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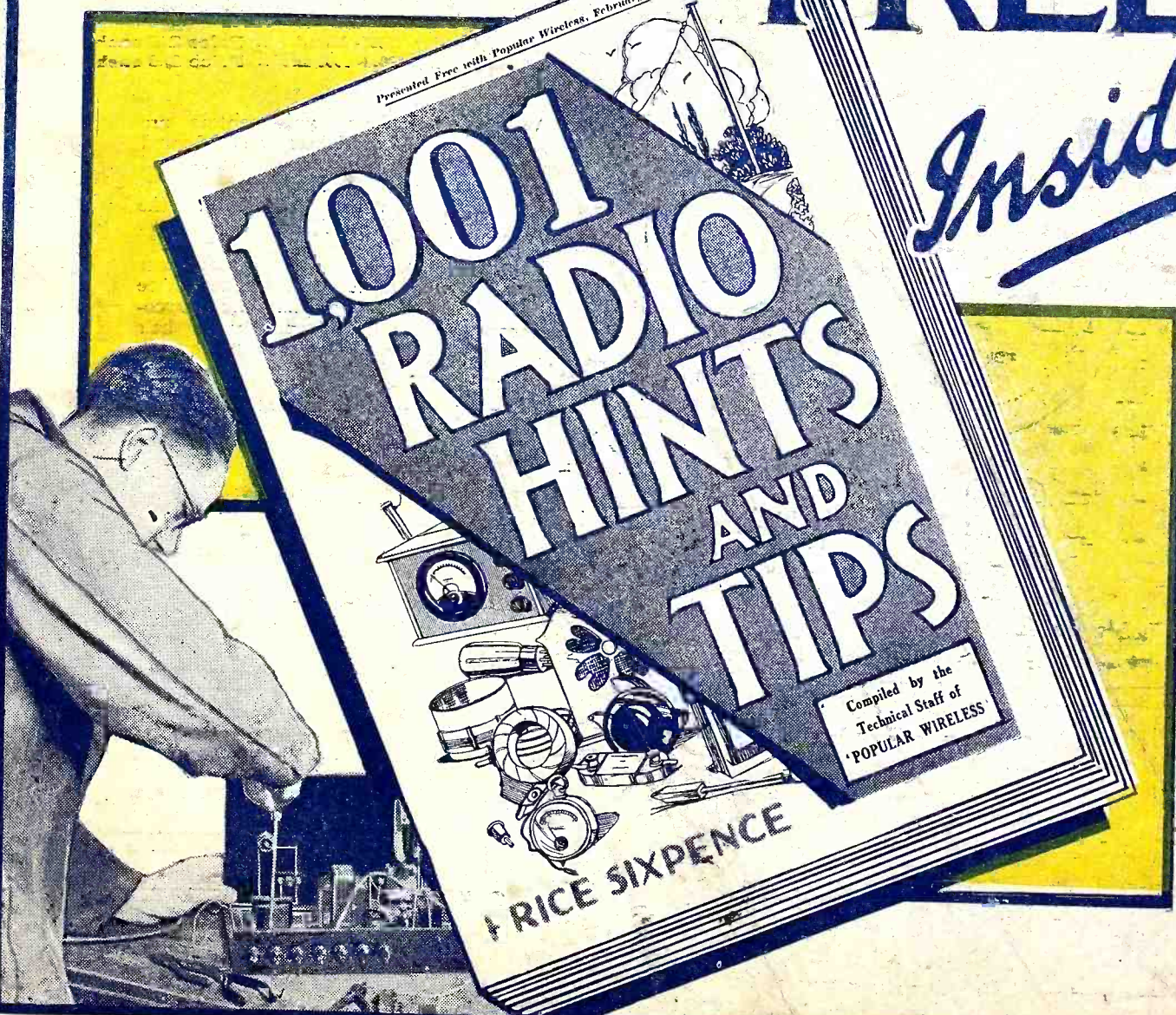
No. 455. Vol. XVIII.

INCORPORATING "WIRELESS"

February 21st, 1931.

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Inside



**The
Ear of
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Receivers—**

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(Regd.)
LEWCODENSER**

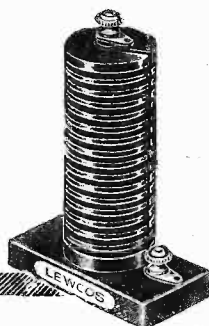
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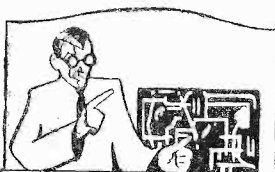
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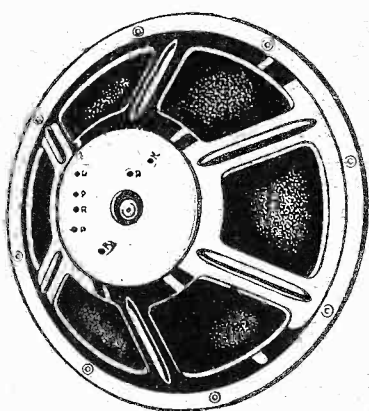
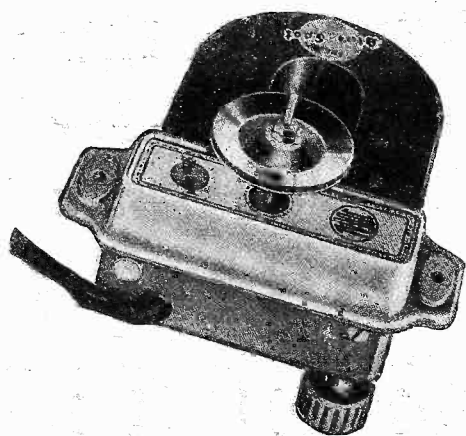
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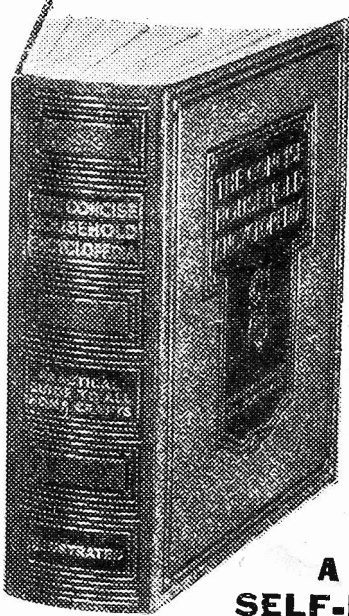
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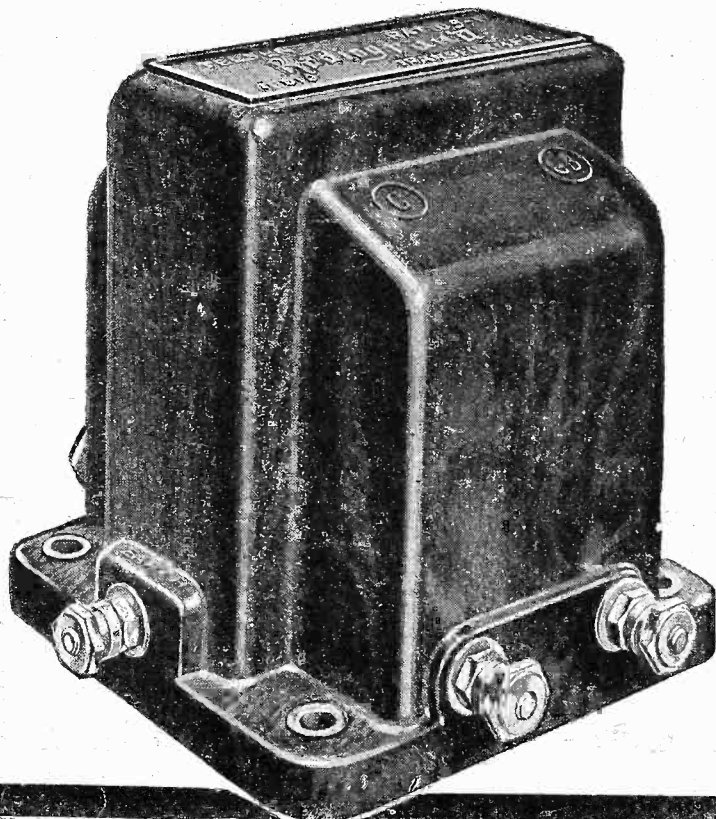
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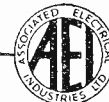
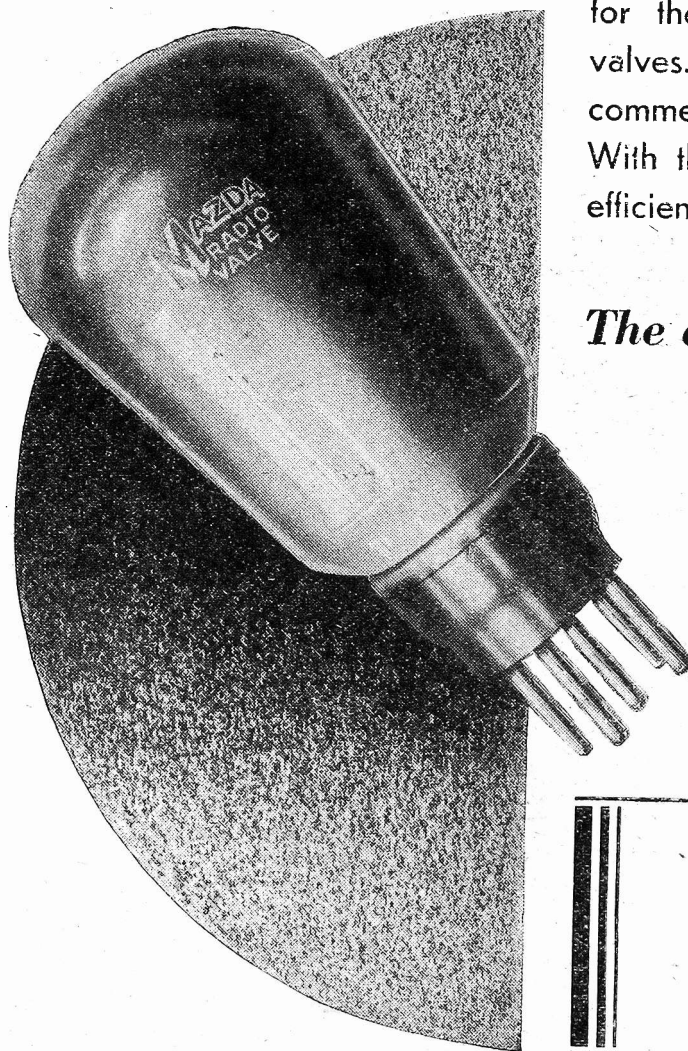
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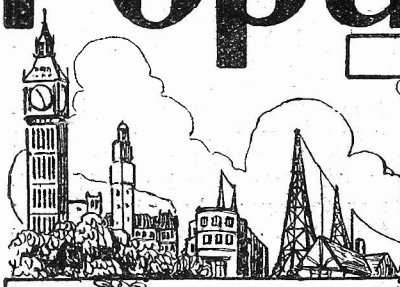
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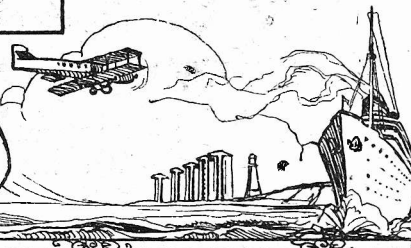
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**TREAT IN STORE?
HONEGGER IN DANGER
WIRELESS FOR THE
BLIND
NECESSARY TRIFLES**

