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No. 451. Vol. XVIII.

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January 24th, 1931

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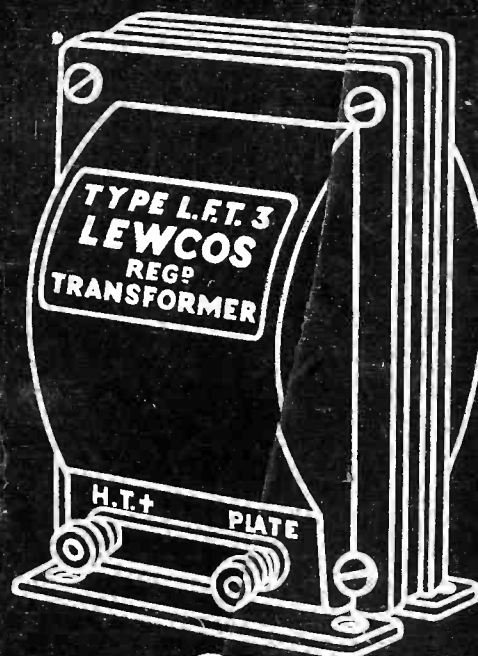


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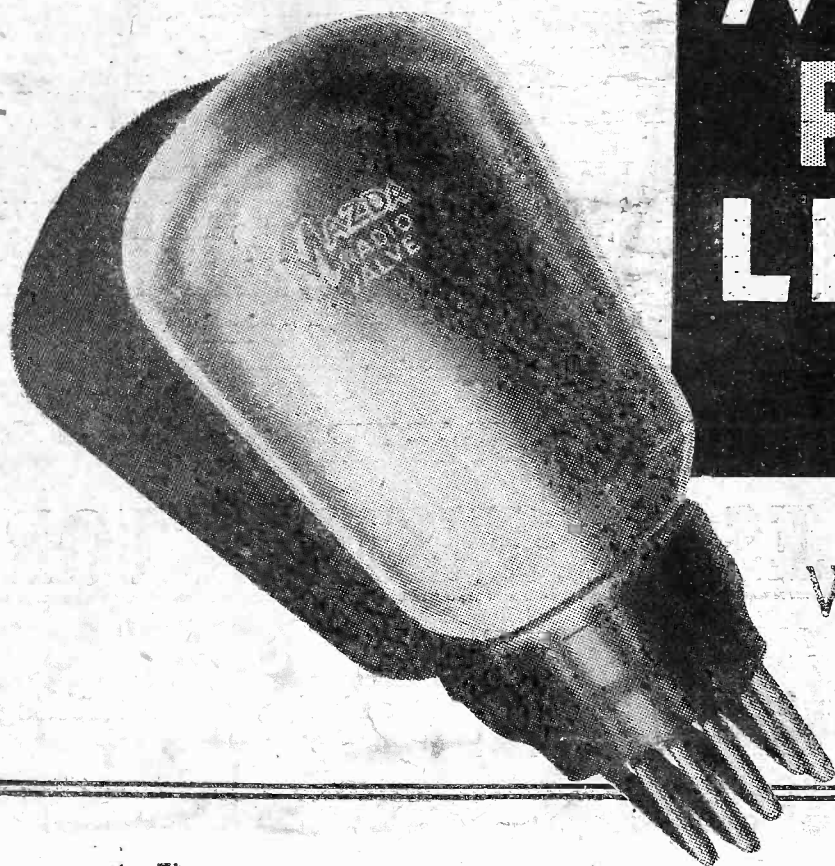
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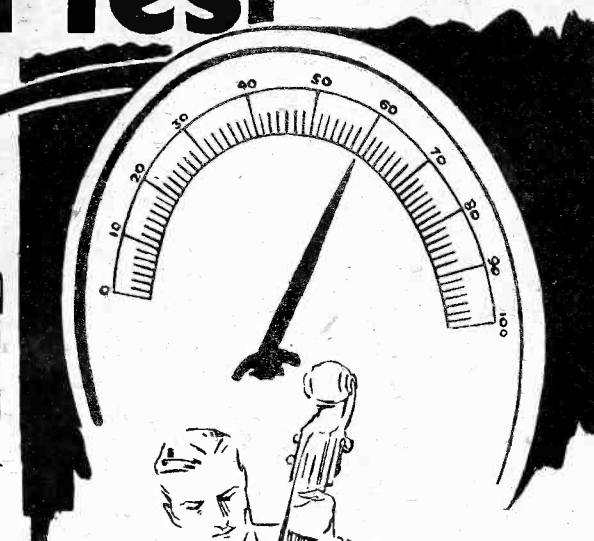


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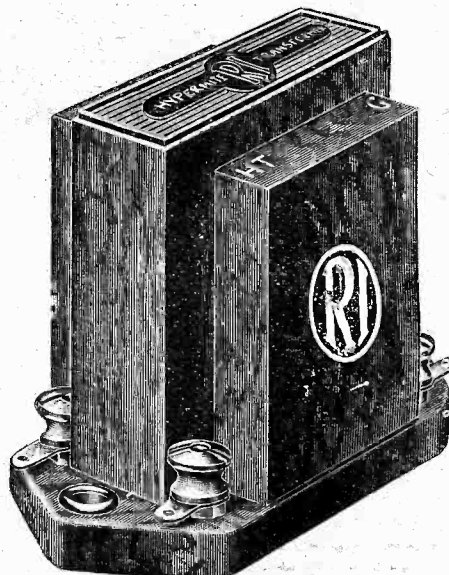
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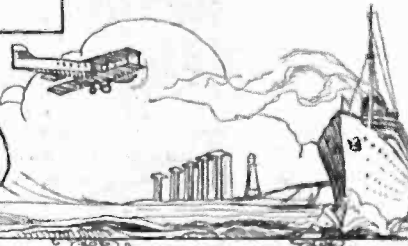
Editor: NORMAN EDWARDS.

Technical Editor: G. V. DOWDING, Associate I.E.E.

Assistant Technical Editors: K. D. ROGERS,

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BRAVO JACK!

SOCIETY NOTE.

CHI HOA! WHAT HO!

AND ICELAND, TOO!

RADIO NOTES & NEWS

**TOO MUCH BRASS.
VALVE BATTERY.
HOW IT PANS OUT.
WHY "FRET"?**

Bravo, Jack!

ANOTHER miserable confession! After eschewing dance bands for years I have at last tumbled down before Jack Payne's bunch of merry minstrels, and now look forward to hearing them. It may be weak and lowbrow of me, but at least I can claim the virtue of my candour in admitting my conversion, and I should hasten to point out that this little human flop of mine must by no means be taken to mean that I forswear my ancient gods, Beethoven & Co. Nunno! It's merely a proof of my catholicity of taste. So, bravo, Jack! But you'll have to do something for that shortness of breath which I observe when you make an announcement 'tween jazz and jazz!

Radio Society Note.

IHAVE been favoured with a copy of the 1930-31 syllabus of the Golders Green Radio and Scientific Society. It takes us to June 21st, and that alone is something to think about in this weather. And what a syllabus it is! Visits to Brookmans Park, Croydon Air Port, the N.P.L. and the H.M.V. works; a

dinner, a dance and a D.F. competition; lectures, demonstrations and so forth. Someone at G.G. knows how to organise.

Can It Be Tried?

ILEARN that in Canada daily information is broadcast about unemployed people and what they can do, so that employers wanting staff can get quickly into touch with the men who want the posts. I really do not see why something of the kind cannot be done here—I have mentioned it before—especially as we should be quite willing

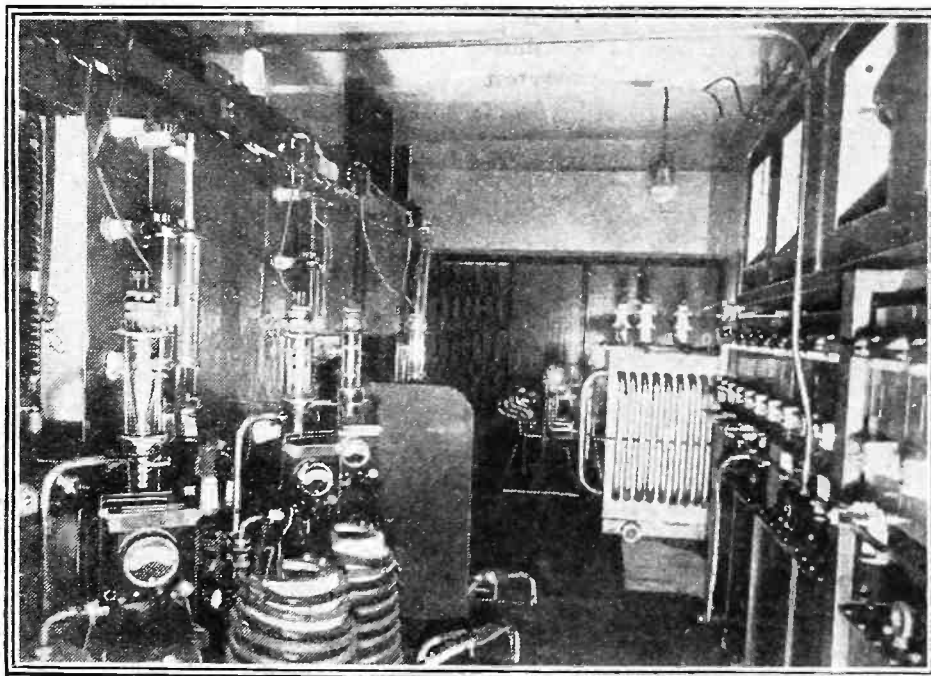
to sacrifice the School Talk or Foundations of Music for the sake of the unemployed.

"Mike" Fright Vanished?

COLONEL BRAND, the handsome, urbane receptionist of the B.B.C., has resigned for lack of a job. No longer does the professor perspire, the singer twitter with stage-funk, or the comedian play castanets with his knees when he finds

no aural evidence—that away down in Indo-China, to wit, at Chi Hoa, near Saigon, there is a lovely, powerful short-wave broadcasting station, with a wave 49.1 metres long and a call-signal P K 3 A N. What could be nicer than that? Listen for announcements in French, English and Chinese: the Chinese you will recognise by its similarity to Japanese (Ha! ha!). In the intervals a bong on a gong will strike the awful hollow of thine ear (Shakespeare nearly!). Well, who will be the first to write and tell me what the Chinese sounds like?

HAVE YOU HEARD ICELAND?



This view was taken at the Iceland broadcasting station, situated about 5 miles from Reykjavik on a hill-top 500 ft. above sea-level. The station will transmit its programmes on 1200 metres, and also work telegraphy to ships on 600 metres outside broadcasting hours.

And Iceland, Too!

THAT paragraph reminds me about the Iceland station which, as I write, is not in action, though from reliable accounts it may be expected "on the air" any day. Interception of this newcomer will not be easy in these parts as the wave-length will be 1,200 metres and the announcements will only occasionally be made in English. However, it is worth while keeping an ear cocked for it, as a curiosity for the log-book.

himself staring at the microphone. Familiarity has bred contempt. The only snag in the argument is that assuredly the B.B.C. does occasionally present newcomers to the microphone. Are we to understand that they derive vicarious courage from the "old-timers," or do the announcers support them on their way to and from the studio?

Chi Hoa! What Ho!

NOW then, you past masters of manipulation, here's a job worthy of your notice. They say—though I have

Gleaned from "the Trade."

ACCORDING to a trade paper a Southport dealer has adopted the slogan, "A home w/out radio is as bread w/out butter." That will remind many of us old 'uns of the early days of the phonograph, when we were told that "a home without a talking-machine is like a home without a mother." The same paper reports the disappearance of a portable gramophone from the shop of a Liverpool dealer—a magistrate, humorously enough.

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

It is thought that someone just blew in, lifted the article, and calmly walked out with it. Very feasible! That's the simplest way of looting it is possible to conceive.

Too Much Brass.

I HEAR my Yorkshire friends cry "Impossible!" but they are referring to t'brass which makes the mare to go, whereas I allude to the brass bands with which we listeners are so frequently regaled by the B.B.C. As the "Northern Echo" truly says, "Their brassiness is too brazen." Many people, no doubt, "like a good band," they like the machine-like precision of the players and perhaps conjure up visions of happier and warmer days on the seaside esplanades. But I consider that they do not come over well and, in fact, are often repellent. A little less of them is all I ask.

Soldered or Attached?

IN an attempt to pander to my weakness for criticising newspaper wireless, for which effort I am grateful, N. W. (Falmouth) sits rather heavily upon some wretched scribbler like myself for advising readers to "attach" a wire to some terminal or other. He thinks that the word should be "soldered." A trifle strained, N. W., for a wire which is soldered to something is attached to it, and a wire which is attached to something may be soldered. However, I agree that soldering is the best way in most cases, though as an old-timer, I consider its importance to be overrated. Thanks for the anecdote about the uncle who asked why you don't run your set off the gas mains!

Valve Bartery.

N. W.'s letter is such a friendly thing, just like radio gossip over a pipe and a pint, that I'm going to cull some more blossoms from it. About three weeks ago, he says, the Regional afternoon programme stopped, when a voice said, "Hullo!" thrice. Did any other reader hear it? Well, all who were listening must have heard it; 'twas doubtless a slight hitch in connection with the landlines. As to a Valve Bartship, me lad, your 61 logged stations declare you to be a tophole ether-strainer, but "quality before quantity" is the slogan of the Order. I have not had an Honours List for many months; where are all the one- and two-valvers?

How It Pans Out.

NOTHING like hard facts for crushing critics. The B.B.C. Year Book gives percentage figures which are astounding. For example, we learn that during the past year 21.39 per cent of the National programmes was occupied by "Serious Music," and 18.3 per cent by "Light Music." Dance Bands took up 10.5 per cent. Query: Does a dance band play "light" or "serious" music, and is Beethoven's Seventh Symphony, which Wagner called "the apotheosis of the dance," serious or light, by B.B.C. standards? Oh dear! Here's "Pictures"—by which I presume is meant Baird's flickers—with 4.37 per cent, as against "Drama" with but a meagre 1.88 per cent. The much maligned talks and readings took up only 9.1 per cent.

Public Radio Clock.

DOES Hythe, Hampshire, hold the record for being the first place to have a public radio clock? That is the claim which is advanced by the village, anyhow. The clock's face is 3 feet in diameter, and is electrically illuminated at night. It delivers the strokes of Big Ben and the six "pips" of G.M.T. through a loud speaker. It is automatically regulated by Big Ben. In addition to providing Hythe with this curiosity, the inventor runs a wireless exchange for over 100 subscribers. Good man!

Radio and the Metal Industry.

THE U.S. Department of Commerce issues some remarkable figures showing the debt of the metal market to radio. In the States more than three million sets are made annually, for which steel, the metal most widely used, is consumed to the

SHORT WAVES.

TELEVISION DISPUTE.

This must also be looked into.—"Daily Mirror."

We recently read of a man who connected an indoor aerial to four separate receiving sets and reproduced simultaneously four distinct broadcasts, each from a different country.

Ours sounds just like that, too.

USEFUL INFORMATION FOR THE HOME CONSTRUCTOR.

"A bolt is a thing like a stick of hard metal, such as iron, with a square bunch on one end and a lot of scratching wound round the other end."

"A nut is similar to a bolt only just the opposite, being a hole in a little chunk of iron sawed off short, with wrinkles around the inside of the hole."

"What particular qualification for broadcasting do you claim to possess?"

"As an actor, I am accustomed to perform before invisible audiences."—"News of the World."

A lady correspondent writes to say that her portable wireless set, which was leaking without her knowledge, has been responsible for burning a large hole in her new drawing-room carpet, and she asks whether we think she should claim compensation.

Well, she might put it to the acid test.

ATMOSPHERICS.

Mercury was a giddy young lad.
The fleetest scout that Olympus had.
I warrant that you could often find him
With a nymph on the pillow seat behind him;
So I'm not surprised if his noise and din
Should worry mere mortal listeners-in.

But Venus is gentle, as well as fair,
And, whatever our experts may declare,
I can't believe that our atmospherics
Are due to that goddess' wild hysterics.
Though there may be stories about her past,
She's a perfect lady from first to last.
—"Morning Post."

Radio Means Riches.

A REPORT from Canada states that the North Monaghan Council has ruled that the possession of a radio set will debar a resident in the district from receiving unemployment relief. Here is a new criterion of solvency indeed!

Those Wonderful Years.

H. A. C. (Leicester)—our Naval Correspondent who admired the navy's W/T but not its grub!—asked when the story of my radio career was to be published. A number of other readers showed a baleful curiosity to peep into my past. Well, I began to think that somebody is hoping to get some evidence against me and that I should do well to run over my history, in order to make sure that all my passages with the police of various countries were finally closed, before coming into print with my memories! However, the truth is now out!

Metallic Fret Covers.

A READER of Fleet (Hants) says that he cannot conceive how any material "west of the detector valve" could affect selectivity. Neither can I at the moment, though I am hoping to learn from W. H. F., who asserts that metallic covers on loud-speaker frets affect both selectivity and volume. Some possible screening effect in the case of portable receivers is the utmost which I can imagine, pending the receipt of more facts. Surely the hindrance caused by the fret and its covering to the free outward passage of the sound waves would be negligible. Anyone else want to speak?

The Changing World.

ONE of the most striking things in the present march of humanity is the rapid way in which the ancient peoples of the East are assimilating Western ideas and adopting Western methods. After Japan emancipated herself there was a long period of quiescence, and it took a world war to rouse the sleeping Oriental. All this because I have just heard that the King of Hedjaz and Nejd has ordered fifteen wireless stations from Marconi's, including one for Mecca. One thing remains, however. No unbeliever may enter Mecca, and so Marconi's have got to produce a Moslem engineer!

Programme Notes.

TWO notable persons worth hearing: On January 23rd Madame Karsavina will be heard in the "Yesterday and To-day" series, and on February 7th Sir Arthur Quiller-Couch, beloved as "Q" the writer, will speak at the Dickens Fellowship dinner. By the way, I am told that Mr. Arnold Trowell, who is Principal Professor of the violincello at the Guildhall School of Music, and who is playing on January 31st in a concert which is to be broadcast from Belfast, can take a fiddle between his legs and play a violin concerto. What a chance for television!

The School Gasometer.

THE programme of broadcasts to schools for the Spring Term is now ready and may be obtained free by anybody who is interested enough in the plot to ask or write for a copy. Oh, what a galaxy of heavyweights has been marshalled in array against the little nippers! How the kids will love to hear "Der Nibelungenheld" read in German and the talk on "The Cotton of the Sudan"! "Schools and Scholars in East Africa" will keep them from shuffling their feet, and Mr. Lloyd James on "English Speech" will make them love radio better and better every day.

ARIEL.

BEHIND THE MICROPHONE

BY CAPT. P. P. ECKERSLEY M.I.E.E.

In his second article our Chief Radio Consultant gives you some further amusing and interesting reminiscences concerning his pioneer days at Writtle.



I TOLD you last week some of the trials and tribulations of early days. I told you of the first broadcasts from Chelmsford and the first regular programme broadcasts from Writtle. I told you (and it is the first time it has ever been published) the dark story of the 100 times too big condenser.

