, but I am unashamed. I cannot think of a better subject to write about at Christmas than this subject of international peace. I cannot think of any way in which the realities of the situation can be better put before apathetic millions than through the medium of broadcasting.

A Plea for a Policy.

When an engineer tackles a job of work, he has a clearly defined programme before him. First I will lay out the baseboard, next I will place the components as they fit best, both with regard to electrical and mechanical considerations. Now I will wire up this circuit, test its performance. Then I will eventually put the instrument to the test of use. And I will modify as use dictates. Throughout this work the engineer keeps a policy. Take the B.B.C. technical development. There has been, and still is, a policy—a policy culminating in the Regional Scheme.

But, apart from the technical development, has the B.B.C. a policy? Once asked what might be the policy of the B.B.C., Sir John Reith replied: "There is such a thing as not having a policy." Quite seriously that is true! What is the policy of the B.B.C.? Ask each member of the Board of Governors separately; I wonder, outside the usual clichés, whether one would get that crashing unanimity which demonstrates thought, solidity, and enthusiasm; I wonder!

But the apologists might say that any policy must be tendencious, and the B.B.C. with its unique difficulty in holding the balance between contending thoughts (oh, heavens!) is unable to have a policy. I disagree; but let us take it at such low terms. Surely—and all this leads us back to the original theme—no one could quarrel with the B.B.C. for living up to its motto, and for publicly stating that it is to do so and incidentally doing it heart and soul?

Is there anyone who does not believe in the necessity for international peace if civilisation is to mean anything? I have never heard anyone directly deny that there is something quite rational behind the suggestion that to kill another person on behalf of a third is unreasonable. I have heard a high official of the B.B.C. say that all this talk about Peace is stupidly sentimental. But I know many of the people in the B.B.C. do believe in Peace; I do know that the nation itself believes in it, if only it can be roused to give expression to that belief.

BROADCASTING IN BUDAPEST

Capt. P. P. Eckersley "snapped" during a recent visit to the radio congress at Budapest.

Smouldering Fires.

So why not come into the open with a definite campaign? A campaign as energetically pushed as those started in the newspapers for a definite object. Not little mediocre sloppiness in the corner, every second word crossed out for fear of "propaganda inadmissible," but a bold, fearless campaign. Let the world know that there are more men under arms now than ever before the war.

And more, let every woman know that the son or husband she loves may be soon a shattered heap, torn to pieces by high explosive or tortured to death in some ingenious way. Let every person know about the poison gas that will creep into their cellars, let them know that they will die very unpleasantly unless something is done. Because it's all ready at a moment's notice to flare up again unless something big and leading and bold is done by some country somewhere. And why not England?

Peace and Goodwill.

And wireless broadcasting has the power to help. It has shown itself able to neglect the wishes of the majority about trivial things; it might change our attitude towards it were it as adamant about a big thing. Let it be said that we are ruled by international finance; that the cauldron of petty greed and hatred is never left unstirred and that *we*, you and I, may be forced to a shameful death because of a few greedy men and, more important, because of many stupid and apathetic politicians.

Peace on earth and goodwill towards men! What a farce! and what a possibility! And what everlasting glory to broadcasting if it really preached it in a factual way.

A merry Christmas to you and all my good will to those who could help if they would.

LATEST BROADCASTING NEWS.

THE B.B.C. AND BAIRD TELEVISION

— FIRST WARSAW RELAY — A KINGSWAY HALL CONCERT— "SCIENCE AND RELIGION" SERIES CONCLUDES—A TYRONE GUTHRIE REVIVAL — "HARD GRAFT" — MIDLAND CAROLS EARLY — MANX FOLK-LORE.

AN important statement may be expected shortly on the future of the broadcasting of Baird television. It is understood that the B.B.C. is completing a new and thorough investigation. While there is every intention to be fair to the Baird interests, and even to give them the benefit of some doubts, there is no denying the fact that most of the people who count at Savoy Hill are against continuing the present arrangement.

But the sudden and complete abandonment of the transmissions is unlikely. Lord Gainford and Lord Ampthill are known to be in touch, and it remains to be seen whether the enthusiasm of the latter can overcome the doubts of the former. Whatever is done about the Baird transmissions, the B.B.C. will be ready to try-out any other system that has reasonable claims.

First Warsaw Relay.

A Polish National Programme, specially arranged for the occasion, will be broadcast to London Regional listeners on Wednesday, December 17th. It will be the first relay by the B.B.C. from Warsaw.

A Kingsway Hall Concert.

Saturday, December 13th, will see a large audience at the Kingsway Hall, London, for one of the popular concerts which give listeners a much sought opportunity of seeing broadcast artistes perform before the microphone.

Megan Thomas (soprano) and George Baker (baritone) are both frequent broadcasters, and Ronald Gourlay, the blind entertainer, has been known to listeners since the very early days of the old B.B.C.

The Band of the Life Guards will, of course, be a great attraction, while the organ solos by Allan Brown, who has arranged the concert, are certain to be among the best items. Those who cannot go to the Kingsway Hall will be able to hear the programme from the National transmitter.

"Science and Religion" Series Concludes.

The series of Sunday afternoon talks on Science and Religion, which aroused much animated discussion, comes to an end on December 14th, when Dr. L. P. Jacks, of Manchester College, Oxford, gives the twelfth talk. Dr. Jacks has written extensively on religious and philosophical subjects. For the next series of these Sunday afternoon talks the subject probably will be "The History of the Bible."

A Tyrone Guthrie Revival.

Tyrone Guthrie's thrilling play, "The Flowers are not for you to Pick," which was specially written for the microphone months ago, is to be revived for National listeners on Thursday, December 18th, and repeated the following night from the London Regional transmitter.

Mr. Guthrie, who like Mr. John Watt, did commendable work at Belfast before he was transferred to Savoy Hill, is also the author of "Squirrel's Cage," a play which last year was responsible for the introduction of a new form of studio technique.

Mr. Guthrie is now in Canada producing a series of special radio dramas for the Canadian National Railways broadcasting system.

"Hard Graft."

Mr. W. Bishop has devised a programme which seems to be exactly the kind required by Welsh listeners, for Monday evening, December 15th. He calls it "Hard Graft," and claims that its seven scenes are typically true of life in the mining valleys.

It opens with a meeting at which the name of the prizewinner of an essay on "Safety Measures in Mines" is to be announced, but the day unfortunately coincides with an explosion in the local pit as a result of which two men are missing.

The writer of the winning essay, in fact, turns out to be one of the missing men—at least that is the supposition since no response is made when his nom-de-plume is called. The scene is then changed to the bottom of the pit where the two missing men are imprisoned by a fall of rock.

Of course, they discuss the essay and remember that the winner is to be announced that evening. From then there are plenty of thrills until the men are eventually rescued by the sagacity of a pit-pony.

Midland Carols Early.

Midland Regional listeners will have their first spot of Christmas Music on Thursday, December 18th, when the Lunch-Hour Carol Service at St. Martin's Parish Church, Birmingham, will be broadcast.

The Choristers, who have been specially trained by Mr. Richard Wassall, will include in their programme two carols by Midland composers—"Christmas Day has Come," by Martin Shaw, and "Song of the Crib," by Vaughan Williams, as well as some of the traditional kind without which no carol service would be complete.

Manx Folk-Lore.

Some interesting stories will be told by Dr. James Lyon, who has arranged a programme of folk-songs of the Manx people for Midland Regional listeners on Saturday, December 20th. These songs, to be sung by well-known singers, will be described by Dr. Lyon during the course of the programme, and he will, no doubt, have something to say of his search for them during a dozen summer holidays spent in roaming about the Island.

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.

Records and Recording.

EVERYTHING nowadays which is worth recording, and perhaps a good deal that isn't, finds its way swiftly and certainly to the gramophone or the film. The speech of the King on some important occasion is recorded in the morning, and broadcast from a gramophone in the First News at six o'clock!

If you arrived in town too late to see the Lord Mayor's procession, you could see it over again, sights and sounds and all, on the films the same night!

Boswell dogged the heels of Dr. Johnson; he seemed almost to live in his pocket; and jotted down everything that fell from the great man's lips; and I have sometimes regretted that other men had not their Boswells, too.

But now Boswell has assumed the proportions of several extremely enterprising business concerns, to say nothing of apparently ubiquitous individuals, and the disc and the film gather their daily harvest for posterity.

Snapshots.

One thing always surprises me. You may walk for an hour in the crowded streets of London and never see a camera in anybody's hand; but as soon as anything happens, out pops a camera.

It doesn't seem to matter where an

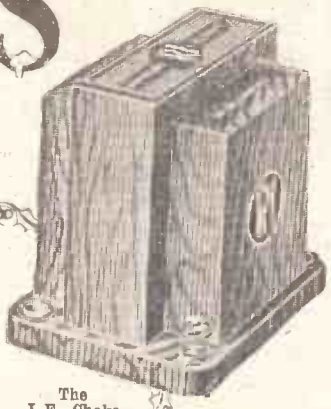
(*Continued on page* 661.)

RADIO GIFTS FOR CHRISTMAS

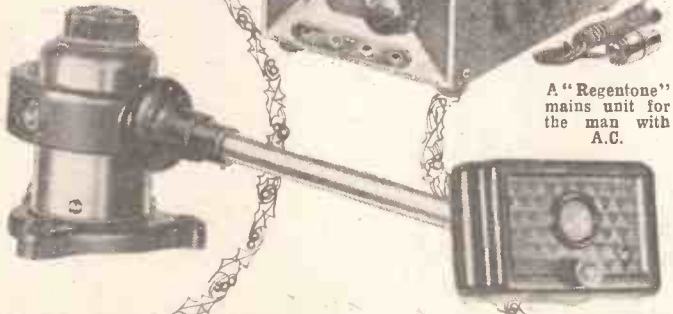
SOME SEASONABLE SUGGESTIONS IN PICTORIAL FORM.

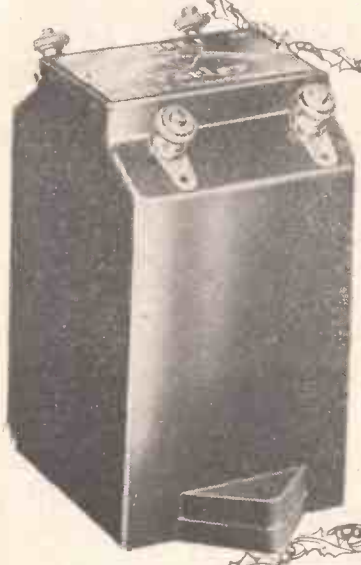
The H.F. choke (above) is a Wearite, for heavy-duty mains work.

A "Regentone" mains unit for the man with A.C.

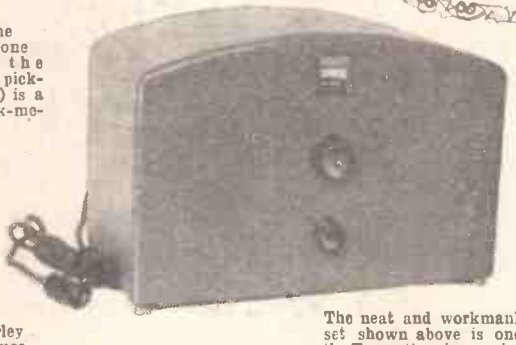


The L.F. Choke shown above is by Radio Instruments.





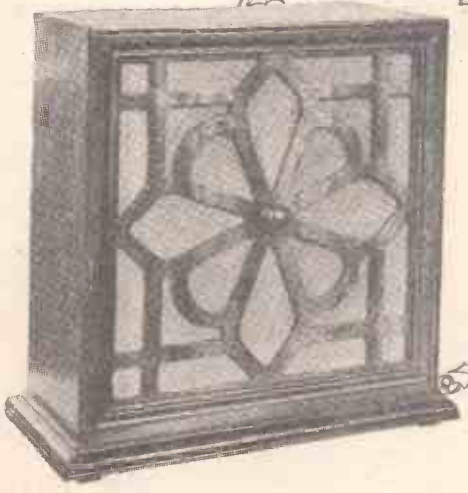
For the gramophone enthusiast the Blue Spot pick-up (above) is a real "pick-me-up."

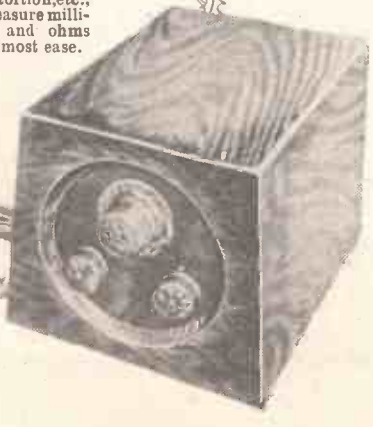


The Varley transformer (left) has "transformed" many a set.

The neat and workmanlike set shown above is one of the Ferranti mains receivers. To the right is a loud-speaker unit and cone produced by "Six-Sixty."

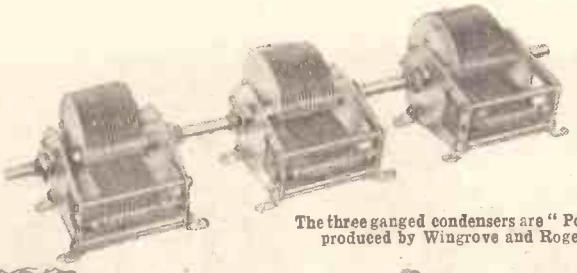
The Pifco All-In-One is an invaluable aid to quality reception, for with it the listener can check for distortion, etc., as well as measure milli-amps, volts and ohms with the utmost ease.



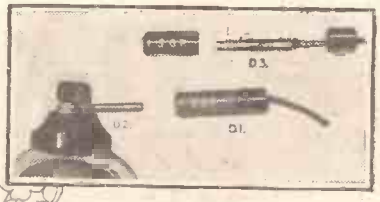


The handsome loud speaker shown to the left is a Marconiphone product, while to the right is an illustration of a Lissen receiver. As will be seen it is singularly compact, but nevertheless it is a two-valver that gives a fine performance.

Standing up in the corner is a condenser that "stands up" to long use!



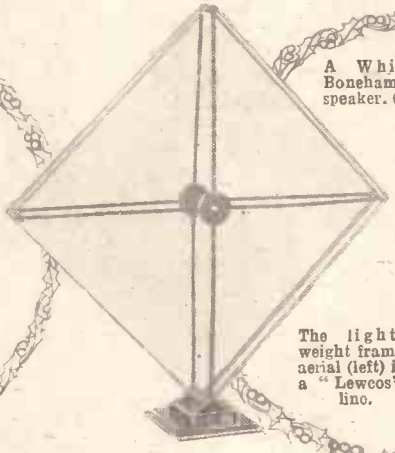
The three ganged condensers are "Polars," produced by Wingrove and Rogers.



The Lectro-Linx S.G. connector.

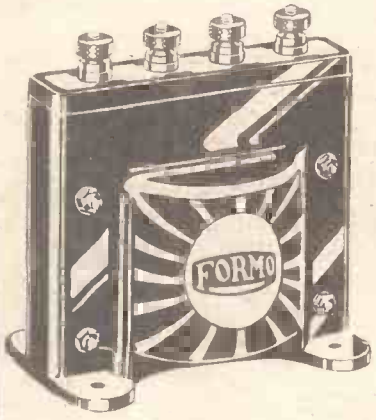
The group of components below comprises an L.F. Transformer, an H.F. Choke, and a valve holder, all of Telsen manufacture.

The Columbia H.T.B. (below) has ingenious and trouble-free connectors.



A Whiteley Boneham loud-speaker. (Right)

The light-weight frame aerial (left) is a "Lewcos" line.

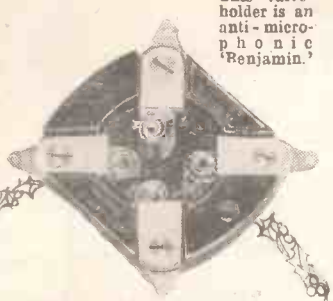


"It speaks for itself!"

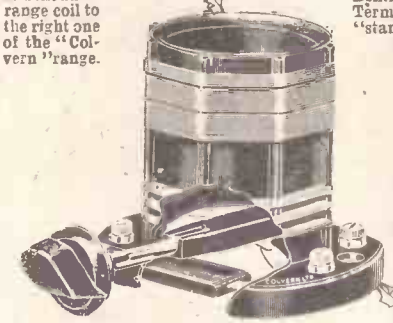
The Gambrell All-Electric Three.

To the left is a Dubilier A.C. "Two," receiver, and to the right the most popular cabinet of all the Pickett Bros. models. Between is a Tungsram valve for use in a "2 volt" set.

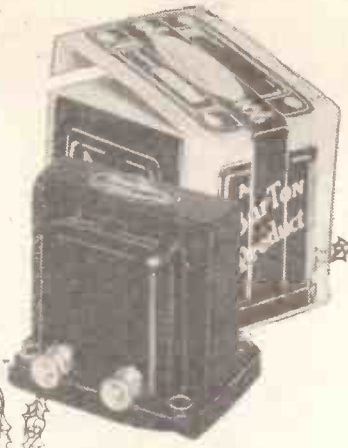
The loud speaker (above) is an "Ormond," and the dual-range coil to the right one of the "Colvern" range.



This valve-holder is an anti-microphonic 'Benjamin.'

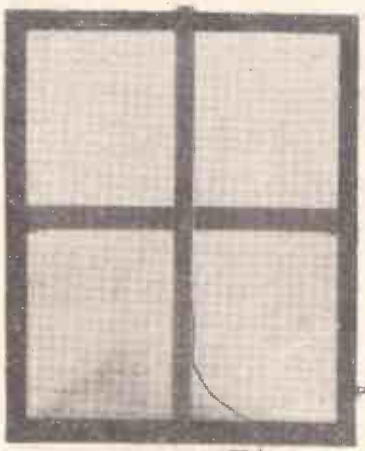


Below is shown the new Belling-Lee Multi-purpose Terminal Mount, which "stands up" or "lies down" with equal facility.

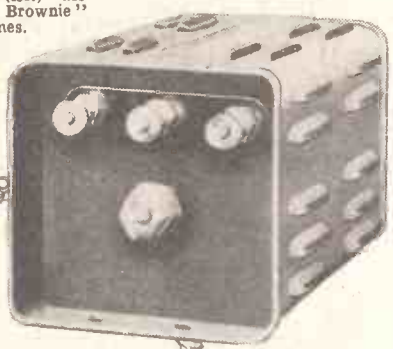


L.F. transformers are represented above by Burtons, and the tuner to the right is of British General design. Below it is a very handy valve-tester, due to Bulgin.

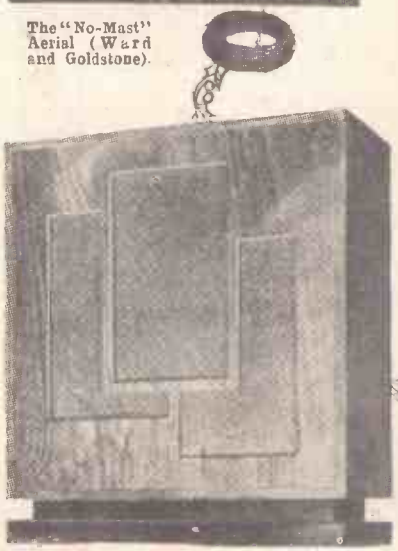
One hundred and twenty volts and up to 20 milliamps can be obtained from this Westinghouse H.T. unit (below).



The slow-motion dial, valve holder, and L.F. Transformer (left) are famous "Brownie" lines.



The "No-Mast" Aerial (Ward and Goldstone).

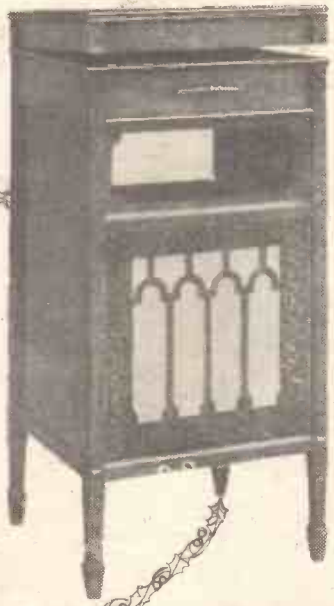


Particularly pleasing is the Graham Farish loud speaker (left). Above is one of the famous Dario range of valves.

The handsome cabinet shown above is of Peto Scott design, and houses a very famous set—the "P.W." "Titan" Three.

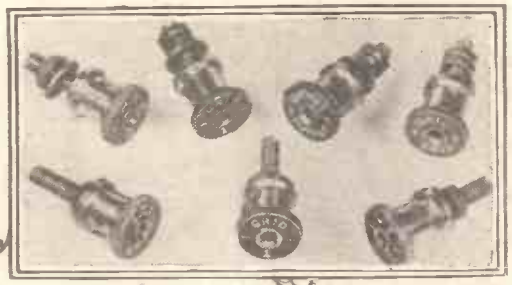
The Ultra set shown below is of distinctive design and performance.

The Exide L.T. Battery lets you keep an eye on the acid level.



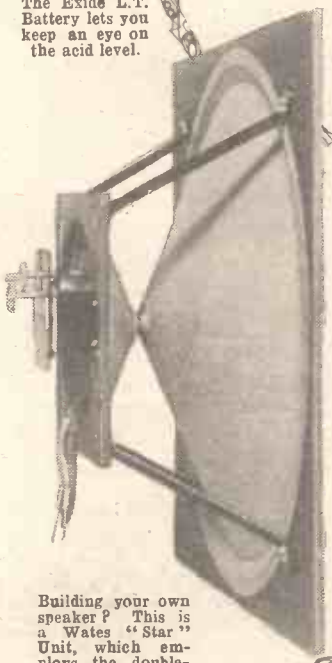
Above is a Carrington (Camco) Cabinet, and below one of Siemen's favourite lines.

Eastick terminals are "at the Top."



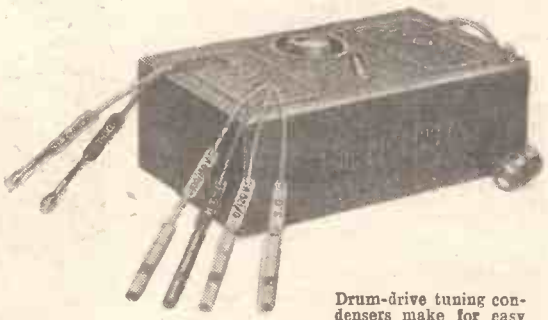
The instrument to the right is a Response Corrector for doctoring your pick-up reproduction.

The combined H.T. Unit and Charger shown below is an "Ekco."

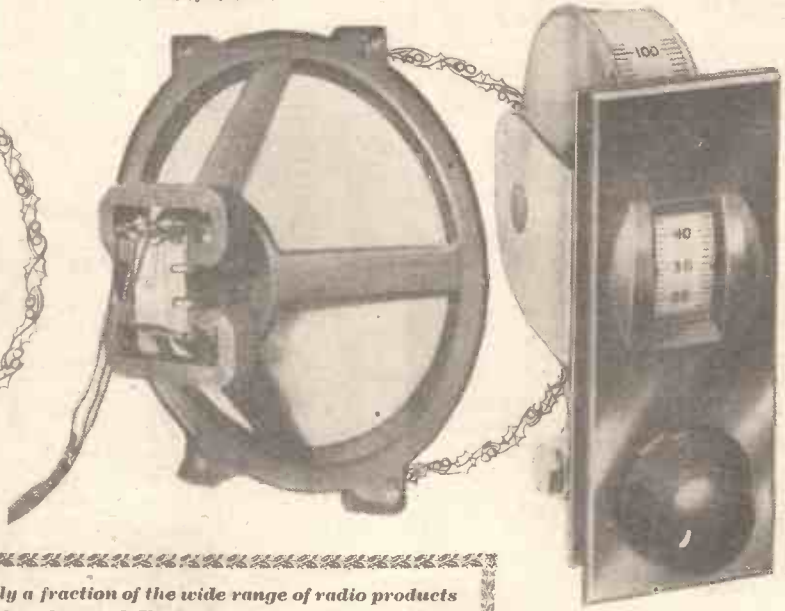


Building your own speaker? This is a Wates "Star" Unit, which employs the double-cone principle.

The loud-speaker chassis illustrated below is a General Electric Co. product, and to the left of it is a Garnett, Whiteley receiver.



Drum-drive tuning condensers make for easy operation and station finding. The model below is a "J. B."



Only a fraction of the wide range of radio products that make good Xmas Presents can be shown in these pages. But you will see that for variety and value it is impossible to beat a radio gift.

B. B. C. Board Changes

By the Editor.

An impartial criticism of the present constitution of the B.B.C.'s Board of Governors, and some notes relative to possible changes and additions in the future.

"Now let me say something about the Charter itself, and if the Committee will be good enough to look at the Charter they will be able to follow me more easily. Clause I of the Charter names the Governors, and on that I will only say that, in our judgment, they amply fulfil all the requirements which were laid down by the Crawford Committee as the desiderata which ought to be possessed by the Governors of the new Corporation.

"They are persons of wide and varied interests and with a broad knowledge of affairs, and the Prime Minister and I are confident that in recommending them we shall be inviting the Crown to entrust this Charter, and the great objects which it is intended to serve, to entirely worthy hands.

"The Charter itself is in form for a period of 10 years, and the tenure of office of the Governors is for five years. It is necessary, of course, in any document of this kind to provide for their due termination, but I should like to say it is our confident belief that the Corporation will so discharge its duties that at the end of 10 years no other form of organisation will be thought desirable, and we also hope and believe that the Governors will individually acquit themselves so well that at the end of five years those who wish to continue in office may be reappointed."

THE above is an extract from a speech delivered in the House of Commons in November, 1926, by Sir William Mitchell-Thomson, Postmaster-General in the Conservative Administration. The five years mentioned in the last sentence will expire at the end of 1931. It follows that the new Board of Governors of the B.B.C. must be constituted before then.

Mr. Walter Payne, who is mentioned in connection with new B.B.C. Governorship appointments.

In the normal course of events, no appointments will be decided upon before the House rises for the summer recess.

It is, of course, probable that public announcement will be delayed until the autumn; but effective consideration will take place during the spring. Let us examine the problems.

As far as Executive control and staff were concerned the transition in 1927 from the old Broadcasting Company to the new Broadcasting Corporation was very smooth. Parliament, however, did not intend that the new Board of Governors should act in the same way as did the old Board of Directors. What was to be the difference?

Mainly, that the Governors, being very much better paid than the Directors, should not have other active financial interests, and should earn their money. The chairman, Lord Clarendon, received £3,000 a year; the vice-chairman, Lord Gainford, £1,000; and the other Governors, Sir Gordon Nairne, Dr. Rendall, and Mrs. Philip Snowden, £700 each.

"Mrs. Philip Snowden would be prepared to accept another tenure of office."

It is by no means certain that this principle of a "working board" as distinct from "public trustees" is sound. But it had been decreed for the new B.B.C. and the Governors were bound to act accordingly.

A "Working Board."

Had Parliament meant to create a Board of Trustees instead of a "working board," the personnel of the first Board would have been ideal. Lord Clarendon was a distinguished public servant, Lord Gainford combined wide business experience with a successful political background, Dr. Rendall's career as Headmaster of Winchester had earned him an international reputation, Sir Gordon Nairne, still a director of the Bank of England, was a world authority on finance, and Mrs. Philip Snowden added to great natural ability an impassioned devotion to the public service, and a determination to carry out her duties in every respect.

"Mr. Whitley solves the problem of the chairmanship for the next five years."

"Without Real Knowledge."

On the general issue of remote responsibility to the State, such a Board would have been ideally chosen. It is doubtful, however, whether such a Board could be equally successful if required to share Executive responsibility.

Once involved in anything below general policy, the members of this Board, with the possible exception of Mrs. Philip Snowden, would be acting without real knowledge of the requirements of an entertainment service for the million.

"Capt. Ian Fraser, . . . knows a very great deal about broadcasting."

And so, in large measure, has experience proved. The spread of undue caution, the slowing down of the machine, the entanglement of red tape, and the increasing frequency of "amateur" decisions—all these are symptoms of executive intervention by the Governors. Nor can they be blamed, because they are merely trying to carry out the clearly expressed intention of the Parliament which appointed them.

Lord Clarendon's retirement in 1930 to go to South Africa, and his succession by Mr. Whitley, solves the problem of the chairmanship for the next five years.

It remains therefore for Parliament to consider the report of the Postmaster-General as to whether Lord Gainford, Sir Gordon Nairne, Dr. Rendall, and Mrs. Snowden are to be asked to continue in office.

While it may be deplored that the Constitution of the B.B.C. has mixed

(Continued on next page.)

B.B.C. BOARD CHANGES

(*Continued from previous page.*)

executive and legislative functions in a way likely to lead to trouble and confusion, the fact has to be faced.

Give Youth a Chance.

Therefore, the qualifications of the new Board must be more directly related to specialised knowledge and executive capacity than to the wider field of experience of the old Board. Therefore, also, if new appointments are to be made, and this seems fairly certain, youth should be given its chance.

As to the intentions of the outgoing Governors, there is little doubt that Lord Gainford and Mrs. Philip Snowden would be prepared to accept another tenure of office. On the other hand, it is believed that Sir Gordon Nairne and Dr. Rendall may insist on retirement.

The Most Prominent Name.

The filling of any vacancies will be a matter of great public importance, all the more so because of constitutional difficulty.

Colonel Moore-Brabazon, who takes the keenest interest in all forms of modern scientific and mechanical advance.

Among suggestions for new Governors, there is one name which stands far above all others. This is Captain Ian Fraser.

He knows a very great deal about broadcasting. As a member of the Crawford Committee, he was perhaps the chief architect of the new B.B.C. He is an extremely competent administrator, has a fertile imagination, and a real understanding of the public mind. His case for inclusion in the new B.B.C. Board is unanswerable.

What About "Dick" Sheppard?

And if only he could desert Canterbury for Broadcasting House, Dean Sheppard would be the second strongest candidate. Dr. Sheppard is, anyway, a real pioneer of broadcasting, and all parts of the work would be stimulated by his vitalising touch.

And the third strongest candidate, representing the younger element in literature and in sport, is J. C. Squire.

It is possible under the Charter to extend the number of Governors from five to seven and this might be desirable if most of the old Board desired to stay on.

Two Extra Allowed.

If there should be only two vacancies, then it would be obviously advantageous to take advantage of the extra two posts.

In the event of four new appointments being necessary, to complete the Board of seven, a formidable list would be Captain Ian Fraser, Dr. Sheppard, Mr. J. C. Squire, and Mr. C. B. Cochran. Failing Mr. Cochran, then Colonel Moore-Brabazon, or Mr. Walter Payne.

More Active Support.

Assuming the possibility of the infusion of this new blood into the Board of Governors of the B.B.C., Sir John Reith and his staff would find a good deal more active support and encouragement than has been the case in the past. It would be important to continue the services of Mrs. Philip Snowden.

It is already under consideration whether the members of the new Board should not identify themselves with special departments of the work as well as sharing general responsibility. For instance, Captain Ian Fraser might become the champion of the Engineering Department, the work of which is most familiar to him. Incidentally, Captain Fraser would then have a chance to foster the development of Empire Broadcasting, a cause which he has so much at heart.

"Mr. J. C. Squire could be counted upon to stimulate and enrich the spoken word of broadcasting."

Dr. Sheppard might well have a roving commission to interest himself in anything and everything pertaining to the service, particularly where trouble threatened.

The Lighter Side.

Mr. Cochran would naturally be attracted to radio drama, and the lighter side of entertainment, while Mr. Squire could be counted upon to stimulate and enrich the spoken word of broadcasting. Mrs. Snowden would remain a sure and enthusiastic champion for, and supporter of, music in all its catholic variety and stupendous proportions.

Mr. Cochran, who could very adequately represent the lighter side of the B.B.C.'s activities.

Here, I believe, would be a "working" Board which would co-operate happily and effectively with the permanent staff, and would make broadcasting increasingly efficient and powerful.

—MIND THOSE MAINS—

Removing Flat Spots—Hand Capacity—"D.X." Tuning.

Any set which works from a D.C. H.T. mains unit should have a fixed condenser (of about ·001 capacity) between its aerial wiring and aerial terminal.

* * *

If your set has a potentiometer for controlling the bias of the detector valve, make sure that this is set in the best position, as it greatly affects sensitivity and reaction.

* * *

One of the advantages of differential reaction is the fact that with this system the reaction adjustment does not appear to affect tuning.

* * *

Adjustment of a neutralising or a small condenser in the aerial lead will enable "flat spots" on short-wave work to be removed.

* * *

If your set is of the type that employs short-wave coils, as those for ordinary waves, and you find it unduly liable to hand capacity, etc., on short waves, it may be advantageous to connect a ·001 fixed condenser (or thereabouts) between the filament and plate of the output valve.

* * *

In sets in which the first valve is the detector, successful long-distance results must depend, to a great extent, on the correct handling of the tuning and reaction dials.

* * *

A common cause of "frying" noises is a dud grid-bias battery.

CHANGING AERIALS.

Preparing for Storms.

THE winter months may seem rather a funny time to talk about earthing aerials and lightning, but here is a new scheme which will enable you to listen-in even when storms make it necessary to earth the aerial.

Don't wait till next summer before you try it, but make the alteration when you have a little while to spare. The idea is to change over to an indoor aerial when the outside aerial is earthed, and to do this with one switch of the ordinary double-pole change-over type.

The connections to make are as follows: One common or centre contact is joined to the aerial terminal of the set. One of the outside contacts to which it will make contact is joined to the indoor aerial, and the other to the outdoor aerial.

Simple But Effective.

The outdoor aerial is also connected to the outside contact diagonally opposite. The remaining centre contact is joined to earth.

This is the earth to which the outdoor aerial is "earthed," and it is therefore desirable for it to be a separate one from the one used on the set. Keep the lead to it straight and thick, and make the earth of the buried type.

If you sketch out these connections you will see how that when the switch is over so that the outside aerial is earthed, the indoor aerial is joined up.

Slight re-tuning will be necessary when making the change-over, but this is much better than doing without radio when a storm is brewing.

A. C.

Xmas Radio "Xperiments"

WITH the Christmas festive season fast approaching, many of you will no doubt be thinking out new forms of entertainment for the amusement of your guests or your family gathering.

You, as the radio enthusiast of the party, must live up to your reputation of being something of an electrical expert, so why not take this opportunity of introducing new ideas in radio entertainment?

Magical Effects.

Perhaps you have not considered before the possibilities of extracting entertainment other than listening to broadcast programmes from your radio receiver.

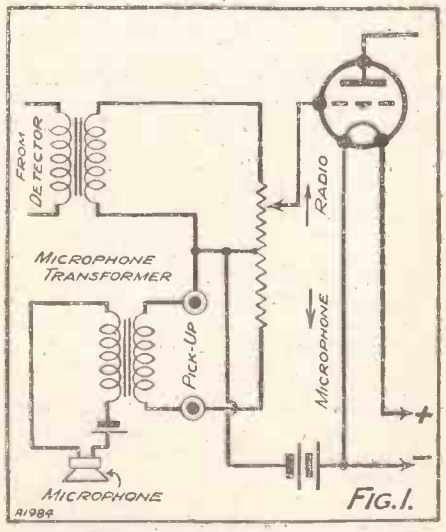
Nevertheless if you possess a loud-speaker receiver and the usual amateur's collection of spare parts you have unexpected facilities for devising a large variety of tricks, games and experiments which will appeal to young and old alike.

It needs only a little ingenuity and a novelty of presentation to make even simple electrical effects appear quite magical to your non-technical friends.

This Christmas you can be sure of at least an hour's amusement, if you prepare beforehand your apparatus and programme, which is sure to be more effective if two of you get together and have one or two rehearsals of the "stunts" that require the assistance of a confederate.

What shall we do now? How often that question arises during the Christmas party! And how difficult it sometimes is to avoid it satisfactorily unless you have a few unusual diversions "up your sleeve." This is where the following article can help, for one of our best-known contributors, Mr. J. English, has devised some really baffling radio tricks that will provide plenty of fun.

A NEAT LITTLE TRICK



You can interpose remarks, announcements, or music into the broadcast programme by means of this simple circuit.

Moreover, if you have a gift for entertainment, you will be able to make more of the few ideas which I set out here.

To begin with, I expect that most of you know how to "fake" broadcast messages, speeches, etc., over your loud speakers so that the transmission appears genuine to an audience which has just been listening to the local station. This is an old trick that never fails to work if carefully performed.

Home-made Announcements.

The easiest way is to have the receiver in another room, where no one is likely to burst in on you. Here you can introduce your carbon microphone into the grid circuit of the first L.F. valve by means of a "fader" potentiometer, as in Fig. 1. This makes the "change-over" appear quite natural; alternatively, the microphone can be connected to gramophone pick-up terminals when provided, and switched over during an interval in the real programme.

If none of your amateur acquaintances has a microphone you can borrow when he is not looking, use instead another loud speaker, even an obsolete horn type will do quite well. In this case you may find that you get the best results by wiring this loud speaker in parallel with the primary of the transformer following the detector, or with the anode coupling resistance as the case may be.

When your audience has tumbled to this little trick you might suggest a simple competition such as guessing the identity of a few members of the party, who will, of course, proceed together to the distant microphone, and there speak in turn over the wireless."

Quite unexpected changes in a person's voice can be effected by doctoring the receiver to produce distortion without making speech indistinct.

Here is another "remote control" trick which, if well and carefully done, will thoroughly mystify and thrill your guests; even your technical friends will be puzzled at first as to how it is done.

The Ghost Talks.

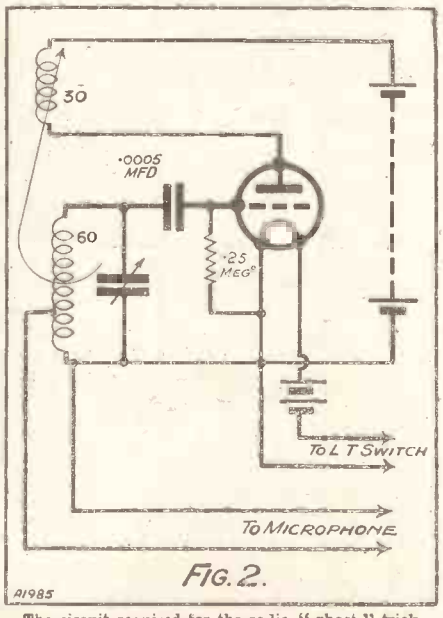
Imagine the company assembled round the fireside without lights, conversation drifting from one topic to another as it so often does on such before-bedtime occasions. Perchance some one hazards a remark on the supernatural and the host suggests the possibility of picking up by radio messages from the spirit world.

In a nonchalant, sceptical manner he brings into the fireside circle the loud-speaker portable, which he switches on. After a few seconds' work with the tuning controls a faint whistle is heard, soon resolved into clearly audible, but not loud, sounds of ethereal music.

Then from the loud speaker com a ghostly voice, the voice of one long d d,

(*Continued on next page.*)

THE PHANTOM BROADCASTER



The circuit required for the radio "ghost" trick —a very effective little scheme.

XMAS RADIO "XPERIMENTS"

(*Continued from previous page.*)

revealing strange secrets of that other world. To the amazement of the company the voice calls upon them by name, uttering startling prophecies as to their future. After a time, the voice becomes fainter, trailing away through more ethereal music until all is silent once more.

You can well imagine that this "stunt" would bewilder any audience, because there are no wires connected to the portable by which speech could be transmitted from an outside source. Moreover, anyone of your guests can prove for himself that it is a real (!) transmission by a few moments' work with the controls of the portable, when he will find that it tunes in just like any other distant signal!

Of course, when you know how the trick is performed it seems simple enough. Under cover of semi-darkness your confederate stealthily makes his way unobserved to another room, where there is a microphone connected by light leads to a valve oscillator concealed in the same room as the portable receiver.

There is also another pair of wires for switching on the L.T. supply of the oscillator from the control room. The "ethereal music" is easily provided by replacing the microphone by a gramophone pick-up and putting on a suitable record speeded up to raise the pitch of the music.

"POWERFUL SERMONS"

Putting the final touches to some of the loud speakers that have been installed in St. Paul's Cathedral to enable everyone to hear the service.

The oscillator itself is quite a simple one-valve affair, roughly made up on the circuit of Fig. 2. You will observe that the microphone is directly connected across a few turns of the grid coil at the low potential end. Alternatively, you can connect it in parallel with a small coil which is then loosely coupled to the oscillator.

In any case, you will need to experiment with the degree of microphone coupling, and of reaction, until you get clear transmission when the valve is only just oscillating. This is the condition for sensitivity.

You can use almost any general-purpose or L.F. valve, although the best results are naturally obtainable with the latter type. A small 60-volt H.T. unit and a dry battery for lighting the filament complete the power supply, and as few components are required the whole outfit can be accommodated in a small box.

Adjusting the Oscillator.

When this is concealed in the same room as the receiver there is usually sufficient radiation without an aerial, if the oscillator coil is of generous dimensions. If you set it up in an adjoining room, however, it is advisable to use a small, concealed aerial—two or three yards of insulated wire, with a counterpoise or direct earth.

The oscillator should be tuned to a wavelength within the range of the portable receiver, preferably one which is normally free from signals. This and other adjustments you will, of course, make in your rehearsals, as it is well worth while getting the working of the apparatus absolutely reliable beforehand.

Other variations of this "stunt" are sure to occur to you during your preliminary experiments with this hook-up, which also possesses possibilities for humorous treatment.

A Mystery Lamp.

Apart from these tricks with wireless receivers, there are quite a number of interesting and amusing experiments which you can carry out with the help of your stock of spare parts. For instance, the children can be kept amused for quite a time with such a simple thing as a two-way telephone.

Two pairs of headphones—or, better still, two separate earpieces, in separate rooms, connected together by a length of twin bell wire—with a small dry cell in series, make quite a serviceable line. The 'phones, of course, when spoken into act quite well as a microphone.

For the grown-ups you can perform the experiment of lighting a lamp by wireless, which you can make particularly effective if accompanied by a good flow of semi-technical jargon.

You have on the table a cardboard box, and alongside it a small coil of wire to which is connected a small flash-lamp bulb. Pointing out the absence of any wires or battery connected to the bulb coil, you bring the latter near the box. When fairly close the bulb begins to glow, shining brightly when the coil rests on top of the box.

Here is the Secret.

The secret of this experiment is the generation of H.F. currents in the bulb coil strong enough to light the bulb by induction from the coil of a valve oscillator hidden inside the cardboard box. Simple enough from a scientific point of view, but to your non-technical friends something very unusual.

The circuit of the oscillator you will find in Fig. 3, which also gives the values of the few components required. An L.F. valve—or, better still, a small power valve—should be used with about 90 volts H.T.; a higher anode voltage will naturally increase the induction effect.

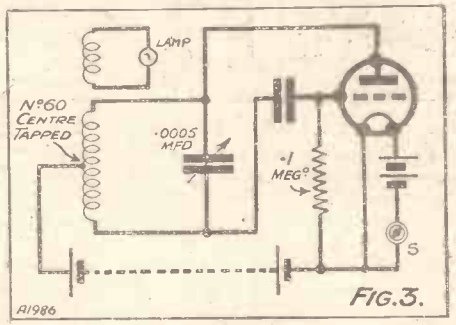
The oscillator coil, preferably a solenoid wound with medium-gauge wire, is mounted inside the box so that the anode end comes close up against the lid.

A Spectacular Demonstration.

The bulb coil is made by winding four or five turns of No. 20 D.C.C. on an inch length of former the same diameter as the oscillator coil.

The ends of this small coil connecting to the bulb holder are stiff enough to support the latter inside the former. The bulb to use is one of those low-consumption types sold for H.T. fuses.

POWER BY RADIO



The radio-lighted lamp is an experiment that will intrigue the grown-up members of your party.

Another pretty experiment, best conducted in the dark, is to suspend the bulb coil by a length of thread, with a thread stirrup, over the oscillator coil so that it can swing backwards and forwards like a pendulum, just clearing the top of the box or oscillator coil. When swinging the bulb flashes each time the coil passes over the oscillator.

You can also demonstrate to your guests the transference of L.F. energy without wires by a further simple experiment. Disconnect the loud speaker from the receiver, and in its place wire an L.F. choke.

An Intriguing Effect.

Then connect a pair of 'phones to another L.F. choke, or to the primary of an L.F. transformer. When you bring the telephone choke near to the one connected to the receiver you will hear the programme quite well in the 'phones, even though the two chokes may be some inches apart.

This transference of music by induction is, of course, at maximum when the axes of the choke windings are in line. What makes the effect so intriguing to your non-technical guests is the fact that they have never before imagined that music and speech could be heard without a material link between receiver and telephones.

A LEAD-IN TIP

If your aerial lead runs down in such a way that it pours water on to the lead-in tube during a shower, tie a piece of string about a foot long on the wire near the lead-in tube, and most of the moisture will run down this instead of along the insulator.

"SOME RADIO CHRISTMASES"

by ARIEL

"WELL," I said, as I gave a terminal a final screw for luck, "this coherer circuit is now perfect, and I think we ought to be getting something through soon."

"That's good," said Marconi, knocking out his pipe, and taking his dinner-pail on to his lap. "Where's Fleming?"

"Oh, he and Lodge are just having a look over the aerial. De Forest said he'd be back about two o'clock, with Hertz and Clerk Maxwell."

"Fine sort of Christmas," grumbled Marconi, taking a bite of bread and loosening the cork of his tea-can. "Still, I suppose—in years to come—the world may be glad of us fellows."

Just then Lodge poked his head round the door of the shack, and said——

Ah, what a yarn that would be, my friends! But you wouldn't believe me, so I will confine myself to my own insignificant experiences.

A Christmas "P.W." would not be the same without a special contribution from our earliest contributor, who, right from "P.W.'s" very first issue, has enlivened you all with his Notes and News. In a future issue "Ariel" is going to give you a brief history of his career—it makes just as fascinating reading as this article, for "Ariel's" life has been full of incident and his experiences have been garnered in the whole four quarters of the globe. Look out for this further article—you will find it worth waiting for.—Editor.

The Wrong Temperature!

I think my first radio Christmas was taken up chiefly with "swotting" for an examination, an exercise which did not harmonise at all well with the customary Christmas dietary. With a load of turkey and plum-pudding aboard, I retired to my room and strove to set down a lucid explanation of "inductance," a physical quality which I have ever since regarded with hate. Still, it had to be done, and then I wrestled with "capacity"—another beastly mystery for which I have never entertained the slightest affection. But let us drop that Christmas back into the Past and bring on the next.

Christmas out of England is just a plain washout for a fellow like me, that loves his Dickens and his England and the footling parties which, however footling, one would not miss for worlds. What then of Christmas aboard a small steamer passing down the Red Sea, bound for India? There was a pretence at decoration: the stewards were extra cheery when they brought the *chota hazri* (little breakfast)—i.e. a cup of tepid tea and some leathery toast. At dinner there was turkey and Christmas pudding—of a kind which mother never made! And nuts! I got a bad Brazil, a chestnut, and three shrivelled almonds. Outside, the atmosphere was like that of the "medium" room of a Turkish bath.

Seven stokers fainted on account of the heat, and were laid out on a hatch cover like dead flies. The wireless operator, with whom I was, of course, pretty thick, chose the occasion for one of his annual attacks of malaria, and I spent some hours in hearing his teeth chatter with ague. He was slightly balmy on the crumpet, too, and kept asking me to listen to the band. (The nearest band was several thousand miles away, on the Bund at Bombay.) Oh, quite a cheery Christmas!

"HARK BACK WITH ME"

Is this "Ariel" recounting some of his many radio adventures to a few of his colleagues? It may be! On the other hand, it might be somebody else posing for an appropriate illustration to this article. What do you think?

Plenty of Ice!

As a relief from the heat, hark back with me to that Christmas which I spent in Northern China, at a place with a name like a crossword puzzle read backwards. I have never been so cold and miserable as I was on that day. As usual, I was travelling, and the ship was held up in the roads for some reason which never was divulged to anyone but the purser—and he wouldn't tell. I put on two complete suits of clothes—undies and overs—and then got into my bunk, and still I shivered. The pages of my book felt like sheets of ice: woodwork felt icy and

(*Continued on next page.*)

"SOME RADIO CHRISTMASES"

(Continued from previous page.)

metalwork burnt with the cold like a red-hot poker. A Christmas of swirling-yellow sea, pouring rain and icy wind.

Business took me ashore to the local radio station, and the populace improved the occasion by organising a small revolt.

FROM SIR OLIVER LODGE.

To all my friends among the wireless listeners all over the land I send my heartiest greetings and a Christmas message of love and goodwill. We all hope for some relief from our present troubles and a happier outlook for the world. In spite of untoward happenings, may the season bring much domestic happiness and family affection to you all.

OLIVER LODGE.

It was then that I first "smelt powder," and heard the voice of the bullet in flight. Of course, I was in a first-class funk, and bolted into a shop for cover, where I was attacked by a yellow-mugged idol with a bamboo. I took his cane away, broke it over my knee, pushed him under his own counter, and retreated into his inner room while the mob surged by, firing happily. There I had a tremendous surprise, for, seated on a low bamboo stool, was a white woman, an Austrian or a German, I should judge, working silken flowers on a black silk gown. Not being a romantic fool I legged it and asked no questions.

I went back to the ship and read the skipper's copy of "Pickwick Papers," trying to imagine myself at home in my beloved Kent.

One Christmas in Majorca stands out clearly in my memory. The wireless mast, a huge steel structure, had fallen during a gale and had wrecked most of our quarters, luckily killing or injuring no one. But the kitchen and chimneys were smashed, and so our meals had to be cooked on an improvised oven in the open air. We had lean goat chops and black bread that Christmas, plus some wine which was as like to red ink as anything I have tasted. On Boxing Day, a day of storm, when the sea was like a wild beast, I tried to pick a half-drowned dog off the beach, and got caught by the waves and dragged in. Only my will and a rope saved me, but I was nicely messed up, and have never liked brown dogs since.

On the following day a man who had been missing for three weeks was brought in by the sea—and I had to identify him. I couldn't! The fish had been before me——

Christmas in New York! A blizzard on, too! Pre-war New York was a place of contrasts; holes in the pavements of the "streets," millionaires' mansions on the "avenues." I went to hear a famous preacher at the Fifth Avenue Baptist Chapel, and observed (a) that the sidesmen wore dove-grey gloves; (b) that it was in order to clap the preacher's remarks; and (c) that whites and niggers mixed there as they did nowhere else at that time. I had dinner at a place where, I now see, only out-of-work carpenters and ticket-of-leave men were in harmony with the establishment; but I was very hard up and also very green in those days. As to radio—well—er—'smatter of fact, I was looking for a job then, hanging round De Forest's office, which was up about thirty storeys! I never took any money off De Forest, and I had raging toothache all the way home—a month's trip on a cattle-boat, boys! A wisdom tooth, and no doctor aboard!

The Happiest of All.

I pass over the war period. I had four radio war Christmases and spent the fifth near the pearly gates with "Spanish 'flu."

The sixth after 1914 I spent with a frame aerial and a seven-valve set, trying to revolutionise wireless. Luckily I failed.

And the happiest of all radio Christmases was that of 1923, when broadcasting was in full swing, when I had a real good set and a full house, wife, kiddies, and friends all together, and radio broadcasting a new wonder.

Since then—ah, well, radio is a commonplace thing now, and kiddies are over-critical, and friends drop off, one by one, leaving memories—and "Ariel" has to carry on somehow, but he remembers that he is "Ariel," the eternal—like Christmas and all that Christmas means—and so I leave you, to your Christmas joys. And "God rest ye merry, gentlemen, may nothing you dismay."

FROM SIR AMBROSE FLEMING.

I have great pleasure in wishing all readers of "Popular Wireless" a happy Christmas and a prosperous New Year. That great addition to the pleasures and interest of life coming from the broadcasting of music and speech is more appreciated than ever, and the home construction of wireless receivers is a never-ending source of interest to innumerable amateurs. It cultivates a number of useful qualities of hand and head and stimulates a keen interest in a highly scientific pursuit. We find how much we value the broadcasting if our receiver breaks down and we cannot immediately set it right. It supplies, as the advertisements say, a long-felt want, and we heartily wish it progress and improvement.

AMBROSE FLEMING.

A POLICEMAN'S LOT . . .

Mr. Dean, a young Brighton radio enthusiast, and the tiny radio transmitter he has designed for police use.

FROM MARCHESE MARCONI.

It gives me great pleasure again to greet readers of "Popular Wireless" with seasonable wishes for Christmas and the New Year.

These greetings are no mere formality, for I feel that the man who adopts such a fascinating hobby as wireless is most likely to have a happy and interesting Christmas and New Year.

Whether he ranges far over continents and oceans through the medium of the ether, or whether he is more modestly concerned with simple reception from local broadcasting stations, he is in touch with one of the greatest and most mysterious phenomena revealed by science, which constantly offers him unlimited sources of entertainment and information, and in addition brings to his laboratory or to his fireside a whole host of invisible but welcome friends.

G. MARCONI.

HERE AND THERE

A bunch of useful tips for the practical amateur.

One of the best methods of checking distortion is a milliammeter connected in the plate lead of the last valve.

* * *

If your last valve's milliammeter kicks upward to a higher reading when loud signals are received, it indicates that the negative grid bias to the power valve is too high.

* * *

Downward kicks of a milliammeter in the power valve's plate circuit indicate that the distortion is due to the grid bias being too low.

* * *

Increasing the H.T. on a power valve, and increasing grid bias to correspond with it, enables the valve to handle a larger output, and thus eliminates distortion due to slight overloading.

* * *

If your panel space is rather cramped, and you have difficulty in fitting a panel bracket, remember that triangular pieces of wood can be very satisfactory in place of metal brackets.

* * *

The loss of emission after a valve has seen long service is often first indicated by failure to get the usual reaction effects.

* * *

Although a twisted connection in the aerial or earth lead will give apparently satisfactory reception for a time, it is certain to deteriorate rapidly and cause heavy loss of strength after a few weeks.

* * *

The capacity of a good variable condenser when "all out" is not more than about one-tenth of its maximum capacity when "all in."

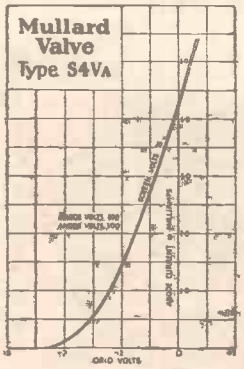
AN OUTSTANDING RANGE OF A.C. SCREENED GRID VALVES

Mullard A.C. Screened Grid Valves (types S.4V, S.4VA and S.4VB) have a really impressive performance. The stage gain obtainable in conjunction with correct circuits is enormously high, making long distance reception really practicable. As with all Mullard A.C. Valves, the electrode system is mechanically compact and rigid, and of high electrical efficiency. The different impedances of the three types offer a choice of valves to suit every circuit. A Mullard Screened Grid A.C. Valve will noticeably improve your radio.

PRICE 25/- each.

Mullard

THE·MASTER·VALVE



CHARACTERISTICS

S.4V.

Max. Heater Voltage ...	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75 volts
*Anode Impedance ...	909,000 ohms
*Amplification Factor ...	1,000
*Mutual Conductance ...	1.1mA/volt

* At Anode Volts 100. Screen Volts 75. Grid Volts Zero.

S.4VA.

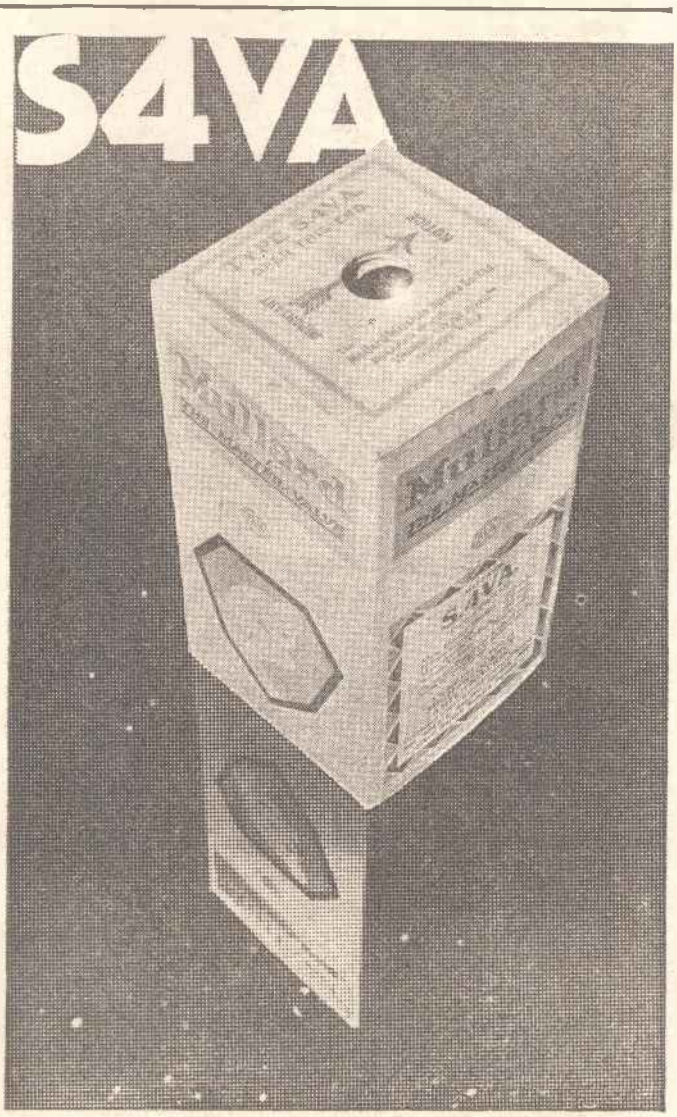
Max. Heater Voltage ...	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75-100 volts
*Anode Impedance ...	430,000 ohms
*Amplification Factor ...	1,500
*Mutual Conductance ...	3.5mA/volt

* At Anode Volts 100. Screen Volts 75. Grid Volts Zero.

S.4VB.

Max. Heater Voltage	4.0 volts
Heater Current ...	1.0 amp.
Max. Anode Voltage ...	200 volts
Positive Screen Voltage	75-100 volts
* Anode Impedance ...	257,000 ohms
* Amplification Factor ...	900
* Mutual Conductance ...	3.5mA/volt

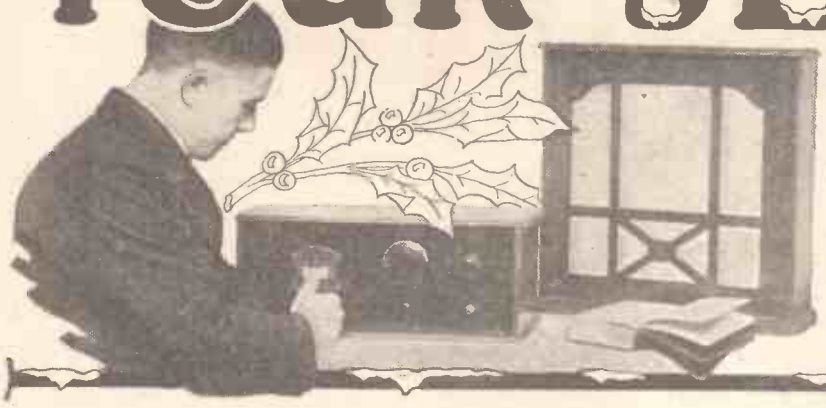
* At Anode Volts 150. Screen Volts 75. Grid Volts −1.



Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

Arks

YOUR SET AT XMAS



by G. V. DOWDING
ASSOCIATE, I.E.E.

Some seasonal suggestions concerning radio reception in general and your own receiving outfit in particular.

HAVING survived the B.B.C.'s hilarious, side-splitting, uproarious birthday broadcasts, we must now get to work with our preparations for the Christmas programmes. Maybe there are a few listeners who failed to appreciate the mirth-provoking items provided by the eminent corporation on the occasion of its birthday. For them I grieve.

The mere idea of a corporation having a birthday makes *me* laugh. I am sure I don't know why, but the fact remains that it does.

Brought from Bulgaria!

I have one suggestion to make regarding this matter, and that is that the B.B.C. should push back its birthday date to November the fifth. I am a stout advocate of all forms of rationalisation, centralisation, pacification and pyrotechnics.

However, the past is dead, as the motorist philosophically said as he glanced back at the tramcar he had knocked over. We must now face the future with its big slice of festivities just ahead.

Over Christmas and the New Year, as you probably know, the B.B.C. does make very special efforts to provide *seasonal* entertainment. Our broadcasters search the whole wide world for suitable material. They collect bells from Bulgaria, carols from Camberwell, hooters from Hong Kong, syrens from Silesia and depressions from Iceland, and mix them all up, label them a grand good-night and serve them cold to a shivering microphone.

To Gladden a Highbrow.

You cannot possibly afford to miss such things. I make no mention of those beautiful Bach Cantatas, Bassoon Recitals, Oboe Obligatos, Fugues and Fantasies for the French Horn and Petites Suites for Three Strings and an Onion;* that are always included to gladden the hearts of the more high-browed among us.

In fact, I feel certain that there will be at least *something* to please *someone* in the very varied fare the B.B.C. has prepared for us this Christmas. I did hear, although mind you, this is pure hearsay, that there is to be a surprise item in the form of a debate on "Why I Collect Postage Stamps," by Jack Payne and the Postmaster-General, with Sir Thomas Beecham in the chair. Another rumour has it that Mr. Agate and Hannen Swaffer are to engage in a friendly microphone tilt over the controversial question, "Should B.B.C. plays be banned?"

Anyway, it is almost certain that a last-minute rapprochement between the B.B.C. and the Fish-fryers' Union will permit of the broadcasting of those lovely songs; "My dear Soul," "A Place in Your Heart," and "I'm a Little Shell-fish," by the Billingsgate choir.

Broken Bottles.

So you see how absolutely imperative it is that you should keep your set in perfect working order between December the twenty-fourth and January the first. It will be quite unnecessary for you to buy new valves, if your present valves are quite all right; likewise, there will be no need to replace your present batteries if it is certain that these still have many moons, and one or two suns, of useful life before them.

On the other hand, I would urge you to equip yourself with one or two "spares," if you have not already done this. Always have at least one spare valve by you. You can never tell when one of those valves in your set is going to stop being a valve. Little things like an accidental application of a hundred volts to its filament, dropping a boot on it, or a sudden surge of Concerto in B Flat are liable to spoil *any* valve's electron emission.

". . But perhaps the set isn't really so bad!"

If you have a spare valve ready, you can deal with such a situation at once. Out comes the broken "bottle," in goes the "spare." The whole thing's over in a flash: and you must trust to providence, and your own ability to handle such crises, that the "spare" valve doesn't immediately go the same way—in a flash!

If you have a detector, 2 L.F., or similar set, I would advise you to keep an ordinary L.F valve as a spare. You could use it, at a pinch, in any position, although Dr. Adrian Boult would, no doubt, regard you with some scorn if you used it in the final L.F. stage.

But what about the batteries? These are, indeed, most important items except where an all-mains outfit is used. You might be thinking that your batteries are sufficiently packed with electrons to stand up against a full week's listening.

The Man Who Forgot.

And so they might be, for an *ordinary* week's listening. But this Christmas you are going to have a most *extraordinary* week's listening. Your "Radio Times" will show you that. Even *you* may not be able to stand it, so just imagine what a strain it is going to be for those poor little batteries.

If the worst comes to the worst—as well it may—you can turn to the oranges, the nuts, the crackers, the lemonade, the soda-water and any one of a hundred and one other Christmas solaces, but the batteries will have to continue their stand against the broadcast broadsides all the time, unless you mercifully switch off.

But that is the trouble, I don't suppose you will switch off. You will have radio going "as a background" the whole time. You may even forget to switch off at the end of a day's transmission. One

(Continued on next page.)

(* Might be "Organ." The author's writing is always difficult to read.—Printer.)

YOUR SET AT XMAS

(Continued from previous page.)

does little things like that at Christmas. I knew a man once who got thoroughly mixed.

At the end of a jovial evening, he suddenly remembered that he had got to switch something off, but couldn't think what it was despite considerable concentration. At last the idea struck him. He grabbed his walking-stick, rushed out of the house and tore round the town trying to poke the street lamps into extinction. (He'd started life as a lamp-lighter!) While in gaol, his mind cleared, and he groaned at the thought of his new H.T. battery running down to complete dissolution, and his fairly new accumulator sulphating its way to destruction. It was his radio set that he should have switched off!

I know you will forgive me for this inconsequential chatter—but the holiday spirit has me in its grip. Nevertheless, I must not forget that it is my duty to impart words of wisdom unto you.

A Surprise for Sir John.

Very well, then, I must be serious. That is vital, for we have it on the authority of the B.B.C. that this Christmas affair is a very serious business. Having discussed valves and batteries, if not fully, at least in some little detail, let us turn our attention to the aerial. I know it's cold out there in the rain, but you can look through the window.

What do you see? A weedy fibre trailing its miserable, bent and twisted way between something that looks like a broken broomstick and a rusty nail driven into the damp-sodden wall? Well, that's no good. You can't call that an aerial. Call it an antenna, if you like—beetles grow those things—but don't call it an aerial.

Tear it down before Sir John Reith sees it, or he may think all his work has been in vain. In its place erect an aerial; and make it as high as you can without impeding the progress of the air mails. Give it insulation fit for the noble work to which it may have to turn a deaf ear. Finally, see that it is fixed to withstand the gales that will blow around it.

Now cast your eyes down. Do you see an ancient, corroded wire snaking its disgraceful way to a lazy, ineffective loop around a dirt-covered water pipe? Or do you see a tired metal strand that wanders out of the window and *may*, if it's lucky, make contact with about an inch of earth?

The Fever of Reform.

If either is the case, pluck out the weed and plant a sturdy growth in its place.

All that done, return and have another look at that set of yours. Filled with the fever of reform, tear off its lid and gaze at the horrible mess of bits and pieces that meets your eye. But perhaps it really isn't so bad; may-be that fellow Jones up the road has a thing that looks like a dustbin filled with old tins in comparison with your own outfit. Nevertheless, a stern task lies before your set.

Look at the leads. Re-cement any that are the slightest bit shaky. Sweep out all that dust and all those cobwebs and cigarette ends. Get a vacuum cleaner on the job, if you've got one in the house.

Don't give any of your Christmas guests the chance to bring your set into similes, such as, "Those B.B.C. talks are as dry as the dust (an eye roves round the room) on your radio set."

About That New Set.

And when you have made certain that everything in the set is as it should be, turn it on and try to imagine what it will sound like when the room is filled with roars of laughter, the rattle of cracking walnuts, and sporadic outbursts of cork-pops.

Will the dulcet tones of Savoy Hill's chief announcer rise to the occasion, will the new Symphony Orchestra, complete with its one hundred and forty, or thereabouts, musicians, all lustily scraping their fiddles, blowing their trumpets and banging their drums, manage to make itself heard through your radio receiver above the seasonal local interference?

Or will there be only a tiny squeaking and twittering in the distance heard at infrequent intervals? These are the questions that you must ask yourself as you stand before your receiver.

If you have any doubts, build a new set before it is too late. Your guests will never forgive you if you fail to give them those B.B.C. talks with stentorian loudness. Some of them may have come hundreds of miles just to hear those talks, giving as a lame excuse that they have, "Looked you up to say Merry Christmas, old man."

HE DOESN'T LOOK PLEASED!

"But you can be certain there will at least be something to please someone in the Xmas programmes."

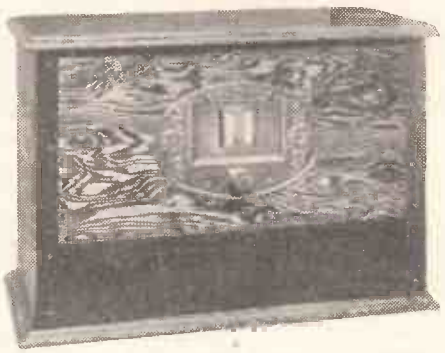
A Loud-Speaker Tip.

By the way, I nearly forgot the loud speaker. That would have been a most serious omission from an article of this character. Acoustic experts will tell you that the best possible position for a loud speaker is at eye level. Now that is as may be, but it decidedly is not the case at Christmas. I speak from practical experience. I would even go so far as to say that the worst position of all for a loud speaker is at the level of the eye—at Christmas.

No, for goodness sake don't have the loud speaker so that it can strike the eye. Conceal the thing altogether, if you can, for its own safety. Some people are rather careless with other people's property. I know you wouldn't throw anything at your own loud speaker but, in the heat of the hilarious moment, would you throw anything at anybody else's? Ponder deeply upon this vital question.

If you can hide the whole set, so much the better. One, or even more of your guests might suffer from that distressing complaint known to the medical fraternity as twisterphobia. It is a nervous disease, and anyone suffering from it feels an urge to twist things. If he sees anything twistable he swoops on it like an eagle.

THE "RED STAR" SET



A newcomer to the ranks of low-priced receivers.

He will pick up a trinket and twiddle it, he will twist the knob on a fire-dog, he will work himself up into a perfect ecstacy of twistation with a loose umbrella handle. But if he sees a radio set he will almost howl with joy. He'll dart at it, seize the dials, and nothing short of an earthquake will move him. There is no cure save sulphuric acid injections and these are, of course, attended by considerable danger to the patient.

However, Christmas comes but once a year (old Spanish proverb), and I do hope you will make the most of it. Radio can help you mightily to have a good time, even if you use it merely to remind you that somewhere, someone is working while you are playing.

At the Other End.

While you are free to crack merry quips and juicy Brazils, serious young gentlemen, complete with spats and dickeys, will be bearing struggling victims to the microphone so that their screams for mercy can be borne on the wings of the ether to the ears of millions of unheeding listeners.

In the rosy-glow of huge transmitting valves, other serious young gentlemen, having carefully laid aside their spats and dickeys and donned aprons, will be busy tending the huge radio machines at Brookmans Park, Daventry, Cardiff, Manchester, and other places.

I wonder whether they will wistfully think of the millions of Christmas puddings and mincepies that will be contacting with as many upper and lower sets as they crouch over their meters and scoop up such electrons as may try to slide off while they aren't looking?

Ah, well! They are part of the cause of a not-too-bad effect!

THREE NEW MARCONI VALVES!

COMPLETING A WONDERFUL 2-VOLT SERIES!