RADIO NOTES & NEWS

**BUSINESS AS USUAL
WHO BEGAN IT?
ELIMINATING THE LOCAL
GOOD BUSINESS**

Another Picture.

THE bouquet which I handed to a wireless firm recently for prompt and effective attention has brought from J. W. (Montrose) a story of unhappy experiences with British firms. Most of his complaint is on the score of delay, one firm taking two weeks to send him a catalogue for which he had paid a shilling. He ordered a cabinet three weeks ago and is still without it. I know, old man! Firms here are very square, when they get going, but I certainly have found them dilatory.

The German Invasion.

WHAT with the interference of Mühlacker and the B.B.C.'s joke of an interval signal, my desk looks like "I don't know what"—as my typist says!—and I was so preoccupied with ruminating about all the choice remarks let fall by my witty correspondents that I overran my station to-night, and when I queried the matter before a strange, foreign porter, he said: "The 'hups' doo." And I nearly went off into another trance in the "hup."

A Cheap Unit.

ONE of the most interesting letters was from H. A. C. (Leicester), who questions me severely about S.G. valves. My set was made—I freely confess it!—by an engineer who holds an important position in the radio world, and we spared no expense. It is quite selective enough for my patience, and I can cut out Mühlacker if I fiddle about for several minutes. I don't know much more than that about the performance of S.G. sets! The S.G. set can be top-hole: it all depends on the maker. H. A. C. achieved an H.F. unit out of "junk" at a cost of about 10s. and got rid of the German. That proves what I said before!

A Treat in Store?

IN view of what we are suffering from German jamming now, it is with considerable apprehension that I learn that plans are afoot for a 100 kw. German station to be used for broadcasting advertisements for international consumption. It is said that the announcements will be made in several languages, too. That will be nice! The last word on a scheme like that is, however, not yet uttered, and I

hope that the last word will be on the side of the public. If it isn't—I'll have food for my pen, sure enough, and I'll dip it in acid.

A Set—Or Not a Set?

THE first case which I have seen reported, of a person being summoned for the alleged working of a wireless set without a licence and being let off because of a ruling that a licence was unnecessary, was that of Mr. J. Lowe, of Manchester. Mr. Lowe said that he had used his set only for amplifying purposes in connection with his gramophone. According to the newspaper report he pointed out that the rules on the back of his licence allowed for the

"MISS" MARCONI



The Marchesa Marconi, wife of the great radio inventor, and her baby daughter. The little girl was born in July, 1930, and is a chubby, robust child with "magnetic" eyes, and no doubt plenty of "loud-speaker volume"!

use of a receiver for that purpose without a licence. But do they? And in any case, there is this point—if he had a licence why was he summoned? And if the rules of the Post-Office allow for that, why did the magistrates take the trouble to rule likewise?

Honegger in Danger.

AS a constructor of non-music, Stravinsky is encroaching perilously near the proud position held by Honegger as the world's greatest caricaturist of music. I will not be so unwary as to invite requests for my definition of music, but I will admit that it does not embrace noises such as those to which I listened, horror-struck, on the recent "Stravinsky night." All I will say is that if Stravinsky writes great music, then Schumann, Mendelssohn, and Beethoven were amateurs. If this is genius, Mozart was a mutt!

Answer to Query.

F. H. (nr. Doncaster) asks for the address of a station which he says he heard working on 51.26 metres, calling London, Chelmsford, and New York; call-signal: H B J. Sir, I believe the address to be The Vatican, Vatican City, New Rome, and the owner the Pope. The call-signal is really H V J, and the wave-length 50.26 metres. F. H. encloses a copy of "Notes and News" for Feb. 19th, 1927, but does not say why. However, I was touched to see the dear old thing.

Wireless for the Blind.

I HEAR that at the end of January the total amount received by the British "Wireless for the Blind" Fund amounted to £30,000, of which £5,000 had been sent in response to Mr. Winston Churchill's Christmas Day appeal. More than 7,500 sets have already been distributed and six thousand more are being prepared. Unfortunately more funds are still required, in fact, some £15,000, and donations will therefore be thankfully received at the offices of the Fund, 226, Gt. Portland Street, London, W.1.

A Few Necessary Trifles.

A PAGE from "La Revue de Radio-Belgique," which O. C. D. (Brussels) was good enough to send to me, has brought a few moments of radiance into my drab (not?) life. "A Novice" enquires of the Editor of that periodical as follows, freely translated: "I have won a set in a competition. In spite of the fact that I have connected an aerial to the 'A' terminal, and an earth to the 'E' terminal,

(Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

the darned lamps won't light up. What about it?" And the Editor's reply, in brief. "Get an accumulator, an H.T. battery, and a loud-speaker, and waggle the rheostats and condensers!" Lovely!

"Amos 'n Andy."

M'KAY, E. V. G. (Rathgar), P. S. N. (Lewes), D. R. (Scarborough), and some ten others! I reckon you all got those two niggers direct from the States much better than we all received 'em via the B.B.C. It sure was a washout, that relay. I said to myself, I ses, as I agonised over the fading, "blasting" noise supposed to be America's premier comedians, "If some of my gang ain't in on this; roundabout thoity metres, me name's not Hayriel," I ses. Arrah, ye spalpeens, ye've got the better o' me,—forninst me, so to spake—in that I've none o' yez shorrut-wave re-savors, I haven't neither. But did I speak like that? 'Tis a darlin' thought!

Business as Usual.

JUST before I annoy you with some science let me divert you with a letter from one of those teeming millions of down-trodden people for whose sake the Gandhi bloke is prepared to forbid ~~murder~~ to murder British officer's wives, cost what it may. "Sir, I observing your Magics, opine that biggish trade possible perpetrated in this district where multiple Marconists practise receiver. Suppose you appointing me sole Agency Magics with ten and one of one half per cent to the under-subscribed.—M. A., Allhalabad University." The answer is that "P.W." doesn't desire to perpetrate any trade other than to enlighten its public in the usual price per copy. We throw in the grand sets, free!

Who Began It?

COMMENTING on the announcement by a Sunday newspaper of a "special radio feature" the "World's Press News" alleges that Mr. Sydney Moseley "pioneered the newspaper radio feature" and that "this special boosting is no more than 'sheep-work.'" That's pretty warm comment, so I will e'en put the "World's Press News" right. Subject to correction by anyone who thinks that he knows better, I will say that the "Daily Mail" was the first English newspaper to "feature" radio—and the articles were not written by Mr. Moseley! I never used to see Mr. Moseley's name in connection with radio as far back as 1922! My bad eyes, no doubt!

Anniversary.