Writtle—a long, low hut full of long, low people—suddenly finding fame for half a crowded hour of glorious life every Tuesday at 8 p.m. precisely. A chop and a beer at the pub, some six of us, and back through the mud, and the “dark” lantern showing us the way, overcoated and rather happy.

Through wet grass to the army hut, and then to crank up the engine. This is reluctantly coaxed from immobility to a shattering roar, the lights go up 10 T.U.’s and generators begin to squeak over.

Two Emma Toek!

Switch after switch chases power into the proper circuits, valves crinkle into a glow, high tension, and a sluggish meter shows us four magnificent aerial amps. (But never worship the amp, it’s power that counts!)

Ginger’y I pick up the microphone, gazing out across the field to the lighted orange window of the receiving hut 50 yards away. “Hullo, Ash! Hullo, Ash, is my speech O.K.? Hullo, Ash, O.K.? O.K.? O.K.? Hullo, hullo, 1, 2, 3, 4, 5,” ad lib.

And a bald head intersected by the bright bands of the telephones nods a welcoming “Yes”! The test is O.K. Shut down. Anxious eyes on the station clock (alarum, 5s.). Tick, tock, tick. Ready. On, O.K.? (Whisper)

Kirke nods, his eyes on every needle.

“Hullo c.q. Hullo c.q. This is WRRittle calling; 2 Emma toek WRRittle. I hope you are hearing me, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Hullo!” And so on for a minute.

A One Man Opera

“Our programme to-night begins with two gramophone pieces played on H.M.V. record No. 37658192. Oh! Tolly Wolly. Sop. Edith Swinger with Orch. Patent No. 92315. disc stamp 77866666606.”

You’ve no idea how much reading matter there is on a gramophone record.

As time went on we became more ambitious. Lampoons, rhymes, plays, singers, gongs, noises off; the B.B.C. has never had a programme idea that had not its embryo conceived at Writtle!

Once the artistes failed. Fog! Dense fog! I was in London at 5.30, arrived Chelmsford by train 7.40, drove a motor-bike through the thick fog (and Ashbridge frozen with fear and cold in the side-car) right up to the

door, flinging myself on the microphone (at 8 precisely) and gave the whole programme myself! It was, I remember, an opera!

My reputation for leg-pulling got me one of the most amusing postcards of my life. A certain singer came to sing, and sang. The programme was reminiscent of some of the dirger Sunday type we are so familiar with to-day.

Even I became a bit depressed. My joy was in inverse proportion to my sadness of the night before, when next day someone wrote to say it was the best burlesque I had ever given!

The Louder the Clearer

And another singer who had the somewhat unscientific idea that the louder he sang the more clearly would he be heard in far-away Europe! The wish was perhaps father to the thought, because he had left a bride to come to our barbarous land. If the wish were father to the thought, it was at any rate factual enough to count upon the equipment—more power, outside a sergeant-major, I have never heard.

It was such a surprise, too, because his intentions were not revealed to us, due to the lack of a common language. Nor did his accompanist (who was, incidentally, very charming, and caused havoc among the staff) reveal anything of the plot.

Going All Out

It was the duty of one of us to hold a microphone in front of the singer. That night our trustworthy and well-beloved Kirke was chief microphone bearer. The opening bars were played. A whistling sound and the banging of windows heralded the singer’s cataclysmic intake of breath, but Kirke and microphone went hurling backwards as the exhalations were caught in the powerful vocal chords of this tremendous lover.

Every needle of every instrument flicked hard over, the engine groaned, sparks flew from here and there, the staff was seen running for blankets to damp the microphone. I wonder did the waves ever so faintly titivate the charming ears of the far-away bride? At least, there was some fulfilment under the vaulted roof of the

Heavyside Layer.

Good days, dear days, and everything so new and untried and spontaneous. Wynn with a new doggerel, MacLarty with a new inductance, Ashbridge getting his circuits purer every day.

Vast, long, windy arguments putting volts and amps in their proper place, patient improvisations to measure things and a steady and growing knowledge. It was surely a fitting cradle for the two Chief Engineers of the B.B.C.

Excelsior!

But we spend too long in the Elysian fields; the stiffer climb awaits us, and we must leave the childish and vivid realities of the beginning, for the more breath-taking lower slopes where we started to carry that “banner with a quaint device to regions full of snow and ice?” (Is that right?)

Perhaps not. My style will, I am sure, improve as I begin upon that more serious matter “British Broadcasting.”

A STAR’S EARLY BROADCAST



The Prime Minister of Mirth broadcasting from the old Marconi House studio. Note the old-fashioned hanging microphone.

DARK DAYS AHEAD FOR RADIO

By THE EDITOR.

Until 1932 it seems little can be done to relieve the congestion in the ether, and yet more stations and more power are being thrown into the ether all the time.

It is interesting to note that some of the daily newspapers are beginning to wake up to the fact that a very serious broadcasting situation is rapidly reaching a climax.

The newspapers can be very useful in making the public, and more particularly the authorities concerned, realise that the recent trouble over the Mühlacker station was but a foretaste of what we must expect unless something is done, and quickly at that, to prevent, not only further "unlimited" congestion in the ether, but to devise some efficacious and international plan for the limitation of power of broadcasting stations.

Springing Up all Round.

Stations are not only springing up all over the Continent, but over-enthusiastic emulation of our own Regional scheme seems to have given many European broadcasting authorities a power complex of a most pronounced kind. What the upshot will be it is easy to forecast when we consider the following facts:

At the International Washington Conference in 1927 wave-length bands were allotted to the mercantile marine, commercial services, air-craft, etc., etc., including broadcasting.

The latter obtained a wave-length band between 200 and 545 metres and 1,340 and 1,875 metres. Experience has since shown—as many critics pointed out at the time, including writers in this journal—that the broadcasting allocation was insufficient: there was no adequate allowance made for expansion of broadcasting services throughout the world. The U.S.A. suffered first; now, it seems, it is Europe's turn.

To begin with, the so-called "short" band can accommodate only 106 stations; the "long" band can take seven. A total of 113. In practice to-day there are, approximately, 200 odd broadcasting stations in operation in Europe alone, and many more are shortly expected "on the air."

"Over Taxed."

Under the Prague plan, as our readers will doubtless remember, 26 European stations shared these "short" and "long" bands, but since the plan was agreed upon it has been broken a score of times: several new stations have crept into the broadcasting wave-length bands—where they have no right to be—and to make matters worse, power has been increased, with the same damning results as income tax—the ether has been, metaphorically speaking, "over-taxed." Net result—growing interference and an alarming indication of fast-approaching chaos.

Are we to wait until the next conference at Madrid, in 1932, before the responsible European broadcasting authorities get together and sort out the muddle which their own incompetence has resulted in? For their work at Washington was incompetent—subsequent facts prove that—the only excuse is that, if the individual experts did

agree and concoct a plan, their recommendations, although modified by the various governments concerned, have not been carried out with the necessary vigour.

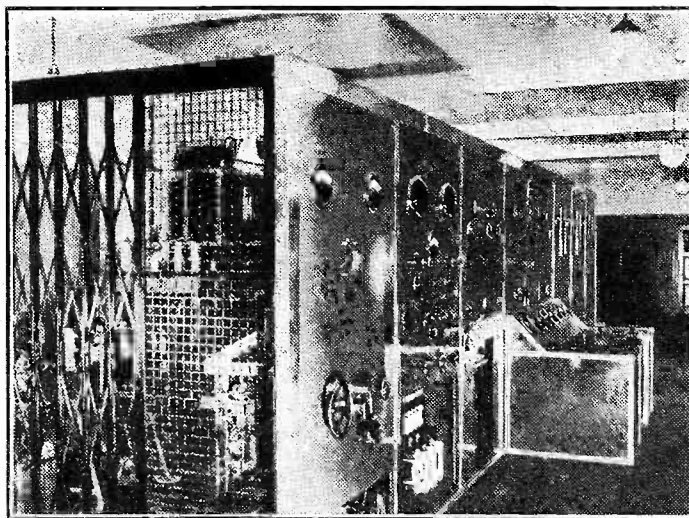
The Chief Offenders.

Well, who are the chief offenders? Undoubtedly Soviet Russia must be saddled with a large share of the blame. At Moscow, Archangel and elsewhere, stations have cropped up and have crept into the scheduled broadcasting bands, where there is no legitimate room for them. They have no right there; they should be kicked out.

It would take several pages to enumerate all the cases we have in mind; but apart from these "orphans" in Russia and elsewhere, it must be remembered that two new stations in Switzerland, one in Warsaw (of 158 kw.), one in Prague (of 120 kw.), a new Radio Paris (five times more powerful than the old one!), the new German regional station (plus seven more to come!), and a brace of Belgian 20 kw. "babies," will all soon be braying "on the air."

Heaven only knows what will be the result. Chaos is an overworked word—but we risk using it again. It meets our verbal requirements very well.

EVEN ICELAND JOINS IN!



A view of the big 16 kw. transmitter at Reykjavik, Iceland's new broadcaster.

Just as a final tit-bit, let it be remembered that the Soviet five-year plan allows for twelve new stations, of which one is reported to be rated at 500 kw.!

Ye gods! Mühlacker caused quite a row, but what sort of cacophony will there be when the above little lot get going?

Start at Once!

And don't forget—they will have to be squeezed in the 200-545 and the 1,340-1,875 band. The 'bus conductor's "move along, please," won't work a miracle.

The remedy is obvious! Immediate international consideration of the situation. Convoke an extraordinary meeting of the

delegates who will meet at Madrid in 1932—or better still, cancel the Madrid meeting and hold it at once in Paris, Berlin or London, and make a quick decision to:

1. Persuade governments concerned materially to enlarge the broadcasting wave-bands, plus rigid restrictions as to power, or

2. Eliminate the "orphans," restrict output of new stations, and enforce definite limitations for power of stations.

But, of course, nothing will be done until 1932—if then. Still, we shall have the morbid satisfaction of saying "We told you so."

"REGIONALISING" THE NORTH.

Preparing for the New Station.

THE "regionalisation" of North of England broadcasting involves more than the construction of the North Regional transmitting station at Moorside Edge. The B.B.C. is doing the job thoroughly. The programme staff at Manchester, Leeds, and Newcastle are hard at work on some really ambitious schemes of programme developments.

Prospects for the future of North Regional programmes are bright—if only Savoy Hill will not spoil it all by scrapping the Northern Wireless Orchestra at the end of March, as is threatened. Outside broadcasts in the North are to be properly organised by an "O.B." Department at Manchester.

The control-room at Manchester will act as control-room for programmes en route to Moorside Edge, but the "S.B." centre at Leeds is to be maintained, for the present, at any rate.

How Programmes Proceed.

At the present time programmes travelling between London and the North, Scotland, and Ireland, travel via Leeds, where there is elaborate equipment for switching, correcting the land-lines, etc. From Leeds lines run to London, Manchester, Sheffield, Bradford,

Hull, Newcastle, and Glasgow.

Belfast obtains its programmes via Manchester, and a submarine cable from Blackpool to the Isle of Man and thence to Ireland.

The only extensive underground cable at present used by the B.B.C. is that from London to Leeds, but it is hoped gradually to replace the overhead cables by underground ones, which are more reliable in bad weather.

The next step in this process of "going underground" will be when the North Regional station opens, for a new underground cable will be used to link Moorside Edge with Manchester and with Leeds.

H.M.V. TACKLES TELEVISION

Much has been done by research workers all over the world to bring television, an already accomplished fact, into the realm of practical politics, but there is still a long way to go before this branch of science becomes of use to the average man. The latest developments have come from an unexpected quarter—the great Gramophone Company's factory and research works at Hayes. An account of the system of television developed there is given below.

By OUR SPECIAL CORRESPONDENT.

IT is a long time since we have heard anything much about television, either in this country or abroad, and one is inclined to imagine that lack of news on the subject means lack of interest on the part of experimenters and research staff.

That this is not true is shown by the fact that a few days ago I received a telephone call from the Gramophone Company (H.M.V.), and to my utter astonishment

First of all he introduced me to the new photo-electric cell, of which H.M.V. are justly proud. It is a caesium photo-electric cell, and was being shown in connection with a talkie amplifier in a comparative test with an up-to-date commercial model of photo-electric cell of the potassium type.

A modulated neon lamp as the light source was being used throughout the experiment, and the light from this lamp was allowed to fall in turn on to the commercial photo-electric cell and then on to the H.M.V. caesium cell. A very marked difference in sensitivity and in the brilliance of reproduction was noticed immediately; as a matter of fact the H.M.V. cell gives 48.3 microamperes per lumen as against the 20 odd microamperes per lumen of the commercial cell, so it is a great advance.

I was then introduced to the real object of my visit, the demonstration of projected television. And here it must be explained that H.M.V.'s have tackled the question of television

from the *entertainment* point of view rather than from the "scientific wonder" aspect, and they have attempted to develop a system of televised cinematography that in the future might be exploited for use for the broadcasting of film of test matches, and other important public events.

The transmission of television of living objects is not being attempted at present, I understand, but there is no doubt that H.M.V.'s got over a very

good representation of a film, projected on to a screen so that a large audience could see it.

Whether the system will ever be practicable from a radio point of view remains to be seen, because five channels are used, and this would mean five separate wave-lengths. So the present congested state of the ether would make it essential that short waves be used if radio were to be a medium of transmission of the H.M.V. system of television.

Land-Line Difficulties.

Land-line work on long distances on this system of television is also difficult, because under the scheme, as it was shown to me, a band of over 23,000 cycles per second on each channel was covered, necessitating not only a specially designed amplifier, but

(Continued on next page.)

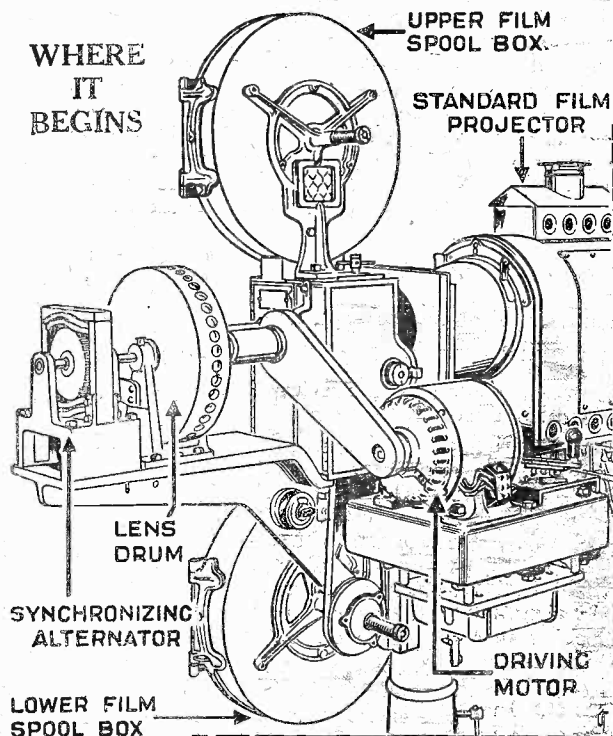


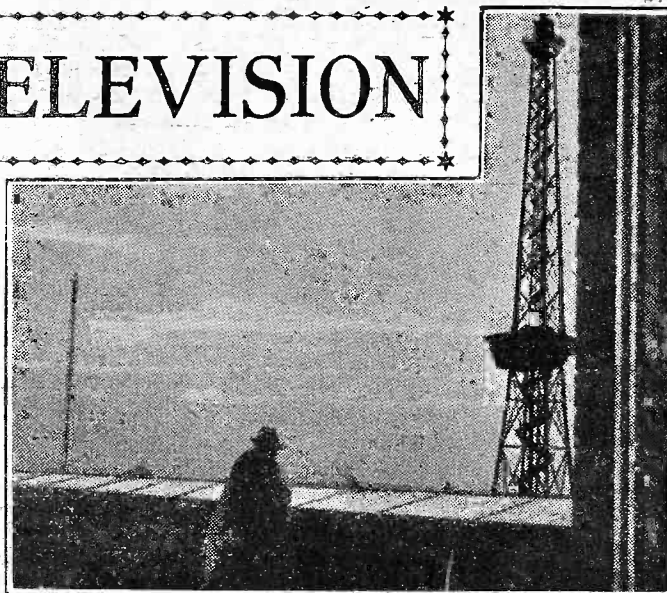
Fig. 1. The projector and scanning lenses which start the picture on its way. After "scanning" the picture elements are thrown on to—

the object of the call was to invite me to come down and see a new system of television which had been evolved at the H.M.V. factory.

I knew that the Research Department of the Gramophone Company had been doing a lot of work on the photo-electric cell, and I knew that they had developed a very efficient one, but I had no idea that they had been turning their attention to television in any shape or form.

The Entertainment Test.

So, therefore, it was with unusual interest that I made the short journey down to Hayes, where Mr. Dyer was waiting to show me round and to explain this development.



THE SECOND STEP IN THE PROCESS

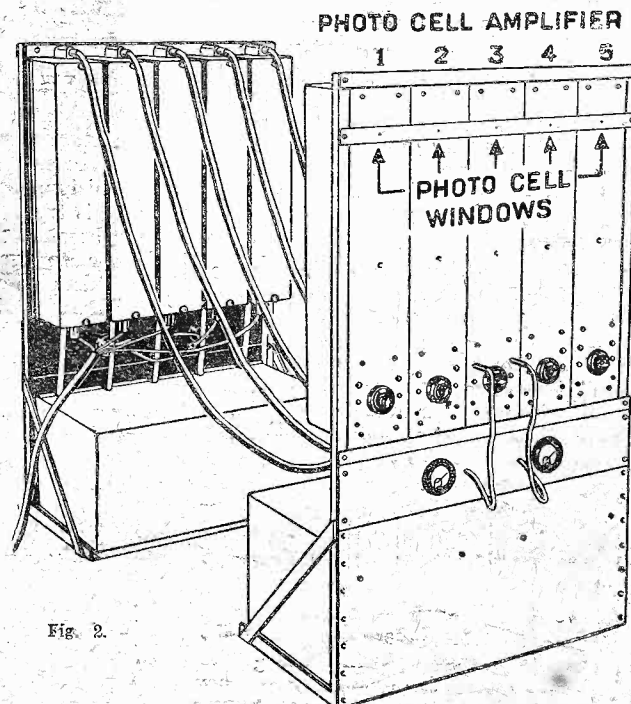


Fig. 2.

The five photo-electric cells and their accompanying amplifiers, which turn the light impulses into electrical pulsations.

H.M.V. TACKLES TELEVISION.

(Continued from previous page.)

highly efficient land lines. Over short distances results, no doubt, would be perfectly good, but over long distances it remains to be seen how much mutilation would be caused by land-line loss.

But let us get on to the technical description of the whole system, by which you will be able to judge for yourselves exactly how much has been accomplished, though as a means of assisting the formation of your judgment I should like to state that the pictures shown were perfectly clear and steady from the ordinary cinematograph point of view, though the blending of the five sections was not all that it might be.