S2/c

A new screen grid valve which at last provides, in perfectly blended unison, every feature required in the ideal H.F. amplifier. Marconi S2/c combines a very high amplification factor with very moderate impedance; enormous magnification is thus easily obtainable in any receiver; at the same time the minute self capacity ensures perfect stability. Rigidly constructed and unvarying in characteristics, S2/c will set new standards in successful H.F. amplification **20/-**

L2/b

Remarkably high mutual conductance—1.55 MA/volt—excellent amplification combined with particularly fine reproduction—these are outstanding points in the performance of Marconi L2/b, a new 2-volt low frequency and general purpose valve of exceptional efficiency. L2/b is a sensitive heavy duty detector, and a supreme initial L.F. amplifier; its low impedance permits of perfect reproduction with transformer coupling, the very high stage gain greatly increasing the overall efficiency of any receiver. **8/6**

P2/b

A new 2-volt super power valve of amazing efficiency with characteristics superior to those of any equivalent 6-volt type—truly a crowning achievement of Marconi research! Marconi P2/b successfully unites a high amplification factor with the low impedance of only 1,850 ohms, a figure ideally suited to the average cone or moving coil speaker. Exceptionally steep slope renders it the foremost output valve for every battery operated receiver in which ample volume, pure tone and strict economy in current must combine for perfect reception. **13/6**

CHARACTERISTICS.	S2/c.	L2/b.	P2/b.
Amp. Factor	330	15.5	6.5
Impedance	300,000	10,000	1,850
Mut. Conductance	1.1	1.55	3.5
Fil. Volts	2.0	2.0	2.0
Fil. Amps.	0.15	0.1	0.2
H.T. Volts—(max.)	150	150	150
Price	20/-	8/6	13/6

USE MARCONI VALVES

The Valves the G. Marconi **Experts use!**

DO WE REALLY NEED — RADIO AT — — CHRISTMAS?

Five favourites of the ether, Tommy Handley, Wish Wynne, B. Walton O'Donnell, Bransby Williams, and De Groot, discuss this very seasonal subject, and have some interesting things to say about it.

TOMMY HANDLEY.

YES!

Of all the periods of the year, surely Christmas is the one when entertainment via the loud speaker is most welcome in the greatest number of homes.

After all, Christmas is still the one great annual festival of the home; the one period when people do not, even nowadays, run off to restaurants for their amusements; the only two days in the whole year when the appeal of cinemas and other entertainments which involve a journey out of doors loses some of its attraction.

A Fireside Festival.

It is the festival of the fireside, and it is to the fireside that people want their entertainments brought. In pre-wireless days they had to invent their own amusements. Some of them did it very successfully, and will go on doing it in spite of wireless, but for those others who found it difficult wireless comes as a priceless boon.

CHRISTMAS CHEER

Mr. Bransby Williams, whose popular Dickens characterisations make him particularly fitted to discuss an Xmas topic.

Suppose for a moment that at Christmas Savoy Hill decided to close down for two days.

Think of all the impatient possessors of new sets, agog to try them out and display them to the admiring gaze of visiting relatives. Think of those who want to dance on Boxing Day and find a piano accompaniment rather thin. There are still people who do not possess gramophones?

And think, too, of the golden opportunity wireless has at Christmas time of making new and permanent converts. Listeners, if they are at all human, are in the most receptive, kindly and uncritical mood of the whole year.

B.B.C. BAND CONDUCTOR

Mr. B. Walton O'Donnell, the conductor of the B.B.C. Military Band.

For the time being highbrows cease temporarily to be highbrows, lowbrows are almost ready to admit that there may be some virtue in Promenade Concerts, father forgets his unpaid income tax demands and bills for school fees, and mother suddenly discovers enough leisure really to enjoy the programme.

Not a Grouse.

Full to the brim with turkey, port and plum pudding, not even the most irascible listener has the energy, or the inclination, to indite one of those vitriolic letters to the Director of Programmes.

B. WALTON O'DONNELL.

Announcers, radio engineers, trombone players and wireless comedians are human beings with feelings just like you and me. This being so, it seems hard that they should be dragged from their suburban festivities on Christmas Day, forced to board empty tramcars, and walk along a deserted Strand to Savoy Hill.

Is It Forced Gaiety?

Anyone with a heart must feel for an announcer's children at Yuletide. Who cannot imagine the real feelings of the concert party in the studio, the members of which are expected to convey over the ether a carnival spirit which must be largely assumed?

And there are lots of people who have too much to do at Christmas to want to listen in. Mothers are busy hearing what has happened to Aunt Mary and Cousin George during the past twelve months. Fathers are too busy playing with clockwork trains while their anxious offspring look on, wondering the while when it will be their turn!

"AS YOU WISH"

Possibly a short "close" season would be good for broadcasting in the sense that, deprived of their wireless, people would discover how much they really valued it.

(Cont. on next page.)

Miss Wish Wynne thinks it is a matter for personal choice.

DO WE REALLY NEED RADIO AT CHRISTMAS?

(Continued from previous page.)

Still, there are many people who do want to listen in at Christmas. So, although as an ordinary human being I would rather be at home than working, if the work has to be done I should be the last to protest against it!

* * *

BRANSBY WILLIAMS.

To me this seems a silly question. Radio is there. Those who want it can have it, and the rest can please themselves. They need not switch on!

Welcomed by Many.

No one asks or compels them to listen. On the other hand, there are thousands of lonely people in lonely places who welcome wireless at Christmas.

I can say this—that my broadcast of "The Christmas Carol" last year brought me the biggest postbag I can remember. In every town I have been in since, people remind me of the pleasure it gave them.

* * *

WISH WYNNE.

Do we really need radio at Christmas? Surely the obvious answer is that some people do and some people don't.

Surely, too, we should struggle as effectively as we may against the mistaken idea of standardisation, against any suggestion that we can all be convinced that we ought, or ought not, to listen at Yuletide—or for that matter, at any other time of the year.

The particular way in which I celebrate Christmas is a personal matter. No one is in a position to lay down the law about it.

I may like to rush off to Brighton, where every moment of my days will be filled with some activity or other, without the necessity of listening in even for five minutes. John Smith may have some form of family ritual which is followed rigidly every Christmas, and which is so all-sufficing that the very sound of a loud speaker would seem to him a sacrilege.

A Matter of Choice.

But that is no reason at all why everyone else should be deprived of his wireless! For the John Smiths are in a hopeless minority. There is, however, always a danger that their protests may be so noisy as to convince the powers that be that they are in a majority.

Bill Jones, on the other hand, represents the normal way of looking at radio. He accepts it as a convenience which is laid on like the water supply. The analogy is imperfect, but it will serve.

And at Christmas, even if he does not use it much, he likes to know that it is there. Certainly it never occurs to him that people can be mad enough to suggest that it should be temporarily shut off for the sake of a few cranks!

Even at Christmas time there are very few houses where people are not glad to switch on the wireless for a few moments which would otherwise be empty and unemployed.

* * *

DE GROOT.

Yes—I feel sure that the general consensus of opinion would reveal that we do want radio at Christmas. And although there is in some quarters a feeling of sympathy with the artistes who are forced to work on such occasions, I think that this is, on the whole, misplaced.

The suggestion that artistes as well as other folk should rest at these times does not bear examination.

An artiste is a servant of the public. True, he works, as a rule, at just those hours which constitute the leisure of the general public, but if he didn't, both his audience and his income would vanish almost to nothing. Even if he works while others play, it is also true that he plays, and very frequently sleeps, while the world and his wife get on with their work.

He cannot have it both ways!

There may be occasions when this necessity of working while others play weighs rather heavily on individual performers. Christmas Day and Boxing Day are very good examples of these. At this time I suppose no artiste really likes working.

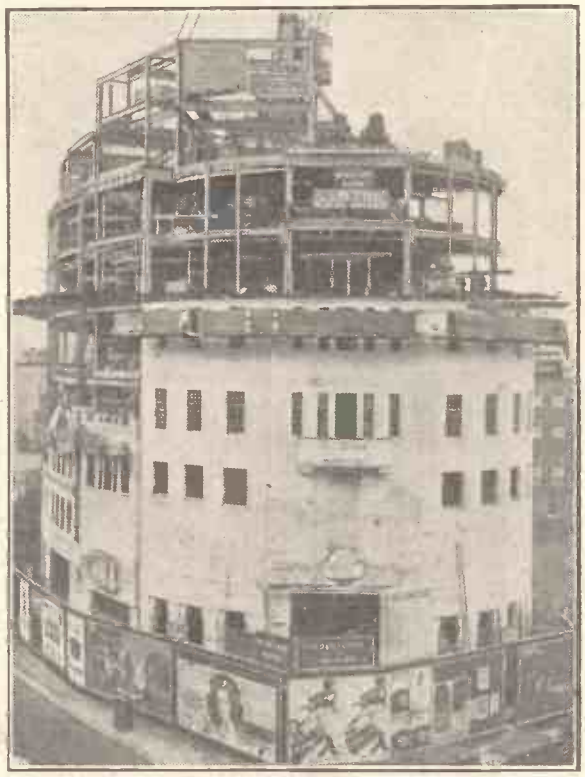
But for the artiste with any sort of conscience there is no shirking such a necessity. The fact that so many additional thousands of people are craving for entertainment makes it incumbent upon him to satisfy their requirements if the task falls to him.

Really Very Fortunate.

Surely the artiste who is called upon to broadcast, say, on Christmas Day should consider himself a very fortunate being. He has an enormous audience—far larger than on an average evening. His work reaches a vast circle of listeners who are in the most friendly frame of mind.

As an artiste he should look on a Christmas engagement as a profitable and pleasant duty!

PROGRESS AT PORTLAND PLACE



The new B.B.C. Headquarters building is at last beginning to reveal its form and it won't be long before the main constructional work is completed.

BROADCAST BREVITIES

Some Interesting Station Information.

The north regional station at Moorside Edge is to use a wavelength of 479·2 metres for its Regional programme and 301 metres for its National.

* * *

The Manchester transmitter will close down when Moorside Edge starts up at the end of the year, and it is probable that Manchester's wavelength (376·4 metres) will be given to the Glasgow station.

* * *

5 G B, the Midland Regional, will probably use a wavelength of 398·9 metres (at present used by the Glasgow station), when the Moorside Edge station is put into service.

SCREENING FOR FRAME AERIALS

Some Practical Tips for Portable Set Builders.

IT is often assumed that any receiver with one or two stages of H.F. amplification will work satisfactorily on a frame aerial if the latter is correctly connected into circuit. This, however, is not always the case.

Often a receiver which is normally quite stable will become a squealing monster when an attempt is made to use it with a frame aerial instead of the outdoor aerial. This instability will often persist even when an earth connection is used with the frame, although the addition of an earth is generally considered a cure for such trouble.

The whole thing is really a matter of screening. It must be remembered that a frame aerial has a very large field; if it had not it would not be very efficient as a pick-up device.

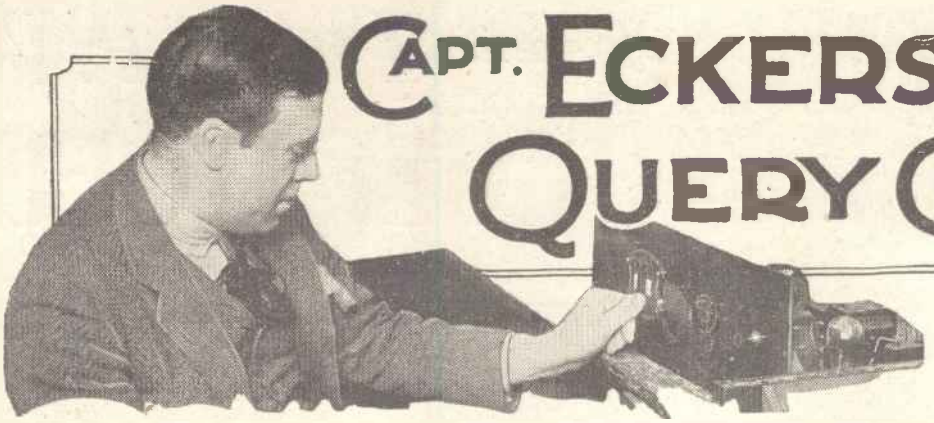
Just a Large Coil.

The frame aerial is really just a large coil tuned in the same way as the coil which it replaces. But the coil has a vastly smaller field and, accordingly, with it a small amount of screening will keep the set stable.

On the other hand, the frame aerial may couple with one of the other coils on the set. This, of course, would not happen if the H.F. and detector part of the set were completely screened.

The remedy, therefore, if you experience such instability when working with a frame aerial, is to try adding extra screening to the set, always connecting it up to L.T. negative.

CAPT. ECKERSLEY'S QUERY CORNER



A SHOCK FROM THE AERIAL—HIS PANEL TURNED GREEN—WHEN THE H.T. RUNS DOWN—SURFACE LEAKAGE—SEDIMENT IN THE CELL.

Under the above title, week by week, Capt. P. P. Eckersley, M.I.E.E., 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.

A Shock From The Aerial.

J. B. W. (March).—"During a recent thunderstorm, my aerial was disconnected from the set, and the lead-in allowed to swing free. Several hours after the storm had subsided, in fact, during the next day, I took hold of the lead-in to connect it to the set, when I received a nasty shock.

"Is it possible, therefore, that the aerial could have been charged during the storm and to have held the charge until the next day?"

Oh, certainly! Good porcelain insulators will hold a charge for ages and ages, even if wet.

It's far better, in any case, to have an earthing switch which changes over the aerial lead-in either to the aerial terminal of the set or to the earth direct. This switch is preferably mounted outside the window, where there is no danger of any kind.

If one gets "the earthing habit" after using the set one is fully protected; but *do* remember to change over on starting to listen!

A CHRISTMAS GREETING TO OUR READERS

FROM CAPT. ECKERSLEY.

In spite of everything I believe in the future of broadcasting. Nothing will and nothing has tempted me from its service. I like to feel that the readers of "Popular Wireless" are fellow-believers.

It is, therefore, with no sense of condescension but rather as expressing the existence of our goodwill born of a common enthusiasm, that I ask you, and the Editor, and the staff of the Paper, to accept my best wishes now, and in the New Year and the years to come.

P. P. ECKERSLEY.

His Panel Turned Green.

J. B. S. (Southport).—"During the last six months the ebonite panel of my receiver has turned from its normal black colour to a greenish hue. Does this indicate any change in the insulation properties of the panel, and should I invest in a new panel?"

The changing colour of your panel probably, in strict theory indicates a change in its insulating properties. But the change is probably not serious enouhg to make the slightest difference to the performance of your set.

Ebonite, unless of the very best make, is inclined to do this. Its surface can be, to some extent, restored, I believe, by wiping with a paraffin-soaked rag.

But I detest the smell of paraffin, and would rather waste a milliamp. Don't worry!

* * *

When The H.T. Runs Down.

L. A. D. (Bournemouth).—"My detector and L.F. receiver recently developed a curious crackling noise, but by placing a large fixed condenser across the battery this interference ceased. The H.T. battery, however, ran down very quickly, and I can only assume that the above fixed condenser was taking current from the battery. Is this correct?"

It's a little difficult to see what happened I do not see quite why taking a load from the battery through a leaky condenser should cure a crackle. Far more likely that the battery developed a fault which manifested itself in the form of a crackle.

Then the condenser could stop the crackle in the way of absorbing sudden charges of battery output. But the battery being faulty, ran down quickly. This is my suggestion for what it is worth.

But have the condenser tested.

* * *

Surface Leakage.

W. S. L. (Leyton).—"I am using accumulator H.T., and I find that a certain amount of leakage occurs. In consequence, the cells tend to run down rather more rapidly than they should. Can I do anything to stop this?"

Each cell can stand on porcelain insulators, for one thing. The porcelain needs putting well under the accumulator.

Then a piece of good hard wood itself supported on porcelain makes earth leakage a minimum.

Then there is leakage over the top of the accumulators. It is possible to insert insulating switches between blocks of cells of 50 volts per block, say. These are "dissed" when not working.

* * *

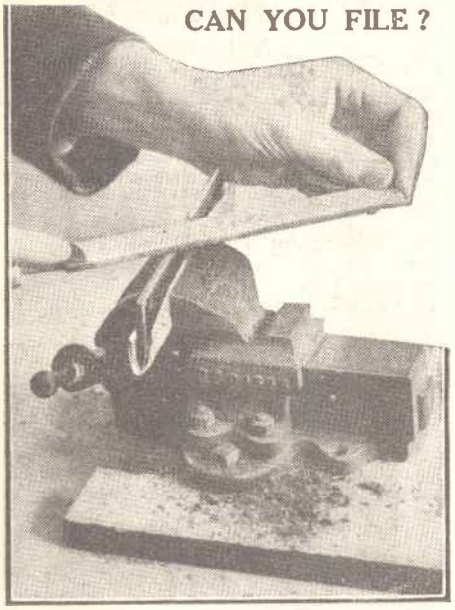
Sediment in the Cell.

B. V. S. (Clacton).—"My receiver is rather heavy on filament current, and to satisfy its requirements in this matter I purchased about a year ago a rather expensive six-volt accumulator battery of high capacity. This I have given a weekly charge in strict accordance with the maker's instructions and, in general, have done everything to maintain the battery in good order.

I have, however, been somewhat alarmed to notice that there is a thin film of sediment at the bottom of each of the three glass containers. The battery is giving excellent service and appears to be retaining its charges in a normal manner.

Does the film of sediment indicate that anything is wrong? I would add that the plates show no sign of sulphation which, I understand, would be manifested by white patches appearing on them."

CAN YOU FILE?



Not everyone knows the tip of holding the file at the end, and yet it is the only really satisfactory method.

Every battery sediments a certain amount. There is nothing to prevent this. It can be minimised by careful treatment.

When the sediment gets so high that it touches the plates, then it is time to do something. Usually one cleans out the container, first removing the plates. This is possible with glass containers and unsealed types of accumulators, but with typical wireless batteries it is a maker's job.

The "P.W." "CHEF-D'OEUVRE"

Here indeed is a magnificent 'Three'—it is as far removed from the usual run of sets as a diamond is from a piece of coal. Its design is really NEW, not a hash-up of standard practices. Though inexpensive and easy to build its performance places it in a class apart. For selectivity combined with p let alone beaten, by any S.G. three so far produced. It is in

Designed and Described by the "P.W." R

"WHAT we want for the Christmas Number of POPULAR WIRELESS," said the Editor, "is the finest 'Three' that has ever been built. A set that will simply stagger the man who constructs it. A masterpiece! A veritable chef d'oeuvre!"

Since those words were uttered the "P.W." Research Department has had the busiest and the hardest time we have ever struck! But it was worth it all, for the result is here before you this week in the form of a really remarkable last-word three-valver.

A Triumph From The First.

Honestly, it is not easy to present the description of this set with our usual decorum of phrase and measured choice of words, for the tests have been so strikingly successful that some of the enthusiasm we felt is bound to creep into any article about the set. But we will try to be brief and business-like.

First, we want every reader to be clear on one point—and that is this: Our own remarkable results with the "Chef d'Oeuvre" are not due to "cooking" of the finished set, but are due to its own outstanding merits.

On the very first try-out it was a triumph. Anyone who builds it, using components that are of similar quality and type, can expect the same success.

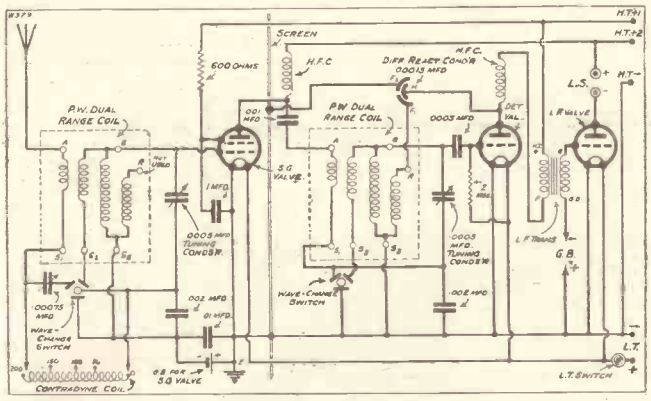
The secret of this receiver is the inherent soundness of the design, and the careful choice of every circuit-value; and as we propose to give complete and comprehensive details of construction in this article, there is no reason why *you* should not repeat our astonishing experience with the "Chef d'Oeuvre."

Perhaps we had better explain that word "astonishing." And the best way to do that is to consider this set, as compared with the three-valvers of the past.

Marvellous DX Powers.

Fundamentally then, this receiver is an "H.F., Det., and L.F.," intended for quality loud-speaker reception, and capable of reaching out to extraordinary distances for foreign programmes. All the parts used in it are of standard

THE CIRCUIT THAT WILL SURPRISE YOU



The design is full of new things, as you will see if you study the circuit. The "Chef d'Oeuvre" is a real super-set.

WHERE THE PUNCH COMES FROM

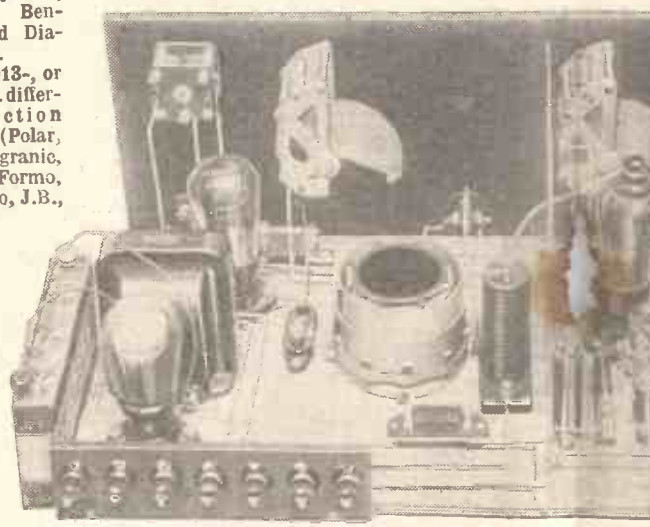
This is the low-frequency end, where real quality and ample loud-speaker strength are assured.

HERE ARE THE PARTS FOR BUILDING THE

1 Panel, 18 in. × 7 in. (Lissen, or Red Seal, Goltone, Paxolin, etc.).
1 Cabinet with baseboard, 10 in. deep to fit (Camco, or Osborn, Pickett, Keystone, etc.).
2 ·0005-mfd. tuning condensers (Lotus, or Lissen, J.B., Igranic, Dubilier, Ready Radio, Formo, Polar, Burton, Ormond, etc.).
2 Vernier dials if condensers are of plain type (Ready Radio, or Igranic, Lissen, J.B., Lotus, Formo, Ormond, etc.).
1 ·00075-mfd. Brookmans condenser (Ready Radio).
2 3-contact wave-change switches (Wearite, or Bulgin, Lissen, Magnum, Ready Radio, Red Diamond, Keystone, Pioneer, etc.).
1 L.T. switch (Bulgin, or Goltone, Lotus, Igranic, Lissen, Ready Radio, Magnum, Keystone, Wearite, Benjamin, Red Diamond, etc.).
1 ·0001-, ·00013-, or ·00015-mfd. differential reaction condenser (Polar, or Lissen, Igranic, Lotus, Formo, Ready Radio, J.B., Parex, Dubilier, Ormond, Magnum, Wearite, etc.).
1 "Contradyne" coil (Parex, or Goltone, Ready Radio, Wearite, Magnum, Keystone, etc.).
2 "P.W." Dual-Range Coils (Wearite, or R.I., Ready Radio, Magnum, Goltone, Keystone, Parex, etc.).
3 Sprung valve holders (Benjamin, or Telsen, W.B., Lissen, Igranic, Lotus, Bulgin, etc.).
2 ·002-mfd. fixed condensers (Lissen, or Dubilier, Telsen, T.C.C., Ready Radio, Igranic, Formo, Watmel, Mullard, Edison, etc.).
1 ·001-mfd. fixed condenser (Mullard, or Lissen, Telsen, etc.).
1 ·0003-mfd. fixed condenser (Ferranti, or Telsen, etc.).

FULL OF NOVEL AND EFFECTIVE

USES NEW "P.W." DUAL COILS



The new "P.W." Coils, the "P.W." Contradyne, and the "P.W." Brookma this magnificent but inexpensive set.

THE BEST S.G. THREE

power and a freedom from snags it cannot be equalled, dubitably a one hundred per cent production.
ESEARCH DEPARTMENT.

types and easily obtainable, but the set is laid out and worked out so that every ha'porth of efficiency is conserved and consolidated.

No coil-changing whatever is required. Instead there are two of the new "P.W." Dual-Range Coil units.

These little fellows have made a whole range of "plug-ins" quite prehistoric, for they cover the long and the ordinary waves with just push-pull switching. And they are not only swifter and simpler, but they are definitely streets ahead in efficiency.

Wonderful Punch.

Both the strength and the selectivity of the "Chef d'Oeuvre" are quite unusual for a three-valver, and to the "P.W." Dual-Range Coils much of the credit for this must be given. The first one slaps every ounce that the aerial can give on to the S.G. valve, and the second unit is equally generous in its deal with the detector.

Really effectiveness of this kind is not met with half as often as one might expect, because in the past efficient coupling usually meant interference from every other station on the map! Not so now.

No Half Measures.

The new coil units enable the set-designer to standardise the couplings so that he knows he can link the aerial to the first valve, and the first to the second, with a certainty of strength and selectivity hitherto unattainable.

And this exceptionally good strength itself provided us with a problem. For it meant that the local station, as well as the foreigners, came in with extra zest!

This was all to the good, in one sense, for it gave a first-class full-strength programme service, always available for the family. And thus the "Chef d'Oeuvre" qualified for a quality local receiver—easy to tune, and a sheer joy to listen to.

But how about sufficient selectivity? And how about that local station's habit of "breaking through" into the long waves?

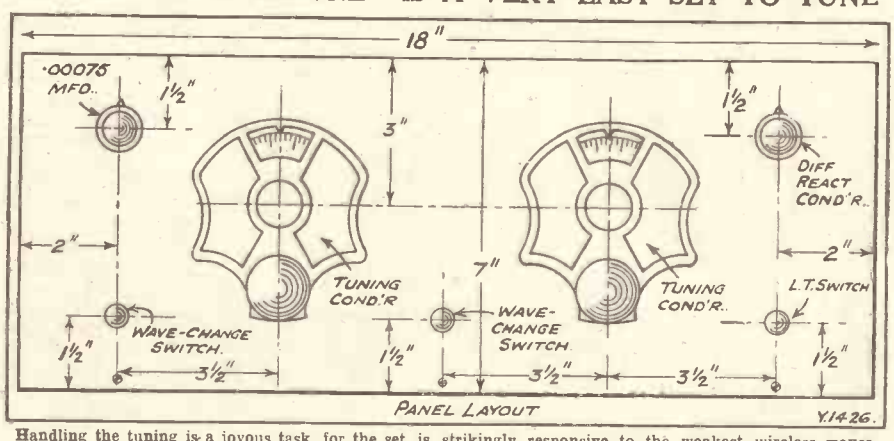
Free From All Interference.

Frankly, six months ago we should have despaired of a simple solution to those problems. But in radio things move quickly, and in the last six months we have had our experience enlarged by the "Contradyne," and by the "Brookmans" system of coupling.

On the complete set you will see we have placed a "Contradyne" coil on the baseboard, just behind the first wave-change switch.

In brief, that "Contradyne" coil keeps the "local" where you want it. Once you have set the adjustment you have finished with all that bother of "breaking through" on the long waves.

THE "CHEF D'OEUVRE" IS A VERY EASY SET TO TUNE

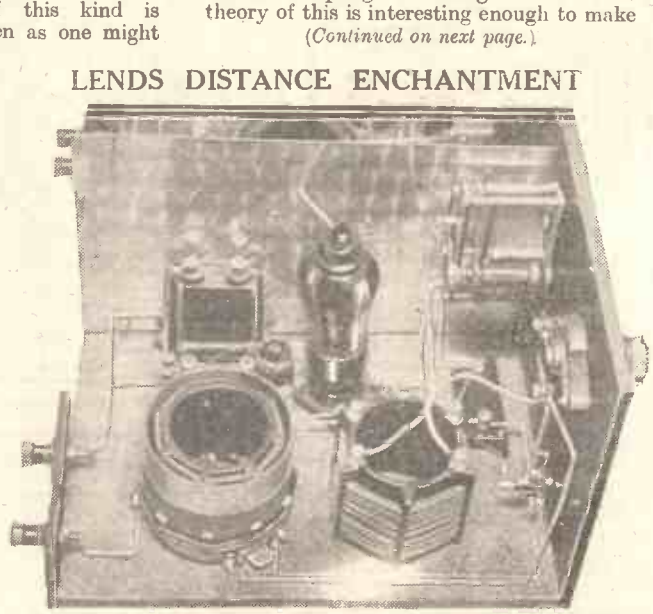


Handling the tuning is a joyous task, for the set is strikingly responsive to the weakest wireless waves in the ether.

Another very important feature of the set is the "Brookmans" method of condenser coupling for long waves. The theory of this is interesting enough to make

(Continued on next page.)

LENDS DISTANCE ENCHANTMENT



You haven't got a ghost of an idea how really well distant stations can be received until you've heard this set working.

"CHEF D'OEUVRE"

- 1 ·01-mfd. fixed condenser (T.C.C., or Ediswan, Lissen, Dubilier, Mullard, etc.).
- 1 1-mfd. fixed condenser (Dubilier, or Lissen, Mullard, T.C.C., Filta, Hydra, Formo, etc.).
- 1 600- or 500-ohm fixed resistance (Ready Radio, or Bulgin, Magnum, Parex, Wearite, Keystone, etc.).
- 2 H.F. chokes (Lewcos and Telsen, or Varley, Lissen, R.I., Ready Radio, Wearite, Magnum, Lotus, Keystone, Watmel, Dubilier, etc.).
- 1 2-meg. grid leak and holder (Dubilier, or Igranic, Lissen, Ready Radio, Mullard, etc.).
- 1 L.F. transformer (Lissen, or R.I., Ferranti, Telsen, Igranic, Varley, Lotus, Lewcos, Mullard, etc.).
- 9 Terminals (Igranic or Eelex, Belling & Lee, Clix, etc.).
- 2 Terminal strips, 7 in. × 2 in. and 4 in. × 2 in.
- 1 Screen, 10 in. × 6 in. (Parex, or Ready Radio, Wearite, Keystone, Magnum, etc.).

Wire, flex, screws, G.B. plugs, etc.

FEATURES

INCLUDES "P.W." BROOKMANS COUPLING

ns Coupling, all figure in

EVER DESIGNED

THE "CHEF-D'OEUVRE."

(Continued from previous page.)

a story, but the "practice" will be of far greater importance to the builder of the set.

For it gives far, far better selectivity on the long waves than older methods. It makes Radio Paris, for instance, sound as if it were really in France, and not a radio suburb of Daventry. Need we say more than that?

Now that we have mentioned the main features, let us turn to the theoretical diagram and just run over the "Chef d'Oeuvre's" circuit in our mind's eye, to emphasise the special points of this very special set.

Valuable Volume Control.

The aerial, you will see, is connected to the first "P.W." Dual Range Coil Unit, the particular winding in question acting as a primary or aerial coil. Two other active coils are alongside this, and when the wave-change switch below them is pulled to the "shorting" position, they are placed in parallel, and tune to ordinary wave-lengths.

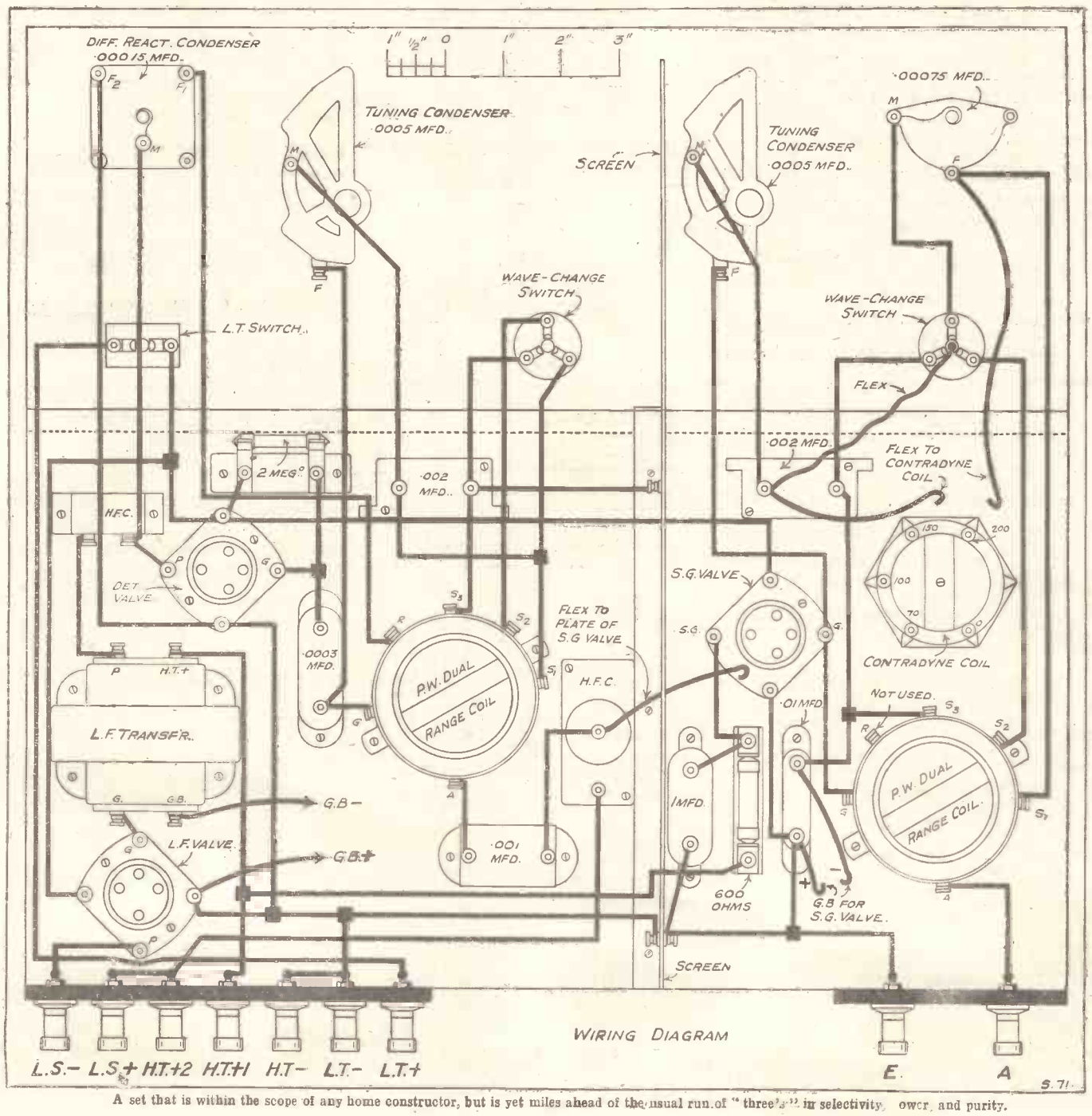
In this (ordinary wave-length) position, the "Contradyne" coil is out of action, but a selectivity control is provided in the form of a ·00075 variable condenser. (This also acts as a fine volume control of the local.)

Normally, this condenser is set near the "all-in" position and left alone. But when searching near the local wave-length and requiring an extra degree of selectivity, this condenser is opened out as far as necessary to give the required sharpness of tuning.

When changing-over to work on the long waves the simple pushing in of the switch brings in the "Contradyne" coil, and so shuts out the near-by low-wave local station. The long-wave secondary coil comes into play at the same time, and the aerial coupling is changed to the special "Brookmans" system in which the ·002

(*Continued on page* 658.)

A TRIUMPH OF SCIENTIFIC SIMPLIFICATION



A set that is within the scope of any home constructor, but is yet miles ahead of the usual run of "three's" in selectivity, power, and purity.

CUT OUT THAT LOCAL

A new "P.W." Brookmans Rejector entirely different from all other kinds of rejectors, wavetraps and selectivity devices. Not only does this unique and inexpensive unit definitely eliminate local interference but it also improves the performance of the receiver when used for distant reception.

Particularly designed for use with all circuits without alteration to receiver.

5/9 POST FREE

—and increase your programmes

The "P.W." Rejector, as described in recent issue. Constructed and assembled strictly in accordance with the "P.W." specification.

COMPLETELY ASSEMBLED AND READY FOR IMMEDIATE USE.

POST THIS ORDER NOW!
DISPATCH GUARANTEED
BY RETURN OF POST

SEE OUR ANNOUNCEMENT ON COVER iii FOR COMPLETE PARTICULARS AND PRICE LISTS OF THE "CHEF D'OEUVRE."

To Ready Radio, 159, Borough High Street, London Bridge, S.E.1

Please send me 1 "P.W." Rejector completely assembled.

(a) *I enclose Postal Order for 5/9.*

(b) *I will pay C.O.D.*

(Cross out whichever does not apply.)

Name.....

Address.....

.....

P.W. All Postal Orders or Cheques should be crossed.

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 Bridge, S.E.1.

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 acrial 20 feet high, using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Konigswusterhausen, 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.

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

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

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

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

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

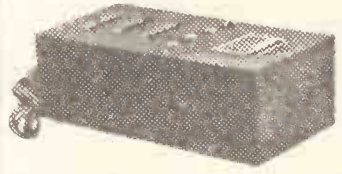
I have examined the above testimonials, and am satisfied that these are genuine communications.—Advertisement Manager, "News-Chronicle."

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, Konigswusterhausen, 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.

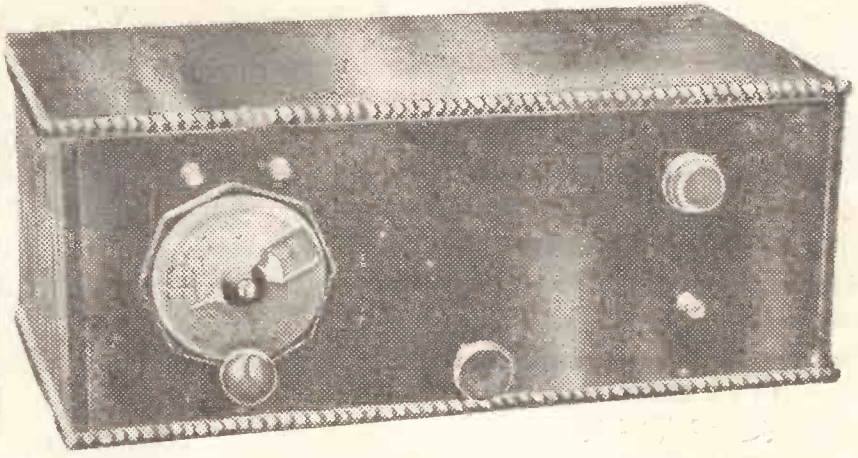
TRADE SERVICE AGENTS WANTED.

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



SPECIAL OFFER. 7 days approval to test. This A.C. eliminator value £4 will be sent to any address on payment of 59/- cash or C.O.D. with the guarantee that if it is not superior to any other eliminator on the market and not giving complete satisfaction the money will be instantly refunded if returned in good condition and undamaged. It is guaranteed to be most silent in operation giving over 20 milliamperes, and suitable for all 2, 3 and 4 valve sets. Test it for yourself. Trade enquiries invited.

STATE MAINS VOLTAGE AND CYCLES.



SPECIAL WIRELESS AND CYCLE BARGAINS.

Usual Price.		Sale Price.
10/-	Latest Type Cabinet 12 × 8	4/11
5/-	Ebonite for same, 12 × 8	3/-
5/11	Transformer	3/6
4/6	·0005 Variable Condenser	2/11
2/-	·002 Condenser	1/3
1/6	·0003 „ ..	10d.
1/-	Grid leak 2 meg.	10d.
1/-	Anti-Mic. Valve Holder ..	9d.
2/3	Rheostat	9d.
2/-	Indoor Aerial	9d.
5/-	Earth Tube	1/6
10/-	Guaranteed Phones ..	4/11
3/6	S.M. Dial	1/11

Usual Price.		Sale Price.
17/6	New Cossor Type Long Wave Coils, pair ..	9/6
7/6	Volume Control	3/11
7/6	H.F. Choke	3/11
2/6	Daventry 5 G B Coil ..	1/3
10/6	6 Volt Amplion Valve ..	3/11
12/6	Cone Unit	6/11
12/6	Cone Speaker Cabinets ..	7/11
2/-	12in. Cone Speaker Frets	11d.
3/-	15in. Cone Speaker Frets	1/11
7/6	Old Cossor Type Coils ..	3/11
15/-	Old Cossor Type Cabinets, 21 × 7	7/11
	Ebonite for same ..	3/11

Usual Price.		Sale Price.
12/6	Mullard Type Cabinet, 18 × 7	6/11
7/6	Aluminium Panel 18 × 7	3/11
17/6	Dual Coil for M.M3 ..	12/6
	Triotron Dull Emitter Valve	4/11
5/-	Cycle Tyre	2/6
2/6	Cycle Tube	1/3
6d.	Panel Transfer	3d.
6/6	Double Reading Voltmeter	3/11
	Triotron Super Power Valve	6/6
15/-	Titan Coil	9/11
9/-	60 Volt H.T. Battery ..	4/11

Usual Price.		Sale Price.
12/6	100 Volt H.T. Battery ..	8/11
5/6	2 Volt Accumulator ..	3/6
2/-	Accumulator Carr. ..	11d.
4/6	Neutralising Condenser ..	2/11
4/-	Reaction Condenser ..	2/6
5/-	Diff. Reaction Condenser ..	2/11
2/-	Loud Speaker Cord ..	11d.
2/-	'Phone Cord	11d.
6/-	S.L.F. Condenser	3/11
21/-	D.C. Eliminator, 15 M.amp.	17/6
£4	A.C. „ 20 Milliamps.	59/-
17/6	Electric Iron. Weight 5 lbs.	7/11
30/-	Cone Speaker	9/11
	'Phones Repaired	2/6

New Cycles, Guaranteed, 59/11; with 3-speed, 79/11; with Dunlop Tyres, 10/- extra.

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**

YOUR XMAS PRESENT LIST

For sheer value there is nothing like a radio present, and here are some seasonable suggestions that the keen purchaser will appreciate.

IT is more blessed to give than to receive. But, alas, it is *much* more difficult!

Receiving a Christmas gift is absurdly easy, even if it is a gift that you hadn't particularly wanted to receive. You simply take the parcel, audibly wonder whatever *this* is, and tear off the wrapper.

Directly your eyes fall on the gift itself you ejaculate, "Gee baby," or "Oh, boy!" or "Say, isn't that the cat's pyjamas!" or some equally authentic British expression of surprised gratitude, gleaned from your visits to the talkies.

A Sad Thought!

And then you turn to Uncle Bill, or Cousin Kathleen, or whoever it was, and do the "Thank you" act. Usually, this is accompanied by some small display of affection—in the former case, perhaps, a hearty slap on the back will be best, while for pretty Cousin Kathleen you reserve a suitable salutation that is less boisterous.

"WHAT A VALVE!"

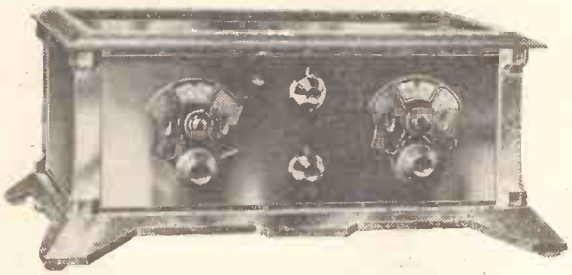
One of the types for A.C. mains.

(You know the kind of thing, mistletoe, and all that.) Receiving a present, in fact, is thoroughly enjoyable. It is the *giving* of a present that seems so difficult.

Especially if your name is not Rothschild, or Rockefeller, or Henry Ford. For that shortage-of-money feeling cramps the style of most of us, and many a Rolls-Royce impulse has to find an Austin Seven outlet.

It is a sad thought, but nevertheless true, that thousands of our fellow citizens are

"AN EMPIRE LINK!"



This Ready Radio Kit Set goes down to short waves, and is called the "Empire Link."

going about their Christmastide shopping in an un-Christmaslike spirit. No joy, no jollity is theirs. Simply one big and pressing problem instead—the problem of "What shall I get?"

There ought not to be all this doubt and difficulty in fixing up our friends with something suitable. It ought to be easy.

It *is* easy, if all the possibilities of radio are borne in mind. For radio makes the absolutely ideal present.

Just Consider This.

Consider it, for a moment, from the *expense* point of view. A radio present can cost anything from a few pence, for a "gadget," up to a hundred guineas or more for a super set "with knobs on." Plenty of scope there for different lengths of purse, isn't there?

Or look at it from the *tempus fugit* angle.

If on December 25th you present your old pal with a nice box of "cork tips," for instance, where will they be by January 25th? Gone up in smoke!

Or if you want to please the landlady's daughter, and after careful cogitation you decide on a nice pair of silk stockings, what will inevitably happen to your carefully thought-out present?

If she takes a stroll along the street the first shower will splash them cruelly. Passing buses and cars will simply fling mud at them. And, sooner or later, they will "ladder."

Most of the ordinary gifts start to depreciate almost at the moment they are unwrapped. But not gifts of

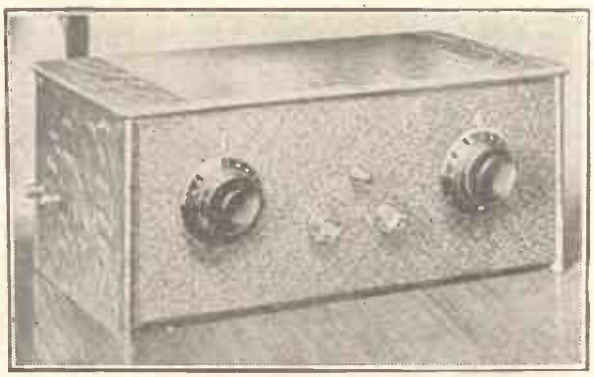
Lasting Pleasure.

For when you put wireless on your Christmas presents list you give day-by-day enjoyment. You give really *lasting* pleasure.

Even nowadays far too many people are missing all the good things that are "on the air" because they do not realise how easy and inexpensive radio reception may be. With the B.B.C. handing out a Regional service and planning to extend it all over the country, there ought to be programmes in almost *every* home.

(*Continued on next page.*)

THE LATEST COSSOR KIT SET.



The "Empire Melody Maker" as made at home from the kit of parts

YOUR XMAS PRESENT LIST

(Continued from previous page.)

At one time crystal sets were the only low-cost means, but nowadays some of the valve sets cost surprisingly little to buy, and hand out a wonderful selection of programmes. If you want to pay a lot you can, of course, but there is no need to do so to get first-class entertainment into the home.

And however much—or little—you pay, where else are you going to get the *value* that you can get from broadcasting? The everyday satisfaction—the companionship

From SIR JOHN REITH.

The B.B.C. this year will make a special effort to recapture for the Christmas season something of the real spirit of goodwill and good cheer upon which the festival was founded.

—the breadth of experiences? To bring radio into a home that has no set is to waken that home to new life. And in the house in which broadcasting is already installed there are endless chances of improvement which all can appreciate.

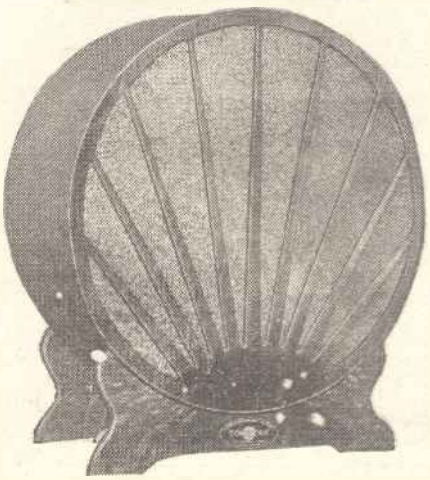
With radio possibilities in mind the giving of a Christmas present becomes less of a problem, and more of a pleasure. It is just a matter of hitting on the right set or parts at the right price.

Here are Some Reminders.

Let us name a few of the parts to act as reminders. And let us begin low down on the monetary scale. (We shall undoubtedly finish there!) Even if it is going to be a question of expending one shilling or less there is a wide field of choice open to us. Anyone with a wireless set can always do with terminals or plugs and sockets, or fuses, or a fixed condenser, or a coil, or clips, or wire, or—well, it will be impossible to name all the little low-cost etceteras.

But the possibilities of radio purchases immediately become apparent, because of the diversity of choice even at the lowest prices. It is a fact that nearly every set or installation in existence could be improved noticeably by a very small expenditure.

DISTINCTIVE DESIGN



The new Donotone loud speaker.

And the improvement effected may be a big one! A little grid-bias battery for an H.F. valve, for instance, doesn't cost much, but it saves a lot of H.T. battery current!

Probably one of the chief reasons why the low-priced wireless gift can bring pleasure out of all proportion to its cost is the fact that there is plenty of scope for skill behind it. A non-technical lady friend will think you are a second Marconi if a fuse is fitted to save her valves—the sort of job that you could do in your sleep, perhaps, but one which she is afraid to tackle!

Gifts That are "Different."

It seems hardly necessary to continue our list of suggestions, for every set-owner or would-be-set-owner is sure to need something! There are, however, a few specially opportune presents that might be overlooked because they are a little "different," and out of the ordinary.

In this class come the new H.T. supply units, which are made in the shape and size of an H.T. battery, so that *they will go into "portable" sets.*

They are not at all expensive. Better still, they add nothing but pence to an electric light bill, so that it is really only their first cost that has to be considered. Ideal presents for portable-set owners.

BUILD IT YOURSELF

The complete kit of parts for the Orgola.

Another present, that enlarges equipment out of all proportion to its cost, is a "gramophone pick-up." (In case that name does not convey a meaning, it may perhaps be well to explain that this little accessory enables the gramophone-owner to play his records through his loud speaker, instead of through the horn in the gramophone cabinet.)

The advantages of "marrying" the gramophone to the loud speaker in this way are legion, and they include the possibility of "programmes" at all hours of the day, independent of broadcasting. So don't forget the "pick-up" if your friend has a gramophone and a loud-speaker set.

A Favourite Gadget.

One favourite gadget that is apt to be overlooked and yet deserves to be remembered whenever a present is in mind is a "volume control." Its name describes it, but doesn't do justice to the constant pleasure it brings, because it enables the loud speaker to be "toned-down" to any desired degree.

It can be fitted in a few minutes, and once it has been installed a "talk" will sound like a talk, and not like an address by a leather-lunged sergeant-major.

Such ordinary needs as a new battery, a new valve, or an extra loud speaker will be among the first things that occur to the mind pondering over radio presents. But if these do not appear applicable for the case in question, there is plenty of opportunity just off the beaten track.

From LORD GAINFORD and other members of the B.B.C. Board of Governors.

In sending the Season's Greetings to the readers of your journals we venture to hope that our own continued progress and that of the Wireless Trade may be shared during the coming year by the staple industries of our country, and that in the coming year we may see the long-awaited revival of general prosperity.

What about a meter? Some people fairly gloat in measuring milliamps or volts.

In most cases there will not be much need for subterfuge to find out what would be appreciated in the radio present line. Most of us have too many wants and wishes.

In districts where the houses are lit electrically there are great potentialities for the present-giver in the way of "simplifying" stunts. The new valves which run on "raw" current are only one of the many methods now available for saving trouble in radio reception.

Have you ever thought of the many advantages of home-charging? No bother with the battery running down, no long jaunts to the charging station to get a new one, but just a switch to throw over to "charge" when necessary.

Off the Beaten Track.

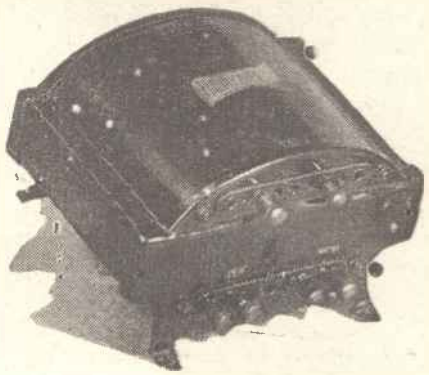
Mains units have already been referred to, and some of these incorporate little trickle chargers, and supply the set's H.T. as well. *There's* a present, indeed!

Another "off the beaten track" present, and a very inexpensive one, is a "hydrometer." These gadgets cost only a shilling or two, and with them the accumulator's condition can be checked with celerity and certainty.

There are, in fact, so many chances of giving sure-to-please presents of a radio nature that some of the wireless shops will be sure to sell out. So don't leave it too late before bagging your bargains.

If you can't actually visit the shops you will find that the advertisements in this number of "P.W." are bristling with Christmas suggestions—stockingsful of real winners.

FOR THE MAINS MAN



Heayberds specialise in mains transformers.

SHORT-WAVE NOTES

By W. L. S.

The latest news about reception on the very low wave-lengths, including some details of the picking up of a programme from South America by a "P.W." reader.

BEFORE I resume my interrupted remarks on short-wave receivers and their little tricks, I must deal with correspondence received during the week, much of which is of sufficient interest to be mentioned in this column.

First of all I have to thank "G. G.," of Birkenhead for forwarding a Q S L card from V K 2 M E (Sydney), and a certificate from the W G Y folk. The former gives the information that V K 2 M E now has no regular hours of transmission and is an experimental station only.

From the certificate I gather that the present W G Y schedule is as follows: W 2 X A D transmits daily on 19·56 metres (except Saturdays) from 18.00 to 20.00 G.M.T. W 2 X A F works every day from 22.30 G.M.T. on into the "wee sma' hours," generally closing down at about 04.15 next morning! Just at this time of the year, of course, the particular time that W 2 X A D is operating is the best for his reception in this country.

Music from Buenos Aires.

And it is strange that, after I made a chance remark that he seemed to have closed down for good, he should suddenly come back on the scene with all his old punch, and, if possible, a little more.

"G. G.," the owner of the certificate, reports that he has been audible every evening for some weeks at the same strength as 5 X X and with no fading.

Other remarks of interest are: P C J unreliable and weak on both his aerials at this distance; Zeesen and Rome 3 R O both terrific on nearly all occasions. Finally, the transatlantic 'phone is always distorted and "not worth listening to." Precisely, "G. G."!

That's what they do it for. The distortion is intentional, for ensuring some degree of secrecy, although if you know the trick you can easily put it the right way up again!

An Enfield reader reports (I believe for the first time) reception of speech *and music* from South America. On about 30 metres, between 01.10 and 03.00, he heard a programme of gramophone records followed by announcements of "Grad-Radio, Buenos Aires." This was received at good loud-speaker strength on two valves, and confirmation from other readers is wanted. I am sorry, "J. A. C.," but I have not yet heard the gentleman myself.

The same reader mentions that my tip of using a condenser in the earth lead to "tune-out" hand-capacity effects has proved efficacious.

And now for the subject of condenser and coil sizes for short-wave work. I have been taken seriously to task for my remarks about keeping the tuning condenser even smaller than ·0001; some people say it can't be done and that I have invented the whole story! It is hardly as bad as all that, I hope.

To get right down to brass tacks, here are some figures. A well-known set of American short-wave coils is sold, for use with a ·0001 condenser. The wave-lengths which they will cover are given as follows: 15–33·5 metres; 31·5–68 metres; and 57–133 metres. Now take the first range. Converting that to kilocycles, we have 20,000–8,955, giving us a band of something over 11,000 kc. to tune through on one sweep.

That Tuning Capacity.

Now compare this with a broadcast receiver, the tuning of which is not *too* easy. This will probably cover 220–550 metres (or, in kc., 1,364–545), giving us a band-width of just over 800 kc.

From the above it is obvious that, leaving out all bugbears such as hand-capacity effects, threshold howl, and so on—assuming a perfect short-wave receiver—the tuning will be about 14 times as difficult as on the standard broadcast receiver! And this with a ·0001 condenser, while some people still use ·0005!

I think we had better change the subject.

Following a brief remark last week about the curing of an intermittent crackling noise by the addition of a S.G. stage when all other cures had failed, I have had the satisfaction of tracking down the trouble.

Tracking Crackling.

It was obvious that the crackle was picked up from outside, as the receiver was dead quiet without an aerial. Early one morning this week I took away the S.G. stage and let it crackle away while I did acrobatic performances out of the window, wearing the 'phones the while.

I had a suspicion that I should see something vibrating in sympathy with the crackles if I looked long and carefully enough and sure enough I did. A small aerial next door to me was waving gently in the breeze, and with every rocking motion of the wire I heard that gentle crackle that had been nearly driving me out of my wits for several days.

Close examination of said aerial revealed the following facts: (a) it was made of steel wire, and *very* rusty; (b) there were five joints in it, none of them soldered; (c) one bare portion was touching a metal gutter when the wind blew; (d) there was a break in the connection from the aerial switch to earth.

Some S.G. Advantages.

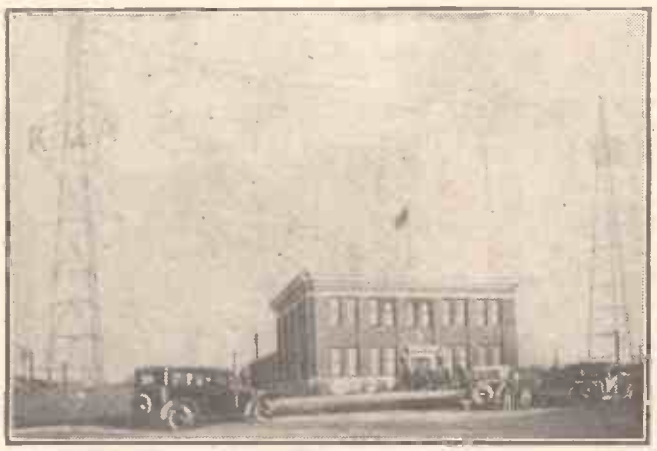
Now here is a very good argument in favour of the use of S.G. amplification, although the connection may seem remote. For this contraption, when I used a straight detector and L.F., took the form of a rapidly varying capacity to earth not so very far away from my own aerial. Obviously, the natural wave-length of my aerial was changing (minutely, but definitely) with every movement of the other one. Equally obviously, these changes were getting through to my tuned circuit and sending everything up and down the scale.

With the S.G. stage in front, if properly designed, quite a large change in the capacity of the condenser tuning the aerial coil will produce only the minutest imaginable change in detector tuning. This is the well-known "buffer effect." Similarly, a swinging aerial will not "get through" when a screened-grid stage is used. And there you have the whole thing.

Incidentally, it is confirmed by the fact that when the S.G. grid circuit is *dead* in tune the crackles could just be heard, while with it slightly off tune, all was quiet.

Needless to say, a better aerial has been put up next door, but I do not feel inclined ever to risk the use of a detector straight on the aerial again, particularly when I look at my galvanised guy wires rubbing on the metal hooks at the top of my mast and think what a noise they could make!

COLORADO CALLING!



As the illuminated sign on the mast shows this is station K O A, which is situated in Denver, Colorado.

AERIAL ITEMS

Making the Supports Safe—Avoiding Fracture, etc.

It is unsafe to rely on a spike driven into mortar to hold an aerial as the mortar crumbles away in time.

* * *

When a brick chimney supports an aerial it is often unnecessary to place a band around this, as a large Rawlplug is quite capable of standing up to the strain in most cases.

* * *

The resistance of wire changes with the temperature, and increases as the temperature is increased.

* * *

Aerial supporting wires and links between insulators, etc., should be of stranded wire to avoid the risk of fracture.

Here's power for greedy sets!... Sets

that expect a lot of low-tension current get it from the Exide "C" Battery ... a generous battery ... gives all that is asked of it without failure and without flinching.

The Long Life battery... famous Exide Long Life

Plates ... patented separators that preserve the plates and prevent shorting ... differently coloured and shaped terminals distinguishable even in the dark ... strong, leak-proof celluloid or glass containers.

When your set demands a lot of current from the L.T. battery you need the one and only **Exide "C" Battery.**

Prices per 2-volt cell: C.Z. 2 20 amp. hours 9/6 • C.Z. 4 40 amp. hours 13/6 • C.Z. 6 60 amp. hours 17/6
Other sizes up to 120 ampere hours.

From Exide Service Stations and all reputable dealers. Exide Service Stations give service on *every* make of battery

Exide Batteries, Clifton Junction, near Manchester. Branches at London, Manchester, Birmingham, Bristol and Glasgow

L 39a

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

SIFAM CIRCUIT-TESTING ADAPTOR.

THE Sifam Electrical Instrument Co., Ltd., have produced a very useful little device that retails at 2s. 6d. It is intended for use with any pocket voltmeter having a low reading scale of 6 volts, and in such a combination enables you to test circuits and leads for continuity.

The adaptor comprises a neat little tubular case having in the one end a spring socket and on the other end a flexible lead with a spade terminal.

The adaptor is plugged by means of the spring contact on to the "spike" of the voltmeter, and the voltmeter lead and the remaining lead of the adaptor are then available for any continuity test.

The little 1½-volt Siemens dry battery contained in the device is readily replaceable, although one ought to last for a very long while. It is an ingenious and useful article and should prove a popular line with radio amateurs.

OSRAM H.2 VALVE.

For H.F., Detector, and R.C.C. stages the new type H.2 Osram valve is a particularly efficient edition to a notable range. Its characteristics are as follows:

Filament volts, 2; filament current, ·1 amp.; amplification, 35: and impedance, 35,000 ohms. From the last two figures you will see that the mutual conductance is 1, and this is extraordinarily good for a 2-volter of the "high mag." variety

In a detector position preceding R.C. it gives excellent results, and evinces no microphonic tendencies whatever. In a neutralised H.F. stage it provides considerable amplification.

Altogether it is a little "tube" of a most attractive character, and one that is particularly suitable for portable sets in view of its economical filament characteristics.

EDISWAN ACTIVITIES.

The "Amazing Mazda Radio Valves" is the title of a 58-page book recently issued by Ediswans. Another interesting Ediswan catalogue details Ediswan Sound-Reproducing Installations, for cinemas, hospitals, hotels, restaurants, etc.

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.

CONCERNING COSSOR PRODUCTS.

Among the new Cossor publications are a 44-page book all about the Cossor four-valve "Melody-Maker," another 44-page book about Cossor valves, an excellently produced catalogue describing Cossor radio sets, and a well-produced folder entitled "How to Increase the Range of Your Set" that deals with the Cossor S.G. valves.

(*Continued on page* 642.)

Varley

FOR EVERY CIRCUIT

Varley components will make all the difference to your reception, whether you are building a new set or modernising an old one. Over thirty years of specialised experience is embodied in the long range of Varley products. They set the standard for accuracy of workmanship and careful, original design—the same qualities that have made the new Varley All-Electric Receivers such a big success.

Your dealer stocks Varley Components. Have a chat with him and examine them yourself. They make ideal Christmas gifts, too—a Varley Pick-up—a Nicore L.F. Transformer—an Output Transformer or Choke. Send for the section of the Varley Catalogue in which you are interested.

SECTION A gives full particulars of 2- and 3-valve All-Electric Receivers, Radio-Gramophones, Gramophone Pick-up, Auto-arm and Volume Control. SECTIONS B and C deal with H.F. Choke, Regional Coils, Bi-duplex Resistances, Rheostats, Potentiometers, R.C. Couplers and Anti-Mobos. Details of Nicore Transformers, Output, Push-Pull Input and Output Transformers, Push-Pull, L.F. and Constant Inductance Chokes, etc., are given in SECTION, D whilst SECTION E deals with Mains Equipment—Power Transformers, Standard, Dual and L.T. L.F. Chokes, Constant Inductance Chokes, Power Potentiometers and Power Resistances.

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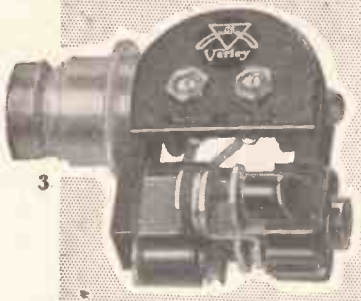
2



3

4

5

6

For RADIO

OLIVER PELL MANUFACTURE

Varley

1. Impedance Matching Output Transformer (six ratios) - - **22/6**
2. Power Potentiometer, *full range, from* - **9/6—11/6**
3. Gramophone Pick-up **37/6**
4. Bi-Duplex Wire-Wound Resistances (including holder), *full range, from* **4/6—17/6**
5. Nicore L.F. Transformer (ratio 4/1) - **£1 : 0 : 0**
6. Standard L.F. Choke (20 Henries) - **£1 : 0 : 0**

Advertisement of Oliver Pell Control Ltd., Kingsway House, 103, Kingsway, London, W.C.2. Telephone : Holborn 5303.

TESTED AND FOUND—?

(*Continued from page* 640.)

"POPULAR" STATION INDICATOR.

A really useful and most novel device of particular interest to portable-set owners has been produced by The Danipad Rubber Co., Ltd.

There are other cards, under this one marked "London," which are suitable for various other localities.

It is known as the "Popular" Station Indicator and sells at 5s.

It incorporates a compass and the needle of this gives you the correct direction of any station when the device is placed against a portable set. You turn the portable round until you get exactly the right position. There are cards supplied with each "Indicator" for all the likely areas in the country where it may be used.

BRITISH GENERAL TUNER UNIT.

On the carton that enwraps the British General Tuner Unit these words appear: "Notice to Purchaser.—Please examine tuner before leaving shop, as this often saves many disappointments." Unfortunately ambiguous, don't you think? But let me remove any false impression those words may have produced.

The British General Tuner Unit at 14s. 6d. is, in my opinion, a first-class proposition. It is miles ahead of many of the tuning units on the market, most of which are, anyhow, far too inselective for modern conditions.

The British General Unit enables a very keen selectivity to be achieved.

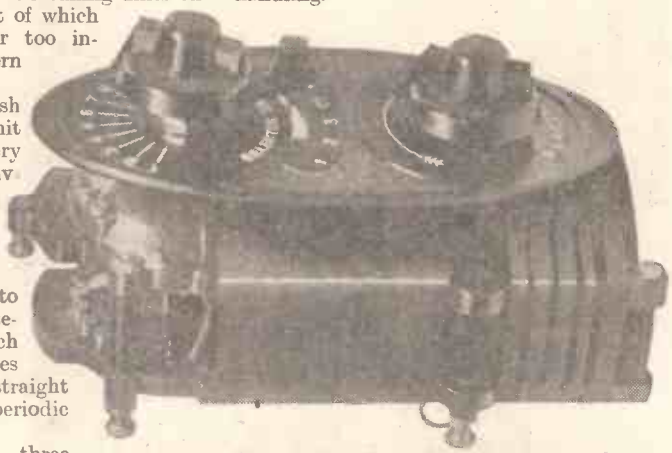
The reason for this is not far to seek. A selector switch is fitted which provides either an ordinary straight aerial coupling or an aperiodic coupling.

Further, there are three variations in this last, and a smoothly-operating rotor functions as a reaction coil.

The controls are grouped on a neat panel plate that carries very plain markings. The unit can be mounted by means of two holes.

This "B.G." is also one of the few units I have seen that has the appearance of a specially designed job. It is not merely a tubular former, carrying rather crude-looking windings. It is built up on a specially moulded structure.

On top of all this it gives the best results of any tuner selling at anything like the same price that I have tested. Handled intelligently, it is a first-class alternative to separate coils in point of efficiency, and well ahead in both compactness and ease of handling.



You can get a very clear idea of the construction of the British General Tuner Unit if you closely examine this photo.

PAYING FOR OPERA:
WHERE THE MONEY COMES FROM

By THE EDITOR.

WELL, as the clown says in the pantomine, "Here we are again!" Not that we think we are so entertaining as a clown—unless "Ariel" holds such a view—but we do bob up with the POPULAR WIRELESS Christmas Number pretty regularly; and we hope to keep on doing so for many years to come.

So long as we do, please bob up with us and keep us up to scratch by enjoying the POPULAR WIRELESS Special Christmas Numbers—especially this one.

This is not the time of the year to be unduly serious; but, since we are all interested in the great game of radio, there is no earthly reason why we should write about green apples or the price of beer, or any other topic which has no connection with radio. The fact is, our topic is radio, so let us keep to it.

A Strange Combination!

Now, as a matter of fact, there is a very good radio topic this week, tacked on to grand opera and politics, Treasury finance, subsidies, and all sorts of queer things. This combination may seem strange, even frightening, but as you probably noted in last week's POPULAR WIRELESS and in the various newspapers, the Chancellor of the Exchequer—Mr. Philip Snowden—has decided to do something no other Chancellor of the Exchequer has ever had the pluck to do before; in short, to subsidise opera for five and a quarter years. He has sanctioned a grant from the Treasury of £92,500.

The "Daily Mail" describes this as "a dole for the most luxurious of the arts, at a time when an enormous Budget deficit is in sight."

Not Quite Fair.

Now, that's rather an unfair way of putting it—and of making politics out of opera. Grand opera under the new scheme will not be "the most luxurious of the arts." It will be one of the cheapest because, thanks to broadcasting, we shall all be able to enjoy opera to the tune of at least sixty broadcasts a year.

As our readers know, we are dead against listeners' money being wasted on a silly scheme like a National Theatre, because if the B.B.C. subsidises a National Theatre, listeners won't get their money back in the form of first-class entertainment. We will let the question go by as to whether the sort of plays listeners would be interested in would be put on the stage of a National Theatre. Quite likely they would not, because when a theatre wants subsidising it is usually a sign that it is putting on plays the general public doesn't want to go and see.

In any case, supposing really interesting plays were staged at this hypothetical National Theatre, it is quite unlikely that more than one or two of them a year would be worth while broadcasting—not perhaps because of any faults in the plays, but because the plays would not be suited to the technique of broadcasting.

Now, opera is suitable for broadcasting. There are all kinds of opera. There is a heavy opera, medium opera, light opera, and the frankly comic opera; in fact, opera to suit all tastes. And opera broadcasts well. Everybody likes a good tune, whether it is classical or just what is described as "popular." And everybody is interested in hearing a first-class singer.

So for money expended in aiding opera the B.B.C. is doing well, and will, in the future, "do listeners proud"; and to describe Mr. Snowdon's scheme as being "a dole for the most luxurious of the arts" is, as we say, unfair.

Opera is Expensive.

The trouble about opera is that it is very expensive. Hundreds of thousands of people would like to go to the opera, but unfortunately they can't afford to do so. Of course, some of these great opera artistes require such enormous fees that the prices of seats for an opera performance have to be, in many cases, prohibitive for the average man-in-the-street; and at Covent Garden,

(*Continued on page* 646.)

PAYING FOR OPERA:
Where The Money Comes From.

(*Continued from page 644.*)

as anywhere else, the gallery only holds a certain number of people.

Readers who have listened to operas in the past (and who probably listen to them quite regularly now that Continental reception is so much improved) know that opera does provide a jolly good entertainment. The "Daily Mail" invites people to look at the financial side of the question. It points out that the gross income received from listeners for broadcasting licences during 1929 totalled £1,470,000. Of this sum, the B.B.C. received £944,301, the Post Office £183,750, and the Treasury £341,949.

The Vital Question.

And it suggests that the question that leaps to the mind is: "How is it that the B.B.C., out of this huge sum of £944,301, cannot spare £17,500 a year to subsidise opera, if it must be subsidised?" It is suggested that this is a difficult question for the B.B.C. to answer. But is it? £944,301 a year is not a tremendously large sum when one considers the expense of putting the Regional Scheme into operation, building Broadcasting House, paying copyright fees, providing varied programmes every night (or nearly every night). All this runs away with money. (As it is the B.B.C. by itself is guaranteeing a few thousands a year towards the scheme which can be called upon if necessary.)

Anyway, apart from what the B.B.C. has to spend, its income is very considerably milked at the start. The 10s. licence fees you contribute may total to £1,470,000, but remember that the Post Office takes £183,750 to cover what it calls "working expenses," i.e. issuing licences, sending round a Post Office man to catch pirates, and other mild forms of amusement. No one is going to believe that that side of broadcasting costs all that money: and as for the reason for the Treasury taking £341,949—well, nobody yet has really stated whether this is legal, or by what right this money is deducted from the fees paid up by listeners in the form of licence contributions.