SUNDAY, Feb. 22nd, is the anniversary of the birth, at Hamburg in 1857, of Heinrich Hertz, whose name will for ever be revered by scientists and by radio men in particular. For in the years 1884 to 1889 Hertz accomplished work in physical research which paved the way to the discovery of wireless communication; he demonstrated the propagation of electromagnetic waves in space, measured their velocity and length, and proved that they are in nature identical with light waves. Unfortunately for the world he died at the early age of thirty-seven.

Cork It Up!

I SEE that the General Council of the National Union of Short-distance Flyers demand that it be made compulsory for all wireless aerials to be corked because the mortality of sporting pigeons is heavily increasing owing to the birds butting into the wires. I think that homing pigeons are pretty and remarkable birds, and that pigeon-racers might have far worse hobbies, but I don't like "demand" and "compulsory," and I advise the Council to be less like roaring lions and more like sucking

SHORT WAVES.

A listener says a German station prevented him from hearing much of a wireless talk. And to think that Germany was once our enemy!—"The Star."

THE HOME DOCTOR.

The electrician was called in to repair the wireless set. Puzzled, he took it to pieces and found a number of cough lozenges in the loud speaker.

"I put them there," confessed the small son of the house. "The poor man sounded so hoarse!"—"Daily Mirror."

A correspondent from St. Austell writes requesting us to "send him our assistants" to help him trace the trouble in his wireless set.

We're very sorry, but they're all busy at the moment.

Gramophone records of favourite wireless items are selling well. An appropriate present for an agricultural friend is a record of a week's fat-stock prices set to a syncopated rhythm.—"Punch."

1st Radio Fan: "How are things going with you, old man?"

2nd Radio Fan (gloomily): "Not at all well. Nothing but interference all the time."

1st Radio Fan: "What do you put it down to? Is it Morse, static—or, perhaps, trams?"

2nd Radio Fan: "No, B.B.C.!"

"Radio takes you to the Circus Ring," ran a recent headline in the "Manchester Evening Chronicle."

Judging by the "roaring" that goes on in our set, we're in the lion's cage already.

"It is estimated that the B.B.C. will have £1,069,648 to spend. . . . How will it be spent?"—(Wireless Note).

All one can say just now is that the plans for disbursement are in the air.—"Birmingham Gazette."

PERHAPS!

The dull radiation from our local station Upon my intelligence jars;
So I'll alter my range,
Just by way of a change,
And receive S.B. items from Mars.

doves—or even pigeons. Then they may get the authorities and the public to listen to them. Will the Union pay for the corks?

Where We Score.

A NOTE from F. M. (Folkestone) puts the spotlight on "P.W." and I cannot refrain from referring to it. He bought an L.S. Unit and chassis, but found that no instructions accompanied it. Accordingly he was in some doubt about the correct adjustment until he saw an article in "Popular Wireless" which told him what he wished to know. That's us! Practical and up to date. A Headingley reader has just written to say that, though he sometimes strays from the fold, he always has to return to "P.W." He alleges that elsewhere he finds designs too much like the expensive cookery recipes—"Take three pounds of butter, a pint of old brandy and two dozen eggs, etc."—but that we do not specify such expensive parts,

Popular Wireless, February 21st, 1931.

yet "get there" just the same. O.K. by me, Chief!

"Push-Pull" Patent Extended.

AN interesting patent case was determined early this year when Standard Telephones and Cables, Ltd., and Electrical Research Products, Inc., U.S.A., applied for a five years' extension of Patent No. 275 of 1915, for a push-pull amplifier in connection with wireless valves. The application was opposed by the Columbia Graphophone Co., Ltd., the Radio Manufacturers' Association, and several well-known manufacturers. As he held that by reason of the war, four years had been cut out of the life of the patent, Mr. Justice Luxmoore granted an extension of four years.

The "Outer Circle."

OUR mad organ-grinder, from the "Workhouse, "Yorks, who conceals his noble lineage under the name of Giovanni Marita, writes to brag about how he converted his "Manchester Chronicle" crystal set into a "P.W." "Outer Circle," after which, he says, he heard many stations on the Continent. A neighbour, doubtless an ice-cream professor, is cited as a "witness of reception." Television on a crystal? Pity he omits to mention the names of the stations logged, though. Then his bragging would have some weight. Love to the other inmates!

Eliminating the "Local."

J. Mc. (Liverpool).—Mc what?—wishes to inform P. F. (Glasgow) that he (this McSomething) resides less than half a mile from the Liverpool transmitter and can cut it out of his three-valver fitted with the 5s. Brookmans Rejector. Even so, he did not follow the "book of words" strictly, for he uses a "50" plug-in coil and a .001 fixed condenser. Reception of foreigners is, however, slightly reduced in volume. When J. Mc-I-don't-know-what cuts out this rejector the "local" comes in without aerial or "earth."

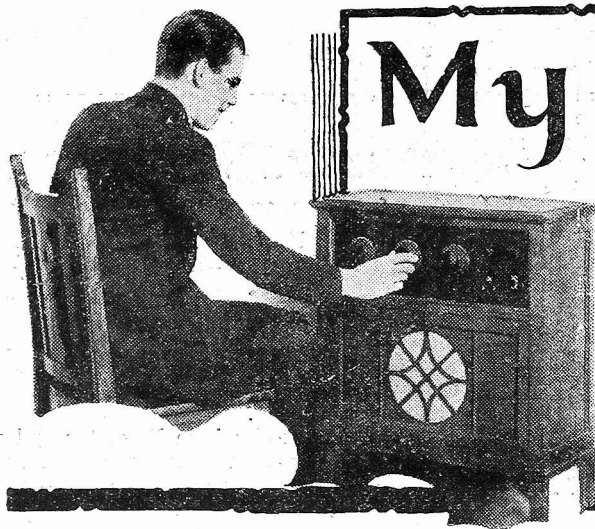
B.B.C. Methods.

A SPORTING cove of Barnstaple wants to rouse up a protest against the B.B.C.'s idea of lightening programmes with irrelevant bursts of melody. He was anxious, at the time he wrote, about a certain boxing match, which he feared would be refined by music every few rounds. As I don't listen to pugilistic broadcasts I can't say what actually happened, but in principle I agree with my correspondent about the irritation which these interruptions create. Those wretched Greenwich "pip pips" for example. I believe that the B.B.C. would interrupt the proceedings of the Day of Judgment with them!

Good Business.

THE wisdom of dealing with reputable firms, such as, for instance, those who advertise in "P.W." is shown by the account given to us by G. N. (Carlisle) of his experience with a well-known firm to whom he sent an L.F. unit for repair. The thing was lost in the post, but before our reader had time to lodge a claim against the Post Office the firm had sent him a new unit. This is by no means an isolated example of the straight, or rather, generous treatment of customers by the better class of firm. These little acts ensure further custom and harm no one.

ARIEL.



My Ideal Sunday Broadcast Programme

ANDREW SOUTAR, the Famous Novelist and Publicist.

IN my opinion, the B.B.C. could with advantage follow the example set by American broadcasting programmes in the past, if not to-day; namely, come down off its perch a little, and cater more for the common man in the street.

When I was in the States, the principal stations shared between them a gentleman who can only be described as a national pastor, and who was so popular that when he "came on the air" every listener used to tune-in his set and listen. He was there, it seemed, to help everybody.

Not only did he give direct and homely talks which stirred the American people

"NO CHANGE"



Miss Winifred Graham says she is quite satisfied with the Sunday programmes as they are.

a national favourite.

Why not have something of the kind here? Rev. "Dick" Sheppard showed that a really human cleric would not go unheard, and the idea could at least be given a trial. After all, the Church has made the English Sunday the melancholy day it is. The B.B.C. could, if it wished, make it the brightest day of the week.

Why Not Good Secular Music?

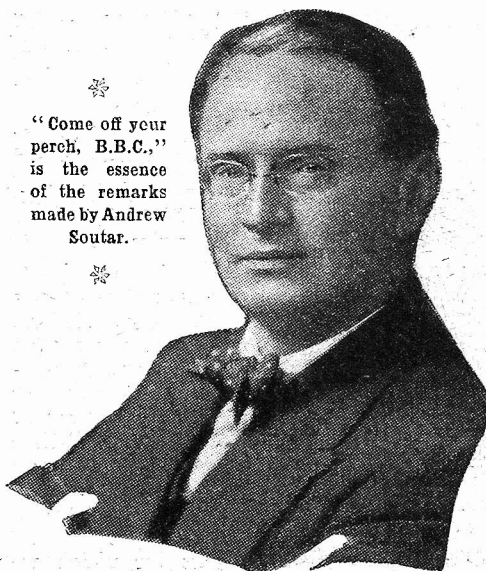
Why not more symphony concerts on Sundays, for instance? There is more true beauty, more understanding of God, to be obtained from the work of the great music masters than is to be found in many a church. There is no irreverence in secular music, there would be no irreverence in really interesting talks.

Ever since the inception of the B.B.C., listeners have grumbled about the "dull" Sunday broadcast programmes, whilst others have expressed themselves as being well pleased with them. In an attempt to get at the truth of the matter, "P.W." asked six people, representative of public thought, to express their views on the matter.