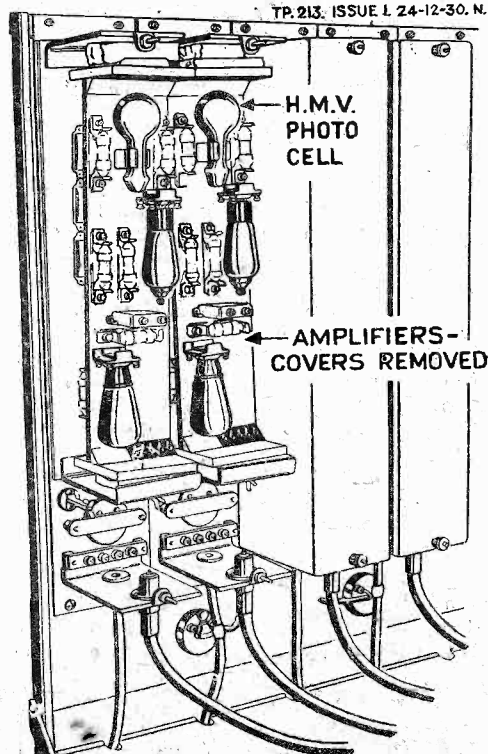
Like a Printed Photograph.

My readers are probably well aware that any system of television yet attempted has consisted of scanning the object to be televised at a rapid rate and in sending over in sequence very tiny portions of the picture by means of a series of tiny electrical impulses.

The result at the receiving end can be likened to a photographic block, as used in POPULAR WIRELESS, for any close examination of a printed illustration will disclose the fact that the picture is actually made up of an enormous number of small dots which vary in size and blackness. If there are a large number of these dots for a given area the texture of the picture is finer, and the correct tone is better achieved. If, on the other hand, there are few dots the picture is said to be coarse.

BEHIND THE SCENES

TP. 213. ISSUE 1 24-12-30. N.



REAR OF PHOTO CELL AMPLIFIERS

Fig. 3. An interior view of the special photo electric cell and the first stages of amplification.

Now the detail attained by television depends on the number of impulses per second for a given area. If the impulses do not come fast enough then the picture will flicker and become blurred, and if there are not enough impulses per square inch then the detail will be lacking.

In each of the five sections of the H.M.V. television system there are over 23,000 impulses per second, which gives a very fine degree of definition.

Now we all know the principle on which the motion picture camera and projector operate, and this principle must be considered when dealing with transmission of moving objects by television.

It is based on the fact that the eye attempts to retain an image after the actual object has been removed. This is known as "persistence of vision," and no moving picture would be possible without this peculiarity of the eye.

In order to obtain successful projection about sixteen pictures per second or a little more are used on the ordinary cinema, when no flicker is noticeable. Occasionally one can reduce the speed down to about twelve pictures per second before the eye will notice flicker.

Therefore, it will follow that in a picture where there are perhaps ten thousand small dots, each of these small dots must be reproduced twelve times a second in order to give the transmitting image the illusion of moving, and still to make use of this persistence of vision to a sufficient extent to avoid objectionable flicker. In other words, 120,000 individual signals will have to be transmitted per second.

The General Arrangement.

This seems a lot, but it is a fact that a picture transmitted with 120,000 signals per second will be somewhat lacking in definition, and this is where the man who is trying to design a television system for broadcasting comes up against it. In order to restrict the frequency of the impulses to within the band allowable by broadcasting under the present system, the number of dots per second has to be reduced, and therefore the detail of the picture has to suffer.

H.M.V., however, decided to concentrate their efforts on achieving as perfect a picture as they could in order to ascertain how much entertainment value could be secured, and not primarily with any idea that the system might be used on broadcasting. Their argument is that without entertainment value television is bound to fail as a commercial proposition, and that unless the result of their researches provides entertainment it is no good tackling the problem at all.

The general arrangement of their system can be gathered from the sketches accompanying this article, but before discussing

these I must impress upon you two principal points which have been concentrated upon in the development of that system. One is that in order to get definition a large number of signals per second for a given area of the picture is used, and the second is that in order to get sufficient illumination for the image so that it can be said to possess entertainment value, some means of modulating a powerful light had to be found

THE END OF THE JOURNEY

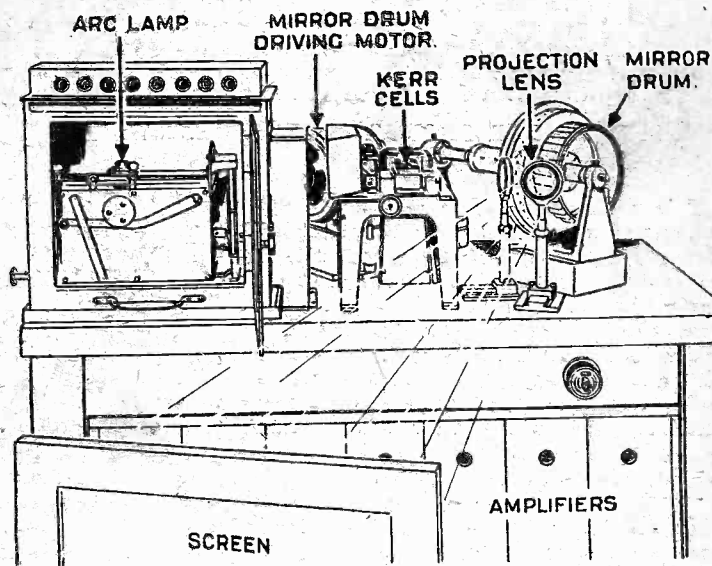


Fig. 4. Finally, the picture, in five sections, is re-combined by the modulated light from the arc lamps being reflected by a series of revolving mirrors on to the translucent screen.

A comparatively feeble illumination as displayed by glow discharge lamps (such as the neon type) which have frequently been used have not proved themselves sufficient. The Gramophone Company therefore set themselves the problem of employing the light from a powerful arc lamp, and designing apparatus that would actually control the light from this source.

In order to get definition a very large number of dots or points of light are employed, and in order to reduce the total number of dots per second the picture was divided into five sections, each section being scanned separately and the signals transmitted along a separate channel. The total scanning of the five sections is re-assembled on the receiving screen.

There are big advantages in using five channels, for in the H.M.V. system a modulation frequency of only 23,750 is required instead of five times that amount, and the design of low-frequency amplifiers capable of handling with anything like a straight-line relationship such high frequency, though not easy, is rendered more practicable.

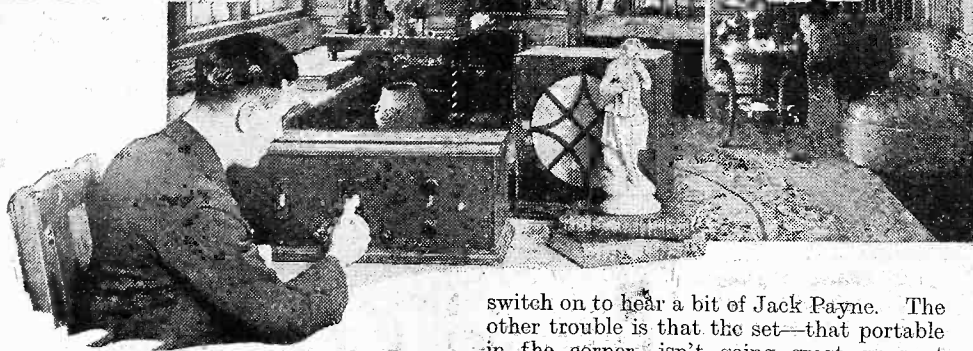
Five-Sectional Scannings.

Now let us look at the diagrams. As will be seen in Fig. 1 the film is passed through a cinematograph of the usual type, the light from it being reflected through a series of lenses on a revolving drum, which for every revolution completely scans the picture in five sections.

The light reflected through the revolving lenses is thrown upon five photo-electric cells, each taking care of its own section of the picture.

(Continued on page 931.)

AT HOME WITH RADIO STARS



One of the most popular of all broadcast artistes is the subject of this week's intimate and exclusive sketch.

8. TOMMY HANDLEY.

I MET Tommy Handley as he was coming home from Savoy Hill the other night, and we went back to his flat for a little chat.

"As a matter of fact," said Tommy, "this flat served as my bachelor quarters—and jolly convenient, too, being right in the centre of things—and after I plunged into the seas of matrimony we decided to keep it on, together with our real home out in the Big Open Spaces at Egham.

"When I'm rehearsing or playing before the microphone, or am doing any stage work, then you'll generally find me here, or down at the club; but at week-ends, holiday times and other times when there is no urgent work to be done, then off the wife and I go to rusticate at Egham. A nice little spot.

"Oh, but this flat has memories—bachelor memories, you know! Some of 'em we'd better forget, and others (by purging the worst bits) I have managed to turn to good account as 'copy' for the microphone. It's so difficult, sometimes, to think of funny things, and if it so happens that one's own life is and has been full of humorous experiences, then it's easier to think of a plot."

Radio and Gramophone.

"I see you're a gramophone enthusiast," I remarked, noticing that we were surrounded by small heaps of records.

"Rather," said Tommy. "Being a radio artiste myself, I often find that the B.B.C. is 'off the air' at times when I want to listen and can listen, and so the old gramo. comes in handy. There are records of all sorts there."

He was right. I glanced at one or two. There was a large pile of orchestral records of numerous makes: really highbrow fare. I picked up from another heap a record which appeared to have only one side. It bore a plain white label, and on closer inspection I saw that it was a test record of one of Tommy's own "all talking" items.

"Ah, that's one of my records," said Tommy. "There are some others there: and between you and me, or you and I (whichever you like), I don't think much of them. Yet people seem to like me on records! Of course, I've never heard myself on the wireless!"

"Do you listen in much?" I inquired.

"I expect I get my ten-shillings'-worth," came the reply. "My two troubles are that on most evenings I don't get home till the dance music is on; but I do sometimes

switch on to hear a bit of Jack Payne. The other trouble is that the set—that portable in the corner—isn't going great guns at the moment.

"And I'm no wireless expert. Time was when, in its pristine glory, it used to bring in the foreign stations, and on slack evenings I often amused myself by bringing in howls and atmospherics from Czechoslovakia. But not now. I'm busy on the stage with my show 'Hello! Folks.'

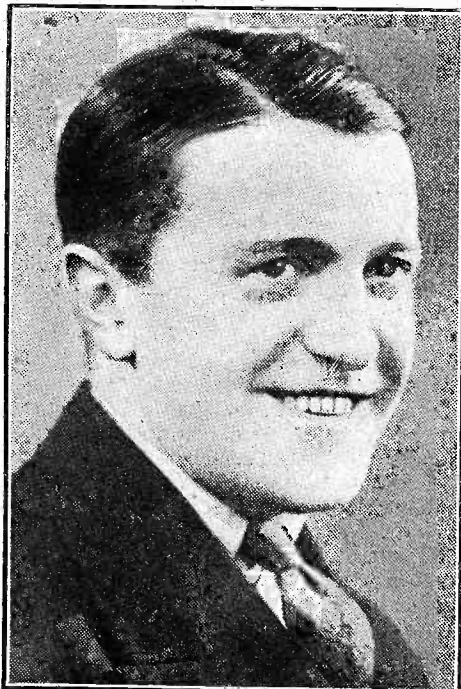
Back to the Mike.

"As you know, this consists of revue performed by well-known radio artistes, and you'd be surprised to know how much work there is in producing and carrying on with a stage show of that description.

"I shall be back at the microphone before your article appears in print, and there's no doubt about the fact that an occasional spell on the 'boards' keeps a radio artiste up to scratch. In some ways the stage is a harder test of an artiste than the studio, and although I shan't mind going back to the 'mike' (rather the reverse, in fact), I feel that this stage work is doing me good and giving new ideas."

"Ah! Ideas," I inquired. "Where do you find it easiest to think of new ideas for

A GRAMOPHONE ENTHUSIAST



An interesting fact elicited by our special representative is that Tommy Handley is an enthusiastic user of the gramophone.

broadcasts? Have you a room which you keep as a 'den' for your Muse?"

"Well, I've a room of my own," agreed Tommy. "You might say that it is vitally my own. I hate it even being dusted. That's one of my bachelor habits which I still preserve! But I don't know that that is the best place for thinking. I find stray humorous ideas coming to me in the bathroom, in the street, when reading the evening paper, and even when hunting for lost golf balls."

"Then you do get time for golf?" I ventured.

"Not so much as I did," explained Tommy. "While I'm doing this 'Hello! Folks!' review I have a few free afternoons, but when I'm doing my bit at the B.B.C. there is precious little daytime to spare. It's when I get back to Egham that I enjoy golf: golf—and the dog. I'm very fond of dogs. Mine's a smooth-haired terrier. You can keep all your Alsations!"

A Golfing "Record."

"Harping back to golf for a moment," I said, "what's your handicap?"

Tommy hesitated.

"Must we harp back to golf?" he asked pitifully. "If you want to say anything about my handicap—just say that sometimes it's more, and sometimes it's less."

I left it at that. After all, you can't cross-question a "star" in his own flat!

"There's one golfing record I do hold, though," said Tommy after a while. "It is a record for losing both ball and club at one hole!"

"It happened on a course down Wimbledon way, where there's a tough water hazard. It was a hot day, and I suppose my hands were slippery. At this water-hazard hole I took a mighty swipe, and away flew ball and club into the water! I waited at the water's edge for a while, like the knight who waited for the sword Excalibur to pop out of the waves; but my club didn't turn up, and my ball wasn't a floater, so I went straight on to the Nineteenth!"

"Are You Clubby?"

"I think that's enough for golf," I said. "What about other hobbies. Are you clubby?"

"Yes," said Tommy. "Savage Club-by. When I'm not at the flat, and when I'm not down at Egham, and when I'm not at Savoy Hill, then you may perhaps find me at the Savage Club with a few friends."

"I won't tell you that I never get any time to myself, or that I work a 24-hour day. But I will say that, like a doctor, I can never be entirely free from my work."

(Continued on page 930.)

LATEST BROADCASTING NEWS.

THE RETURN OF MR. WHITLEY SIR HARRY LAUDER— "LITTLE TOMMY TUCKER"— STOP PRESS—WHY THE PANTO BAN? Etc.

IN a few weeks now, Mr. Whitley, Chairman of the B.B.C., will be back from India to resume command at Savoy Hill. Among some of the problems awaiting his attention are the "talks" situation, the future of broadcast education and of relations with outside educational bodies, and the new Board to be appointed this year.

Presumably the Prime Minister will be guided by the ex-Speaker of the House on the subject of his colleagues for the remaining five years.

Sir Harry Lauder.

Sir Harry Lauder makes his fourth appearance before the microphone in this country on Thursday, February 5th, when he takes part in the National programme between 8 and 9 p.m. More than two years have passed since the great Scottish comedian was heard by British listeners, and during most of that time he has been abroad visiting New Zealand, Australia and the United States.

His previous broadcasts have all been of nearly an hour's duration, in fact, on one occasion he exceeded that time, which is not altogether satisfactory to either artiste or listener. It has, therefore, been decided that on February 5th, Sir Harry shall have two periods, each of twenty minutes, for his inimitable songs and patter, the remainder of the hour being filled with orchestral music.

"Little Tommy Tucker."

The excerpt from "Little Tommy Tucker" at Daly's Theatre which is to be broadcast on Saturday, January 31st, will include a scene in a B.B.C. Studio in which the heroine falls in love with the voice of an announcer—an event that has several times occurred in reality, although the B.B.C. makes a point of never disclosing such spiky tit-bits of information concerning its domestic affairs.

As listeners will hear, the story in the excerpt ends with perpetual happiness between two people, which is one up on the B.B.C., because no announcer, as far as we know, can make so sweeping a claim as an outcome of his microphone duties.

Stop Press.

"Stop Press," a feature originated by John Watt, when he was a member of the productions staff at Belfast, and one edition of which has been presented from London since the author joined the staff at Savoy Hill, is to be given a second show on Tuesday, January 27th, for London Regional listeners and repeated two nights later for the National people.

"Stop Press" is really a miniature revue and one of the sketches is designed to give an indication of what a perfect "mix-up" would occur if our broadcasters "swapped jobs."

Can anyone imagine A. J. Alan singing a

comic song, or the Four Marx Brothers reading a news bulletin, which are among the burlesques? Those who heard the first edition of "Stop Press" will be pleased to learn that the sketch in which Miss Blimp swims the Hellespont and the play entitled "B.B.C. Exchange" are to be repeated.

Why the Panto Ban?

The third and final pantomime broadcast of the season for Northern listeners takes place on Saturday, February 7th, when part of the performance of "Jack and the Beanstalk" will be relayed from the Theatre Royal, Leeds.

The rub in this paragraph will be against the Southern listener who will wonder why on earth no pantomime relay has been included in the National or London

Regional transmissions this winter. Even Scotland, which professes its broadcast programmes to be more cultural than those of all other parts of the country put together, has had its pantomime relay.

Lots of theatres in and around London would be only too pleased to allow a broadcast, while it cannot be argued that the South is any more critical or more appreciative of good material than the North, or that the North is content with something inferior to what the South will tolerate.

Programmes of Promise:

"Bumpkin Pie"—Some Widdicombe Faire, written, composed and produced by Ernest Longstaff with additional songs by various authors and composers, reads like a tasty morsel for those who can listen to the National programme at 8 p.m. on Friday, February 6th.

Mr. Longstaff is so well acquainted with the intricacies of microphone work by long and successful experience that to-day anything from his pen can be cashed in as good. On February 6th the Revue Chorus and Orchestra will be conducted by Mr. Longstaff himself.

Another February broadcast from the London studios, which should also be well worth hearing, is "The Pursuit of Pleasure."



NEXT WEEK

"P.W." will introduce

THE £4 FOUR

A TOP-NOTCH
SET AT
ROCK-BOTTOM
PRICE!

ALSO

THE "P.W." FRAME AERIAL

COMING SHORTLY

LEONARD HINAY

J. H. SQUIRE

PHILIP RIDGEWAY

and others on

"If I were the Governor of
the B.B.C."

FOR THE LISTENER

By "PHILEMON."

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is served up.

A "Skit Inspection."

ONE of the most popular Saturday night items must be the relay from the Kingsway Hall; and when the Roosters are there, the fun is fast and furious.

They are not so good individually as they are all together; but all together they are as lively and as entertaining a party as anyone could wish for. Their Army sketch, entitled "Skit Inspection," seems so comfoundedly funny that I could scarcely hear it for the continuous roar of laughter. Even the laughter, with the fog still in the air, was good to hear.

The whole programme went with that sort of amateurish swing which is, when it is good, so very, very good.

The Schönberg Music.

Realising that I was going to be lowbrow on Saturday night, I braced myself and determined to be highbrow on Friday night.

I listened to the Schönberg music conducted by Schönberg himself.

I understand that the B.B.C. Orchestra had put in a good many hours at rehearsal; so that we heard the music just about at its best. It was queer stuff.