Listeners' Money.

It is all to the good that the Treasury should be made to part with some of this money which it has been storing up ever since the Broadcasting Corporation came into being. It is legitimately the listeners' money, but it is not handed over to the B.B.C., and therefore to say that the Treasury is being milked to subsidise opera is untrue. The Treasury is simply being forced to part—thanks to Mr. Snowden—with a certain amount of money subscribed by listeners and which, by rights, should have been given to the B.B.C. at the very beginning.

This so-called "dole" for opera works out at about £17,500 a year for five and a quarter years—or, in total, £92,500 for five and a quarter years. During that five and a quarter years listeners will probably benefit to the tune of roughly 315 first-class operatic broadcasts. If the B.B.C., out of the income it at present receives, were to attempt to give 315 first-class opera broadcasts in five and a quarter years, it would certainly have to spend considerably more than £92,500.

Remember, this sum is only a contribution towards the maintenance of a grand opera season throughout the year, or nearly throughout the year; and a good deal more money will have to be found actually by the syndicate running the opera scheme. In our opinion, the B.B.C. have struck a very fine bargain; or, rather, Mr. Snowden has concluded, on behalf of the B.B.C., a very fine bargain, and listeners should be very thankful that they will get such first-class fare for their future programmes at such a very small cost.

From the ethical point of view it is correct to say the money does come from the Treasury: and don't forget, when you listen to arguments concerning the scheme, and when you read articles which attack it and try and link it up with Budget questions, that the money is coming originally from a fund *which was formed by milking your licence fees.*

An Unofficial Tax.

We can only hope that more of this £341,949 which has been held by the Treasury as a sort of unofficial tax on licence fees will be used for the benefit of broadcasting in the very near future. If it is used for something which directly or indirectly does not benefit the broadcast listener, then it will be time to squeal.

DON'T FORGET TO BUY YOUR COPY OF THE XMAS NUMBER OF "MODERN WIRELESS."

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. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS

THE "MAXIPOWER" FOUR.

P. H. L. R. (Paddington Green, London, W.)—"The 'Maxi-power' Four given away with 'P. W.' recently and shown on the Blue Print No. 60 seems to be exactly what I want for long-distance reception on both long and ordinary waves.

Although I had never tackled a four-valver before, I had so many of the parts that I got on with it straight away, and I had not experienced the slightest difficulty until I was just finishing. And then I find I am not quite clear by what is meant with the C10 condenser (·01) where two flexible leads go to G.B.

"They are marked — and + and between them it says 'G.B. on V1.' Does that mean that the leads go through to the grid-bias battery, or what?"

All it means is that the flexible leads are to be attached to the — and + respectively of a small grid-bias battery which is placed beside C 10, the ·01 fixed condenser.

Usually a screened-grid valve takes either ·9 or 1½ volts negative bias, so that there is no need to buy the ordinary rather large grid-bias battery. But you can buy one of the little ones sold specially for the purpose, and obtainable at any dealer's.

Probably you will find that the makers of your S.G. valve recommend either ·9 or 1½ or possibly even a little more on it, with the H.T. voltage you are using (generally 120 for H.T.+2) and you can be guided by their recommendations.

If no particular value of grid bias is given, you can be sure that you will be improving reception and economising in H.T. current by using a 1½-volt cell and connecting it as shown by the two flexible leads on the diagram. The specified grid bias for 2-volt S.G. valves is .9 volt, but as a general rule 1½ volts is quite satisfactory.

You might try putting the positive lead to the positive end and the negative lead on 1½ and 3 in turn, to see which gives the best reception. The higher the bias that you can get the valve to take without

(*Continued on page* 650.)

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.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 648.)

detriment, the lower the H.T. current it will take from the battery.

So it is an advantage to use 3 if possible, but generally 1½ is sufficient, and the higher value may effect sensitivity a little, which, of course, is not wanted if you are out for long-distance reception. (As these G.B. leads should be kept short, it is not advisable to take them to the other grid-bias battery at the far end of the set.)

USING A COUPLING UNIT.

H. S. (Sunningdale, Berks).—"I am going to put up the 'Sharp Tuned' Two (blue print No. 57 circuit), but instead of an L.F. transformer I want to use a unit which I have on hand which is called an 'A.F. Choke Coupler.'

"It has four terminals, one of which is marked B+, another A, the third G, and the fourth C. How should I fix it in the 'Sharp Tuned' Two, and would it require grid bias?"

It takes the place of a transformer with certain minor alterations, and grid bias will be required the same as for the transformer arrangement.

Mount your unit in the place now occupied by the L.F. transformer, and then connect up as follows: Take H.T.+1 to the terminal marked B+; H.F. choke to the terminal marked A; the grid socket of the V2 valve-holder to the terminal marked G on unit; finally fit a flexible lead to the terminal marked C and this should terminate in a plug which will be connected to 1½ or 3 volts on a grid-bias battery.

The voltage recommended for H.T., etc., and valves will remain unaltered, choke coupling of this kind being very similar in D.C. Resistance to low-frequency coupling by means of a transformer."

A SIMPLE VOLUME CONTROL.

V. M. W. (Slough, Bucks).—"What is the method of using a variable resistance to control the volume at the aerial end of the set, instead of the usual potentiometer method of reducing the input from one valve, after rectification?"

Usually for variable resistance control of volume in the aerial end of the set a fairly high resistance is employed such as 25,000 or 35,000 ohms. This may be simply a variable resistance of the two terminal kind, or a potentiometer with the slider connected at one end, so that it becomes in effect an ordinary variable resistance.

If the slider and the one terminal is connected to the earth terminal and the other terminal of the coil to aerial, so that the resistance is placed right across the aperiodic aerial coil, the effect of cutting out resistance will have the effect of side-tracking the aerial energy, and consequently will give a smooth and continuous variation of volume.

It has the advantage of not noticeably altering the wave-length of the grid circuit, thus obviating any alteration in tuning. If a high resistance of this kind is not available there is another way of controlling volume, though, as this will work with even a 15- or 20-ohm rheostat or even lower, neither the same wide range nor the gradual variation can be expected.

The method, however, is quite effective within certain limits, and all that is necessary for it is the variable resistance itself, and in the set the type of aperiodic aerial coil which is tapped.

One side of the aerial resistance goes to the earth terminal, and the other side is fitted with a crocodile clip and placed in turn on the taps on the aperiodic aerial coil. (The variable resistance should be one such as a rheostat with a definite "off" position.)

It will be found that if this arrangement is clipped across one-third, or one-half, or perhaps a quarter of the aerial coil, the resistance in circuit will reduce coupling effectively. And a little care in choosing the tapping position will generally enable even an old rheostat to function quite efficiently as a volume control in this manner.

THE "QUIET" SET.

S. E. (Halifax).—"I have not laughed so much for years! There was my friend bending over his new set, with his mother and a friend of hers, who was supposed to be deaf. I was peering into the set as well, while he explained that in spite of the power he could get from it it was a well-behaved set that never howled, or anything like that.

"And then suddenly he must have touched one of the wires or something, but the loud speaker let out a roar that made everybody jump out of their skins. To our astonishment the 'deaf' old lady took to her heels! She heard that all right!

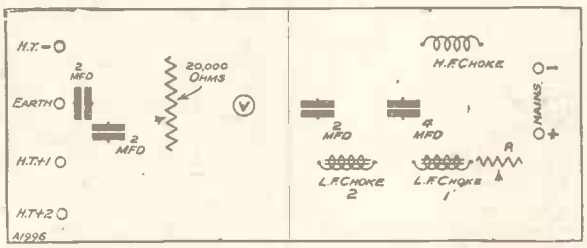
"I have never heard such a terrible roar in my life, and we had to switch off before we could stop laughing.

"Afterwards the set seemed to go quite all right, and it does seem a very good one (though he did make it!) What would be the cause of an awful roar like that?"

(Continued on page 652.)

POPULAR "WIRELETS" No. 25

A D.C. H.T. MAINS UNIT.



Here are the "components" for a D.C. mains H.T. unit, incorporating an H.F. choke in the negative main, a variable voltage adjustment for H.T.+1 (and a voltmeter for reading this), and a means of adjusting H.T.+2.

Can you "wire up" this circuit?

(LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 650.)

In all probability it was simply a microphonic valve. In such a valve the filament (or one of the other electrodes) is suspended in a state of tension such that if the valve is knocked or caused in any way to vibrate the spacing of the electrodes relative to one another is altered at the frequency of the vibration.

This results in a tremendously loud howl such as you heard. And in bad cases even slight vibration, such as walking across the floor or turning the loud speaker nearer to the set, will start the trouble.

The remedy, of course, is to "cushion" the valve by employing a microphonic valve-holder, or by covering it with cotton-wool or other shock-absorbing material. Usually it is the detector valve that gives trouble in this way.

CHOOSING AN L.T. BATTERY.

J. T. P. (Godstone, Surrey).—"I am going to put up a four-valve set, H.F., Det., and two L.F., and have thought of buying two low-tension batteries, one to be on charge and the other in use, changing them over week by week. What size batteries shall I require?

"I am told that much depends on the kind of valves used, and for your information I ought to add that the first valve is of the screened-grid variety, the second one detector, and there is the ordinary low-frequency and one super-power valve."

You can easily find out exactly how much filament current your set takes by adding together the filament consumption of the different valves, which will be found on the leaflets supplied with them.

Probably you will find that your H.F. valve takes, perhaps, ·2 amps, the detector ·1 amp, the first L.F. valve say ·15 amp, and the super-power valve perhaps ·4 amp. If you add these figures together you will find the total will be a little less than ·9 amp.

The capacity of a low-tension accumulator to supply current to a wireless set is shown in figures on it (or in the literature accompanying it), in the form of "actual ampere-hours capacity." Ampere hours, as the name implies, is the product of amperes and hours, so that it means (in general) that if you are going to take approximately 1 ampere out of it, then a 20 ampere-hour capacity battery would supply the current for 20 hours working, or a 30 ampere-hour battery would give you 30 hours working.

If you listen in, say, five or six nights a week, for an average of three hours a night, a 20 ampere-hour battery would last you nicely for a week. But if you listen much more than this you would require the 30-ampere battery.

The figures quoted here are representative ones, and as yours may be rather different from these it is a simple matter to find out by adding the filament currents of the various valves together. This gives the total current required, and then you can decide which is the better capacity for your purpose.

WHICH IS NEGATIVE?

"H.T. FROM THE MAINS" (Cranbrook Park).—"To connect up the H.T. unit I must know which is the positive and which is the negative of my mains. How can I tell?"

One of the easiest methods of finding which main is negative and which is positive is to make a simple electrolytic cell by dissolving a pinch of salt in a tumblerful of water and inserting into this the two leads from the mains, on opposite sides of the glass. (Even the salt is not essential.)

A lamp of the ordinary household voltage should be in series with one of the leads to prevent excessive current being applied accidentally.

When such a simple water-resistance is placed in series in this way, it will be found that bubbles rise from the end of the wires in the water. One of the wires will "bubble" much more freely than the other, and the wire which has the excess of bubbles is the negative.

NOTE.—It should be remembered that it is unsafe for anyone not experienced in this class of work to interfere with mains wiring. Accidents happen very easily if would-be experimenters do not know exactly what they are doing.

Incidentally it will probably be found that the supply company's regulations specifically prohibit *alterations to the wiring, except by a qualified* electrician.

THE "MAXI-POWER" 4 ON LONG WAVES

A. W. F. (Buckhurst Hill).—"I made up the 'Maxi-power' Four from the blue print and it goes fine on the ordinary wave-lengths. There are plenty of foreign stations to be had, and some of them come in at great strength (Rome is a regular visitor).

"But on the long waves—no good. I can

(Continued on page 654.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 652.)

just hear 5 X X or somebody, but the set works just as well with the long-wave coil out altogether, as when it is in the holder.

"At present I have a 250 long-wave coil. Ought I to get a 200 instead? Or what can I do?"

The "Maxi-power" should go just as well on the long waves as it does on the short. Evidently there is something seriously wrong with your set, and as this fault only shows up when the switches are in the "long-wave" position, we have a clue as to where the fault lies.

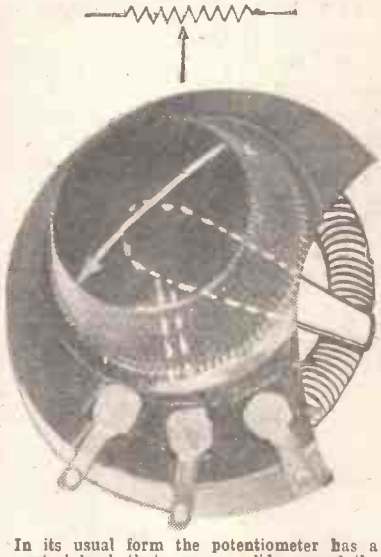
It must be something that is supposed to be inactive when working on the lower wave-band, because the set is O.K. there. And as there are not very many extra parts brought in when switching over to long waves, you ought not to have much difficulty in tracing which of these is "playing up."

Let us see just what extra *parts* come in action when we switch over to long waves. (We shall know that the fault lies in one of these, and it ought not to take long to find out, when we have narrowed down the field of enquiry in this way.)

"INSIDE" INFORMATION

No. 8

THE POTENTIOMETER



In its usual form the potentiometer has a control knob that moves a slider round the resistance element, which may be of wire or of some other high-resistance material.

As illustrated above, the movable connection can come from either end or intermediately. The theoretical symbol (top) shows this perfectly, by means of a "movable" arrow to represent the central connection.

If you look at the theoretical diagram you can imagine Rome's signals, for instance, coming down the aerial, past the aerial terminal, through the coil L_1, and then going via the switch S_1 (which is "closed") and C_{10} to earth.

But if you "open" that switch for long-wave working, things are altered somewhat. After going through L_1 the down-coming signal finds the switch open and impassable, so it has to go via the *condenser* C_9 and through a *coil* L_2 before it can reach C_{10}. (You can follow the route on the circuit diagram.

We have emphasised Condenser C_9 and Coil L_2 because they are only in action on long waves. In other words they are "suspects."

On the other side of the screen we shall find a very similar state of affairs.

Just over the words "Filament Rheostat" on the blue print theoretical circuit you will see a lead going up to S_2. And when S_2 is closed for ordinary waves the signals go straight over the switch to L_1, etc.

But when that switch is "open" for long waves the route is along the flex lead to L_6, *so* L_6 *and the leads to and from it* must be suspected, too.

Narrowed down in this way, we can be fairly sure that the fault lies in either C_9, L_2, L_6, or in the leads to one of these, or in one of the wave-change switches (S_1 and S_2).

Have a good look at each of these in turn, and see that there are no dud contacts.

CHRISTMAS PROGRAMMES

IT is impossible to think of Christmas without considering the gigantic part which broadcasting will play in providing entertainment in millions of homes, from Land's End to John o' Groats, from the coast of Wales to the Norfolk seaboard, and more important still, to those who dwell in remote places, whose work will keep them on wave-tossed lightships, and yet others whose life is set in inaccessible places where the ordinary happenings of the big world of habitation do not normally penetrate.

Those Four Days.

And while we look back and remember that ten years ago there was no broadcasting, only the lunatics amongst us would dare to contemplate with equanimity what life without it would be to-day.

Whatever else can be said of British people, we are now a nation of broadcast listeners. Any other communal spirit amongst us may be denied, but whether our lot is cast in mansion or cottage, whether in circumstances affluent or humble, we can, and shall, enjoy the festive entertainments which B.B.C. transmitters, great and small, will radiate for all who can receive them.

Wireless has no class distinctions. It is impossible to define its territorial limits. The revolution that has come upon us has been as irresistible as it has been beneficial. We talk about the blessings of broadcasting but we do not fully understand them, because broadcasting is bigger than anything the world has yet known. It is always with us, to be utilised as we wish.

And at Christmas everybody will want it at some time or other, for have not many people a full four days holiday to mark the joyful season this year?

Special Holiday Fare.

The B.B.C. has always arranged a complete week of special programmes for Christmas, and below we print a summary of the most outstanding items to be radiated by the National, London and Midland transmitters, and other stations taking their programmes.

NATIONAL.

MONDAY, DECEMBER 22nd.—8 p.m.: Nativity Play, performed by villagers at St. Hilary, Cornwall. 9.35: Vaudeville programme from the London Studio.

TUESDAY, DECEMBER 23rd.—2.30 to 3 p.m.: 37th Annual Banquet for Little Londoners, organised by the Trustees of the Treloar Crippled Children's Christmas Hamper Fund, relayed from the Guildhall. Speeches by Viscount Burnham and the Lord Mayor of London, community singing, and musical selections by the City of London Police Band. 8.30 to 9 p.m. and 9.45 to 10.30 p.m.: Excerpts from "The Love Race," a musical comedy in which Stanley Lupino and Laddie Cliff are appearing at the Gaiety Theatre.

(*Continued on page* 658.)

CHRISTMAS PROGRAMMES

(*Continued from page 656.*)

WEDNESDAY, DECEMBER 24th.—8.30: Carols by the Wireless Singers and members of the Wireless Military Band relayed from Whitechapel Church. 10.30: True ghost stories as told in conversation between three people.

THURSDAY, DECEMBER 25th (Christmas Day).—5.15: Special Children's Programme for all Stations.—"Pantomime Re-Potted," relayed from the Midland Regional Studios at Birmingham. 7.30: Pantomime, "Little Red Riding-hood and the Wolf," written, composed and produced by Ernest Longstaffe. 10.15: Feature Programme of "Christmas Reminiscences."

FRIDAY, DECEMBER 26th.—3.10: Running Commentary by George Allison on the Association Football Match between the Arsenal and Manchester City, relayed from Highbury.

SATURDAY, DECEMBER 27th.—7.30: "The Silver King," the famous melodrama, by Henry Arthur Jones, produced by Peter Creswell.

London and Midland Regional.

SUNDAY, DECEMBER 21st.—3.30: Programme of Modern Carols by the Wireless Singers. 8 p.m.: Service with carols relayed from the College of St. Nicolas, Chislehurst, with address by the Rev. L. H. Nixon, Precentor of Westminster Abbey.

TUESDAY, DECEMBER 23rd.—6.40: "Bethlehem," by Rutland Boughton. 9.45: Feature Programme, "A Christmas Miscellany."

WEDNESDAY, DECEMBER 24th.—8 p.m.: Pantomime, "Little Red Riding-hood and the Wolf," by Ernest Longstaffe.

THE 'P.W.' 'CHEF-D'OEUVRE'

(*Continued from page 632.*)

fixed condenser that is joined to the tuning condenser plays a leading rôle.

On the other side of the S.G. valve—that is to say, coupling the high-frequency stage to the detector—a similar coil unit and wave-change switch do the necessary wave-changing of the second tuned circuit. In this case, of course, there is no "Contradyne," but you will see that a "Brookmans" coupling is provided by a ·002 condenser, as before.

The Output Filter.

This second coil unit has, too, an active reaction winding. Most readers will be familiar with the advantages of differential reaction, and those who will make their first acquaintance with it in this set are in for a treat!

The low-frequency stage is absolutely straightforward and needs no comment at all, but perhaps it will be as well to mention one point about the loud-speaker connection.

You will see that no output filter is shown. The reasons are three-fold.

Everyone knows that a powerful loud-speaker set should have an output filter circuit, if possible, and a great many readers possess a separate filter unit which can be added to this set. Reason No. 1!

(*Continued on page 660.*)

THE "P.W." "CHEF-D'OEUVRE."

(Continued from page 658.)

In the second place we wanted to keep cost as low as possible. And thirdly, we did *not* want anyone to leave out the "Contradyne" coil, or some equally important part of the set just to get in the filter.

For a filter can easily be added later, but altering the H.F. side isn't so easy. Particularly in a set of this calibre, where every step-up in strength has been studied, and really remarkable amplification is obtained.

Easy to Construct.

The actual construction is not at all difficult.

You will find panel-drilling dimensions on a separate diagram, and on the larger one that shows the wiring you will see a scale that gives the distances on the base-board, etc.

Be sure to get everything "placed" right, and aligned as shown. And before you mount your wave-change switches remember that one of them will need the small modification that will now be described.

If you look at the theoretical diagram you will see that the first wave-change switch has three outer contacts, like the other, but it also has a flex lead going to its plunger. So you must fit this flex to it.

Saving Soldering.

To save soldering it we used a "Wearite" switch, the plunger of which ends in a screw. And it was but the work of a moment to undo this screw, slip off the insulating collar, place the flex in contact with the central contact-piece, and screw it all up tight again.

(If you buy a switch which has no screw but a solid end, you will have to solder the flex, which shouldn't prove much trouble. But the screw-ended type is easier still.)

The rest of the construction is such a straightforward matter of copying our set that it need not be recounted at length. But the not-very-experienced constructor may like to be reminded that special care has to be taken with wires that pass through metal screen.

Even the best insulation or coating may crack unexpectedly when bent, so pass wires through the screen very circumspectly. Otherwise H.T.—like sin!—will be sure to "find you out"!

The Screen Connections.

Even if you haven't done much "screening" before you will find it easy enough. The connections to the screen itself are made by means of the screws and nuts supplied with it, and shifted to the required positions.

There is just one other constructional point that may save you trouble if mentioned. And that is that as the panel-mounted condensers will "overhang" the switches and baseboard-mounted components that are close to the panel, these should be wired up before the condensers are finally mounted.

In other words, do the surrounding wiring before the tuning condensers are there to get in the way. That plan simplifies the soldering a lot.

(Continued on next page.)

THE "P.W." "CHEF-D'OEUVRE"

(Continued from previous page.)

Now about the valves. You will want one of the screened-grid type, one "H.F." or special detector valve, and one power, not an ordinary L.F. valve.

The latter type will handle far more power without overloading than an ordinary L.F. valve, but as it requires more H.T. current, and usually more voltage as well—many may prefer the smaller valve and be content not to run the set "all out" except on distant stations.

The H.T. requirements will, of course, depend on the valve maker's recommendations, usual voltages being up to 80 for H.T.+1 (detector and screen of S.G.), and 120 for the last valve and plate of the S.G., which run from the H.T.+2 lead.

There is room for a 9-volt grid battery on the baseboard, or two (if required) on end, side by side.

For the H.F. valve's grid bias a 1½-volt unit will do, or better still, one of the little "9" S.G.-bias batteries that are now being stocked. Either will do.

A "Silky" Set.

Operating the "Chef d'Oeuvre" is a sheer joy. It is a "silky" set to handle, simply full of programmes, but with a degree of selectivity that even the Brookmans twins (or Moorside's pair, when they arrive) can't get over.

Of course, if you live in the real "swamp" area—within about 5 miles of a twin Regional, or 1 mile of an ordinary main station—you will have to think seriously of a short aerial, or some special selectivity device. But if your local is at ordinary and not "doorstep" distance you can trust the "Chef d'Oeuvre" to laugh at it!

When you push the switches in for long waves, remember that the first time this is done you must "set" the "Contradyne" clips to prevent the local's tendency to trespass.

Don't just clip on at "0" and "200" and leave it at that, but try various positions for the clips to decide which gives you the best strength for foreigners and freedom from interference. Afterwards you can forget the "Contradyne" coil—except to boast about the way it works!

Well, that's all we *need* to say, but we should like to add two wishes.

The first is that we hope you get even half as much fun out of this set as we did! For if so you will actually experience our second wish, which is—as you can guess—"A Happy Christmas"!

FOR THE LISTENER

(Continued from page 606.)

accident happens, somebody is always there to see it and snap it. That somebody should see it is surprising enough; but that he should have a camera is uncanny.

If the Prime Minister's hat blew off in a gust of wind one morning, not necessarily in Palace Yard or Whitehall, but say in a Clapham side street or on Epsom Downs, I would bet my shirt a photograph of the occurrence would be in the papers next morning.

Is this organisation, or miracle?

(Continued on next page.)

FOR THE LISTENER.

(Continued from previous page.)

Ancient History.

Sometimes I wish that the Disc and the Film had been in existence from ancient times. What would one not give for a record of the speech of Socrates before drinking the hemlock; his very voice!

Or of the Roman troops marching along between Gloucester and Cirencester? Or of Savanarola preaching in the Piazza to the Florentines? Or of Drake playing bowls on Plymouth Hoe?

No More Legends.

All this mechanical recording of everything puts an end to legends about great men; for legends arise in the twilit regions of history where there are no faithful records. There will be no more legendary heroes.

It is even impossible that Mr. Bernard Shaw should ever become a legendary hero. There would surely be a record somewhere of George Washington telling a lie, that is to say, proposing a toast after dinner or opening a bazaar.

And another of William Tell missing the apple. And another of Robert Bruce in meditation, no microscopic examination of which would reveal the presence of a spider.

Mechanical Programmes.

All this leads up to mechanical programmes. We have already had a taste of these. I have heard Harry Lauder, in person, over the wireless; and I have heard a gramophone record of him singing one of his famous songs. There was practically no difference.

I would rather see Harry Lauder than listen-in to him any day; but if I am compelled to listen-in to him, it makes no difference to me whether I am hearing him at first-hand, or at second-hand via a record. The records now are so amazingly good.

Why should the B.B.C. pay handsomely for Sir Harry's presence at the microphone, when, so far as listeners are concerned, the entertainment would be equally good by records of his songs and patter? Why should it pay at all for inferior artistes, when records of good ones would be cheaper?

(Continued on next page.)

FOR THE LISTENER.

(*Continued from previous page.*)

Musical Records.

This applies particularly to records of music. Music necessarily forms a large proportion of broadcast items; and it must be exceedingly difficult to keep this part of the programme up to any sort of standard year in and year out.

A good deal of it is bound to be inferior. Nobody can reasonably complain of that. So far from complaining, I personally rather like some inferior music. But I like it well rendered all the same.

It matters very little to me if they murder a Concerto by Hindemith, for I do not understand it very well and cannot really tell whether it is being murdered or no; but let nobody murder "The Lass of Richmond Hill" for me, please!

I do not imagine that Keith Falkner could ever muck up one of Bach's Arias; but if he did, I shouldn't really be much the wiser; on the other hand, I should intensely resent anybody, Senorita Molto Vibrato for example, who should muck up for me "The Lost Chord."

Whether, therefore, one likes high-brow or low-brow music, the safeguard against inferior performance lies in the records. They cater well for all tastes; and I can easily conceive that the lighter side of our musical programmes might be improved by a liberal sprinkling of discs.

The Worst of It.

The worst of it is that records are only sent out when they are practically flawless; and for this reason, if for no other, I pray that mechanical transmission may never wholly supersede human transmission. For I have a secret affection for mistakes, and for people who make mistakes.

Occasional mistakes, I mean. I like a singer who for once in a way goes a little flat on the high notes. I like an actor who now and again goes back on a mis-spoken word and corrects himself—a thing which a good actor will never do.

I like a speaker who makes what Mr. Lloyd James would deem a howler. It is human to stumble, and I like humanity. But these stumblings are never allowed on the records; and for that reason I should soon weary of an entirely mechanical programme.

TECHNICAL NOTES

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

Concerning Wave-Traps.

THE references to wave-traps which I made in these Notes recently have shown clearly the great interest taken by listeners in this particular device. The interest in wave-traps has naturally increased very much since the Regional Scheme, and I expect in a large number of cases the interest is born of necessity!

There is a very important point with regard to the adjustment of a wave-trap, which I have already indicated in previous references but which is often overlooked, especially by those who have not previously been accustomed to use a trap.

(*Continued on next page.*)

TECHNICAL NOTES.

(Continued from previous page.)

Wave-Trap Adjustments.

The point is that the wave-trap must be adjusted very carefully by a definite condenser capacity; if so adjusted (assuming, of course, that the trap is properly designed and constructed) it should do its work well and cut out the unwanted station.

It often happens, however, that the precise required setting of the trap is quite sharply marked—like the tuning of a selective receiver for a particular wavelength—and unless a certain amount of care is exercised this desired position may be continually overshot, with the result that you do not seem to be able to find the operating adjustment.

Before coming to the conclusion that there is anything wrong with the trap, you should try adjusting the condenser with extreme care throughout the whole of its range. It is practically certain that in this way you will eventually come across the setting which gives the desired result.

Inefficient Working.

Of course, there are other factors which may militate against the proper action of the trap, so that even when you get the best position, the unwanted station may not be by any means completely silenced.

One of the commonest causes of this ineffective working of the wave-trap is the too close proximity of metal objects such as condensers and screens. You know perfectly well that the H.F. currents will set up eddy currents in any such neighbouring metal object and the effect of these eddy currents is to react adversely upon the original currents in the coil.

It is often unavoidable to have screens or condensers in the vicinity of H.F. coils, but you should take care not to have them any closer than can be helped.

In regard to the wave-trap coils in particular this, as I say, is often the cause of inefficient operation, and is one of the first things to look for if your wave-trap does not seem to be doing its job properly. I need hardly remind you that the most effective of all trapping devices is the "P.W." Brookmans Rejector. This remarkable article adds sensitivity to your set instead of taking it away, as do most wave-traps, while its trapping action is extraordinary.

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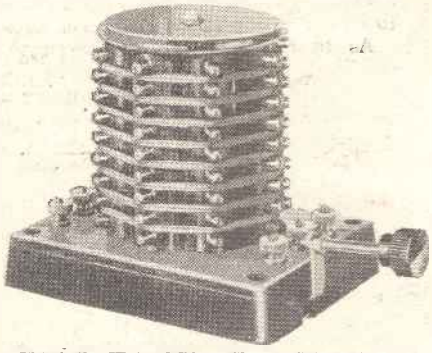
USEFUL XMAS PRESENT



This is the Watmel Wave-Change Coil, which can be used in a very wide variety of circuits.

TECHNICAL NOTES

(Continued from previous page.)

L.F. Distortion.

Low-frequency instability may be of various kinds; sometimes it makes itself extremely pronounced whilst in other cases it is scarcely perceptible.

If it takes the well-known form of motor-boating, of course you simply have to rush to the set and cure it. Motor-boating often occurs when you are juggling with the grid bias of the amplifier, particularly when the grid bias is disconnected.

But when the low-frequency instability is of the less pronounced kind, it is sometimes apt to go unnoticed, or rather its effect is noticed but the cause is not identified.

It becomes a nice question how much low-frequency feed-back can take place without becoming clearly evident to an uninitiated listener—it goes without saying that if howling or motor-boating is reached, it is evident to anyone.

Signs to Look For.

You will often find that the best way to look out for what I may call "incipient" low-frequency feed-back is to pay special attention to the loudest parts in the reproduction; it is not always easy to detect any distortion due to this cause in notes which are of small or medium volume.

But in the loud notes you will generally observe an undue prominence together with definitely bad quality, and this is quite likely to be due to the above-mentioned cause.

As to the cure for low-frequency instability, an output filter circuit, as I mentioned in another connection recently, is a well-known method, whilst a de-coupling resistance with shunt condenser may be used in the detector anode circuit.

Inserting Extra Condensers.

Talking about a shunt condenser reminds me that I often receive questions as to the possible use of a condenser in this, that, or the other position in a wireless circuit. Many experimenters, especially newcomers, get the idea (and perhaps they can hardly be blamed for it) that you can never go wrong in any part of a radio circuit by sticking in an extra condenser or two.

It is true that there are many points in the radio circuit where a condenser may with advantage be added, but in spite of its extreme usefulness it is wrong to jump to the conclusion that a condenser can just be slapped in anywhere and is bound to do a bit of good.

It is not always possible, however, to state with certainty whether a condenser in such-and-such a position will prove an advantage, which means that there is often a sporting chance that it will.

I can only tell you the more definitely accepted positions in which condensers, of the fixed or semi-fixed type, may be used or tried.

Some Useful Positions.

One position, of course, is between the end of a potentiometer and the slider, whilst another is across the grid condenser—the added condenser in this case being of small capacity.

The aerial circuit may often be adjusted to great advantage by means of a condenser in the aerial or earth lead, whilst in the

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

case of the tuning condenser, another condenser in series with the same naturally has the effect of reducing the capacity and adapts the tuning for short-wave or comparatively short-wave reception.

In a set which has capacity reaction it is sometimes a good plan to have a condenser between the anode of the detector and the filament, so as to prevent any possibility of a short-circuit. The usual arrangement of the reaction condenser is between the L.T. and the detector anode. It may be connected to an H.F. choke and, of course, the reaction coil is included in the circuit as well, but there is the possibility of a "short" and to avoid this an additional condenser may be introduced in the circuit from anode to filament.

In some types of ready-made receiver this additional condenser will be found already fitted, but if it is not fitted in your set it is a good plan to put it in. The value of the condenser may be about ·001 to ·002 mfd.

A Safety Condenser.

This condenser should, of course, be connected in series and it is a very simple matter to introduce it into the circuit. This may be done by disconnecting one of the leads from the reaction coil and connecting it instead to one of the terminals of the fixed condenser which you are now introducing.

The other terminal of this condenser is now connected to the terminal of the reaction coil from which you have just removed the lead. The fixed condenser is now in series with the reaction coil and may be the means of saving a short circuit with its unpleasant consequences. The capacity of such a condenser should not be less than ·001 mfd.

Easy Reaction.

In addition to this, a condenser may often with advantage be connected direct between the detector anode and filament and then adjusted (assuming the condenser is a variable or semi-variable one) to a value which permits of much broader control of the reaction. This is a great help, especially for distant reception and makes the reaction much more manageable and generally useful.

Of course, the high-tension voltage applied to the detector anode may need to be adjusted to the new conditions before the best reaction results will be obtained.

There are many other uses to which condensers may be put, and it would take much more space than I have available even to mention the majority of them. A large-capacity by-pass condenser, of course, is sometimes useful for shunting across an H.T. dry battery.

It also comes in handy for quietening a noisy H.T. mains unit and for smoothing and filter purposes generally.

Long Leads.

Talking about filters reminds me that I have had some queries lately with regard to the use of long leads for the loud speaker—a point which I touched on in these Notes a few weeks back.

It is quite a common thing for listeners to have their loud speaker at a good distance from the receiver and, consequently, the question of the effect of long leads is one which often crops up.

(Continued on next page.)

TECHNICAL NOTES.

(Continued from previous page.)

The point is that the leads—which are naturally of twin flex—have a capacity effect, which becomes equivalent to connecting a condenser across the terminals of the loud speaker. The result then depends on whether such a condenser action across the loud speaker improves the quality or otherwise.

I say this because in some cases the addition of a certain amount of capacity across the loud speaker appears to give better results especially in cases where high-frequency peaks exist although legitimate high "notes" also suffer. On the other hand, with some speakers the extra capacity has a very adverse effect.

Find the Cause.

I should add that the loud-speaker leads are often blamed for poor results which, in fact, are due to quite different causes.

One common cause of poor quality of reproduction is the overloading of the loud speaker itself, that is, by pushing too much power into it so that it cannot cope with the power and reproduce faithfully at the corresponding strength.

Another cause, somewhat similar in general nature, is the overloading of the output valve of the receiver. The high-tension voltage applied to the output valve, as well as the grid-bias voltage, usually have a pronounced influence upon the quality and it is much more likely that bad quality will be due to errors in this direction than to the loud-speaker leads.

A grid leak connected across the secondary of the low-frequency transformer is a very well-known dodge which may generally be tried and will often be found to improve results.

TECHNICAL TWISTERS

No. 38.—SOLDERING.

CAN YOU FILL IN THE MISSING LETTERS?

Before two surfaces are soldered together you must be sure that they are perfectly . . . . .

Any traces of dirt, rust, etc., should be removed with a file or . . . . . paper. A little . . . . should then be applied, and it is advisable that both surfaces should first be . . . . . by the application of the hot soldering iron (which is suitably coated with solder).

The final joint is easily made only when both surfaces are tinned, and when the iron is placed so that both surfaces are . . . . . equally by it.

Last week's missing words (in order) were Tinned, Flux, Green, Solder, Use.

AT HOME WITH RADIO STARS

(4.) MISS GRACIE FIELDS.

"P.W.'s" representative visits the world-famous comedienne, and is entertained at her home—by a radio-gramophone!

MISS GRACIE FIELDS is such a versatile sort of person that I guessed a visit to her home would be instructive, both so far as radio and the art of home-keeping were concerned. She is a wireless and radio-gramophone enthusiast.

Two miniature but fearsome cannons guard the entrance to the house, which is approached by a wide, semi-circular drive; but it takes more than cannons to keep away Press reporters!

An amusing feature at the front of the house is a small foundation stone inscribed "Gracie and Archie, 1923," which has a history; for Miss Gracie Fields is in private life Mrs. Archie Pitt, the wife of the famous theatre manager and producer. And Archie Pitt, too, is a versatile person, for it is he who has designed practically every detail, architectural and otherwise, of their new Hampstead home, "Tower." And it is he who has given ample scope for the radio-gramophone, so it is not only Gracie who is the wireless enthusiast!

The "Fatty Goo" Room.

You know Gracie Fields on the wireless. You know her on the stage, too, of course. So you will know how full she is of pep and verve, and both pep and verve—and modernity—are reflected in her home. It is not wildly modernistic, but just pleasantly modern and extremely comfortable.

Her home reflects her character. She is a home-lover, and the amount of importance she places in straightforward home life, and in such simple things as plenty of good music (and radio music) in the home, disprove the Mrs. Grundy theory that all stage "stars" are stage-struck!

When Gracie Fields was heard in a broadcast vaudeville hour a short while back, I noticed just the same almost American freshness of personality as I did when, later, she personally conducted me over her new home and showed what a large part music—and most of it radio music—plays in the daily routine.

Together we saw the cosy entrance-hall, with its novel layout and its cheery colour scheme of grey-green, with weathered oak furniture; and also the rooms leading out of it.

One of these she dubs the "Fatty Goo" (fatigue) room, but I wonder if Gracie is ever "fatty-goo'd"? Both rooms are most tastefully decorated to her own choice in light, modern furniture with deep purple upholstery. There is a fine stained-glass window at the top of the broad stairway, and this gives a view into the garden and kennels.

Leading off the entrance-lounge is a ballroom, the very latest thing, where Miss Fields' friends can enjoy dancing to the music of the wirelesss set on a specially sprung floor. It is the wireless room, too, and when she entertains, dancing nearly always enters into the programme.

I asked if, apart from using the set as a convenient source of dance music, she ever listened-in for serious comparison between artistes.

"Why, yes," she said; "I listen a great deal—when I can. But the B.B.C. doesn't give very much in the mornings, does it? And there are precious few evenings when I am free.

Gracie's Secret.

"I'll let you into a secret. I'm always a little nervous when I broadcast. Perhaps it is because of the microphone, or perhaps it is that with the wireless you can't tell how your turn is going with the unseen audience. I expect people have told you that before.

"Now, whenever I get an opportunity to listen, home here in the quiet, to other artistes, I try to visualise their difficulties in just the same way that I am conscious of mine. I really do believe that if I had the same opportunity as millions of listeners have of listening to humorous and vaudeville broadcasts of every kind, then I could improve my own broadcasting."

She switched on the set for a few minutes—it was in the morning—and a cookery talk was in full blast.

"I mean, you can't do much with *that*, can you?"

BACK FROM AMERICA

Miss Gracie Fields (left) photographed after her return from a triumphant tour of the United States.

A Call at the Kennels.

I said that, from an entertainment point of view, it certainly was a hundred per cent poor.

"Let's see the rest of the house and my Airedales in the kennels."

A rather noticeable thing about the Pitt household is the large number of men-servants who do work which would ordinarily be done by womenfolk. These men have a quaint uniform of white, something after the Eastern fashion.

Gracie Fields is devoted to her dogs. There are six of them in the house. Down at the kennels I saw four most lovable Airedale puppies which, apart from radio, comprise her hobby at the moment.

You all know Tommy Fields. He is Gracie Fields' brother, and by no means a newcomer to the microphone. And set apart from the rest of the house is a three-room suite for his special use. Tommy Fields plays with his sister in many of her radio and stage productions.

Radio and Records.

When I was at "Tower," Gracie was full of her forthcoming American trip, and, to the accompaniment of the radio-gramophone, she told me many of her plans for this transatlantic adventure.

Indeed, my brightest memory of her is when, the afternoon's radio programme being over, she sat on a "humpty" at the side of the radio-gramophone and played over for me some of her latest records, in the meantime cheerily chatting about the prospect of leaving her lovely home for a while and carrying out that arduous programme in the States, which has since proved such a success.

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#443

Popular Wireless

LARGEST NET SALES

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

CHANGE OVER.
A CHRISTMAS HAMPER.
SHORT REPLIES.
THE "HIGHLAND HOPE."

RADIO NOTES & NEWS

HEAVE HO!
ARCTIC VALVES.
"WHAT IS MAN?"
THE NEW TUBE.

The B.B.C. and Trade.

I SHOULD think that one way and another the B.B.C. must help trade enormously.

I do not refer alone to radio traders. Just think of all the music and gramophone records which must be sold as a direct result of broadcasting. (Incidentally, just think of all the records which are not sold but which would be if they were made. On hearing Borodin's "Danse Polovtsienne" recently, I went out to buy a record of it, without success!) How many books has broadcasting sold? And what about garden stuff, theatre and concert tickets, musical instruments, and so on? Oh, what an advertising medium!

Change Over.

IT is announced that Mr. Wheeler, Engineer-in-Charge at Belfast, has been appointed Engineer-in-Charge at the new North Regional station, and has taken up his new duties at Moorside Edge. Mr. S. A. Williams, who was formerly at the Manchester station, becomes Engineer-in-Charge at Belfast. Good luck to them both, and no breakdowns.

A Christmas Hamper.

IF you appreciated our Christmas Number your appetite should be whetted to enjoy the good fare provided by the Special Christmas Number of "Modern Wireless," which is packed as tightly with luxuries as is a Christmas hamper. Amongst the contributors are Sir John Reith, Edgar Wallace, P. P. Eckersley, and Commander Kenworthy. Four new sets are described, the "Plus-X" Four, the "M.W." Three, the "Mains-Power" Three, and the "Tri-Coil" Two. Besides this, there are details of the construction of the "Super-Simple" Mains Unit. A full size blue-print of the "Plux-X" Four is given free with the magazine, which costs eighteen pence—about eight pages a penny!

Short Replies.

L. G. K. (Swindon).—Thanks, but the electrical effects of h.p. steam were thrashed out in these Notes many moons ago. O.B.K. (Trondhjem).—Thanks also to you for your letter. Glad the "Explorer" Four solves your difficulties. Nice English you write, sir. E.H. (China).—Remarks appreciated. Glad 5 S W does you a bit of good sometimes. Chow, chow! A.E.W. (Nr. Leicester).—We had an idea that the "Three Coil" Three was as good as you say. "Stations literally pour in," eh? Thanks for telling us, old man.

An Aerial Error.

I OBSERVED that the man on my right spent most of last Saturday afternoon in pulling down his aerial and erecting a new and much shorter one. "Ere the winter storms begin?" I quoted, placing my pipe and head over the fence. I wished him good luck with it—ours is an awful road for aerial casualties—and he said that he had reduced its length from 80 to 40 feet. As it was obvious that he was not including the 30 feet of downlead, I had to point out that he had really reduced it from 110 feet to 70 feet, a very different thing. He knew better, of course, but had committed an oversight.

SPEAKING BY BEAM TO CANADA

This photograph shows the scene at the Bridgwater Beam station when the Colonial Secretary, Mr. J. H. Thomas, spoke by wireless 'phone to Canada. With him are some of the Dominion Premiers, and (left) Marchese Marconi.

The "Highland Hope."

ONE of the passengers on board the "Highland Hope," which went on the rocks near Peniche, off the Portuguese coast, was Mr. F. S. Hayburn, the Deputy Managing Director of the Marconi International Marine Communication Company, Ltd. After seeing his wife and daughter into a lifeboat he had the luck to be ordered to join the same boat as an oarsman. This boat was damaged by lurching against the liner, and its occupants, or such as remained, had to sit for over an hour up to the hips in water, trying to keep the boat away from the wash of the screws—all being in sodden night attire. Mr. Hayburn and his folk were safely landed, but lost all their kits.

Radio in Ceylon.

I HAVE been looking with interest through the "Ceylon Radio Times," and I must say that considering the resources of the island the programmes are wonderfully good; they are largely made up of gramophone concerts, but are certainly none the worse for that. Talk about the B.B.C. and its pronunciation experts! I should like

(*Continued on next page.*)

RADIO NOTES AND NEWS

(Continued from previous page.)

to hear them trying to tackle "Bhikka Habaraduva Dhammaransi of Divi Bhummikaramaza, Unawatuna Galle." I observe, too, that on November 5th, which in Ceylon is not Guy Fawke's Day but "Full Moon Day," "Maka Samaya Suttra" was chanted by two reverend gentlemen whose names would use up three lines of print.

Heave Ho!

I AM indebted to a Clapton reader for drawing my attention to a testimonial concerning a certain two-valve set, written by someone in Reddish and printed in a Sunday newspaper. "I am more than delighted. I just put a covered aerial on the bed, pulled it along the floor, and was amazed to hear two or three foreign stations." It is not clear whether he pulled the bed along the floor or the aerial which was formerly on the bed but which, possibly, fell off. I think the Reddish man must have been reading about moving coils!

Valves in the Arctic.

ALTHOUGH we generally treat our valves as tenderly as new babies or eggs, it is interesting to learn, as we do from time to time, what brutal usage they really can stand and yet remain on the active list. Mullards tell us that they have had a cable from the British Arctic Air Route Expedition as follows: "Congratulations. Your valves stand worst treatment imaginable. No casualties yet!" When one considers what happens to the equipment of an Arctic expedition before it is finally dumped on the ice, and what is done to it by blizzards, sledging, etc., this is to be regarded as full marks for Mullards little bottles. They may one day advertise, "Stop me and drop one!"

Those Day Programmes.

THE programmes offered by the B.B.C. for consumption during the daytime are such that I am glad that I have to go out of the house every day. You ought to hear my ladyfolk "crack on" about them—"uninteresting talks, and the eternal Gershom P.Q." I think that that was a very good suggestion which was advanced in the "Birmingham Evening Despatch" to the effect that some provision might be made for the many thousands of workers such as bakers, night-watchmen, police, postal employees, and newspaper men, who can only listen to broadcasting during the day.

"What is Man?"

AN unfortunate incident, a little mistake on the part of Nature, an insignificant insect on a planet "belonging to an inconspicuous middle-grade star in one of the numerous islands of the archipelago of island universes." That is what man is, according to Sir A. S. Eddington, F.R.S. I confess that I found his "talk" very salutary, and after hearing Sir James Jeans, F.R.S., similarly discoursing, some days later, I decided that it would be nothing short of ridiculous to continue boasting of the fact that I still had a snapdragon in flower! If you feel the need for readjusting your conceptions of values, follow these astronomical "talks."

Are Eggs Eggs?

AS I am on the subject of "talks," a rare occurrence, I should like to call the attention of housewives to a "talk" given in America. It was mostly about eggs, and I was alarmed to learn that there are more kinds of eggs in heaven and earth than were dreamt of in my philosophy. I used to think that eggs are eggs—fresh eggs, new-laid 'uns, shop 'uns and "cookers." Apparently, America has all these, and in addition "quality eggs," "hennery eggs" and "nearby hennery eggs." It's handy to have a hennery nearby, though not too near!

Items to Note.

SO rarely do we get a Shakespearean play that you will do well to sample "A Winter's Tale," to be broadcast Regionally on Dec. 11th, and Nationally on Dec. 12th. Saturday's Kingsway Hall Concert is the pick of the basket for Dec. 13th. On the 17th Regional listeners should hear the first relay from Warsaw, when a Polish National Programme will be given. I forgot to mention in date order the broadcast of the Hallé concert on Dec. 11th. If you listen only to the second part thereof, Elgar's "Enigma Variations," you will have a red-letter evening.

SHORT WAVES.

A woman correspondent asks where she can purchase some new wave-lengths. A friend has informed her that the type of receiver she uses occasionally runs out of wave-lengths, and therefore requires recharging.—"Daily Sketch."

* * *

"Wireless music is to be turned on in the main rotunda of the Pennsylvania Railroad Station in New York. . . . It is announced that the whole performance will be chaste and dignified, music quietly floating through the air to amuse and calm people waiting for trains," we read in the "Daily Express."

Usually it's the trains that are "chased."

* * *

"Hanything hon the 'air to-night, sir?" inquired the barber.

"I don't know," curtly replied his victim; "I'm not interested in wireless."

* * *

In referring to the radio home constructor of ten years ago, the "Pictorial Weekly" writes: "In his time, the wireless receiver was weird and wonderful, and looked it."

That's all very well—but did it work?

* * *

MARRIAGE VOW UP TO DATE.

Boy: "Mother, where is daddy?"
Mother: "On the short waves, I believe."
Boy: "Why don't we ever see him?"
Mother: "Because he has not got 3 L O."
Boy: "But, mother——"
Mother: "That'll do, son. I took him for better or for Morse."

* * *

Oh, woman, in our hours of ease,
Shy, fussy, coy, and hard to please!
When Yankee signals are a "wow,"
It's: "Egbert, WILL you stop that row!"

A Case for "The Key"?

A MAN of Frinton-on-Sea waxes humorous at the B.B.C.'s expense over the mystery of the "jamming" of London Regional by Stuttgart. According to newspaper reports the B.B.C. had to bring on their super-radio-direction-finding sets, and wonderful wave-meters before at long last they were able to name the offender; yet my correspondent points out that the offender had been naming himself quite clearly over the ether. He suggests that the B.B.C. should buy a copy of our "Key to the Ether," and save the expense of super D.F.'s, etc. There's summat in it, as the man said when he sat on the pincushion!

Short Acknowledgements.

A LADY of Salop very sadly bemoans the threatened disbandment of the Northern Wireless Band. All clear till March next, good lady! S. H. C. (Willesden) has picked up Buenos Aires and wants a "Knighthood." Did you do it with a cat's-whisker? If not, you don't qualify. G. B. (Wallasey) says the German broadcasting system beat ours over the R101 affair, for they pushed the news out before 9 a.m. at Hamburg. Technical parts of his letter flung to the technical hounds. H. V. S. (Darlington), five pages, largely about Unidyne. (Oh, Queen Anne!) Will introduce H. V. S. again later. P. V. (Lagos) asks for samples of transformers. Funny thing, but these "cullud" fellow-Brits. of mine can't get rid of the notion that "P.W." is a sort of shop.

"Down With Him."

AN old friend of my young and care-free days breezed in here yesterday, on leave after three years' exile in Peru, where he serves the Peruvian State Radio service. He has been based on Cuzco, a town full of interesting relics of a past civilisation. He tells me that, in his opinion, South American revolutions are akin to measles and mumps in Europe—bound to happen! President Leguia is now languishing in prison, yet he had given Peru a postal and telegraph service equal to, if not better, than any in S. America, and has provided for an international radio telegraph and telephone service. He has made his capital, Lima, a town of beautiful buildings and given them a broadcasting service, yet—"Down with him!" Give me England, and—er—England.

The New Vacuum Tube.

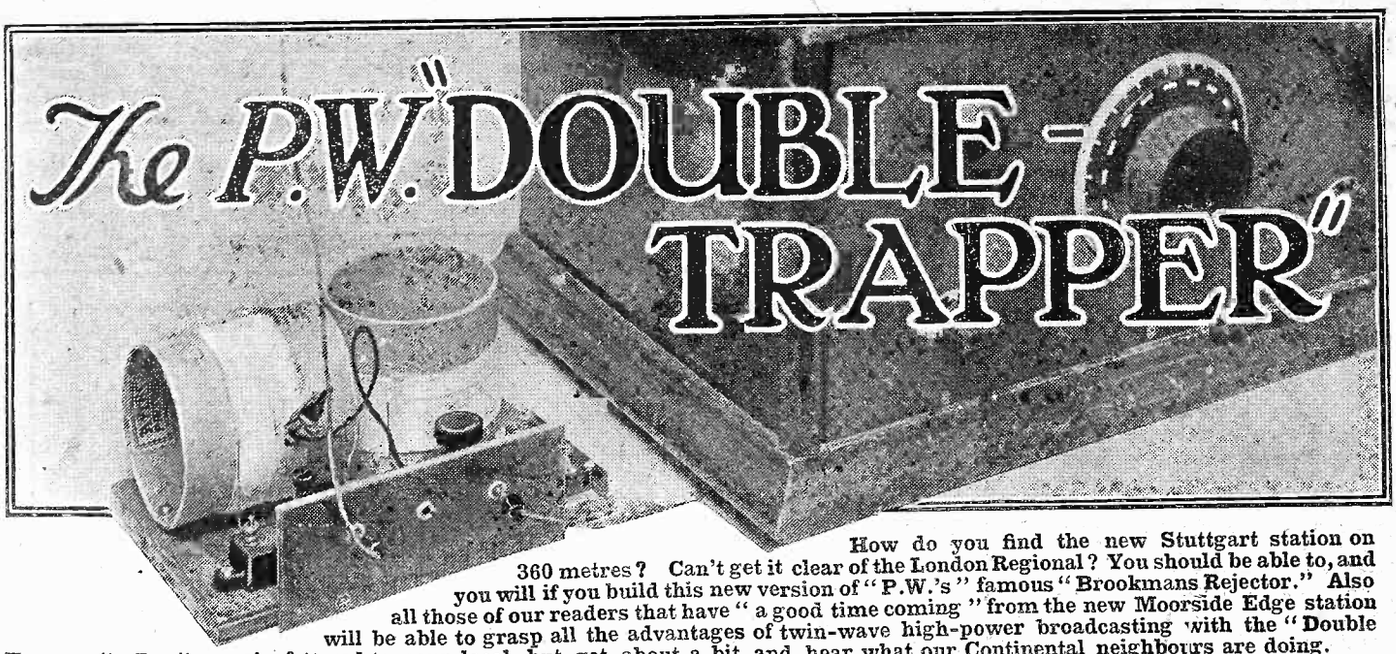
I REFERRED briefly to this wonderful tube some weeks ago, since when I have gleaned a little more information about it. It is so sensitive that, in conjunction with photo-electric apparatus, it can be used for the determination of the heat of stars which are so distant that through the telescope they appear as mere points of light. My reaction to this is sheer wonder about Man, who can do such a thing! The current which this tube can measure can be as tiny as 0·00000000000000001 ampere! (In other words, the amount of "juice" left in a fourpenny flashlamp battery after my kid son has cherished it for a week!)

Radio Research.

I THINK that I recently expressed the view that serious scientists had given up trying to invent devices to cut out "atmospherics," apparently a futile task. A Canadian report lends a certain amount of weight to my opinion. The National Research Council of Canada has established an associate committee on radio research under the chairmanship of Dr. A. S. Eve, of McGill University. One of the first problems will be the study of the radio-frequency standard. (I am not sure what that means.) That will be followed by investigations into refraction over water, impediments to long-distance transmission and the effect of both the aurora and meteorological conditions on wave propagation. No X's need apply!

ARIEL.

The P.W. "DOUBLE-TRAPPER"

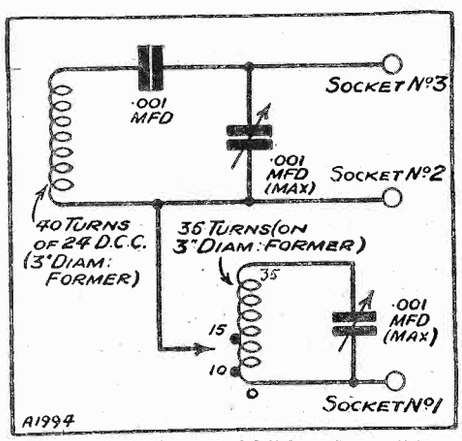


How do you find the new Stuttgart station on 360 metres? Can't get it clear of the London Regional? You should be able to, and you will if you build this new version of "P.W.'s" famous "Brookmans Rejector." Also all those of our readers that have "a good time coming" from the new Moorside Edge station will be able to grasp all the advantages of twin-wave high-power broadcasting with the "Double Trapper." Don't remain fettered to your local, but get about a bit and hear what our Continental neighbours are doing.

IT'S not difficult with the aid of the famous "P.W." "Brookmans Rejector" to cut out any single interfering broadcast station, but what about the problem of cutting out two at once? That's a very different pair of shoes, as many know to their cost!

To be sure, in very many cases it is enough to be able to remove one station at a time. In the London area, for example, it is almost always the 356-metres transmission (London Regional) which causes all the trouble. The 261-metres wave

THE KEY TO THE ETHER



The secret of this wonderful "Open Sesame" to foreign reception.

(National) does not as a rule spread round the dial nearly so much.

In such circumstances a single efficient rejector is all you require, so as to be able to cut out the 356-metre wave when you find it is interfering with some station you want to hear. For these situations we described in a recent issue a very simple version of the "Brookmans Rejector" which fills the bill perfectly.

Wipes Them Both Out!

By the way, those who just want results without the trouble of making up this latter unit for themselves may be interested to know that it is being offered complete and ready for use by some of the advertisers in "P.W."

However, there are other cases where *both* transmissions spread badly and interfere with each other and with other stations. What you want then is some device to cut out both at once, and that is a vastly more difficult problem.

Its difficulty is only too well known in the "P.W." Research Department, for it is a puzzle upon which we have spent months of work. It is comparatively simple to find a rejector which will wipe out either of the two transmissions, but when an attempt is made to connect two rejectors in series the trouble begins.

How It Is Done.

What usually happens is that the adjustments of the rejectors get tied up together, and every time you try to set one it throws the other out. The most effective solution of the problem which we have found lies in the use of two rejectors of entirely different and carefully chosen types.

The *only* ones which we have found to work really successfully in tandem, so to speak, are those you see in the instrument we are disclosing this week. One is of the wonderful "Brookmans" type, which is an exclusive "P.W." invention, and the other is a modernised version of an older rejector, which was at one time used in our sets quite often.

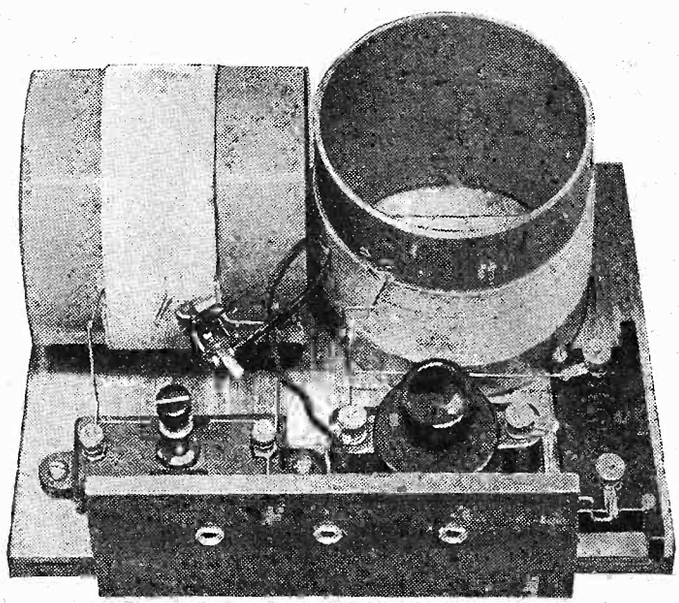
This latter was known as the "P.W." Standard Wave-trap, and it served the needs of the day very well. However, in its original form, good as it was, it could not cope with the worst of "Regional" conditions, and so

(*Continued on next page.*)

THE PARTS YOU NEED

1 Baseboard, about 5 in. × 7 in.
1 Terminal strip, 5 in. × 2 in. (Keystone, or Wearite, etc.).
3 Sockets (Clix, or Eelex, Belling & Lee, etc.).
2 ·001-mfd. max. compression type condensers (Lewcos and Formo in original, or R.I., Lissen, Polar, etc.).
1 ·001-mfd. fixed condenser (Lissen, or Telsen, Dubilier, T.C.C., Igranic, Mullard, Ready Radio, Ediswan, Ferranti, Magnum, etc.).
2 Formers, 3 in. long × 3 in. diam. (Pirtoid, or Paxolin, etc.).
Wire, screws, tapping clip, about 2 oz. of No. 24 D.C.C. wire, etc.

RADIO'S MAGIC CARPET



The "Double-Trapper" acts like a charm on your set, leaving you free to roam through the ether to distant shores, unhindered by that powerful local that has been troubling you so much.

THE "P.W." "DOUBLE-TRAPPER"

(*Continued from previous page.*)

we developed the "Brookmans Rejector."

In the light of recent investigations it has been found possible to improve the earlier type very considerably. The alterations are only very small matters, but they make all the difference to the capabilities of the rejector.

In its latest form it is so thoroughly rejuvenated that it is quite well able to shut out the more easily eliminated Brookmans Park wave. That is how we use it in the remarkable double interference eliminator we are just introducing to you.

Very Simple Construction.

The "Brookmans Rejector" is used to remove the 356-metre wave, which is almost always far more difficult to eliminate and calls for a really super-drastic rejector. Then for the more amenable 261-metre wave we have provided the simpler rejector which is quite well able to deal with it with sufficient thoroughness for all ordinary purposes.

The two rejectors are connected in series in the unit, and there is a simple little arrangement which enables either or both of them to be brought into the aerial lead to your set.

While you are glancing at the circuit diagram to see how the two rejectors are connected, we may as well explain the switching, or rather plugging, scheme we have just mentioned.

Observe that the unit has three sockets marked 1, 2 and 3. These give you the desired control of the "rejecting" which is going on. Thus, to get both rejectors into circuit, plug your aerial lead into socket No. 3, and the lead from the aerial terminal of your set into No. 1.

If the rejectors have been correctly adjusted (a simple matter) both local waves will now be wiped out almost completely, except on powerful sets, when they will be heard only when fully tuned in. The distant stations, being relieved of the usual swamping, will now be free to come in loudly and clearly.

So much for general matters. The adjustment of the rejectors will be covered later, but first let us just deal with the very simple and easy constructional work. (Don't be alarmed by the sight of those home-wound coils; they are nowhere near so difficult to make as many people think.)

The unit is assembled on a very simple plan, with just a small ebonite strip and a baseboard. Exact sizes don't matter, but the relative placing of the coils *is* really important. Do not make any changes here, for any reason whatever.

The coils represent the main part of the work, and you will find details of turn numbers, wire gauge, etc., on the diagrams, also the diameters of the formers. The latter should be 3-in. long, and it is to be noted that the 40-turn winding on the vertical one should be placed roughly in the middle of its tube.

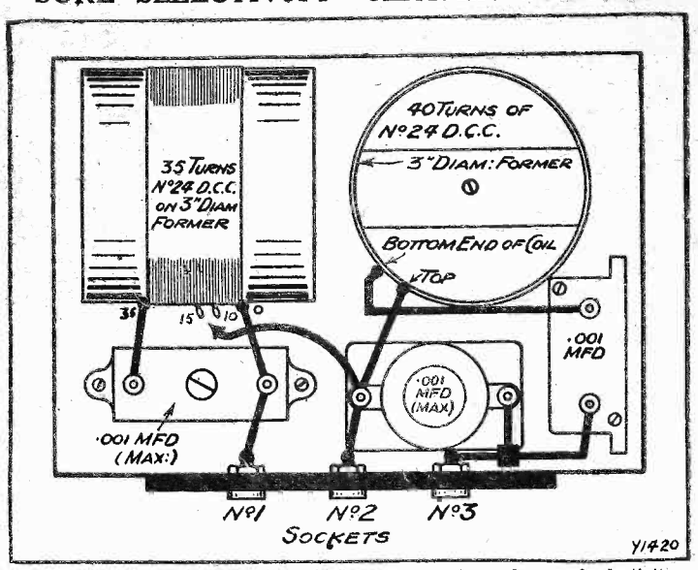
The Coils.

This winding occupies about $1\frac{3}{4}$ in., so there will be a space of a little under $\frac{7}{8}$ in. of unoccupied former at either end. The placing of the other winding on its tube does not matter, neither does the direction of either winding. Be careful to note though, that the tenth and fifteenth turns on one coil from which tappings are taken are counted from the end which is wired to socket No. 1.

So much for the coils. They are really very easily and quickly wound, and the rest of the constructional work will not take more than perhaps an hour. The upright coil is mounted in the usual way with a wooden cross-piece in its lower end, while the other is secured by two screws passing through its walls, one at each end, down into the baseboard.

The rest of the assembling and wiring is really too simple to call for description.

SURE SELECTIVITY—CERTAIN SUCCESS



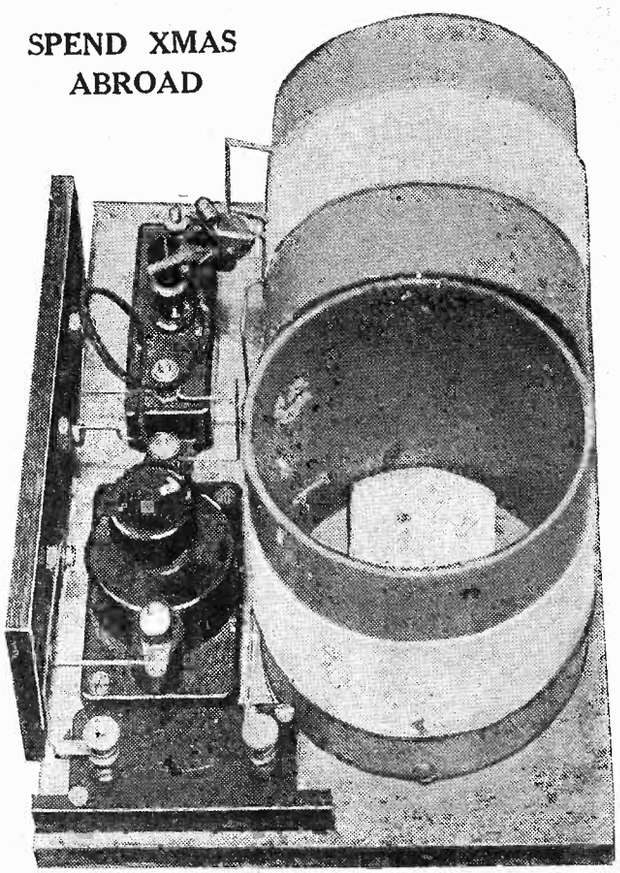
Nothing much to wire up, is there? Yet you can get any degree of selectivity required, and complete wipe-out of your interfering local at negligible cost.

The adjustment of the two rejector condensers should be done one at a time, starting with the one for the more powerful station (the one nearest the fixed condenser). Plug into sockets 2 and 3, and adjust this condenser until you find the rejection point. Most Londoners will want to tune it to cut out the 356-metre transmission.

That done, bring in the other rejector (plug into 1 and 3), and adjust it to cut out the 261-metre wave as completely as possible.

Our instructions on these points are necessarily rather brief, and those who are unfamiliar with rejectors would do well to watch the more detailed notes given from time to time in Radiotorial.

SPEND XMAS ABROAD



Why not take a trip round the Continent this Christmas? Your set could take you through France, Spain, Italy, on to Prague, Budapest, and back via Vienna and Germany, on a real Christmas tour. But you must be able to get rid of that troublesome local—and the "P.W." "Double-Trapper" can do it for you. It is not like other "traps," it does not decrease your set's sensitivity, it INCREASES it as well as giving you razor-edged selectivity.

RADIO ODDS AND ENDS

Licence Figures—Police Radio—Terminals, etc.

There are now more than 2,000 schools in which children listen regularly to the B.B.C. educational broadcasts.

* * *

Wireless licences in this country at the end of July amounted to 3,162,460.

* * *

More than 17,000 blind listeners receive free licences from the B.B.C.

* * *

The City of London Police are installing a powerful radio equipment at their headquarters in Old Jewry, E.C.

* * *

Although B.B.C. stations are normally linked by Post Office trunk lines, transmissions before 6 p.m. are usually relayed to provincial transmitters by wireless.

* * *

If you are making your own H.T. unit remember that insulated plugs and sockets and terminals can be obtained, from which it is impossible to receive a shock, and these are certainly well worth the little extra expense.

IF I CONTROLLED *the* B.B.C.

by GEORGE ROBEY

It has often been stated that the B.B.C. programme control should be vested in the hands of variety experts—and where could you find a greater expert than the inimitable George Robey? Here he tells "P.W." readers what he would do to liven up the programmes. And behind the quips and queer asides there is that glimpse of wide sympathy and broad humanity that has endeared "George" to the British public.

GENTLE reader, I'm all of a 'tis-was over a bright idea!

Why a reader's always supposed to be gentle, and what a "'tis-was" is, I don't know. However——

You see, I was just walking on my way to the Palladium (my chauffeur had gone to buy the "Radio Times"; one of the B.B.C. announcers had just commandeered the last taxi, and I couldn't ride my bicycle because I'd lent the front wheel to a man who said he wanted to use it on top of his chimney as an aerial) when a great big hand came down whack on my shoulder and a voice said: "Hey, you! Come along with me!"

I Meet the Editor.

Well I was just wondering if it was a long walk to Vine Street, and who would bail me out, when I looked up and saw Norman. (Norman's the Editor, see?) Nice fellow, Norman. Used to sing in the choir when he was a boy, and keep rabbits and things like that.

The girls adore him. I remember one year, when we were at Brightlingsea together—ahem! Yes, a very steady fellow, Norman. Never has more than "one," and always asks me if I've got a potentiometer on my grid, and if the frequencies of my choke radiate my curves, or something like that.

Terrifically clever, you know. I mean, he can take a loud speaker to pieces and—— But, as I was saying, there was I walking along towards the Rose and—the Palladium, when Norman claps me on the shoulder and looks at me like a man in the desert who's just heard Niagara Falls broadcast through a crystal set.

"My Lucky Day."

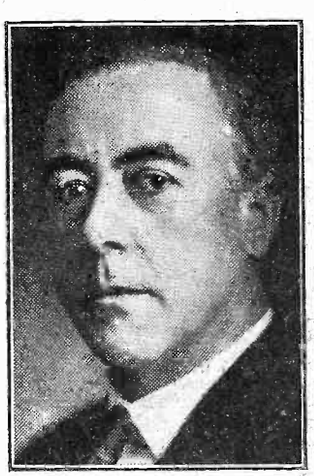
"George," says he, "this is my lucky day!" (They invited Norman to go and tour the American Radio Stations some while ago, and ever since he came back he breaks into the vernacular and lunches off pork and beans.) "I was just going to send out an S.O.S. for you."

"Give it a rest," says I. "Let the jolly old amperes look after the volts and let the high-tension chase the low. Who cares if an armature balances itself on four poles?

"Who wants to know why the blushing grids screen themselves? In other words, Norman, forget it; step along with me to the Palladium and *see* a show that's worth it. Savoy Hill's a relaxing place. What you need is a change of air."

"That's all very well," says he, stopping short in the street, and, with a dramatic gesture, nearly poking the eye out of an elderly gentleman who happened to be passing at the time, "but have you any idea of the thousands—hundreds of thousands that Savoy Hill is entertaining at this minute?"

"Ah, that's the point, as the old lady said when she sat down on a darning needle,"



GEORGE ROBEY KING OF MIRTH

"Get to know the public's likes and dislikes, give them what they want, and cut out what they don't want."

says I. "Look at your paper and tell me what they're doing."