CHRISTOPHER STONE, the Popular Gramophone Critic.

I am surprised that since the present controversy is but an echo from an older one, listeners should so soon have forgotten the restrictions imposed on the broadcasting authorities. If I remember rightly, the B.B.C. are under an agreement with the Churches not to transmit anything except relays from religious institutions themselves, during the hours of Divine Service; and so, taking this into consideration, and the fact that even Announcers and engineers must have a day of rest sometimes, I doubt whether we are likely to see my own

"Come off your perch, B.B.C.," is the essence of the remarks made by Andrew Soutar.



private idea of a perfect broadcast programme for some considerable time.

Still, a compromise might be effected. There is still a certain amount of time

during which there is neither any broadcasting service nor any church service; I see no reason why this should not be filled by the reproduction of gramophone records. In these days many a record can be transmitted as perfectly as the real thing—so why not?

All that is required is one or two engineers and a gentleman to change the records. Indeed, I have already pointed this out to the B.B.C. and detailed to them the long list of excellent discs of sacred music which at present go almost unheard save by the favoured few. And I have offered to change the records myself!

WINIFRED GRAHAM, the Well-known Authoress.

My ideal conception of a Sunday broadcast

COMPROMISE



Mr. Christopher Stone suggests a compromise not unconnected with gramophone records.

programme is little different from the reality of to-day. In other words, I am not at all sure that I would have them changed if I could. But I realise that to many men and women Sunday is the great wireless day, the one day of the week during which they can listen to everything.

Surely for these an alternative station might cater?

Since, however, I am asked to record my own point of view, selfishly, and without any regard for other people, I say "no change."

I go to church in the morning, and so I have no time to listen then; I entertain a few friends to tea in the afternoon and so am thoroughly occupied during that time; in the evening—well, I have a programme to my taste for at least two hours, and by the end of that I am ready to go to bed—though this latter fact is no reflection on the programmes!

(Continued on next page.)

MY IDEAL SUNDAY BROADCAST PROGRAMME.

(Continued from previous page.)

MISS PHYLLIS NEILSON-TERRY, the Popular Actress.

In my ideal Sunday wireless service, both stations available to every listener under the Regional Scheme would be utilised to offer a contrast—but for one station, the station to which I should tune-in, the programme would be roughly as follows:

Morning: A church service with a good choir and, most important of all, a good speaker. This to be followed by lunch-time music similar to that given during the week. Then in the afternoon, from about Three o'clock onwards, a light orchestral concert or else a studio production of Shakespeare.

Some time ago we were given a number of scenes from Shakespeare in the late afternoon, and, one Sunday, I actually seem to remember a performance of Flecker's "Hassan," but dramatic production has not been overdone, although Sunday afternoon seems to me to be an ideal time for it.

In the evening, perhaps, there would be a Symphony concert, a service, and possibly an opera. Then, to conclude, the Epilogue. I would not miss this for anything!

J. H. SQUIRE, leader of the Squire Celeste Octet.

The B.B.C. Sunday programmes are, I submit, the acme of perfect construction, and are so arranged that any clear-headed man or woman must find it difficult to see the point of view expressed by those who are apt to decry them. In the old days, when technical difficulties prohibited a real alternative programme, some people may have had a right to grumble. To-day, I see very little the matter.

"ACME OF PERFECT CONSTRUCTION"



Mr. J. H. Squire, who is seen above with his popular Octet, says "leave the programmes as they are."

I would not have the programmes dreary—but are they? I would not have any single person left uncatered for—but, are the jazz lovers so steeped in their sin that they cannot even enjoy the light music

given by the small orchestras and bands from time to time?

If the church service is to give way to vaudeville and dance music—and I cannot visualise the possibility—are the invalids, the bed-ridden and the sick to be entirely unconsidered?

No, leave the programmes as they are, I say! They give offence to no one in their present state; revised, they *might* do so. The only alteration I might make is so small as to be hardly worth consideration, namely, to fill up with a light concert the gap between the evening and afternoon transmissions.

AN ORDINARY LISTENER, the first person we met in the street.

I am a low-brow. I do not go to church, I do not like Symphony concerts, I detest

CONTRASTS



Miss Phyllis Neilson-Terry appeals for contrasts.

Chamber music. I am so very low-brow, indeed, that I cannot even appreciate the mournful numbers generally rendered by the Wireless Military Band. Nor do I go into rhapsodies when I hear a screeching woman, or a deep-toned man. I am interested in the news bulletin, the variety programmes, and what is commonly known as "tea-time music." How am I catered for?

I get one news bulletin on Sunday, and, if I am very lucky, in the evening a relay from an hotel. Then at half-past ten the Announcer gently puts me to bed. No, sir, it isn't good enough.

The time allotted to programmes on Sunday is hardly half the time given on weekdays, but I have yet to understand why this should be.

The Surplus

With the colossal surplus realised every year, surely the B.B.C. can afford a few extra engineers and announcers so that the others may have the day off? Let's have a full-time Sunday and let the extra time be filled in by dance music, light matter, and all the things for which we

listeners have been asking!

On second thoughts, however, perhaps matters had better stay as they are. It gives me a chance to tune-in the Continent so it is really a blessing in disguise!

THE "OUTER CIRCLE."

A correspondent's successful experiments.

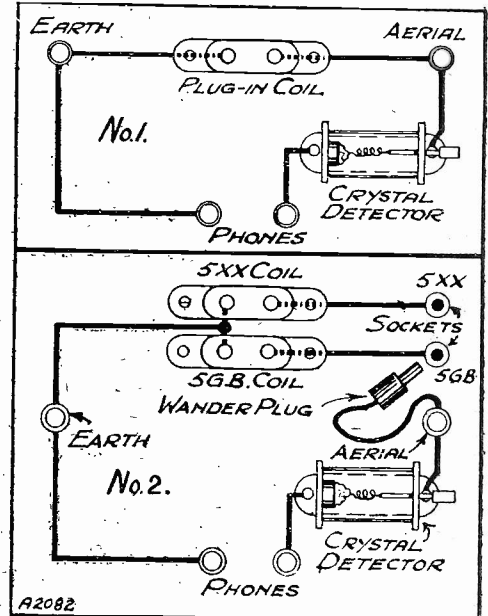
The Editor, POPULAR WIRELESS.

DEAR SIR,—You will get still louder and clearer reception on your admirable "Outer Circle" Crystal Set if you dispense with tuning condensers altogether, and cut your coils experimentally to exact wave-length to suit your aerial. My circuit design is enclosed.

I reside 53 miles from Daventry and on this set get speech and music from both 5 X X and 5 G B as loud and clear as if artists were in my room.

Wind the coils a little too long, and cut off inch by inch until exact. At first music will sound distant, but as you shorten the

THE LAST OUNCE



The two schemes our correspondent employs to get the very last ounce out of his "Outer Circle" Crystal Set.

wire, will approach nearer. At exact wave-length announcers will sound close beside you.

For Weary Willies and Tired Tims, whose constitutional lassitude is too languid to change a plug-in coil, I append a second design.

It employs wander plug and two coils of different wave-lengths permanently fixed. On polite request, any obliging bystander would move the plug when asked to change over to the other station.

Yours faithfully,

S. KENSIT WILKINSON.

P.S.—On my outdoor aerial, 198 turns on duo-lateral suit 5 X X, and 96 turns for 5 G B. When B.B.C. closes down, I can hear strong Continental stations sufficiently clearly to distinguish the words of speeches.

* * *

(You certainly do generally get better results if you go to work like Mr. Wilkinson. But not all constructors are prepared to experiment and fix their tuning in such a way.—TECH. EDITOR.)

PRESENT THOUGHTS *and* FUTURE POSSIBILITIES

BY CAPT. P. P. ECKERSLEY

M.I.E.E.



Our Radio Consultant-in-Chief, who contributed a great deal to the moulding of British Broadcasting, criticises present conditions, and ventures a few remarks and suggestions regarding the future.

ANYONE superficially examining the state of the development of broadcasting might be inclined to believe that we had reached a state of comparative stability. To me a closer examination shows that there is a manifest failure of many of the attempted crystallisations of modern technique.

In the first place it is questionable whether the experiment to monopolise broadcasting is justifiable on all counts. Broadcasting would have been as free as the Press had it not been for the technical necessity to restrict the number of stations operating simultaneously.

The Evils of Monopoly.

The inadequate ether gamut allocated to broadcasting services brought about monopoly. To my mind monopoly of the technical side of broadcasting is essential, but I doubt if so obvious a case could be made out for the necessity to invest in one body the responsibility for what is to be sent out. It induces that worst of all vices, caution.

The future must see some greater freedom for the public to express its feelings, even though it is wiser not to act upon the opinions of an uninstructed majority.

I think the future must see a more constant examination into the activities of the corporation entrusted with ether broadcasting monopoly.

What energy, life, flexibility and good spirit there was behind the poor programmes sent out by the B.B.C. when it was on trial; what caution, emasculation, sameness, dullness, characterises its presentation of the excellent programmes of to-day!