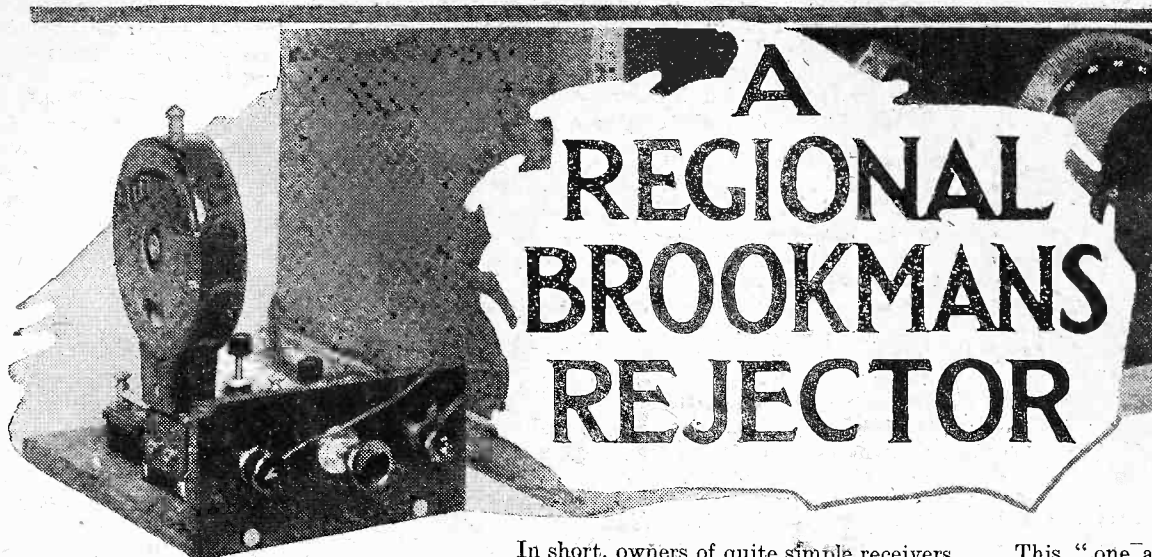
A girl seeks her lover through a wood, and finds his corpse. Apparently she goes mad. She goes mad for about half an hour. The music interprets that madness.

I should imagine that technically it must be an amazing piece of work, and will be doubtless fully appreciated by the technicians. As a piece of music, it confused and terrified me. Perhaps Herr Schönberg will take that as a compliment.

Talks by Women.

Women speakers have carried off the honours this week. If all those who contribute to the series "Yesterday and To day" are going to be as good as Mrs. St.

(Continued on page 932.)



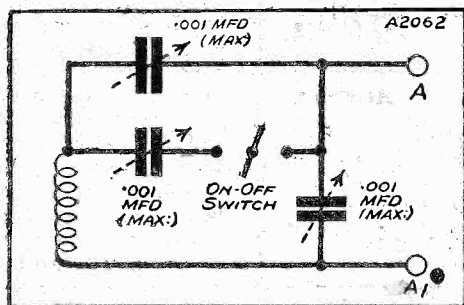
A REGIONAL BROOKMANS REJECTOR

A further version of the most famous interference-preventer in the world one which blots out one station and, in many cases, actually improves the reception of others. With the model described you can pre-set to two powerful stations and wipe either out at the touch of a switch.

By the
'P.W.' RESEARCH
DEPARTMENT.

WE gather from correspondence received that a certain proportion of our readers are still experiencing difficulty in meeting the selectivity requirements of the Regional Scheme, and so we are

AN AMAZING FACT



It is hard to believe that any such device can work effectively without decreasing the sensitivity of the set. But the "Brookmans Rejector" does and, further, it improves the general selectivity, though the circuit is as simple as could be.

making a special point of including some high-efficiency rejectors of various types in our programme for the season.

We have always in mind, too, the fact that the Northern Regional station will be opened ere long, and when that day arrives quite a lot of people are going to get a surprise.

We don't want to alarm our Northern friends unnecessarily, but they would do well to prepare for the event in advance. It is very difficult for them to imagine the acute interference which is set up in the neighbourhood of a Regional station, and those who at present use fairly simple receivers within a radius of some fifteen or even twenty miles of Moorside Edge should really think seriously as to what they intend to do about it.

The Northern Regional

They must make up their minds that their sets are going to have the greatest difficulty in dealing with the extraordinarily severe demands made upon them by Regional conditions. Not merely will they find that it is difficult to separate the two transmissions, and to tune in their favourite foreign programmes, but they will also discover what so powerful a station can do in the way of "breaking through" on long waves.

In short, owners of quite simple receivers in this area are going to be up against it just as we are here in the Brookmans Park area, and we want to urge them to make preparations in good time. Lots of us in the South were caught napping, and there is no reason why it should happen again now that we know exactly what is coming.

We understand that there is a population of some 600,000 in the area of expected intense difficulty around Moorside Edge, and amongst so many there must be a goodly number of "P.W." readers. It would seem, therefore, that we must devote a due amount of space to offering them real help as we can.

One obvious solution, of course, is to set to work in good time and build a modern highly selective receiver like the "Chef d'Oeuvre" Three, described in the Christmas number of "P.W." That, however, is a way out that will not appeal to some people, and to them we would suggest that they should try what can be done with the aid of a modern and efficient type of rejector.

Trapping Two Transmissions.

The "P.W." "Brookmans Rejector," for example, is capable of performing the most remarkable feat of interference-elimination, and will always give great relief, if not a complete cure.

It will give relief, in the sense that it will shut out *either* of the two transmissions so thoroughly that one has to search carefully and tune it in quite accurately in order to hear it at all. It will thus solve the problem of mutual interference between the two transmissions.

Where it will fail is in cases where *both* transmissions spread badly round the dial so that to eliminate just one of them is not sufficient to permit foreign stations to be received. In these cases a double eliminator is required, i.e. a device which will shut out both transmissions at once, and leave the dial clear for foreign stations.

Such a gadget was described in "P.W." for December 13th, 1930 under the title of the "Double Trapper," and to this we would refer those readers who are situated less than about ten miles from a Regional station and wish to continue to use a simple type of "detector and L.F." receiver.

This, of course, is the area of real misery for the long-distance enthusiast. Further out things become easier and a single type of rejector usually furnishes all the assistance that is needed.

This "one-at a time" kind of rejector will also serve the purpose quite well in the real "agony area" if the receiver in use is of the more modern and selective type, and so only wants help over certain portions of the tuning range.

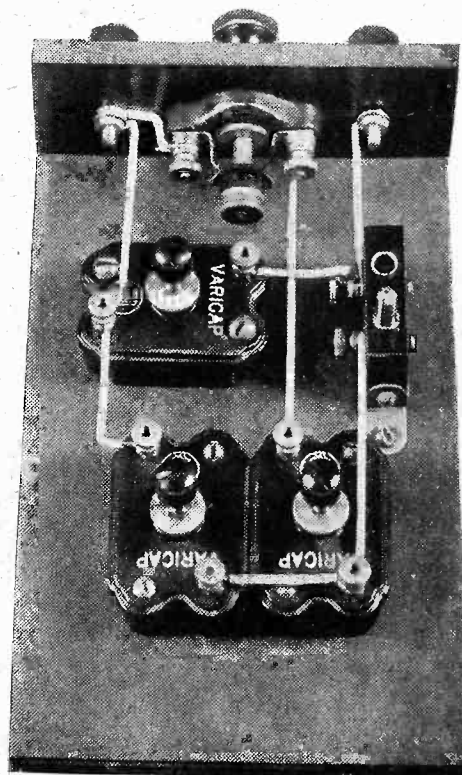
Unapproached Efficiency.

It seems to us, therefore, that this type of interference eliminator is the more generally useful, and so should receive the most attention. Accordingly we are describing the device this week in something of a "de Luxe" form, carefully thought out to make it as convenient to use as possible.

It is simple enough, for all that, and not at all expensive to make. It does its job, though, and those who have bitter memories of the behaviour of the early wave-traps will get a pleasant surprise when they come to try a modern rejector.

(Continued on next page.)

YOU CAN BUILD IT



It is nothing more than a very straightforward assembly of inexpensive parts.

A REGIONAL BROOKMANS REJECTOR.

(Continued from previous page.)

Well, perhaps not just "a" modern rejector, but "the" modern rejector, which is that exclusive "P.W." idea, the "Brookmans" type. This, as so many of our readers know, is an interference-eliminating device of unapproached efficiency, and it quite definitely does not cut down the general performance of your set. In some cases it will even improve the results on all stations other than the one being rejected!

Very Easy to Use.

Just two little warnings, though; the kind of interference which it will eliminate is that produced by a powerful local station and no other. Don't expect it to cut out Morse, tram-car noises or atmospherics! Secondly, note that it is designed to work with "P.W." receivers, and may not go properly with some commercial sets or others not of our designs, because of different methods employed in the aerial circuits of these sets.

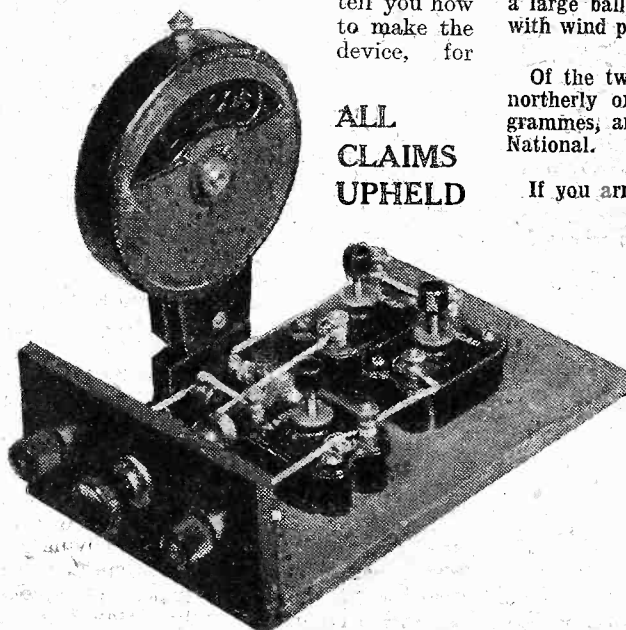
The one you have already seen in the photos is designed to enable you to use the "single" type of rejector with the maximum of convenience. It will reject either of the two Regional transmissions, but not both at once. To make it simple and easy to use, it is fitted with a little device which enables you to reject either transmission at will by moving a switch.

Too Simple for Words.

This will be found a great convenience in practical use, for the adjustment of a rejector is rather a delicate operation, and it is not one which you want to make every time you change from one station to the other. With the present scheme you set the rejector condensers once and for all and just work the switch as required.

It would probably be a waste of space to tell you how to make the device, for

**ALL
CLAIMS
UPHELD**



Inasmuch as this version is the original "P.W." "Brookmans Rejector" with the simple addition of the switch and another small condenser, the results must clearly be those about which so many "P.W." readers have enthusiastically written.

just observe its simplicity in the photos! A piece of wood, an ebonite terminal strip with a switch on it, a coil socket and three compression-type adjustable condensers, to be assembled and wired up, and that's all there is in the job.

How to use it is far more important, and this we will tell you in detail. First, you connect your aerial lead to the A terminal of the rejector instead of to the set. Connect the other rejector terminal to the set aerial terminal.

Insert a No. 50 plug-in coil (the size is important as a rule) in the rejector and proceed thus: put rejector switch to "off" and set nearest adjustable condenser to a medium value (start by screwing knob right down, then unscrew about three complete turns; not critical).

The rejector should be placed so that the terminals and switch are nearest to you. Then the right-hand condenser of the pair at the back is the one to be adjusted next.

RADIO ITEMS OF INTEREST

The North Regional—Grid Bias, etc.

The maximum current that can pass through the human body without serious results is about 10 milliamps.

The resistance of the human body varies with health, moisture of the skin, etc.; but the resistance from one hand to the other is generally of the order of 50,000 ohms.

The height of the Brookmans Park aerials is limited by Air Ministry regulations to 200 ft.

Moorside Edge Regional Station uses three steel lattice masts each about 500 ft. high.

The B.B.C.'s North Regional Station near Slaithwaite is situated about 1,000 ft. above sea level.

At Moorside Edge each 500-ft. mast rests on a large ball, which allows it to sway slightly with wind pressure.

Of the two aerials at Brookmans Park, the northerly one is used for the Regional programmes, and the one nearer London for the National.

If you arrange to switch over the grid of a power valve to a preceding stage, do not forget to alter the grid bias accordingly.

The power of the Langenberg (Germany) station is to be increased to 75 kw. next summer.

If you have not experimented with different needles for your gramophone pick-up, you should do so, as this often effects a noticeable improvement in tone.

A semi-variable condenser with a maximum of .001 mfd. in parallel with a 200,000-ohm variable resistance connected across a pick-up's terminals sometimes assists in cutting out "scratch."

Tune in lower-wave station on set, and adjust this condenser until you find the "rejection point" at which it vanishes almost completely. This is sharp, so adjust carefully. If you do not get sufficient elimination, reduce the condenser nearest the front a little and try again. In fact,

COMPONENTS AND MATERIALS.

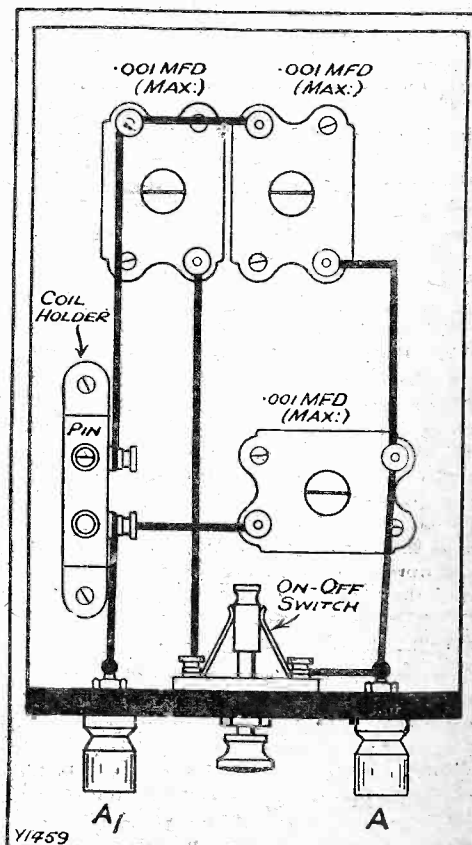
- 1 Terminal strip, 4 in. × 2 in. (any good insulating material).
 - 1 Baseboard, 6 in. × 4 in., about $\frac{3}{8}$ in. or $\frac{1}{2}$ in. thick.
 - 3 .001-mfd. (max.) compression-type condensers (R. I., or Lewcos, Formo, Lissen, Polar, etc.).
 - 1 On-off switch (Lissen, or Goltone, Igranite, Ready Radio, Benjamin, Bulgin, Lotus, etc.).
 - 1 Coil holder (Lotus, or Igranite, Wearite, Bulgin, Keystone, Red Diamond, etc.).
- A little wire and a few screws.

try the front condenser at several settings, and see which is the best, re-adjusting the right-hand near condenser each time, of course.

That being all settled, tune in the longer-wave station on your set, then close the rejector switch (pull knob outwards to "on" position). Now adjust the left-hand near condenser to the rejection point for the longer-wave station. Do not make any alteration in the condenser near the front while doing so; this must remain set.

With this second rejection point found the preliminary adjustments are complete and need not be touched again. In future all you will have to do is to put the switch "on" to shut out longer-wave station, or "off" to eliminate the other one.

REVITALISES OLD SETS



Even if your new Regional programme spreads over the whole tuning, this "Brookmans Rejector" will completely "kill" the interference.

CAPT. ECKERSLEY'S QUERY CORNER

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



L.F. and H.F. TRANSFORMERS—
RESULTS FROM A PENTODE—
TACKLING HUM.

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

L.F. and H.F. Transformers.

J. P. (Yarmouth).—"Does an H.F. transformer function in a similar manner to an L.F. intervalve transformer? That is to say, if the secondary of an H.F. transformer is wound with three times as many turns as the primary, is a voltage step-up of 3 to 1 effected as would be the case with an L.F. transformer of 3 to 1 ratio?"

In considering the difference between high-frequency transformer and low-frequency transformer one has got to realise two things. The first, that in a low-frequency transformer the connection is entirely dependent upon having 100 per cent coupling (or as near as possible) between primary and secondary windings.

This is done by using iron which makes an easy path for the interlinking magnetic fields. Iron cannot be used with high-frequency transformers for frequencies much above 100,000 periods per second, so that it is not easy to design a high-frequency transformer with 100 per cent coupling.

The second point to appreciate is that the self-capacities of the windings may produce all sorts of spurious effects upsetting both phases and amplitude of the inducing and induced currents.

If this is occurring it is not *a priori* accurate to state that the simple winding of three times as many turns on the secondary as the primary will produce three times the voltage on the secondary, but provided certain precautions are taken, and provided a large range of frequencies is not desired, the statement is not untrue.

One might put this another way by saying that provided aperiodicity is achieved, and provided the coupling is very tight, and provided the transformer is not expected to work into a considerable load, then the connection of the high-frequency transformer is to some extent analogous to that of the low-frequency transformer.

Results from a Pentode.

J. L. (Balham).—"I have recently replaced the small power valve in my two-valve (det. and L.F.) receiver by a Pentode valve with a view to increasing loud-speaker volume. The result has been somewhat disappointing, as there is hardly any increase of volume although there is a marked absence of bass notes.

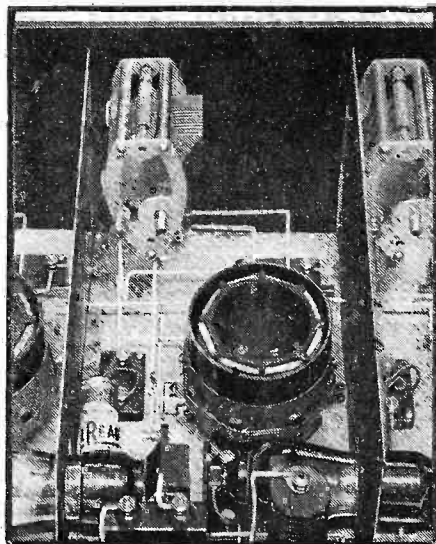
"It would appear that the mere substitution of a pentode valve for an ordinary

power valve is insufficient to achieve my object and I would, therefore, appreciate your advice as to what steps I ought to take in order to secure the increase in volume which I feel sure should ensue when a pentode valve is used?"

This is a typical case where the valve has been considered apart from the design of the circuits around the valve. You would not expect to make your 10 h.p. car go very much faster simply by fitting racing magnetos!

Racing magnetos, however, are worth while adapting to an engine designed for racing.

H.F. COUPLING



The "P.W." and "M.W." dual-range coil is a type of H.F. transformer, and here we see it used to couple together two stages of S.G. amplification.

Coming down to more detail, it is fundamental that a valve cannot achieve magnification unless there is some form of impedance in its anode circuit, and, more important still, that impedance has to have a greater or less value dependent upon the characteristics of the valve.

Further still, and in general, the greater the impedance of a valve the greater the value of the optimum impedance. A pentode valve is an extremely high impedance valve, and to get proper magnification the impedance in the anode circuit has to be very high before the valve can magnify to anything like its theoretical magnification.