"Tell you in a second," says he, producing the "Radio Times" from his dispatch case, and turning over the pages. "What do you want—the Midland or the Regional?"

"The Regional," says I, noticing a nervous, rather crestfallen look on his face as he looked at the Midland programme.

Trying to Please Everybody.

"The Regional?" he echoes thoughtfully. "Um—yes—ah—I see the Midland's doing——"

"The Regional," I repeated obdurately.

"Yes, yes, of course," he stammers in confusion. "Perhaps, you'd like to have a look, at it?" he suggests desperately.

"Perhaps I would," says I, taking the paper from him, and looking at him firmly. "Thanks, that's enough," says I, handing it back to him.

There was a moment's silence. Norman's face had gone very red, and he was twirling his walking-stick rather uncomfortably.

"You see, George," he says at last, "they're trying to please everybody—honestly they are."

"Huh!" says I, very stiffly.

"You see, there are some people who go mad over that sort of thing."

"Get the Personal Touch."

"I believe you, Norman," says I, colder than ever. "I felt that way myself last night. But why must Savoy Hill be so interested in asylums? Now, if *I* controlled the B.B.C.——"

"Ah," says Norman, producing his note-book and pencil in his best professional manner. "Ah!" says he, "what would *you* do?"

"If *I* controlled the B.B.C.," says I impressively, "I should get the personal touch into it. I should get to know the public's likes and dislikes, give them what they wanted, and cut out what they didn't want."

Norman replaced his notebook with a sigh and looked at me sorrowfully.

"That's the trouble," says he. "It can't be done. The public grumble away to themselves, but when it comes to telling the B.B.C. what they *do* want, well—they're just too lazy."

The Robey Scheme.

"Ah, but I've got a scheme that's never been tried before," says I mysteriously.

"Oh," says Norman, licking his pencil and taking out his note-book again. "And what's that?"

"I'll have to write it down," says I, with pride. "A few words would not do justice to the propounding of a scheme that will for ever place the B.B.C. in debt with myself."

"All right, George," says he, as we reached the stage door. "Spill the beans."

First of all, to get the personal touch and acquaint myself with listeners' likes and dislikes, I should, if I controlled the B.B.C., announce the scheme of nominating one licence-holder each week (he or she would

(*Continued on next page.*)

"IF I CONTROLLED THE B.B.C."

(Continued from previous page.)

be picked quite at random from the Post Office records) to come up to the studio and broadcast his or her opinion of the programmes generally and make suggestions for their improvement, and for such services should reward the candidate chosen each week with a gift of fifty pounds.

This, in itself, would prove a breathless attraction, for I should see that the chosen one was not communicated with by letter. On the fateful day of the announcement, therefore, one could be pretty certain of every licence-holder listening-in to hear if he or she were going to have the opportunity of airing their grievances and, at the same time, be handsomely rewarded for it.

Mr. Higgins.

I should say that Monday evening every week would be the best day for the surprise nomination and Saturday evening for his or her appearance at the Studio. As a kick-off, therefore, we might, as we all sat around in our drawing rooms, expect to hear an announcement after the style of the following:

"Ladies and gentlemen, as the result of our random choice for the first critic of our programmes, we are happy this evening to address Mr. Alfred Higgins of 399, Prospect Street, Camden Town, London.

"I will repeat that. The name is Mr. Alfred Higgins, of 399, Prospect Street, Camden Town, London. We hope that you are listening, Mr. Higgins.

"As you already know, it has been our increasing desire to become acquainted with some of our listeners and allow them the opportunity of expressing their opinion of the programmes we submit, and to have suggestions for anything which would add to their popularity.

"We therefore extend a cordial invitation to Mr. Higgins to come up to the studio next Saturday evening for the purpose of giving us his opinion and offering any suggestions that he may have.

"The Toones We Know."

"For this service we would ask Mr. Higgins to kindly accept as a little memento of the occasion, the reward of fifty pounds, as advertised in the press and in the "Radio Times," the official organ of the British Broadcasting Corporation.

"We may add that a warm welcome awaits you, Mr. Higgins, and we are assured that our nomination of you will be to the benefit of British Broadcasting as a whole."

To which Mr. Alfred Higgins, better accustomed perhaps to the use of the pick-axe than the King's English, but with nevertheless decided views on the matter, would probably respond next Saturday evening in the following manner:

"'Ullo everybody! I bin arst by the B.B.C. to come up 'ere at Savoy 'Ill and say wot I thinks of the programmes we've bin 'avin' and wot I'd like to 'ave in futcher.

"Well, ladies and gen'lemen, seein' as 'ow the B.B.C. 'ave paid me fare from Camden Tahn and give me fifty quid as well, I don't like ter complain too much abaht things.

"But since they arst me and they don't mind wot I say, I must say as 'ow this 'ere perishin' chamber musick gives me the sick. Now, I don't mind a good rousin' march on the brass band, but to 'ave to sit and 'ear stuff wot ain't got no toone's somethink crool. So wot I ses is: 'Give us the toones we all know.'

Racing Tips Wanted.

"As the B.B.C. as arst me if I've got any suggestions to offer, I'd like to say as 'ow I think it'd be a good idea if we could 'ave a racing talk every evening instead of the noos at nine o'clock.

"I allus put me bob on each day, same I expect, as you do, and if the B.B.C. 'ad 'old of a good tipster wot noo the winners every day they'd be doin' a service to the community.

"I think that's all I've got ter say, thank you. Oh, I know; the missus says as 'ow she's rather parshall to the cornet, and could Mr. Legget give us 'Abide With Me' if he's got the musik. Good-night, everybody."

Week after week, the excitement would spread; day after day a greater number of licences would be applied for and, slowly but surely, as different classes of people in different spheres of life were called upon to air their views, the requirements of the public would be more easily gauged and catered for.

Another scheme I have for revolutionising the British Broadcasting Corporation is——

[Ed.—Thank you, George. That will do.]

WHO SAID "FIRE"?

The Burton-on-Trent Fire Brigade uses a system of loud-speaker fire-alarms.

THAT GRID SWITCHING.

By A. S. CLARK.

ALTHOUGH switching valves is not so popular at the present as it used to be, there is still a very large number of receivers in which a switch is provided for cutting out one of the L.F. stages. It is quite common for such switching to be of a type known as "grid switching."

Grid switching has one great advantage over the older method of switching in the anode circuit of the detector or first L.F. valve. It makes it possible to keep the last valve—which should be a power valve in the case of a loud-speaker set—always in circuit, and also the output arrangement is never disturbed.

This is achieved by switching the grid of the last valve to the coupling device either preceding or following the first L.F. valve. The grid bias for the last valve is therefore obtained sometimes via one, sometimes the other, and since the first L.F. valve is supplied via the first coupling device when working on both L.F. stages and different values of grid bias are required by the two valves, grid bias switching has to be provided.

"Up in the Air."

The value of bias on the power valve is therefore always correct and the last valve cannot be harmed by receiving too little bias, but there is another way in which it might be harmed. As the switch is moved from one position to the other the grid of the power valve is momentarily "up in the air" or disconnected.

Generally this will be for only a moment, and possibly not long enough for damage to result, but it might easily get left in the mid-way position for a short while. All that is necessary to guard against the trouble is to put the L.T. switch off for a moment while changing over the valve switch.

ABOUT YOUR SET.

H.F. TUNING—GRID BIAS, etc.

In sets employing one tuned high-frequency stage in front of the detector, it is of more importance to keep the aerial and H.F. circuits in tune with one another than to handle reaction, for long-distance work.

* * *

If your grid-bias battery is out of sight in the cabinet do not fail to overhaul your plugs occasionally and to open them out. (Lack of grid bias is very harmful for the valves at the L.F. end.)

* * *

Keeping an accumulator in good condition is very largely a matter of regular and correct charging.

* * *

When installing a dry rectifier the maker's recommendations regarding the smoothing capacity across the D.C. output terminals should be followed, as too high a value here may damage the rectifier.

CONCERNING VALVE AMPLIFIERS

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

In his final article of a short series our Radio Consultant-in-Chief deals with those valve operating requirements that make for first-class loud-speaker results.

(4.) OUTPUT CIRCUITS.

I HAVE tried to show how any valve may be "worked out" as to its characteristics, and designed for the circuit it has to feed into.

It is perhaps not uninteresting to consider this subject a little further. The most common mistakes are made concerning the output stage.

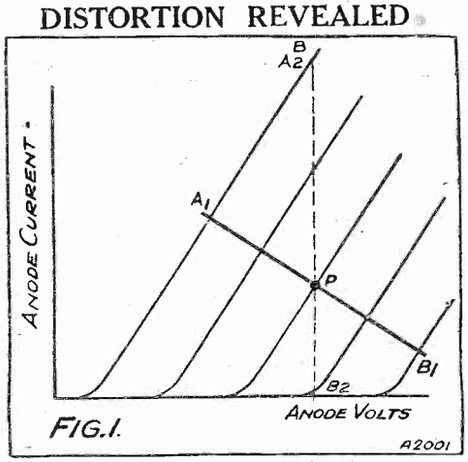
Let me revive your memory. We took a set of anode-volt anode-current characteristics as in Fig. 1. We chose a working point P and we found a line which was the locus of all the points swung through as the grid was varied between zero grid volts and maximum negative grid volts.

The Slope of the Line.

The slope of the line gave the anode impedance. If the anode impedance was 0 the line was vertical, if infinite the line was horizontal. If there were no anode impedance there was no volts change on the anode.

As the impedance in the anode is varied the load-line tips up and down. If it tips too vertically (too little anode impedance) then the intercepts (A_2 P P B_2.) are not equal, and distortion must set in since the anode volts change in one direction of grid volts swing does not equal the anode volts change with the other direction of grid volts swing. We get "bottom-bend" distortion if the anode impedance is too low.

DISTORTION REVEALED



Load-lines on anode-current anode-volts curves. The full line indicates good conditions, and the dotted line bottom-bend distortion.

But consider that we have so designed things that the intercepts A_1 P. P B_1. are equal whatever, within limits, the value of the anode impedance. Without drawing all the characteristics then consider Fig. 2. We draw simply the boundary characteristics. Here is the line swinging round P.

There is no bottom-bend distortion whatsoever in the conditions as represented. The vertical projections of the lines, A_1 B_1. A_2 B_2 = A^I B^I. A^{II} B^{II}. etc., represent the anode volts change with given grid volts change.

Consider that this represents a valve feeding direct into a loud speaker. Now a loud speaker has an inductance and a resistance. The reactance of the windings increases with frequency. Thus, since resistance remains constant, the impedance of the loud speaker increases rapidly with frequency.

Thus consider Fig. 2. At maximum frequency we may represent the condition of affairs as A_3 P B_3. The anode-volts change, i.e. the voltage fed into the loud speaker, is represented by A^{III} B^{III}. Medium middle frequency conditions are represented by A_2 B_2. the anode-volts change being now A^{II} B^{II}. But at the low frequencies the anode-volts change is A^I B^I, much less than at the other frequencies.

Too Little Bass.

So a valve is apt to give too little "bass" to the loud speaker *unless matters can be arranged so that the load-line stays constant.* This can be done in two ways, firstly by making the anode-volts anode-current curves infinitely steep, or by arranging it that even at minimum impedance the line is sensibly horizontal.

This latter condition means, in fact, that the lowest impedance of the loud speaker must be large compared with the valve impedance, hence the necessity for low impedance output valves. In this case the change of slope of load-line is relatively small with changing frequency.

Perhaps, however, I may conclude by warning those who have followed me closely that even if they have achieved a constant voltage output valve they have not necessarily achieved perfect quality from the loud speaker.

It is part of the general muddle that loud-speaker design has not been greatly concerned with output-stage design, and equivalently output-stage design has been unconcerned with loud-speaker design. I do not think I shall be blaming anyone, but rather remarking a fact, when I say that loud-speaker design has been largely empirical.

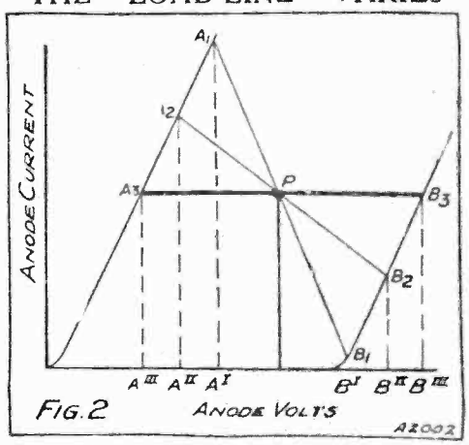
"Hit and Miss" Principle.

The B.B.C. has been taken as a standard of quality, a fairish typical output valve feeds the loud speaker and the rest develops by continuous listening.

If, of course, a system could be set up in which one "control" prevailed we might get so much nearer perfection. But people say where would come the stimulus if we are to discount individualism? Which is all another story.

But the conclusion to these articles should be that people ought to be in a position to *design* their generators (output stages) to match loud speakers and have freedom from distortion and maximum power output.

THE "LOAD-LINE" VARIES



This diagram illustrates how the load-line slope varies with varying loud-speaker impedances and with varying frequencies.

It is a matter of choice of valves. But if the transformer output is favoured we are far less dependent upon the choice of valve. We can, by a transformer, make the anode impedance anything we like.

LATEST BROADCASTING NEWS.

TELEVISION IN 1931.

BROADCASTING HOUSE EXCAVATIONS—THE EX-KAISER A B.B.C. LISTENER—AMOS 'N ANDY.

AS a result of further private examinations, and a good deal of consideration, the B.B.C. has decided against suspending the Baird television transmissions at the end of December. The transmissions will go on in the New Year.

Apparently the demonstrations revealed just enough improvement to justify continuance of broadcasting facilities. There is also no doubt that the B.B.C. engineers are beginning to take more interest in television. They are known to be agreeable to trying-out any system or process; but they come to the conclusion, both on general and technical grounds, that the Baird system is still the best in the field.

This being so, they propose, during the next stage of development to co-operate as far as possible with the Baird engineers. There is, of course, no question as yet of programme values in television, but the newly-discovered technical interest of the B.B.C. should be most welcome in Long Acre.

Among forthcoming experiments which may be undertaken is the testing of a portable television transmitter. If this were to materialise as a practical possibility, its use would add tremendously to the interest in such "Outside broadcasts" as the Derby and Grand National. But that is looking ahead with a vengeance!

Broadcasting House Excavations.

In the excavations for Broadcasting House in Portland Place, it was discovered that the Bakerloo Tube passed that point, 96 ft. below street level, or 16 ft. deeper than is shown on any existing maps. A letter received by Mr. Tudsbery, the B.B.C. Civil Engineer, from one who was engaged on the tube excavation, recounts how the head ganger presented him with a "crystal lump," and the petrified remains of a human foot and leg discovered in virgin soil over 90 ft. underground.

Opera Subsidy Echoes.

The Opera Subsidy has claimed more Parliamentary time and interest than any other subject connected with broadcasting in the past five years. But one result is to awaken many M.P.'s to the possibilities of broadcasting as a fruitful field of awkward questions. Also it has brought home to political circles the importance of the new appointments to the Board of the B.B.C., which will have to be made in 1931. Government opinion is disposed to regard any vacancies as fit spoils for party patronage, and in the event of a reversal of fortune at the next General Election, this interpretation would be a kind of re-insurance against the feared misuse of the state monopoly by a new Government of another political colour. Conservative headquarters has got wind of this trend of opinion in the enemy camp, with the result that there is already a busy canvassing of likely candidates "in the Conservative interest."

Ex-Kaiser a B.B.C. Listener.

The ex-Kaiser has announced his intention of listening to the National programme on Sunday, December 21st, when the Rev. Joseph Llewelyn Thomas preaches in Welsh at the monthly religious service, which is to be relayed from Aberpergwm Church, Port-Neath-Vaughan.

Mr. Thomas is a distinguished cleric and has written many publications, including "Kaiser William's Pilgrimage to the Holy City," and "A Visit to the ex-Kaiser at Doorn."

Amos 'n Andy.

Amos 'n Andy are to be heard by British listeners on Wednesday, December 31st, and their turn is broadcast from one end of the United States to the other. Of course, they command an enormous fee, but such is their personality and hold over the American public, that while they are "on the air" the whole of the United States virtually ceases to do anything else but listen to them.

Telephone calls fall by a colossal number, and several churches have had to alter the time of evensong services because people simply will hear Amos 'n Andy. Their "turn" is a conversation between two negroes, but Amos 'n Andy are white men.

Amos, whose real name is Freeman Cosden, was formerly an actor, and Andy, otherwise Charles Correll, was a bricklayer and an amateur minstrel before he took up broadcasting.

COMING SHORTLY:

MY RADIO CAREER

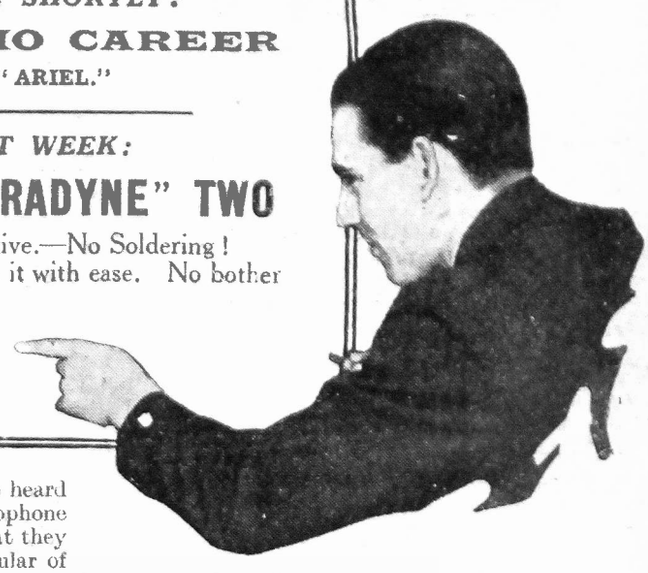
By "ARIEL."

NEXT WEEK:

"THE CONTRADYNE" TWO

Powerful.—Selective.—No Soldering!

Anyone can make it with ease. No bother from the Local Station breaking through into long waves.



For those who may not have heard about these famous microphone artistes we hasten to say that they are probably the most popular of all broadcasters the world has ever known.

Every night, for fifteen minutes, they hold forth, in the interests of a firm of toothpaste manufacturers (but not in any ram-it-down-your-throat advertising style), It will be very interesting to see how British listeners take to the kind of stuff which has properly got the whole of North America by the ears. We hope that conditions are suitable for a first-class relay.

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 Thrill.

I TRUST that you heard "Dr. Jekyll and Mr. Hyde." It was not very good as a play; but as a thrill it would take some beating.

Other attempts have been made to dramatise the stories of Robert Louis Stevenson, but without much success. He was a great story-teller, but had no sense of the theatre. Indeed, he did not really believe in the theatre.

He was once asked to write a play; but he refused, because "playwriting," he said, "is a falsification of life." There were too many soliloquies in this play; but they couldn't be helped; the material was dramatic but not theatrical.

Leon M. Lion.

The thrill of the dual personality was in the hands of this well-known and very accomplished actor. He made the most of it. It was largely a matter of the extraordinary use of his voice.

B.B.C. repertory players who may have been listening had a fine lesson on what the voice can be made to do. The gulf between the professional actor and the next best is very wide.

By the time these Notes appear you will probably have heard Ernest Thesiger and Ernest Milton in a play by Lord Dunsany. Evidently Savoy Hill is taking the dramatic side of its work "Ernestly."

The Ginger Group.

The Vaudeville hour has recently been much improved by the introduction of what is officially known as "The Foursome," and popularly as "The Ginger Group." The result is that we get fewer and better items, with The Ginger Group

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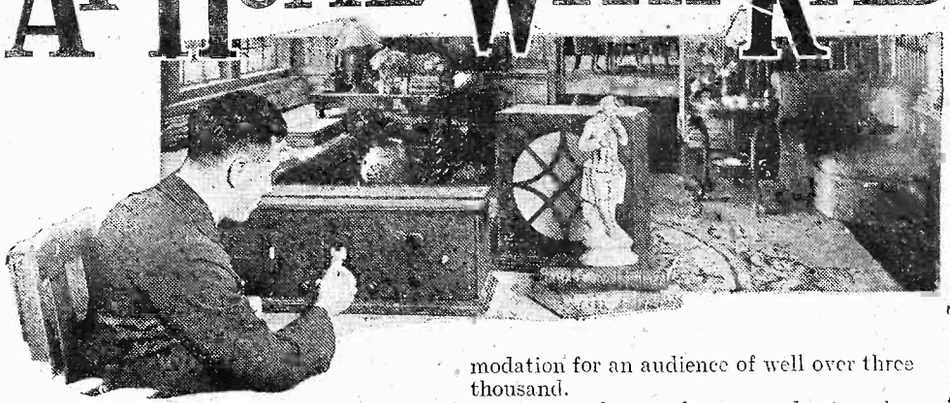
AT HOME WITH RADIO STARS



The subject of our intimate and exclusive sketch this week is that popular violinist and orchestra leader who was the first to give a vital impetus to the broadcasting of restaurant music in this country.

(5.) DE GROOT.

IF you entered De Groot's sitting-room you would know at once that you were in the home of somebody "in the profession." And it would not take you very long to realise that the somebody concerned moved in the very best musical circles.

For grouped on the mantelpiece and crowded together on top of the grand piano are dozens of photographs of the people who matter in music. Sir Landon Ronald rubs shoulders with Rachmaninoff. Ysaye plays his violin soulfully towards the smiling eyes of Myra Hess.

His Friends.

All the modern masters are there—and they are not all of the highbrow variety. Accorded a special place of honour on the corner of the mantelpiece is Gracie Fields, friendly and smiling.

I was examining the collection when De Groot entered the room. He was gratified, I think, to see that I was interested in his photographs.

And well he might be, for such a number as he possesses must surely be unique, and is as fine a testimonial to the esteem in which he is held as any man could desire. "They are my friends," he said. "I am proud of them."

De Groot speaks with a strong, but not unattractive, foreign accent. (He converses fluently in French, German, Dutch, and English.) He was born in Holland, but the greater part of his life has been spent in England, and he became a naturalised subject many years ago.

A Bad Beginning.

His outlook on life is sound; he is a true philosopher, and has an overwhelming belief in the goodness of things. If he is in luck, he is pleased but not excited; if things go wrong, as they sometimes do, then he awaits the better things ahead. And, at a time when there is so much talk of trade depressions and other ugly aspects of our existence, it is refreshing to hear such views expounded.

It was with a smile that De Groot told me of his first visit to this country. "I was sixteen at the time," he said. "A violinist in an orchestra of Dutch youths. An Englishman who heard us playing said we should do well in England, and he eventually arranged that we should appear for a week at Newcastle-on-Tyne.

"The theatre at which we were to appear was called the Olympia, and is still in existence as a talkie house. It had accommodation for an audience of well over three thousand.

"At our first performance about twelve people put in an appearance. There was a similar number at our second and last concert.

"My fellow-musicians and myself returned to Holland penniless, hungry, and terribly seasick. It was not a very promising introduction to England."

Quite recently, De Groot again appeared in Newcastle. By coincidence he played at a theatre adjoining the old Olympia. But on this occasion he topped the bill, and the enormous number of encores he gave testified to his popularity with the discriminating Northerners. That is a sound justification of his philosophy of life.

To De Groot, music is, first and foremost, an art. But it is also a business. As I talked with him, I fancied I noticed a certain regret in his manner—a regret that he could not altogether forget the business side of his profession.

In this I may be wrong, but I am convinced that the artist in De Groot disdains the pounds, shillings and pence, the organisation and the clerical work which the business side of him demands.

A POPULAR BROADCASTER

De Groot and the violin that entrances so many radio listeners and gramophone enthusiasts.

"You must find that incessant travelling to various parts of the country is very tiring," I suggested.

"It would be more so if I travelled by train," he replied. "I go everywhere by car, which occasionally I drive myself. Only in exceptional circumstances do I travel by rail.

"Such an occasion was the last Royal Command Performance when I was playing in Aberdeen. I travelled twelve hundred miles in order to play for a bare ten minutes at the Palladium."

Bridge as a Pastime.

I learnt afterwards that De Groot collapsed on his return from Scotland. The sad truth is that his health is not what it was. Wisely, he conserves his strength by comfortable travelling, and retiring early to bed at night.

"What do you like best after music?" I asked.

"There is something I like more than music," he returned. I frowned, for this was a strange confession from an acknowledged master of music. Then I saw the twinkle in his eye. "It is a good game of bridge," he explained.

Bridge is the foremost of De Groot's hobbies; and since Mrs. de Groot and his son and both daughters are equally keen he does not lack for practice. He is, too, interested in all sorts of literature, but the only opportunity he gets for reading is at night. He collects china, and showed me a cabinet containing many picturesque pieces of shepherds, animals, and the like.

A Radio Benefactor.

Also—and this, my experience has taught me, is something unusual amongst radio performers—he likes *listening* to the wireless. He has a beautiful all-mains five-valve cabinet set. As he opened the doors and showed me the simplicity of the working, I could not help wondering if wireless listeners appreciated how much they owe to De Groot.

For it was he who first popularised restaurant broadcasts, a form of entertainment which, in the first instance, was nothing more than a very doubtful experiment. De Groot had a great responsibility, not only to himself but to a vast and ever-growing wireless public when he undertook the first public broadcast from the grill room of the Piccadilly Hotel.

He has, too, discovered and encouraged wireless talent, and there is many a star broadcaster to-day whose success is due to De Groot.

S.H.

THE B.B.C. YEAR BOOK

By THE EDITOR.

Some interesting facts and figures illustrative of the progress made in broadcasting during the past year.

UNDER the title of "The B.B.C. Year Book, 1931," the B.B.C. publishes for the fourth year in succession its annual review of the aims and achievements of the broadcasting service in Great Britain and Northern Ireland. The record embraces the period from November 1, 1929, to October 31, 1930. The price of the publication is two shillings.

A Super Studio.

Interesting details are given of the future headquarters of British broadcasting in Portland Place, London, which are expected to be ready for occupation by the autumn of 1931. The building will contain some twenty studios, from the super studio, or concert hall, which is three storeys in height, to dramatic studios and studios for special branches of broadcasting. One of the amenities of the concert hall studio will be a lounge for the comfort of the public. Several of the studios in the new building will be far larger than the largest studio in the B.B.C.'s present premises at Savoy Hill.

Among the new features of the Year Book for 1931 is a comprehensive summary of the broadcasting events of the year. Besides a calendar of outstanding broadcasts and programmes of an unusual nature, this section contains lists of prominent speakers, musicians and variety artistes who have appeared before the microphone during the year. Schedules are also included of sporting events and public ceremonies which have been relayed, and lists of cathedrals, churches, theatres and music-halls which have contributed to programmes.

Programme Proportions.

A chapter entitled "Finance" provides an answer to those who would appropriate a part of the B.B.C.'s funds for subsidies. In this chapter the B.B.C.'s needs in the way of revenue and capital expenditure are examined and found to exceed its present financial resources. The excess of income over revenue expenditure is the Corporation's only resource for meeting capital expenditure, which must increase rapidly as progress is made with the Regional Scheme. It is stated that "the Corporation is entering on a phase of development in which its needs in the way of revenue and capital expenditure are bound to exceed greatly its present financial resources, and it is obvious that some of the existing limitations of its resources will have to be overcome very shortly if its progress is not to be unduly impeded."

Programme developments are the subject of an article which shows that the boundaries of broadcasting are continually extending. In the course of the next five years practically all the important broadcasting activities in Europe will be available for listeners in Great Britain. Relays from Canada, Australia, America and liners at sea are still romantic experiments

Foremost among the special articles on music is a chapter on the new B.B.C. orchestra. It is the aim of the Corporation that this orchestra should set a standard for English orchestral playing and should bear comparison with the finest orchestras in the world. Although the full orchestra attains to the imposing strength of 114 for symphony concerts requiring a full modern orchestra, the players will undertake every kind of work calling for division and subdivision to suit varying musical requirements. From the ranks of the full organisation seventy-eight players will be taken for symphony concerts requiring a medium sized orchestra. For light symphony concerts another division of sixty-seven players will be made, and for "popular" orchestral concerts and similar programmes forty-seven players will be taken. For theatrical programmes thirty-six players will be used.

An indication of the way in which alternative programmes may eventually be provided for the whole of the British Isles is contained in an analysis of National and London Regional transmissions. The analysis as printed in the Year Book is as follows:—

	National %	London Regional %
Music	58·742	83·507
Drama	1·889	1·673
Talks	23·324	13·284
Religious Services ..	5·504	1·076
Appeals	·164	·192
Children's Hour ..	5·569	—
Special transmissions	·433	·101
Pictures	4·375	·167

The percentages of wireless receiving licences to population are shown by counties in the form of a schedule and by means of a shaded map of England. A comparison is made of British and American alternative programmes on October 1, 1930.

The story of the North Regional transmitting station explains the plans that have been made to introduce alternative programmes for listeners in the North of England. The station at Moorside Edge is nearing completion and has been allotted the most effective wave-length in the "medium band" which this country possesses. The North Regional transmitting station has been built on lines similar to the London Regional station, but certain innovations have been made. The process of changing over the service from the present system of low-power stations to the new high-power station is described.

Scotland's New H.Q.

Chapters are devoted to the Children's hour, religious activities, educational progress, the National Chorus, poetry reading and the S.O.S. service. Sir Frank Dyson, the Astronomer Royal, contributes an article on the B.B.C. time signals. Mr. Tyrone Guthrie foretells the future of broadcast drama. Scotland's new headquarters and the Northern "Proms" are the subjects of separate chapters

A section of the Year Book is devoted to the technique of broadcasting. Problems of reception and of the design of equipment used in transmission are explained and typical queries which have been raised by listeners in correspondence with the B.B.C. account for the subjects of several informative chapters. Pages devoted to the identification of stations should interest listeners who wish to receive continental programmes, and articles on technical progress and high quality receivers should attract those who like to keep abreast of improvements.

OPERA FOR TRAVELLERS

Whiling away a weary journey on a Hungarian railway with opera picked up from a local station.

That Subsidy.

The row about Mr. Snowden's grand opera "subsidy" continues. It is a nice and convenient political whip—but listeners who judge impartially will realise that the anti-operaites, who drag in arguments about the unemployed and "want of public money," etc., know very well that the money for assisting opera comes from a fund founded on deductions made from listeners' licence fees.

It is grossly unfair to accuse Mr. Snowden of spending public money, for no one can deny that the impression thus given leads people to believe that money paid in the shape of income-tax—or such like—is being used for the opera subsidy.

Getting a Return.

In actual fact, as we have pointed out before, it is only the listener who is paying for the subsidy; and the listener cannot legitimately grumble. He is getting a definite and valuable return—in the shape of 60 opera broadcasts a year.

It is better to have these opera broadcasts than the Treasury should collar a proportion of the licence fees and give nothing in return!

WHY YOU SHOULD BUILD P.W. SETS

by G.V. DOWDING, Associate I.E.E.

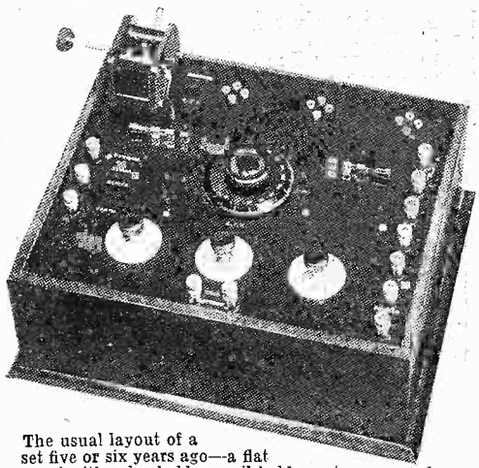
There are some very good reasons, as you will see in this special article by our Technical Editor.

NEW "P.W." sets are *new* sets, and in many cases they are based on entirely novel circuits—the result of continuous research and experimenting on the part of our Research and Construction Department.

As readers will probably have noticed, we have developed the set designing side of our activities very much during the past two or three years. Nevertheless, we are always prepared to accept set designs from outside sources, and very seldom does a week pass when we do not test out two or three designs submitted to us by independent engineers and by amateurs.

We examine these sets with complete impartiality and are very glad when, on rare occasions, we find one that includes novel features, and is able to pass the necessarily rather severe tests, because it is our main aim to give "P.W." readers the best of everything in the way of radio that is available.

NOT POPULAR NOWADAYS!



The usual layout of a set five or six years ago—a flat panel with valve holders, coil holders, etc., mounted on it.

However, it is difficult for the individual to compete with a scientifically directed organisation having "on tap" some of the keenest radio intelligences in the country, and so it is seldom that independent designers are able to achieve the standards we have set.

The Acid Test.

If you have any doubts at all about the newness of current "P.W." sets, do please apply this acid test. Take any set design of one or two years ago—our own, or anybody else's—and, if you can, build it up. Then look through your last few "P.W.'s" and search out a fairly current "P.W." set, with an ostensibly similar circuit, and build that up. You will find that for ease of operation, selectivity and punch, the latest "P.W." receiver will knock that old design into a cocked hat!

The experiment is one that could be carried out only by an amateur having a fair number of spare components at his disposal, and one who would be prepared to spend the necessary amount of time on it. But he would find it most amusing and instructive.

An easier way to make similar comparisons is to try and find someone with a set a year or two old and someone else with a modern "P.W." set of a similar character, and borrow both receivers for an evening!

Others can take our word for it that the difference in all-round efficiency between two such instruments is staggering. We ourselves are able to gauge the difference with precision for the simple reason that we do not rely upon ear-tests, but upon scientific measurements.

Very High Standards.

And the standards laid down for the performances of different classes of sets have been creeping up steadily all the time.

Meanwhile, components and valves have been improving at a similar steady rate, so taking everything into consideration, it is very well worth while for constructors who are still using sets of 1928 and earlier vintages seriously to consider the advisability of scrapping their old friends in favour of current designs.

In many cases it will prove a great wrench to part with an old favourite, but it will be a change attended by many real advantages. At first they might not be appreciated; skill in handling the old set's controls will have been gained by long experience, and any faults in reproduction will have dulled on the ears through constant repetition.

Here is another important point. We do not alter our set designs from week to week. We do not rush into production with every minor improvement we manage to effect.

Look back over the past year and you will notice that our programme for that period reveals a wide diversity of set types rather than a series of similar sets in slightly different make-ups. And don't go only by the theoretical circuits, for new coil designs and layout arrangements, etc., are often just as vital as circuit developments.

Also you cannot fail to notice that we do not slavishly adhere to certain specified principles; our policy is to allow plenty of room for the individual constructor to use his own discretion. And we endeavour to include in each of our programmes sets suitable for every conceivable purpose and pocket, even, as far as we can, catering for those minorities having very specialised requirements.

Our Main Endeavour.

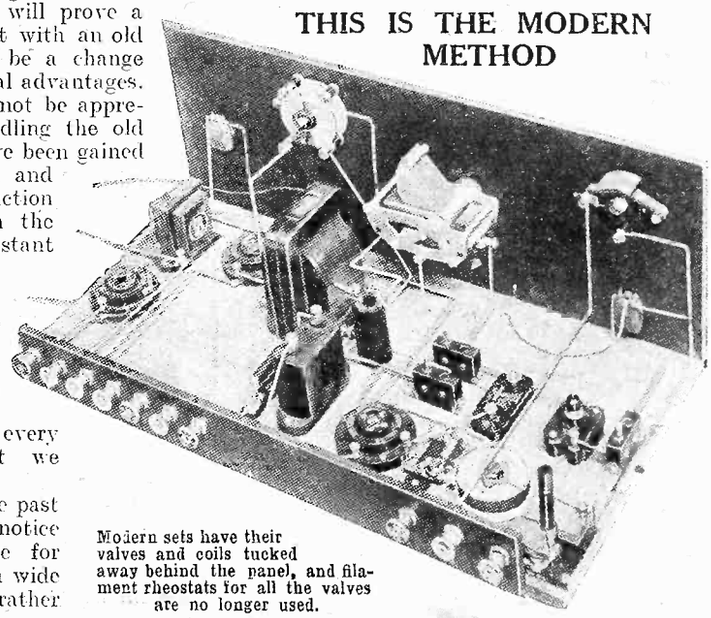
In this way we endeavour to satisfy every reader. In certain cases we are able to produce designs that appeal equally strongly to extraordinary large numbers of constructors—the colossal successes of the "Titan," "Magic," etc., proves that.

As has been said, each constructor knows the kind of set which he wants—his finances guide him to a very great extent—and it is our job to see that he gets it, giving him that little extra guidance provided by a fair and unexaggerated description of each of our designs.

Where a successful series of sets is followed fairly soon by important developments, our policy is to make the new developments applicable to existing sets as far as is humanly possible.

In conclusion, constructors should note that we do not unnecessarily vary our forms of lay-out; always looking ahead we aim at leaving scope for the rebuilding of sets, when they become old, in accordance with new ideas.

THIS IS THE MODERN METHOD



Modern sets have their valves and coils tucked away behind the panel, and filament rheostats for all the valves are no longer used.

SHORT-WAVE NOTES.

By W. L. S.

Details of an interesting theory advanced by amateurs.

THERE certainly is not much cause for complaint about the general behaviour of the short waves just recently, judging by the amount of distant stuff that I have heard during the few minutes at my disposal.

Every morning after breakfast, on 20 metres, I have logged at least five New Zealanders, and very often a stray Australian or two. On the one or two afternoons I have had "on the air" I have infallibly heard Sumatra, the Philippine Islands and Australia, and at 10 a.m. one day I logged that most difficult place of all, Hawaii. So that things may definitely be said to have bucked up at last.

The Effects of Day and Night.

One can learn a lot by studying a globe and holding a small spotlight at different angles, to observe the positions of the areas of light and shade. It might surprise readers to know that there is a time of day and time of year when the line of light and shade from here stretches straight down to Africa in one direction and curves across Greenland to the Pacific Coast of Canada in the other!

In my humble opinion, it is almost a proven fact that short-wave signals travel best of all *along* this line, and worst of all when crossing it at right-angles; the intermediate position is that when they have to cross at a fairly acute angle, which is relatively easy for them.

This is rather surprisingly confirmed, in connection with the previous remark, by the fact that at this time of the year, at about 4.30 or 5.30 p.m., one can often hear South Africans and the very infrequent West Coast Canadians coming in at the same time.

Sometimes even the stations right down low on the Californian coast can be heard at this time, which in itself would seem very strange were it not considered in relation to the "shade line."

Real Distances and Echoes.

Incidentally, a globe also teaches us how entirely wrong ideas of distance can be formed by familiarity with a "Mercator" map. If you study the latter you will see that the distances from London to Alaska and from London to the southernmost point of Chile appear to be about equal. By operating on a globe with a piece of cotton you will find that the ratio between the two is about three to one!

As a result of an interesting argument with some fellow-amateurs on this subject, an interesting theory came forward. It is well-known that a short-wave echo is often heard on stations sufficiently powerful to get right round the world a second time, and that on super-high-powered commercials as many as four or even five echoes can sometimes be heard.

A Possible Cause of Smudginess.

The suggestion coming from the discussion was that the peculiar "smudginess" of certain distant signals is caused by the signals coming simultaneously along three or four paths of slightly different length.

If you consider the line from California to London, taken round the surface of a globe, you will discover that it is quite difficult to find which line really is the shortest. Surely, now, if the line of light and shade were so placed at a particular time that signals following it round would not be taking the shortest route, that would account for some funny things?

Different Paths for Signals.

The stronger signal would probably arrive that way, but there might well be a weaker one that was following the shortest path.

I should be immensely interested to know whether readers have had any experiences in connection with distant reception that might confirm this.

CORRESPONDENCE.

FOR THE PORTABLE-SET OWNER.

ARE U.S. PROGRAMMES BETTER? —THOSE MAINS UNIT VOLTAGES— PENTODE ARTICLES.

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.

FOR THE PORTABLE-SET OWNER.

To The Editor, POPULAR WIRELESS.

Dear Sir,—I believe there are a good number of people who, like myself, invested in a portable in order to obviate the beginner's dilemma of choosing speaker, batteries, etc.

These people (again like myself) acquire a certain amount of radio knowledge and consequently wish to have a "receiving" range greater than that of the average portable.

I have experimented considerably in order to achieve the best results from the following scheme:

Wind about 25 turns of wire (26 D.C.C. is equally as good as special frame aerial wire) on a diagonal frame, so that the rectangle formed by the turns of wire is approximately the same shape as the frame aerial in the set. (See top of sketch.)

Both ends should be earthed, or one end earthed and the other end connected to an aerial. Even one end earthed and one end free will work quite well.

The frame should be placed behind the portable and parallel to its aerial.

I have mine on the window sill and a curtain covers it.

Although the long-wave transmissions are not "boosted" much the medium-wave stations are very much helped. Normally I cannot receive London or Midland Regionals at any strength. (The circuit is 2 H.F., Det., R.C., L.F.)

With the extra frame aerial I can pick up quite a lot of stuff after dark, my latest bag being Naples direct at moderate loud-speaker strength. The scheme is quite selective, and I can receive Stuttgart with only a trace of London.

I hope the above will be useful to others.

Yours faithfully,

N.B.—Flat or dead spots may be cured by altering the distance between the frame and the set.

Sussex. J. D. MOSLEY.

ARE U.S. PROGRAMMES BETTER?

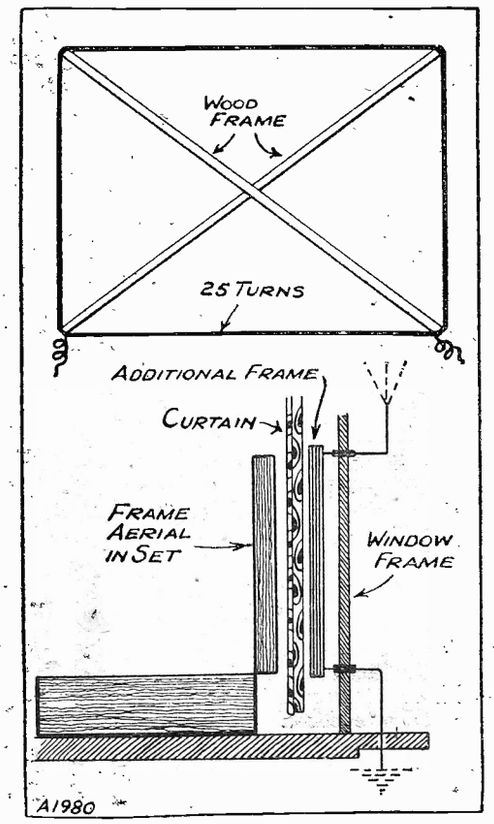
The Editor, POPULAR WIRELESS.

Dear Sir,—Mr. L. W. Corbett, in his recent article on "Are U.S. Programmes Better," raises the question of the readiness of British advertisers to foot the bill for expenses, if advertising were permitted in the B.B.C. programmes. This point has already been settled by advertisers themselves, who are so keenly anxious to "get on the air" that they have gone to some of the more powerful foreign stations in order to reach the British public. In doing so they have, incidentally, provided a few spots of interest to alleviate the depressing dullness of the Sunday programmes inflicted upon us by the B.B.C.

The illogical attitude of the B.B.C. in this matter is hard to understand, in view of the fact that gramophone record manufacturers are advertised several times weekly, even to the extent of giving the reference numbers of records played. If the B.B.C. desire to introduce bright and interesting music into its programmes by means of gramophone selections, well and good, but this can be achieved without advertising the makers of the records. To the owner of a gramophone it may quite feasibly be of interest to know where the record can be obtained, but why limit advertisement to one class of merchandise?

Yours faithfully,

Birmingham. H. B.



How Mr. Mosley arranges the extra aerial for his portable.

THOSE MAINS UNIT VOLTAGES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I was interested to read in the issue of POPULAR WIRELESS for October 25th, two letters, viz., one from Mr. Burnard with regard to the "Neutype" Four, and one from Mr. Lefever with reference to mains unit voltages.

I can certainly endorse very heartily Mr. Burnard's remarks regarding the "Neutype" Four. I made up this set some little while ago, and was surprised at the very excellent results obtained. The number of stations that can be received without reaction, or with very little, is remarkable. Selectivity, too, is a prominent feature.

In the construction of the set, I departed a little from the instructions and descriptions given, adding a volume control, a potentiometer for the detector valve, an output filter, and an H.T. supply lead for each valve. Also, the R.C.C. unit was substituted by a low-ratio L.F. transformer. With 150 volts on the H.F. and the super-power valves, 90 on the detector and 120 on the first L.F. valve, a fine variety of programmes is available. I think the "Neutype" Four is a really good receiver.

I agree with Mr. Lefever that a high-resistance voltmeter is a necessity with every H.T. mains unit. A voltmeter of 1,000 ohms per volt resistance is not an easy thing to borrow. The mains unit I have in use at present has six tappings, the current and voltage from each varying with different valves, and the maker's can supply no information beyond maximum milliamperage figures for each tapping and for the unit as a whole. I found as much as 40 volts fluctuation on the "maximum" tapping when trying two different super-power valves.

Like Mr. Lefever, I would welcome enlightenment from one of the well-known manufacturers.

Yours truly,

Hull. A. J. LONG.

PENTODE ARTICLES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel I must express my thanks to you for the instructive articles in the recent four numbers of POPULAR WIRELESS, entitled "Radio Pictures."

I do hope these articles will be published separately, as it would be most useful for young folks to obtain such useful knowledge so splendidly expressed. May we see many more such articles.

Yours faithfully,

Ventnor. ISAAC WESTLEY.

LISSEN

FIXED CONDENSERS

Deliver all their stored up energy

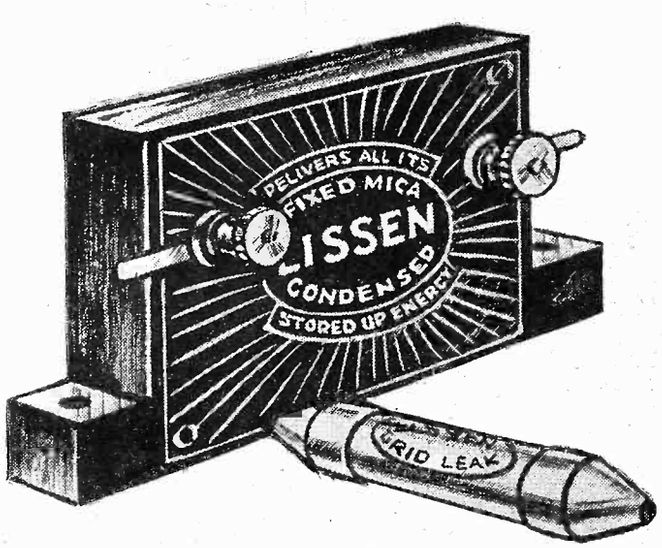
Because you are using bigger H.T. voltage—because you are seeking always more power and more purity from your set—because you are going out for ever more distant stations—your need for condensers that will stand up to all demands without leakage and without breakdown is more urgent now than ever.

Lissen fixed condensers have become the standard fixed condensers in almost every published circuit. Accurate to within 5 per cent of stated capacity.

·0001 to ·001 mfd., **1/-** each

·002 to ·006 mfd., **1/6** each

INSIST UPON LISSEN PARTS ALWAYS



H.T. ELIMINATORS YOU CAN USE LIKE A BATTERY

MOULDED CASES MADE of INSULATING MATERIAL—HEAVY "CAB TYRE" FLEX LEADS

The current you get from Lissen Batteries is the purest form of current you *can* get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get H.T. current from your mains smoother, steadier, better than before.

There are four types of Lissen Eliminators; one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will demonstrate for you the Lissen Eliminator to suit your needs.

D.C. MODEL "A"
Employs 3 H.T.+tappings: H.T.+1 giving 80 volts for S.G. valves; H.T.+2 giving 60 volts at approx. 2 m/A for detector valves; H.T. +3 giving 120/150 volts at 20 m/A.
PRICE **27/6**

D.C. MODEL "B"
Employs 3 H.T.+tappings: H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approx. 2 m/A.; H.T. + 3 giving 120/150 volts at 20 m/A. for power valves.
PRICE **39/6**

D.C. Models working on 100-110 mains voltage give output voltage of approximately 60% of above voltages.

A.C. MODEL "A"
Tappings as in D.C. Model A.
100-125 volts
and
200-250 volts
PRICE - - - - - **£3-0-0**

A.C. MODEL "B"
Tappings as in D.C. Model B.
100-125 volts
and
200-250 volts
PRICE - - - - - **£3-15-0**

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before YOU BUY YOUR NEXT BATTERY THINK of the new process EDISWAN RADIO BATTERIES

Now Ediswan give you a dry battery with a greater capacity than ever before. Made under a new process, it gives tremendously long service—longer than ever before. And greater power—power that is steady and silent—giving new life to your set, new sparkle to your reproduction.
Super capacity at ordinary prices. Get an EDISWAN Battery to-day—all good radio dealers sell them.

60 volt	10 m/a	7/9
66 volt	10 m/a	8/6
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60 volt	super power 20 m/a	15/6
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Branches in all the Principal Towns

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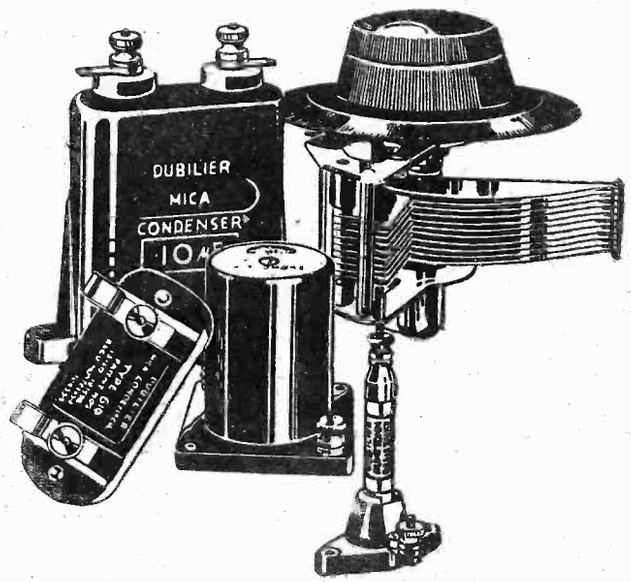
The best is now cheaper!

Dubilier Condensers and components are specified in all the best set designs—you have only to look through several issues of the Wireless periodicals to prove that. There *must* be a reason. There is. Set designers know that for maximum efficiency and all-round reliability Dubilier Apparatus is unequalled.



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DUBILIER RADIO COMPONENTS

DUBILIER CONDENSER CO. (1925) LTD.,
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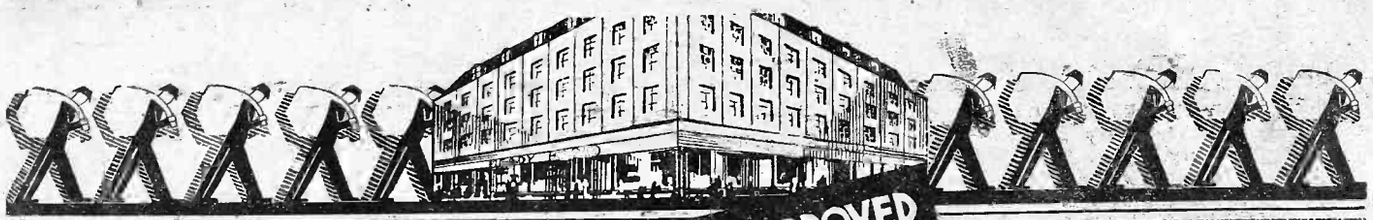

TROUBLE-FREE SET BUILDING

USE READY RADIO APPROVED NON-SOLDERING KITS ONLY

USE "JIFFILINKS" FOR WIRING-UP

"MAXI-POWER" FOUR

KIT A less valves and cabinet £7.8.0 or 12 equal monthly payments of **13/6**

KIT B with valves less cabinet £9.15.6 or 12 equal monthly payments of **18/-**

KIT C with valves and cabinet £11.5.6 or 12 equal monthly payments of **20/9**

'EASY-CHANGE' THREE

KIT A less valves and cabinet £4.4.6 or 12 equal monthly payments of **7/9**

KIT B with valves less cabinet £5.12.0 or 12 equal monthly payments of **10/3**

KIT C with valves and cabinet £7.2.0 or 12 equal monthly payments of **13/-**

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KIT A less valves and cabinet £4.9.0 or 12 equal monthly payments of **8/3**

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THE "NEW COIL" FIVE

KIT A less valves and cabinet £10.18.3 or 12 equal monthly payments of **£1**

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KIT C with valves and cabinet £16.5.9 or 12 equal monthly payments of **29/9**

"CONTRADYNE" THREE

KIT A £5.0.9 or 12 equal monthly payments of **9/3**

KIT B £6.8.3 or 12 equal monthly payments of **11/9**

KIT C £7.11.9 or 12 equal monthly payments of **14/-**

TO OVERSEAS CUSTOMERS
All your goods are very carefully packed for export and insured, all charges forward.

THE "CHEF-D'OEUVRE"

		£	s.	d.
1	Permcol polished ebonite panel, 18 × 7 × 3/16 in.		6	0
1	Permcol matt. ebonite strip, 18 × 2 × 3/16 in.		2	0
1	Hand-polished solid oak cabinet with 10 in. baseboard	1	10	0
2	ReadiRad Duograph S.M. dials		13	0
1	ReadiRad ·00015 mfd. differential condenser		5	0
1	ReadiRad on-off switch			10
2	ReadiRad "P.W." dual-range coils	1	10	0
1	Contradyne coil		7	6
3	Telsen sprung 4-pin valve holders		3	0
2	ReadiRad ·0005 mfd. variable condensers		9	0
1	ReadiRad Brookmans ·00075 mfd. condenser		3	6
1	ReadiRad "Hilo" H.F. Choke		4	6
1	Telsen H.F. choke		2	6
2	Dubilier ·002 mfd. fixed condensers		4	0
1	Dubilier ·01 mfd. fixed condenser		3	0
1	Dubilier ·1 mfd. fixed condenser		2	6
1	ReadiRad 2 meg. grid leak and base		1	4
1	Telsen "Radiogrand" L.F. transformer 5-1		12	6
1	ReadiRad ·001 fixed condenser			10
1	ReadiRad ·0003 fixed condenser			10
2	ReadiRad 3-point wave-change switches		3	0
1	ReadiRad 600 ohm resistance		2	6
9	Belling-Lee "B" terminals		4	6
1	ReadiRad 10 in. × 6 in. screen		2	0
3	Valves as specified (S.G., Detector and Power)	1	19	0
1	Packet "Jiffilinx" for wiring		2	6
	Wire, screws, flex, wander plugs, etc.		1	8
	TOTAL (including valves and cabinet)	£9	17	0

Any of the above components can be supplied separately if desired.

KIT A less valves and cabinet £6.8.0 or 12 equal monthly payments of **11/9**

KIT B with valves less cabinet £8.7.0 or 12 equal monthly payments of **15/3**

KIT C with valves and cabinet £9.17.0 or 12 equal monthly payments of **18/-**

The new "P.W." Brookmans Condenser is entirely different from all other kinds of rejectors, wave-traps and selectivity devices. It definitely eliminates local interference and improves distant reception.

Particularly designed for use with all circuits without alteration to your receiver.

COMPLETELY ASSEMBLED AND READY FOR IMMEDIATE USE. Post Free **5/9**

Send to-day for a copy of our 1931 "Radio Out Of Income" FREE Catalogue—a complete encyclopædia of Components, Sets, Speakers, and everything necessary for the Wireless enthusiast. POST FREE.

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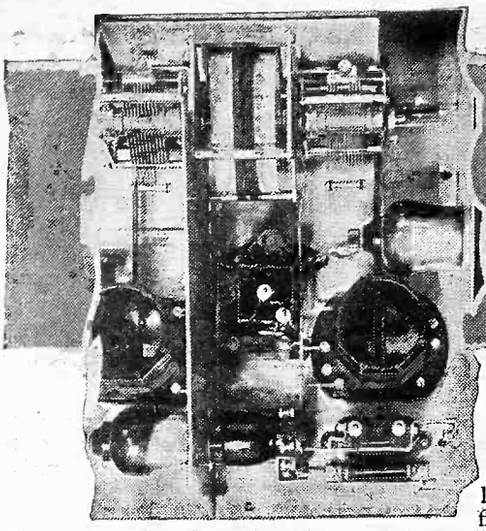


POWER GRID DETECTION

By Carden Shiels.

A development for the "music lover" that is, of late, becoming increasingly popular in "moving-coil" circles.

IN the past designers have chiefly devoted themselves to improving the "reach" or selectivity of receiving sets, no doubt because this proved to be a strong "selling" point. They found that listeners generally were more interested in bringing in a variety of foreign programmes than in the musical quality of what they heard.

At the present time there is a decided movement in favour of the "music-lover." The fascination of listening to the foreigner has given way—in the case of a large and growing section of listeners—to a preference for National and Regional programmes, provided the "quality" of reproduction is such as will satisfy a critical musical ear.

Methods of Rectification.

Of course, the ideal set should provide for both requirements, but, unfortunately, we are still in the stage where high selectivity necessarily involves some falling-off in the quality of response, and vice versa.

The modern receiving set is now falling into two distinct classes, one suitable for general purposes, and the other specially designed to give the highest possible moving-coil quality at comparatively close range and with great volume.

The new method of power grid-rectification represents the latest advance towards perfect, i.e. distortionless reproduction. In spite of its growing popularity—and of its use in many of the mains-driven sets shown at the recent exhibition—the difference between power grid-rectification and its older rivals, "leaky grid" and "anode bend" is not widely understood.

The earliest valve detector was the two-electrode valve, which, although theoretically perfect so far as quality is concerned, did not long survive the appearance of the leaky-grid three-electrode detector.

An Interesting Comparison.

Volumes have been written on the precise action of the grid-leak in separating-out or detecting the signal components from the received carrier-wave. So far as the purpose of this article is concerned, it is sufficient to say that rectification here takes place in the grid circuit.

By contrast, in the anode-bend detector, the signals are separated out from the high-frequency components in the anode circuit of the valve.

This allows a very simple distinction to be made between the two methods. In the leaky-grid detector the carrier-wave is first rectified (in the grid circuit) and the rectified signals are then amplified between the grid and plate. In other words, the valve combines the task of rectification with one stage of low-frequency amplification.

In anode-bend rectification, on the other hand, the carrier-wave (including the signal components) is first amplified between the grid and plate, and the low-frequency signals are afterwards separated from the high-frequency components in the plate circuit. That is to say, the anode-bend rectifier is equivalent to one stage of H.F. amplification, followed by a stage of detection.

NOTED GERMAN RADIO INVENTOR

Baron von Ardenne is only 23, but he has many inventions to his credit, his latest being a system for re-radiating distant station programmes by small local transmitters.

Anode-bend rectification claims to be an improvement on the use of the grid-leak and condenser. Its supporters point out, quite rightly, that the grid condenser offers a shunt path to the high frequencies and so leads to a serious loss in the upper register. They forget that a by-pass condenser in the plate circuit of the anode-bend rectifier can be equally at fault in this respect.

It is also true that the grid-leak rectifier produces serious distortion on high input voltages. On the other hand, it will respond to input voltages too feeble to be detected by an anode-bend rectifier, i.e. it is more sensitive than the latter.

Increase in Impedance.

Again the grid-leak circuit allows grid current to flow. It therefore tends to "damp" the tuned circuit of the preceding H.F. stage, and so reduces selectivity. As against this, anode-bend rectification necessitates the use of a large negative bias, which increases the internal impedance of the valve, and makes it essential to use high-resistance coupling to the first L.F. amplifier, with a corresponding increase in H.T. voltage.

Inconclusive Arguments.

In short, arguments on the relative merits of grid-leak and anode-bend rectification appear to be unending and inconclusive so far as proving the superiority of one method over the other.

As the name implies, power grid-rectification is a reversion to the principle of grid-leak rectification, but it is combined with certain improvements which remove its original defects whilst incorporating the advantages of anode-bend rectification.

From one point of view it is a development which has been made possible by the use of H.T. mains units. One hundred volts on the plate, particularly when used in conjunction with resistance coupling, rules out the use of dry-cell H.T. batteries unless 200–250 volts are available, in order to compensate for the voltage drop across the anode resistance.

Where the Difference Lies.

With the high plate voltage of 100 (as compared with 40–60 on an ordinary leaky grid rectifier) is combined the use of a much smaller grid condenser and leak than before. By lowering the capacity of the condenser from 0·0003 to 0·0001 mfd., high-frequency loss is reduced to zero for all frequencies below 10,000 cycles, which is the highest practical limit of audibility.

The leak resistance instead of being 1 or 2 megohms as usual, is reduced to ·25 megohms. This allows the grid condenser to discharge in a very short period of time, i.e. in less than one ten-thousandth part of a second, so that the highest essential

(*Continued on page* 703.)

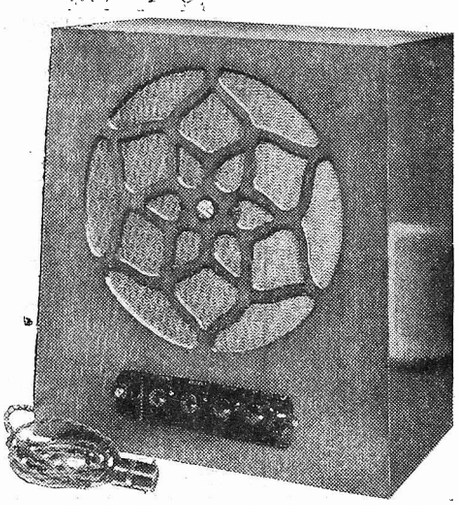
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

ANOTHER COLUMBIA SET.

THE Columbia Graphophone Co., Ltd., seems to be entering into radio very enthusiastically. I have just received a sample of yet another new Columbia set, and this is model 309, a mains "two" of a most interesting nature.

It is a compact table model, having a loud speaker built into it. It has been designed specifically for those who have no radio knowledge whatever. The only external controls are two switches, one for on-off purposes and the other to provide a choice between two programmes.



The plate has been removed and you can see the four controls that are pre-tuned to any two stations. A range of coils for different wave-bands is available, and the suitable pair is plugged into the sockets inside the set.

Tuning and reaction controls are fitted, but these are hidden behind an ornamental plate. When the set is installed this plate is removed and the two sets of controls are adjusted to the two programmes, these then being made available merely by operating the appropriate switch.

The set is, of course, installed and adjusted by the dealer. The outfit has sufficient sensitivity to collect a pair of programmes practically anywhere in the country, and at good strength and with good quality.

As with the other Columbia I recently tested, the set is very selective, and there is no overlap at all at a distance of but a few miles from the Brookmans station.

This model 309 is available both for A.C. and D.C.—the particular one I had on the test bench was designed for D.C. operation.

There is a noticeable hum, although this was quite drowned by the speech or music. The Columbia people will probably score a success with this set: and they deserve to if only because it adequately meets the requirements of a very large number of listeners.

STADION H.T. BATTERIES.

J. Fabian, of Cowper Street, Great Eastern Street, London, recently sent me a sample of the Super-Quality Stadion high-tension battery which he has just placed on the British market. It arrived with seals unbroken, and was said to have been picked at random from stock.

On breaking the seals, it was seen that several of the sockets were badly corroded. But I think this corrosion is due to a gaseous discharge from the pitch filling (which I noticed was very "bubbly" in appearance), and not to electrolyte creeping.

The sockets of the Stadion are on the side—an excellent scheme that appeals strongly to me. Also the sockets for the grid-bias tappings are arranged in one separate row—another attractive feature.

But unfortunately the battery did not stand up to its test for long before a rather serious voltage drop occurred.

IGRANIC RADIO COMPONENTS.

Publication No. 6,681, due to Igranic Electric Co., Ltd., describes their excellent range of radio components and concludes with a list of European broadcasting stations and the Igranic coils that can be used in various positions for their reception.

HEAYBERD'S MAINS UNIT.

Of particular interest to mains enthusiasts will be the new leaflet issued by Messrs. Heayberd, which describes their various mains components and constructor's kits.

ASTRA COMPONENTS.

Astra slow-motion dials are made under an Ormond licence. There are one or two different models available in different sizes, but the same general principles of structure are found in each. The gearing is obtained by a small cog working on a large semicircular section that is toothed.

When it is desired to drive the condenser without gearing, the slow-motion control knob can be pushed upwards out of action. It clips into the neutral position as easily and as definitely as the smoothest on-and-off switch, and it snaps back into operation just as readily.

I am rather prejudiced against cogwheel gearing, for so many past attempts have resulted in harsh, uneven movements, but this is not the case with the Astra. The adjustment is perfectly smooth throughout, and there is not the slightest trace of backlash.

By means of the above-mentioned "gear-change," the direct drive is free from all restrictions. There is a very sharp scale, and a hair-line is carried around and contributes greatly to the close readings which can be obtained. There is a definite stop at each end of the scale. The Astra dials are well made and are nicely finished.

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.

There is also an Astra reaction condenser having a maximum capacity of ·0001 mfd. This has an all-brass construction and a neat pigtail is fitted to render a completely permanent connection to the moving vanes. Its action is smooth; it is indeed one of the best little reaction condensers I have examined.

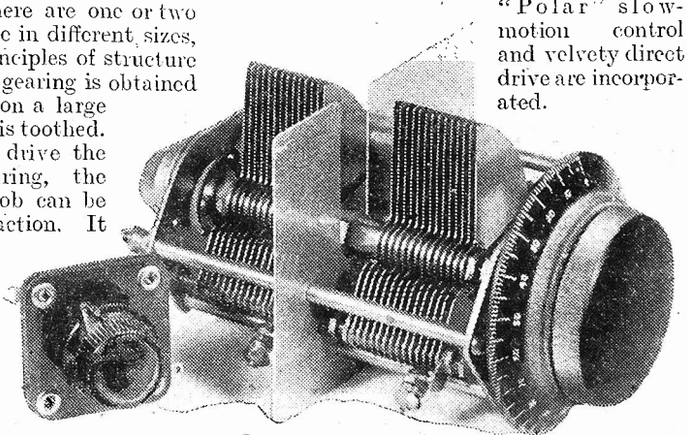
"POLAR" TWO-GANG CONDENSER.

The only thing that can limit the usefulness of the latest "Polar" "Ideal" gang condenser I have seen, is the necessity of matching the set layout and its screening with the divisions and screen of the gang condenser.

But that is serious only in the case of high-efficiency H.F. stage sets. I can see a real use for this excellently made "Polar" Two-Gang in the even more popular two-tuning circuit sets of a simple character.

A very nice little trimming condenser is available and this is also shown in the accompanying photograph.

With a maximum capacity in each section of ·0005 mfd., this "Polar" "Ideal" product sells at 18/6. The usual remarkably smooth "Polar" slow-motion control and velvety direct drive are incorporated.



The "Polar" "Ideal" Two-Gang condenser and a "Polar" "trimmer" that can be used in conjunction with it.

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. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS

THOSE RADIO TERMS

J. C. (Newport, Middlesbrough).—"As I am only just starting to pick up wireless at the age of fourteen, I wish to know the meaning of a few words such as 'mfd,' 'meg,' 'ohms,' etc. Can you explain them so that I know what they mean, although I have not been trained for wireless?"

We would like to help, J. C., but the trouble is that there are such a lot of terms that cannot be explained in a few words. (Did you see all "Pentode's" articles? If not, they will teach you a great deal about that kind of thing.)

However, we can give you a few helpful examples based on those terms you name.

"Mfd." for instance, is the abbreviation for microfarad. That word "micro" is a prefix, which means one-millionth.

This prefix micro can be used in front of other words, as well as in front of farad, and in wireless we often speak of a micro-henry, which is a millionth of a henry.

(In the same way, if you have £1 of your own in your pocket you may not be a millionaire, but you could certainly claim to be a micro-millionaire. You see the idea? Micro means a millionth part.)

"Farad" is an interesting word, too. It signifies the unit of capacity.

You know that all condensers have a certain amount of "capacity"—some more, some less—and there must be some kind of unit capacity to which all other capacities may be compared. That unit is the "farad."

The farad does for capacity what the mile does for distance. It gives you a standard—a means of comparison. But as it is too big for ordinary use we deal in condensers having not farads of capacity, but in millionths of farads. In other words, in microfarads.

Even a microfarad is a pretty hefty capacity, so we sub-divide that into the usual fractional or decimal parts, and thus we get "half a microfarad condenser," or a "point five" condenser (·5 mfd.) which is the same thing.

Or for tuning and other small capacity jobs we use ·0005 mfd., or ·0003 mfd., etc, these being so many decimal parts of a millionth of a farad.

Whilst we are about it we might add that the "farad" is called after the brilliant Englishman, Michael Faraday, the son of a blacksmith, and one of

(*Continued on page* 698.)

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.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 696.)

the greatest experimenters who ever lived. He became President of the Royal Society, and was the first man to get the first hint of the possibility of wireless, for he observed that one electrical circuit could be "coupled" to another, and that effects in the one could be caused by the other even with "empty space" between the two circuits.

We haven't room to go into the other terms in detail here, but they are all interesting. "Meg.," for instance, is the abbreviation for one million—just the opposite to "micro," which you will remember means one-millionth.

Small condensers as used for radio are expressed not in farads but in $\frac{\text{farad}}{1{,}000{,}000}$ i.e. microfarads.

And very high resistances are not reckoned in ohms, but in ohms × 1,000,000, i.e. meg-ohms.

TROUBLE WITH A RECTIFYING VALVE.

F. A. F. (King's Heath, Birmingham).—"I seem to have had bad luck with my rectifying valves, which do not last at all satisfactorily.

"As the circuit which I am using for them is rather a special one for absolute silent H.T., I am wondering if any of the modifications I have made is likely to cause the life of the valve to be shortened. Will you please check over the enclosed diagram?"

Your diagram shows that you have *two* 4-mfd. condensers in parallel across the D.C. output from the rectifying valve. This gives you an effective smoothing capacity of 8 mfd., but the maker of the rectifying valve you are using recommends a 4-mfd. condenser to be used here, and not an 8.

As this capacity has a definite effect on the life of the valve and the short life of your valve is almost certainly due to the departure from the maker's recommendations, cut out one of the 4-mfd. condensers which are wired across the centre tappings of your transformer and you will probably find the trouble will disappear.

Extra smoothing can, of course, be applied to the H.T. *output* rather than to the rectifier, if necessary, and if there is a trace of hum present remember that the detector's H.T. supply is particularly liable to give rise to it.

SIX TERMINAL VALVES.

A. R. M. (Ipswich).—"After managing to run two moving-coil speakers in different parts of the house with quality that none of my musical friends can grumble at and which seems to me to be perfect, I became so satisfied with my reception that I slackened off a little in my interest in radio development. But when I was in a dealer's shop buying a G.B. battery the other day, I noticed one of the new mains S.G. valves with five pins at the bottom, instead of four, and also a terminal on top. Whatever are they all for?"

In a normal valve there are two filament pins, and a great many of the circuit connections, such as the earth terminal, return from grid leak, etc., are made to one of these. But in an indirectly heated valve the filament or heater is run from raw A.C., and it would not do to make ordinary circuit connections to either of the actual connecting pins, so the filament in such a valve is merely a "heater."