We Need a Dictator.

What is the ultimate aim of broadcasting even if machinery could be devised to force initiative into the minds and hearts of its trustees? To my mind broadcasting is the means of enabling us with our mind's eye to see through the gap of our loud speaker into a world of beauty in art and of thought in the spoken word.

Talks should live through the knowledge and enthusiasm of the talker, drama should not be palely excused for failure because we cannot listen to it, but should be, as it has sometimes been, dramatic in terms of its own medium.

Music should be chosen to soothe the tired upon the one hand or to interest thought upon the other. Broadcasting should be a rostrum for violent controversy, and thus a

means to educate us to the enjoyment of thought.

The announcers should be men of wide culture and experience and not repressed for fear they might become more popular than their employers.

All this will never come about unless an almost unbelievably energetic and enthusiastic and encouraged dictator arrives or unless each dictator is stimulated by an insecurity of a proper sort, or unless the medium itself allows of greater flexibility.

I believe in monopoly, but monopoly only to further the true interests of the listener. A policeman can hold up traffic or direct it; our transport is slowed up all too frequently because the former policy is more in vogue than the latter.

A monopoly can hold up progress or direct it. Traffic will be quicker as the technical means to implement transport are improved. Broadcasting will be more stimulating as the technical means to implement it become more flexible. It is the technical basis which is the true foundation of all developments.

To-day ether broadcasting must admit

technical failure in many respects. This is not due to a failure of the technicians developing it, it is intrinsic in the method. I live 15 miles from two 45 kw. stations.

Neither gives me clear reception and both give me variations of the same programme. If more channels for alternative programmes were available, and if the monopoly were consequently forced (by sheer lack of the same sort of material!) to experiment on new lines, then it could be forced to put over minority programmes, to forget the claims of the organisation and to remember those of the public.

Press-the-Button Radio.

It is technical progress which will in the end determine the policy of the programme makers. Again I say I believe in monopoly, but only in a stimulated monopoly.

If we had more and wider channels for broadcasting, we can conceive of everyone's receiving set with six buttons to press and six definite clear contrasted programmes for his choice.

We could imagine, if there were more channels for broadcasting, a revival of something like the telephone, when theatres, churches, continuous dance music, musical halls, debates, parliament, important lectures, after-dinner speeches, were all simultaneously available with the constructively thoughtful programmes sent out by a body entrusted with the monopoly.

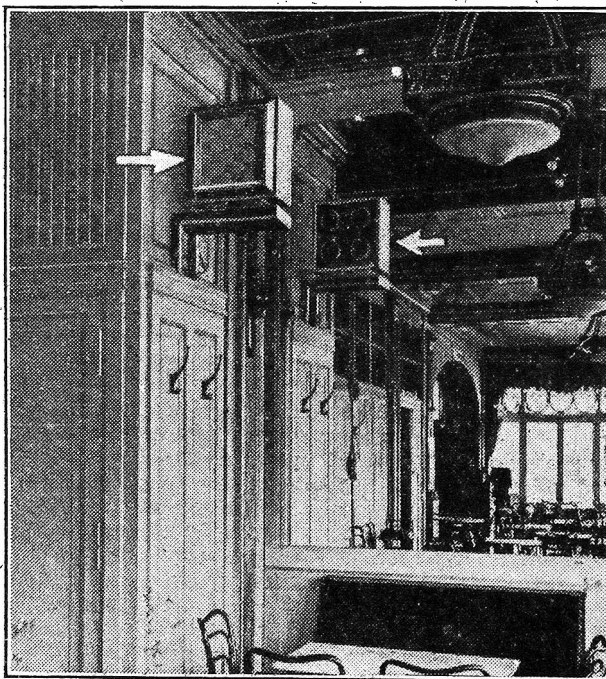
Even Television.

I foresee future development in technicalities, then, as a struggle to secure more and more channels for the simultaneous broadcasting of different programmes. If means could be found to do this, all sorts of developments are possible. Even television might thus find practical application.

Doubtless in time we shall be able to see an adequate picture transmitted from one room to another. The problem will then be only a quarter solved, there would be yet the problem how to transmit this picture to a wide public.

(Continued on page 1118.)

LOUD SPEAKERS AT LEIPZIG



Loud speakers (indicated by arrows) installed at a Leipzig café.

CONSTRUCTORS' PROBLEMS

An interesting commentary on the "confessions" of some of our correspondents.

By THE EDITOR

MANY readers who read our editorial, "That Safety Margin," appear to have found a good deal of truth in it. In fact, some of the letters we have received have been in the nature of "confessions!"

One reader writes to say that he has been in the habit of making outstanding "P.W." sets for several years, but admits that he has always more or less "paraphrased" our original set design and the instructions with it. For example, he admits not always using the specified components, or the alternatives, given in our constructional articles.

"I have been more or less successful," this particular reader informs us, "until I decided to build the 'Chef d'Œuvre.' In this case I altered the layout to suit a panel I had by me, and also used one or two components not mentioned as suitable by the designer. In doing so I suppose I saved about twenty-five shillings in cash—but it proved the truth of the old adage, 'spoiling the ship for a ha'porth of tar.' I got results of a kind, but I was not satisfied, so one day I rebuilt the set absolutely, as per the designer's instructions, and I must say the results obtained were vastly better.

First-class Advice.

"Since then I have decided it is cheaper in the long run not to mess about with a design, and so you can count me as one of your readers who has learnt by experience that it pays to follow the designer. I hope your editorial article will help other readers to realise this fact."

We hope so, too, because we know by experience, and from the very significant information we obtain from a perusal of readers' queries, that ninety-five per cent of the trouble experienced by readers who build our sets is due to the constructor introducing his own variations into the design.

Here is an extract from a letter sent in by another reader who is obviously an "old hand," and his experience just goes to show how even an amateur with years of experience behind him can encounter snags which, although simple in themselves, can cause endless trouble and expense.

An Old Hand.

"The difficulty with an amateur constructor like myself," writes our correspondent, "is that we have no option, when beaten by some unknown fault, but to scrap the set entirely and try something else until we get a set that *will* work; for the simple reason (and quite logical one) that everybody in trouble cannot possibly reach the designer for assistance, although quite positive that the set is *really* exactly to specification."

"I started 'monkeying' with wireless nearly twenty years ago and, although I can fairly claim to be a capable constructor, I have never studied the theoretical end of the business at all. Prior to the war a few of us experimenters were trying to find out how the radio worked by home-made telegraph keys, solid copper wire aerials, coils borrowed from Ford cars, etc., coherers

with filings tapped by buzzer hammers, and 'phone receivers "borrowed" from old telephone sets.

"When the war broke out, the police wrote 'Finis' to all that, and down came the aerials. Most of us then turned to other experiments, in a khaki uniform. After that job was over and we were home again, we found very little advancement, but it came, gradually.

Early Days.

"I remember the first variable condenser, a card wrapped in silver paper pushed in and out of an envelope similarly coated. The first valve, smuggled in from Japan by a chum who was a ship's operator, and handled as though it was a chunk of dynamite. Then we got 'peanut' valves from the States, but they cost about 25s. each.

MINERS' LEADER LISTENS IN



Mr. A. J. Cook, Secretary of the Miners' Federation, listens in at the Manor House Hospital, where he recently had an injured leg amputated.

"Coming down to 1923, in England, I built an ambitious three-valver of American design, Cosor bright emitters, etc., but *what* a search I had, all over the country for a pair of 'phones! I got a good set, however, and still use them.

"I had lots of fun with my set out in the country, heaving a wire up in to the nearest tree for an aerial, and when at home putting the earphones into two teacups for a loud speaker. I built several small sets afterwards and then, in a weak moment, started out to build a *real* set, a six-valver, 2 H.F. screened and neutralised, det. R.C. and 2 push-pull power.

"That set was a regular nightmare. I expected to get any station on earth that happened to be working, instead I got 2 L O with difficulty—and right here in London, too! I wrote to the magazine that boosted it, but they ignored my letters. I tried all the tests I could think of, checked the wiring until I knew it blindfold, rewired it and retested it all to no purpose.

"I then hired a wireless expert for a fee of a guinea to go over it: it beat him. I

hired another and, after paying him, all I got was emphatic advice to scrap it as useless! I tried all the wireless friends I knew and it beat them, too.

"Then the 'P.W.' 'Magic' Three came out and I promptly set my teeth into it—and what a revelation it was! I have built several of them for others; have doctored them for other people in difficulties and I always had a roaring success.

"Then I added S.G. to my own set by building the 'Magic' Four, and considered I had the last word in sets. What a comfort it was to roam the Continent to get away from the B.B.C. blues!

"The Set Would Not Work."

"Then came the Dual-Range Coil and I fell. I dismantled my old, beloved 'Magic' Four and carefully assembled the 'Exhibition' Four. Every joint and terminal tag carefully soldered, every component of the best and exactly in the position designed for it.

"The set just would not work properly; selectivity and sensitivity 'punk'; just noise, grating, groaning, and shrieking, with the m.a. needle suffering from St. Vitus' dance. I checked the wiring several times, then got wireless friends to do likewise; checked everything over with 'phones and battery: all O.K.