A loud speaker, as such, has an impedance which varies over the frequency range: at 10,000 cycles it may have an impedance of 20,000 ohms, at 50 cycles it may have an impedance of only 1,000 ohms.

At 10,000 cycles, therefore, the pentode valve has achieved something like its theoretical magnification. At 50 cycles it has achieved hardly any magnification at all.

Thus the pentode valve with the loud speaker connected straight in its anode circuit magnifies the high notes but not the low. And as the high notes as radiated are very much more feeble than the low notes, the volume would not appear to increase in proportion to the theoretical magnification of the valve if the loud speaker is connected straight in the anode circuit.

I cannot explain, but only recommend the remedy, which is to design or have designed a loud-speaker transformer, one winding of which (the high resistance winding) goes in the circuit between the high-tension and anode, the secondary, or low resistance of which is matched to the loud-speaker impedance.

* * *

Tackling Hum.

T. R. (Hastings).—"I am greatly troubled with a humming noise which I believe is due to some electrical machinery near me. I have tried a number of dodges in my efforts to cut out this interference, but so far have been unsuccessful. Can you suggest anything?"

"My set is a detector followed by 2 stages of L.F. amplification, and I am using an outside aerial."

Remove the aerial from the set. Does the hum still persist?

If it does not you are unlikely to be able to remove it without treating the machinery (or the man in charge of it!) in some way.

Are you lighting your filaments from the mains, because if the hum is there when your aerial is removed this may be the trouble. In which case be sure that your grid leads come to the centre of a potentiometer connected across the valves.

Are grid leaks too high? What is quality like otherwise? Do you use a moving-coil loud speaker? Is your loud speaker too near the set and making it pong? Is your set vibrating mechanically. Have you a proper earth?

Answer all these questions and then write to the B.B.C.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

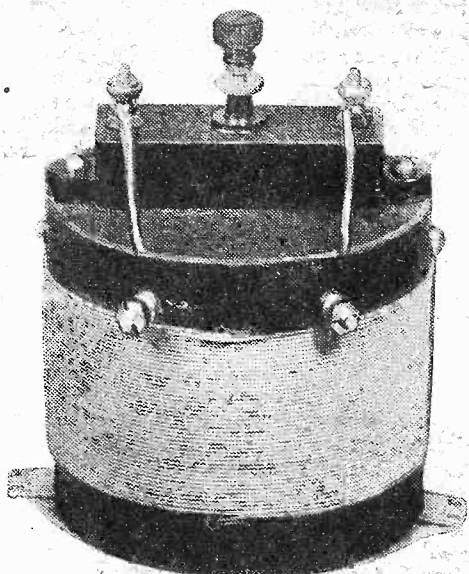
Tested and Found—?



THE FAMOUS "P.W." REJECTOR.

FOR the convenience of those who cannot or do not want to wind their own coils, Messrs. Ready Radio are selling the "P.W." "Brookmans Rejector" complete.

As they charge only 5s. 9d. for the device built exactly to specification, it constitutes a distinctly attractive line.



A "P.W." Brookmans Rejector made by Messrs. Ready Radio.

For any good wave-trap 5s. 9d. would be a small enough price to pay, but for the "P.W." "Brookman's Rejector" the figure seems almost trivial in comparison with what the little article will do.

Remember, it not only provides really effective trapping, but, unlike most similar articles, it generally adds to the sensitivity of a set by reducing its aerial load.

We have received samples of the Ready Radio "P.W." Rejector, and find that they are in accordance with our original specification, and that they are right up to standard in point of efficiency.

IMITATION BLUE SPOTS.

The British Blue Spot Co., Ltd., are extending a warning to buyers that a quantity of cheap imported articles are being passed off on the public as genuine Blue Spots. British Blue Spot, Ltd., point out that for their own protection the public should look for the Blue Spot trade mark (it appears in their advertisements from

time to time), and also ensure that the goods are packed in their standard packing which, in the case of units and chassis, is of yellow and two blues.

RADIO BARGAINS.

The latest list issued by Electradix Radios, Ltd., embodies an enormous amount of electrical and radio material priced at very attractive figures. There are numerous illustrations.

NEW FERRANTI RESISTANCES.

Ferranti Ltd. advise us that the following new additions to their range of wire-wound shunt-feed resistances are now available: 500, 650 and 1,250 ohms, with current-carrying capacities of 60, 60 and 50 milliamperes.

The price of these resistances is 2s. 9d. each, without holders.

As Messrs. Ferranti point out, these shunt-feed resistances are particularly useful for obtaining automatic grid bias in A.C. mains receivers.

It is interesting to note that Ferranti's guarantee every one sold to be within 5 per cent of its stated value. Things like that inspire confidence. The 20,000-ohm sample sent to us for test purposes measures out with a figure of error of less than 1 per cent! For practical purposes that is entirely negligible.

I mustn't forget to add that the resistances are now being built into tubes of moulded bakelite which are practically fire-proof.

WHEN MAKING LOUD SPEAKERS.

I recently received a Tonax tone adaptor. This appears to me to be a very valuable little gadget for those who make their own loud speakers. It costs one shilling, and it comprises a small chuck that grips the reed drive, two cone-shaped aluminium washers and two coned felt washers for gripping the diaphragm. Two further washers of a flexible nature are provided, the use of which is optional. In cases, these last washers undoubtedly do improve results.

HANDBOOK FOR DEALERS.

Philips Lamps, Ltd., are distributing a handbook to dealers, so that each shall possess a permanent record of the particulars of Philips radio products. I should imagine that dealers will find this book of invaluable assistance to them.

LAMPLUGH DYNAMIC INDUCTOR LOUD SPEAKER.

One of the most interesting loud-speaker developments since the inception of the moving coil is the application of the inductor principle.

The inductor is an electro-magnetic movement, but the armature traverses a line

parallel with the pole pieces, and it is returned to its mean position by magnetic pull, and not by springs.

There seems to be no reason why you should not get moving-coil results with such a movement properly constructed. You have the freedom of travel necessary for properly balanced bass frequencies, a uniformity of sensitivity, and an absence of inherent reed or armature resonances within the audio range.

We have recently been testing a Lamplugh Dynamic Inductor Loud Speaker unit fitted

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

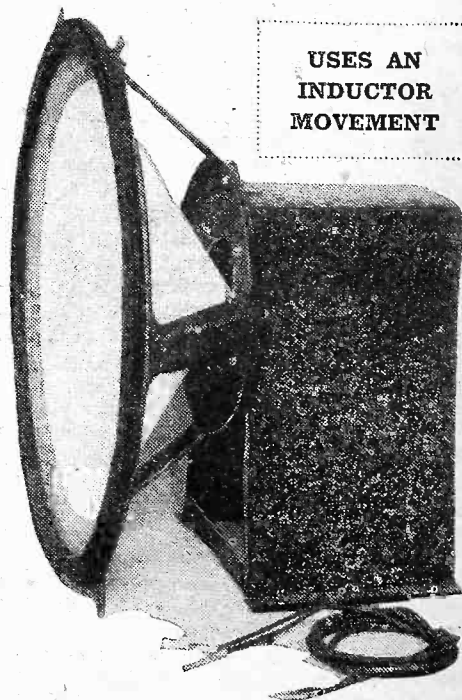
We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

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

to a proper baffle (very important that) and must admit that the results were impressive. It is sufficiently sensitive to operate well with quite small outfits, and if it is provided with the proper input, a response definitely better than a few moving-coil speakers we have heard is given.

The bass is clean and full, and if the instrument has not quite the brilliance of the upper register of a first-class moving-coil loud speaker, you must not forget its much lower price and that it does not necessitate the use of the mains.

USES AN
INDUCTOR
MOVEMENT



This is the Lamplugh Dynamic Inductor. It requires only a baffle and cabinet to form the complete loud speaker.

CORRESPONDENCE.

AN "ALL-WAVE" THREE

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

AN "ALL-WAVE" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—The article, "Next Year's Sets," by Victor King, in a recent issue of "P.W.," proved very interesting to me, especially the paragraph in which he deals with the wave-changing of the future.

At present I do not think a "household" set requires to operate on short waves. Certainly, it must operate on the medium and long waves, the change being effected by switches which should be operated by one control mounted on the panel.

In my particular case the family require such a "household" set, easily operated; while at times I like to explore the short waves. But two separate sets would be an unnecessary expense, also lack of space was another serious consideration.

My present set is a solution of this problem. It is an S.G., Det., L.F. set, the circuit diagram for which I enclose; and this may require a word or two of explanation.

The parts of the circuit within the double lines represent complete plug-in units, which fit into two six-pin bases mounted on the baseboard.

The two units which serve both L.W. and M.W. are shown as plugged into the set, and it will be seen only a movement of the ganged switches is required to change to either of these wave-bands.

Below, the two short-wave units are shown. These take the place of the former units when it is desired to work on the short waves.

Points of interest are the means by which the neutralising condenser only is brought into circuit when the short-wave coil No. 2 is inserted. Also, this latter coil is 16 turns of bare wire, with a tap for the earth connection, thus any size of grid coil between 4 turns (12 turns reaction), and 10 turns (with 6 turns reaction) can be used, covering a wave-band from 18 metres to over 70 metres, a further advantage of this system being that only the lower degrees of the tuning condenser need be used, permitting most efficient working.

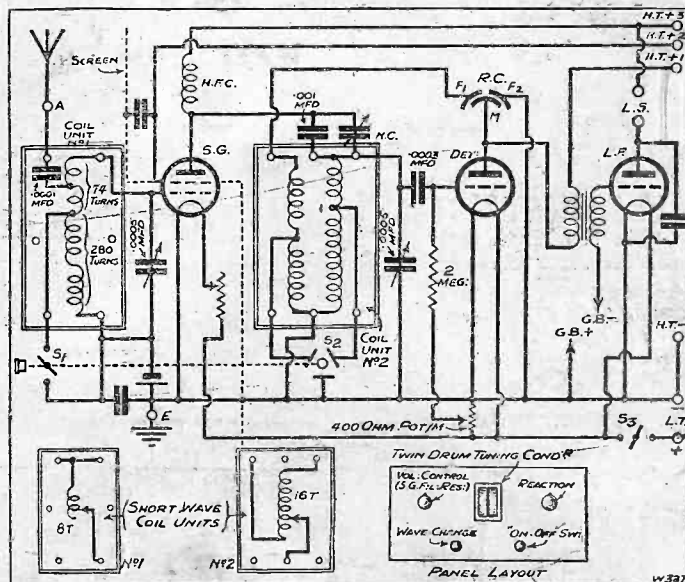
Incidentally, in designing this set I have been greatly helped by information collected from "P.W." For example, the L.W.-M.W. coil unit No. 2 is a "Titan" coil fitted with the necessary pins, and W.L.S.'s "My Screened-Grid Short-Waver" was taken as the basis of the short-wave circuit.

The only difficult part of the construction was the

matching of the long and medium wave coils, so that as a "household" set the twin drum dials may be rotated as one.

I have tried a second "Titan" coil in the aerial circuit, but only by complete screening could I prevent coupling between the circuits, and the screens prevented coil-changing without some difficulty.

A READER'S SWITCHING SYSTEM



This shows the ingenious scheme for wave-changing evolved by Mr. Hewitt, and explained in his letter on this page.

I trust this will interest other readers of "P.W." faced, perhaps, with the same problem.

Yours faithfully,

Liverpool.

G. HEWITT.

[Ed. NOTE.—It is interesting to note that Mr. Hewitt's letter arrived just after the issue of POPULAR WIRELESS, containing details of the "Interchange" Three had gone to press. The latter set uses a rather similar scheme, and employs the new "P.W." Dual-Range Coil, while our correspondent has employed different wave-change units.]

THE "CONTRADYNE" THREE.

Dear Sir,—Some time ago my friend and I had occasion to write you concerning Brookmans Park Rejector and old type Cossor circuit. You were kind enough to offer your assistance with further information. You gave us that assistance, but there was a difficulty about aperiodic tappings, and we decided to wait. We have now built your "Contradyne" Three, and I now want to congratulate and thank you for such a circuit. It is fine, especially on the medium waves. I have already identified eighteen foreign stations; there are others I can get, but as yet I am unable to fix them. We were not able to get the coils through the trade, so my friend made them himself, and he has made a beautiful job of them. Foreign stations come in louder than our local stations in some instances, on the medium waves, but I wish I could get more volume on the long waves. I can get six stations, but not sufficiently loud enough to be comfortable. Of course, I realise I am not giving the voltage you specify. At present I have only 100 volts (Exide accumulators). Both the tappings are on the H.T. 100. Mullard valves, P.M.I.A., P.M.I.L.F., P.M.2. Power 2 volts. Grid bias 6 and 9, not considering the reception on the other waves I am proud of the performance of the set. My family enjoy music from stations we were never able to reach before, and I want to say how thankful we are to you and your staff for the privilege we are now enjoying and greatly appreciate.

Please accept my thanks and best wishes.

Yours faithfully,

E. EVERTON.

Birmingham.

THE most interesting short-wave event of the past week or so is also, in my opinion, one of the most interesting for some years. I refer to the fact that on the 80-metre amateur band, in which interest has grown so rapidly, the United States stations have suddenly started pouring in, every bit as loud as they usually are on 42 or 20 metres.

Is it Correct?

This is proof that even if the "eleven-year cycle" business is correct (and this is only admitted at present by the doleful ones) there will still always be one wavelength on which DX stations can be heard and worked. For if 40 and 20 metres are dying down until their minimum is reached next year, or the year after, 80 metres should be improving correspondingly.

Looked at in this way, it seems quite clear why the first Transatlantic records were made and broken over and over again in 1923 and 1924 on the "long" short waves!

In response to several inquiries for full details of the receiver that I use myself for "keeping watch," I propose to describe it in some detail in a future issue of "P.W.," with the Editor's permission. It is no longer of the rapidly-changing variety, as I have at last found one that really satisfies my demands, and does not get on my nerves by means of silly little tricks that I cannot account for.

SHORT-WAVE NOTES

By W. L. S.

The United States Stations are pouring in!

It will probably disappoint those enthusiastic readers who have written me on the subject simply because it is so straightforward and conventional, but there may be a few novel points in it that I have overlooked!

I have received an interesting letter from a New York reader of "P.W." concerning short-wave reception on the other side, and in which are these points. First, W2XAF is very weak indeed. PCJ is hardly ever heard at all, and Zeesen is quite poor.

"With a Bang."

On the other hand, LSX (Buenos Aires) "comes through with a bang," and is also pretty consistent. It looks as if conditions are all right from north to south and very poor from east to west.

This reader, "G. L. P.," also gives me particulars of the "International Short-Wave Radio League," which, he says,

helped him on a lot when he started on the subject. If anyone would like to get in touch with "G. L. P." on the subject, I will forward letters to him.

He is also good enough to give the full address of the Buenos Aires station, for which I have already been asked many times. It is: Transatlantic Radio Corp., San Martin 329, Buenos Aires, Argentina.

And now the "weekly five." Readers do not seem to have been getting on very well with reception of the stations I have mentioned from week to week.

Have a Shot at Them!

Let us hope it is due to bad conditions and not to an epidemic of bad receivers! For this week I suggest:

FTM, Sainte Assise, on 15.5 metres;
VLK, Sydney, on 18.37 metres;
UOTH, Vienna, on 27 metres;
DHC, Nauen, on 29.47 metres; and
JIAA, Tokio, Japan, on 38.1 metres.

I have logged four of them myself during the past month, so there should be no difficulty in finding them this time.

In addition to G2GN, the Olympic, G2GL, the Homeric, and G2IV and GFWV on the Majestic, working telephony to the shore, we now have the Bremen (call DDDX) and the Hamburg, both doing the same thing at irregular hours. All these boats work between 22 and 26 metres.

NOTES FROM THE NORTH

The opening of the North Regional station will revolutionise radio reception in the North of England. A review of 1930 and a prospect of the important developments of 1931 is given here.

IT is a safe prophecy to say that 1931 will be a record year for broadcasting in the North of England. As I write, the stage is set for the biggest event since radio first came to the North, and only some slight delay behind the scenes prevented the curtain being rung up before 1930 was out.

Trade Boom Expected.

Widespread public interest and curiosity has been aroused by the preliminary news and rumours about the North Regional station at Moorside Edge, and those who are aware of what is going to happen are eagerly waiting to see exactly how the new station will affect radio reception in Northern England and the North Midlands.

One result of this is a severe slump in the wireless trade. One of the biggest wholesalers of wireless apparatus in the North tells me that trade is "dead" because the public is afraid to buy.

"But," he adds, "as soon as the new station has been testing long enough for us to prove that modern sets can provide the requisite selectivity, there will be a rush to buy. I am preparing for a three months' trade boom."

There are, however, an astonishing number of people who are innocently unaware of the sweeping revolution which the B.B.C. is to bring about by the opening of the North Regional station.

Unaware of New Station.

Visiting a village in one of the Yorkshire dales recently, I fell into conversation with the Vicar, who proved to be a keen radio "fan." He told me that in his dale Daventry National was the only British station that could be received satisfactorily on a three-valve set.

A number of foreigners came in quite well, he said, and he asked me if I could advise any alterations so that he could get better reception of British stations.

When I suggested that he should wait until the new station at Moorside Edge was in full action he expressed surprise. "What!" he said, "are they opening a new station in the North?"

Giving the parson the credit of being the best-informed person in the village, I assume that this village will be taken entirely by surprise by Moorside Edge.

Better Programmes.

The surprise will be intense, for I myself verified the Vicar's report on local reception conditions, and after these poor conditions the change to powerful reception from a local station will be staggering.

This applies to the greater part of the North of England, for the areas served by the present low-power transmitters are restricted to a few miles round each, and most of the North has had to rely on 5XX.

The revolution in the method of transmission will be accompanied by an equally important revolution in programmes, for which the B.B.C. has been steadily preparing during 1930.

The system under which the northern transmitters have sometimes relayed the National programme and sometimes broadcast local items has been far from satisfactory, for the programmes are often ill-balanced, taking a week as a whole, and when a local item is given it inevitably arouses the fury of the people who happen to be particularly attached to the National item it has replaced.

From Moorside Edge the National programme will be broadcast in entirety on 301 metres wave-length. Simultaneously the second transmitter, on 479 metres, will give what will be known as the North Regional programme.

Northern Talent.

Sometimes the Midland Regional and London Regional programmes will be relayed on this wave-length; but the B.B.C. has given its assurance that the major part of the programme will be of northern origin.

"ALL TELEPHONES, PLEASE!"



The use of radio on long-distance trains is becoming more and more common, particularly on the continent. The usual scheme is to hire 'phones from the steward on the train, here seen on his "round" of the carriages.

On this wave-length Moorside Edge will be literally the voice of the North. From the B.B.C. studios at Manchester, Leeds, and Newcastle, and by means of outside broadcasts from all over the North of England, the talent of the North and its manifold activities and interests will be brought "on the air."

During 1930 the North Regional staff of the B.B.C. have been steadily preparing for this fulfilment of their dreams, and the quantity of North country material broadcast by the Manchester and Leeds transmitters has been gradually increased, the idea being apparently to try it out on the dog.