The real cathode is insulated from this heater, so the valve makers put an additional pin in the centre of the valve and connect this to the cathode, to provide the necessary circuit connections.

The base also carries the usual grid pin, but the plate or anode connection is *not* opposite to this. Instead, the standing-by-itself pin (which in an ordinary valve could be the anode) is, in a screened-grid valve, connected to the screen, and the true anode connections are made to the terminal on the top of the bulb.

USING A WOODEN DIAPHRAGM.

T. L. (Rochester).—"I want to mount my cone loud speaker on my sideboard, the ends of which are wooden panels measuring 3 ft. 6 in. × 2 ft. 6 in. I am told that I can mount a cone unit close to the centre of one of these panels, and then clamp the centre of the wooden panel on to the driving rod of the cone unit, and fix it by fixing nuts just like a cone.

"I have heard one loud speaker mounted in this way, and reproduction was really excellent, so I should like to try it, but I am a little fearful of spoiling the wood if it is not going to be much use. Is there any way of telling whether a panel is likely to be successful as a 'diaphragm?'"

It is not a matter that can be decided in advance, but is essentially one for experiment.

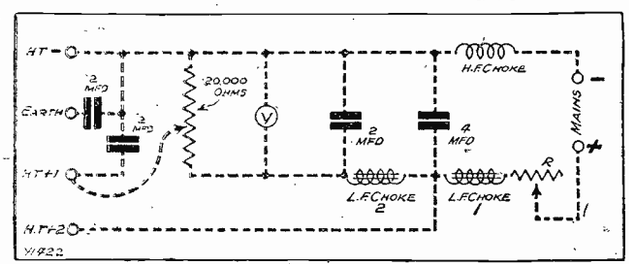
You can, however, get quite a good idea of the suitability of different panels, etc., by mounting your loud speaker on a long flexible lead (after removing the cone), and then holding the driving rod fairly firmly up against the spot where it is proposed to fix it, if satisfactory.

Remember when comparing different panels in this way that much will depend upon the pressure

(Continued on page 700.)

POPULAR "WIRELETS" No. 25

AN H.T. UNIT FOR D.C. MAINS.



The dotted lines show the connections for the D.C. H.T. unit, the "components" for which were given last week. Note the variable voltage for H.T. + 1 (obtained by means of tapping points on the 20,000-ohms resistance) and the variable resistance R, which is of the "power" type, having a value of about 10,000 ohms.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 698.*)

when holding the unit. Rough and ready comparisons can easily be made to determine which seems the best panel and which position in the panel gives maximum sensitivity and clearness.

THE "EASY-CHANGE" THREE.

E. J. (Stapleford, Notts.).—"I am going to put up the 'Easy-Change' Three, but do not understand the wave-change switching from what is said on blue print. How do the switches go?"

On the medium waves the "X" coil, L_3, is used for tuning and aerial coupling, by closing S_2 and putting the panel plug in the appropriate socket. (Closing a wave-change switch means placing all the contacts in connection with each other. In the opposite position the contacts are broken and the switch is said to be "open.")

Coil L_1 is the reaction winding, and this serves on long waves also by virtue of the special positioning of the coils (see note on blue print for this).

The long-wave secondary coil, L_2, is also in circuit on medium waves in parallel with the "X" coil, but since it is very large in comparison it has a negligible effect on the tuning range of the circuit, and, of course losses are kept well down in this way.

To go over to long waves you open S_2 (put it to "off"), and the low-wave coil, L_3, thereupon goes out of circuit to all intents and purposes. If all you want is 5 X X you will in most cases find you can then get it at particularly good strength be re-tuning to some point near the middle of the dial.

If, however, you want foreign stations on long waves without interference from 5 X X, then you should shift the plug to the other socket on the panel. This gives you a quite normal primary and secondary on long waves, the reaction coil serving also as a primary or aerial-coupling coil.

THE L.S. RETURN LEAD.

L. A. T. (Cheshunt).—"Last Christmas we had a great stunt at a friend's house by means of a loud speaker connected across the 'input' terminals of a two-valve amplifier. (No doubt you know all about the method, which allows anyone's voice at the first loud speaker to come out of the ordinary loud speakers connected to 'output.' It comes out just like broadcasting, but with a strong 'local' flavour!)

"I want to try the same idea, but with a telephone earpiece hanging (in disguise) on the Xmas tree at the distant end.

"Concealing the two wires is the difficulty and I am wondering if I could use one wire instead of two, because the 'return' wire only goes to earth on the set. (It's a choke-filter circuit, 2-mfd. condenser).

"Could I take it to an 'earth'—say a water-tap—close to the Xmas tree, instead of bringing it right back to the set again?"

Yes, it will be quite O.K. to earth at the loud-speaker end, instead of at the set end. You should not have any difficulty in hiding the wire, because just for this occasion quite fine wire will do. (The green-coated thin wire of about 32 gauge, which is often used for tying presents, etc., to Xmas trees, is just the thing.)

MAKING THE "P.W." DUAL-RANGE COIL.

F. E. (Ilford).—"Which number of 'P.W.' gave details for making the 'P.W.' Dual-Range Coil at home?"

The coils were described in detail for home constructors in "P.W." dated October 11th, 1930. There was such a run on this number that it is out of print, but the constructional details are given again below:

To make a "P.W." Dual-Range Coil you need a piece of ribbed former (either eight or nine ribs will serve), 2½ in. long and 2½ in. in diameter over the ribs. In the ribs you must file a series of eleven slots with the edge of a narrow file (just as for the "Cossor tradyne" coil). Slots to be about ⅛ in. wide, the full depth of the rib, with a space of about ⅛ in. between them (not critical).

This former is thus equipped to carry a slot winding in eleven sections. Ten slots are for the long-wave secondary, and one is for the reaction winding, which serves for both wave-bands.

Now the windings. The reaction one goes in the *second* slot up from the bottom. Thirty turns of a fairly fine gauge, such as No. 30 D.S.C. wire.

The long-wave secondary consists of 25 turns in each of the ten slots, making 250 in all, of No. 26 D.S.C. Start at the bottom, put 25 turns in first slot, miss over the second slot, leaving it empty for the reaction winding, and continue in third slot, then the fourth, and so on up to the top.

Now the reaction coil. The *direction* of this is vital. The starting end is to be joined to the lower end of the large winding, and it is then to carry on as though it were a continuation of the latter. Imagine that the large coil had finished at the bottom, then carry on the reaction winding as though it were the same winding having another section added in a continuing direction.

The *outer* former is 2½ in. long and 3 in. in diameter, and is of Pirtoid or other good material. The low-wave secondary has 48 turns of No. 24 D.S.C., in the same direction as the long-wave secondary.

Supported above the lower end of this on eight or nine ebonite spacers (about ⅛ in. × ¾ in. × ¾ in.) is the primary, consisting of 12 turns of the same wire in the same direction.

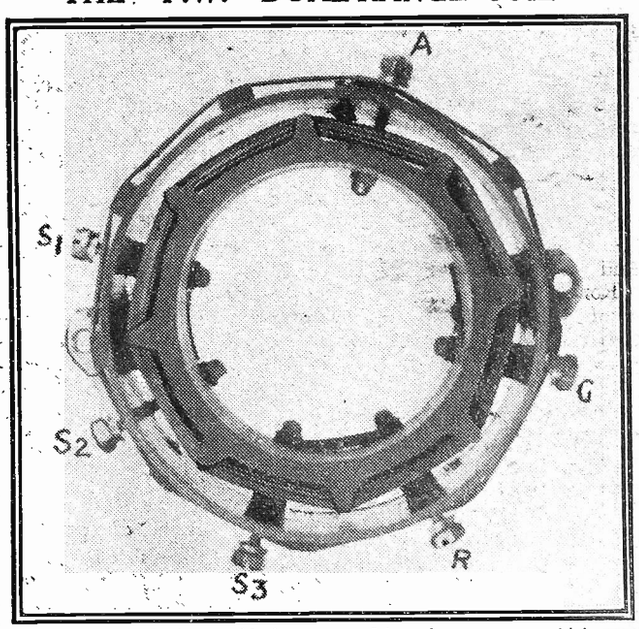
Important: Lower edge of primary to come over lower edge of low-wave secondary, which in turn is to come over lowest slot in long-wave former.

Next, the connections: Top ends of both secondaries go together to "G." Top end of primary to "A," lower end to "S_1." Lower end of low-wave secondary to "S_2." Lower end of long-wave secondary and start of reaction to "S_3." Finish of reaction to "R."

Method of Assembly: Six 1-in. brass screws must be passed outwards through both formers. Positioning can be done with nuts or ebonite washers (cut from small tubing) between formers. Double nuts on outer ends to serve as terminals, preferably with soldering tags. All to be placed round *lower* edge of formers, in positions shown.

Mounting in sets: Small brass brackets attached at the bottom, or a wooden cross-piece fitted inside ribbed former, will enable the unit to be fixed firmly to baseboard of set.

THE "P.W." DUAL-RANGE COIL



Note the method of assembly by means of long brass screws which pass through the formers, and being fitted with suitable nuts they act as terminals.

THE NEW "P.W." COIL.

FAULTY SPECIMENS IN CIRCULATION.

It has come to our notice that a number of faulty specimens of the new "P.W." coils have been circulated.

The terminals are screwed to the former in such a way that they grip some of the turns of the short-wave secondary winding and, in cases brought to our notice, have caused short-circuits.

Readers should look out for this fault, and make certain that there is clearance between the terminals and the winding in question.

FOR THE LISTENER

(Continued from page 680.)

filling up the longer or shorter intervals between.

The ginger is quite hot enough to be appreciated. The hour passes much more quickly. The dull patches have been eliminated.

All About Money.

I listened to Mr. Reginald McKenna for so long as I could follow him in his talk on "Monetary Policy." He soon got beyond me.

The only monetary policy with which I am at all familiar is not quite so complicated; though it is hard enough to deal with. How to make sixpence stretch to ninepence; how to keep from getting cold feet in an overdraft; how to avoid income-tax; and so on.

Mr. McKenna's inquiries did not cover natty little problems like these. Indeed, at the very start he said that current cash was a comparatively insignificant factor in "Money." To me, on the contrary, it is everything, and then some.

Amos N'Andy.

These American comedians are to broadcast to us from America on New Year's Eve. They are £1,000-a-week men across the pond.

Their monetary policy is fairly straightforward. When they broadcast in America, everything else stops; Broadway doesn't jazz; Wall Street doesn't crash; Al Capone drops his gun.

When they broadcast across the Atlantic, the liners will cut out their engines, and the icebergs will dip their snowy ensigns. And we shall hear the Big Noise.

Ronald Frankau will be in bed that night with the ear-ache. Flotsam and Jetsam will be carried out on the ebb. Attaboys!

Lord Beaverbrook's Broadcast.

I was very interested to hear this flutterer of the dovecotes. The impression I got from his voice and manner was that things would be likely to move in the direction he wished them to. He crackled with energy.

He seemed hardly to be able to control his head of steam. I understand that somebody is going to answer his arguments. For all I know they may be answered. But it is one thing to answer an argument, and another to stop a man.

I imagine Lord Beaverbrook to be a man who will take some stopping. At any rate, if he is the railway engine, heaven forbid that I should be the cow!

Mudlarker.

It isn't spelt quite like that. It is a German wireless station. It gets on top of our little London Regional and worries it like an Airedale worrying a Dandy Dinmont. I wish it wouldn't.

I was just beginning to like the Germans again. When I was in Italy they were my great stand-by. The other evening when somebody was lecturing on "Currents from our Hearts," a quite different sort of current was flowing from mine enough to drown this Mudlarker in a tide of fiery wrath. Isn't somebody going to do something about it?

THE "CRYSTACHOKE."

(*Continued from page* 689.)

means a quite unusually good standard of both volume and selectivity.

For example, the receiver was tested on an aerial containing the full permissible 100 ft. of wire placed on top of a high building at a distance of under 15 miles from Brookmans Park, and then proved capable of separating the two transmissions with the greatest of ease.

Simple Adjustment.

That may not sound very remarkable to those who do not know how much real "juice" is picked up by this aerial, but it really indicates most unusual selectivity. No ordinary crystal set will do anything like it, and this one, be it noted, not merely did it quite easily, but gave good loud signals into the bargain.

From further tests we believe we are safe in estimating that the receiver will separate the two transmissions properly at all distances greater than about nine or ten miles on any aerial of normal size and height.

The exact method of getting the adjustable capacity tap is rather interesting. One of the two condensers provides the necessary tuning of the circuit, while the other is of the compression type. The idea is to set the latter at maximum (knob screwed right down), tune upon the ordinary variable and note results.

Then reduce the capacity of the compression condenser, re-tune and again note results. Try various combinations in this way until you find the best one, and thereafter no further adjustment will be needed. That is simple enough, isn't it?

Easily and Quickly Built.

It is a particularly easy little set to build, too, and we shall not take long in giving the necessary constructional details.

The coil is the main part of the set, and this just calls for brief description. 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 Aerial Taps.

The rest of the job is just a simple matter of assembly and wiring in accordance with the wiring diagram, and it won't be long before you have the receiver ready for test. The main adjustment we have already described, and it just remains to add that you should try the aerial clip on each tapping point on the coil, re-tuning each time, and noting which gives the best results.

A final point: the set is expressly intended for the "Regional" areas, and so no provision is made for long-wave reception.

POWER GRID DETECTION.

(*Continued from page* 693.)

musical frequency can pass through without causing the grid to "choke" and so produce "frequency" distortion. The higher plate voltage is also found to eliminate "amplitude" distortion for any depth of modulation up to 80 per cent.

Put in another way, power grid-detection consists in adjusting the detector valve so that it operates on the straight-line part, both of the plate-current grid-volts curve and of the grid-current grid-volts curve.

Grid Current is Necessary.

As some current must flow in the grid circuit (to ensure rectification) there should be no negative bias on the grid. In mains-driven valves, the grid may be connected directly to the cathode, but for other valves a small positive bias is necessary. This, combined with 100 volts on the plate, means that the total current passing through the detector valve may be of the order of 6–8 milliamps, instead of 1–2 milliamps. as usual. Hence the term "power" grid-detection.

Not for Dry H.T. Batteries.

Such a large output current would, of course, be a serious drain on a dry-cell H.T. battery, though it is immaterial in the case of mains-driven valves. If the rectifier is transformer-coupled to the first L.F. stage, a parallel-feed should be used to prevent saturation of the transformer core by the heavy D.C. component.

The low value of leak resistance used naturally tends to damp the preceding stage of H.F. amplification, but since the main object of power grid-detection is purity of reproduction, any loss of selectivity due to this cause is of no practical importance.

DIRECT OR RELAY.

A Tip for the D.X. Listener.

As the German stations are rather fond of picking up American broadcasts on short waves and relaying them on ordinary wavelengths, do not assume because you have heard an American announcement you necessarily picked it up direct across the Atlantic.

TECHNICAL NOTES.

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

In the Grid Circuit.

I HAVE more than once been asked whether the effect of long loud-speaker leads is the same as that of long leads to a gramophone pick-up. At first sight this is quite a natural question, since the pick-up is, in principle, a very similar device to the loud-speaker (although operating in the opposite sense).

But actually the circuit connections of the two devices are totally different, the loud-speaker being, of course, in an H.T. output circuit (or an equivalent arrangement) whilst the pick-up is in a grid circuit.

The conditions in the case of the pick-up leads are very much more sensitive than in the case of the loud-speaker leads, with the result that whereas short pick-up leads are essential, quite lengthy loud-speaker leads may often be used without any really noticeable bad effect.

A Detector Question.

I have been asked by a reader whether it is possible to get a high amplification by using a very high value of grid leak and also a high-value anode resistance with a high-impedance detector valve.

On theoretical grounds this might at first seem possible, but in actual practice it results in all kinds of consequential complications in the circuit and finishes up by doing more harm than good.

It has been found far better to use the more conventional values for grid-leak and anode resistance.

Pentode Comments.

My recent remarks in these Notes on pentode valves and power valves have brought a number of letters from readers discussing various aspects of the matter. One reader, however, disagrees with something I said, and as he raises one or two other interesting points, I thought it might be useful to refer to them now.

In the first place, he wants to know why I "condemned" the pentode without discussing "maximum undistorted output." Well, before going further, I do not think I "condemned" the pentode. I merely pointed out that to get the best results it was very important to use the pentode valve in the particular conditions for which it is designed and specified and not to expect *impossibilities* from it.

An Output Problem.

My correspondent says, "Surely a valve for loud-speaker work should be judged by its output in milliwatts. Therefore, if the five-electrode type will deliver as many healthy milliwatts as the triode, is there not a great advantage in the fact that we have had to 'volume control' the grid input, or better still, slacken off the reaction coupling? I am using a 4-volt pentode P.M. 24 which, according to figures, delivers 500 milliwatts, and I find that a super-power valve by the same makers, also 4 volts, only gives 380 milliwatts and takes twice the filament amps. From this it seems

(Continued on next page.)

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REGISTERED AT THE G.P.O. AS A NEWSPAPER.

CAPT. ECKERSLEY ON RADIO OPERA (See Page 715)

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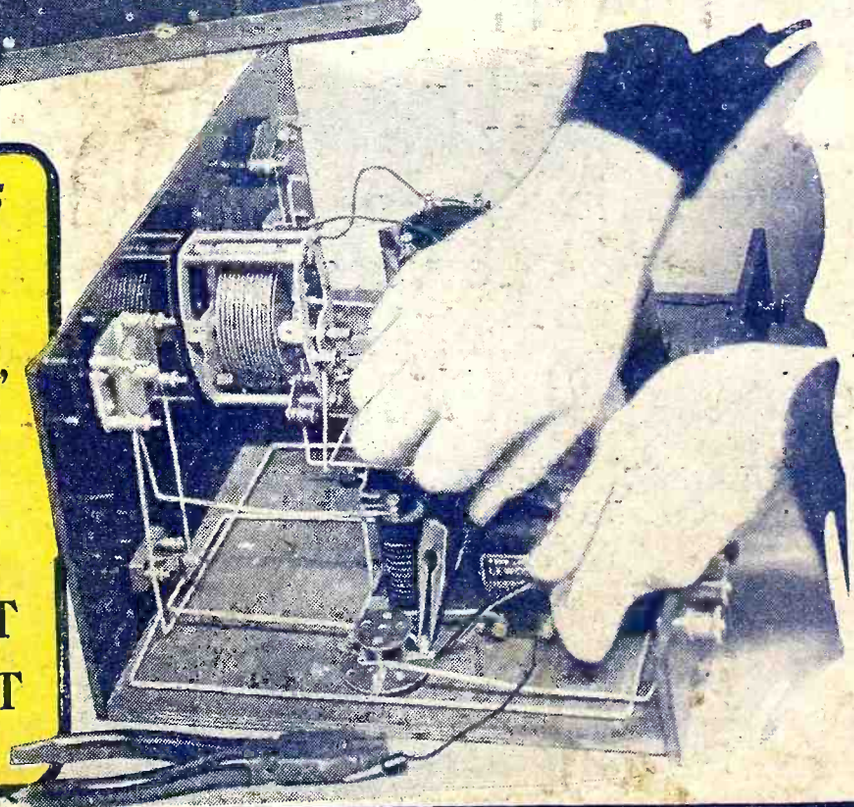

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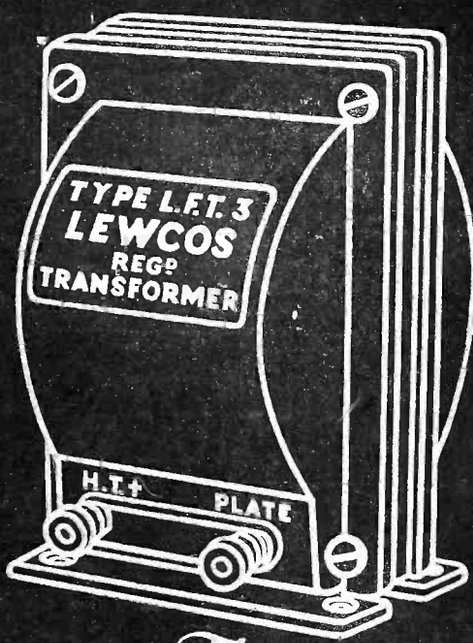

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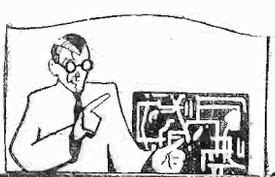

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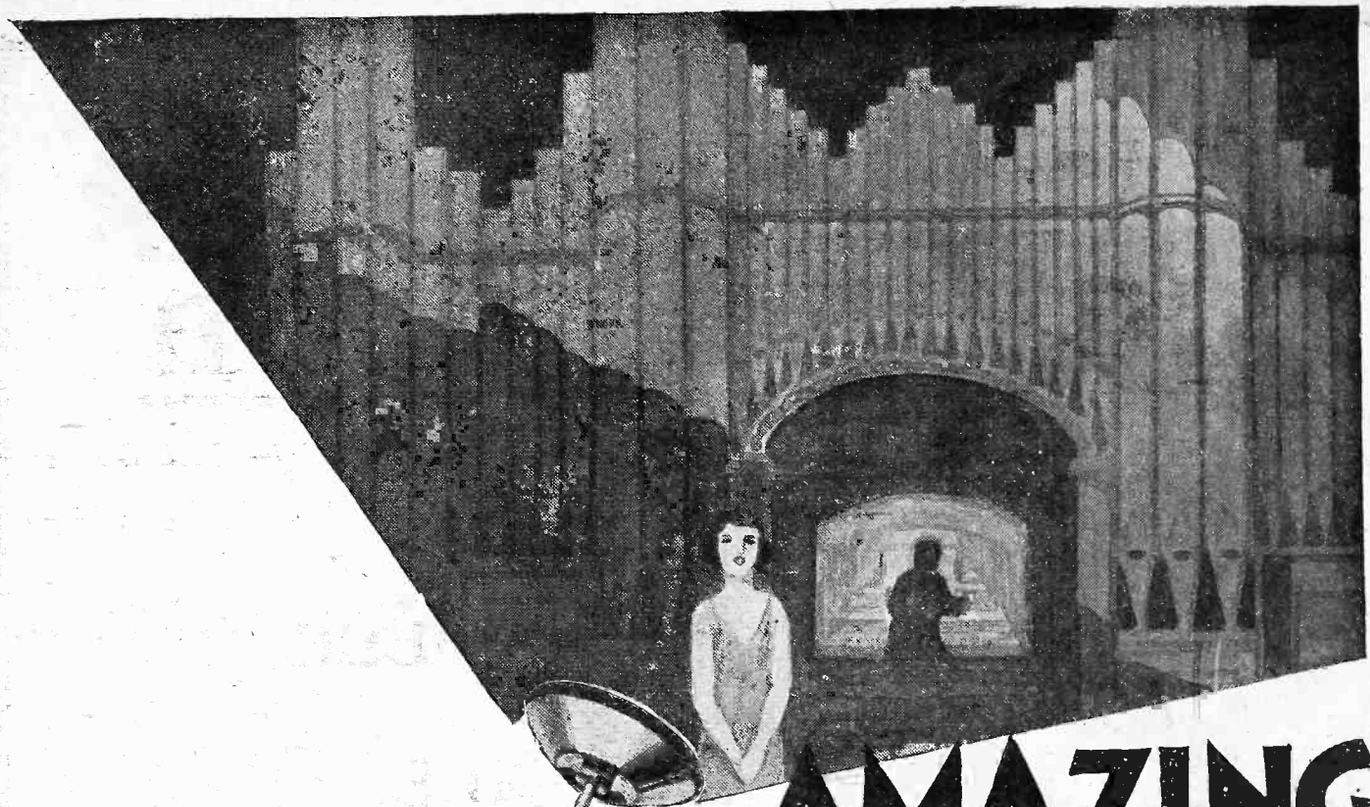

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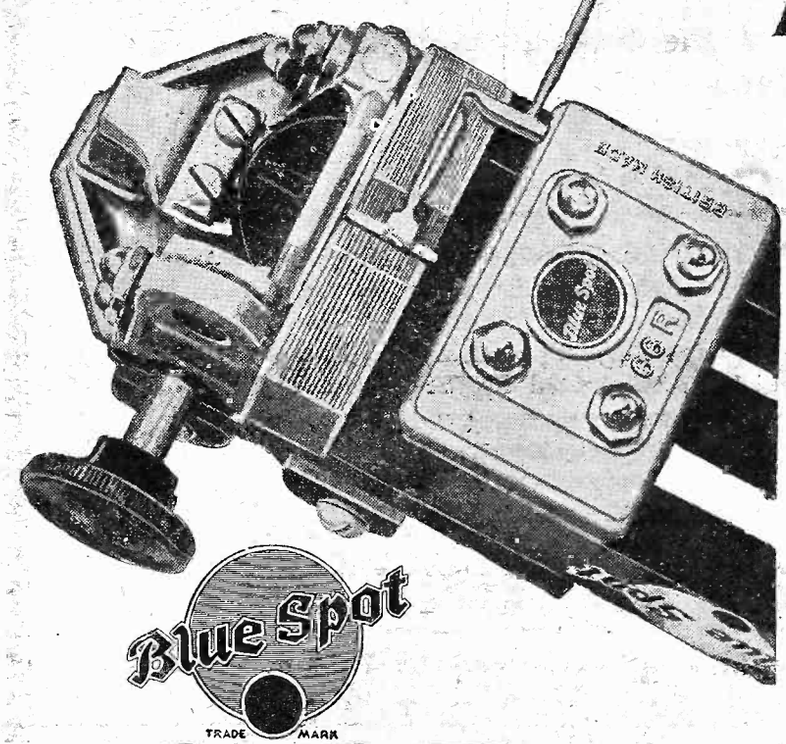

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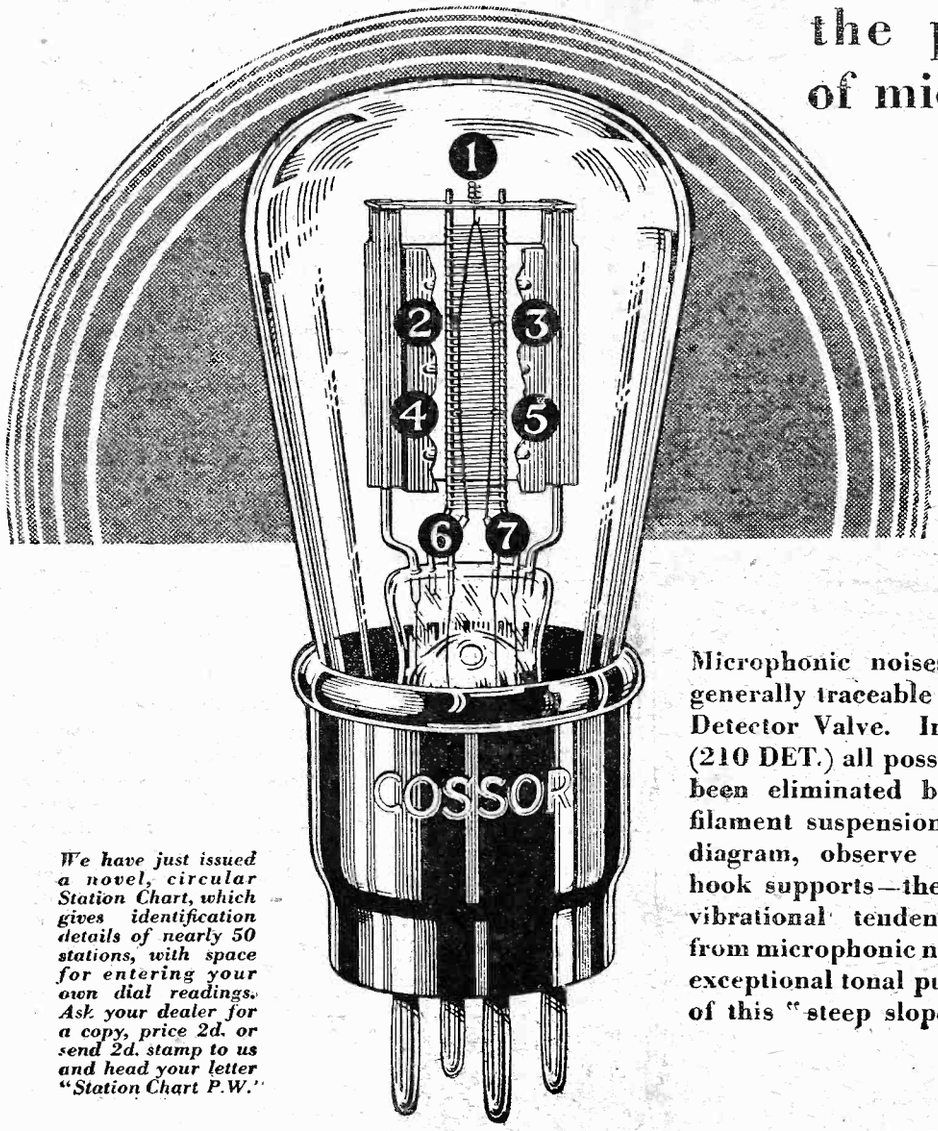

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FOUR MORE DAYS.
THESE NEWSBOYS!
MILLIONS OF 'EM.
PROGRAMMES FIRST.

RADIO NOTES & NEWS

LISTENING TO LEEDS.
FREAK CONNECTIONS.
BUCK UP, BRITAIN!
ANY OLD LEAD?

Four More Days.

JUST four more days and the great Festival will begin. The foundations of romances, and also of ruined digestions, will be laid, and shop assistants will compose advertisements for "sitting down" jobs. May you all spend your Christmas wisely, kindly and happily—and the same to me! May the turkey be a veritable Sultan of a Turkey, and may the pudding "come out" as clean as a whistle and be of that classic dark hue which brings a smile of pride to the little pudding-maker. Them's my sentiments, chaps!

The Stenode Radiostat.

CONGRATULATIONS to Dr. Robinson on the reported success of his trip to the U.S.A. in order to demonstrate his invention, the "Stenode Radiostat." I hear that great interest in this receiver was shown by all the leading manufacturers of radio equipment, and that an "American Radiostat Corporation" is to be organised for the purpose of granting licences to manufacture under the British company's patents. If the Radiostat is badly needed anywhere, it must be in America, and we wish it the very best of luck.

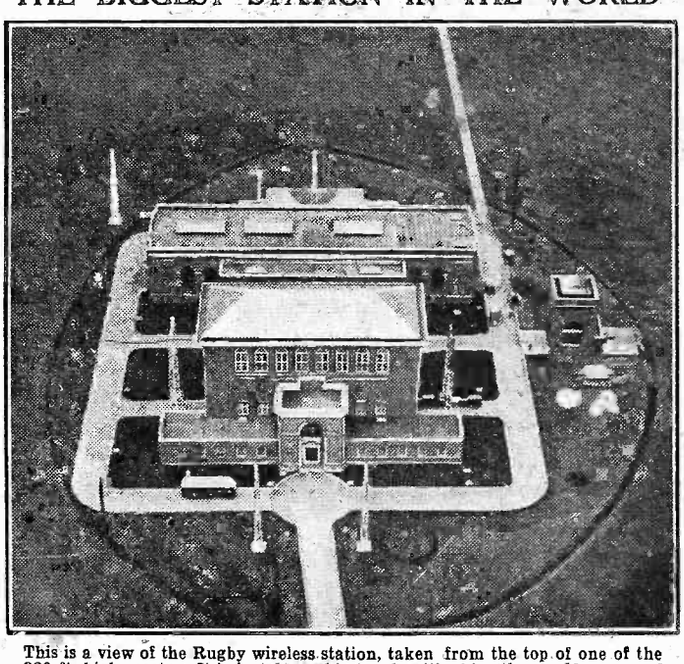
These Newsboys!

DAVID SARNOFF, President of the great Radio Corporation of America, landed in New York as a poor Russian emigrant boy not so many years ago. He has now presented the equivalent of £2,000 to St. Lawrence University, Canton, New York, to commemorate a loan of £45 which was made to him in his youth, with which he bought a newspaper stall. The money is to form a fund for loans to needy students. By the way, Edison was formerly a newsboy—and so was Edgar Wallace.

"Mass" versus "Lone" Listening.

LO, a coincidence! I was alone in the house one Sunday afternoon and turned on the new toy, the remarkable S.G. set without a name. A goodish programme, yet it seemed to fall flat; it was as exhilarating as a cocktail that has stood overnight in the rain. Pondering the possible cause of this I got no farther than the notion that listening alone is like drinking alone, when I happened to pick up an October number of the "Musical Standard," where I read, "The effect of music is enormously increased by mass excitement." "To listen alone, or almost alone, is almost to listen coldly." It's a true blue fact! You try it! Hear Beethoven's Seventh Symphony at a Queen's Hall "prom," and then at home by yourself. The one is a sort of white-hot experience; the other only a nice red glow.

THE BIGGEST STATION IN THE WORLD



This is a view of the Rugby wireless station, taken from the top of one of the 820-ft. high masts. It is in telegraphic touch with ships the world over, and it forms the telephonic link between all Europe and the U.S.A.

Those Atmospherics.

TO change the subject we are all glad to hear of attacks on radio's oldest and most obstinate problem, and I must, therefore, refer once again to the apparatus devised by Mr. Riccardo Bruni of Genoa, about which I had a Note on November 1st. This gentleman's father kindly writes to say that the trial tests gave "complete elimination of all disturbances" and that the Italian Government is to test it again this month.

Improvement in Transmission?

AFTER having read the newspaper article sent by Mr. Bruni, senior, I begin to suspect that what his son has invented is not an apparatus for cutting out "X's" or "atmospherics," but a method of improving *transmission*. Else, why does Mr. Bruni say: "The apparatus used in this test was for continuous current, but another trial test is to take place . . . with an apparatus for alternating current"? Perhaps my courteous correspondent would explain further.

Millions of 'Em.

THEY say that about every tenth person in the U.S.A. has a wireless set, which makes the total number about 13,500,000! New York alone is said to have 1,752,000 sets, California being next with 1,470,000. Heavens! What a country! But they are not satisfied, for a report from Illinois states that all prisons and reformatories are to be equipped with wireless. One wonders what the total would be if they began to imprison "bootleggers"—why, they would have to *import* receivers! And build more gaols, too!

Distinguished Listeners.

SURELY that was a triumph of persuasion to get together at Sir Landon and Lady Ronald's house the Marchese and Marchesa Marconi, Mr. G. Bernard Shaw, Sir Hugh Allen, Director of the Royal College of Music, Dr. McEwen, Principal of the Royal Academy of Music, and Mr. Ernest Newman, the well-known music critic, all to listen to a demonstration of a new radio receiver—a Marconiphone Model 560, in fact. I should like to know what Mr. Newman thinks of present-day radio, for I recollect that he used to be very

(*Continued on next page.*)

RADIO NOTES AND NEWS

(Continued from previous page.)

pessimistic about broadcasting not so very long ago.

The "Whiff of Audacity."

A WHIFF? By my halidom, 'twas an outrageous blast when Mr. H. Granville-Barker, a play-writing gentleman, coolly proposed that a portion of the B.B.C. surplus should be handed over for the establishment of a "national" theatre—whatever that may be! I am glad to note that Lieut.-Commander Kenworthy lost no time in getting up in the House of Commons and asking the Postmaster General "What about it?" So far no scheme for robbing the B.B.C. has been submitted to the Post Office, but the danger is by no means past. We know that Mr. Clynes has a weakness for the "fine arts," and that "national" anything sounds good to him and his colleagues. So, as eternal vigilance is the price of safety, let listeners ensure the safety of their B.B.C. funds by keeping an eye on subsidy-hunting gentry connected with the theatre.

Programmes First.

IF the B.B.C. would spend more on programmes—and more such expenditure is badly required—their cashbox would not cause the mouths of subsidy-hunters to water so freely. There is enough money available to provide at least two alternate programmes for every B.B.C. station. The present arrangement is a mere pretence at alternatives and the repetition of certain long items on the day following their first broadcasting is very annoying, especially if the other station is giving programmes which one would rather escape. Why should the B.B.C. make a profit? Let it balance its budget and no more, putting its would-be surplus "back into the business" after providing for the necessary reserves—which should be earmarked indelibly *for the B.B.C.'s own consumption.*

Listening to Leeds.

YOU can now listen your way to Leeds, for after a deal of experimentation a train in England is actually fitted up for the reception of broadcasting. Namely, the L. and N.E. 10.10 a.m. from King's Cross to Leeds. You pay your shilling, plug your 'phones in, and receive 5 X X—and anything there is to listen to until 1 p.m., when you want to go to your lunch! The receiver is a three-valver kept in the guard's van. The aerial is about 30 feet long, a single wire, and is run along the roof of the van. The credit for this innovation, from the technical side, is due to Messrs. McMichael.

A "Friendly Follower."

OF the "friendly following," about which I gloated in a recent issue, no reader better qualifies as a member than a Scot who is at present exiled in Newcastle-on-Tyne. To wit, J. McL., who offers us the first refusal of a new name for a set. The matter will be referred to our Nomenclature Department, Jock, as also will your offer to act as our unofficial representative in the North. As Jock is a professional radio man his appreciations of "P.W." make a warm glow pass through our shrunken forms. Any time you are near Tallis, "come ben the hoose."

A Fine Bit of Reception.

I'VE had a note from a Public Works official in Kuala Lumpur, Malaya, about his reception of the international broadcasting experiment, when Messrs. MacDonald and Hoover, and the Japanese Ambassador spoke. He received 5 S W, K E L (S. Frisco), J I A A (Tokio), K P K (Manila), and either Sydney or Nairobi, all at L.S. strength except 5 S W, the best being K E L, a 7,000 miles jump. "It will be noted," says J. B. B., "that the complete circle of the globe was successfully covered, Chelmsford, for instance, being received either W to E at 7,000 miles, or E. to W. via New York and S. Francisco, at some 17,000 miles, and if only Bandoeng, Java, had also taken part, listeners in Eng'and could quite successfully have received London either direct or after passing right round the world."

SHORT WAVES.

SUICIDE IN COMMERCE.

"——Portable Radio. We should like to demonstrate this model to you. Its tone and volume have nothing to be desired."—Natal paper.

* * *

According to reports, the police superintendent of the town of Arles-en-Provence, in France, has issued a by-law that all loud speakers must be switched off at sunset.

Does this apply to mothers-in-law? asks a correspondent.

* * *

THE JUDGMENT OF PARIS.

Referring to the Sunday evening programmes from Toulouse, which are specially provided for England, a Paris newspaper writes:

"Something new on the western front. Everyone who has been in England must have noticed how bored the poor English are on Sundays."

* * *

"A Radio 'Kidnapped,'" runs a headline in the "Glasgow Evening Times."

We wish the one next-door had been.

* * *

THIS WEEK'S MARTYR.

The man who, having with super-human efforts got 2 F C, was asked by his mother-in-law to change the record, because she preferred a nice song to that silly "whistling solo"!

* * *

"Wireless keeps even the cow contented," we read in the "Sunday Chronicle."

Yes, we humans must be very hard to please.

* * *

Henceforth, or so I read,
Grand Opera's destined to be grand indeed;
Born at the B.B.C.'s Olympic nod,
Nursed by its genius, nourished by its wad;
While Tommy Beecham—ay, and H.M.V.—
Join in the gay but high-class harmonee.
"Evening News."

* * *

There's one thing to be said for radio: even if you do have to listen to some of those bad sopranos, you don't have to look at them as well.

The "Drumm" Accumulator.

I HAVE previously called attention to the new type of storage battery invented by Dr. James Drumm, a master at University College, Dublin, who has presented his invention to the Irish Free State. It is reported that a battery of Drumm cells can store enough power to run a train for 60 miles, and that its recharging takes a few minutes only. The Dail has voted the Ministry of Industry and Commerce £13,000 for this battery, which, by the way, has been patented in twenty-four countries.

"Freak" Connections.

EVER since I ventured into the open with a squeak of surprise because a man said that he received with his aerial "earthed" from a point near the lead-in, I have been the target of letters from practically everybody in the British Isles who connects his set in an unorthodox and inefficient way. The foreign mail is now breaking out into this complaint, and I refer now to a letter from G. K. M. (S. Africa) who tells of a set in King William's Town which receives Jo'burg without an aerial and with the "earth" plugged into the aerial terminal, better and freer from X's, than when connected à la mode! There is no limit to the vagaries of radio receivers.

Buck-up Britain!

THERE is that in G. K. M.'s letter which strikes a more serious note. He states that he could not find a British set for sale in the country. German, Dutch and American sets are available, but when he wrote to a well-known firm in England, asking for lists, he got no reply. Dutch "all-mains" sets are being sold there for £32 10s., and German ones for about £40. Naturally, he asks whether British firms really want any South African business. If they do they must invade the market with sets in which sensitivity is placed before selectivity. There are only three stations (442, 405 and 378 metres); Jo'burg is 15 kw., Durban 1·5 kw., and Capetown 1·5 kw. "All-mains" sets are popular, even on isolated farms, for many of these have electric light plant; but some battery sets are required.

An Unobtrusive Aerial.

A READER who signs himself "Helpful"—may his tribe increase!—describes how for an indoor aerial to be used with the "Magic" Three, he covered the back of a picture measuring two feet by eighteen inches with tinfoil from cigarette wrappers, connected the foil to a wire and the wire to the set via the back of an almanac. The result, he says, is very satisfactory—and so it ought to be, for it is an old and well-tried device, though not quite so efficient as forty feet of the best strung up on a nice pole in the garden.

"Our Conservative Navy."

I AM glad to learn from my ex-naval correspondent, H.A.C. (Leicester), that although he found the grub to be "rotten"—which, he says, would make a story by itself—he does not consider that the W.T. Department of the Navy is conservative. Well, perhaps he is right. The Navy was slow to take up wireless—slow as a Service, I mean—but when it did I think it went ahead as fast as all the rules and red-tape would permit.

Any Old Lead?

MAY I be permitted to call attention just once more to the fact that even when your accumulator has buckled and sulphated beyond possibility of redemption it may yet be of use because of the lead in its plates. If you have any such "duds" a postcard to Mr. S. C. Knott, at Middlesex Hospital, Mortimer Street, London, W.1, apprising him of the news that he is welcome to them, would be gratefully received by him.

ARIEL.

WHAT I THINK OF RADIO OPERA.

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

Here are some very novel and refreshing comments on a subject that has recently aroused much discussion among listeners.

PERSONALLY I like opera. Wagner has a robustness seldom associated with sensibility. Also I like garlic, snails and Port Salut cheese. I do not like Gilbert and Sullivan. Puccini is lovely slop for a summer's night and reproduces wonderfully on a gramophone. Lots of people will disagree with my likes and dislikes.

These are my *personal* likes and dislikes, and I'm hanged if anyone is going to tell me what I *ought* to like (or dislike). But bureaucracy has decreed that we all *ought* to like opera (when the majority of us do not), and it's going to be broadcast whatever it costs; private enterprise knows that most of us love Gilbert and Sullivan opera so they won't on any account have it broadcast. This is all somewhat confusing to a logically minded person, and rights and wrongs get very muddled.

It is the avowed policy of the B.B.C. to give the public programmes which the Board of Governors considers the public ought to like, and not what the public think they want to have.

Go-ahead Influences.

The Board of Directors would seem to be eminently qualified to implement the policy so firmly expounded by the Director-General. It is a question whether the decision to give us opera is part of that policy or whether it is considered that for once they are coming near to satisfying public need.

Are they consistent or not? Obviously, in regard to this decision to subsidise opera, they have been persuaded by the go-ahead influences in the B.B.C. directorate, and any arguments with our no-saying Chancellor have had an influential supporter towards a yes-saying result. But was "yes" the right answer?

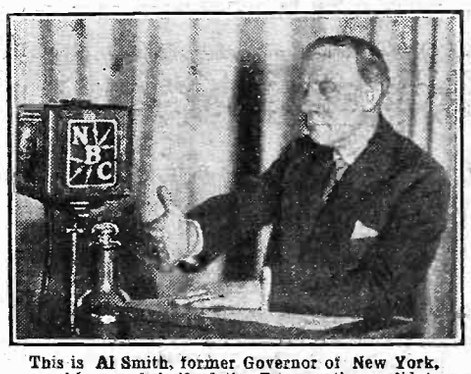
I am not dogmatic on the question, but I certainly feel that the decision was most unwise, particularly at the present time.

The fact that opera does not pay is not necessarily an argument against it. The fact that it requires subsidy in all foreign countries where it is continuously presented, and that so far England has refrained from official support, is not in itself a condemnation.

The fact that Sir Thomas Beecham's enthusiastic support for the League of Opera failed to raise enough money to start opera, or that when his object of having opera, at popular prices, is achieved in another way makes him burst into rage, is still no fundamental bar to opera as such. It may, of course, be a condemnation of Beecham opera, but not opera. And that may be no particular evil.

In my view, the debatable point is whether broadcasting or opera have much in common, and whether, if they have, such a large sum of money is truly available for this purpose, above all others, and whether, indeed, in these times the money *is* available for any purpose to do with opera or broadcasting. Also, whether the money available is going to give us good opera.

VERY DEMOCRATIC!



This is **Al Smith**, former Governor of New York, speaking on behalf of the Democratic candidate for that position. His voice was broadcast all over America.

Let me be clearer. Broadcasting is surely an art concerned with sound, and sound only. Opera when well done combines sight and sound for its full effect. Therefore opera is to that extent emasculated when one of the supposed essentials is completely missing.

A Great Difficulty.

Such artificial aids as telling us the story are merely admissions of essential failure to present the opera as an opera. Of course, as music, opera is very well. And hearing the music may make us want to go to see and to hear. This widens our opportunities of enjoyment and is all to the good.

And so we come to this: by having the opera presented in emaseulated form we are to be intrigued into going and seeing and hearing it. So then, of course, opera would pay.

But it does not. See subsidy! And the B.B.C. has been broadcasting opera for years. But it has not had the effect of making people go any more. Perhaps the subsidy will make broadcasting of opera so much better that people will go.

But here is a great difficulty. The broadcasting from the studio is much better. You can place artistes so that they can really be understood (words and all), so that balance is right for broadcasting. You cannot do that in Covent Garden, *so opera is broadcast worse—thanks to the subsidy.* It *is* difficult to get the rights and wrongs of it all.

Then, again, this money supposedly comes from the entertainment tax on broadcasting. Is it best spent on opera? When I was in the B.B.C. I was very keen to raise the power of 5 X X *now*, at once. But no! We had not the "resources." Money is "resources." We could double the effectiveness of 5 X X for £20,000; but opera, culture! And boxes for the elite!—ugh!

The Most Pathetic Fact.

Perhaps the most pathetic fact is that the money seems still insufficient to give really good opera continuously. I reckon there is available some two hundred pounds a performance. Is this enough, even with box office receipts?

Up to now broadcasting is said to spoil opera as far as box office receipts are concerned. Therefore, we shall be allowed only isolated acts, we who listen *and pay!* By ruining the box office receipts we get our money's worth then!

And, lastly, is the money available even for increasing the effectiveness of 5 X X, for giving more alternative programmes, for engaging better and better artistes, for research, experiments, rewards to the deserving, for the myriad ways it could be effectively spent on *broadcasting?*

To my view, it is not. The licences and the unemployed increase their numbers apparently proportionately. Our Chancellor might see a constructive policy in further taxation on wireless, increasing licences to help pay for the increasing unemployed. This surely would be more constructive than subsidising opera?

What a pity it is that people do not see essentials more clearly, and that because of a failure to grasp such essentials continually "bolster an inefficiency"—a phrase I learnt at Savoy Hill!

THE B.B.C. IS HARD UP.

By THE EDITOR.

Despite the millions of ten-shilling licence fees paid by listeners there is not a superfluity of cash left when the Post Office, the Income Tax Collectors and the Treasury have each had its "rake-off."

IT will probably come as something of a shock to many readers to learn that the B.B.C. is "hard up."

Being hard up is not a very unusual phenomenon these days, but it seems to have surprised many people that even with an income of £944,301 (for last year) the following words should appear in the B.B.C. Year Book for 1931: "Entering on a phase of development in which its needs in the way of revenue and capital expenditure are bound to exceed greatly its present financial resources."

Enormous Expenses.

The fact is, of course, that the B.B.C. is committed to at least two costly ventures—the Regional Scheme, and the new Broadcasting House.

The latter item is what may be colloquially termed a mere fleabite when compared, from the expense point of view, with the Regional Scheme. Each Regional station costs something like £150,000.

Add to this the enormous programme and administration expenses, and the fact that the B.B.C. pays income tax on the money received from the Treasury, and it will be seen that a gross income of nearly a million a year is not so marvellous, after all.

There is no doubt that the B.B.C. is very seriously hampered by the present scandalous arrangement whereby listeners' licence fees are "milked" by the Post Office and the Treasury—and then again by the income tax authorities.

At the risk of repetition, we again remind readers that the B.B.C. gets less than six shillings from every ten shillings paid by listeners. Last year the Treasury took £341,949.

The B.B.C.'s income from all sources for 1929—including profits from publications, etc.—was, as a matter of fact, over a million—but after taxes, etc., the amount available was found to be inadequate.

It seems pretty clear that force of circumstances will eventually make the Treasury disgorge. It would be a fine scandal if the B.B.C. got into really serious financial difficulties and the Treasury refused to help by returning some of the money deducted from licence fees.

The whole business is really amazing, and it is a singularly striking example of how the public meekly accepts a situation which, to say the least of it, has never been legally authorised.

To cap it all, when Mr. Snowden announced the other week that a small portion of this Treasury hoard, built up from pickings from licence fees, was to be returned to the B.B.C. for the purpose of assisting opera, and incidentally the broadcast programmes, there was a terrific yell of protest from all quarters of the land.

The Listener Pays.

Misuse of taxpayers' money was alleged, and a dozen other distorted versions of the whole business. It could have been argued that the so-called subsidy was a misuse of *listeners'* money, for it was the listener, and no one else but the listener, who found the money. Those who did not possess wireless licences would have done better to keep quiet. They were not concerned. Their money was not being used.

But with amazing indifference to the real facts people all over the country have jumped into the fray and letters numbering thousands have for weeks past appeared daily in the press condemning the Chancellor's action.

A Very Great Truth.

A few enlightened critics have pointed out the real facts, but their voices have been drowned in the general clamour roused by the ignorant, the prejudiced, and the political wanglers who jump at any opportunity to raise a political dust. Altogether a rather sickening business.

Hazlitt once wrote that "Prejudice is the Child of Ignorance." Anyone who has studied the financial facts of broadcasting, and condensed them in the light of the Opera Scheme, will realise the very great truth of Hazlitt's dictum.

Well, let us hope the B.B.C. won't be too seriously handicapped by lack of money. If it is, and the Regional Scheme is again held up, or British broadcasting is in any way set back, then there will be absolutely no excuse for the Treasury to withold its accumulated deductions from listeners' licence money.

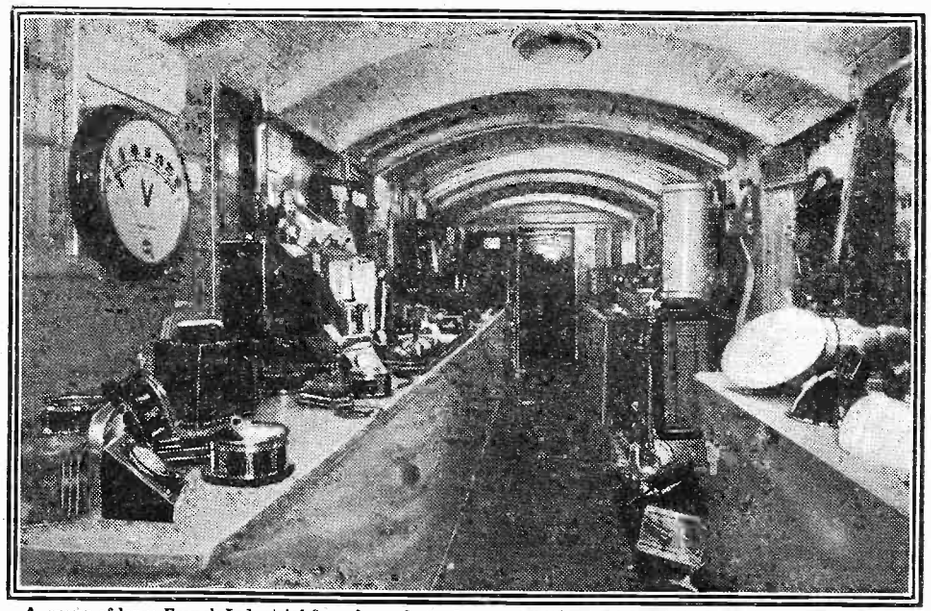
B.B.C. FINANCE.

In a written reply to Sir William Mitchell-Thomson, the Postmaster-General gives the following figures of the total receipts from wireless receiving licences during the year ended March 31, 1930, and their distribution, with the corresponding figures estimated for the year ending March 31, 1931 :—

	1930	1931
	£	£
Total receipts ..	1,537,377	1,725,000
Deduct 12½ per cent (for P.O. expenses of management)..	192,172	215,625
Deduct contribution to cost of conversion of "spark" stations, &c. ..	6,686	3,150
	1,338,519	1,506,225
Paid to B.B.C.(based on licence receipts for previous year)	963,171	1,069,648
Balance to Exchequer	£375,348	£436,577

Mr. Lees Smith adds that he is not in a position to furnish particulars of the total income of the British Broadcasting Corporation from all sources during the same two periods; but its total income during the year ended December 31, 1929, is shown in its Third Annual Report (Cmd. 3599 of 1930) as £1,097,337 7s. 3d.

A RADIO EXHIBITION ON A TRAIN



A group of large French Industrial firms have formed an exhibition which is displayed in a railway train. The train is travelling all over France and stops at all the big towns. Above you see the radio section of this novel show.

PROGRAMME CABLES

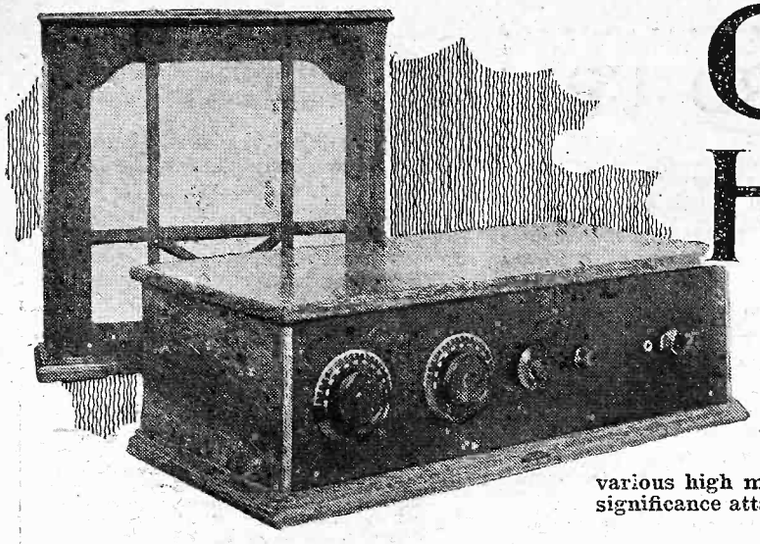
Although the buried cable has the advantage that it is less liable to breakdown, the overhead line for S.B. work scores in quality.

* * *

A new high-quality type of Post Office cable is now being laid between certain important towns in the British Isles, and will eventually be available for S.B. work.

* * *

With the new Post Office buried cable an almost straight response characteristic from 50 to 7,000 cycles is obtainable.



ON THE HIGH "C's"

By G.V. Dowding, Associate I.E.E.

Another of those fascinating "music and the ordinary amateur" articles, which we are sure will be enjoyed by all readers. It shows you how to correlate the various high musical notes with their respective frequencies, and the vital significance attached to the harmonics that accompany all musical sounds.

ONE of the minor tragedies of radio is this: many listeners do not realise that dozens of notes are lost during every few seconds of a musical broadcast. The range of the average radio receiver is remarkably restricted, although, unfortunately, a vast number of people seem to find it adequate.

However, it is very apparent that listeners are, on the whole, developing their critical faculties. Of course, at one time the romance of radio completely smothered criticism—it was regarded as so wonderful that anything at all could be received that criticism of the noise emitted by the 'phones or loud speaker was out of the question.

Coming to the immediate present, I have an important question to ask "P.W." readers. It is this. Are you able to criticise the output quality of a radio set?

Obviously you cannot do this with scientific precision if you haven't got a proper testing outfit enabling you to measure the response of your gear at every frequency in the "audio" range.

Timbre.

But can you give a rough approximation of the general failings of a radio outfit?

I don't suppose you can do even that, unless you are a trained musician and are in a position to know exactly what the various musical combinations that broadcast should really sound like, and can identify the various instruments and are familiar with their natural "timbre."

Perhaps you are glad you are not able to do these things, and count yourself lucky that you can take broadcasts as you hear them—as agreeable noises!

On the whole, I think that very critical listeners get far less real enjoyment out of their listening than do those that can forget their sets and such things as frequencies while a band or an artiste is broadcasting.

Nevertheless, it is very interesting on occasions to try and correlate musical notes with their respective frequencies. It is certainly very instructive.

Dissatisfaction—But Progress.

It may make you a trifle dissatisfied with your present apparatus, but a little dissatisfaction is a good thing—it makes for progress. It makes you want to improve your reception, and, in the long run, you get a fuller satisfaction from broadcasting. It is true that "what you don't have you don't miss", but on the other hand, when you get those things your horizon assuredly widens.

For instance, if you have never heard a brass band broadcast via a powerful receiver working a first-class moving-coil loud speaker, you do not realise what a stirring, thrilling thing it is, with its full-blooded "om-pom-om-pom" effect that makes you want to get up and march along the room in time with the music!

It is quite wrong to suppose that you must have a set giving a straight line output from about twenty to ten thousand cycles before "realistic results" can be obtained. Anyway, such an affair would be quite useless, for the simple reason that the B.B.C. does not broadcast such a range of frequencies. They are lucky when they can keep fairly straight from forty to four thousand.

Nevertheless, such a range is often quite adequate from the point of view of many listeners, and maybe that is a pity!

You know how far down the scale the various instruments go in terms of frequencies (that is if you read a recent article of mine), but the upper end is not so clear-cut in its limitations.

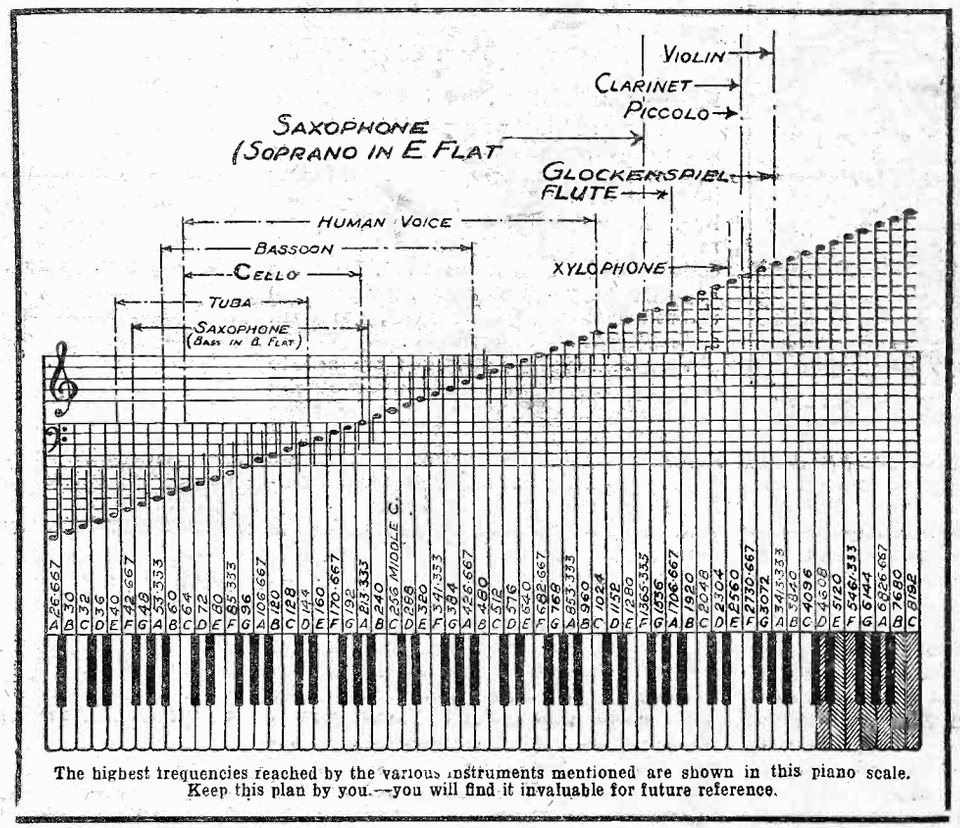
When an instrument emits a note having a fundamental frequency of sixty or thereabouts, realism is well served if the receiving outfit cuts right off just below sixty, but deals fairly well with frequencies a thousand or two above. You see, no musical note comprises just the one frequency—its main or fundamental frequency is always accompanied by a number of subsidiary higher frequencies, and these are known as harmonics.

Fundamentals.

Now you see where lies the "nigger in the woodpile." The higher the note the higher its harmonics, and the more widely spread they will be in view of the fact that a fundamental is always the highest common factor of its harmonics,

(*Continued on next page.*)

THOSE HIGH NOTES—AT A GLANCE



The highest frequencies reached by the various instruments mentioned are shown in this piano scale. Keep this plan by you.—you will find it invaluable for future reference.

ON THE HIGH "C's."

(Continued from previous page.)

A note of 60 cycles will have harmonics of 120, 180, etc., but a note of 3,000 cycles will have harmonics twittering away at 6,000, 9,000, 12,000, etc. That is, they will be trying to twitter, but the average radio receiver will not let them, and so the note loses something of its characteristic tone. A violin note tends to sound like a flute note—a proper violin note sounds so beautiful simply because it is rich in harmonics.

One of the instruments that suffers worst in radio processes is the clarinet. It is true that its notes run up to only 2,500 cycles or so, but it is an instrument that depends for its success very much upon harmonics, and a falling off at the usual two or three thousand hits it badly.

That Shrill Squeal.

As the clarinet tootles up the scale there comes a patch where the harmonics of the notes it emits actually predominate over the fundamental frequencies after that; it then runs into a very shrill tone that is absolutely lost in the ordinary loud speaker.

HE HITS THEM!

Teddy Brown ventures well into the "High C's" with his xylophone.

It is rather otherwise with the piccolo, for although this little flute can range up to the middle of the third octave above the piano's middle C—about 3,000 cycles—its notes are not so rich in harmonics. A little, or even a lot, of harmonic snipping leaves it comparatively unaffected in tone.

Very different, however, is the case of the glockenspiel, which is something like the xylophone in construction, except that it has metal resonators. You hear it in some dance bands; it has a very high and rather penetrating note not unlike a tuned triangle.

Its fundamentals go well above 3,000 cycles, and no radio set in existence can take in more than a mere handful of its harmonics. And being a percussion instrument, that is an instrument that has its notes generated by blows, it has other characteristics than those contributed by harmonics which inevitably suffer in any of the various radio processes.

The ordinary piano goes higher than anything we have yet mentioned, for its top note is above 4,000 cycles. But those top notes are seldom used. Even Mendelssohn's Spring Song, which I referred to in my previous article as "light and airy," does not take in any note above 1,700 cycles, and that only at the very end of the score.

The Wonderful Piano.

If you look through a book of music you will see that very few composers for the piano use notes above the third C above middle C, and that has a frequency of a mere 2,000.

By the way, it is rather wonderful that the piano should go above and below practically everything else, isn't it? However, when you strike the very high notes on a piano you find that they have little individual tone—they sound flat and expressionless against the rich fullness of the notes nearer the centre.

Why should that be? The reason is fairly obvious when you think it over. The ear has a limited range, so that it cannot take in harmonics of frequencies above a certain maximum. Many people cannot hear notes of seven or eight thousand cycles. Therefore, the lower the note the more chance it has of getting away with a big proportion of its collection of harmonics.

This indicates that we need not concern ourselves too much with the very, very high frequencies, for even if we were able to get them through our radio we should not be able to hear them! I am of the opinion that ten thousand represents the highest point at which we need aim—at least until we develop our aural faculties a great deal more than they are developed so far by critically listening to those B.B.C. programmes!

After all, we must get something of a limit!

Practical Considerations.

But I am writing in terms of ideals, not in those of practical radio! In the average present-day set there is a very serious falling off at about two thousand, so that those high fundamentals, let alone their harmonics, get very shabby treatment. Practically everything in a radio set, from the high-frequency stages (where these are used) up to the loud speaker itself, are dead against those high frequencies.

Very misleading resonances are apt to occur in many loud speakers at frequencies in the neighbourhood of two or three thousand, and these are liable to lead listeners to think that their high notes are getting not only their fair share of treatment, but more than their share.

Further, a lack of bass may make the reproduction sound high pitched and lead to the same sort of wrong conclusion. In such circumstances, far from the high notes being given undue amplification, it is actually that they want to "stay put," or have even more proper magnification and then have an adequate bass added.

There are people who throw away most of their already poor measure of high-frequencies by placing fixed condensers across the terminals of their loud speakers in order to make the results "mellow." Fancy making a clarinet "mellow"!

It is the high-frequencies that distinguish between the sounds made by a xylophone and a vibraphone, or a miramba and a glockenspiel.

The whole object of a band, whether it be a dance band or a symphony orchestra, is to get over a medley of musical notes of a carefully chosen kind. The brass band does not have instruments made of brass just because brightly polished brass looks smart, and a "silver" band does not spend hundreds of pounds on silver instruments simply because silver looks "posh."

ABOVE THREE THOUSAND!

Tom Jones, of the Eastbourne Grand Hotel Orchestra, can play notes of over three thousand cycles frequency with his violin.

The reasons underlying such choices are of a purely technical character—an instrument derives its tone from its structure. A brass instrument will have a different tone from one made of wood, and a silver instrument will sound different from either. You can distinguish the difference between a "middle C" played on an organ and a similar note played on a piano, for they will each have their own individual tones.

And they owe their characteristics, as I have said before, to their harmonics. Take away those harmonics and you take away individuality. One tuning fork or valve oscillator emitting a pure note free from incidentals will sound like any other similar device.

A Complicated System.

A big symphony orchestra such as the new B.B.C. outfit has scores of instruments of different kinds, and they all overlap to a very great extent. In cases, groups of instruments must be playing exactly the same notes, but they are not all merely piling up the powers of fundamental frequencies. Each instrument, brass, wood, string, percussion, contributes its own harmonics, little families different from all those due to any other instruments even of similar nature.

But listen to your set very critically the next time Adrian Boult and his boys are on the air, and ask yourself whether you are getting as much as you should of the thousand and one incidentals in the way of partials, that one hundred odd instruments are able to generate.

THOSE MAINS UNIT CIRCUITS

THEY ARE QUITE EASY TO UNDERSTAND AND EXTREMELY INTERESTING IF YOU READ THEM THE RIGHT WAY.

SOME HELPFUL HINTS.

By J. ENGLISH.

JUDGING by the questions I am frequently asked about mains units, there must be a good many constructors who are much puzzled by the theoretical diagrams of these devices, especially those of the A.C. type. You, yourself, may not perhaps have very clear ideas on this subject, and the purpose of this article is to help you to follow diagrams of simple A.C. units and what goes on inside them.

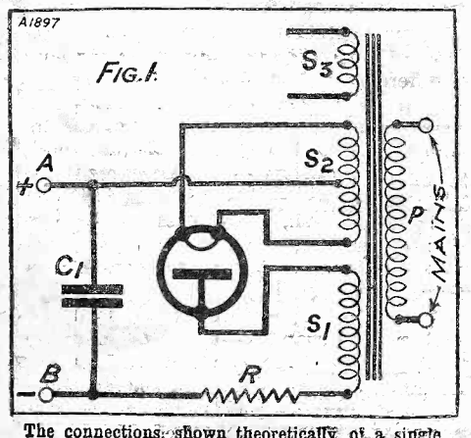
With so many people now going over to mains operation it is nice to remember that if you have a working knowledge of simple mains units and can follow their diagrams, your less well-informed friends will look upon you as a real live expert!

There are Three Sections.

After all, mains units, or eliminators as some call them, are not nearly so complicated as you may imagine, and the recipe for getting quite familiar with them is first of all to grasp a few fundamental principles underlying their make-up, and then add commonsense and a little simple arithmetic. Thereafter you will find that you can follow designs which previously seemed hopelessly complicated.

Now it is a great help if you look upon an A.C. mains unit as being made up of three sections—the *rectifier* for changing alternating current into direct current, the *smoother* for removing roughness and hum from this D.C., and finally the *distributor*, which breaks down the voltage supply from the smoother and distributes it to the H.T. terminals on the unit at the right values for each valve in the receiver.

SINGLE WAVE

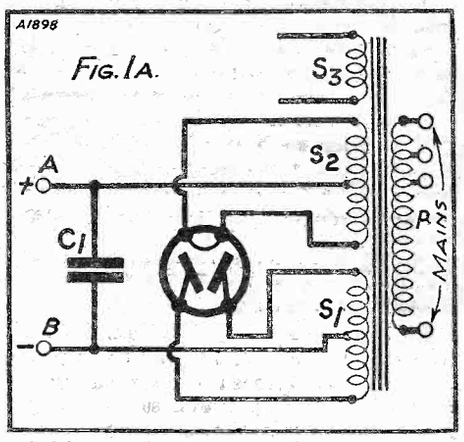


The connections, shown theoretically, of a single wave rectifier valve.

Suppose we now follow out in some detail the make-up of each of these sections in a simple mains unit, as this will bring to light the fundamental principles common to all A.C. units and, at the same time, give you a clearer idea of the working of each section and the purpose of each component. The mains unit I have chosen as a basis for examination here is the first of the excellent A.C. "Safe-Power" series, the circuit diagram of which is reproduced in Fig. 4.

We will commence with the rectifier section which has been cut off and re-drawn

DOUBLE WAVE



And here you have the connections relevant to a double-wave rectifier.

in Fig. 1. This section comprises a specially designed iron-cored transformer linking the mains to the actual rectifier.

For the latter we can use one of several devices, in this case a special valve without a grid. Another popular type is the metal-oxide rectifier with which you may already be acquainted.

The Rectifier Portion.

You will see in Fig. 1 that the rectifier valve is fed from A.C. from one of the secondaries of the "power" transformer, the primary of which is either specially wound to suit the voltage of your mains or provided with tappings to suit various voltages. Incidentally, the frequency of your mains supply, usually 25 or 50 cycles, must also be specified when buying a power transformer. (Look for this on the meter.)

In the transformer of Fig. 1 there are three secondaries specially wound to step-down or step-up the mains voltage, as the case may be. S_1 supplies alternating current at a fairly high voltage to the "half-wave" rectifier which converts it into raw D.C., S_2 supplies raw A.C. at a low voltage, 4 volts in this case, to heat the rectifier filament; and S_3 also raw A.C. at the regulation 4 volts, ready for the heaters of A.C. valves, which you will use when you want to make your receiver entirely mains-operated.