"I suspected my H.T. eliminator, so bought dry H.T. batteries—no better, and another pound note wasted. I sent the eliminator back to the makers, who returned it promptly as being in perfect condition!

"This was getting serious, and Christmas was coming along, so I tore the whole works down again and made up another 'Magic' Three to see me over Christmas, and it, of course, did not let me down.

"I then decided to reassemble my old 'Magic' Four and use the new coils in it, as I noticed you promised to publish the new diagram, but I could not wait. I used every care, soldered joints, spacing of wires and components according to plan, every terminal plier tight. Switched on and *nothing* happened.

A Mystery Solved.

"I started all my tests again and found I had one of the coils connected wrongly. Corrected this and the set came to life with a roar—but *what* a roar! Just noise, distortion, and general instability, with no selectivity whatever. Tried different valves, different aerials, earths, batteries, grid leaks, potentiometer settings, etc., but it was no use. My friends blamed everything from coils to terminals, but could not find any faults on test.

"I looked at all my beautiful wiring and orderly placing of components ruefully, and thought of the waste of time and money spent on it only to get all this terrible noise and distortion. Thinking desperately of some new test to apply before making a clean sweep of it I casually changed the grid bias tappings and, hey presto!—the mystery was solved—or, rather, the set changed to a beautifully well-behaved, powerful, but docile instrument that is now a joy to handle. Distance is no object, purity of the best, and I can make our twin at B.P. sit up, beg and behave."

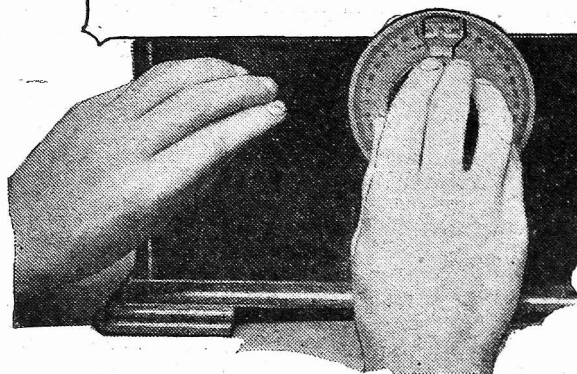
Space will not allow further extracts from the many letters we have received apropos of our article, "That Safety Margin," but we hope to give further examples of readers' experiences next week.

THE CHAOTIC ETHER

WHY NOT CUT OUT THAT SPACE-WAVE?

by J.C. JEVONS

A suggested remedy for the present congestion in the ether that seems worthy of close consideration.



AS Captain Eckersley says, we cannot use the best waves for broadcasting so long as most stations are limited to wave-lengths between 250 and 550 metres. The trouble is that on this wave-band, engineers are forced to use excessive power in order to give the required service.

We have our own Regional scheme of high-powered stations, and the German authorities have now definitely decided to go ahead with seven more stations similar to Mühlacker and Heilsberg, each nominally rated at 75 though capable of developing 150 kilowatts. This is but the beginning. Other European countries will be compelled to follow suit, more or less in self-defence, as soon as they are able to do so.

A Vicious Circle.

In short, a vicious circle is being created simply because waves between 250-550 metres are not naturally adapted to the needs of broadcasting. To ensure a reliable service the radiated energy must first and foremost have a predominant earth-bound component, sufficient to cover a local radius of, say, 50 or 100 miles from the transmitting aerial.

Unfortunately, waves between 250 and 550 metres are more inclined to travel upwards through space than to cling to the ground. After reflection from the Heaviside Layer, the space-waves come back to earth again, possibly some hundreds of miles away. This, of course, makes it comparatively easy for British listeners to hear German, French, Spanish, Italian and other transmissions, providing we are willing to put up with a certain amount of fading.

But it does not provide a reliable local service. Each nation naturally wants to cater primarily for its own citizens, and is more or less indifferent to what happens to the waves once they have passed the boundaries of the country of origin.

Getting Worse and Worse.

The only way in which it has, so far, been found possible to supply local listeners with a satisfactory service on waves of medium length is by increasing the power output from the transmitting aerial. And this starts the vicious circle.

High-powered stations in each country can give good service on 250-550 metres to their own citizens, but will cause increased interference in foreign countries due to the

reflected space-waves. This leads to a corresponding increase in the power employed in the affected countries in order to counteract the "imported" interference. As soon as the "backwash" is felt in the first country, it must promptly use still more power, and so the thing will go on until the ether becomes an intolerable welter of conflicting waves.

As one remedy Captain Eckersley advocates the more extensive use of longer wave-lengths—say between 1,000 and 2,000 metres. Within this band of frequencies, the earthbound component is predominant, and reliable service over a larger local area can be ensured with a reasonable power-output. Unfortunately, as one increases wave-length one finds far less accommodation in the ether.

If, for instance, broadcasting were confined to wave-lengths between 1,000 and 2,000 metres, not more than fifteen different stations could operate simultaneously without overlap. A wave-length of 1,000 metres represents a frequency of 300 kilocycles, whilst one of 2,000 metres is equal to 150 kilocycles. The difference, 150 kilocycles, provides elbow room for only 15

THEY USE SEAWEED!



A workman packing the walls of one of the new Portland Place studios with dry seaweed, so as to make them soundproof.

stations, assuming a gap of 10 kilocycles between each to prevent overlapping of the modulation side-bands.

This, on the face of it, is quite inadequate to meet the growing demands of all the European countries. It is true that the existing facilities for broadcasting on the longer wave-lengths might well be extended, but this would at best only give a temporary measure of relief.

The Super-Het Solution.

Of course, there is the remedy for developing new and more effective methods of selective reception. The superheterodyne circuit offers one of the most promising means of defence along these lines, but it is too expensive for most listeners.

The same objection applies to the new Stenode Radiostat receiver, which is a development of the supersonic principle, and will presumably be even more expensive.

There is, however, another possibility that still remains to be explored. Why not tackle the problem from the transmitting end, and devise some method of radiation which shall free the 250-550 wave-band from unwanted "space" waves?

The question may perhaps appear presumptuous, but the time is coming when some such solution will become imperative if European transmission continues to increase at its present rate.

As previously explained, the inherent weakness of the 250-550 wave-band is its tendency to radiate upwards instead of along the ground. We know that waves can be prevented from spreading laterally by directional methods, such as the well-known Beam aerial.

A Far Better Plan.

Why not apply the same methods to prevent the waves from spreading upwards. If they can be confined horizontally, why not vertically? By making such an aerial of circular shape the radiation could be distributed uniformly in all directions towards the horizon, as is necessary for broadcasting, though at the same time the upward spread could be strictly limited.

It is admitted that up to the present Beam aeriels have only been used successfully with waves below the 100-metre mark. But the directional principle holds good for any wave-length, the question of cost being the chief obstacle to its use in the case of longer waves.

If there is no other alternative, even a very expensive aerial system is better than a complete breakdown of the broadcast service due to over-congestion in the ether. After all, it will be cheaper in the long run to erect a few costly aeriels, rather than to force millions of listeners to install complicated and expensive super-selective sets.

LATEST BROADCASTING NEWS.

B.B.C. ORGANISATION.

**DR. BOULT'S SINCERITY—
BRASS BANDS—SIR HARRY
LAUDER—TROUBLES OF
£30,000!**

THERE is in progress a general tightening up of the organisation of the B.B.C., which appears now to be getting back more to the state of affairs which prevailed in the days of the B.B.C. when it was a "company" and not a "corporation."

Curiously enough, the "reversion to type" is being arranged under the aegis of a chairman who previously spent most of his useful public service as Speaker in the House of Commons.

The point is that Sir John Reith has begun to take a real interest in programmes, apart from Sunday transmissions. It follows that several existing jobs may become redundant.

Dr. Boul't's Sincerity.

Few people have realised what was involved in and implied by the postponement of "Morning Heroes," which was to have been given as part of the B.B.C. Symphony Concert at the Queen's Hall on Wednesday, February 4th. "Morning Heroes" is Arthur Bliss's Choral Symphony of War—the only thing of its kind in music.

It was to have been conducted by Dr. Adrian Boul't, who is reported as having said that he was out of sympathy with the motif, and who also felt that he had had an inadequate opportunity of rehearsal.

In view of this situation, it is more than creditable to Dr. Boul't that he not only declined to conduct an inadequately rehearsed performance, but he also readily accepted the offer of the composer to conduct the work himself on March 25th as part of a programme the rest of which Dr. Boul't will be directing.

It so happens that March 25th will be a particularly appropriate anniversary for this musical masterpiece.

It was in March, 1918, that Arthur Bliss got his inspiration for the original embodiment of the impression "Pass, Pass Ye

**"POPULAR WIRELESS" HAS
AN UNRIVALLED BROADCAST-
ING NEWS SERVICE AND IS
ABLE TO PRESENT TO ITS
READERS ALL WORTH-WHILE
NEWS AND VIEWS REGARDING
B.B.C. ACTIVITIES.**

Proud Brigades." Listeners generally will realise the terrific significance of the dedication "To the memory of my brother, Francis Kennard Bliss, and all other comrades killed in battle." All honour to the sense of delicacy and fair-mindedness of Dr. Adrian Boul't.