For the dog—the radio listeners of those two great industrial cities—this was occasionally unfortunate, but generally speaking the North Regional programmes have now been completely rescued from the morass of mediocrity in which they wallowed.

Vast improvements were made in 1930 on the dramatic side. There is now a competent company of radio play-actors at the North Regional headquarters at Manchester, and in Mr. Victor Smythe the North Region has a producer who works like a Trojan.

Improved Revues.

The acting in North Regional plays has not yet attained quite that effortless sincerity, and the production has not been so entirely smooth-running as in the best of Savoy Hill's efforts during 1930, but very rapid improvement is going on, and in the presentation of a more homely type of drama than Savoy Hill provides Manchester can certainly give points to London.

Towards the end of 1930 radio revues produced in the North showed a marked improvement, particularly in the slickness of presentation. Northern vaudeville, on the other hand, has been disappointing, and needs energetically working up to the National programme standard.

Outside broadcasting in the Northern Region has been most enterprising, and I understand that plans have been made on an extensive scale for putting "outside" events of all kinds on the ether this year.

The Orchestra.

One of the happiest features of Northern broadcasting has been the delightful "microphone manner" which has been developed by the North Regional announcers.

Under Mr. T. H. Morrison the work of the Northern Wireless Orchestra, and the musical side of the Northern programmes generally from the Hallé Orchestra to the brass bands for which the north is world-famous, has maintained a high standard, and the most consistently satisfactory feature of the year's broadcasting in the North has been the work of the Northern Wireless Orchestra. For that reason the threat of dissolution which hangs over its head is especially deplorable.

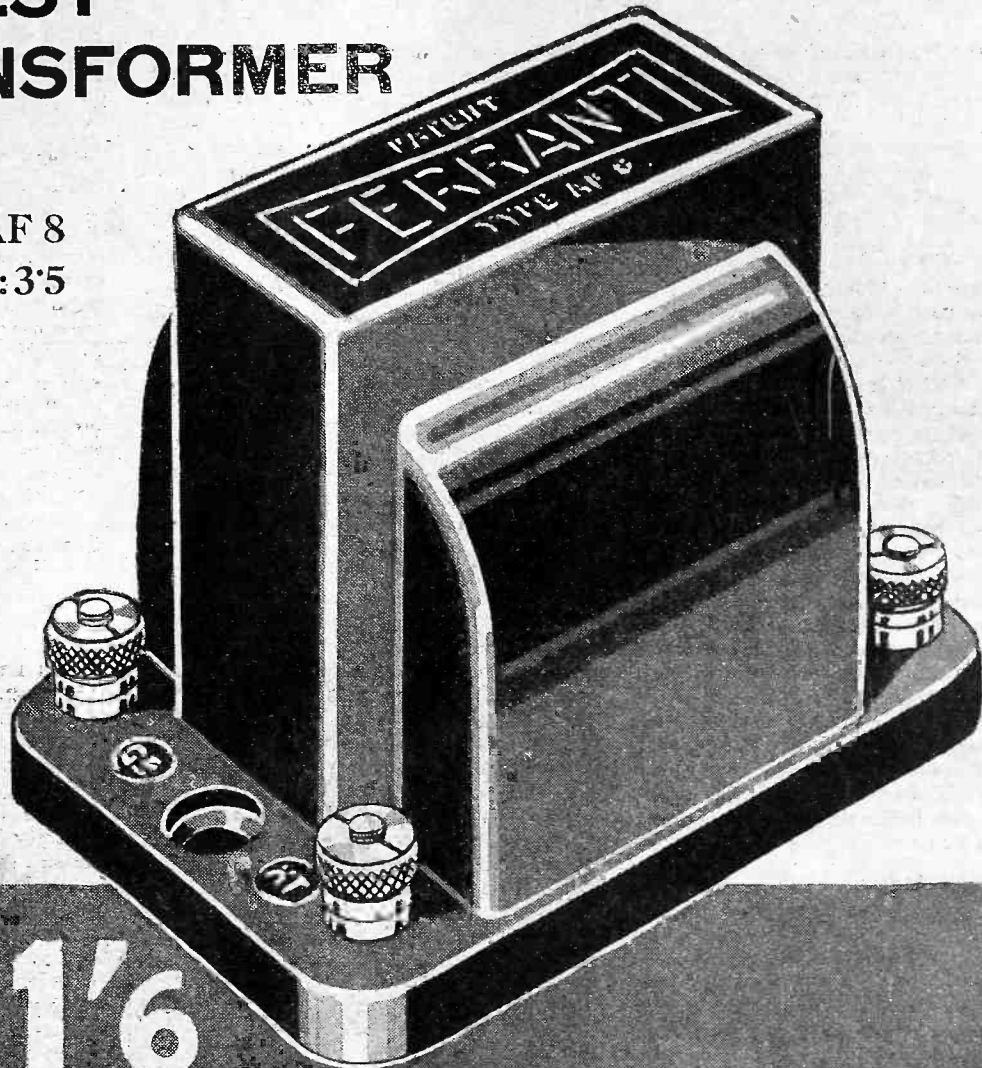
The Regional news bulletin is the worst feature of Northern programmes. The triviality and inefficiency of the B.B.C.'s local news service in the North is astonishing.

The North Regional staff is as keen as mustard, and reminds me of the early days of the B.B.C., when everybody was a pioneer, an enthusiast.

A great responsibility rests this year on the North Regional director, Mr. E. G. D. Liveing. To him, to his assistant, Mr. J. B. Clark, and to all who, in addition to those mentioned above, help to run Northern programmes, I send the wish that their programmes may improve in 1931 as much as they did in 1930. If they do, we shan't have much to grumble about next year.

THE VERY LATEST TRANSFORMER

Type AF 8
Ratio 1:3.5



only **11'6**

—and a **FERRANTI** at that!

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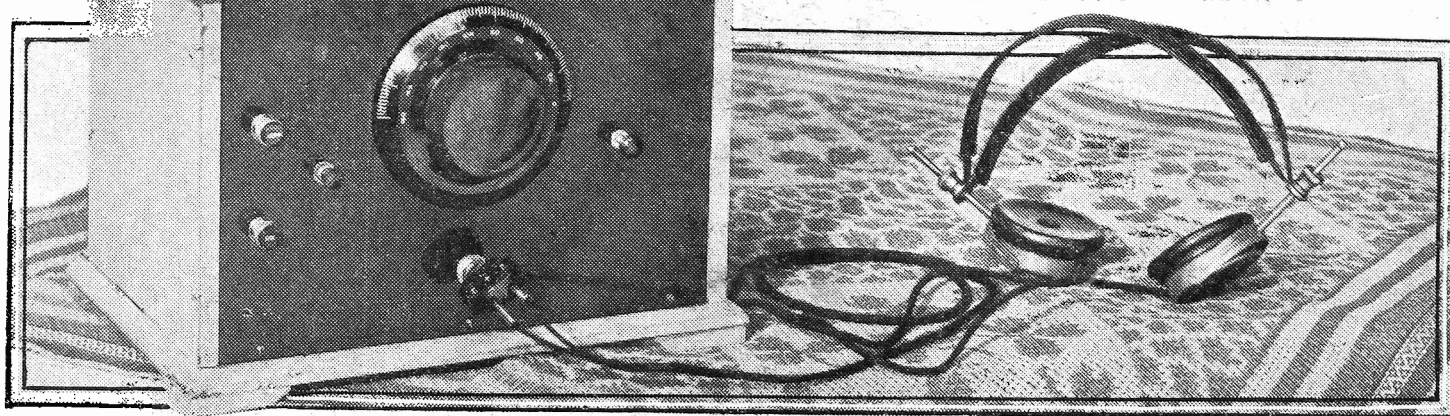
It employs the FERRANTI patent air-spaced sectionalised windings, which are known the world over, and no nickel-iron is used in its construction.

Used in thousands by manufacturers of high-grade Radio Receivers.

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MODERN CRYSTAL SETS



I FANCY that it is incorrect to speak of modern crystal sets in the sense that the sets themselves are modern. More truly the interpretation of the title of this article should be crystal sets that are used in modern times.

There has been little or no progress at all in the design of crystal detector receivers during the past twenty years. There has been, as with all things radio, a certain amount of improvement effected. For examples of these I would refer you to the structure of the detector itself—once a very shaky affair and now a moderately robust and reliable device. And, of course, "P.W." has played its part in the development of circuit twists that add quite a bit to the general effectiveness of crystal outfits. The "P.W." "Reactocrys" is a notable instance of this.

Fundamentally Unchanged.

However, despite all the foregoing, it is an undeniable fact that the crystal set of to-day is fundamentally similar to those of pre-war days. Compared with the terrific strides taken by valve apparatus the poor crystal looks as though it has been stuck right in the mud for ages.

At a point somewhere near the beginning of another year, it seems fitting that we should review the situation if only for the sake of those readers—a minority, perhaps, but a very enthusiastic minority—who still cling to the crystal as their only means of reception.

At one time valve users were the smaller section of the home-constructing public, but there is little doubt but that they now constitute some 90 per cent, or even more, of those that hopefully scrape the night ether.

Will the Valve Survive?

The reason for this is almost too obvious to mention. Valve apparatus offers unlimited scope for experiment, and it never stands still—there are always new avenues opening up, although here, too, progress is slowing down, but not to a standstill, I think. I confidently predict that the valve set of ten years hence will be a very different thing from those employed in this year of grace.

Indeed, I am not too sure whether the valve, as we know it, will survive. It has always been my impression, as "P.W." readers know well, that one day even the thermionic valve will meet a formidable

G. V. DOWDING, Assoc.I.E.E.

Advances some observations that will interest and hearten crystal enthusiasts and advises inveterate loud-speaker listeners to try telephone receivers as a fascinating experience.

rival in some electro-magnetic or electro-chemical principle. Maybe a young man reading these very words is destined to be the instigator of some such radio revolution.

It is a fascinating prospect to linger over in one's imagination. Conceive of the fame and fortune awaiting the man who comes along with a little sealed bottle, containing three electrodes and, let us say, a radioactive fluid, that would cost about fourpence to make and which would displace

any valve in any set, even one of those expensive mains valves. Think of the shock to the present generation of radio enthusiasts if all that could be done without resorting to any additional source of energy such as our present H.T. and L.T. supplies.

That Shut-In Feeling.

To return to the present hard facts, other factors that contribute to the decreasing popularity of the crystal set are the cheapening of valve apparatus and its much more social loud speaker in place of telephone receivers. Personally, I regret the waning use of 'phones. In my opinion, 'phones make for good listening. You see, when two ear-pieces are clamped over your ears extraneous noises, such as are always present in the house and within its immediate vicinity are to a great extent reduced. Good modern 'phones are light enough and quite comfortable to use—they don't make your head ache like those old heavy ones.

And you are able more easily to concentrate on what is coming to you via the radio. Someone enters the room, and the mere fact that you are wearing headphones tends to short-circuit their casual conversation. The illusions of a radio drama and other such broadcasts are generally more complete, too, in such circumstances, for you have the feeling that you are shut in with the radio, and not listening to it from a distance as with a loud speaker.

The Chummy Crystal.

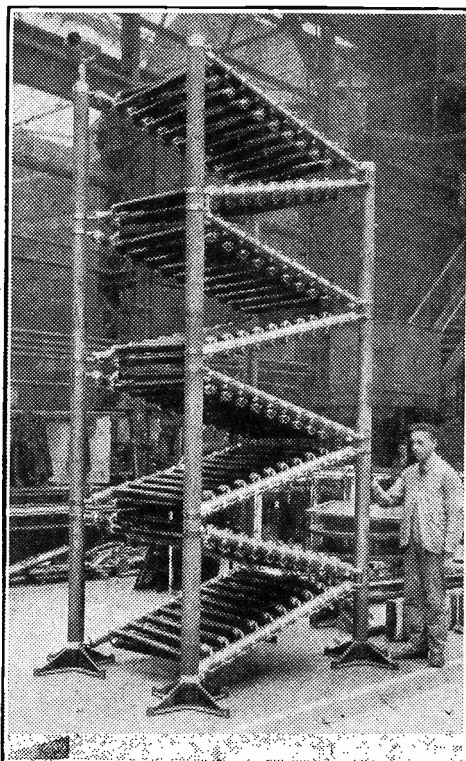
There are many readers who have old crystal sets tucked away which they have not used perhaps for three or four years. I would advise them to get the sets down, dust them, and take a few broadcasts from the local via a crystal detector for a change. They will discover it is interesting!

There are no doubt thousands of you owning valve sets who listen on the short waves and even to distant medium wave broadcasters with 'phones, and I expect you will endorse my next observation. This is that the apparent closeness of contact that 'phones enable you to gain adds vastly to the interest of listening to those distant stations and makes them more "personal," as it were, than when you "tune in direct on the loud speaker."

And taking everything into consideration, there is a great deal to be said for the crystal set as a "chummy" companion to solitary listeners. And when I say

(Continued on page 936.)

800,000 VOLTS!



A bank of condensers built by Ferranti for use on 800,000 volts—just a few times greater than the pressure the condensers they make for your set have to stand!

£10,000

CASH PRIZE MUST BE WON

Wonderful **DOUBLE TWO**
Wireless Ballot open to all
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A WEEK FOR
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COMPLETE WITH
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Send coupon now for particulars of this amazing offer. The Double Two Competition is open to all. There are no difficult conditions. It need take you only a few minutes to arrive at the solution which will bring you a cheque for £10,000. Do not let this wonderful opportunity pass. There is no reason why YOU should not be the lucky winner of a fortune. Post coupon at once.

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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

WAS IT THE CONDENSER ?

L. T. S. (Sittingbourne, Kent).—"For a long time I had been getting excellent results with an ordinary transformer-coupled last stage. Recently I thought I would try to "auto-choke" the transformer, and with this in

view, I bought a fixed resistance and condenser, connecting up according to the makers' instructions (enclosed).

"At first I was charmed with this arrangement, for it certainly did seem to give even better results than formerly. But now I have had a trouble which I cannot make out, and which bids fair to ruin my valve.

"What happened was that suddenly and with almost no warning, the whole thing gave distortion, nothing that I could do making the slightest difference to it.

"But what alarmed me was that I noticed that the milliammeter in the plate circuit of the

last valve immediately went up. So all I could do was to switch off and hope that the valve had not been hurt.

"All connections are sound and perfect, and there is no such simple fault as a broken grid-

HOW IS THE SET GOING NOW?

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

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

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

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

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

bias lead or bad contact in this part of the set. I am absolutely at a loss to know how such a fault could occur."

Everything points to a dud coupling condenser. Should the insulation of this not be perfectly satisfactory, the grid of your power valve will be affected by the preceding valves' high-tension.

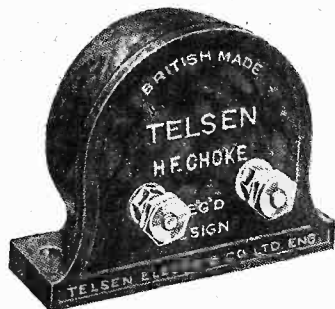
Obviously this can take place by the H.T. causing current flow through the L.F. transformer, and decreasing the effective bias of your G.B. battery. With H.T. + "getting through" like this the power

(Continued on page 928.)

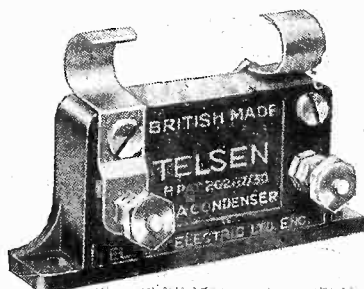
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of the superiority of Telsen Components is to be found in the fact that, apart from their continual inclusion in the most popular sets of the day, they are being bought by wireless enthusiasts in ever increasing quantities.

Components may look alike, but there IS a difference—a very big difference—in Telsen! MANY FEATURES OF TELSEN COMPONENTS ARE PATENTED, hence the remarkable improvement in performance when they are incorporated.



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



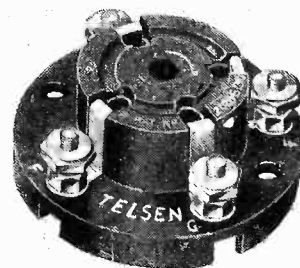
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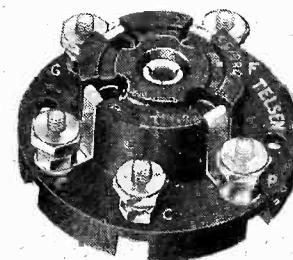
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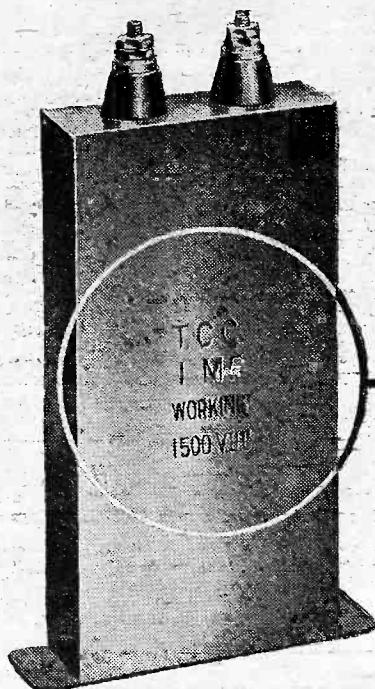
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TELSEN FIVE-PIN VALVE HOLDERS. Price 1/3 each.

TELLING THE TRUTH ON A CONDENSER



Test Voltages or Working Voltages?

SOME condensers are marked in a misleading manner. They indicate test voltages, which are obviously so much higher than actual working voltages, you may believe you are buying more efficient and better insulated condensers. This is not necessarily the case. The old idea that the continuous working-voltage of a condenser was half its stated test voltage cannot now be relied upon, for Condensers of similar capacity and size have been sold stamped with varying test voltages, but with no indication of the working voltage. Do not take risks, therefore. See that the condensers you buy are definitely marked with their maximum **working** voltage. You will always find this on

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£6
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SURELY the aim of every wireless listener is to attain perfection in Radio with the minimum amount of trouble and expense.

Model A.C.188 was first in the "Wireless World" Competition at Olympia, and is suitable for any set, Standard or Portable, and can be attached to either without the slightest alteration or replacement of valves.

Clarke's "ATLAS" Model A.C.188 is fitted with two variable tapplings of 0/100 and 0/120 Volts and one fixed of 150 Volts. The output 150 Volts at 25 m/A is twice that of any other Unit at the price, and the L.T. Trickle Charger caters for 2, 4, or 6 Volt Accumulators. Ask your dealer for Folder No. 55, or write direct to the sole makers:

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CLARKE'S
"ATLAS"
ALL MAINS UNIT

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 926.)

valve's emission would certainly go up as you describe, with possibly undesirable results to the valve's health. You should certainly have that condenser out, and test it with a milliammeter in series with an anode resistance. It should, of course, show only a momentary kick when H.T. is switched on but if it shows a steady reading you can be sure it is a dud one.

NOT A RUSSIAN.

P. M. (Warwick).—"I have heard it several times on Sundays and think it is a Russian station. During the service they sent out last Sunday evening there was a male voice choir. Was it a Russian?"