The valve is called a "half-wave" rectifier because it only passes current when its single anode is made positive, which happens at each half cycle, or alternate pulsation of the A.C. supplied by S_1.

In some mains unit diagrams you will come across a valve with two anodes. This is a "full-wave" rectifier giving about double the D.C. output, as each anode rectifies alternate cycles, a slightly different connection of S_1 then being necessary, as shown in Fig. 1a.

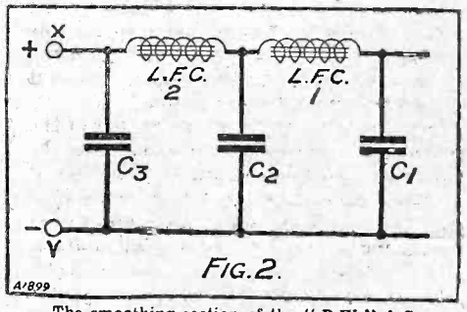
How to Follow the Circuit.

Notice in Fig. 1 that one end of S_1 is connected to the rectifier anode, and the other end eventually goes to H.T. –, whence the circuit is completed through the valves of your receiver to the H.T. + terminals and back through the smoothing chokes and the centre tap on S_2 to the rectifier filament. You can follow this rather tortuous circuit better if you ignore the other two sections of the unit, and imagine your valves as a high resistance connected across A and B in Fig. 1.

When looking at a mains-unit diagram always try to trace out in full this circuit from rectifier anode to rectifier filament, as this is the actual path taken by the H.T. current. It must now be obvious to you that the filament is the positive or high potential side of the rectifier valve, quite the

(*Continued on next page.*)

THE SMOOTHING SECTION



The smoothing section of the "P.W." A.C. "Safe-Power" Unit.

THOSE MAINS UNIT CIRCUITS.

(Continued from previous page.)

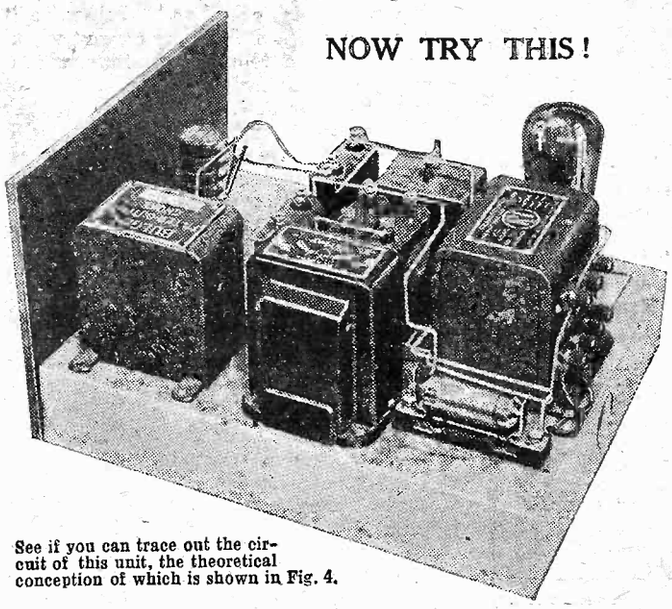
opposite of the valves in your receiver, and explains why you cannot make one 4-volt secondary do for both rectifier filament and A.C. heaters.

Another important point about the valve rectifier is that the voltage of the D.C. output varies according to the amount of current you take from it. If you use a Mullard D.U.10 in this particular unit, and S_2 supplies 150 volts, the D.C. voltage across A and B will be about 175 at 10 m.a., and 150 at 25 m.a. approx., ignoring the effect of R.

The latter is a resistance specially included as a voltage regulator, as you can see when you trace out the H.T. circuit and find that the total output current flows through it. The fixed condenser across A and B also deserves special mention, as it is absolutely essential if the rectifier valve is to do its job properly.

It helps to smooth the rectified current, as you can imagine it as a large reservoir into which D.C. is pumped in jerks by the rectifier, and then drawn out again at A and B at a steadier rate. The section to follow the rectifier is the smoother, invariably a collection of chokes and condensers, without which your loud speaker would "hum" rather alarmingly.

NOW TRY THIS!



See if you can trace out the circuit of this unit, the theoretical conception of which is shown in Fig. 4.

Removing the Ripple.

The pulsations in the current drawn from A and B are "ironed" out by passing it through the smoother, shown in Fig. 2. The iron-cored chokes are an effective barrier to the A.C. ripple riding on the back of the D.C. current, coming from the rectifier, and this unwanted component is then short-circuited away to H.T. negative through the comparatively easy path of the large fixed condensers.

If you compare Figs. 1 to 3 you will see that condensers C_1 and C_3 are each common to two sections. For the most effective smoothing you must have generous sized chokes of low D.C. resistance and high inductance. High resistance chokes mean a loss of voltage at X and Y.

The D.C. resistance of the choke in ohms multiplied by the H.T. current flowing through it in *amps.* gives you the voltage wasted, which we naturally want to be as small as possible. It is also important to make sure that your by-pass condensers are rated to stand at least twice the D.C. voltage of the rectifier output, in this case about 150 volts.

HANDING OUT THE VOLTS

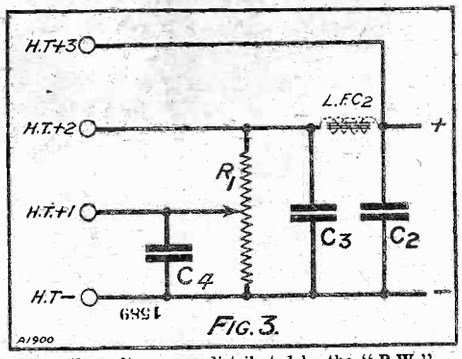


FIG. 3.

How the voltages are distributed by the "P.W." A.C. "Safe-Power."

The smoother section of the A.C. "Safe-Power" unit shown in Figs. 2 and 4 is rather ingenious, as you will see that the H.T. current for the earlier valves is smoothed more than that for the output valve, which is not quite so particular in this respect.

We now have left only the distributor section, which is a vital part of any mains unit as it controls the voltages.

The distributor of the unit we have under discussion here is quite a simple affair, as you will see from Fig. 3.

Output Scheme.

Notice that the lead coming from the junction of the chokes is essentially a part of this section, although it seems to be mixed up with the smoother. You will remember that in the original unit a voltage of approximately 130 volts is available at H.T. + 2 and 3 under normal load, the difference between this voltage and that supplied by the rectifier being accounted for by the voltage drop across R, and the chokes.

The resistance R_1 wired across the output from the smoother is called a potential divider, because a wide range of voltages up to nearly that of H.T. + 2 can be obtained by moving the tapping connected to H.T. + 1 along R_1, just like a potentiometer, which it actually is. The voltage of H.T. + 1 increases as we move the tapping towards H. T. + 2. This potential divider itself naturally takes some H.T. current from the smoother, 6 or 7 milliamps in this case. Before finishing with the distributor I want you to notice in Fig. 3 that there is a fixed condenser connected from the *receiver* side of each H.T. terminal to H.T. negative, and that each terminal is separated from the other either by a resistance or a choke. This wiring of condensers and impedances results in a complete decoupling device for each output terminal, and thus for each valve in your receiver.

Consequently, with this unit, back-coupling and L.F. howling is a very remote possibility. In all well-designed mains units the distributor resistances are always arranged to separate each H.T. terminal, which in turn possesses its own large by-pass condenser.

Now that we have dissected a simple mains unit, turn once more to the complete diagram of Fig. 4, which should now tell you a great deal more than it did before. Similarly when you come across other diagrams, even complicated ones, just split each one up into its three sections in your mind's eyes, and then all its apparent complications will vanish.

RANDOM NOTES.

TECHNICAL AND OTHERWISE.

An accumulation of dust on a valve holder or between the legs of a valve will often give rise to a high resistance and leakage, and cause intermittent "frying."

* * *

The creeping of the acid of an H.T. wet battery is often caused because the cells are placed in a damp container, by failure to see that the cells are perfectly dry before filling, or by allowing the liquid poured into the cells to splash.

* * *

When placing one L.F. transformer near to another, or near to an L.F. choke, remember that the position for minimum interaction is when the cores are at right angles.

* * *

Germany is to follow Britain's lead and is inaugurating a regional scheme by means of which the whole country will be covered by only three stations.

* * *

Pick-up enthusiasts should remember that a gramophone motor should not be wound up and left overnight, but should always be unwound when idle.

* * *

If a set fails to work after the service man has recently changed the L.T. battery, the probability is that the trouble is due to a dirty contact on this.

* * *

Never keep your batteries a long way from the set, as long leads between them are not only wasteful but are unnecessarily dangerous.

SAFE, SILENT, AND CERTAIN

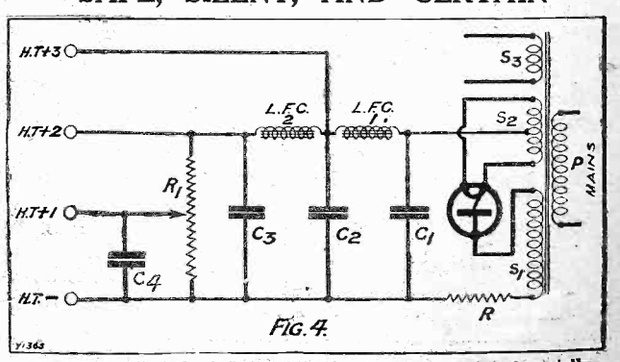
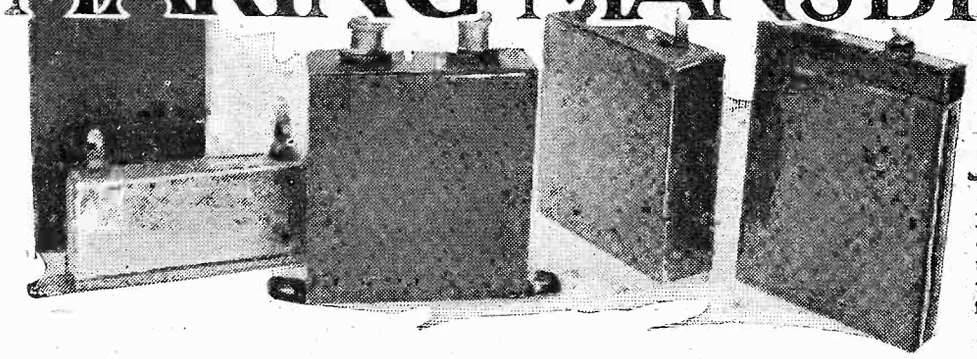


FIG. 4.

The full circuit of the A.C. "Safe-Power," one of a series of specially designed H.T. mains units produced by the "P.W." Research Dept.

MAKING MANSBRIDGES



BY

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

Have you ever examined the "innards" of a large fixed condenser? One of those 1- or 2-mfd. fellows? It's a wonderful sight, as you will realise from the fascinating description and illustrations below.

TO judge from external appearances only, there is hardly a more thoroughly uninteresting instrument in the whole galaxy of radio gear than the average Mansbridge condenser.

A small metal case of fairly standardised pattern, two terminals or connecting tags growing from the top of it, and sometimes a moulded base; that is all. Nevertheless, despite its far from thrilling appearance, the Mansbridge condenser embodies constructional features of the greatest interest.

REMOVING THE JACKET

The first glimpse inside a 1-mfd. condenser.

An ordinary fixed condenser, as you are aware, consists simply of alternate layers of tinfoil and waxed paper or mica. Now, one of the disadvantages of this type of condenser lies in the fact that it cannot be made in comparatively large capacities without unduly increasing the bulk of the instrument.

Hence the inception of the Mansbridge type of condenser, which was the invention, in 1900, of a Mr. G. F. Mansbridge, a Post Office engineer, and which, up to very recent times, was manufactured under licence by four firms only.

An Ingenious Scheme.

The Mansbridge condenser depends for its functioning upon the use of "metallised" paper. A roll of tough paper is taken and pure metallic tin is deposited on it by means of a special process. In this state, however, the thin layer of metallic tin is hardly conductive enough for any electrical use. The roll of metallised paper, therefore, is subjected to a calendering operation in which the paper is heavily pressed between rollers moving at different speeds.

The consequence of this treatment is that the metallic particles are more or less forced into the body of the paper, and are brought into permanent electrical contact with one another. So great is the pressure to which the paper is subjected that many of the metallic particles are forced right through to the other side of the roll.

Owing to this fact a further operation is necessary before the metallised paper becomes suitable for the manufacture of Mansbridge condensers.

In this latter process the particles of tin which have been forced through the paper by the calendering rollers, and which, of course, if they were allowed to remain, would render the paper conductable on both sides, are actually burnt away.

The metallised paper is passed through rollers across which is connected a high-voltage supply (about 2,000 volts), a bank of condensers being placed in parallel with the circuit.

Full of Holes.

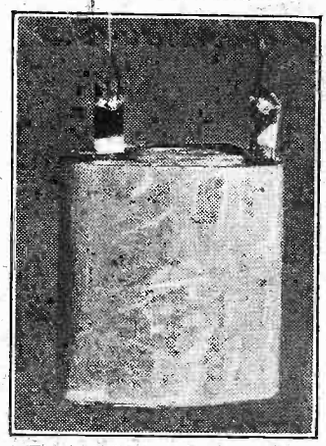
The result of this operation is that the particles of tin which protrude through the back of the paper are burnt away, thus leaving a roll of metallised paper which is conductable on one side only, and which is therefore suitable for Mansbridge construction.

If you happen to have handy a piece of this metallised paper taken from an old Mansbridge condenser, you can very readily see the results of this electrical burning process. Hold the paper up to a strong light and examine it through a powerful hand lens. The paper will be seen to be covered with innumerable pin-holes, and to be quite different in appearance from an ordinary strip of tinfoil when examined under the same conditions.

YARDS, AND YARDS, AND YARDS!

A small section of the gigantic strip of metallised paper used in Mansbridge condensers. There are many yards in a 2-mfd. condenser of this type.

BEFORE UNWINDING



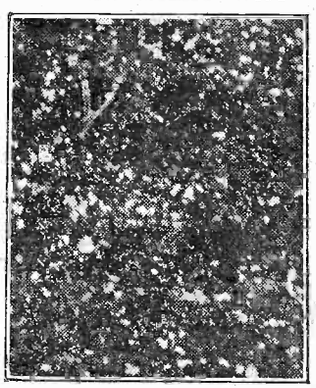
The metallised paper before unwrapping, as in the centre photograph.

Viewed under the microscope the effect is even more startling, the entire body of the paper being seen to be riddled with gaping holes of irregular size and pattern.

Strange as it may seem, the presence of these pin-holes in the metallised paper in no appreciable way affects the efficiency of the material for use in condensers.

The paper is cut up into suitable lengths for use in the construction of Mansbridge condensers.

NOT THE MILKY WAY—



—But a highly magnified photo of the pinholes in a Mansbridge condenser's paper. The light is seen through the holes, and the blurred effect is due to refraction by the pinholes.

Two lengths of the metallised paper are taken, together with two plain paper strips. The interleaved strips are then rolled up together—the necessary condenser connecting tags, of course, being slipped in at suitable places—the roll subjected to high pressure, embedded in wax, and finally placed in the now familiar Mansbridge casing. And there we are!

LATEST BROADCASTING NEWS.

THE GRAND OPERA MUDDLE.

THE CHRISTMAS SPIRIT AT SAVOY HILL—CHRISTMAS AT BELFAST—"THE LAD FRAE INVERSNECKY," etc.

THE situation about the subsidy to opera gets more and more intricate. It now emerges that the B.B.C. has agreed to go on for at least two years whether or not the Government is able to carry out its intention. In other words, the B.B.C. is committed to a possible expenditure of £50,000 in two years on opera alone.

As the B.B.C. has announced its considered view that opera for broadcasting is not worth a-penny more than £7,500 a year, there is a risk of the expenditure of £35,000 not represented in programme values. Members of Parliament who have been making difficulties for the Government on the subsidy are now turning their attention to the B.B.C. aspect.

The Christmas Spirit at Savoy Hill.

It appears that the general "atmosphere" at Savoy Hill is very much happier and healthier than it was a year ago. The intense rivalries, struggles, and intrigues of that troubled time have disappeared.

Harmony prevails among the higher grades, and is reflected by happier conditions generally. The only outstanding cause of friction is the talks, but even this will be allowed to stand over for the period of festivity and Christmas worship.

Christmas at Belfast.

Belfast has no intention of letting the festive season pass without putting on one of those bright feature entertainments for which the Ulster Station has now become famous.

It is called "The December Review," and is described by Alan Campbell, who has written and devised it, as a "Christmas Entertainment." Listeners will hear it on Tuesday, December 23rd. Philip Whiteway and Clifton Helliwell have composed and arranged the music, and listeners will be asked to imagine they are suddenly transplanted from the queue outside a theatre to the other side of the footlights.

It will be unusual to mix with the people one never meets in the ordinary way, the call boy, the dresser, and many others whose work, though not seen, is as important to the success of the show as the principals.

"The Lad frae Inversnecky."

Harry Gordon, the "Lad frae Inversnecky," whose broadcasts with his own Concert Party from Aberdeen were a delightful feature of the Scottish summer programmes, will be heard again by Glasgow and Aberdeen listeners, on Friday, December 26th, during an hour's relay of the pantomime "Mother Goose," from the King's Theatre, Edinburgh.

Also in the cast are Archie Glen, Nita Croft, and Betty Jumel. On the same evening a programme of Sea Shanties, arranged by Ian Whyte, will be sung in the Aberdeen Studio by Harry MacGillivray (baritone) and a male voice chorus.

Mr. Tyrone Guthrie in Canada.

For some time negotiations have been going on between the Canadian National Railways and certain officials at Savoy Hill with a view to the appointment of an official to take charge of radio play producing for the C.N.R. broadcasting system.

The post has now been accepted by Mr. Tyrone Guthrie, who, before he joined the productions staff at Savoy Hill some time ago, did excellent service at Belfast. He is the author of "Squirrel's Cage" and "The Flowers are not for you to Pick," two fine plays which have drawn considerable appreciation from listeners.

A Welsh Christmas Programme.

The wind howls, the thunder crashes and lightning splits the sky over a remote part of the Welsh countryside where the only shelter for miles is an apparently deserted mansion.

To a deserted mansion travellers come, one by one, to await the passing of the storm and soon the time is being spent in relating strange experiences.

It is just the right sort of thing for a Christmas programme, and is being transmitted by the West Regional Stations at 9.30 p.m. on Friday, December 26th.

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.

THE journey which Sir James Jeans took us in a rocket to the centre of the Sun where the temperature is several millions of degrees was very exciting. How either we or the rocket ever came back I don't know! I felt that I could do without a hot-water bottle in bed that night!

The Red Giants are stars which are big enough to contain a million suns inside them; and the White Dwarfs are stars on which a spadeful of "soil" weighs several tons. On the whole I'm glad I'm on the earth!

It is all very wonderful, and if you are missing any of these talks, well, you're missing something!

Good-looking Fellows.

In the B.B.C. Year Book, which has just been published, there is a record of the percentage of failure in the transmitting machinery. It works out to this: That for every 5,000 hours of your listening you are likely to get one hour of breakdown—and I suppose somebody will write to the papers and complain about that hour!

I like the photographs of the more renowned among the Broadcasters. What good-looking fellows they are!

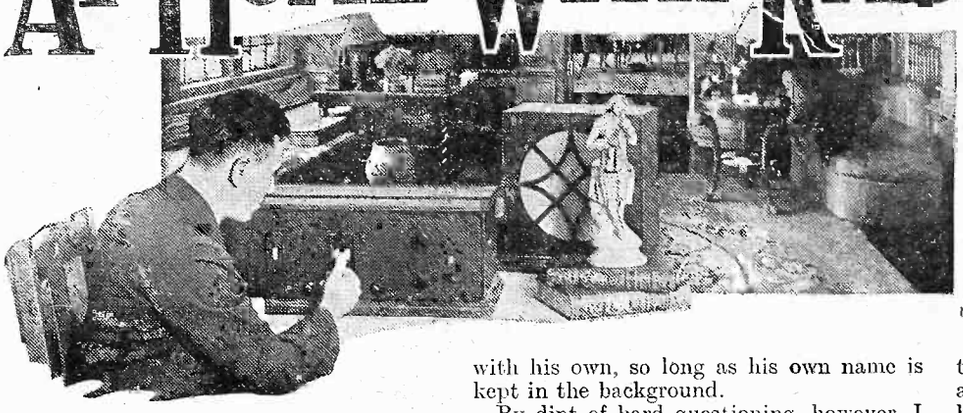
A Red-letter Night.

I suppose I am old-fashioned, but no music appeals to me quite so much as Beethoven, and I have rarely enjoyed a Symphony Concert so much as the one the other evening which was entirely devoted to his works.

"The Emperor" Concerto was a superb performance, which did the greatest possible credit to the conductor, Sir Landon Ronald, the orchestra, and Benno Moiseivitch, who was at the piano. It was sheer delight; all so high-spirited and splendid. A red-letter night for me.

(*Continued on page 746.*)

AT HOME WITH RADIO STARS



Our representative discovers some new and unexpected sidelights on a famous pianist whose radio recitals have achieved great popularity.

(6.) SOLOMON.

IMAGINE a broad-shouldered, dark-haired young man of medium height. Imagine a large pair of horn-rim spectacles, and behind them flashing eyes of quick intelligence. Imagine the young man dressed quietly and unobtrusively, a trim lounge suit, plain white collar and shirt, and a tie of tasteful harmony.

That is Solomon.

He has no use for the black sombrero, the Victorian cravat, or the flowing cloak of the traditional genius of music. He does not drawl continually of artistic temperaments, smoke endless chains of cigars, or turn pale at the blatant squeaking of a motor-horn. In fact, he is a human being with very human tastes and habits—and a genius for the piano.

Ease and Harmony.

I was welcomed with a smile and a hearty handshake. Solomon took my hat and coat, motioned me towards the lounge, and a second or two later was seated beside me on the divan.

My first impression was one of delightful ease and harmony. Solomon's lounge is decorated in blues, so well matched and so quietly ordered that it is impossible not to realise that here indeed is a home of one who understands the true meaning of taste. A Steinway grand occupies one side, and on the other there is a desk, a bookshelf, and, tucked away in a corner, a number of music files.

"Have you lived here long, Mr. Solomon?" I asked.

"About two years," he said. "And it suits me splendidly—for the simple reason that I can practise here as long as I choose without disturbing my neighbours. In a flat I previously occupied I sometimes received a telephone call as early as ten in the morning from a neighbour who demanded to know 'when the darn row is going to cease.' It was very unsettling for both of us, so I had to find a place where I should be more or less unrestricted."

A Child Prodigy.

"Tell me something of your career," I said.

Solomon thoughtfully polished his glasses.

"I am afraid you won't find it a very interesting story," he smiled. That, I thought, was a reply typical of Solomon.

There are a thousand and one subjects he likes to discuss, but Solomon is not one of them. He likes to absorb your own ideas on music, art, or literature, and compare them with his own, so long as his own name is kept in the background.

By dint of hard questioning, however, I drew from him a few brief facts of his life.

He is a Londoner—in fact, almost a Cockney. He started his music lessons at five, and when he was eight gave his first recital at Queen's Hall. He has played in Ireland, Scotland, Wales, America, and throughout the Continent.

Weakness for Flowers.

He did not think to tell me, however, that he is one of the few child prodigies who have fulfilled their early promise, or that many competent critics consider him one of the greatest English pianists of all time. He will forgive me, I hope, for supplying this deficiency to my readers.

Solomon has a great weakness for flowers. In his lounge I saw no fewer than half a dozen huge vases packed with flowers of every hue and description. Whenever he has an hour or two to spare he slips away to the country in his car and picks the flowers himself.

I asked Solomon his general views on broadcasting.

"Considering the very great task which confronts the B.B.C.," he said, "everything is splendidly managed. I think, however, that too much broadcasting is done. There are three main stations which supply continual programmes—with a few breaks, of course—from ten in the morning until midnight, to say nothing of the provincial stations.

"I believe that if each programme were two or three hours shorter, a higher average standard of entertainment would be gained. That is only a personal view, and you must take it as such."

"Then you don't care for dance music?"

"Certainly I do, but I must have it in small doses. I find it all so much alike that after a quarter of an hour or so I am glad to listen to something else."

Solomon has no special leaning towards any one of the great classical masters. There are times when his mood suits him to a Beethoven sonata, and he has no thought for the others. Anon he inclines to a Chopin nocturne or a fugue or concerto by another. Music to him is largely a matter of moods.

Real Sportsman.

His taste in literature is entirely cosmopolitan. He reads advanced works printed in French. He enjoys the works of the popular novelists, and, like another genius of our age—Sir Oliver Lodge—simply revels in the pure, unsophisticated humour of P. G. Wodehouse.

It was something of a shock to hear Solomon give an expert opinion on a big fight that was pending at the Albert Hall. I mentioned two contests that I had seen some five years ago. Solomon remembered them perfectly for he, too, had been a spectator.

He told me how he had endeavoured to see the Final Test Match at the Oval, but found the gates shut. So he jumped in a taxi and went straight off to Lord's. He gave me a very sound reason for the decline of the Middlesex side, and went on to sing the praises of Bobby Jones, who has collared the four great golf championships of the world in a single season.

Solomon told me of the many occasions he had seen the Wimbledon Tennis Championships, and that he sometimes managed to snatch a game himself.

From all of which you may gather that he is something more than a great pianist. He s a great sportsman, too.

A GREAT SPORTSMAN

Solomon devotes much of his time to music—but, as our representative found during his visit, he has many other interests.

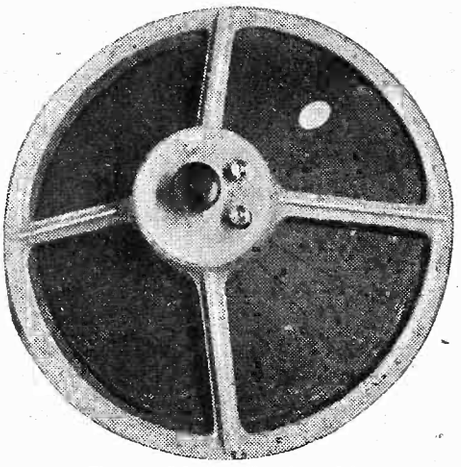
FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

A CELESTION CHASSIS.

I HAVE now had an opportunity of examining the Celestion D.20 chassis, the first chassis loud speaker ever made available to the public by Celestions. The price of this instrument is three guineas—a very moderate price, in view of its sturdy, scientific construction.

It never has been the policy of Celestion, Ltd., merely to fasten *a* unit to *a* cone and then encase the whole in a cabinet and call it a loud speaker. Right from the very beginning they have obviously realised the necessity for "sympathetic" assembly.



The new Celestion Chassis model.

You have very good evidence of this in the new chassis model. It is clear that the framework, the mounting and the special cone construction have all been designed as parts of a whole, and not as individual items.

The result is that this chassis is first rate. It is very sensitive and will respond as excellently to the output of a small two-valver as to the output of a more ambitious outfit. Its freedom from peaks and the even balance between the high and low frequencies prove that Celestions are maintaining their very high standard.

NEW OSRAM VALVES.

Unless you have actually used them, it is hard to realise how superior A.C. valves are to the battery-operated types. It is no exaggeration to say that the A.C. valve is in comparison staggering in its effectiveness.

And properly constructed, a Det.-L.F. A.C. set will give results almost equal to the best of battery-operated three-valvers. Unfortunately, we have not all got A.C. mains!

However, those who have will be greatly interested in three Osram mains valves, the characteristics of which have recently been improved.

These are the M.H.L.4, the M.H.4, and the M.L.4. They are all 4-volters taking 1 ampere filament current. The M.H.4 is a high-magnification valve suitable for detector, certain H.F., and L.F. positions. It has an impedance of 16,000 ohms, but its amplification factor is 35, thus you see it has a mutual inductance of over 2, which is astonishing for a valve of such a type.

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.

The best equivalent battery-operated valves generally have mutual conductances of ·5 or thereabouts.

The M.H.L.4 has an impedance of 8,000 ohms, and an amplification factor of 20, so this achieves a mutual conductance of 2·5. This M.H.L.4 is a valve suitable for detector and L.F. positions.

The M.L.4 is a power valve with an impedance of 3,000 ohms and a magnification factor of 9 (mutual conductance 3).

All three of these new Osram valves are designed for a maximum H.T. of 200 volts, so that they come well within the scope of the "medium power" man. They are most effective valves, and the results they give are, of course, up to the usual Osram standard. I have seen similar Osram valves in the process of making, so that I do not find it surprising!

EVERYTHING FOR WIRELESS.

This is the appropriate title of the 1930–31 catalogue issued by Will Day, Ltd., In over 104 pages, all kinds of radio products due to all the leading makers are listed.

POLAR CONDENSERS.

Wingrove & Rogers, Ltd., have now prepared for distribution a leaflet giving full details of their fine range of Polar condensers.

MAINS UNIT LEADS.

The usual twin flex, especially that of the cheaper kind, is not suitable for mains unit wiring. It is seldom particularly robust and I, personally, would hesitate to use it as a direct extension of a power point.

A very strong and quite safe material is that known as "high tension cable," but this, on the other hand, is bulky, clumsy stuff, awkward to handle and far from being neat in appearance.

Realising this, those enterprising northerners, Ward & Goldstone, Ltd., have produced a special "shock-proof" flexible cord, which admirably fills the breach.

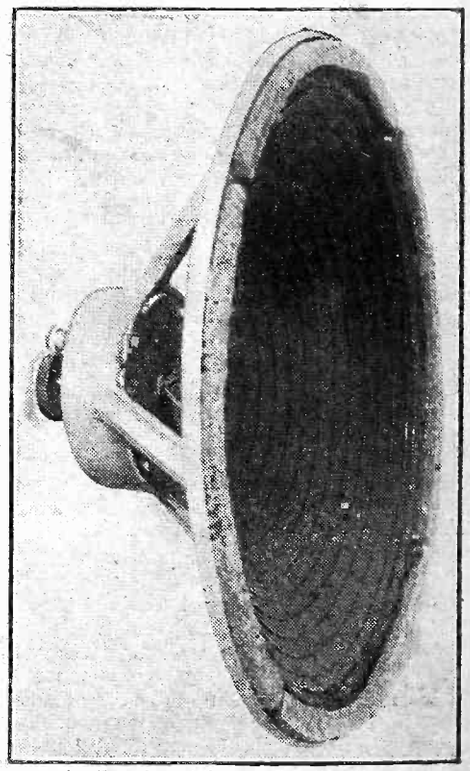
It comprises two leads, each consisting of 23 strands of 36-gauge wire encased in solid rubber. The whole makes a neat, easily-wired flexible of a most dependable nature and minus that fabric covering that so easily seems to fray and look untidy.

Another new Ward & Goldstone line is a "shock-proof" adapter—a very useful device. Fixed to the end of a mains unit connecting lead, it enables such an instrument to be plugged into either a lamp holder or a wall socket.

The adapter is in two sections, the one being a bayonet-type fitment, the other a two-pin plug; and it is to this latter that the lead is joined. There are two sockets in the bayonet portion into which the plug can be inserted. The two sections are linked by a strong silken cord so that they cannot be separated. The price is 1s. 6d.

ANOTHER FERRANTI H.T. UNIT.

Ferranti, Ltd., have issued a new constructional chart dealing with the building of an H.T. supply unit suitable for use with any receiver of good design employing up to five-valve stages. The maximum output of the unit is 50 milliamps at 200 volts. Ferranti, Ltd., will send a copy of this chart free on request to anyone interested.



Another view of the new Celestion Chassis.

PURE LISSEN CURRENT FROM YOUR MAINS!

You cannot get purer current for radio than the pure D.C. current of a Lissen Battery—BUT IF YOU WANT TO USE AN ELIMINATOR USE A LISSEN ELIMINATOR.

Because no current from any eliminator is smoother or more silent than the current from a Lissen eliminator. No eliminator output is more constant, none is so free from hum.

Lissen have made eliminators safe—notice that the neat moulded cases of these Lissen Eliminators are made entirely of insulating material—see also the thickly insulated "cab. tyre flex" that Lissen have used.

Lissen too have made it easy for you to choose the right eliminator—there are only four models and they satisfy the requirements of 90% of listeners. In producing these eliminators Lissen have compared their current with the purest form of current known, namely the Lissen Battery, and have got as near to that standard as it is humanly possible to do.

If you are buying an eliminator, be sure to see a Lissen Eliminator. Your Dealer will be pleased to show you one that will suit you.

TYPES AND PRICES.

D.C. MODEL "A"
(100-150 volts and 200-250 volts).

Employs 3 H.T.+ tappings: H.T.+1 giving 80 volts for S.G. valves; H.T. +2 giving 60 volts at approx. 2 mA. for detector valves; H.T.+3 giving *120/150 volts at 20 mA. Price **27/6**

D.C. MODEL "B"
(100-150 volts and 200-250 volts).

Employs 3 H.T.+ tappings: H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to *120/150 volts at approx. 2 mA.; H.T.+3 giving *120/150 volts at 20 mA. for power valves. Price **39/6**

*(The output voltages given from D.C. models operating from 100/150 volt mains are approximately 75 per cent. of those quoted.)

A.C. MODEL "A"
Tappings as in D.C. Model "A"
(100-125 volts and 200-250 volts). Price **£3:0:0**

A.C. MODEL "B"
Tappings as in D.C. Model "B"
(100-125 volts and 200-250 volts). Price **£3:15:0**

LISSEN ELIMINATORS

LISSEN LTD., Worple Rd., Isleworth, Middlesex.

CAPT. ECKERSLEY'S QUERY CORNER

"CLOUDY" VALVES—THE COST OF A POWER VALVE—H.F ON SHORT WAVES—MAINS DRIVE OR "PERMANENT"—SHARING THE SUPPLY—IS IT REALLY SAFE?

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.

"Cloudy" Valves.

G. C. (Southport).—"The valves in my receiver have the familiar internal bright coating of, I believe, magnesium, but I have noticed that, towards the bases of some of them, where the glass is normally clear, a grey clouding of the glass is becoming apparent.

"Is this circumstance normal, or does it indicate partial failure of the valve to maintain its initial good characteristics?"

I fear I am not knowledgeable on this point. But the proof of the pudding is in the eating, and I expect you can soon prove whether the valve is in fact behaving properly, either by borrowing a similar valve and comparing, or by doing an emission test, because emission failure would be the only trouble, surely?

* * *

The Cost of a Power Valve.

H. St. J. (Liverpool).—"Why should a power valve cost more money to purchase than a valve of medium or high impedance? I take it that the retail price of a valve affords indication of its relative production cost, and yet casual examination seems to me to reveal that a power valve is much more robustly constructed and that the assembly of the electrodes would require less care than in the case, for instance, of a valve of 30,000-ohms impedance.

"Of course, I realise that my inexpert opinion cannot be reliable, but I should like to know what difficulties in manufacture are peculiar to the power valve."

I am not expert in this matter. True, the construction of a power valve is more robust but on a mass production job this does not count for much.

A power valve has to use more material, and quite likely has to be pumped harder. Lastly, is it not true to say that there is a less quantity production of power valves, and that therefore they could not be economically mass produced?

This always puts up costs, and I am inclined to believe this is the chief reason that they are more expensive.

* * *

H.F. on Short Waves.

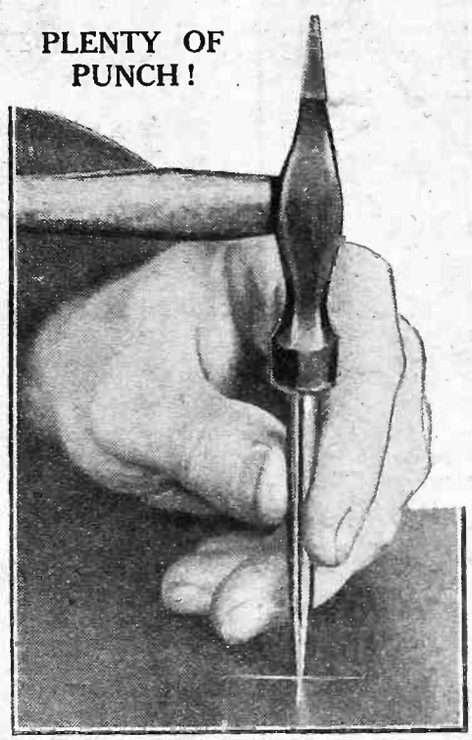
H. A. L. (Charlton).—"I want to build a very efficient short-wave receiver, and I notice that most of the published designs are of the Det. and L.F. variety.

"I would like, if possible, to use two H.F. stages, but my friends tell me that this cannot be done, because on the ultra-short waves an ordinary H.F. stage becomes very inefficient, and does not magnify at all. Will you please tell me whether this information is correct?"

I am perplexed enough to build a sensible, stable, calculable, easily handled 2 H.F. set for frequencies of 1,000 kilocycles. I shudder at the thought of 15,000 kilocycles!

No! Leave it alone. You can't get anything out of it if you try. The best way for simplicity is, as your friends advise, Det. and 2 notes.

PLENTY OF PUNCH!



If you want a hole accurately in position it must be punched, or the drill will wander. If you haven't a proper centre punch, a nail will do quite as well; so there's no excuse for incorrect position.

But if you are ambitious, design a superhererodyne using 2 H.F. in the intermediate. That ought to be sensitive, although I should hate to pick up more of short-wave distortion than I do!

* * *

Mains Drive or "Permanent"?

J. W. H. (Yarmouth).—"I am thinking of purchasing a moving-coil loud speaker of the permanent-magnet type, but I noticed at the Radio Exhibition that the manufacturers of such speakers claimed no more than 9,000 lines per square centimetre as the flux density of their magnets. This is considerably below similar data furnished by makers of the mains energised types.

"I appreciate that the permanent-magnet type of loud speaker must, therefore, be less sensitive than its current-operated counterpart, but I am uncertain if it also sacrifices any of the good frequency characteristics possessed by the current-driven speaker.

"Could you, therefore, tell me if the permanent-magnet type of loud speaker is capable of such good reproduction as the mains- or accumulator-driven type?"

It's simply a question of convenience. The quality, other things being equal, is the same with a mains-energised as with a permanent-magnet type. Some people prefer to eliminate the necessity for separate magnetisation power and find the permanent-magnet type a convenience well worth the slight loss of sensitivity.

* * *

Sharing the Supply.

B. W. G. (Dundee).—"I have in use a three-valve receiver (Det. and 2 L.F). After purchasing a super-power valve, I find that the H.T. eliminator in use is not capable of supplying the necessary current for all three valves.

"The output, however, is sufficient for the last valve only. Would it be satisfactory to obtain a second eliminator to feed the first and second valves, and use the original eliminator for the last valve only?"

Yes, certainly. Or a high-tension battery, for that matter, if you think it a bit extravagant with two eliminators.

Or if cost does not worry you, why not a redesign of the whole eliminator? But anyhow, that's not my business. A second eliminator is, of course, a perfectly feasible solution.

* * *

Is It Really Safe?

L. D. R. (Highgate).—"I am thinking of obtaining in the near future a set operated entirely from the A.C. mains. Before doing so, can I have your assurance that providing the set is of high quality and the makers' instructions are followed, there is no danger of damage being caused either to self or the mains?"

You need fear nothing. If the maker is reputable, and if you follow his instructions, there can be no danger whatsoever.

Indeed, a metal standard lamp is often more dangerous than a wireless set.

WIRING YOUR SET

By G. P. KENDALL, B.Sc.

You can take liberties with the wiring of "P.W." sets, because, as Mr. Kendall explains, they are so designed that they achieve their high degrees of efficiency without being critical in construction.

HOW fashions do change in the radio world! Only a little while ago every technical writer was urging the constructor to take all possible pains to make a perfect copy of the wiring of the original design from which he was working, to take no liberties anywhere, and so on.

And now what do you see? Nothing less than an article from your humble servant, deliberately inciting you to take liberties, and telling you how to do it without risk of regrettable consequences!

That is just what I am about to do, and I will tell you why: it seems that all the terrifying warnings which have been hurled at the poor home constructor have so filled him with forebodings that there is a general impression abroad that a wireless receiver is really a very tricky thing to make.

Set Construction is Really Easy.

It is only natural that such an impression should have got about, and I have seen unmistakable signs that it is quite widespread. It is no uncommon thing to come across a constructor who has built one set, got satisfactory results, and then been afraid to make a later and better one for fear he might not be as successful the second time.

All the fuss about "copying the run of the wires" has made him think that a set will only work properly if the connecting wires between the various components are arranged in one particular way. Quite reasonably, he concludes that he may not be lucky enough to puzzle out just how they run from the photos, and then there may be trouble, or so he thinks, and who can blame him?

Pardon me if I lapse into plain, homespun colloquialism, but the only (printable) expression I know which conveys my opinion of that idea is this: it's all my eye!

Critical Designs Barred.

If it were true it would mean that all our set designs were mighty bad ones! The designer who turned out sets which were as critical as all that would have just cause to be heartily ashamed of himself, and believe me he wouldn't have an earthly of doing it for long in the "P.W." Research Department!

It may have been true to some extent of the earlier receivers with the more primitive systems of H.F. amplification, but that is just another way of saying that they were really not good sets, or not so good as modern ones, at any rate.

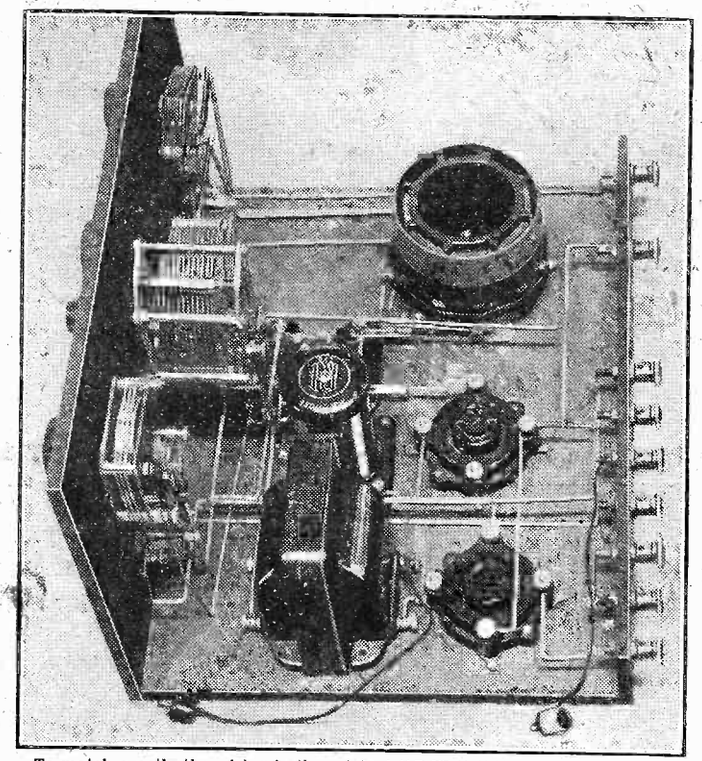
Suppose that there is a risk of harmful interaction somewhere in a modern design, what do we do about it? Do we laboriously seek out the only run for the wires which will prevent it, and then try to frighten the constructor into copying it closely?

We do not: in goes some simple screening, and that is the end of that! We have a perfectly "safe" receiver thereby, and one which can be made up with the wiring run in all sorts of different ways so long as the right points are joined, and a bit of common sense is exercised, with practically identical results.

The real fact of the matter is that in a modern design you have quite a lot of latitude in wiring, and there is no cause for alarm at all. Of course, it is a good idea to copy the original wiring, because it was done by a skilled worker, and you can be sure that it was carried out in one of the various good ways.

If, however, you can see another way of joining up the same points which also gives direct leads, by all means use it. It is sure to be just as good in the vast majority of circuits. (If we ever find, in some very special set, that certain wires are best run in a particular way we say so, but it hardly ever occurs.)

A VERY RECENT EXAMPLE



To match exactly the wiring in the original "P.W." "New-Coil" Two you would have to solder some of the leads. But you lose nothing if you make the minor alterations of wires necessary for a "no-soldering" hook-up.

Simply Follow the Layout.

You can quite safely take it for granted that any normal "P.W." set can be wired up in all sorts of different ways, and work properly every time. You see, we arrange the layout of the parts so that all the different methods of joining up the correct points are good methods.

It's not difficult in the light of modern knowledge, and it is just one of the things which we do to make "P.W." designs safe to follow.

What it means is that if you lay your parts out carefully in the positions shown on the wiring diagram there is no need to worry about the exact method of wiring up the various points. So long as the right ones are joined and you use your common sense to avoid any needlessly long or wandering leads, all will be well.

So fully do we believe in this feature of our sets that the draughtsmen who prepare the wiring diagrams are allowed to use a little discretion in showing the run of the wires in the clearest possible way. You will sometimes see, in consequence, that certain leads may be placed a little differently in the diagram from the arrangement visible in the photos of the set

Soldering Not Necessary.

Do you realise that a further consequence of this feature of "P.W." designs is that they can be wired up without any soldering? If it is merely a matter of seeing that the right points get connected together, you can obviously run all your wires between terminals on the various parts themselves, and avoid all "T" joints in the wiring.

Suppose you have three points, A, B, and C, which are to be wired together. If you can solder it may look neatest to join B to C and solder the end of a lead from A to a point midway along the B–C wire. If you don't want to solder, you can just as well connect A straight to B or C, whichever is the nearest. If the set has been properly designed there will be no difference in efficiency.

For example, look at the photo on this page, and observe the wire coming away from the second terminal on the strip, counting down from the top. Midway along a wire is soldered to it in a "T" joint, and it ends in another "T" into a lead between a valve holder and the terminal strip.

Both those soldered joints could have been omitted. They are only there because the wire-man was seeking for neatness of appearance, and not for any reason connected with efficiency.

Now do you begin to get the idea? If you find a series of points in a wiring diagram which are so connected up that you can get from any one to any other by passing only along wires and never *through* components, you can join them in any order.

If the layout of the design has been properly done the result will be good wiring, however you do it, subject to the exercise of just a little discretion on your part.

That would have sounded like high treason a few years ago, but times change!

The New Marconi LP2 Masterpiece!

A HIGH AMPLIFICATION POWER VALVE—

AMPLIFICATION FACTOR 15!

NOTE THESE FIGURES

Filament Volts– – 2.0
Filament Amps – 0.2
Amplification factor 15
Impedance – 3,900 ohms
Mutual conductance 3.85 MA/volt.
Anode Volts – 150 (max.)

APPROX. OPERATING DATA

Anode volts – – – 125
Grid bias – – – – – 4½
Anode current – – 6 M.A.

STUDY THESE CONVINCING FACTS

1. A power valve with an amplification factor of 15—a hitherto unheard of figure.
2. Mutual conductance 3.85 milli-amps per volt—the highest valve efficiency yet achieved irrespective of type.
3. Stage gain thus comparable under working conditions to that given by a pentode.
4. Impedance only 3,900 ohms—a figure perfectly matching the average speaker.
5. Provides reproduction of exceptional quality without the sacrifice of volume from distant stations.
6. It is the supreme output valve for portable and most battery operated sets.
7. Strictly economical in current consumption—H.T. current only 5–6 milli-amps under normal conditions.

10/6

And here are particulars of the NEW P.2. WITH OUTSTANDING CHARACTERISTICS.

1. A genuine super power valve with an amplification factor of 7.5—a figure previously considered impossible!
2. Combining the stage gain of the average SMALL power valve with an output which is adequate for a moving coil speaker.
3. Mutual conductance 3.5 milli-amps per volt.
4. Impedance only 2,150 ohms, ensuring reproduction of ample volume and perfect quality.
5. Ideal for the moving coil enthusiast who requires 6 volt results from 2 volt equipment.
6. Minimum current consumption compatible with highest efficiency—a most important point to the listener with battery equipment.

NOTE THESE FIGURES.

Filament volts – – – – – – – 2.0
Filament amps. – – – – – – 0.2
Amplification factor – – – – – 7.5
Impedance – – – – – 2,150 Ohms
Mutual conductance – – 3.5 MA/volt.
Anode volts – – – – – 150 (max.)

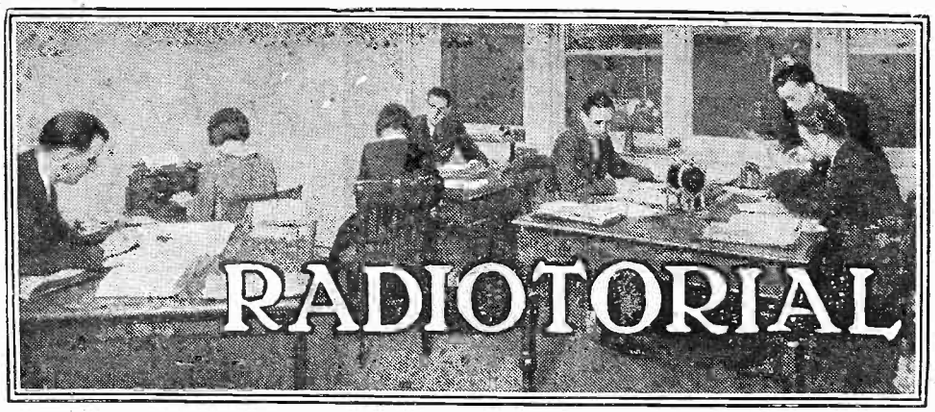
APPROX. OPERATING DATA:–

Anode volts – – – – – – – 125
Grid Bias – – – – – – – – –9
Anode current – – – – 12.5 M.A.

PRICE 13/6

G. Marconi

USE THE VALVES THE EXPERTS USE!



All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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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

CHECKING FOR H.T. LEAKAGE.

H. G. (Parsons Green, S.W.).—"Recently I put a milliammeter on the panel, and arranged plugs to insert it in the last valve's plate circuit, or in negative H.T. to check total current flowing.

"I notice that when in the latter position it reads 17 m/a. when the set is switched on, which is about right for H.F. detector and 2 L.F. according to valve-makers' slips. But even when the set is off there is a very small indication on the needle—about one-third milliamp, or less—unless the H.T. — plug is taken out of the mains unit.

"Is this anything to worry about, or can I take it that if reception remains good when in use, and I move the plug H.T. when switching off, a small leak doesn't matter?"

We should certainly not be inclined to leave the leak in peace, merely cutting it off when the set is out of action; you have all the necessary means of tracing it in a few minutes, and it would be far more satisfactory to do so.

One reason against leaving it is that it may get a lot worse, suddenly, and do no end of damage. Also, you may forget to remove the H.T. — lead, and it is not desirable that leakage may occur for hours on end, for obvious reasons.

A simple way of finding the leaky spot is to connect the milliammeter in turn in the different H.T. + leads, to discover the one in which it fails to go right "off" when the set is switched off.

When the leaking lead is found, test the effect of removing by-pass condensers, etc., in that part of the circuit until the erring component is found.

For instance, you may find that the m/a. goes right off when in the detector lead and in the power lead, but stays on slightly even when the set is off, if connected in the H.T. lead that supplies the S.G. plate and the first L.F. valve.

In such a case see if the needle still reads when the L.F. transformer primary is disconnected.

Yes? Then the leak is in the remaining part of the circuit.

(*Continued on page 740.*)

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.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 738.)

First undo the plate terminal of the S.G. valve, and then "work back" to coil, choke, etc., towards the meter, until you find a disconnection that will stop the leak.

You can't miss the fault with a meter showing it up in this way, and in your shoes we should certainly not rest until we had replaced the dud component or connection. You won't be very long finding it if you go systematically to work.

A VERY SELECTIVE THREE.

"Wozzo" (Caterham, Surrey).—"Reception here on the 'Magic' Three is simply 'silky,' but in January we are moving to Hatfield, just near Brookmans Park. And I don't want to give up my roaming round the Continent, so I am looking for a real 'humdinger' in the selectivity line.

"It's got to be a 'Three,' because I have proved a 'Four' is unnecessarily expensive. And the annoying part is that a chap I met casually at a dinner told me of the very set, but like a fool I didn't write it down, and now I can't trace it (nor him!).

"He lived out St. Albans way, he said, and had just made up this 'Star' Three from a blue print (I think it was a 'Star' Three or an 'International Star' Three—something like that). He said it was a real razor, and he certainly knew all the Continental stations like a book, so it can be done with a three-valver even at short distances from London's Twins.

"Can you tell me where I can get a blue print of a set of that name, or put me on to a real super in the selectivity line, capable of bringing in plenty of foreigners even with a twin Regional only three or four miles away."

Your elusive acquaintance was probably referring to the "Interstar" Three, which was specially designed to give exceptionally high selectivity. (It incorporates one S.G. H.F. stage, with the famous "Star Turn" tuning arrangement.)

Full details of this set will be found on the "M.W." Blue Print No. 13. (This is one of eight blue prints given away with the November "Modern Wireless.")

ROME ON THE SHORT WAVES.

"Mussolini" (Near High Wycombe.)—"What has happened to Rome, which used to be receivable at great strength on just over 25 metres?"

Since about the beginning of November the Rome short-wave transmissions have been sent out on the 80-metre wave-length instead of the 25·4 wave-length, the station authorities having decided after tests that the 80-metre wave-length gave the most favourable service conditions.

TECHNICAL TWISTERS

No. 40. Charging an L.T. Battery

CAN YOU FILL IN THE MISSING LETTERS?

The re-charging of a battery should always be done at the rate specified by the . . . . .

One good sign that a battery is properly charged is that each cell then . . . . . freely.

Another sign of proper charging is that the . . . . . fails to rise over several hours.

The vents in the plugs must never be allowed to become stopped up, because there is then no escape for the . . . given off during charging, and the battery may . . . . .

Last week's missing words (in order) were: Cools. Copper. Flux. Flux. Flux.

IRELAND'S NEW STATION.

"Pat" (Maryborough, Queen's County).—"The papers are saying the new Irish high-power station is to be erected near Athlone. Will I be able to work a loud speaker from a crystal set?"

It's doubtful, "Pat," but there is certainly a chance for you.

Generally a crystal set will **not** work a loud speaker because the latter requires a great deal of power to drive it, and this must normally be obtained from batteries, valves, etc., in the form of a more or less powerful valve set.

Nevertheless, in districts quite close to a high-power broadcasting station, and at ranges of say up to five miles, it is quite usual to find that lucky listeners living, as it were, "under the aerial" are able to work a small loud speaker because of their proximity to this high-power station.

So far as we know, the exact site of the Irish high-power station has not been settled, but as you are situated near the geographical centre of Ireland, it is quite possible that it will be in your vicinity, in which case you may be able to work a loud speaker without a valve set. But if the station goes up over five miles away, you will in all probability find that although reception is very powerful on a crystal it is really not quite powerful enough to work a loud speaker nicely.

GLASGOW'S POWER.

"Puzzled" (N. B.).—"I see that the power of the Glasgow station 5 S C has been increased and is now given as 1·2 kw., but I still get the programmes on exactly the same setting of my condenser. Is that O.K.? No louder."

The power employed has nothing to do with wave-length, and it is only an alteration in wave-length that would affect your tuning adjustment.

(*Continued on page* 742.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 740.)

As a matter of fact even the power has not been altered, but is the same as it was previously, the only alteration being that a new method of reckoning power is now employed by the B.B.C. This gives all the B.B.C. stations higher figures than were previously used to indicate the power of these stations.

Actually there has been no alteration to Glasgow at all, either in wave-length or in power, so it is quite right that you should still be receiving the programme at the same setting on your receiver and at the same strength as formerly.

TWO-VALVE BLUE PRINTS.

R. W. L. (Wheatley, Oxon.).—"I want a blue print to build a two-valver. What kind of circuit can I get in blue-print form from 'P.W.'? I want the full constructional details, list of parts, etc."

The following is a list of the two-valve blue prints now available. Each contains a wiring diagram showing back of panel, and baseboard, a theoretical circuit, and also a list of the components necessary, with operating hints, etc. The price is 6d. per blue print, but a stamped, self-addressed envelope must be enclosed with the application.

"P.W." B. P. No. 34. An H.F. and Detector Two-Valver Tuned Transformer, Neutralised. A simple receiver for long-distance headphone work.

"P.W." B. P. No. 38. A Two-Valve L.F. Amplifier. A two-valve L.F. amplifier with one resistance and one transformer-coupled stage.

"P.W." B. P. No. 53. The "Regional" Two. A simple but highly-efficient little set (Det. and L.F.), especially designed for the Regional scheme, incorporating a form of the "P.W." Brookmans Rejector.

"M.W." B. P. No. 4. The "Titan" Two. A very simple and straightforward little "Det.-L.F." two-valver with wave-change switching based upon the use of a "Titan" dual-range coil unit.

"M.W." B. P. No. 5. The "Full Tone" Two-Stage Amplifier. A very powerful two-stage L.F. amplifier using transformer-coupling in both stages. A standard type of anti-battery-coupling filter is provided in the input circuit, and this, together with the output filter for the loud speaker, makes the amplifier very stable.

THE CHRISTMAS CRACKLE!

R. W. T. (Beckenham).—"Help, help! S.O.S.—S.O.S.! I am sinking under the strain! Help! S.O.S.! My 'Maxi-power' Four, which was the pride of my life, has developed a continuous crackle, crackle, crackle, and it will *ruin* my Christmas unless you can tell me how to stop it.

"For half an hour or so the programme goes perfectly, and then I get a sort of G-r-r-r-r-r-r-r-r, followed by two or three grunts and a crackle. After that I may go for half an hour without anything else happening, or I may be irritated beyond measure by repetition after repetition of this mysterious noise.

"I spent over a week looking for it, and I can stand it no longer. So if you want me to feel peace on earth, good-will to all men, tell me how I can stop this noise.

"I suppose I have asked for it partly, because I have used a lot of components from my previous set, but the S.G. valve is a new one, so are the switches, and so is the differential reaction condenser, as well as an odd fixed condenser or two, and a couple of the coils (long-wave).

"Most of the other stuff I have used before, and I have never been troubled with a crackle from it. The funny thing is that the 'Maxi-power' Four was the best set I have ever put up, and it is because I am particularly anxious not to take it down that I want your help.

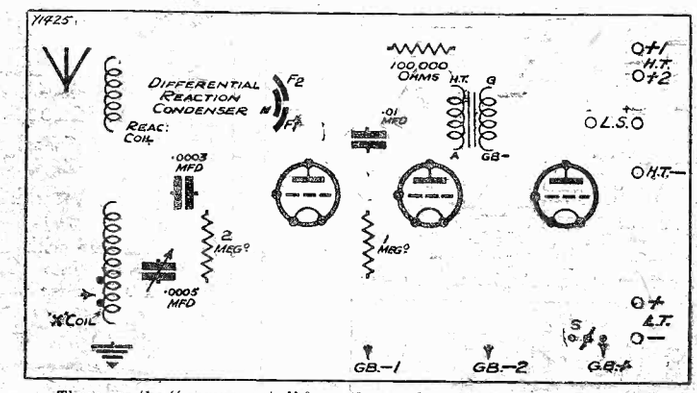
"What hampers me in finding this crackle is the fact that it is not continuous, but comes and goes, so when I change a resistance and find it is cleared up, I then go happily on thinking it cured until it starts all over again. Several of my friends who know a thing or two about radio have had a go at it, but none of us can put his finger on the spot or suggest a method of finding exactly where it is.

"We have tested through with 'phones and dry cell, and substituted what we could

(Continued on page 744.)

POPULAR "WIRELETS" No. 26

A STRAIGHT THREE-VALVER.



These are the "components" for a three-valve set comprising Detector and two L.F. Amplifiers (one resistance-capacity and one transformer stage). Plug-in coils—one ordinary and one X-type—are used, and differential reaction. Can you "wire-up" this circuit?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 742.)

for other components, but it did not cure the crackle.

"For instance, one man lent me his power valve and we tried the whole evening with that, and thought we had actually found the cause of the trouble, when a quarter of an hour before London closed down the crackle started again with *his* valve in! I have also tried an old transformer which I have by me, and it happened when that was in use!

"And another thing I notice is that the crackle is there even when I turn the filament rheostat of the S.G. valve right off. That cuts out the broadcasting, but it does not cut out the crackle.

"Can you tell me how, without buying testers, I can put my hand on the cause of the trouble, or otherwise I shall go mad."

It is certainly not going to be easy with a crackle that only comes and goes like this one, and we are afraid you are in for a long tiring search. However, this is the way to set about it, and we have no doubt that if you follow this plan you will trace the crackle before the holidays, and thus ensure yourself a Happy Christmas.

We already have something to go on, and that is that the power valve, the L.F. transformer and the S.G. valve circuit have nothing to do with it. So you had better have a whip-round among your pals and try and borrow as many of the other components as possible to substitute for those in your set while you are trying it out.

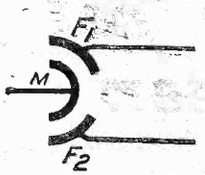
Try a new anode resistance, for instance, different H.F. choke, new grid leak, and, if possible, a new grid-bias battery, while if you can obtain a new L.T. and H.T. battery, so much the better.

The first thing to do is again to *look* carefully all over the set and make sure there are no bad connections, such as loose coils, half broken flex leads, dud pigtail connections to variable condenser, etc. If you can see nothing of this kind wrong at all, then connect up your new components in place of the old ones, and first of all switch on the set with the S.G. and all valves going so that you can ascertain if these are up to standard.

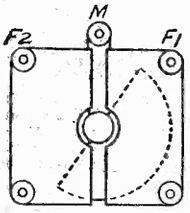
"INSIDE" INFORMATION.

No. 10.

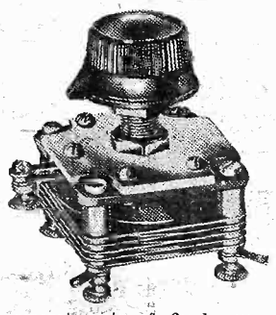
THE DIFFERENTIAL CONDENSER



This is the sign you see in the theoretical circuit diagram.



On the wiring diagram this, or some similar representation of a differential condenser will be found. (Usually the makers do not mark the terminals F_1 etc.)



Two separate sets of fixed vanes (here marked F_2 and F_1) are arranged so that moving vanes can interleave with either set, or partially interleave with both. (See the dotted moving vanes in centre picture.) The theoretical sign for a differential condenser (top) clearly illustrates this action.

"P.W." DIAGRAPHS.

If it misbehaves as formerly on both long and ordinary waves, equip yourself with a sheet of paper and a pencil and look for the crackle. As soon as you hear it make a note of how the circuit is arranged, such as "all four valves, on long waves," etc.

As we are reasonably sure from what you say about turning off the S.G. valve that it cannot be in this (H.F.) circuit, you should then, without altering any of the other tuning adjustments, etc., or switches, disconnect the H.T. + 1 from the battery, disconnect the S.G. valve, and remove it altogether from the set. Take off aerial and earth also then switch on again and listen to the loud speaker.

There will be no sign of broadcasting, of course, but you should be able to detect the slightest appearance of the crackle when it comes along. As you have already done everything you know in the way of testing joints, etc., we should not attempt to touch the set any more, but simply sit down and read a book or something and note whether the set will continue to crackle without its S.G. valve and all that associated circuit.

If it does so you must thin down the circuit still further. Having taken the first valve off, the next thing to do is to work from the other end, and cut the whole of the loud speaker and power stage out of action.

In other words disconnect the primary of the low-frequency transformer from "P" and H.T. + 2, and join a pair of 'phones across the two leads, and then listen-in on 'phones (if you have no 'phones, and cannot borrow a pair, try and borrow a *different* loud speaker).

The object is to refrain from using the same part over again, but to use *different* ones (as if your loud speaker were faulty it would show up as a crackle whatever improvements were made to the rest of the circuit).

At this stage you will be listening in to a detector valve without aerial and earth connected to an R.C.-coupled stage of L.F. There will be nothing else in circuit, so if the crackle continues you know it is one of the components now in use, and these consist only of the detector valve with its grid, plate, and reaction circuits, the L.F. valve with its resistance coupling in front of it, and the 1½-volts grid bias and H.T. feed.

Should the crackle disappear with this arrangement you can locate the faulty component by joining up again, listening-in with your 'phones or loud speaker in the plate circuit of the power valve, and changing over the transformer or the grid-bias battery until the absence of the crackle proves that the faulty component or wiring has now been found.

Do not forget that the valves themselves are "components," and these must be tested by substitution to make the test complete.

(Continued on page 746.)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 744.)

If, however, even with the detector and one L.F. stage and telephones you still get the crackle, you must go a step further to eliminate possible causes of the trouble by connecting your 'phones across the points now joined to the 100,000-ohm resistance. This will give you a detector circuit only, and by listening to this you will soon be able to say definitely whether the crackle is in this stage or in the following one.

Do not forget in all the tests that in order to show up any crackle as much as possible it is as well to advance the reaction a little way so that the set is somewhere near the oscillation point. And do not forget that when changing components and putting in new ones, or altering the valves, to make a note on the paper of the components which you have now definitely excluded as being possible causes of the trouble.

Finally remember that not only every component but every wire should be suspected, and it may be necessary to place short temporary leads from point to point before you can give the absolute O.K. to various stages in this way.

We are afraid it is going to be a long and tiring job, but short of pulling the whole set to pieces, or using proper testing instruments, it seems the only way to cure the crackle and ensure yourself a Happy Radio Christmas.

THE "CRYSTACHOKE."

In last week's description of the coil for the "Crystachoke," on page 702, the number of turns was given as 55 (of No. 24 D.C.C. or D.S.C.). This should have been 60 turns as shown in the diagrams, but as a matter of fact 55 turns will work quite well in most cases.

THE HEAYBERD L.T. TRANSFORMER.

F. C. Heayberd & Co. have asked us to point out that the wording of the advertisement of above which appeared in "P.W." Nov, 15th, may give a wrong impression, and that no "eliminator" is required. If the valves in a receiver are substituted by indirectly-heated valves, all that is required for the latter is the appropriate L.T. transformer.

FOR THE LISTENER

(*Continued from page* 722.)

Contrasts.

Most of us are familiar with Derek McCulloch's voice telling us in which square Mr. Allison is exhorting Bastin to shoot. He arranged an interesting little programme of sportive and musical contrasts which, since I am old enough to have ridden a bone-shaker and young enough to have taken a pillion-rider on a motor-bike, I enjoyed very much.

Mr. Allison was in the programme, in his best Cup-Tie-Final manner. Indeed, Mr. McCulloch would be as lost without Mr. Allison as would Boswell without Dr. Johnson. "And everywhere where Allison went, Derek was sure to go"!

Somebody is sure to make a nursery rhyme about them some day!

A.P.H.

The initials are familiar to all readers of "Punch," and listeners had a taste of Mr. Herbert's quality in the wholly delightful "Policeman's Serenade" which formed part of a concert of light music the other evening. Mr. George Baker was excellent as the Policeman, and Vivienne Chatterton, with her bird-like voice, so charming as the amorous Susan that I felt I would willingly become a "gentle burglar," too, if only she would sing to me!

"If."

Lord Dunsany's play came over very well.

The opening was, I thought, a little confused. It did not grip me, or I did not grip it, immediately. This, it seems to me, is a weakness in a radio play, which should absolutely nail down the listener in his chair from the start.

But after the noise of the railway station had faded out, and Ernest Thesiger and Gladys Young had the microphone to themselves, the play went smoothly and entertainingly to its end. Thesiger, of course, was good; but I was particularly pleased with the way in which Miss Gladys Young played up to him.

Her first scene was a little triumph. I expected a great deal from Lilian Harrison in the not too easy part of Miralda, and was not disappointed. This actress seems to me to have all the tricks in her bag, and with her drawling and seductive voice she got the rather exotic and sinister part of Miralda well across.

Some of the players stumbled at their words, for which there is no excuse in a studio performance.

Lance Sieveking.

I always anticipate the productions of Mr. Lance Sieveking with much pleasure. He usually has some original and brilliant idea up his sleeve.

Nobody is defter at the control panel than he is. He has the sharpest eye for effect. He has outgrown what seemed to me a fault, namely a tendency to give us too much panel and too little play. I congratulate him on his production of "If."

His idea of marking the passage of time by having voices to repeat the days of the week and the months of the year with increasing rapidity until they ran up and out on the note of a siren, was extremely clever.

My only criticism is that perhaps he used this device too often. But it was a vastly amusing trick.

Toc H.

The little share we were allowed in the Birthday Festival of Toc H at the Albert Hall must have created a deep impression. Mr. Clayton's description of the forming of a Chain of Light all round the world on Birthday Night had all the eloquence and fervour of simplicity.

The idea is itself so beautiful, and so quickens the imagination and the memory, that the simple statement of it came charged with power.

Detective Story.

Many of us have pleasant memories of a detective story which was broadcast in weekly chapters not long ago, and therefore look forward eagerly to another to be begun in the New Year. A group of well-known and clever authors are taking part in complicating the story, and we shall no doubt have a pretty hard nut to crack.

TECHNICAL NOTES

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

Fieldless Coils.

I HAVE more than once been asked whether the use of so-called fieldless H.F. coils is an alternative to the use of screens in an H.F. amplifier. The point of the question is, of course, that if the coils are "fieldless," there would appear at first sight to be no possibility of interaction and coupling between one stage and another, and therefore no need for screens.

This is a very natural question, but with regard to the fieldless character of the coils, there is a snag in this, as in so many other things. The fact is that no coils are actually fieldless, and the most you can say is that the external field is *reduced* by a special arrangement of the turns. There are several such arrangements, as you know, one being the binocular or side-by-side arrangement, whilst another is the toroid formation.

Astatic Combinations.

Long before wireless, arrangements were often proposed for neutralising the field of one coil by that of another. For example, the coils of a galvanometer are sometimes arranged in "astatic" formation, but the astatic effect is never one hundred per cent.

As regards the H.F. amplifying stages, even assuming that the coils were completely self-contained electro-magnetically, so that there were no stray field, there would still be possibilities of inter-action, due to other components and conductors, so that even truly fieldless coils would not do away entirely with the need for screens.

For really satisfactory results when using much H.F. amplification it is very important to avoid stray coupling as completely as possible, but I am afraid that it is by no means sufficient to rely entirely upon the design of the coils themselves, without using screens.

A Common Cause of Trouble.

It is surprising how few people will go to the trouble to examine—and replace, if necessary—the grid-bias battery in a receiver or amplifier. This is all the more strange in view of the fact that, whilst the G.B. battery has an exceedingly important influence upon the proper functioning of the valves, it is as a rule, a very minor and inexpensive item, supplying comparatively few volts and needing renewal only at very long intervals.

It is true that in a powerful amplifier the grid-bias battery may be, in fact, a full-size high-tension dry battery, and therefore a fairly considerable item to renew. But I am thinking more particularly of the majority of cases where the grid-bias battery is called upon to supply, perhaps, only 6 or 9 volts.

In many cases, bad results are due to this grid-bias battery having been left without examination for a very long time, perhaps even a couple of years, during which period its voltage has gone down to zero (or even less, as the Irishman said !).

(Continued on next page.)

TECHNICAL NOTES.

(*Continued from previous page.*)

If there is no bias applied to the grids of the valves it doesn't say much for the prospects of the filament emission, and, incidentally, what you may think you are saving on the grid-bias battery you are losing many times over in H.T. current consumption.