Brass Bands:

It is all very well for the B.B.C. to say that they pay no attention to the Press. It would be wrong, of course, if the B.B.C. were to allow any section of the Press to

disturb it into a policy of panic for a commercial reason. There appears, however, to be little danger of any such development.

On the other hand, it would be more graceful of the B.B.C. to admit Press assistance when offered and accepted. The case in point is the recent agitation for a brass band.

Although the B.B.C. officially denied the possibility of the formation of anything remotely resembling a brass band, it has leaked out that Mr. Barlow (first tuba in the Orchestra) has formed an emergency brass band by augmenting the brass section of the Wireless Military Band.

Sir Harry Lauder.

No one has asked Mr. Stanford Robinson to write a tribute to Sir Harry. I wonder why?

Troubles of £30,000!

Despite the efforts of the Home Office to keep things pure, there are many of us who are now hoping to win one of the big prizes in the next Irish sweepstake. Mr. W. P. Crozier, a Northern journalist who has given many broadcast talks, has written his first radio play, and he has taken as his theme the troubles of a man who has won £30,000 in a sweepstake—a lot of money; in fact, sufficient to give the play a nice-sounding title.

Lucky Chap!

The lucky man, whom Mr. Crozier calls Amos Gradwell, has a wife and a sister who make up their minds they are better able than Amos to handle such a large sum, particularly when they begin to fear that a good chunk of it looks like finding a home with the Reverend Somebody's mission.

The story of the play is interesting, but we must not reveal more of it, otherwise it will spoil the broadcast performance which is down for Northern listeners on Friday, March 6th. Personally, I am making a note of this date.



NEXT WEEK

L. F. CONTROL FOR YOUR 'COMET'

Some further steps towards the magnificent finale of this perfectly progressive Receiver.

The "P.W." FLEXI-COUPLER

An Easy-to-make little gadget which enables the wonderful new "P.W." Flexi-Coupling system for great selectivity to be applied to any set.

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.

Sir Harry Lauder.

IT was good to hear him again. Not so young as he was, like the rest of us; his laughter not quite so spontaneous nor so clear; but his singing voice, which has charmed the round world for more than a generation, almost as good as ever; the songs themselves just as good as ever. But they are his own songs, and will die with him. I cannot imagine anybody else singing "Tobermory."

Gloucester Orpheus.

I had to give Sir Harry short shrift, for not the archangel himself would lure me from listening to the Gloucester Orpheus Society. For purity of tone, balance of voices, fine training and conductorship, there can be few choirs to equal this one.

I have rarely heard the "Skye Boat Song" sung so well. And as if the choir itself were not enough, Jean Coxon added to the programme a glorious rendering of "The Bell Song" from Delibes' "Lakme." Down there they know how to prepare a feast!

"Dr. Abernethy."

This was hardly a play. It was a series of interviews between Dr. Abernethy and

his patients, designed to show off the "rough diamond."

It was good fun listening to him; it must have been an experience consulting him! The date was 1815 or thereabouts, when the medical ranks were not so crowded; nowadays it would go rather hard with his practice if he behaved like that. But he was a fine character.

The part was admirably played by Walter Fitzgerald. Dramatic character-sketches of others of these "old worthies" like Beau Brummel would make an interesting series.

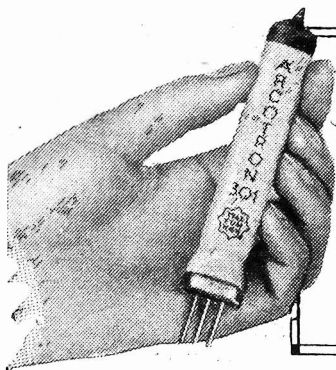
Light Music and the G.P. Quintet.

We are apt to overlook those who continually serve us, and to take them for granted.

Listeners probably owe more to the Gershom Parkington Quintet than to any other group of men appearing at the microphone. They seem ready to lend a hand anywhere. They seem to me to get better and better.

Their playing is always a pleasure to listen to; their programmes are always bright and fresh; and they have the knack of choosing interesting soloists to assist them. They are among the old stagers in

(Continued on page 1118.)

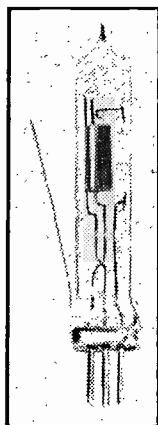


THOSE RADIO — RODS —

Some authentic technical details about those amazing little mains valves with external control electrodes.
By Dr. ALFRED GRADENWITZ.

ATTEMPTS to control the electrons in a valve statically, from outside the glass, date back to the early days of valve development. However, the tests carried out failed to lead to any tangible results owing to the impossibility of obtaining sufficient amplification for practical purposes.

This was mainly due to the fact that in the case of ordinary bulbs the control electrode could not possibly influence the space charge around the cathode. The peculiar shape of radio rods had to be adopted in order that the controlling outside surface might encompass the area of the space charge sufficiently closely.



Inside view of one type of rod.

Bias Ineffective.

Radio rods are subject to operating conditions altogether different from those of ordinary valves. It is, for instance, impossible to record any static characteristics of this new type of valve, the glass wall being charged inside with electrons whenever a positive voltage is applied to the control grid, while the total voltage resulting from that of the control coating and the voltage of the charge on the inside of the wall is always nil. No amount of positive grid bias has any effect.

Use of Gas-filled Rods.

This is true also more or less of any negative voltage applied to the control coating, providing there are some slight remnants of gas in the valve. At the same time, gas-filled Telefunken rods will respond to alternating H.F. voltages, there being set up excess charges on the wall whenever the voltage of the outside coating is varied, so that the resulting voltage no longer is nil. These excess charges always take a certain time to be compensated across the insulation resistance of the glass wall.

Telefunken rods destined for purposes of amplification are designed as high vacuum valves, whereas those devised for detecting purposes are of the gas-filled type.

Telefunken rods are directly heated with alternating current. No directly-heated mains valves have so far been very successful as detectors, owing to the direct effect

exerted by the filament on the grid and the influence of voltage variations on rectification.

However, gas-filled Telefunken rods, on account of their characteristic behaviour, as explained, are insensitive to low-frequency voltages.

Detecting Action.

Any voltages applied from outside are, so far as the negative half-wave is concerned, compensated by the ions of the residual gas; in fact, the lag between the electrons and ions is only felt as the frequency becomes more rapid, until the ions in the case of real high frequency are no longer able to follow.

Only low-frequency oscillations are thus compensated by ions, resulting in a rectifying effect which is quite similar to the detecting effect of standard valves.

The insensitiveness of the gas-filled radio rod to low frequency by no means affects the low-frequency modulations of the H.F. pulses. Oscillation on the grid being invariably of high frequency, and being in turn modulated in accordance with the rhythm of the speech or music transmitted.

Insensitive to L.F. Pulses.

Whereas a frequency of, say, 100 reaching the grid from the alternating-current mains has practically no influence upon detector rods, a sound of the frequency of 100 arriving from the transmitter in the form of modulated high frequency will readily be passed on.



Another type of radio rod.

radio rods is that, owing to direct heating, they will start working immediately they are switched on.

A diagram is shown of a typical circuit for these rods. Coupling condensers and grid resistances between the detecting and resistance rods respectively can be dispensed with, the steady voltage of the control coating being without any influence on the working of the valve.

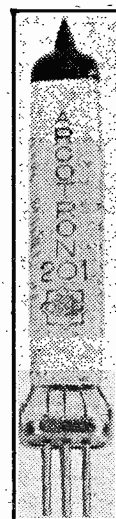
Telefunken rods behave in many respects in different ways from standard valves, and enable considerable simplification of the circuits employed.

Instances of this have already been given, namely, the absence of coupling condensers, and the fact that directly-heated cathodes can be utilised. The property of the detector of being 'unresponsive' to low-frequency pulses has the advantage of making the question of back coupling from following L.F. stages of much less importance.

Ordinary Output Valve.

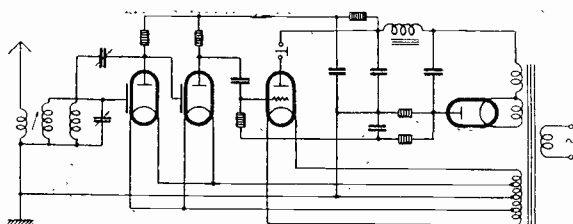
You have seen why radio rods are not suitable for L.F. purposes, and therefore will not be surprised to note that a three-electrode valve of the ordinary type is utilised for the output. The circuit shown is, of course, a three-valve H.F., det. and L.F. arrangement, complete with all-mains power supply apparatus.

A half-wave rectifier valve is used for H.T. purposes, and only one smoothing choke is required, instead of the two usually necessary.



Outside view of one of the rods.

HOW THEY ARE USED



The circuit connections of an all-mains radio-rod receiver.

Smoothing Apparatus Simplified.

The most conspicuous advantage of gas-filled Telefunken rods, therefore, is seen to be in the absence of any grid hum, thus greatly simplifying the design of the smoothing apparatus.