It could not have been a Russian station. If you heard it sending out a religious service, as the Russian stations do not broadcast anything at all of this nature.

FITTING AN R.C. STAGE.

S. G. T. (Huntingdon).—"With the H.F. unit in front of the detector and the two transformer stages, results are a bit too strong, and I would rather go out for purity."

"It is certainly very clear on everything but the loudest notes, but I think I am overloading a little and should like to use the transformer in another set if I could put a resistance in its place. I would like to use the R.C. unit I have on hand, but am not quite sure about the connections."

The alteration is a very simple one. All you have to do is carefully disconnect the grid and grid-bias leads from the secondary of the transformer and the other two leads from the primary—all the batteries, of course, being disconnected from the set as usual when alterations to the wiring are being made.

With the L.F. transformer lifted out of the way, all you have to do is to place the R.C. unit in position, this being marked for the four leads. Usually there is a "G" mark, which means the grid lead, and "C" or "G.B." which signifies grid bias.

One of the terminals on the unit should be marked H.F. (or perhaps B+), and the final terminal is usually either marked P or A standing for plate or anode.

This lead usually goes to an H.F. choke if in a detector reaction circuit, or direct to the plate, if in the circuit of the L.F. valve.

TUNING A SHORT WAVER.

S. W. (Nr. Norwich).—"What are the chief points to watch for when handling a short-waver for the first time?"

With a short-wave set you require good slow-motion dials and with most novices the tendency is usually to turn them much too fast. It should be remembered that short-wave tuning is phenomenally sharp and it must be undertaken carefully.

The tuning dial must be rotated very, very slowly, or otherwise the short-wave carriers will fail to appear. It is so easy to miss a transmission that short-wave enthusiasts nearly always wear phones, instead of using the loud speaker when tuning, just to make sure that nothing is overlooked.

At the faintest sign of a chirp or whistle tuning should be very carefully adjusted and reaction slackened off a little, so that the set is not quite oscillating. Often when condenser-controlled reaction is employed a slight variation of the reaction condenser will alter tuning enough to make a station disappear.

Therefore, both hands should be used, one for tuning control and one for reaction, and these two must be working together in perfect harmony. The tuning dial must follow up and down the carrier whistle which you are investigating, while the reaction is varied to the necessary degree.

Co-ordination between the two dials must be close if the various signals received are to be fully appreciated. Once you have got the hang of the thing you will find that short-wave tuning is really quite

simple, and far more exciting than operating an ordinary set.

NEW BLUE PRINTS.

T.S.E. (Southampton).—"My brother-in-law swore that it was a 'P.W.' Blue Print, all right, but it wasn't shown on the list you sent me in December. Are there other new ones, as well as this 'Sharp Tune'? If so, what?"

Several additions have been made to the lists sent out last year, and all the following are now obtainable.

"P.W." BLUE PRINTS.

No. 57.—The "Sharp Tune" Two. A really simple all-wave set with a special selectivity control. Ordinary plug-in coils, wave range 20/2,000 metres.

No. 58.—The "Easy Change" Three. An efficient receiver using plug-in coils in a special wave-change circuit.

No. 59.—The "Three-Coil" Three. This is a high efficiency selective receiver, with an S.G. H.F. stage, which requires only three ordinary plug-in coils.

No. 60.—The "Maxi-Power" Four. Powerful and selective long-range reception, with wave-change switching and plug-in coils.

"M.W." BLUE PRINTS.

No. 10.—A D.C. H.T. Unit. A simple but highly-efficient H.T. unit for D.C. mains, with a special voltage measurement scheme.

No. 11.—The "Change-Range" One. A very efficient little single-valve set, giving all the advantages of wave-changing switching.

No. 12.—The "Separator" Two. A simple little detector and one L.F., with a wave-change rejector for dealing with "Regional" conditions.

No. 13.—The "Inter-Star" Three. A sensitive long-range receiver of exceptionally high selectivity.

(Continued on page 930.)

"P.W." PANELS. No. 3.—SWITCHES.

Before mounting a switch it is a good plan to examine it carefully to make sure that the springs are sufficiently strong.

The ordinary on-off switch has many useful applications; wired across a loud speaker it will cut it out of series with other speakers, or wired across a long-wave coil it will cut this out of circuit.

Special insulated switches should be used for bringing "mains" sets, units, etc., in or out of action.

CHEAPER ELECTRIC RADIO by



It now costs only £2 : 12s. : 6d. to electrify your portable—any portable—for D.C. Mains, with the new Regentone Combined Unit, Model II.

For A.C. Mains the new Regentone Combined Unit Model W.5.A. costs only £4 : 15s., or Model W.1.D (H.T. only), costing £3 : 7s. : 6d.

These new Regentone Mains Units fit inside any portable—they are suitable for all standard 2-, 3-, or 4-valve receivers.

Write for FREE Art booklet, with colour supplement, "Cheaper Electric Radio by Regentone"—let us prove to you how much cheaper and more reliable is Regentone Electric Radio.

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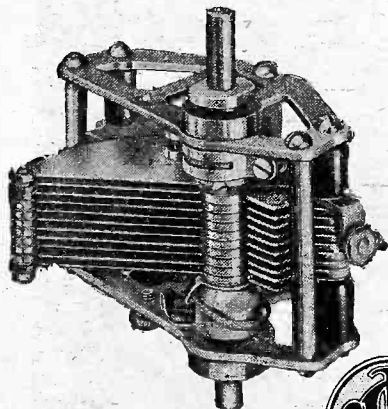
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J.B. have concentrated for years on the manufacture of their Precision Condensers and Dials. The excellence of these products to-day justifies this specialisation.

No one could glance at a J.B. Condenser without being struck by its beauty of finish and its workmanlike appearance. Closer inspection shows all the accuracy, careful thought and attention to detail that have gone to make it what it is.

There is a J.B. Precision Condenser for every purpose. Illustrated here is the J.B. Universal Log Condenser, famous for rigidity and low loss construction.



J.B. UNIVERSAL
LOG
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Adjustable—for
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PRICES:

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·0003	9/-
·00025	8/9
·00015	8/9



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Brake & Saxby
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York Rd., King's
Cross, N.1.

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

THIS booklet gives complete instructions for building high- and low-tension eliminators; and there are chapters on Alternating Current and Rectification, Types of Electricity Supply, High-Tension Trickle Charging, Low-Tension Trickle Charging, Moving-Coil Loud Speakers, General Principles and Methods of Rectification, Smoothing, Transformers for Eliminators, Voltage Doubler Circuit, Voltage Dropping, Types of Rectifiers, etc.

If you are building an all-mains set, send for this forty-page booklet—the coupon, together with 3d. in stamps, will bring it to you by return of post. Or if you intend buying an all-mains receiver, make sure that it incorporates the



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SIGNAL CO. LTD., 82, York Rd., King's Cross, N.1.
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PLEASE WRITE IN BLOCK LETTERS.

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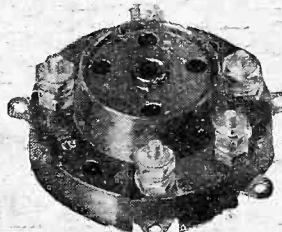
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Every Thursday, 2d.

GIVE YOUR VALVES A FAIR CHANCE



For all modern valves and in particular for Screen Grid Valves, valveholders with high insulation between sockets are essential. Use this W.B. Valveholder and ensure ideal valve-operation. It takes either 4- or 5-pin valves. Special spring contacts grip the valve-pins firmly. Screw terminals make soldering optional. It's wise to use W.B.—the valveholder with a reputation.

Price 1/-

Made by the Makers of the famous W.B. Permagnet Magnet Moving Coil Loud-speakers, Cone Speakers and Switches.



**BRITAIN'S LEADING SET-MAKERS USE
VALVEHOLDERS**

Whiteley Electrical Radio Co., Ltd., Radio
Works, Nottingham Road, Mansfield, Notts.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 928.)

Will cope with the most arduous Regional conditions: incorporates one S.G. H.F. stage, with the famous "Star Turn" tuning arrangement for ordinary wave-lengths, and interwave coupling for long waves.

No. 14.—The "Multi-Wave" Three. An all-wave receiver, giving excellent results on short, medium, and long waves.

No. 15.—The "Drum-Control" Four. A high-efficiency four-valver with wave-change switching for plug-in coils.

No. 16.—The "Filter Tuning" Five. A simple but powerful and efficient long-range receiver. Normally

what I had always intended, and that is fit in an output filter circuit. What exactly will be the connections and extra components required? (The set is the 'This Year's "Magic" Three'.)

The additional wiring is very simple. You will need one good low-frequency choke with an inductive value of about 20 henries, one large fixed condenser of 2 or 4 mfd., and two terminals marked Loud Speaker for the new output.

The fixed condenser must be of really good quality and if you are using mains H.T. it should be one that has been tested at a much higher working voltage than that of your mains. In use it will have constantly to stand the full voltage of your mains and consequently any leakage here would be fatal to your scheme.

To wire up, examine the inside of your set and you will find that the plate socket of the last valve holder is connected to one of your loud-speaker terminals. The H.T. of the battery is connected to the other loud-speaker terminal, and you must disconnect your external loud-speaker leads from these two terminals altogether.

In place of them wire up the low-frequency choke across this part of the circuit. The large condenser must be placed at some convenient spot close to the choke, and from one of its terminals a lead must be taken to that side of the choke which is now connected to the plate of the valve holder.

The other side of this fixed condenser goes to one of your new "Loud-speaker" terminals, and the other new "Loud-speaker" terminal goes to the L.T.—H.T.—earth, or other convenient point which is connected to earth.

This completes the alteration, but do not forget that after your loud speaker has been connected to the new terminals the loud-speaker adjustment (if any) may need alteration for sensitivity, as the plate current of the valve does not now pass through the windings.

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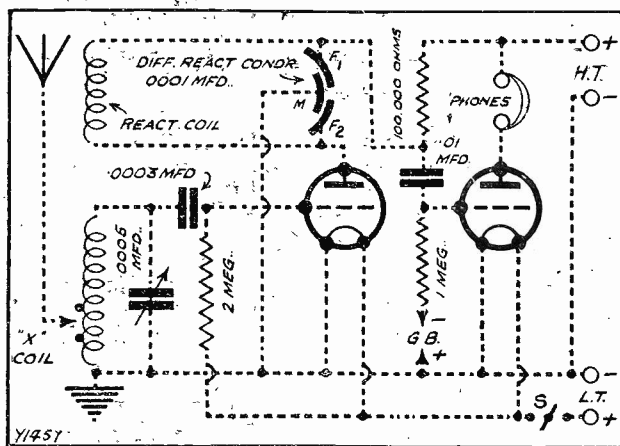
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A DET. L.F. WITH R.C. COUPLING.



The dotted lines above show the connections for a straightforward Detector and L.F. amplifier, using differential reaction and resistance-capacity coupling. (No special selectivity device is included, so the set is not suitable for use near a Regional station.)

employs only two tuned circuits. For high selectivity an extra tuned filter circuit may be brought in by the simple movement of switching.

A CRYSTAL SET FOR REGIONAL CONDITIONS.

J.N. (Watford).—"I always thought a crystal set could not cut out one twin and get the other till I heard your 'Crystachoke' at the scoutmaster's.

"Now I should like to try it here if you will give me connections (in words) and the details of making the coil."

The correct making of the coil is the main part of the set. The "former" is a piece of 3-in. diameter tubing, 3 or 3½ in. long, and on this you must wind 55 turns of No. 24 double-cotton-covered wire (or 50 of No. 24 double silk) in a single, close layer.

Start at the bottom and make tapping points for the aerial clip (twisted loops, later scraped bare, will do) at the 15th, 20th, 25th and 30th turns as you go.

In the lower end of the tube fit a wooden cross-piece in the usual way for purposes of mounting on the baseboard. Fix the cross-piece with small screws, passing through holes in the wall of the tube into its ends, and pass a larger screw down through it into the baseboard of the set.

The connections of the other parts are as given below: Aerial terminal to a flex lead and clip which is tried on the coil tapplings, 10 to 30.

"Earth" terminal is joined to the end of the coil nearest to the 10 tapping, to one end (it doesn't matter which) of the H.F. choke, to the moving vanes of the variable condenser, and to 'phones.

The remaining "phone" terminal goes to one crystal terminal, the other side of the detector being joined to the fixed vanes of the variable condenser, to one side of the .001 compression condenser, and to the free end of the H.F. choke.

The final connection is from the "60" end of the coil to the remaining side of the .001 condenser.

Set the .001 at its maximum, tune on the other condenser, and note results. Then reduce the .001 a little, re-tune, and again note results, continuing in this way until you find the best position.

A final word—don't forget to try the aerial lead clip on different taps, re-tuning each time, to see which is best for your own conditions.

FITTING A FILTER CIRCUIT.

T. B. (Eastbourne).—"Now that I have two loud speakers going I am forced to do

AT HOME WITH RADIO STARS.

(Continued from page 907.)

I've only to look at the advance lists of my forthcoming broadcasts to be assured of that.

"Each of those broadcasts means the provision of some new 'funny stuff'; and it is essential that it should be new. It must be the Tommy Handley type of 'funny stuff,' for if it is at all different, or after the style of some other broadcaster, then listeners say, 'Ah! Tommy's run dry of ideas.' He's been listening in to Stainless Stephen and has pinched his style." And, honest truth, I never do listen in to other people to 'pinch their ideas.'

"Often at the flat here I put on one or two of my own records, and stand that torture because I find that some old joke of mine, which I myself may have forgotten, sometimes suggests a new idea—perhaps a whole crop of new ideas.

"Just before I left for the B.B.C. to-day I was putting on some of my records. That is why the place looks like the 'Dis-Orderly Room.' And you can bet your best high-tension that Mrs. Handley, who, by the way, is known perhaps better as 'Jean Allistone' to listeners, is down at Egham, for she wouldn't have the place looking like this!"

"But," I said, "I suppose it often did, in your bachelor days?"

"Good lor, ye——" said Tommy, and then stopped. "Oh, no it didn't. You don't wring any confessions out of me!"

But, somehow, I think I have!

H.M.V. TACKLES TELEVISION.

(Continued from page 906.)

The output from each photo-electric cell is amplified by the valves in the sections shown in Fig. 2, and the signals from these are further amplified. Fig. 3 shows a closer view of the photo cell and amplifier section.

Fig. 4 gives a general idea of the receiving end. Here the signals are again amplified by specially designed amplifiers, and it is claimed that an amplification of nearly a million is obtained.

As the intensity of the transmitted signals will vary according to whether they are generated by light spots that are bright or dark parts of the picture, the light from the arc lamp, therefore, must be modulated in sympathy. This is done by a specially developed form of Kerr cell, a light-valve capable of operating at high frequencies and of handling a considerable amount of light.

No Rash Promises.

These special cells, as you will see in Fig. 4, are situated between the arc lamp and the revolving drum. This latter has on it highly polished mirrors which correspond exactly both in speed of revolution and relative position with the transmitting lenses.

The synchronising is very simply carried out by means of a special dynamo mounted on the lens drum of the film projecting shaft (Fig. 1) which energises a special form of control at the receiving end.

Whether anything will come of this system remains to be seen. At present it is an interesting laboratory presentation of television, and The Gramophone Company do not wish it to be taken as anything but a laboratory experiment at the moment.

They make no rash promises that it will ever come upon the market, but they consider that television is a vital necessity for the future and that it behoves anybody who can to carry out experiments in the subject. Consequently, the tests which have been undertaken at Hayes have been done not with the idea of raising a tremendous publicity shout, but with a view to H.M.V.'s contributing their quota to the world's scientific research on the subject of television as a possible future entertainment.

Which is Better?

The question in readers' minds that will immediately rise is "Is the H.M.V. system as good as the Baird?" There is no direct answer to this. It is entirely different in conception from the Baird system, and the two can hardly be compared.

The result of the H.M.V. system as shown to me is remarkably brilliant and clear; the sections do not blend quite properly—but it would be grossly unfair to both sides if I were to say "here are two systems of television; this is better than the other."

The future alone can show what will be the ultimate end of either system, and I do not intend to prophecy ultimate adoption for broadcast transmission of television programmes for either. We must wait and see.

It is interesting to note that, as a sequel to a demonstration at the Physical and Optical Society's Exhibition, Baird Television, Ltd., state that they have issued a writ against The Gramophone Company, Ltd., claiming infringement of a patent.

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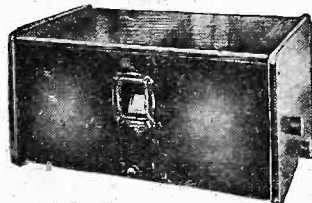
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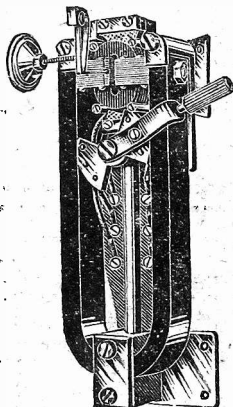
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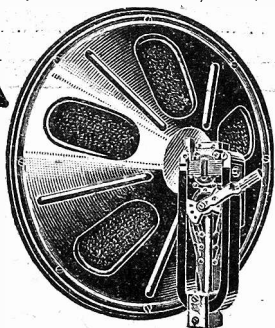
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FOR THE LISTENER

(Continued from page 908.)

Loe Strachey, then it is going to be what they call in the North Country "champion." With her delightful voice and charming manner, she spoke of the changing modes of travel. The bicycle, the motor-car, the aeroplane; she had journeyed in them all, and loved them all.

What Persia Looks Like.

The same evening, Miss V. Sackville-West gave what can only justly be described as an extremely brilliant account of "What Persia Looks Like."

Her pictures were full of life and colour. Her descriptive language was masterly in its words and in its restraint. I actually and really saw the Persian land.

There are to be other talks on Persia, in view of the Exhibition now open in London. It is said to be wonderful. Many of you will see it.

I shall. And those of us who see it will have in our minds the memorable impression which Miss Sackville-West gave us, as a background, of the country from which these amazing treasures come.

Who Killed Johnson?

The first chapter of "The Scoop" was interesting enough. But what to me was even more interesting was the very skilful and dramatic way in which Miss Dorothy Sayers read it.

It was a fine piece of reading. Miss Sayers has a kind of masculine voice which fitted well the raucous bustle and din of a newspaper office and she spoke the men's parts better than those of the women. The question now is: Who killed Johnson? But I am no good at that sort of thing. I should think that I must be the most gullible man alive, and in the course of this story I shall doubtless believe every single character, in turn, including Hemingway himself, to be the criminal. That's the fun of it.

Drama.

Mr. Val Gielgud, who is the director of dramatic productions, appealed to us to play our part in making radio drama a success. He asked for concentrated listening.

My heart fluttered a little when I heard him say that a play adapted by myself was to be produced next month! Forgive me! If I don't puff myself, who the dickens will?

Return of Vernon Bartlett.

This was a welcome return of one of the most valued and most popular of broadcasters. He was not very cheerful about the "Way of the World."

Apparently it was his opinion that this year would be the most critical year since the Armistice.