Overloading.

Some little time back I was talking in these Notes about the important question of the overloading of valves. Of course, you always bear carefully in mind the danger of overloading the low-frequency amplifier, and particularly the output stage. It is for reasons of this kind that valves—so-called power and super-power valves—are designed to handle a large amount of energy without distortion.

But the overloading may equally take place at the *detector* and, as a matter of fact, I think probably much more trouble arises from overloading the detector than from overloading in the subsequent stages, and frequently it is unsuspected.

Detector Operation.

The incoming signal by the time it reaches the detector stage should, of course, for the best possible results be raised to a certain degree of strength, or rather its strength should be within certain limits. If it is *below* the required strength, naturally it will not operate the detector efficiently, whilst if it is *above* the desired range it will overload the detector.

In cases where a fair amount of high-frequency amplification is used, or where powerful local stations are being received, there is a great danger of the overloading of the detector taking place.

Fortunately, however, in these cases it is quite a simple matter to prevent this trouble, and the method of preventing it consists simply in reducing the strength of the signal.

Controlling the Strength.

There are various ways in which the strength of the signals can be cut down before they reach the detector: one simple and quite satisfactory method is to introduce a resistance into one of the tuned circuits of the H.F. amplifier.

In this way the strength can always be adjusted so that, even though you tune in to different stations, giving very different signal strengths as received on your aerial, the actual strength delivered to the detector is roughly the same in all cases. If you can have a meter in the circuit, so as to give a definite indication of the strength of the signals, so much the beter, although it is not essential.

Underloading.

Of course you will notice that in the foregoing I am assuming that the power of the transmitting stations (or the amount of high-frequency amplification in your receiver) is such that the signals can always be delivered to the detector at a strength which is on the "positive" side, so to speak, and therefore can be adjusted by merely cutting down.

There will be, however, cases where the strength of signals is actually too weak,

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

and here, beyond giving them the maximum high-frequency amplification of which the H.F. end of your receiver is capable, there is nothing more that you can do.

Reaction Points.

Whilst on the subject of receiving different stations, particularly in cases where the response is on the weak side, I should like to mention how important is the proper use of reaction. You know full well the great advantage of reaction, which, in effect, neutralises the resistance of the circuit even sometimes to the point of rendering it self-oscillating.

Reaction, however, like many other good things, is very apt to be abused, and I have often noticed listeners, especially beginners, placing far too much reliance upon reaction.

Aim at Maximum Efficiency.

There is often a temptation to skimp the efficient design and construction of different parts of the receiver, and to rely eventually upon a good slice of reaction to make up for any deficiencies.

This is all very well, but remember that reaction should be used sparingly, and that there are definite limits to the relative amount of reaction which can be used, without spoiling the quality of the reproduction.

In other words, you should endeavour to get every ounce of signal strength and quality *without* reaction, and then bring in a judicious amount of reaction for the purpose of gaining a reasonable increase in volume without distortion.

I need say little about the ordinary control of reaction, as this in itself is a perfectly straightforward matter and means nothing more than the turning of a control.

The Need for Skill.

This, however, is not all that goes to it, for the reaction is not always independent of the tuning or, rather, perhaps I should say the tuning is not always independent of the reaction. Consequently, reaction must generally be adjusted for each setting on the tuning dial or dials, and if there are more tuning dials than one, the independent adjustment of these calls for quite a fair amount of skill, especially if you are searching for distant or weak transmissions.

If you are relying to any appreciable extent upon the reaction to give you volume, then obviously you have to follow your tuning adjustments very closely with adjustments of the reaction control, otherwise you may miss the station you are looking for.

This sometimes calls for a good deal of patience and, furthermore, you have at the same time to be very careful not to overshoot the mark and put the set into oscillation.

A Useful Rule.

A useful hint in this connection which may help you when searching, is that when you alter the tuning so as to tune the set for *lower* wave-lengths, the effect upon the reaction is generally the same as though the reaction control had been turned up: that is, as though you had increased

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

reaction, whilst if you adjust the tuning dial for *higher* wave-lengths, it is as though you were leaving reaction behind, that is, as though you had reduced the amount of reaction.

It follows from this that if you are gradually altering the tuning in the direction of higher and higher wave-lengths you must *follow* with the reaction control, whilst if you are tuning down to lower wave-lengths the reaction adjustments must *recede*, otherwise the effect of the tuning will, as it were, catch up and over-run the reaction and will put the set into oscillation.

Reducing Trouble.

I expect the effect I have just mentioned above is familiar to most of you, but at the same time if you bear it in mind when actually turning knobs simultaneously it will help you to avoid a good deal of random work and to find the station you want with the minimum of trouble.

Transformer-Coupling Peculiarities.

I have been asked whether it is satisfactory in the case of transformer-coupled amplification, using two transformer-coupled stages, to use the same type of transformer in each stage, or whether it is better, as is sometimes urged, to use different transformers?

If the two transformers were perfect, there would be nothing to say against this arrangement. In actual practice, however, even the best transformers are not perfect, and the reason why some people prefer not to use two identical transformers is because, owing to their defects being more or less identical, they are occasionally apt to give rise to a certain type of low-frequency oscillation.

Coupling Devices Not Perfect.

On the other hand, if two good transformers differing from one another in characteristics are used, it is more likely that the defects of the one will not, so to speak, "play up to" the defects of the other, but will tend rather to counteract them, with the result that perfectly good overall results are obtainable, whilst the set remains stable.

At first sight it may appear strange that two identical high-class transformers should not necessarily give the best possible results, but it merely turns on the fact that although the transformers may be of high quality they are not and can never be *perfect*.

THE "CONTRADYNE" TWO

(*Continued from page 732.*)

diagram will show you how well we have succeeded in this endeavour.

However, there is one little practical point we should like to bring to your notice. It is our invariable rule so to arrange the layouts of "P.W." sets that it is possible to wire them up in a perfectly efficient manner without any soldering whatever.

The parts are always arranged so that if you connect up the circuit with leads running from one terminal point to another in any convenient order perfectly efficient wiring will result. There is never any need to solder one wire to another at some intermediate point, although it may sometimes be done in our own models to secure neatness of appearance.

No Soldering.

Some of our readers do not seem to be aware of this, so by way of demonstration we have wired up the "Contradyne" Two entirely by the terminal-to-terminal method. It does not contain one single soldered joint. Evidently pretty easy to make! All "P.W." sets are like that, remember.

With this point cleared up we can leave the rest of the work to you.

WHEN YOU HAVE READ YOUR XMAS MODERN WIRELESS

DON'T FORGET TO

TELL YOUR FRIENDS ABOUT IT

Now you want to know how the controls work, and you will be ready to try out the set. The use of the series aerial condenser we have already dealt with, and it just remains to tell you how the switches work.

The upper one controls the "Contradyne" coil; put it to "off" to bring the coil into circuit, i.e. for work on long waves. For the medium waves put it to the "on" position, so short-circuiting the "Contradyne" coil.

The wave-change switch works similarly, being put at "off" for long waves and "on" for medium. With most switches, by the way, you push the knob inwards for "off" (long waves), and pull it outwards for "on" (medium).

The Valves Required

Now you just want some valve and voltage details and you can start. For the detector (V_1) use a valve of the H.F. or "special detector" class, and for V_2 one of the L.F. or ordinary power type.

The H.T. voltages should be as follows. About 60 volts on H.T. + 1, adjusted for the smoothest reaction and best volume on distant stations. On H.T. + 2 you want just the usual 100 to 120 volts.

The only actual adjustment to be made in the finished set after you have got it working is the position of the tapping leads on the "Contradyne" coil. Try these on various pairs of the terminals on top of the coil until you find the setting for maximum volume and complete freedom from interference.

A VISIT TO THE NORTH REGIONAL

(Continued from page 727.)

The third set supplies the grid negative voltages, and the layman's idea of a grid-bias voltage will receive a shock when he hears that as much as 2,000 volts G.B. is to be used at Moorside Edge.

Spare generators are provided for all purposes, so that if one machine breaks down another can be switched into circuit. The power from the generator-room goes to the transmitters via cables which run through a vault underneath both these rooms.

Safety First!

The transmitter-room, a lofty hall 74 ft. long and 60 ft. wide, is the most fascinating room of all. Down the sides of the hall are arranged a series of large aluminium cases with glass doors. They are about 6 ft. high and contain the inductances, valves, and other components of the two transmitters.

By opening the glass doors the engineers can obtain access to the apparatus, but the opening of the doors immediately cuts off the power supply. Safety first!

The aim of the B.B.C. to give a broadcast service of 100 per cent reliability is evident in here, too, for if any valve fails a spare can be switched into circuit in less than fifteen seconds.

The two transmitters are identical, each being capable of putting about 70 kilowatts into the aerial, but the one radiating on 301 metres wave-length will probably work on higher power than the one on 479 metres, owing to the greater attenuation on the shorter wave-length.

The transmitters were designed by the B.B.C. from data obtained from the Daventry Experimental station. Air-cooled and water-cooled valves are used, and about 10,000 gallons of water a day is required for the latter.

The Cooling System.

Pumps down in the vault circulate the water through the valve jackets. The heat of the white-hot anodes heats the water, which then passes outside the building to a cooler—a bank of pipes through which the hot water flows while cold water sprays on the outside.

Cooled, the water now returns again to the valve jackets. The system is designed so that in summer weather the water leaving the valve jackets will not exceed 110 degrees Fahrenheit.

The end block of the building contains two control-rooms and two quality testing rooms (one for each transmission), a kitchen, mess-room, offices, and so on.

As we walk out of the entrance hall at this end of the station we look back at the modest and simple building which contains so much wonderful and expensive apparatus, and we feel that the sadly antiquated broadcasting service of the North of England is at last being brought bang up-to-date.

Don't Miss
THE P.W. "CLEAR-CUT" CONE
NEXT WEEK.

POPULAR WIRELESS, December 27th, 1930. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

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Where The Milliamps Go. The New Ardenne Radio.

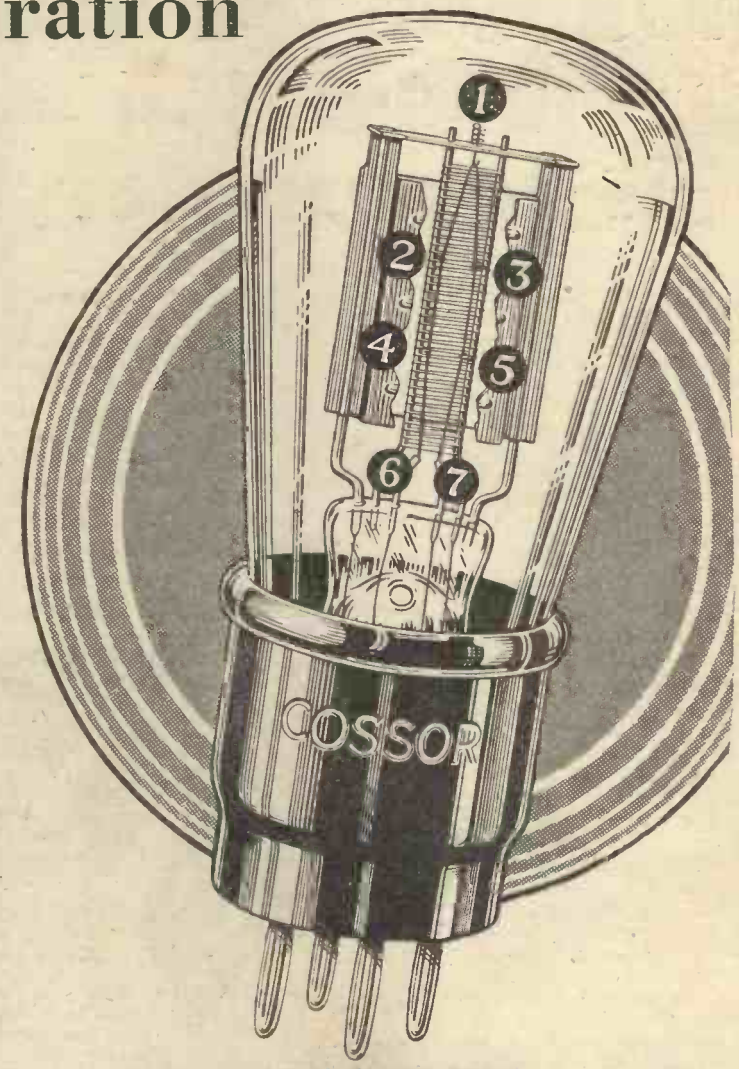
BROADCASTING IN 2030

By VERNON BARTLETT, CHRISTOPHER STONE, M. STEPHAN and SIGNOR TOSCANINI

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 90-150. *Price* 8/6

We have just issued a novel circular Station Chart, which gives 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"

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CAT AND RADIO!
DO WE REVERSE?
"AND THE NEXT PLEASE."
AN OLD TIMER.

RADIO NOTES & NEWS

PUFFING BILLY.
HOME CONSTRUCTION.
RADIO SHIPS.
NEWSPAPER SCIENCE.

The Cat and Radio Again.

IN view of the anecdote which I recounted in these columns about a dog who twitched its limbs in time with a radio dance band I was interested to read in "The Times" a letter from a lady who states that her cat has a pash for the B.B.C.'s new orchestra, and waves its tail to and fro when listening to the loud speaker. It would be interesting to learn whether this cat has ever seen Sir Henry Wood conducting!

Wireless Construction Blindfolded.

NO doubt you will like to hear about Mr. W. Jacques, of Thrapston who, so says the "Northampton Echo," has not only succeeded in making a one-valver, complete with accumulator, etc., in the space of 2¾ ins. x 3 ins. x 6 ins. (inside), but made a two-valver in two hours and ten minutes, whilst blindfolded. All the components were mixed up before he began, and his feat included the drilling of the panel!

At the end of the time mentioned Mr. Jacques was receiving Radio Paris on the set!

I congratulate him—on demonstrating that for the "home constructor" there are still worlds left to conquer. Things were getting a trifle tame!

Let's Be Accurate.

HO, ho! Here's a good one! Let's be accurate, even though we use a slide-rule. A man told me, the other day, while we were trying to solve a a bit of mathematics, that during his early days as an engineer he was testing a certain machine together with another fellow—a youngster from college who was proud of his facility with the slide-rule. The square root of each reading had to be taken. "H'm!" said the youngster. "Square root of sixteen?" He worked his rule and then continued, "Er—three—point—er—nine—nine—nine .... *Ah—call it four!*

Do We Reverse?

PEOPLE sometimes think me a little particular when I crack jokes at the expense of the newspaper radio "experts," especially those who write for the Sabbath papers, but I find the temptation irresistible; they are sometimes such "easy meat." A well-known and generally sound evening paper published last month an article from its New York correspondent in which it was solemnly stated, apropos the Americans' desire to listen to B.B.C. stations, that the drawback is that they have to sit up so late in order to do it, because 8 p.m. in London is 1 a.m. in New York, and 2 a.m. in Chicago. Ay, and Thursday in Italy!

"Holy Russia" Thinks Big.

I DON'T know about the "holy," but the Russians, or those who rule them, certainly have no small ideas, whether the subject be 5-year plans or radio. I see it reported that the "People's Commission of Soviet Posts and Telegraphs" (Golly!) have made a five years' plan for the development of broadcasting. Only sixty-two more stations are to be built and allowed to add their quota of russky to the already tortured ether; and, as a result of this, so they say, they expect that the total number of listeners will exceed 14 millions! Evidently they anticipate having enough leisure to sit down and listen despite the other five-year plan.

CRYSTAL SET ON XMAS CARD!

She is going to spend a Happy Christmas, for the postman has delivered a Christmas Card on which is mounted a complete crystal set. By adding 'phones, etc., both the London stations were heard at good strength!

"And the Next, Please."

J. R., or perhaps J. K., of Manchester, fires in a psalm of praise for a certain make of valve with hair packing as an "anti-pong" device. I am rather surprised to learn that any "pong" trouble is experienced with up-to-date valves. "Why don't makers supply the complete parts for the 'P.W.' coil?" Perhaps they will when they read this. "Why don't we publish an article entitled, 'Valve curves and how to read them"? My memory is bad, but I have a "hunch" that this subject has been done more than once. Finally, J.R. (or J.K.) says that it is the ambition of his life to "catch me bending" on electrical matters. Ee, lad, ye're not the only one! There are thousands waiting to catch poor old "Ariel"—and one of these days I shall make a "bloomer" deliberately, just to see 'em snap at it!

News of An "Old Timer."

IN "P.W.," June 28th and August 2nd, we published photographs of a heavy-weight, ancient, crystal set which was still working. Mr. H. A. Beal, 41, Silwood Street, Rotherhithe, S.E.16, asks us to state that this set is located at his address. He says that the set is an object of wonder and admiration for all who see it, and that it has had a successful career in various exhibitions.

(*Continued on next page.*)

RADIO NOTES AND NEWS

(Continued from previous page.)

The " Puffing Billy."

THIS set, which is ten years old, measures 19 in. by 19 in. by 9½ in., and is built of 5-16th oak. In order to avoid what is called the " dead end " effect which is sometimes experienced when taking a tapping off a large solenoid coil, each of the 95 turns of the tuning coil is brought to a stud, making a circle of studs 11½ ins. in diameter. In order to enable the coil to be divided into nine sections there are nine switches, by means of which any section can be cut out. There is also a valve amplifying circuit included. Truly the " father and mother " of a set ! The " Puffing Billy " or " Rocket " of radio receivers.

" Kind Words Will Never Die."

MR. C. E. RUSSELL, described as " an author and writer "—the difference between the two being subtle—is reported to have told Mr. M. Aylesworth, the head of a U.S.A. broadcasting system, that " here one hears insufferable balderdash, buffoonery, jazz, trivialities, tuneless songs, uninspired singers, inane jests, barbarous jocosity." He was referring to U.S.A. broadcasting, of course, and added that he believed radio in America to be a menace to public welfare and a powerful narcotic to public culture." Doubtless there is nothing for Mr. Aylesworth to do now but to turn his attention to the peanut trade !

The Vital Force of Radio.

NOW hearken to Captain Barber, Chairman of the Radio Manufacturers' Association on this side of the Atlantic, as he purrs over radio at the R.M.A.'s Annual Banquet. " Radio has eased the burden of millions, and has done more than all the churches to help the soul of man. In spite even of the Sunday programmes of the B.B.C. it is the most vital force in the country to-day." Just as exaggerated as Mr. Russell's indictment of American radio. Most of the culture spoken over our ether was and is obtainable from books ; it is not the product of wireless. Wireless is a form of distribution only ; cheap amusement, education and information.

Home Construction.

IN the same speech Captain Barber is reported to have waxed sarcastic over the " home constructor." " All you want is a good designer, who will provide you with a kit of pieces and a few miles of wire. Then, with a coke hammer and a pair of tongs, you can get Berlin in the bathroom." (Roars of laughter, no doubt, from the manufacturers of complete sets). Well, the " home constructor " is a much more " vital force " than radio ; he is the potential inventor and improver of radio technique. Marconi himself was the first radio amateur, tinkering for love of tinkering. So never mind, boys—continue your experiments.

Radio Ships ?

IN a speech at a dinner of batti-wallahs, (electricians), it was stated that in the future we may be able to propel light and heat ships by means of radio. Whilst we can shove a ship like H.M.S. Centurion about by radio, I do not believe that it will ever be possible to propel one to India or Australia by means of energy transmitted by electro-magnetic waves. Moreover, granting that it were possible, I think that oil would be a cheaper prime mover—or even coal. If, during the next thirty years, I prove to be wrong—I will publicly recant.

A Cry from Canada.

FOLLOWING the letter from South Africa bemoaning the lack of enterprise shown there by British radio manufacturers, comes another, this time from Canada. " Reginan " tells me that the Americans hold the market there. " In my opinion," he says, " the English manufacturer doesn't want the overseas trade. I wrote to Mr. ——, who advertises in ' P.W.' about a microphone three months ago, but up to date he has not replied. I can get an American mike which will suit my purpose." He is thinking of building the " Sharp Tune " Two—" but here again, where's the British manufacturer of the parts ? " Let us hope that these letters will be taken to heart by those whom they concern.

SHORT WAVES.

RUSSIAN BROADCASTS.

Moscow squalling.—" Daily Mirror."

* * *

" Wireless set in gaol causes a revolt," runs a headline in the " Evening Standard." They probably thought they were at least safe from it there.

* * *

GETTING ON.

We are rapidly becoming " Englified " in the North, it seems ! In a certain shop window I notice they are advertising : " UmbrellaRs Recovered."

Or is it an ideaR of the B.B.C. ?—" Bulletin and Scots Pictorial."

* * *

" Stuttgart, accused of jamming Daventry, now says this is tit for tat, as Daventry has been jamming Stuttgart. . . . Without real co-operative goodwill under international direction, the whole world would be reduced in time to a state of wireless chaos," we read in the " News-Chronicle."

But it would still be a " jammy " place to live in.

* * *

There's a lot to be said against the use of loud speakers in private gardens. For instance, there was the case of the neighbour who knocked at the front door of a house and owing to the loud speaker in the garden, failed to make anyone hear that he wished to borrow the lawnmower!

* * *

A reader from St. John's Wood recently wrote suggesting that the B.B.C. should bottle Chamber Music and sell it as weed-killer.

This seems rather unfortunate, as it apparently has quite a bracing effect upon the said reader.

* * *

Resident in Flat No. 1 : I hear you want to buy my wireless set. How much would you give me for it ?

Resident in Flat No. 2 : Three pounds more than you paid for it, sawed, split and delivered.

Warning to Aerial Erectors.

AS a matter of fact the instance to which I am about to refer shows that even the innocent bystander should beware. It was reported last month that a young lady of Durham was asked by a friend who was on a ladder, erecting an aerial, to put her foot on the bottom rung to steady the ladder. This she did, but at the same time seized the aerial, which had been thrown over an overhead electric cable. She was unconscious for two hours, and was lucky not to lose her life. So if there are power lines near you with which you might become involved during aerial erection—*keep away !* Have an indoor aerial, or at least give the job over to professional linesmen.

(H)airbrushes.

WHAT a lot of people know all about the special brushes for coating surfaces with paint, solutions, etc. I select two letters. N.P.S. (Boscombe) says that " spray painters " have been in use for over twenty years ; that they are gadgets for the projection of liquids in the form of a fine spray produced by compressed air, and that they are used in at least sixteen trades.

If anyone would like to experiment with this process they might try their luck with J. McK. T's (Paisley) suggestion and use a scent spray operated by a foot pump, not by the lungs—but it doesn't sound very hopeful to me.

Death to Interference.

WHEN one complains to the Post Office that an electric haggis-mixer is making haggis of the B.B.C. programmes, they (the P.O.) beat their breasts and say that they have no power to remedy the evil. Why don't they get the power, or move the authorities who have it ? In Belgium the town of Ciney has made a bye-law under which all users of electrical machinery must equip it with apparatus to prevent interference. Penalty for offenders—a fine of 5-15 francs, or quod up to seven days. The town of Brockville (Canada) has made a bye-law ruling that all electric signs must be muzzled so as not to interfere with broadcasting.

Newspaper Science.

F. C. (Charlton) writes enclosing a cutting from the " Daily ——," which states that two Frenchmen, M. Givelt and M. Couplex, have invented an organ which has no pipes or wind ; which draws its sound from the atmosphere and can ventriloquise. No doubt it can also juggle with balls and make smoke come out of its ears ! M. Givelt is credited with saying that there were already in existence a number of instruments drawing music from the atmosphere." Frankly, I think he has been misreported, because only poets and reporters, and bad ones at that, think the air contains music.

From Our Toro Correspondent.

I HAVE to thank A. B. T., of Toro, Uganda, for his friendly letter and for a useful idea which I have passed to the technical wallahs as he asked. But when he asks me to dish up a joke which I have forgotten, I confess that my heart bleeds for him because there is nothing in the basket. Perhaps he can overlook this and find a strain of humour elsewhere in these notes. Oh, by the way, A. B. T. thinks that he detects a " tinge of cynicism " creeping into " P. P. E.'s " articles. No ! That's just a cheap fountain-pen !

A Historic Hint.

THE little wooden shack on Long Island, where Marconi worked at his trans-atlantic experiments in the early days of wireless, is to be preserved as an historic relic. Good idea ! But if it were Edison's shack his twin soul, Hy. Ford, would take it away to Dearborn, together with some of the dirt underneath and some of the air overhead ! However, I expect they will hang a picture of Edison inside, just to give the place the proper tone.

ARIEL.

THE BEST WAVE for BROADCASTING

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

WHAT are the best wave-lengths for broadcasting? I have seen articles on this subject which appear to be slightly misinformed, and as I have made this my pet study, perhaps I may be allowed to base this article on some later ideas and ideals. Briefly the longer waves go further over land. The longer waves are, therefore, better for broadcasting.

A station's aerial emits waves. These can be considered as straight lines, representing the rays of energy as they go outwards (see Fig. 1).

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.

(1) THE GROUND RAY.

Two Kinds of Rays.

There is a ray we may call the ground ray, because it radiates along the ground. Broadcast listeners live on the ground, and it is the ground ray which gives them their service. But there are space rays which go upwards. These, we suppose, hit an electrified layer and are bent earthwards again.

Thus a station can send rays (space rays) all round the world because they echo about between earth and sky and do not escape into the cold spaces of the universe to be there lost for ever. On the whole, short waves keep within this annular sky-earth-bounded space better than long.

But, bouncing about as they do, they are apt to be inconstant and never the same. This trouble is called fading. Fading does not matter (because it can be eliminated) in commercial telephone and telegraph working, but it is a fundamental disadvantage in broadcasting. Thus broadcasting must rely on reception of the ground ray.

Fading Troubles.

It is quite true, as any enthusiast will demonstrate any night, that one can hear, and hear well, via the space ray, but—it fades more or less. Rome! famous Rome! Yes, I have heard all the stories, and I just *know* it fades, because I have listened.

Not badly often, but quite badly enough sometimes. The space ray can never satisfy the engineer for service, much as it may amuse the reacher-out as a hobby.

So we go back to the real problem—the transmission of the ground ray. This ground ray is steady, it does not fade but, passing as it does over the ground, it gets tired by having to come in contact with things on the ground.

Trees and bushes, and telegraph wires, and houses, and the partly-insulating, partly-conducting nature of the ground itself, all rob the waves of their energy, and so the ground ray soon dies away; caught in the things of the earth.

A Good Analogy.

One of the better analogies in all this is to consider that the wireless station blows a gigantic wind from off its aerial. This wind blows along the ground, and it gets caught up in trees, and houses, and hedges, and hoardings, and so loses energy.

A strong wind is blowing. You are walking in London. Here it is still as a June day of flaming sunshine; round the corner, woof, and hat goes flying, overcoat blown about your legs, you stagger with the force.

You are, however, more sheltered in town. Go up to the roof tops and the wind is steadier and stronger. Motor out into the country, and on the big plains the wind roars at you. And even if it has been caught up into eddies, and dissipated in energy in that copse, the copse is no shelter 100 yards away; and the wind blows the tree tops anyhow.

So with electric field intensity from a wireless station. Here in Balham the strength is wonderful, there in Streatham it is weak, up on the housetops it is better, down in the basement you are sheltered. On the open plain outside London it is steady, but just behind this hill it is poor while the strength closes in again as we move away from the sheltering hill.

How Long Waves Score.

Nevertheless, because of the houses, the hills, the trees, the earth, and the things on the earth, the wind gets feebler and feebler *on the ground* as we move further away from the source. Up in the unimpeded sky it blows the clouds to pieces and any upland again gets fuller force—the sky wave is stronger because it finds no obstacles.

But what determines how far away we can appreciate a sensible disturbance? In wireless the dying away of strength of the all-important ground wave is determined only by two things, the conductivity (used in a large sense) of the earth, and the length of the wave. We cannot change the effect of the earth, we can change the length of the wave.

Now the wave-lengths allocated to broadcasting are the more unsuitable the shorter they are. Daventry 5 X X, with its wave-length of 1,500 or so metres, gives direct ray "service" over ordinary sort of pastoral country to 200 or 300 miles: London National (261 or so metres wave-length) gives a similar service to 30 or 40 miles. London National is susceptible to shielding and variabilities among houses, and gives a poorer service in Kensington than Kent.

Direct Rays Needed.

As to indirect (and always fading) service—it is very good in Madrid! But we want direct ray service, and so we want longer waves and the most suitable are those between 600 and 2,000 metres.

They give direct ray service, non-fading service, steady service; they give programmes, and it should be the principal task of the forthcoming international conference to provide the waves according to the needs of the several claimant services.

HOW RADIO WAVES RADIATE

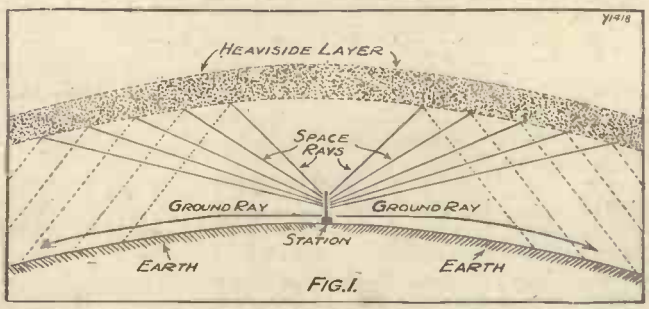


FIG. 1.

A pictorial representation of the two kinds of rays circulated by a wireless broadcasting station.

SPENDING ON THE GRAND SCALE

MAKING £1,200,000 LOOK SMALL.

AN INTRIGUING ARTICLE

By THE EDITOR.

THE publication of the B.B.C. Handbook for 1931 (in which, among other things, may be found some illuminating facts about the Corporation's income and expenditure), the controversy about subsidised opera, and the steady upward trend of licence figures, have all contributed to the creation of another great wave of popular interest in the B.B.C. in general and broadcast programmes in particular.

Public opinion seems to have been startled, even thrilled, by the announcement that, next year, the B.B.C. will have £1,200,000 to spend—£1,069,648 from the licence revenue, and about £140,000 a year from profits from publications, etc.

It certainly is a grand sum! One million two hundred thousand pounds! Actually to spend! Well might some newspaper writers be forgiven the misuse of the word "romantic."

One daily paper has already stimulated public imagination by inaugurating a £1,000 competition—the main idea being that its readers should vie with each other in sending in a list of ways and means for spending such a huge sum of money on broadcasting.

Could You Spend a Million?

The competition should prove successful, and some of the suggestions sent in by competitors will probably be weird and wonderful; and even provocative of thought for the mandarins of Savoy Hill. The more one thinks of spending one million two hundred thousand pounds *in one year*, the more fascinating the idea becomes, and at the same time more appalling.

If *you*, dear reader, were given that sum to spend *intelligently*, you would be tackling no light task. You would probably have a nervous breakdown before 1931 had drawn to a close. We should!

Some Expensive Ideas.

But when it is a question of the B.B.C. spending this huge sum, it appears to be the easiest thing in the world, as easy as kiss your hand, as the saying is. The way the B.B.C. can make £1,200,000 look like the cash resources of a child's money-box is simply astounding.

"It's easy," says the B.B.C., in effect, "quite simple. £780,000 on programmes. £100,000 on the new orchestra, £12,000 on administration expenses and depreciation, £300,000 or so on new construction work, £7,000 on opera (perhaps more)." And there you are!

Seems simple, doesn't it?

And yet the B.B.C. apparently are apprehensive of being hard up in the not distant future!

It's not surprising. The change-over from the old twenty-one stations system to the Regional Scheme was expensive—the full cost has yet to be met.

Each Regional, for instance, costs between £120,000 and £150,000; and on top of this the B.B.C. has been "stung" for Income Tax!

The new orchestra ran away with £100,000; but although this seems expensive the result will undoubtedly justify the expense.

For the first time in the history of music—and that goes back to the day when Adam first discovered how to whistle to Eve—this country will be the possessor of the finest orchestra in the world. And that's something the world would have scoffed at as impossible a few years ago.

On the whole it is understandable why the B.B.C. people don't think the spending of £1,200,000 too difficult. Big ideas have been conceived, and to "put them across" big money is necessary.

It seems even "bigger and bigger money" is wanted. Six and something (5d. to be precise) out of every 10s. licence fee, is not a big enough share, although it totals to £1,069,648 in a year. The odd bobs and pence go to the Post Office and the Treasury.

The Treasury's Nest Egg.

But that is an old story. You all know about the nice little nest egg the Treasury has accumulated; and you all know about the row that has been raised because Mr. Snowden wants to return a few thousands to the B.B.C. for the benefit of British opera and, incidentally, listeners.

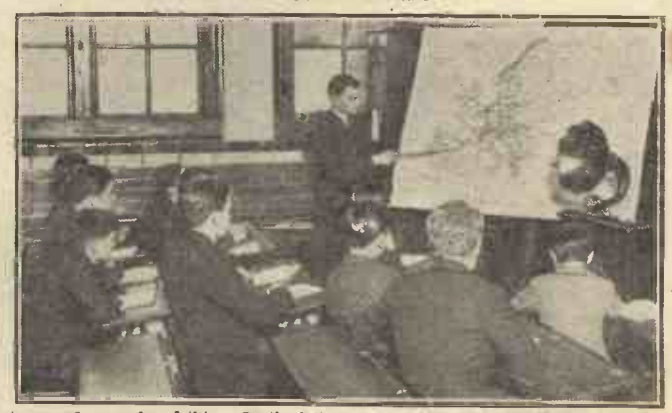
The row has been loud and prolonged, and founded on such a conglomeration of distorted facts, fancies, prejudices and general misrepresentations, that it now looks as though the Treasury will not have its nest egg nibbled at. Which is a pity.

If the scheme *does* fall through the B.B.C. may try and conjure up *all* the necessary cash. But it will be a crying shame if it has to.

SPEAKING ACROSS THE SEAS!

Recently Messrs. Heinz arranged simultaneous banquets in eight different countries. President Hoover gave a special speech in America and this was picked up by radio at the various centres. Above is the scene in London.

THE INFINITE VARIETY OF THE RADIO PROGRAMMES



Broadcast touches upon every phase of our social structure, and above you have two good examples of this. On the left you can see the Prince of Wales behind a microphone, while on the right a loud speaker is being used for a broadcast geography lesson to a class of boys in an elementary school

The P.W. "CLEAR-CUT" CONE

A loud speaker, designed on absolutely novel principles, that constitutes a complete break-away both in construction and in the very realistic results it gives. It can be easily built at the cost of but a few pence above that of the unit and we are sure it is destined to set a new standard in reproduction. Build it—so that you will have an instrument capable of doing justice to the output of your P.W. set.

ONE of the most tantalising things about so rapidly progressing a science as radio, at any rate to those behind the scenes, is the length of time we seem to have to wait before new inventions reach the stage of practical use.

We know that they exist, and we suspect they will be of great importance, but there is nothing for it but to wait as patiently as we can until they come along.

Neglected by Trade.

The "free-edge" cone for loud speakers is a case in point. It is now close on three years since the writer of this article first heard such a loud speaker in action, and was tremendously impressed thereby, yet how many real "free-edge" instruments are there on the market? To all intents and purposes there is none, certainly none at all, apart from some rather costly moving-coil types.

Yet we have here the means to effect a real and substantial improvement in loud-speaker reproduction. Why not exploit it? There are practical difficulties, but they can be overcome, and the reward is sufficiently great to make it well worth while to take a little trouble.

There do not appear to be any patents which can interfere with the free development of the idea. There are patents covering some of the best *methods* of producing a free-edge effect, but the effect itself is apparently clear of all restrictions.

Since there is, therefore, no question of injustice to any inventor who may be trying to get the idea developed commercially, the "P.W." Research Department has determined to take a hand in the matter.

Frankly, we have grown tired of waiting to see the benefits of the free-edge cone made available through the usual channels. We have accordingly decided to develop it ourselves and show our readers how they can embody it in a loud speaker of the home-made type.

This decision has involved us in a great deal of experimental work, for it is one thing to know that the free-edge cone is capable of giving exceptionally fine reproduction, and quite another to devise a really satisfactory method of suspending such a cone.

We have succeeded, however, and in the "Clear-Cut" Cone we have embodied a method of achieving the free-edge effect at its best in a very simple and practical way. Not merely that, but our method confers another very important advantage: it provides a type of double cone which greatly improves the uniformity of response of the speaker to different frequencies.

Relieved of Damping.

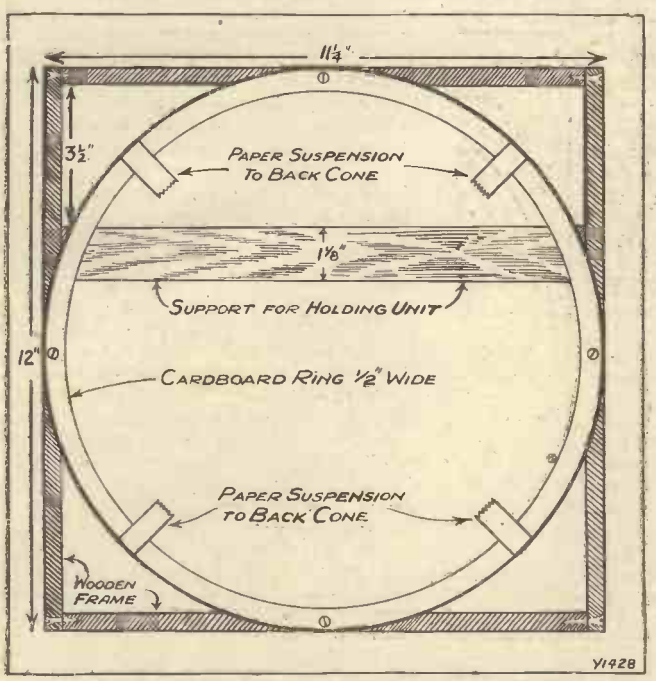
With so much made clear by way of introduction, perhaps we had better pause a while and tell you what a free-edge cone is and what it does. Well, by free-edge we mean that the edge of the paper cone is *not* attached to a leather, rubber or fabric "surround." It is left entirely free and the cone is supported at some other point.

The result is that the edge is relieved of the acoustic "damping" effect of the usual suspension, and so it is free to reproduce a whole range of higher frequencies which are normally absent or very weak.

It is sometimes argued that these higher frequencies are of little importance, but you have only to listen for a while to a good free-edge speaker to realise how far out

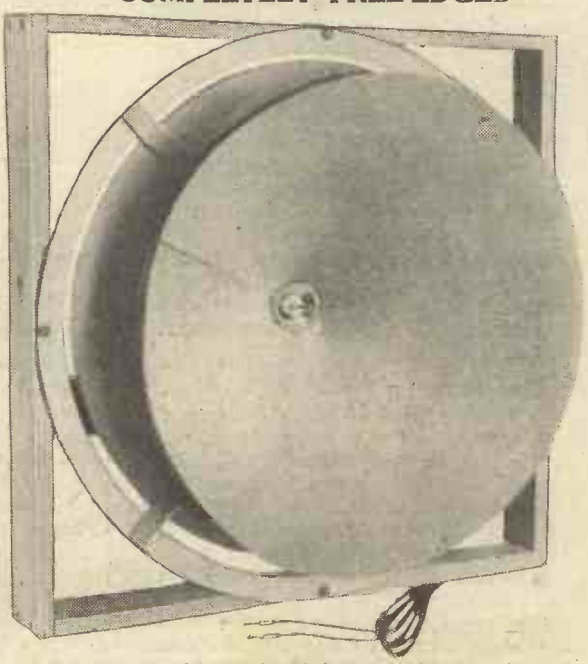
(*Continued on next page.*)

NOVEL FOUR-POINT SUSPENSION



The back cone should be fixed to the cardboard ring by four paper strips. No other cone-fixing should be employed.

COMPLETELY FREE-EDGED



The front and complete cone is entirely free-edged, and by this means a wonderful response is obtained.

THE "P.W." "CLEAR-CUT" CONE.

(Continued from previous page.)

this contention is. There is so great an improvement in brilliance and naturalness of reproduction that all other speakers sound quite dull and lifeless by comparison thereafter.

However, we must be brief and get down to constructional matters without further delay.

First, you make an ordinary single cone of the usual medium weight (120 lbs. per ream) "Kraft" paper, then attach to this a sort of half cone, seccotined to the back, and going off at an angle. Dimensions for these, and a semi-sectional diagram will be found in the illustrations on these pages.

Having got your double cone stuck together and all joints between paper well pressed together with the fingers, put this assembly aside to dry for some hours, with the mouth of the main cone resting on a flat surface, and a small weight (about ¼ lb.) on top.

The Cone Suspension.

The main portion of the chassis is of wood, and the diagrams show you how to put this together very easily. The driving unit goes on the strip at the back, and the dimensions given suit the Blue Spot type R unit. (A little modification will enable other good units to be employed.)

That done, cut the cardboard ring you see attached with small screws to the front edge of the wooden frame. The actual suspension is by means of strips of adhesive plaster between the back cone and this ring. See photos and diagrams and then pull up the plaster strips until they are only just free from slack.

We must be very brief, but we think that you will be able to manage the rest of the assembly with the aid of the photos. Having finished your chassis you can work it just as it is at first, but to get the full benefit of the very fine bass it will give, you want a "baffle," and this point we will deal with in an early issue.

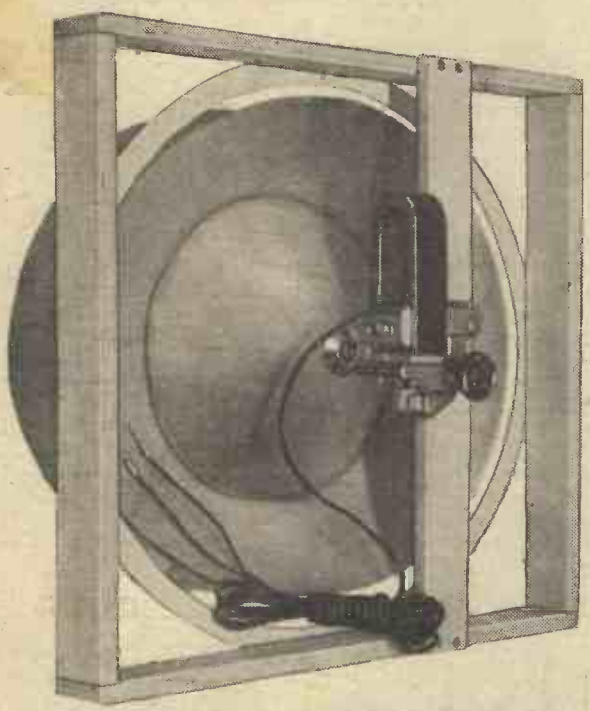
The Back Cone.

There are perhaps just one or two practical points we might mention before we leave you, however. For example, there is the matter of the attachment of the back cone to the main one.

To make this as easy as possible, describe a circle on the main cone before it is seccotined in to shape—i.e. while it is still in the flat, to provide a guiding line along which to stick the back cone. The position for this line is indicated in the middle diagram on the right.

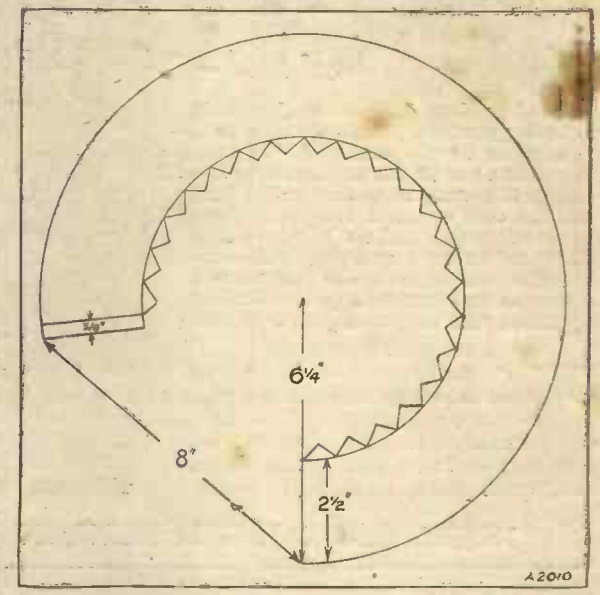
Note that the inner edge of the back cone is to be cut out with triangular teeth all round. It is these teeth which are actually stuck to the main cone. Smear each tooth evenly with seccotine, wait until it begins to get tacky, then press them on to the main cone all round the guiding line. This is an important part of the job, so it should be done with great care.

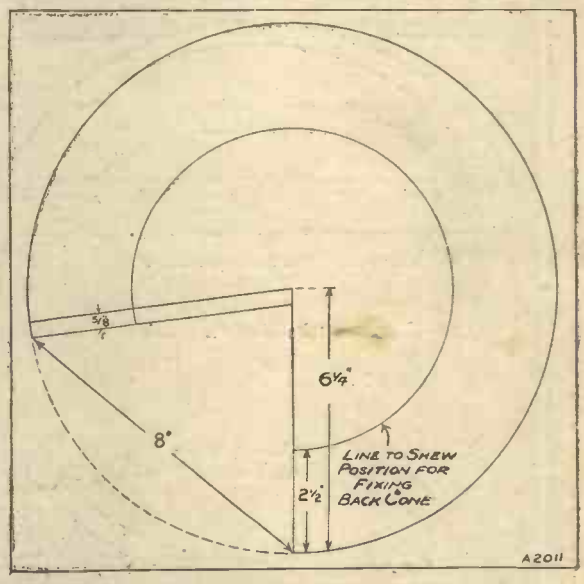
SIMPLE UNIT FIXING

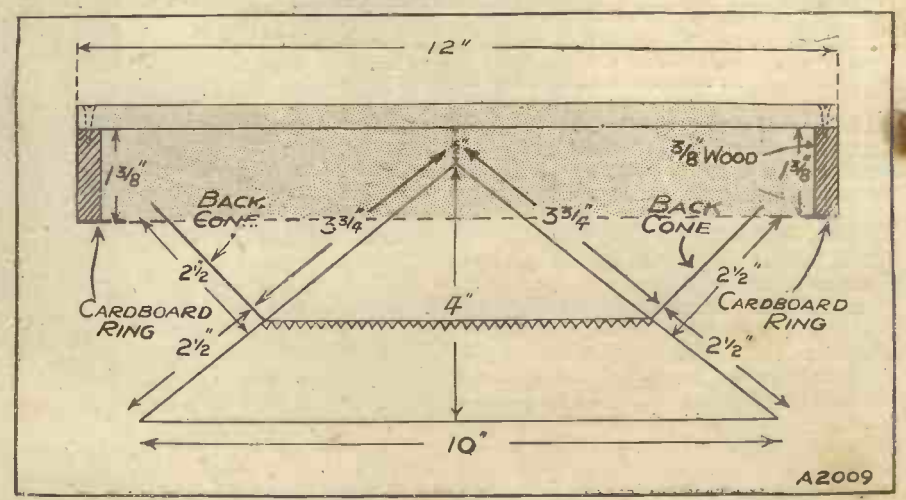


The wooden framework is a very simple affair, and you don't need much carpentry skill to be able to fashion it.

A NEW CONE COMBINATION







At the top you have the exact dimensions of the back cone, while in the centre those of the front cone are given. The fixing details are contained in the bottom diagram. Carefully tackled, you will not find it at all difficult closely to duplicate the construction of the original model and so duplicate the very fine results it gave.

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

Snow and ice can play havoc with your radio, and there are other factors which may affect it during the winter unless you take precautions.

THIS is the season of snow. This white mantle of Nature may even have made its appearance in your district before now. But if such is the case, let us hope that, so far as your radio activities are concerned, it has dealt with you kindly.

There's no doubt, however, that a snowstorm can play havoc with an aerial, and especially with one which, owing either to age or to insecure suspension, has fallen into what we might term an infirm and feeble condition.

Heating the Aerial.

After all, snow, in the mass, is not exactly a light-weight material, and no matter how picturesque to an æsthetic eye aerial wires, insulators and spreaders may appear when draped with a goodly layer of this wintry element, the extra degree of strain to which the whole aerial system is thereby subjected may, in many instances, prove disastrous.

Many commercial stations and well-known broadcasters, for instance, take special steps to combat the settling of snow and ice on their aerial systems. The Marconi station at Carnarvon sends up into its aerials a heavy current in order to heat up the wires so that the deposition of snow on them may be prevented.

Some time ago, I believe, it was reported that the great French station at Sainte Assise, which, as you probably may know, possesses a most elaborate aerial network, supported at a height of some 800 ft. above the ground, entered into a calculation of the total extra weight which is thrown on the aerial after a heavy snowstorm.

Four Hundred Tons.

The authorities of this station worked out their estimate to the tune of approximately four hundred tons. No wonder, therefore, that these people are rather keen on the matter of electrically heating their aerial in severe weather.

Dealing, however, with purely amateur aerials, it is obviously an impossibility in these instances to send a heavy electrical current up into the aerial. Generally speaking, so far as the actual elevated portion of the aerial system is concerned, the best the amateur can do is to take every precaution to see that the aerial is fitted to withstand a reasonable extra strain, and, of course, to shake off, by means of a gentle swaying of the downlead, or of the halyards, any snow which may happen to remain on the aerial system.

Snow, however, is not the greatest cold-weather enemy of the aerial system. As a matter of fact, a slight deposit of snow on an aerial will quickly be blown away—that is to say, if it remains *snow*.

Often enough, however, the snow turns to ice, which congeals around the aerial wire and insulators. More snow, perhaps, comes along after a while, and, maybe, the process is repeated, thus considerably increasing the total strain on the aerial points of suspension.

Besides this, there is another danger to be borne in mind in considering the effects of wintry weather upon an aerial system. I refer to the expansion of water in the process of freezing.

A drop or two of water may find its way between the strands of a stranded-wire aerial. The water then freezes, and, in freezing, it expands and forces the wires farther apart. Result, after the subsequent thaw—a weakened place in the wire.

Insulators, of course, may crack under the deteriorating influence of ice and snow, owing to similar causes.

Generally speaking, signals are not usually found to "go off" during snowy weather. Ice and snow are reasonably good insulators. It is when the thaw comes along that decreases in signal strength may appear owing to insulation-leakage troubles.

In many instances, the lead-in system of the aerial may prove a most vulnerable area in snowy weather. Snow and moisture may creep down the lead-in tube if the latter is not properly protected.

Leaky Lead-in Tubes.

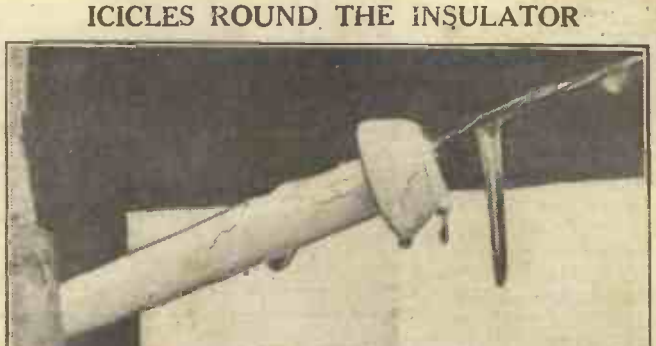
They may freeze and so crack the tube, or, when the thaw comes, they may (and, indeed, they are most likely to) give rise to leakage troubles. See, therefore, that your lead-in system is in good order, and is well protected from the elements during spells of cold, snowy and frosty weather.

There are cases where you have aerials suspended over house roofs, and in their neighbourhood may be chimney-pots. In such instances, although the aerial owners may have troubles galore owing to the metallic corrosion of the wires from the sulphurous gases of the chimneys, the same hot gases will serve to retain the aerial wires in a snow- and ice-free condition.

Country aerials, however, and particularly those situated on moorland heights, are, I think, the ones which are the most likely to have to withstand the rigours of snowy weather, and it is to these that special attention should be paid during the winter's inclement spells.

Hailstorms have been known to throw an extra strain upon aerial systems, but, of course, the amateur can hardly guard against possibilities such as these.

ICICLES ROUND THE INSULATOR



Keep your aerial free from snow and ice, for not only do they add considerable weight, but may cause the insulators and lead-in tube to crack.

LATEST BROADCASTING NEWS.

GOOD TALKS UP NORTH.

DUBLIN AT BELFAST—
THE ROOSTERS AGAIN—
LIVERPOOL CATHEDRAL—
CARDIFF MAKES MERRY, Etc.

THE regular talks on Current Topics by Mr. W. P. Crozier, Assistant-Editor of the "Manchester Guardian," have long been a feature of the Northern programmes.

This is a feature which the officials of the Talks Department at Savoy Hill might do well to examine, and—if they can overcome the prejudice that prevents them understanding the true value of a journalistic training—incorporate into their own trifling effusions as something worthy of the general requirements of listeners.

A Wonderful Summary.

The position of an assistant-editor (and there are scores about besides Mr. Crozier) is unique, inasmuch as it provides exceptional opportunities of access to the kind of material which the public really wants, while the long and intensive training of his profession supplies a critical ability unequalled in any other walk of life.

At the end of next week Mr. Crozier will finish another year of microphone work with a review of events in the North as they have happened in 1930. A year ago he gave a wonderful summary for 1929, and it is no idle boast to say that thousands of listeners will eagerly await his analysis of the many important phases of Northern life.

There is, of course, another side—the humorous—of current events, and this also will be the subject of a broadcast talk to Northern listeners on Tuesday evening, December 30th, when Mr. Gordon Phillips, "Lucio" of the "Manchester Guardian," speaks under the title of "The Purple Past—Light Relief in 1930."

Dublin at Belfast.

The good relations which seem to be now firmly established between the officials of the Irish Broadcasting Service at Dublin, and of the B.B.C. at Belfast, will result in another visit by the famous Abbey Players to the Ulster station on Monday, January 5th, to present two plays—Lady Gregory's "Spreading the News" and J. M. Synge's "The Shadow of the Glen." (The last-named is the author of the famous "Play-boy of the Western World.")

The Roosters Again.

A much appreciated item of the programmes for West Regional listeners, and one which has for its main object the provision of entertainment for blinded soldiers and sailors, is the concert organised by the Marchioness of Bute, which is to take place in the City Hall, Cardiff, on Saturday, January 10th. The programmes will consist of orchestral numbers, and an entertainment by what is probably the most famous of all war-time concert-parties to survive—the Roosters.

Liverpool Cathedral.

To Liverpool Cathedral, that truly magnificent building, the construction of which has just been completed on Merseyside, goes the microphone next Sunday evening, December 28th, for a relay from all stations taking the National programme of a "People's Service" at which the Rev. Canon C. E. Raven will preach.

The acoustic properties of the Cathedral make it particularly suitable for broadcasting, and as Canon Raven has a great reputation as a theologian and lecturer—he has been Hulsean Lecturer at Cambridge and Noble Lecturer at Harvard—the service will no doubt rank high among religious broadcasts of the year.

A Dickens' Fantasy.

Mr. Howard Rose, the senior producer under Mr. Val Gielgud at Savoy Hill, will be responsible for directing "A Pickwick Party" production for National listeners on Monday, December 29th.

This Dickens' dream fantasy, which has been written by Stanley C. West, with music by Marjorie Broughton, takes place on Christmas Eve at the Marquis of Granby Inn, where most of the well-known characters in Dickens' works will come to life—namely, Sam Weller, which will be played by Kingsley Lark; Mr. Pickwick, Stanley Cooke; Mrs. Micawber, Gladys Palmer; Dora, Elsie Griffin; Jingle, Bernard Ansell; Mr. Warble, Robert Chignell; Mr. Micawber, Joseph Farrington; Sairey Gamp, Lena Maitland; and many others.

Cardiff Makes Merry.

Cox's Mayfair Café, at Cardiff, will be the rendezvous of all who want an enjoyable evening, on a date yet to be finally decided in mid-January, when the Cardiff Radio Traders' Ball, arranged under the auspices of the Cardiff and District Radio Club, will once again take place.

The proceedings, in so far as it is possible, will be broadcast, and listeners will look forward not only to the dance music, but to an excellent cabaret show which is in process of organisation. It is good to know that the proceeds are to be devoted to the Wireless for the Blind Fund.

Hogmanay in Scotland.

The officials in charge of Scottish broadcasting are delighted with their achievement in getting Mr. Walter Barrie to take the chair at the broadcast Hogmanay Ceremony which will be heard by all Scottish listeners on New Year's Eve. Mr. Barrie will be supported by singers and fiddlers who will illustrate his humorous remarks with old Scottish songs and tunes.

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 Christmas Story.

THAT was a good Christmas story James Whelan told us of a Scotsman who knew that the turkey was only big enough for his wife and himself, and therefore said to his four children: "Which of you would like a penny instead of turkey?" All hands went up, and they got their pennies, and watched their parents wolfing the bird.

And when the pudding came in, "Now, who will have a penn'orth of Christmas pudding?" said Pa. I trust the youngsters found some way of paying the old rascal out before the holidays were over.

A Debate on the Theatre.

Did you hear Mr. Hugh Walpole and Mr. Osbert Sitwell discussing "What's Wrong With the Theatre?" with Mr. C. B. Cochran butting in? It had interesting moments, but on the whole was not a very successful debate.

The fault, I think, was Mr. Sitwell's, who had evidently prepared beforehand some extremely snorty criticisms which were so outrageous that it was difficult to give heed to them.

So the affair was one-sided; and with Mr. Walpole very amiable, and Mr. Cochran very cautious, the discussion got nowhere.

(*Continued on page* 780.)

THOSE RADIO PLAYS

by G.V. DOWDING, ASSOCIATE I.E.E.

Our Technical Editor pleads for life and laughter in radio drama rather than death and despair. He also has something to say about the presentation of B.B.C. plays, and the "crazy technique" often adopted.

WHAT do you expect for your ten-shilling licence fee? Entertainment? Education? Well, you get plenty of the latter, anyway, for the educationists have a firm grip on the organisation of Savoy Hill. But I, for one, am not quarrelling with them so long as they leave plenty of programme time clear for entertainment "pure and simple." Few of us want to listen even to one station all the time, let alone two, so selective listening is essential as well as being highly desirable.

Variety and Vaudeville.

What sort of entertainment does our radio give us? First and foremost, there is music, and we get plenty of that. There are dance bands, military bands, symphony orchestras, quintets, quartets, octets, nonets—every conceivable kind and size of musical combination, playing all sorts of music. On the whole, I think the music department does very well. Some of us may grumble at or deride the prominence given to the "highbrow" element, but an impartial examination of any week's programme reveals a pretty decent selection of diverse "numbers."

The variety and vaudeville departments keep their ends up excellently, although I do not think that they are given either the scope or the financial assistance they deserve.

There remains the Dramatic Department, and, from an entertainment point of view, it is my opinion that it is failing us very badly indeed. The psychologist might find radio plays a highly interesting study. They say that the radio drama is in the process of developing a new technique. It is, and a more neurotic, morbid and depressing technique it would be hard to conceive.

Being, as I hope, an ordinary, normal kind of person, it gives me the shivers. During the past year or two I have watched this tendency towards broadcast neurosis with consternation.

That some of the plays are beautifully produced, and are simply magnetic in their appeal to the senses, makes it all the worse.

Those "Grave" Complexes.

Many of you may be violently disagreeing with me, but withhold your judgment until the end of this article; think the matter over, and then see if you don't revise your opinions.

Take first of all the selection of plays that are broadcast. I don't know who is responsible for this, but it is plain that he is riddled with "grave" complexes.

Here are just a few of the plays that have been put "on the air" by the B.B.C. during the past year or so. "Tintagel" (the description of a child dying); "Danger" (death in a mine); "He" (a woman going mad); "The Flowers Are Not For You to Pick" (a drowning man's fleeting thoughts); "The First Second" (The first second after death); "The Crossing" (death in a train smash); "Obsession" (a man obsessed by the thought that he'd killed his brother); "Copy" (a re-enacted murder); "The Jest of Hahalabad" (predicted death).

Not a very cheery lot, is it?

People certainly do go mad in real life, people die—we've all got to die—but I, for one, don't want my radio to remind me of such things. Every one of us has a morbid strain in our make-up which it is sometimes difficult to suppress, so I think it is unfair for the B.B.C. to go out of its way to stir it up.

I do hope that they don't make a practice of dramatic morbidness in order to "get over" effectively. That is a horrid thought. You see, there is nothing like a chilly death scene to grip the emotions. Every budding dramatist knows that, and every budding dramatist works a horrible death scene into one of his first plays. Afterwards, most of them realise that the "classicals" have a corner in such ideas, so they turn their attentions to the best modern method of ensuring success, i.e. the risqué. (But that is quite rightly barred by the B.B.C.)

More Neurosis.

I grant you that good comedies, or good dramas without deaths or Parisian touches, are very hard to write, but surely it is better to give healthy productions of such characters infrequently rather than descend to the depths of gloom and despair to complete standardised schedules?

Of course, there is a very large following for the morbid—note how well the newspapers sell during particularly ghastly murder trials—but surely the B.B.C. should leave such things alone.

So much for the selection of dramatic material. Now, how about the presentation? Here, the neurotic element seems to be at its best—or, I should say, worst.

A man is dying. The producer doesn't let him get it over nice and snappily. Oh,

(*Continued on page 778.*)

"THE MAN WITH A FLOWER IN HIS MOUTH"

Referring to this play, of which the B.B.C. has broadcast a television version, Capt. Eckersley said in a "P.W." article: ". . . . the play itself is macabre in the extreme, and concerns, if my mind serves me, a man haunted by a filthy disease." The photo shows you a scene from the play.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

R.I.'s MAKING "P.W." COILS.

A GREAT compliment has been paid to the new "P.W." Dual Range coil. Radio Instruments are producing it in quantities! I believe this is the first time R.I.'s have diverted from the L.F. and mains sections of sets with a new H.F. component for about a year.

Messrs. Radio Instrument's version of the "P.W." and "M.W." Standard Dual-Range coil.

Further, I fancy it is the very first time R.I.'s have entered the market with a coil due to anyone except themselves.

But R.I.'s know that our new coil is a good coil and one that will do nothing to impair their very high reputation. And you may be absolutely certain that they would not place their trade mark on anything that did not reach a high standard.

As a proof of the thoroughness and enthusiasm with which Radio Instruments devote themselves to the manufacture of radio apparatus, it can be mentioned that every one of these dual range coils they are making is given an independent test both for wave-length and inductance on every one of the windings.

I have had several of the R.I. versions of our standard coil unit sent to me and I have no hesitation in saying that they are excellent pieces of work—every bit as good as our own original models in point of electrical efficiency, but a hundred or so times superior in regard to workmanship and finish! But then, they were wound on large precision machines, while our own were laboriously wound by hand!

But the very best feature of the R.I. coil unit is its price—12s. 6d., which is of course, as cheap as any that are made. In that it is an R.I. it becomes real value for money!

It is to be obtainable through all the usual factors and dealers.

A COLOURED LEAFLET.

J. J. Eastick & Sons, Ltd., offer to send to any reader a copy of their latest coloured leaflet of Eelex products.

NEW RED DIAMOND SWITCH.

The Jewel Pen Co., Ltd., announce a useful addition to their range of Red Diamond switches. This is a single-pole double-throw type, having a push-pull action and arranged for single-hole panel mounting, that has a dead spindle.

By insulating the spindle from the various contacts and terminals, the switch can be used on a metal panel without having to be insulated in any way.

A switch of this kind is also very useful for certain wave-change and pick-up switchings. It is a well-made article having a neat, definite action. The terminals are of a substantial character and carefully placed to facilitate wiring.

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.

CONCERNING PUSH-PULL.

Ferranti, Ltd., inform us that they are now able to supply their Push-Pull Audio-Frequency transformers with separate grid bias tappings on the secondary to enable the output valves to be biased separately where required.

This is not at present a standard arrangement, but can be carried out at a cost, additional to the list price, of 5s.

Ferranti's say that if valves are within 20 per cent of their rated characteristics they do not consider separate biasing desirable, and that they are also of the opinion that most valves should be sufficiently near in their characteristics not to necessitate this separate biasing. But they have arranged to supply transformers as above, as such consistency is not always met with in the case of the very large valves.

CLIX ANODE CONNECTOR.

If you use an S.G. valve you will find a Clix Anode Connector a safe and tidy method of making connection to its top terminal. It is certainly a most useful addition to that fine range of Lectro-Linx's terminal devices which contributes so much to trouble-free radio.

BURNDEPT RADIO RECEIVER.

In home-constructor sets appearance is an important factor to which designers and constructors alike pay strict attention. Nevertheless, in a commercial set appearance is even more vital. To be completely successful, it is quite essential that a set should have a first-class shop-window and showroom "presence."

In this respect the Burndept A.C. receiver de luxe is advantageously placed. Its appearance is striking, and yet unostentatious. It has those compact lines which suggest woodwork fashioned for a set, and not a radio receiver built into a cabinet.

It is an all-mains outfit, and it uses a screened grid H.F. valve, and one of those new Mazda A.C. Pens. It has a valve rectifier and complies throughout with the latest I.E.E. regulations.

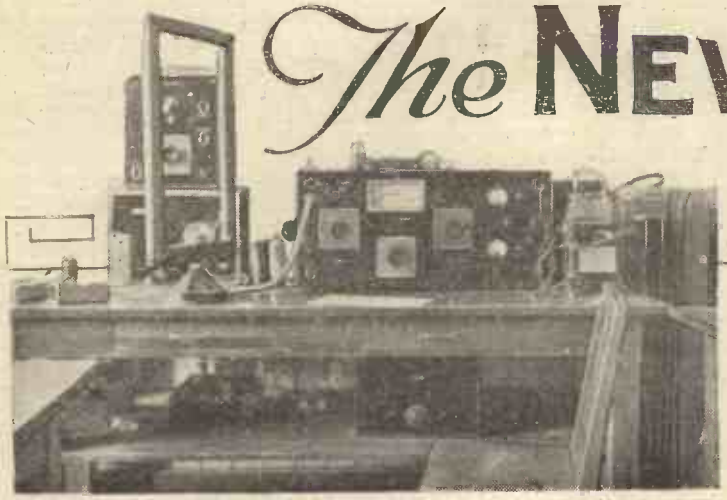
The two-wave bands it covers are 210 to 560 and 900 to 2,100 metres. The reaction is smooth throughout. The outfit gives plenty of volume from a number of stations when used with an outdoor aerial and the selectivity is adequate. Altogether it is a fine set.

CORTABS DE LUXE.

These are label devices for leads. Each Cortab is provided with two holes through which the lead is threaded. There is a very plain marking such as "H.T.+3" followed by a white space and then "volts." You can write in the space with a pencil the actual volts you find needed.

A packet of Cortabs de Luxe, sufficient in number and markings for an up-to-date set including S.G. and pentode valves, costs one shilling. They are made by those well-known ivorine specialists, Money, Hicks, Ltd.

The Burndept A.C. receiver has a handsome appearance, as you can see. Down control tuning is provided, and the loud-speaker is situated behind the ornamental fret.



The NEW ARDENNE RADIO

By OUR BERLIN CORRESPONDENT.

The description of a wonderful scheme originated by a well-known Berlin radio engineer. If it is put into practice by the German broadcasting people, as is quite possible, distant stations will be brought to the "door-steps" of the lucky listeners concerned.

THERE is, of course, a striking difference between receiving conditions in city areas on the one hand, and in the open country on the other. The field-strengths of remote stations in large cities are reduced to small fractions of what they are in the open country, whereas, on the other hand, interference is several times as strong.

This is why remote stations can, within the precincts of cities and in their immediate neighbourhood, be received only with the very best and most elaborate sets.

It has occurred to Manfred von Ardenne, the well-known radio engineer, of Berlin-Lichterfelde, that a very efficient means of securing satisfactory reception with simple and inexpensive sets would be obtained by raising the field intensity of remote transmitters sufficiently to drown all interference. How this is possible will be briefly stated in the following:

An Ingenious Scheme.

Outside the city, where there is no material absorption of waves coming from remote stations (whereas within the city area, this may grow up to 90 per cent), and where the average of interference is only about 1 to 2 micro-volt/metre (as against 50 to 100 micro-volt/metre inside the city), there is installed a high grade receiving plant.

This receives and amplifies the fields of a certain number of remote transmitters. This modulated high-frequency of certain remote transmitters is used to modulate an ultra-short wave radiated by beams into the centre of the city.

The transmitted high-frequency, or rather the transmitted field of remote transmitters, is there filtered out and, after due amplification, radiated from a relay transmitter the energy of which has been so designed as to secure throughout the city area a field intensity of remote transmitters amounting to 10 to 20 per cent of that of the local transmitter. This would enable excellent reception to be obtained with the very simplest type of two or three-tube feed-back receivers, with the same minimum of interference as in receiving the local transmitter.

Selective or Aperiodic!

There are two varieties of field amplification, viz., selective and aperiodic amplification; whereas the former comprises the transmission of a given number of transmitters, e.g. the ten best European transmitters, aperiodic field amplification, according to von Ardenne, means the transmission of the whole range of radio waves between, e.g. 200 and 600 metres.

Selective amplification should preferably be used to begin with, being more simple to carry out in actual practice and entailing the use of a considerably smaller relay transmitter. A simple calculation shows that in a city of the size of, say, Greater Berlin a 10-kw. relay transmitter would be quite sufficient.

Making D X "Local."

The operating expenses of a field amplifier plant are of about the same order of magnitude as those of a normal radio transmitter.

Reception, according to von Ardenne's scheme, then, is as selective as in connection with high-grade multiple-circuit receivers, and as free from interference as local reception.

Inasmuch as each large city can be fitted with a field amplifier such as this, an extraordinary increase in the number of subscribers is to be anticipated.

Selective programmes, which for technical reasons could not be strictly realised even in connection with Berlin and Koenigswusterhausen, will thus be placed at the disposal of European listeners. The best European transmitters being chosen for transmission, listeners in city areas will have the same international choice of programmes as those living in the country.

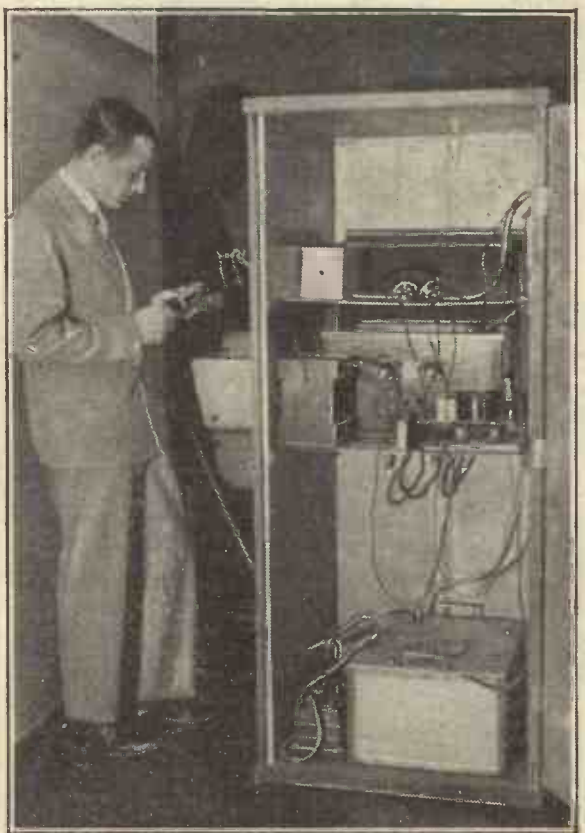
It may be said that the most important problem in connection with this scheme, viz. the multiple modulation of ultra-short waves, has been solved satisfactorily, that any interference by the local transmitter—or, inversely, interference in the local transmitter by field amplification—is strictly avoided, that fading in the remote transmitters is balanced by a special compensation in the relay receiver.