"Because things are so bad, they will be better," was his rather cold comfort. But there is a broad sanity and quiet reserve about Mr. Bartlett which steadies one.

TECHNICAL NOTES

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

Impedance Ratios.

I WAS talking some little time back about the relation between the impedance of a loud speaker and that of the output stage of the receiver. You know that in general the impedance of the external circuit should be larger than the internal impedance of the valve, a ratio of 2 to 1 respectively being often aimed at.

For this reason experimenters often try to arrange to use a loud speaker of very high impedance, sometimes altogether too high, and also to connect two or more loud speakers in series, when the speakers are of too low impedance individually.

Now although at first sight this seems to meet the conditions laid down, there is a snag in it, because when you connect the speakers together in series you not only increase their impedance to varying currents

but you also increase their ohmic resistance to steady currents.

In many receivers the anode current, which is taken by the output stage, passes through the loud-speaker windings, and if the resistance is greatly increased

The GRID LEAK & CONDENSER

appear in nearly every valve set as the means of detection.

Usual values are .0003 mfd. and 2 megohms.

In many circuits the leak is not placed "across" the condenser, as shown, but one end goes direct to L.T. +, or to a potentiometer slider.

(as it will be by putting two or more loud speakers in series) the anode current is cut down and consequently the efficiency of the output stage is also cut down, so that what you gain on the swings you lose on the roundabouts.

Alternative Arrangements.

In fact, in some cases, paradoxical as it may seem, it is actually an advantage to connect a couple of loud speakers together in parallel rather than in series. However, if you particularly wish to connect the loud speakers in series (and under proper conditions there is sometimes a definite advantage in this arrangement) you can do so by including an output choke filter between the receiver and the speakers.

In this case the anode current does not, of course, pass through the loud speakers, and therefore the difficulty mentioned above does not arise. I am assuming that the total resistance of the loud speakers is not enormously high, as even with the choke filter arrangements the ohmic resistance of the loud speaker does matter if it becomes very large. But there is a great deal more latitude than when the anode current is actually passing through the speakers.

When a power valve of rather low impedance is used in the output stage, if a choke filter arrangement is used you may find it advantageous to employ two speakers in series, even speakers having different characteristics, so that by the combination you get all parts of the scale fairly well covered.

(Continued on next page.)

**LOOK OUT FOR
THAT COMET!**

TECHNICAL NOTES

(Continued from previous page.)

Equalising Frequency Response.

By the way, talking about the balance of different parts of the register, a great deal can be done to equalise the upper and lower frequency response by various circuit dodges in the receiver itself. There are many such little arrangements, and they fall broadly into two classes, those which have the effect of *reducing* the stronger parts of the register to the level of the rest, and those which have the effect of *raising* the weaker parts to the level of the stronger ones.

I need hardly say that the majority of such arrangements for producing a uniform response are of the former kind, that is, they simply suppress stronger parts to the level of the weaker ones. This is really the wrong way of attacking the problem, and is like weakening the strong links of a chain to match the weakest.

The Lower Register.

One of the arrangements I refer to is sometimes called tuned-transformer coupling. It involves the use of an L.F. transformer in a shunt-fed circuit, coupled to the anode of the valve by means of a condenser which may vary from about 1 microfarad down to 0.1 microfarad, a resistance of about 40,000 to 50,000 ohms being included in the anode circuit of the valve.

The effect of this arrangement is to increase the amplification in the lower parts of the register and if the condenser is made of a smaller capacity the part of the register which is affected goes higher up in the scale. The tuned-transformer coupling arrangement can then be made very effective.

On the other hand a somewhat similar result may be obtained by by-passing the upper register, if this is unduly strong.

Some Simple Dodges.

In the same way, just as the lower parts of the scale can be emphasised, so by corresponding arrangements the upper part may similarly be brought out more strongly. For this purpose, however, a choke and an anode resistance (of fairly low value) are put in series with the anode circuit of the detector or an L.F. valve. The impedance of the choke is greater the higher the frequency, so that the higher frequencies are more magnified; this arrangement has, as a matter of fact, been found exceedingly effective.

Naturally, it is much better to use a method which actually increases the weaker part rather than one which suppresses the stronger part because, in the latter case, after having suppressed the stronger part to the level of the rest, you have to find means to raise the volume throughout the whole scale.

Modern Valve Developments.

Improvements and developments in valves take place nowadays with such rapidity that there is an almost bewildering selection of valves from which to choose for any stage of a receiver. As might be expected, the most notable advances have been made in connection with valves designed to operate direct from the electric supply.

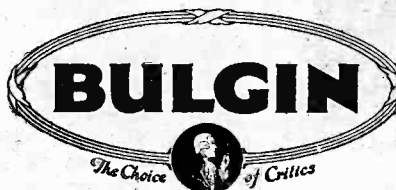
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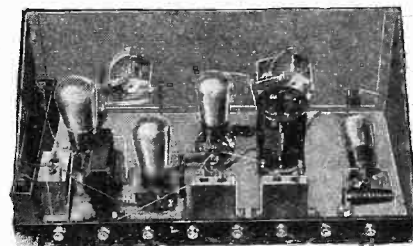
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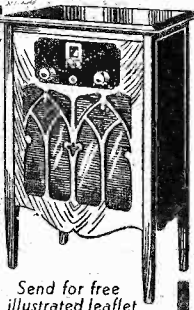
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TECHNICAL NOTES.

(Continued from previous page.)

but at the same time great improvements have also been made in battery-operated valves.

In the case of the Mullard indirectly-heated A.C. valves, an addition has been made to the screen-grid series by the S4VB valve, which has an amplification factor of 900, whilst its impedance is less than that of the previous S4VA. The extent of the reduction of the anode impedance is quite considerable, as you will see from the fact that whereas the S4VA has an anode impedance of 430,000 ohms that of the S4VB is about 250,000 ohms.

New Two-Volt Valves.

This valve has a standard heater which takes 1 ampere at 4 volts, whilst anode voltages may be applied up to about 200. The voltage for the screen grid should be about 75 to 100 volts, a condenser being connected between screen and earth, of a capacity of about one-hundredth of a microfarad.

When the screen voltage is derived from a mains unit it is important in the case of this valve to use a potentiometer, not a series resistance, for obtaining the intermediate voltage required.

Another interesting series of valves is the new Marconi 2-volt valves for which it is claimed that they give very greatly improved volume and tone, and have longer life as well as greater sensitivity which, of course, means greater range.

Amongst these valves are the screen grid (S2C), a valve for medium amplification (HL2C), another for low-frequency amplification (L2B), a power output valve (LP2C), and a super-power output valve (P2B).

A High Amplification Factor.

It is interesting to note that the power output valve LP2C has an amplification factor of 8, its mutual conductance being 2 milliamps per volt, and its impedance 4,000 ohms. It is particularly claimed for this valve that it is very economical as regards current consumption, and that exceptional quality of reproduction is obtainable without sacrificing volume on distance reception.

Incidentally, the Marconi 2-volt valve range now includes L4 types, so that there should be no difficulty in making the necessary selection for any particular set or type of circuit.

Current Economy.

The LP2 and the P2 are two new Osram valves of the G.E.C., the first being a power valve, and the second a super-power valve. The LP2 is particularly suitable as a loud-speaker valve for sets of the "two-valve" class, for portable sets and generally where economy in current consumption is a consideration whilst reasonably high amplification is required at the same time.

The P2, that is, the super-power valve, is naturally suitable for sets with a greater volume output. The voltage required on the anode is 150, the impedance of the valve being only 2,150 ohms, whilst the amplification factor is 7.5 and the mutual conductance 3.5.

(Continued on next page.)

TUNEWELL

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Many coils of extraordinary efficiency have been developed in the "P.W." Research Laboratories. To get the full benefits of "P.W." design use Tunewell Coils, which are carefully wound to exact "P.W." specification.

All Tunewell Coils have a very low self-capacity, due to the high quality of their materials and workmanship. More Stations, more easily separated—louder signals, too—that's what you get from Tunewell Coils.

New "P.W." Coils, base fitting or 6-pin type. 10/6.

Not only have all the benefits of "P.W." design been retained, but to this has been added the extra efficiency of the low-loss principle on the lower wave band winding. The most efficient of all "P.W." Coils. Carefully tested and guaranteed.

Ultra short wave (to specification). 3/11.

"Contradyne" Coils. Base fitting, on bakelite. 8/3.

"Explorer" Coils. Dual range 10/6. Low range 3/11.

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EASY PAYMENTS

The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless". Thousands of satisfied customers. Send us a list of the parts you require, and we will send you a definite quotation. Anything wireless.

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WET H.T. BATTERIES

Solve all H.T. Troubles.

SELF-CHARGING, SILENT, ECONOMICAL
JARS (waxed), 2 1/2" x 1 1/2" sq. 1/3 doz.
ZINCS, new type 10d. doz. Sacs 1/2 doz.
Sample doz. (18 volts), complete with bands and electrolyte, 4/1, post 9d.
Sample unit, 6d. Illus. booklet free.

Bargain list free.

AMPLIFIERS, 30/- 3-valve set, 25/-
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STOCKWELL, LONDON



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Concert Grand 1st stage, 10/6d. 2nd stage 9/6d.

Baby Grand 1st. or 2nd. stage 8/6d. post paid

EUREKA MULTIPOLE DOUBLE THROW SWITCHES

2-pole 3/-, 3-pole 3/9d, 4-pole 4/6d. Pull Push 1/6d.

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THE DAILY SKETCH
YOUR Picture Paper.

WHY WASTE



**MONEY
ON DRY**

BATTERIES?



72 No. 3 Cells complete with chemical, all fitted in 3 Uni-bloc Trays with Lid. List Price £34.0 or 5/- down and 5 monthly payments of 12/6.

Install the Standard Leclanche type battery (as illustrated) and enjoy the wonderful improvement in reception that this regenerative, high capacity power supply provides. Here are a few reasons why thousands are using Standard Batteries in preference to costly dry batteries.

1. Battery running costs are halved.
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4. 5/- down and the balance in easy monthly instalments of 12/6 IS LESS THAN YOU PAY FOR DRY BATTERIES WHICH AFTER A SHORT PERIOD ARE ONLY GOOD FOR THE DUSTBIN!
5. Unlike accumulators, no recharging necessary.

We advise free of charge the best type of battery to suit your receiver. Send particulars of number and type of valves without obligation to purchase. Obtainable from Halfords, Currys or Radio Dealers everywhere.

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THE HALL MARK

OF BETTER RADIO

MAGNUM

BURNS-JONES & CO., LTD.

25, NEW HIGH ST., LONDON, E.C.

TECHNICAL NOTES

(Continued from previous page.)

Temperature Coefficient.

I do not think it is generally known that the resistance of a metal wire (for example a valve filament or the resistance element of a rheostat) varies with the temperature. This effect is with some metals and alloys quite pronounced, and if a rheostat of such metal is running rather hot, the actual resistance may be quite a considerable percentage greater than when the metal was cold.

The factor which gives the rate of variation of resistance with temperature is known as the "temperature co-efficient." In the

TECHNICAL TWISTERS

No. 45.—FREQUENCY.

CAN YOU FILL IN THE MISSING LETTERS?

One circuit is said to be "tuned" to another when it is adjusted to the same

The of a tuned circuit depends on its and

Owing to the fine variation and ease of mechanical adjustment attainable is usually varied by means of an adjustable

The frequency is the number of complete which the current performs in

To ascertain a station's frequency in its wave-length should be into 300,000.

Last week's missing words (in order) were Volt ; Ampere, One, Ohm ; Voltmeter ; One and a Half Volts.

vast majority of cases the resistance increases with rise of temperature, although there are certain exceptional cases where the resistance decreases with rise of temperature.

Internal Structure.

Another factor which influences the resistance of metal is the actual state or internal structure of the metal itself. With fairly freshly-drawn copper wire, for instance, the metal is pliable, soft and non-brittle, but in course of time the metal will gradually become crystalline, and in doing so it will become harder and more brittle; at the same time its electrical resistance will increase.

This effect will take place simply with the passage of time, but it will be accelerated if the wire is exposed to certain conditions. For instance, an aerial wire left exposed to

(Continued on next page.)

**KEEP YOUR EYES
OPEN FOR THAT
COMET!**

**USE GOLTONE
COILS—
FOR
BEST
RESULTS**

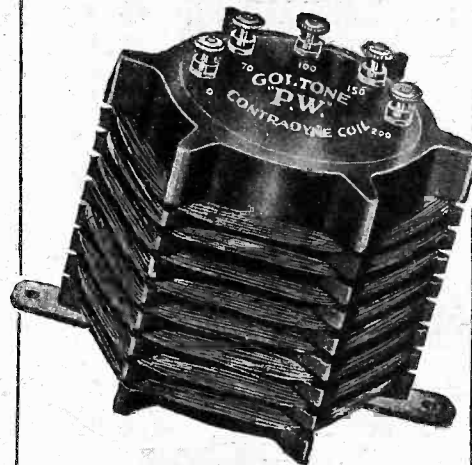
Specified and Recommended by "POPULAR WIRELESS" and "MODERN WIRELESS" For their various circuits.



**"GOLTONE"
"P.W." & "M.W."
DUAL RANGE COIL**

FEATURES. Extraordinary Selectivity, Clear Reception, Exceptional Efficiency. When operating on Short Wave, the Long Wave winding is paralleled, thus ensuring the avoidance of losses usual in other types of Dual Range Coils.

No. DW/12 . . . Price **12/6**



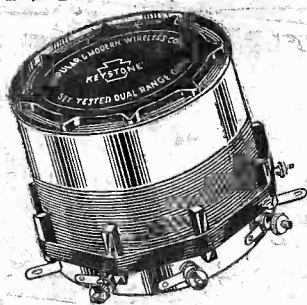
**"GOLTONE"
"CONTRADYNE"
COIL**

The purpose of this Coil is to eliminate Short Wave interference on lower end of Long Wave scale. Also provides protection against interference of local stations, giving purer reception. No. R11/12 Price **6/6**

Pamphlet, giving full particulars and First-Class Circuit using both these Coils, FREE on request. Obtainable from all Radio Stores. Refuse substitutes. If any difficulty, write direct.

**WARD & GOLDSTONE LTD.,
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NO COMPLAINTS



TESTED for
Wavelength
Smooth Reaction
Continuity.
Finally SET
tested for
Stability.

Fully
Guaranteed

THE KEYSTONE P.W. AND M.W. DUAL RANGE COIL

Wherever a P.W. Coil is specified insist upon the KEYSTONE. No other coil can give such selectivity or sensitivity on both wavebands. Made exactly in accordance with "P.W." specifications and fully approved.

A satisfied user writes:—"Many thanks for your prompt advice about my set, 'Chef d'Oeuvre.' I have now fitted the KEYSTONE P.W. COIL you supplied, and am pleased to say that the set is functioning perfectly. I am returning the other maker's coil and wish that I had fitted a KEYSTONE in the first place."

C.O.D.
Pay the Postman
Immediate Delivery

12/6

We pay all charges
Contradine coils also supplied, 7/6 each

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"BROADCAST" Plug-in Coils

CHEAPEST AND BEST.
25 .. 100 50 .. 1/- 125 .. 1/3 250 .. 2/-
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35 .. 10d. 75 .. 1/2 175 .. 1/6 400 .. 2/9
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Centre-Tapped 6d. extra. "X" Coils 9d. extra.
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V. BURT, 185, High St., Deptford.

TECHNICAL NOTES.

(Continued from previous page.)

atmospheric and weather conditions will be affected, more particularly on the surface, in this way as well as in other ways and, inasmuch as the high-frequency currents travel in the surface layers of the wire, its efficiency may be quite appreciably interfered with. What is more important from a practical point of view, however, is that the wire may become brittle and in due course may break.

MODERN CRYSTAL SETS

(Continued from page 924.)

solitary, I do not mean only those who live alone, but also those who reside in a family circle which is, on the whole, unsympathetic to radio listeners.

An Unfailing Stand-By

There are no batteries to replace or get charged and no valves to burn out. The thing is practically everlasting, and if well made, with good materials, a change of crystal every two or three years or so represents the sole maintenance necessary. Within twenty miles of a Regional station you get comfortably loud volume in good telephone earpieces, sufficient strength, indeed, even for those who are rather hard of hearing.

And there will be two programmes between which you can alternate all the time. And there will be fewer parasitic noises such as are to be heard loudly on many valve sets.

The quality will be undoubtedly good, although it would not be fair to say that it will equal that of a good valve set. Nevertheless, it is undeniable that it must be greatly better than the response of the average valve set.

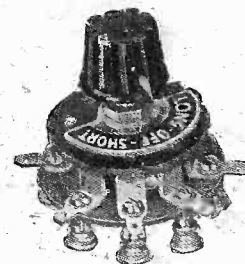
The crystal set also has its niche as the valve-set owner's stand by. If you have a little crystal set and a pair of 'phones packed away, you are guarded against any breakdown in your radio-receiving system. If carefully covered to keep out the dust, and stood in a dry place, a crystal set will not depreciate with the passing of the years. I have one at home that I made in 1913, eighteen years ago. It is not selective, and its silicon-steel detector is not as sensitive as the modern two-crystal combinations, but it can pull the local in with sufficient volume for all ordinary telephone receiver purposes.

Work a Loudspeaker

It provides a striking comparison with the "P.W." "Inductoears" that stands beside it on the same shelf, and is a monument to the fact that the crystal set has advanced in detail if not, as I have already declared, in fundamentals.

The more modern hook-up enables me to separate the two Brookmans transmitters, and the volume is such that one wonders at times whether someone won't some day give us a loud speaker with a really decent input-output power ratio and enable crystal loud-speaker sets to become a complete reality.

That is another fascinating possibility, isn't it?



HEINZ!

There are 57 distinct parts in this Double Pole Rotary switch and each is designed and finished with the engineering precision and thoroughness implied by the name Benjamin. Catalogue No. 1142 describes the switch fully and gives circuits in which it can be used. Have you had your copy?

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Taff Rd., Tottenham, N.17
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3/6

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Designed
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MAP &
CHART**



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ON SATURDAY

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Opera from Berlin and Vienna; famous orchestras from Paris—the lilting music of Spain—this map will enable you to tune in to any programme which your set can get with the least possible delay. It will double the pleasure of listening.

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R.I. LTD. Dual Range Coils 12/6

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Laboratory Tested

The "Popular Wireless" of December 27th, 1930, said: "A great compliment has been paid to the new 'P.W.' Dual-Range Coil—Radio-Instruments Ltd. are producing it in quantities—every coil is given an independent test both for wave-length and inductance on every one of the windings. It is a hundred or so times superior in workmanship and finish."

Obviously, R.I. were expected to produce the best—they have done so in a TROUBLE-FREE coil that is wound, assembled and tested to a degree of accuracy unattainable by the amateur or maker of less repute.

Start **Right** by purchasing the R.I. Coil which you know will certainly cover the range of wave-lengths claimed for the circuit on which you are working.

Ask your Radio Store for R.I. Coils. In case of difficulty please write direct giving dealer's name and address.

**Insist on R.I. Dual-Range Coils
They're Best and cost no more**



Tested on the Wavemeter



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