May be Tried.

At the recent joint meeting of the German Electrical Society and the Heinrich Hertz Radio Society this scheme was placed before an expert audience by von Ardenne, who in this case, as in connection with his well-known triple radio valve, has been co-operating with Dr. S. Loewe.

The debate following the young inventor's address, of course, brought out a certain amount of adverse criticism, but the general impression was that the scheme was well worth a trial. This was also the opinion expressed by Dr. Bredow, Secretary of State for Wireless Broadcasting, who, in the course of the debate, insisted on the desirability of this test.

ARDENNE'S APERIODIC AMPLIFIER



The aperiodic high-frequency power amplifier used by von Ardenne in experiments with his interesting radio programme rediffusion scheme.

SHORT-WAVE NOTES.

Have you heard all six continents on telephony ? Below you will find a useful hint in this connection, together with "red-hot" news about short-wave stations worth listening for and details of a suggested test.

By W. L. S.

THERE is just time to wish a last-minute "Happy Christmas" to all my English readers; and I must apologise to all the short-wavers overseas for forgetting that their copy will take some time to arrive. But, at all events to them I can sincerely wish "A Prosperous and *Interesting* New Year."

Whether the tremendous pile of letters I have accumulated is supposed to represent a sudden revival, or merely a new form of Christmas cards, I cannot say. The fact remains, however, that my correspondence nowadays covers a generous portion of the breakfast table, and I am left marvelling at the time people find to listen all over the short-wave spectrum and discover new stations.

Complete Call-Sign List.

First of all let me answer those who are desirous of getting hold of a complete list of amateur call-signs. The "Amateur Call-Book" can be obtained from the R.S.G.B. at 53, Victoria Street, S.W.1, price 4s. to non-members, and contains the addresses of all the world's amateurs, kept up-to-date month by month.

Next we have a crop of letters about L S X, Buenos Aires, who is in great demand as being capable of supplying that sixth continent! The other five are easily received, but if we take North and South America as separate continents (as the A.R.R.L. do), we do not find many listeners who have heard all six of them on telephony.

My most reliable source of information quotes him as working on 28.98 metres daily from 0100 to 0400 G M T. His full title is "Grad-Radio, Buenos Aires," and not "Grand Radio," which is a pardonable error.

His transmissions consist mostly of gramophone records, and are received at excellent strength all over England. On a two-valver, last time I sat up as late as that, I had him at comfortable speaker strength.

Transatlantic Working.

W 2 X A F is also very good in the evenings nowadays (on 31.5 metres, of course) although conditions from Transatlantic work on the amateur bands are very poor indeed.

Re V K 2 M E, about which sundry enquiries have been reaching me, he is only an experimental station, and on his own admission he has no regular hours at all. When he is on he works on 31.28 metres and relays V K 2 B L and V K 2 F C, the two big long-wave broadcast stations.

Next, with reference to the crowd in the neighbourhood of 50 metres. "J.O.", of Nottingham, reports the consistent reception, with a "Magic Four," of W 3 X A L on 49.18, W 8 X K on 48.86, W 2 X E on 49.02, W 9 X F on 49.83 (this latter being Chicago), and a Toronto station on 49.22. Quite a good bag for a band one metre wide!

This same reader reports 5 S W and P C J very poor, but Lyngby, Zeesen and Rome overpowering. Incidentally, I do not know how many try to get Rome on 80 metres nowadays, but he is far stronger to me on that wave than he was on 25.4. On 80 he is actually about the same audio strength as Brookmans Park on the same receiver!

Use of Old Prefix.

Now for an interlude. It is rather remarkable to note that two separate readers have heard Morse stations signing "E U—" and then the call-sign, and comment that in the new books ETA-ETZ are given as Ethiopia, with no mention of "EUA-EUZ."

The answer to this riddle is that the Russian amateurs are still using the prefix "EU" that was allotted by the A.R.R.L. in 1926 or so, and refuse to recognise Washington Convention suggestions. Their prefix should be RA, but they invariable use EU, and, moreover, call the station they are working by its old prefix instead of the new one!

Reception of Amateurs.

On the subject of amateur transmissions, several readers have at some time reported excellent reception from I-1 M M, the Italian amateur working on the 40-metre band until a few weeks back, when he suddenly disappeared. Other excellent transmissions logged on 40 metres were from G 5 T Z (Cowes), G 6 W T (Cornwall), G 6 R G (Galashiels) and a number of Londoners whom it would be invidious to single out. I-1 R O is off the air because he appears to be on a visit to the United States.

I wonder how many readers could guess the actual number of regular broadcast transmissions between 10 and 80 metres? I am afraid I shall not be believed when I state that it exceeds 100, but that is so! And I propose for the next few weeks to give details of some of those not too often heard in this country.

Try for These Stations.

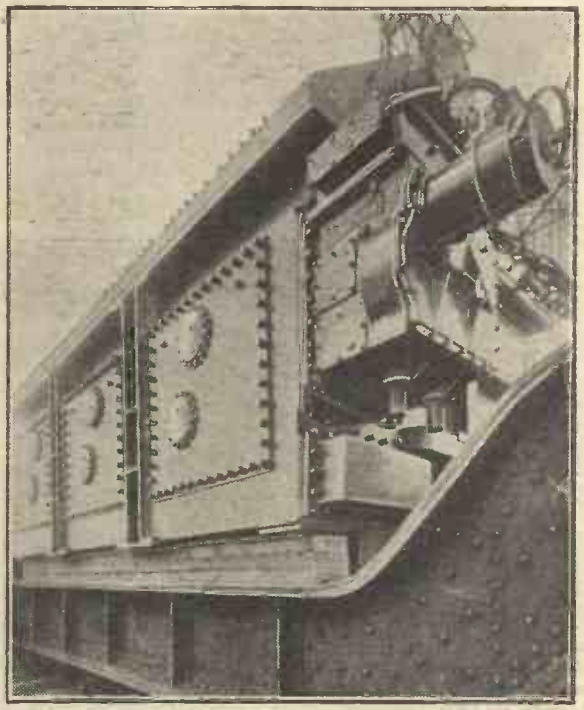
Just to liven things up I also invite claims from readers who think they are the first to hear any of them. This week I suggest the following: R V 1 5, Khabarovsk, Siberia, on 70.2, from 0900 to 1200 G M T. V E 9 C L, Winnipeg, Manitoba, on 49.5 from 2330 onwards. V P D, Suva, Fiji, on 38.0, daily at irregular times.

P K 6 K Z, Makassar, Celebes, on 25.5, from 1140 to 1440. (I think a special order of merit might be instituted for this one!) F Z R, Saigon, Indo-China, on 18.5, daily at irregular times.

Just in case I am thought a hypocrite, I may as well say that I have heard three of the above myself, but confess that the others have beaten me completely. I will look out another five specimens for next week!

Another interesting test that I propose to carry out one day is to name a certain period of six or twelve hours, and to invite readers to send in a complete list of all short-wave stations heard during that time. As well as being interesting from the "rivalry" point of view, this would also be quite valuable in furnishing information concerning the locations in which certain stations are best received. I am sure the Editor will not mind displaying the name of the sender of the best list, together with the list, in prominent type. I do not, however, propose to award a "W.L.S. Cake" every week.

NOT FOR A SHORT-WAVER!



This is a photograph of a huge 60,000 K V A capacity transformer recently built by Messrs. Ferranti, Ltd., for working at 132,000 volts. It is shown on a special type of railway truck employed to convey monster transformers.

WAVE-LENGTH INFORMATION

Some Interesting Short-Wave Brevities.

The Canary Islands have recently been testing on a wave-length of 41·7 metres from 10.30 p.m. onwards.

* * *

The Barcelona Radio Club sends out gramophone records and news on 50 metres every Saturday between 8 and 9 p.m.

* * *

Turin recently altered its wave-length to 29·62 metres.

* * *

Recent experiments show that much of the energy radiated between 5 and 8 metres breaks through the Heaviside Layer and is lost.

WHERE THE MILLIAMPS GO

Have you ever considered exactly why your H.T. battery runs down so quickly, just where the juice is going? This short article provides some useful data on the vexed subject of anode current consumption.

By K. D. ROGERS.

ON the face of it this seems rather a peculiar title for an article, doesn't it? I can imagine you all saying: "Of course we know where the milliamps go—into the set!"

Quite right, but where into the set do they mostly go? You naturally reply: "The L.F. portion of it." And you probably leave it at that with a feeling that, in any case, it is no good talking about where the milliamps go, and that once gone they cannot be brought back.

That's perfectly true, but one can, after all, control their going. In the first place, let us get it into our minds that if we want really good loud-speaker reproduction, those milliamps have got to go. We can economise to a certain extent, although, perhaps, we cannot economise as much as we should like.

"Can I Cut Them Down?"

For instance, if you are the owner of a three-valve set using a screened-grid detector, and an output valve, and you want good pure reproduction from your local, you have got to supply that set with a certain number of milliamps.

Probably you can get quite good loud-speaker reproduction with about ten to twelve. But you say: "Oh, but that's a costly job. Cannot I cut it down?" You *can* cut it down, but you run a risk of spoiling the reproduction. Let us examine it more closely. The screened-grid valve takes a certain amount of anode current and screened-grid current. We will allow it 3 or 4 milliamps. It will take about that when properly biassed, I expect. The detector takes a negligible quantity—call it a half, or call it one, but for the sake of argument we will call it one. That's 4 or 5 milliamps so far, and leaves five or a little more for the last valve.

Now, in order to work a loud speaker properly we must have a fairly large plate current variation in the anode circuit of the last valve. In other words, we want *milliamps*.

Now, a small power valve takes about 5 milliamps or more. Without a large anode current we obviously can't get a very large anode current charge, and therefore the valve cannot be expected to carry a very large signal to provide the loud speaker with energy.

So if we use a small power valve we shall get a certain amount of amplification and a certain amount of power, but we must beware that we do not overload the valve on the local station.

An Expensive Business.

In order to be able to carry a bigger input voltage, and therefore to provide a bigger output, one must have a larger power valve, always assuming, of course, that the set is capable of providing a fair input to that valve, as it will in the case of our S.G. three-valver.

But this larger power valve, unfortunately, wants more milliamps. This is going to be rather an expensive business if run from a dry battery? Yes, I am afraid it is, and that is why mains high-tension is becoming so popular.

For all but moderately small sets—that is, sets taking not more than 7 milliamps, it is not an economical job to use ordinary *small* dry H.T. batteries. The double- or the triple-capacity batteries are much more economical in the end, though they cost more initially; and whether you use a small or a large set, if you can possibly run it off the mains, do so. You will gain a big advantage.

People who use moving-coil speakers, and want big volume out of their speakers, usually look upon 20 milliamps as nothing really large, and those 20 milliamps very often go mainly in the last stage.

To Work a Moving Coil.

During the last few months we have had placed on the market a new 4-volt valve, the P.X.4, for use either with A.C. or battery filament supply, and which takes ·6 amp. on the filament. It has an anode consumption, when properly biassed, of something like 40 to 50 milliamps. That's a lot, but it takes a lot to run a moving-coil speaker at really loud volume, and if you have ever used one of those valves you will be surprised at the comparative ease with which even that type of valve will overload. In other words, it's not a colossal valve, after all.

But most of us do not want a valve of that calibre. I only take that as an example of where the milliamps *can* go if we like to let them. Fifteen to twenty milliamps is usually enough for a sensitive speaker even of the moving-coil type in an ordinary small living-room. It is unnatural or unpleasant to

(*Continued on next page.*)

POWERFUL PENTODES

Pentode valves are inclined to "walk-off" with more milliamps than we expect. The Lissen on the left is fairly economical, while the 2-volt Mullard takes a total of about 16 m/a. max.

TWO HUNGRY VALVES

The P X 4 and the Mazda A.C. Pen, two valves designed for output work. The former takes about 50 m/a. (max) and the latter 25-30 m/a.

MORE MAINS TYPES

The Cossor A.C. Power and the Six-Sixty 4X. S.G. A.C. valve.

WHERE THE MILLIAMPS GO

(Continued from previous page.)

have a loud speaker going so strong that it shakes the floor and gives you the impression that the orchestra or brass band is actually in the room. No one would think of inviting a brass band into a small drawing-room, and unless you want that sort of volume there is no need to go for that really high milliamperage. Up to twenty is usually quite sufficient.

PUNCH!

The Osram P.625 A, which takes 25 milliamps, can provide plenty of output power.

Not Easy!

But it is not easy to get up to twenty unless one uses a mains unit, and that is why I want to stress the advantage of the mains unit and the all-mains set. To run a set having a 15- or 20-milliamps consumption in anything like an economical manner without a mains unit (and when I say economical I mean comparatively so) one has to use a triple-capacity H.T. battery, and these are expensive.

I do not want you to think that I am advocating high H.T. wattage consumption. I do not like high anode consumption any more than you do, but with the present design of valves, in many cases it's got to be.

A valve is not capable of manufacturing power; it has got to get it from somewhere, and, neglecting the power supplied to the filament, it comes from the H.T. battery or mains unit, in the form of milliamps at a certain voltage.

What They Take.

Now, if you look at a list of modern power valves, you will find very few that do not want seven or more milliamps.

To work a three-valve set having two L.F. stages, quite satisfactorily, you need a super-power valve in the last stage, and that super-power valve is greedy. It wants milliamps; it wants seven or ten or more, according to the size of valve, dependent in turn upon the loudness of reproduction you want from your speaker. And so we see where most of those milliamps go.

And now, as a rough guide for set constructors, let us list in a general form the various types of valves and see how greedy or otherwise they are.

Resistance-capacity valves want half a milliamp. Detector valves, as a rule, want about half to 1 milliamp, if not of the power-detector type. Ordinary type H.F. valves want about 1 milliamp. Screened-grid valves, even when biassed, may want from 2½ to 4 or 5. First L.F. valves can usually get along all right with about 2 or 3. Second L.F. valves, if not super-power or big output valves, can usually manage with 4 or 5; and small output valves usually want between 5 and 8. Super-power valves of the small type, such as the P.2 or the P.220 want about 10; and when we get past these to the P.220A we find that 12 or 14 milliamps is not too much. Then the P.240 is a hungry valve, requiring still more, and finally we come to the range of really large super-power valves, such as the P.625, with 16 to 18, and the P.625A with 20 to 25 milliamps. Pentodes we must also look after, or they will sneak away with more milliamps than we expect.

Don't Under-Bias.

The above figures are given with approximately 120 volts H.T., and it is supposed that the valves are properly biassed. If you do not bias them properly you naturally alter the milliamp consumption. If you give them too much bias you lower the milliamperage and may ruin the quality of reproduction, though a little overbiassing is sometimes beneficial in saving H.T., but *under-biassing* must be guarded against, as one would the plague. It is costly in regard to milliamps, and it may be costly as regards the emission of the valve (which, after all, is the same as the milliamps), and therefore the life of the valve.

Watch the Pentode.

So watch that last stage. If you use a pentode, watch it more than ever, for pentodes have a nasty sly way of getting rid of milliamps without one knowing. One reckons the plate of a pentode may takes say, 12 milliamps, but one is liable to forget the screening grid, which usually "walk, off" with another three or four, depending on the make of the valve.

I know one pentode valve which takes 26 milliamps on the anode when properly biassed, and on top of that the screening grid takes another seven, bringing the total up to 33—no joke for a person with only a dry battery or a small mains eliminator.

So do not forget when next you build your set, or if you consider buying a mains unit, that you want to take carefully into consideration those milliamps. You want to make sure you can supply all the milliamps required by your set at the correct voltage. If you are on the mains there is no need to grudge a few milliamps to your power valve—it will repay you a thousandfold; but if you use dry batteries you have to be more careful.

Calculating the Consumption.

Before you build a new set, therefore, work out in your own mind how many milliamps it wants, to see if you can supply them. Nothing is more disheartening than to build a set, to get the valves and then find that either your batteries do not last long, or that the mains eliminator hums like fun simply because it is trying to supply too many milliamps.

A valve-maker's catalogue will soon show you how much anode current each valve is going to take, and by adding the figures so obtained together you get the total consumption of your set. It is very surprising how rapidly those milliamps add up.

PLENTY OF POWER

A corner of the new "Exide" accumulator store opened at Bristol by the Chloride Electrical Co. Ltd.

FOR THE CONSTRUCTOR

S.G. VALVES, USING UNITS, Etc.

When joining up a flexible wire to the terminal on the top of the bulb of a screened-grid valve, remember that the thread on the nut should not be strained by tightening with pliers, as a good finger-tight connection is quite satisfactory.

* * *

If you use a D.C.—H.T. mains unit, it is an excellent plan to insert a ·001-mfd. condenser (fixed) in series with your aerial terminal inside the set.

* * *

Do not destroy the leaflets and instruction charts which you may get from time to time when purchasing components. Use a drawing-pin to hold them all inside the lid of the set, where they will always be easy to find and may prove invaluable if you decide to alter the circuit in some way.

* * *

The lead-in from an indoor aerial, as from an outdoor aerial, should generally come from one end of the parallel wire (or wires), or from the centre.

* * *

An extra pair of "hands" for holding small work while it is soldered can easily be improvised by slipping a strong elastic band over the handle of a pair of pliers.

* * *

SUCCESSFUL SOLDERING.

The golden rule for successful soldering is to keep the iron and work clean, and at the correct temperature.

* * *

The numbers on a tuning dial have no direct relation to wave-length, but merely indicate the position of the moving plates in relation to the fixed plates.

* * *

If you wish to relate the figures on your condenser dials to the wave-lengths covered you must "calibrate" the set.

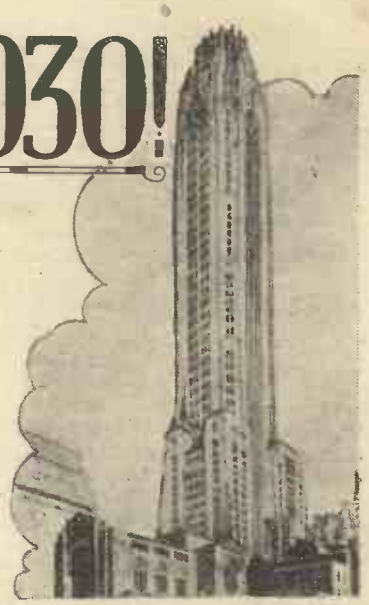
* * *

"Calibration" simply means the preparation of a list, chart or table showing wave-length figures and the corresponding condenser dial reading.

* * *

A calibration "curve" not only enables you to refer back to stations previously picked up but it also shows you the condenser readings for other stations.

BROADCASTING IN 2030!



A short time ago British broadcasting celebrated its eighth birthday; the completion of eight years of progress in microphone science and art. In less than ten years radio has revolutionised the world, tremendous strides having been made.

If all this happens in less than a decade, what will a century bring?

That is the question which famous broadcasters and writers venture to debate in this interesting symposium.

CHRISTOPHER STONE,
The Gramophone Critic.

IN a recent British film it was indicated that in ten years we shall have combined wireless telephones and televisors in everyday use. If this is going to happen in ten years, and remembering what has happened in the past ten years, how shall I debate what shall be a century hence? No, I can merely indicate the general trend of the way things will probably go.

In my own field, gentlemen, one thing is certain. The circular gramophone disc will go. It will be replaced by some kind of sound-on-film system in a long roll, corresponding very closely to the manuscript rolls we had in the early days of writing. Thus, there will be no need to break up a symphony into twelve equal parts and jump up to turn the record at each part until the effect of the music is ruined twelve different times.

Portable Sets Paramount?

We shall just sit still and do nothing, as the fortunate possessors of gramophones which automatically change the records are able to do to-day.

Also, I see much in the portable set. In all probability the fundamental system underlying this idea will be expanded until every radio gramophone—there will be no mere separate radio receivers or gramophones—will be all-electric, without aerial or earth, and equipped with television apparatus by which we shall see studio programmes, current events, or the latest films according to the alternative programme we select—there will be dozens from which to choose. But we shall probably have these things within thirty years and they may be antiquated and out of date before 2030.

A "RECORD" BROADCASTER

Mr. Christopher Stone, who is a brother-in-law of Compton Mackenzie, is well-known for his gramophone record broadcasts.

Before care-free wireless sets can become universal, however, every country will have to be "electrified." Several European countries are still relying on gas for their main power, so there is still much to be done.

SIGNOR ARTURO TOSCANINI,
The Famous Italian Conductor (in a special interview).

Broadcasting certainly has done a lot in its ten years of life, but I am not altogether sure that its work has been "to the good" as you say. In the world of music, at least, radio has done nothing but separate the heart of music from its body. At the moment, you cannot hear an orchestra through a loud speaker. You merely hear a tune—a very, very different thing. The ordinary loud speaker of to-day has no more to do with true music than has a hurdy-gurdy.

GREAT AMERICAN CONDUCTOR

Toscanini, the world-renowned conductor, who recently gave a series of concerts at the Queen's Hall, with the New York Philharmonic Orchestra.

It is hoped, however, that within a century much change will have been wrought. Broadcasting on the Continent and in America must be freed from the chains, either of State or of Advertising, which encompass it. If I had my way, every broadcasting station should be ruled by a selected body of musicians, dramatists, and other satellites of the creative arts.

Waiting for the Perfect Speaker.

Eventually a perfect loud speaker will be invented, and then every sphere of human activity, the placing of each separate brick on the wall of civilisation will be broadcast from one station or another.

Not a public event but will not be described to listeners, not a concert that will not be overheard by the microphone, not a single speech of note that will not be followed by millions.

There will be no studios as we know them. Every place will be adapted to the microphone, and the broadcasting headquarters will be occupied only by programme organisers and engineers.

VERNON BARTLETT,
Whose informative treatment of international affairs forms one of the most popular features in the programmes.

I believe that the discovery of wireless will prove to be much more important than that of printing. With its help, in a hundred years, war will certainly have disappeared; this method of settling disputes has long since ceased to be profitable, for the means of waging war have become so expensive that both victor and vanquished are ruined by it.

End of Language Barrier.

But misunderstanding, fear and distrust have often proved more powerful than commonsense. In 100 years, we shall, I suppose, have such a development of wireless communications that even the most remote parts of the world will be at least as well known to us as our next-door neighbours are to-day.

"NO MORE WAR"

Mr. Vernon Bartlett believes broadcasting will eventually ensure international peace.

Propaganda will be useless as a method of working up the feelings of one nation against another. Indeed, I doubt if nations as we know them to-day will still exist, because we shall have rid ourselves of the barrier of languages.

Some international tongue will be universally spoken, as Latin was spoken by the relatively few educated people in the Middle Ages, and we shall not think of a German or a Russian or a Siamese as being

(*Continued on next page.*)

ROUND THE WORLD WITH THE "P.W." "MAGIC" THREE

A fascinating account of a "P.W." reader's experiences with the "Magic" Three in all corners of the globe.

The Editor, POPULAR WIRELESS.

Dear Sir,—Perhaps the following notes of a voyage round the world, using a "Magic" Three circuit will be of interest to S.W. enthusiasts. Results seem to me excellent, considering that home-made coils (without bases) and unsuitable valves with only 80 volts H.T. and long battery leads were used.

Leaving England en route to Panama and New Zealand, and after getting the "feel" of the set, 5 S W, W 2 X A F, W 8 X K, P C J, etc., were heard regularly every night at good strength to Panama. Although the Pacific is noted for long ranges, this did not seem to apply to 5 S W, as he disappeared completely for over a fortnight. but W 8 X K remained at excellent strength all the way to New Zealand.

"Local" Stations.

Apart from what one might term "locals" out there—Saigon, V K 3 M E, V K 2 M E, 7 L O, K Z R M, P L W, etc.—W 9 X F, W 8 X K were the best signals. I was one of the few in Melbourne to receive the obsequies for R101 victims via 5 S W. The latter on this occasion being very weak and fading marked.

Leaving Melbourne for home via Suez, 5 S W put in an appearance R 5 and stayed put all the way to European waters. Curiously enough, Zeesen, a station one sees boosted frequently as A1 abroad, was never heard at more than a whisper.

Rome on 25 metres came in at great strength several nights, until the wave was altered, and it was 10 days before I found her up near 60 metres, at equally good strength. Moscow on about 45 metres is a powerful signal.

The Buenos Aires Station.

I have just read Mr. Easter's letter in "P.W." November 1st, 1930, and can corroborate his remarks re the Buenos Aires transmission, except that I got the call as L S X pronounced "elley essey eckeo."

The station is situated at Monte Grande, Buenos Aires, and will, I believe, be eventually used as the telephony link with Europe. He was at great strength in the Red Sea on the speaker at 01.00 G.M.T.

The amateur radio club station of Socrabaja, Java, was heard on several occasions, and I placed his wave between 49·5 and 50; times of transmission between 12.30 G.M.T. and 15.00 G.M.T. when heard. The power used is low.

I was able, on the Indian Ocean, to receive the ratification ceremony of the London Naval Treaty from stations K E L (Bolinas Cal. 43·7), K B K (Manila 44·91), J I A A (Tokyo, approx. 38·5), V K 2 M E (Sydney), 2 X A F and 5 S W. The latter was clearest and steadiest throughout the broadcast.

Commercial and amateur stations too numerous to mention were heard. At the time of writing, in Dunkirk, I have just been listening to Radio Saigon on 49 metres at good 'phone strength. This station closes down daily between 15.15 and 15.35 G.M.T.

Interval signal, stroke on a bell, but no direct mention of station name. Announcements are thus, in French: "Vous avez entendu—interprété par l'orchestre de Radio Saigon." Chinese programme about 12.30 G.M.T.

With good wishes to your excellent paper.

Yours faithfully,

"SEAGOING FAN."

Ed. Note.—It will be remembered that Mr. Easter in his letter said:—"A new short-wave broadcast station for British listeners to try for is L S H at Buenos Aires, Argentine. It is on the air from 8 to 10 p.m., eastern time, which corresponds to 01.00 to 03 00 G.M.T. I have been hearing it for a time now, but as the announcing is all in Spanish I was not able to identify it at first. The wave-length is 28·9 metres."

"BON SOIR, MESSIEURS"

M. Stephan broadcasting one of his famous French lessons from the London station.

BROADCASTING IN 2030!

(Continued from previous page.)

much more of a stranger than a man of to-day who comes from some other part of the British Isles and speaks a different dialect.

In all this the League of Nations (as the political organisation), aviation (as the quickest means of transport), and broadcasting in all its forms (as the most effective method of exchanging ideas) will play a very important part. In fact, without broadcasting, I doubt if the ideal of close political co-operation between all nations could possibly be achieved.

MONSIEUR E. M. STEPHAN, famous for his "French Lessons."

I agree with Mr. Bartlett. Solely through the tremendous power of broadcasting, I believe, long before another century has passed, perhaps within fifty or sixty years, that we shall see an International language.

This will be based on a mixture of English and American, varied in different countries only according to the accent of the country concerned. Thus, some of the outrageous slang terms of the present will be respectable words in the future.

Wireless tends to standardise speech. Above all, it tends to standardise English. Even at the present time, we have many Continental stations giving frequent announcements in your language, and more people are learning it every day. With the advent of broadcasting over three hundred million people have come within its reach.

When Everyone Speaks English.

This is inevitable. Certain languages must disappear and must give way to English in the same way as the language of Brittany once gave way to the language of the French and is now little heard.

French, itself, is losing the footing it has long had as an international language, the language of diplomacy. English is replacing it. Similarly, the Bulgarian and Serbian languages are marked out for death. Radio is the murderer.

Yes, in a hundred years' time we shall all speak one language; the outlandish tongue of "the foreigner" will have disappeared.

MOORSIDE EDGE

THE LATEST NEWS.

THE possibility that the North Regional station may not be in service as soon as was anticipated is indicated by an address given by the North Regional Director of the B.B.C., Mr. E. G. D. Liveing, at the Huddersfield Rotary Club.

Mr. Liveing said that the test transmissions would start early in the New Year. The B.B.C. did not intend to commit itself to any dates, but after a period of experiment the North Regional programme would be sent out on 479 metres, and later the National programme would start on 301 metres. Listeners could be certain that they would be receiving a full alternative programme service in June.

Mr. Liveing also hinted that it is not absolutely certain that the new high-power station will replace all the present North of England stations, except Newcastle. It has been known for some time that the Newcastle transmitter will be retained.

Relays to Remain?

Mr. Liveing said that it was not intended to abolish the small relay transmitters in some of the outlying parts of the North of England until the B.B.C. was satisfied that listeners in those areas were obtaining a good service from Moorside Edge.

Presumably this refers to the Hull, Liverpool, and Stoke-on-Trent transmitters. Hull is 65 miles from Moorside Edge, Liverpool 48, and Stoke 45.

These ranges are, of course, only a very rough indication. Nevertheless, they appear to show that there is a risk, especially in Hull, of the new station (particularly on its 301-metres transmission) not being able to provide as good a service to these outlying towns as they obtain from their local transmitters.

An aerial, apparently of an experimental nature, has been slung between two of the masts at Moorside Edge; so perhaps, even if public tests do not start until the New Year, private tests will be carried out this month.

FOR EVERYTHING IN RADIO

SEND TO READY RADIO

Ready Radio Service has become famous because tens of thousands of listeners have learnt that the most convenient and satisfactory method of purchasing their radio equipment is to send their orders to Ready Radio.

Ready Radio holds colossal stocks of radio sets, equipment and components. Your order can be supplied *from stock*. There is no need for you to suffer the inconvenience of delay; you need not accept substitutes — if you send your order to Ready Radio you know that you will get what you order—immediately — and that everything you order will be new and in perfect condition.

OSRAM MUSIC MAGNET FOUR

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Complete equipment.

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4-Valve Kit.

Supplied complete with all parts. Cabinet and Valves.

Cash Price £13:12:6

Or 12 equal monthly payments of **£1:5:0**

COMPLETE KITS OF PARTS FOR THE "CHEF-D'OEUVRE"

KIT A	KIT B	KIT C
less valves and cabinet	with valves less cabinet	with valves and cabinet
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11/9	**15/3**	**18/-**

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CAPT. ECKERSLEY'S QUERY CORNER

SWITCHES FOR H.F. CIRCUITS—CHOKE COUPLING—MORSE "MODULATION"—METAL PANEL FOR SHORT WAVES—WHICH WIRE FOR AERIAL?

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.

Switches for H.F. Circuits.

B. R. A. (Glasgow).—"I am about to purchase some switches for H.F. work, but in view of the advice published from time to time as to the necessity for using switches adapted for this class of work, I should be glad if you would advise me as to how to tell switches which have characteristics which make them suitable for use in H.F. circuits."

Your question is a little ambiguous. I do not know if capacity to earth is a serious factor or not, because I do not know in what circuit you propose using the switches.

But reading between the lines, are you not considering wave-change switches? If you are, capacity to earth does not usually matter, because your inductance is, in any case, in parallel with a relatively large condenser.

There are, of course, dielectric losses and the switches should therefore be mounted on good insulation, not "muckite." The contacts require to rub on and off and want to be particularly good if the voltages and currents are small.

If you are switching H.F. in non-resonant circuits capacity effects may be serious.

* * *

Choke Coupling.

M. S. (Plumstead).—"I have a couple of good high-inductance chokes, and I am thinking of using them for a super amplifier I am constructing. I have been told that these chokes will not give me such a good frequency characteristic as resistance coupling, and that the self-capacity of them will produce a noticeable high note loss.

"Will you please tell me whether this is likely to be the case?"

The point about choke-capacity coupling is that the phases of the voltages grid to earth, anode to earth, are largely different, and that the chokes and condensers may produce widely different impedances on different circuits throughout the frequency range, and so upset the conditions of magnification.

Furthermore, the "good high inductance chokes" do not necessarily give the correct anode impedance, even for good high-emission valves, and it is better to choose the correct value of resistance than the widely varying and incorrect value of choke.

No! Choke-capacity coupling is excellent when avoiding patents and making money, but I should not use it for your own purposes.

Morse "Modulation."

"INTERESTED" (St. Albans).—"Whilst listening to a recent outside broadcast from the South of England the transmission seemed to be spoilt by the presence of a noise not unlike very fast Morse, but which I could not eliminate by tuning. Is it possible for Morse to be picked up by the land-lines and to be broadcast from the National transmitter?"

Yes; and, unfortunately, this sometimes happens.

The B.B.C. hires land-lines from the Post Office. These lines run parallel to and in the same group as other lines carrying on the ordinary telegraphic and telephonic communication intrinsic in the Post Office system.

Sometimes the signals in one circuit or set of circuits induce a smaller copy of themselves in neighbouring circuits. The trouble can be eliminated, but circumstances occur, particularly with the more obsolescent type of equipment, when it is momentarily inevitable.

The Post Office are doing magnificent work in renewing much of their old plant, and, particularly with existing facilities, do everything they can to help the B.B.C. to consummate long-distance broadcasts.

* * *

Metal Panel for Short Waves.

G. G. (Hendon).—"Do you consider a metal panel has any advantages for short-wave reception? I have heard so many conflicting opinions that I am quite undecided as to what to employ on my new S.W. set."

Yes, I do like a metal panel, all things considered.

One cannot lay down too hard and fast rules, and say that unless everything is shielded no short-wave receiver will ever work; but one can say, in principle, shielding is very much to be desired, and in certain cases is a prime necessity.

Thus, as a metal panel is a convenient shield in conjunction with other shielding, it is for that reason to be preferred. Then, again, there is hand-capacity effect, and, while there are other ways of eliminating this, what is easier than a metal panel?

* * *

Which Wire for Aerial?

J. B. (Gidea Park).—"Can you tell me whether the gauge of wire used for an aerial is important? I have a quantity of No. 20-gauge hard-drawn copper, but I have been told that 7/22 is the more commonly used wire. If I use my existing 20-gauge wire, shall I get any loss of signal strength?"

Oh, no! For reception purposes one is largely independent in the matter of the gauge of wire.

Unless yours is a very exceptional case, you won't notice any difference in signal strength between the two aerials you mention. Reaction can increase a signal enormously, and makes one independent of the aerial resistance to a large extent; besides which the coils are of such resistance as to be overwhelmingly large compared to aerials of 20-gauge and 7/22.

But the point is mechanical! A solid 20-gauge wire will be more inclined, if there is movement, to break; the more flexible stranded wire is, therefore, more commonly used. In view of the fact that many winter storms and March winds are waiting for us in the near future I should prefer the 7/22 wire.

ITS WHOLE-TIME JOB

The reamer is often looked on as an extravagance, and many constructors enlarge a panel-hole by penknife and patience. But in its own limited field the reamer is invaluable and makes panel-drilling a pleasure.

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. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS

USING AN INDOOR AERIAL.

S. A. (King's Norton, Birmingham).—"It all began at the kids' party, when I had to bring a pair of steps indoors, and spend an hour hammering and fixing paper chains all over the house. And when that was done, having the hammer and the steps handy, I thought I would try an indoor aerial

"Fixed it inside twenty minutes, and found it was the best bit of work I'd done for a long time. Selectivity seemed about twice as good as with the old aerial, and the dial bristled like a porcupine with possible programmes.

"If anything, it was better in long-distance reach than the old outdoor effort, and, best of all, it was quieter to work. Before there had always been crackles and hissing, but since changing over there has been perfect peace.

"What I should like to know is, why have I been led to believe that outdoor aerials are better than the indoor? Why have I had to put up with an ugly pole and wire for so long, when I had better programmes in the loft than there were out in the garden?"

The idea that an outdoor aerial was always and necessarily better than an indoor aerial is a relic from the days of the crystal set—or very simple valve set—reception. Especially was it true with the crystal set that the larger and higher the aerial (within limits, of course) the better the results.

But since H.F. valves have been vastly improved by the introduction of neutralising, and by screened-grid types, and since they have been coming into more and more general use, the necessity or advisability of a long outdoor aerial has declined.

In many cases a shorter aerial, giving a "sharper" pick-up, is to be preferred to a long outdoor aerial, because the set is quite capable of doing all the amplifying necessary for loud-speaker results.

The big outdoor aerial still scores in respect of the strength which it is capable of delivering to the set, but nowadays, with a modern set and valves, mere strength is often not so desirable as it was.

Nevertheless, for a crystal set or simple valve set without H.F. amplification, the outdoor aerial is often necessary if adequate strength is to be obtained, especially as indoor aerials vary a lot in efficiency—according to shape, situation, etc. So it will be a very long time before everyone who changes from outdoor to indoor, as you did, will find the same advantage as in your own case.

REDUCING THE CAPACITY OF TUNING CONDENSER.

H. E. G. (S. Tottenham, N.15).—"In a recent 'P.W.,' W. L. S. declared his faith in small-capacity variable condensers for tuning. I want to try the same myself. Would a ·0003 in series with a ·0005 variable bring the capacity low enough?"

This would be a suitable value to use if you want quite a big reduction. For the curious thing about capacities in series in this way is that the final effective capacity is always *less than the least* of the separate ones. By adding a ·0003 to a ·0005, you bring it down to less than ·0003. If you added a ·0001 to a ·0005 you would get less than ·0001. And so on.

In fact, the smaller the capacity you add in series the greater is the reducing effect.

(See also the reply to H.M.)

CONDENSERS IN SERIES.

H. M. (Hertford).—"How much do I reduce the capacity of a 2-mfd. condenser by joining a 1 mfd. and a ·5 mfd. in series with it?"

The method of calculation is easy to follow and useful, so we will give it in detail.

The rules are:

(1) Write down your capacities.

(2) Divide each into 1, and add the results.

(3) Then divide that answer into 1, which will give you the effective capacity.

So, in your case, we first write down the capacities as 2, 1, ·5. Dividing each of these into 1 gives us ·5, 1, and 2. Adding these together gives 3·5. The third step is to divide this into 1, and $\frac{1}{3{\cdot}5} = {\cdot}285$ approx. Thus, by joining the 2 mfd., 1 mfd. and the ·5 together, you have a capacity of just under ·3 mfd.

ADJUSTING GRID BIAS.

"PATER" (Colchester, Essex.).—"I tell my boy he should not change the grid bias of the super-power valve unless he switches off the set first. But he still does it, and I can't for the life of me remember a good reason for switching off first, so he is a bit sceptical about the whole thing.

"Calls me 'faddy'! But I saw it in 'P.W.' and I wish you would repeat the reason, as I remember thinking at the time what a good thing it was I saw your warning about it"

You are quite right to be a bit concerned about it, for if he continues to change grid bias without switching off, you will soon find yourself requiring a new super-power valve.

The reason why it is necessary to switch off is easily understood if you look at the valve's curve or maker's data on the subject of grid bias and H.T. You will see that the maker's allow for a certain maximum anode current to be taken, at a certain specified H.T. voltage, and with a definitely stated value of negative grid bias.

If you are going to use a fairly high value of H.T., you *must* use fairly high grid bias, too, or otherwise you will take too much plate current from the valve, and so damage the filament emission. (All the plate current is emitted from the filament.)

The makers will tell you it is *important* from the point of view of valve-life not to run the valve with too high a filament voltage, nor too low a grid-bias voltage. Doing either of these will shorten the valve's life.

Now consider what happens in a case like yours. We will assume that the G.B. voltage is supposed to be 21, the high tension at 150 volts, and the plate current at 20 milliamps.

The effect of using an altered grid bias of 18 volts would be to increase the plate current up to, say, 22 milliamps, and the proper way to try this is to *switch off the set*, change the plug to 18 volts, and then switch on again. All you have caused, in this case, is a *little* alteration to grid bias and to anode current.

Now suppose that the set was left "on" while the change was carried out. What happens?

Starting with 150 volts H.T., 21 grid bias, and 20 milliamps plate current again, the grid-bias plug is taken out and put into 18 volts instead. But at what a cost to the valve!

The grid bias goes suddenly from 21 to 0 (this latter is the G.B. value whilst the plug is in neither socket),

(*Continued on page* 776.)

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.

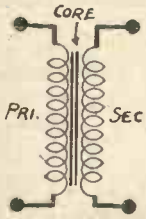
Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

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.

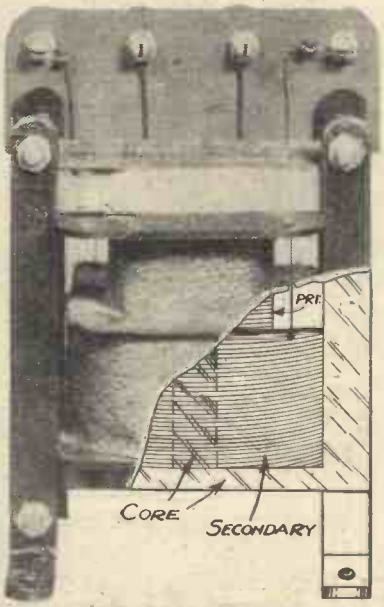
LONDON READERS PLEASE NOTE: Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

"INSIDE" INFORMATION

No. 11. L.F. TRANSFORMER



The "diagraph" below shows how the two windings are assembled on a core, the ends of the windings being taken out to the terminals. This one is a step-up transformer—with fewer turns in the primary than in the secondary. The theoretical diagram (left) clearly illustrates the principle.



"P.W." DIAGRAPHS.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 774.)

and although the H.T. remains at 150 the anode current goes suddenly soaring up to perhaps 40 milliamps!

This is simply ruinous, for the normal plate current takes out of the valve nearly all it is capable of giving. A jump to anywhere near double its rated output is over-running it just as seriously as a big increase in L.T. voltage would have done.

Of course, when the G.B. plug goes into the 18-volt. socket, down goes the plate current to normal size again. But alas! the damage may all be done in that second or so that the valve has no bias at all; so remember it must never be "on" with no grid bias applied to it. In other words, it must always be "off" when the grid-bias plug is shifted from one socket to another.

THE POWER THEY USE.

N. P. (Leeds).—"Rome has been coming in so well that it recently started an argument. My friend declared that this was due to the fact that it had a higher power than any other station in Europe. Is that true?"

No. The aerial power of the Rome station is 75 kw. and there are several other stations in Europe using the same power in the aerial, amongst them being Stockholm (on an adjacent wave-length), Oslo, Norway, on 1,071 metres.

The new German Regional stations at Muhlacker and Heilsberg also have powers of up to 75 kw., though, being new, they may not yet be using the full punch of which they are capable.

Most powerful of all is the new Warsaw station, which is due to start up on Christmas Day on 1,411 metres, with an aerial power of 120 kw.!

HOW TO MAKE A "CONTRADYNE" COIL.

T. A. (Hale End, Essex).—"Though it is an old-fashioned set, it is perfectly O.K except for the one trouble of the low-wave station coming through on the long waves. Otherwise the long-wave side is quite O.K., but when I get near the bottom of the condenser I can hear the London Regional plainly.

"I am told the other cure is a 'Contradyne' Unit. If this uses a simple coil, as I am told, can you tell me how it is made and the number of turns, etc.?"

Essentially the "Contradyne" coil is simplicity itself, consisting merely of a winding on a piece of 8- or 9-ribbed tube, 2½ in. in diameter and about 3 in. long. This is mounted on a wooden baseboard about 4 in. × 4 in., with an ebonite strip measuring 4 in. × 2 in. to hold two terminals and an on-off switch.

For this coil you will need two ounces of No. 26 D.S.C. wire, a short piece of flex, and a few odd screws. The terminals are mounted at either end of the ebonite strip, with a switch in the centre enabling the coil to be cut out of circuit if desired.

The first thing to do is to file the ribs of the coil former, making ten file cuts in each rib. These cuts are placed equally along the former and form ten separate slots for the winding.

Each slot is about ⅛-in. wide, and there is about ⅛-in. between them. Preparing this former is the longest part of the business, but it is really quite simple with a sharp file, or if preferred the slots may be cut with a hack saw.

When finished mount five small terminals between adjacent ribs at one end of the coil, which we will call the top. The first of these terminals is labelled O, and it bears the beginning of the winding.

Each slot on the former has wound in it twenty turns of the D.S.C. wire (making a total of 200 turns in all), and tappings must be taken to the terminals at the following turn numbers: The first terminal (which is marked with an O) takes the beginning of the winding, and at the 70th turn the wire is taken to No. 2 terminal. It is then carried on again, winding in the same direction all the time, to the 100th turn, which comes out at terminal 3.

The winding is carried straight on again after this to the 150th turn (which goes to terminal 4), and the final 50 turns, when wound on, are secured to the end of the coil (200th turn) (terminal No. 5). The coil is then ready for mounting.

This can be done in any convenient method, one of the best ways being to cut a strip of wood and jam it into the bottom of the coil, passing a screw through this into the baseboard. Alternatively any other convenient method may be used.

The remaining operations are very simple indeed, one terminal being marked A1 and the other A2. A1 is joined to one side of the on-off switch and to a flexible lead which can be taken to any of the terminals. The remaining side of the on-off switch can be taken to A2 and to 0 on the coil.

In use you simply join your aerial lead-in to the A1 terminal, and the A2 terminal then goes to the aerial terminal on the set. When the switch is in the "on" position the circuit is exactly as formerly, and the "Contradyne" coil is out of circuit. When you push the switch into the "off" position you bring the "Contradyne" coil into action.

You will find that the results from it will depend upon the setting of the flexible lead, which should be placed in turn on 70, 100, 150 and 200 terminals to see which gives the best results under your conditions of working, to exclude the low-wave station when working on long waves.

Curiously enough you may find that it actually *improves* long-distance stations, besides completely removing the trouble of the "local" coming through. But this is a side issue, and merely results from the aerial being brought more nearly into tune with the long-wave station.

The real purpose of the "Contradyne" coil is not to improve the long-wave stations so much as to exclude the local when switched over to long waves, and we think you will find after adjusting the flexible lead carefully that it is wonderfully capable of carrying out its job.

CONNECTIONS FOR A REJECTOR.

D. C. D. (Rochdale, Lancs).—"I am afraid that an ordinary wave-trap with a simple set like this will be no good at all, as I am only about nine miles from the new Moorside Edge station. At first, they said I must have a new set with H.F. valves, but I stood out against this, and in the end they admitted that though ordinary wave-traps were no good I might be able to separate both programmes when I wanted to with a 'Brookmans Rejector.'

"So I bought the set of parts, consisting of an ebonite strip, a couple of terminals, ·0003 fixed condenser, two coil sockets, two switches, and three little variable condensers, two ·00075 and one ·0005 mfd. What are the connections for this? (The photograph does not show all the wiring.)"

The left-hand terminal is the one to which the aerial is fixed and this is joined to one side of the ·0005 variable, one side of the first ·00075 variable, and one side of the ·0003 fixed. The other sides of the ·0003 and ·00075 variable are joined together and taken to one side of the first switch and to pin of the coil holder.

The other side of this switch and the socket of the coil holder are joined to the remaining terminal on the ·0005 variable, to one side of the second switch, and to the flex lead which goes to the second coil. The other side of this second switch goes to the other (A_2) terminal, to the pin of the second coil holder, and to one side of the second ·00075 variable condenser.

The final connection is from the other side of this ·00075 to the socket of the second coil holder. In use you simply tune each of the variables to cut out an unwanted transmission, and the corresponding switches enable you to bring in these stations if wanted.

LISTENING-IN NEXT DOOR.

E. T. M. (Glasgow).—"There are three sick people in the house next to mine, and I thought of running flex leads from my set to enable them to hear one loud speaker and one pair of 'phones. But I am now told this is illegal. Is that right?"

There is usually no objection to such a plan properly carried out, but the point is that in such a case *both* houses require a receiving licence. You might inquire at the Post Office to see if special facilities are afforded in cases of invalids, etc., but we are not aware of such exceptions, and we are afraid you will find that a second licence must be procured.

WAS IT TURIN?

L. M. C. (Chepstow, Mon.).—"In 'The Key to the Ether'—for which many thanks—it says that Turin calls itself 'Radio Turino' and works on 273 metres, but I get a station on 500 metres which says 'Radjio Turino.' It must be just about 500 because it is below Brussels No. 1, and I have heard this announced unmistakably. Does Turin use two wave-lengths?"

No. Turin's wave-length is 273·2 metres and the confusion must have arisen when Milan was relaying the Turin programme. Milan works on 501 metres with the same power as Turin, and possibly you heard an announcement intended only for Turin listeners, instead of the dual announcement.

GRID BIAS AND PLATE CURRENT.

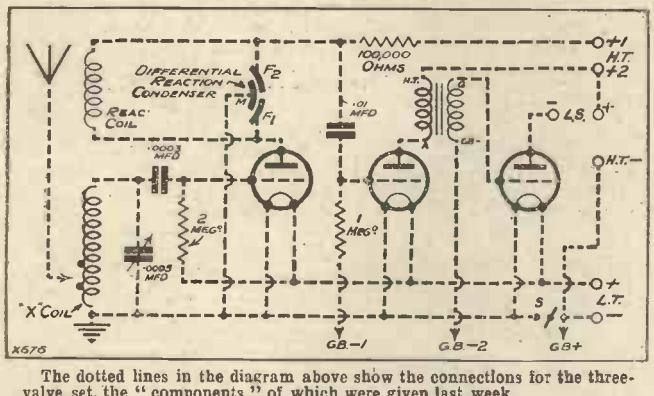
S. M. (Warwick).—"I have not used very high voltage on a very large power valve before, and there is one little thing about it that puzzles me. With 300 volts actually on the plate of the valve, and the recommended grid bias, which is 27 volts (both measured accurately) I should get an anode current of just under 20 milliamps.

"Actually the anode current is well over 20 milliamps, though I can reduce it by using extra negative grid bias. In the circumstances which would be the better way, to run it with the wrong current or with the wrong bias?"

With very large valves of this type the figure which the makers give as representative do not invariably apply to all their particular valves. It is recommended that if the correct value of volts actually on the anode give slightly less anode current than the valve is rated for at that voltage, the negative grid bias should be decreased slightly.

(Continued on page 778.)

POPULAR "WIRELETS" No. 26



The dotted lines in the diagram above show the connections for the three-valve set, the "components" of which were given last week.

As only X-coil selectivity is employed, the set would not give adequate selection near a Regional station, but it is almost ideal for the country listener with no local station quite near.

TECHNICAL TWISTERS

No. 41. Testing Condensers.

CAN YOU FILL IN THE MISSING LETTERS?

One good method is to join a voltmeter and battery in . . . . . with the . . . . . to be tested.

A momentary flick of the needle denotes . . . . . insulation.

If the voltmeter needle shows a constant reading, the condenser is . . . . .

When the full battery voltage is indicated by the needle the condenser is . . . . . .

Last week's missing words (in order) were: Maker, Gases, Specific Gravity, Gas, Burst.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 776.)

Similarly, if the anode current is slightly *greater* (as in your case) than it should be at the given voltage, negative grid bias should be so adjusted to give the requisite anode current.

The average grid bias figures are given as a guide, and should not be followed too literally, for as stated, individual valves vary somewhat.

Do not forget that when adjusting grid bias to a large power valve, or for that matter to any L.F. valve, neither of the grid-bias plugs must be removed from the battery whilst the set is "on." It should always be switched off until the plug is put into the new position, and if this is not done there is a likelihood of damaging the valve's emission.

* * *

TOO MANY H.T. + TERMINALS.

R. E. (Old Trafford, Manchester).—"In my last four-valve set I only had two H.T. + terminals, and it was perfectly satisfactory, but in the new one I find there are four. Are all these really necessary?"

Having a large number of H.T. positive tappings on the set enables each particular valve to be given exactly what high-tension voltage it requires. For very selective and high-quality reception it is frequently necessary to adjust the high-tension accurately in order to obtain the best results, and it is difficult to do this for separate valves unless each has a separate high-tension supply.

It is for this reason that the high-tension positive terminal is duplicated or triplicated on multi-valve sets, and we think that in general it is a refinement that is well worth while.

* * *

AERIALS AND INSULATION.

D. G. D. (Huddersfield).—"Is it a fact that even if the lead-in is insulated it should not be brought close to the steel window frame? What difference can this make if a good insulated covering is round the wire?"

In radio we are constantly up against the fact that the ordinary insulator does not always "insulate." In the ordinary electrical sense of the term we say that air is an almost perfect insulator, but in wireless we use condensers with air dielectric, and we find that the wireless currents apparently flow across these just as well as though there was a connecting wire instead of air between the plates!

There is, of course, a technical explanation for this, but lack of space prevents us entering into it here. All we need say is that what is a good insulator to ordinary electrical currents, may, under certain conditions be capable of acting quite as a good *conductor* to high-frequency currents, of the type which we are dealing with in wireless reception.

It is this fact which conditions the position of the aerial lead. It may be properly "insulated," and therefore it may be quite impossible for the *ordinary* electric current to leak across from it to the steel window frame. But the aerial lead-in will not be carrying *ordinary* electric currents.

Instead it will be carrying high-frequency currents, which are able to "pass across" small spaces, rubber, air or other "insulation." Thus, in order to prevent this high-frequency current from running away to earth, the only safe plan is to remove the wire altogether from the neighbourhood of any conductive surface which is connected to earth.

It is for this reason that the lead-in should be spaced away from walls, roofs, metal windows, etc., as is frequently recommended in "P.W."

TESTING H.T. BATTERIES

IT is no fun at all being a "lone voice in the wilderness." I know, for I have had the experience. You know yourself that you are right—if you have the courage of your convictions, and you also know that others agree with you.

Nevertheless there is all the time an uneasiness in one's mind. One feels that there is a danger that unthinking critics may label one a "crank."

When, in due course, one's ideas are generally endorsed one gets one's reward. You feel you have accomplished something definite.

At this particular moment I have in mind the question of H.T. battery tests.

For years the general practice has been to give H.T. batteries continuous discharge tests through fixed resistances.

The results were plotted in the form of curves showing the declining voltages of the batteries against hours of discharge.

I have always maintained that such curves are practically valueless, and that they are liable to give false impressions of a battery's efficiency.

Quite Misleading.

I based this on the very evident fact that there are other things that affect the useful life of an H.T. battery besides mere zinc consumption.

For example, there might be poor insulation between cells which would impose a current drain that doesn't affect the battery's life appreciably during a matter of a few weeks, but which becomes important when months are considered.

But more serious is the matter of paste. It often happens that a battery's actual life in practice is more determined by its paste than by its actual zinc consumption process, which is part and parcel of its current generating powers.

When the paste dries up the battery ceases to be a battery, even although its zinc is in good condition.

And inferior paste *does* dry up too quickly when the battery is used in warm living rooms.

No, constant discharge tests are widely divorced from actualities.

H.T. batteries are used for restricted periods over months not continuously for so many hundreds of hours.

Quite recently I noticed a contemporary started to give H.T. battery "period" test reports, and more recently still the Radio Manufacturers' Association passed the following resolution:

"A decision was made to recommend to members certain methods of testing H.T. batteries, and the following specification is given:—

"'Batteries should be discharged through a fixed resistance for 30 hours per week (6 hours per day for 5 days per week), readings being taken at the end of each day's test until the voltage has fallen to 60 per cent of the nominal initial closed circuit voltage—such initial closed circuit voltage being taken as 1·35 volts per cell. For small type batteries the fixed resistance should be 150 ohms per cell, and for super-type batteries 100 ohms per cell.'"

Step in the Right Direction.

That is a step in the right direction, but I think 4 hours per day would be better—as being nearer the kind of usage H.T. batteries are subjected to by listeners. But the recommended resistances are fairly well chosen.

They provide for 15- and 10-milliampere discharges for super-type and small type batteries.

Well, I have advocated this sort of thing for years and years, and all H.T. batteries reviewed by "P.W." are tested in this way. But I expect the R.M.A. have the idea that theirs is a new and original suggestion. 'Twas ever thus!

G. V. D.

THOSE RADIO PLAYS

(Continued from page 763.)

no." Agonised whispers are heard, "Dying, dy-ing, dy-ing, dy-ing," etc.

Someone kills someone else. Does he conclude his dirty work with an agonised ejaculation of remorse? Probably, but again the microphone phantoms contribute their dreadful comments, "You kil-led him. You kil-led him. You killed him, killed him killed him, killed him," etc., etc.

Another play personality remembers something during his last seconds of earthly existence. Once more the spectres of the ether take charge. "You're late for school, late for school, late for school, late for school. H-u-r-r-y up. H-u-r-r-y up. Hurry up, hurry up, hurry up," etc., etc.

All very effective, most effective, but, I maintain, a simply crazy technique. One that reminds one all too clearly that the gap between reason and madness is very narrow—too narrow for it to be right for the B.B.C. so to play on our deepest emotions.

Give us reality if you must, but for goodness' sake give us life and laughter rather than sorrow and death. That is what I, for one, ask of the B.B.C. We have all of us too many private miseries with which to contend without it being necessary for the B.B.C. to broadcast a quota to us. And how the feelings of some unfortunate listeners must be harried by at least a good many of the sporadic outbursts of the temperamental, art-for-art's-sake B.B.C. dramatic department!

Was I Cheered Up?

One evening not so very long ago, I happened to be feeling just a trifle "off colour." I hadn't suffered any particularly bad fortune, hadn't been recently bereaved or anything like that. I'm not often fed-up, and I wasn't very severely so that evening. I merely felt that I wanted something to divert my attention from everyday affairs. I didn't even seriously want cheering up. Fortunately, I seldom do.

However, I turned on the radio, deciding to listen to a play that was "billed" in the "Radio Times." I didn't know what it was about—in a usual B.B.C. terse manner, the thing was described merely as "A Play by ——."

My goodness, didn't it make me happy! Didn't it send my spirits soaring up! It did—*not!*

That radio play was the most depressing experience it would be possible to imagine. A ghastly moan of sheer despair ran through the whole of it. The Dramatic Department scored a distinct hit. I shivered and trembled and would have switched off had I not been held by an unhealthily morbid curiosity as to the outcome of a groaning wretch's harrowing experiences. (I wondered how the actors could hold on to their sanity.)

You see, they'd got me firmly in their grip. The play was a huge success! It happened to be about the only day in the whole year that I was feeling slightly blue—a ripe candidate for neurosis. And my blues unhappily coincided with one of the periodic demonstrations of the B.B.C. Dramatic Department.

You may say it served me right for switching on a B.B.C. play, as I apparently knew what to expect. Correct, it did!

FOR THE LISTENER,

(Continued from page 762.)

Speaking Voices.

Mr. Sitwell said that nowadays one could never hear what actors were saying because they spoke their parts so badly. Unfortunately for my belief in him, I had listened that afternoon to Henry Ainley and Baliol Holloway in the "Tent Scene" from Julius Cæsar, and also to Noel Coward and his amusing playfellows; and I had heard with ease every single word they uttered.

Mr. Ainley has a glorious voice which he uses, as near as may be, to perfection. Noel Coward's skit on his own play, "Private Lives," was as entertaining, if not more so, than the play itself!

Dark Subjects.

I liked Alexander and Mose. I always do like these "negro" comedians, whether the negro part of them is in the skin or simply stuck on the face.

Their quiet, drawling voices and their simple fun. I liked it when Alexander got out a mouthful of polysyllabic words, as long as a sea-serpent and as heavy as the Encyclopedia Britannica; and Mose replied, "Says which?" After which, Alexander translated it into English, very short.

It reminded me of how George Graves used to say, "In other worrrds!" Or was it George Robey? Anyhow, it was a George!

Theatrescope.

This was a medley of songs belonging mostly to the last generation; with a few modern ones thrown in for comparison. I do not think that anybody could honestly say that the old ones were better. Perhaps the range was a little wider.

I like the modern syncopated songs; I like the lilt and the catch in them: but I confess I sometimes wish that they were not always sung by love-sick swains—"I'm sighing for you," or "Calling for you," or "Longing for you," or "I want to be near you"—slightly monotonous perhaps.

How Would You Spend It?

That million pounds, I mean, which is reputed to be the B.B.C.'s income for next year.

My personal view is that the greater part of available money should be spent on the purely entertainment side of the programme; on the vaudeville, the plays, and the lighter music; and that the whole of this side of the programme should be placed under the direction of some Cochran of the wireless whom I would pay highly.

I put myself the other evening in the position of a man who comes home tired after his day's work, and wants to be amused. At 6.40 he had a spell of Brahms' pianoforte quartets; at 7 p.m. a twenty-five minute talk on "Live Stock Types for the Meat Trade To-day," followed by another twenty minutes of "The Need for Science in Commerce."

Then a quarter of an hour's interval.

Then the symphony concert, followed at 10 o'clock by another talk by Wickham Steed on some topic of international politics. By that time I imagined the worker either in bed or drunk.

Wanted, Imagination.

The B.B.C. staff does not lack in earnestness; and that is a good quality. On the educational side they do well. On the entertainment side there seems to me to be a lack of imagination.

I do not quite see how this is going to be remedied except by the appointment of a Director of Entertainment, a man with a flair for the "cakes and ale," with sufficient imagination to visualise a whole nation thoroughly enjoying itself in one house.

TECHNICAL NOTES

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

Pick-up Curves.

SEVERAL manufacturers of gramophone pick-ups have for some time past been supplying curves with the instruments, showing the response to the various frequencies for the usual musical range.

This is very satisfactory, and when you find a manufacturer prepared to supply an actual performance-curve of any instrument, you know that he has got beyond the guesswork stage and definitely understands the why and wherefore of the various points of design of the instrument in question.

It is, in fact, noteworthy that a considerable improvement in electrical pick-ups has taken place in the past two or three years, not only in regard to sensitivity, but also in performance, compactness and design.

A Curious Advantage.

With regard to the performance-curve of the pick-up, you will notice in some cases that this curve shows apparently an increasing sensitivity or response as the frequency *falls*, and you might think that this indicates a defect in the pick-up.

At first thought you will be inclined to presume that the ideal curve would be one which showed a *uniform* response over the entire range, as a matter of fact, the increasing response for the lower frequencies is an advantage in a pick-up, because it helps to counteract a defect which is necessarily inherent in gramophone records.

Amplitude Limits.

If you think about it for a moment you will realise that there is a definite limit to the amplitude (the side-to-side motion) of the recording needle, because if the needle were allowed to swing too far it would go into the next adjacent track.

If this limitation were not imposed, the recording expert would prefer to allow increasing amplitudes for lower frequencies. The fact that he cannot do so means that he has in effect to adopt a falling-response curve for the lower frequencies for his electrical *recorder*.

Now if the electrical *reproducer* has a rising-response curve in these regions, it makes up to some extent for the effect of the record and gives us more or less the same result as though we had an electrical reproducer with a straight-line curve and a record in which there was no restriction as to amplitude.

This peculiarity of the curve of the pick-up represents, in fact, rather an ingenious dodge for getting over a practical difficulty.

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When contemplating the building of a new receiver I think it is safe to say that in most cases the design of the low-frequency amplifier is fairly easily decided. You have, of course, to decide what amount of L.F. amplification you require, and this to a large extent determines the number and type of valves ; then as regards the question of inter-valve coupling this is (to some extent, at any rate) a matter of taste and fancy. The L.F. end of the set need not, and I think in most cases does not, cause any particular anxiety.

But the high-frequency amplifier is a different question altogether, and many experimenters have considerable difficulty in making a decision as to the amount of high-frequency amplification to use and also as to the type of valve which should be employed.

The moment you go in for elaborations in the H.F. you are apt to complicate the design of the circuit as well as the operation and control of the receiver when completed. It is for this reason that beginners, at any rate, are often advised to confine themselves to a single stage of H.F. amplification.

Planning H.F. Stages.

We have discussed previously in these Notes some of the points which arise in connection with the H.F. amplifier, including the use of screen-grid H.F. valves and ganged condensers.

Now I think it is often rather difficult to decide whether to use, say, a stage of neutralised H.F. amplification or to employ a screen-grid stage.

This largely depends on whether you attach more importance to H.T. current economy than to range or sensitivity.

If H.T. economy is the major consideration (and there are many cases where this is vital, but sensitivity not very important), then you would be well advised to consider using a stage of neutralised H.F.

Make-Shift Circuit.

Another point which I should mention is that to get the full benefit from the screen-grid valve the circuit should be built up to suit this particular valve.

It is a common thing for experimenters to make a sort of modification of an existing circuit—not primarily suitable at all for a screen-grid valve—and then, having fitted the new valve, to come to the conclusion that the S.C. is not all it is cracked up to be.

The screen-grid valve, like any other radio component—in fact, much more than most—must be used in proper and appropriate conditions if you are to derive the full advantage from it.

Finally, note that the effect of grid bias upon quality and H.T. current consumption—an important point with valves generally—is particularly important with the screen-grid valve.

The G.B. Must Be Right.

Unless the right amount of grid bias is applied to the valve you will find that the H.T. consumption will be very wasteful and, in any case, as mentioned above, even when the valve is used under correct conditions, it makes quite a fair demand upon a low-capacity H.T. dry battery.

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Incidentally, the grid bias for the screen-grid valve generally amounts to one to three 1½ cells.

Screen Voltages.

Perhaps before changing the subject I should emphasise the importance for really best operation of using correct voltages. For instance, the screen voltages applied to a screen-grid valve should be carefully adjusted and, furthermore, you should check up this voltage from time to time by means of a reliable voltmeter to make sure that it has not dropped seriously below the proper value.

If the voltage is derived from a dry battery, as is frequently the case, you may find that a screen-grid valve is misbehaving itself, and that the trouble is due to the screen voltage having gone all wrong.

The experience gained with the ordinary valve as regards falling voltages is quite misleading when it comes to a screen-grid valve ; as you know, with an ordinary valve, if the voltage drops it generally means a gradual loss in the volume and quality of reproduction, but with the screen-grid valve various peculiar things may happen ; for one thing the valve may be set into oscillation.

A Matter for Trial.

As regards the anode voltage for the screen-grid valve, this should in practically all cases be well up to the maker's specification and, in fact, I have often found that better results are obtained by applying even more H.T. voltage than that specified.

On the other hand, I should say that you can sometimes get apparently just as good results with a somewhat *lower* value of anode voltage than that specified.

This, however, is a matter which you can very easily discover for yourself. Sometimes the voltage of a battery which you have on hand just falls a little short of that required for the valve, and in such a case it is clearly a convenience if you find you can use the battery without the addition of any extra voltage.

De-Tuning.

I am often asked what is the simplest and most suitable method of controlling volume, but the answer to this question depends very largely upon the type of circuit used and also upon the conditions, and so I will indicate briefly some simple ways in which the volume control can be effected.

In the first place, taking a set which has only a single-tuned circuit and not requiring reaction, you can often obtain volume control for the local station by the very simple process of detuning.

Generally speaking, this method cannot be used in other cases for the obvious reason that you are liable to run into interference from other stations and also to introduce distortion—in many cases the distortion introduced in this way is very pronounced.

Another method is to put a variable resistance in the filament circuit, but this, again, is limited in its application. For example, if the filament current in the low-frequency amplifying valves is not up to

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the required value, it is practically certain that distortion will be produced.

Perhaps this will not be so noticeable if the actual volume of reproduction is very small, but if the volume is considerable you will find, as a rule, that this method has its drawbacks.

Potentiometer Control.

One of the commonest methods of volume control is to use a potentiometer which may, for example, be connected across the output side of an L.F. transformer, the slider of the potentiometer being connected to the grid of the succeeding valve.

In this way the voltage which is passed on from the transformer secondary to the next grid can be varied up to the whole amount of the voltage output of the transformer secondary.

In the case of an R.C. unit, the potentiometer volume control may take the place of the grid-leak, the resistance of the potentiometer being used for the leak, whilst the voltage passed on to the first L.F. valve is, of course, determined by the position of the slider.

Transformer Characteristics.

There is an important point to bear in mind with regard to volume control. Take the case just mentioned above, where a potentiometer is connected across the secondary of one of the L.F. transformers.

If the actual resistance of the potentiometer is too low, it will seriously upset the characteristics of the transformer and may for this reason, apart from any other, introduce distortion.

Generally, however, the total resistance of a potentiometer intended to be used as a volume control is pretty high, so that in the case of a component especially intended for this purpose the danger just referred to is not likely to arise.

As a general rule the resistance of a potentiometer intended for volume control purposes with a transformer should not be less than about half-a-megohm. If the volume control is to be used with an R.C. coupling stage, however, its resistance should be roughly the same as that of the grid leak which it displaces, a value of about 1 to 2 megohms being generally suitable.

Consider Your Filaments.

Where the dimming of the filaments is resorted to as a means of volume control it is better that this should be applied to the filaments of the H.F. valves rather than the L.F. ones.

At the same time, remember that the running of present-day dull-emitter filaments at much below their rated temperature is apt to do them considerable harm. In any case, as I have already mentioned, the control of volume by filament temperature should be avoided, if possible.

Referring to the question of power valves, which we were talking about some little time ago, readers are often in doubt about the best type of valve to use in the detector stage, especially where a power valve follows.

Sometimes we are told that a high-impedance valve should be used as a detector, sometimes that a medium-impedance valve will work best, whilst sometimes we hear of a low-impedance, or virtually a power-valve, being employed.

For this reason a detector which can handle a fairly large input and output of power is sometimes referred to as a power detector, but this term is liable, I often think, to give rise to misunderstanding, especially with beginners; it simply means that the detector can handle a larger amount of power than is usually passed through the detector stage.

Perhaps the best way to consider this is to imagine we have a receiver in which either very powerful signals are being received or in which there is a large amount of high-frequency amplification, the result in either case being that fairly heavy power is supplied to the detector.

Rectification Methods.

Now suppose there is only a single stage of low-frequency amplification and that this comprises a power valve. Then in order to get the best out of the power valve it is obviously necessary to feed a fair amount of power into it and as this comes (in the case we are supposing) straight from the detector without any intermediate amplifying stages, it is clear that the power actually delivered by the detector must be fairly large, larger than it would be if we were going to have some intermediate step-up stages between the detector and the output valve.

The so-called power detector works in precisely the same way as the ordinary detector, that is, by means of grid-leak or anode-bend rectification. It is, however, important if the best results are to be obtained that a larger value of anode voltage than usual should be employed.

A Suitable Guide.

This has the effect of increasing the magnification and together with the low impedance of the valve enables large grid-swings to be dealt with without introducing distortion.

From the above remarks you will see that there may be no particular advantage about using a low-impedance power-handling valve in the detector stage unless the conditions both in the high-frequency and low-frequency parts of the receiver happen to call for such a valve.

A guide in the matter is the question of the amount of power which is fed into the detector and the amount of power which the detector is called upon to feed into the next stage. As I say, if the total amount of high-frequency amplification or the strength of the transmission is such that powerful signals are fed into the detector, or if there is not to be a great deal of low-frequency amplification subsequent to the detector, then there may be an advantage in using a low impedance valve for the purpose.

The Effect on Reaction.

I should mention, however, that it is not uncommon when a low-impedance valve is used in the detector stage for trouble to be encountered with the control of reaction. In fact, for general purposes I do not advise you to handle heavy power at the detector stage.

You will generally find it more satisfactory from every point of view to use a fairly sensitive detector efficiently operated and to rely for actual volume upon proper arrangement of low-frequency amplifying stages.

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