Another most welcome advantage of

SPRUNG VALVE HOLDERS

A SPECIAL campaign to emphasise the advantages of the use of sprung-type valve holders has been launched by the Benjamin Electric Ltd. in conjunction with the Igranic Electric Co. Ltd.

In this connection, they have had extensive experiments carried out to show exactly what effect good sprung valve holders can have in regard to the quality of results given, and the life of valves. The above firms are issuing a booklet of great interest to the constructor, entitled "The Elimination of Pong," and this gives a full account of the experiments.

HOW TO MAKE THE "COMET" SELECTOR COIL.

Full constructional details of the coil that figures in the wonderful "Flexi-coupling" system applied to the "P.W." "Comet."

By G. P. KENDALL, B.Sc.

THE "Star-Turn" type of Selector coil which we have adapted to meet the needs of the "P.W." "Flexi-Coupling" scheme is a standard unit obtainable from most of the firms who specialise in coils for "Popular Wireless" and "Modern Wireless" sets. A proportion of our readers, however, like to make their own coils, and for their benefit we are giving the specification on this page.

The winding itself is extremely simple, although a number of tappings have to be made. The mechanical details, however, require to be carried out with some care if a satisfactory unit is to be produced, and reliable action of the Selector switch.

Easy to Construct.

The reader with a fair amount of experience of constructional and coil winding work need not hesitate to tackle the job, for it is not really difficult. It is just a matter of a little painstaking work in fitting up the stud switch and assembling the unit.

There is nothing critical about it electrically, and slight variations in the winding, method of assembly, and so on, make no difference to its working. In this respect it is much simpler and more straightforward than a dual-range coil, where the various windings must be correctly proportioned and positioned in relation to each other.

Essentially, the unit consists of a tapped single-layer winding of 84 turns in all, on the usual tube, with a stud switch to vary the amount of coil in circuit in steps of four turns at a time. This is found, in practice, to give quite sufficiently close tuning for an aerial circuit.

The basis, then, is a piece of tubing of some good insulating material, such as "Pirtoid," with a diameter of 3 in., length $3\frac{1}{2}$ or 4 in. In each end of this a wooden cross-piece is fitted, one to provide a means of mounting to the panel (two screws) and the other to form the attachment for a disc of ebonite of about $2\frac{1}{4}$ in. diameter, on which the studs and arm of the Selector switch are mounted.

The Terminal Connections.

The switch has 18 studs, and the arm is fixed on the end of a brass spindle running right up the centre of the coil and out through a hole in the panel. Holes for this spindle are required in the wooden cross-pieces, of course, and a knob is placed on the end to enable the switch to be rotated. Some simple kind of pointer is desirable on the knob, to indicate roughly where the switch arm is at any given moment.

The tube carries three small terminals, marked A, B and C, and a convenient position for these is at the end furthest from the panel. The actual positions do not matter much, but it is best to see that they read A, B, C from right to left as you

look at the coil from the back of the set in which it is mounted.

The winding comprises 84 turns of No. 24 gauge wire (either double cotton or double silk covered will serve) in a single layer. Begin at the end of the tube nearest the panel and wind on 20 turns.

From this point take a tapping to No. 1 stud on the switch. This is the stud on which the arm rests when the knob is turned fully to the left.

Now put on 4 turns, tap out to No. 2 stud, 4 more turns, tap to No. 3, and so on until 84 turns are on. Take the finishing end to No. 17 stud, leaving No. 18 blank for another purpose.

Now the internal connections of the unit. Terminal A is to be wired to the arm of

By the by, it may be a help to you in placing the winding on the tube to know the actual length which it occupies. Well, with No. 24 double-silk-covered wire, wound reasonably carefully, the 84 turns should cover approximately two inches of the tube.

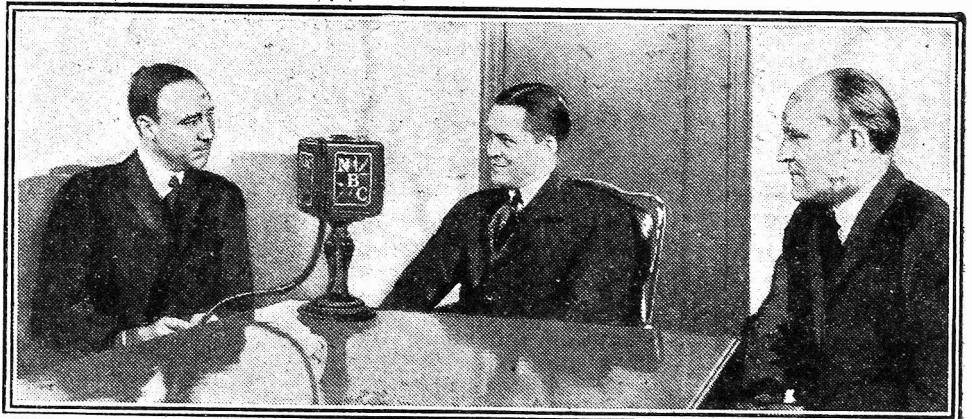
If you bear this in mind when starting the coil you will be able to get your winding nicely in the middle of the former. It doesn't matter electrically, of course, but it looks neater this way.

How Tappings are Taken.

As you will have realised by now, the length of $3\frac{1}{2}$ inches given for the tube is somewhat longer than you need, but we chose this size for two reasons. In the first place it is a standard size in the "Pirtoid" range of tubes, and secondly it just allows room for double cotton-covered wire to be used, if desired.

The length of the winding in this case would be approximately $2\frac{1}{4}$ inches. Of course, the winding length will vary a little according with the neatness with which you make the tappings and the closeness of the turns to each other, which in turn depends on your skill in winding. If it is your first attempt, therefore, it is wise to expect the winding to run perhaps an

A SCOOP FOR AMERICAN BROADCASTERS



Bobby Jones (centre), who holds all the leading British and American Golf Championships, has fixed up with Mr. Aylsworth, President of America's National Broadcasting Co., to broadcast a series of golf talks.

the switch, and C to the start of the winding. The 18th stud, blank until now, is to be wired to terminal B.

That really completes the job, but there remain one or two details to be discussed. The appearance of the unit, for example, would be improved by a covering of Empire cloth over the winding. It is easily stuck in place with a few little dabs of molten Chatterton's compound.

Then there is the question of some sort of indicator on the panel to tell you where you are. Most people will find a knob and pointer of some kind sufficient because, after all, you really make the adjustment by ear.

Spacing the Turns.

If desired, however, it is a simple matter to cut out a card scale and secotinate it to the panel, and mark it out with 18 divisions to denote the position of the pointer for each of the stud positions. If you first mark out a rough scale, it is easy to copy it neatly in Indian ink and secure this second attempt to the panel after marking it out.

eighth of an inch over the figures we have given.

The tappings, by the way, are quite easily made in the following fashion: As you reach each point, push a hole in the tube with a sharp-pointed scriber or other tool which will not injure the adjacent turn of the winding, and take a loop of the wire through and so to the appropriate stud of the Selector switch.

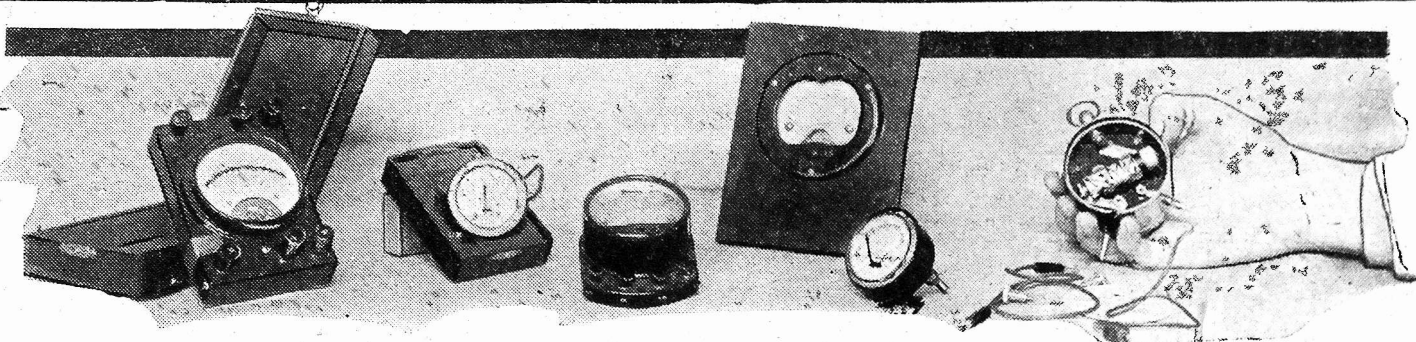
SOME SHORT REMINDERS

Correct negative bias on the grids of S.G. valves often improves selectivity.

It is expected that the change-over from Savoy Hill to Broadcasting House will take place in the autumn of 1931.

In a well-designed broadcasting aerial most of the energy is radiated horizontally, but a certain amount of radiation takes place at all angles.

HOW THOSE METERS WORK



HOW many wireless enthusiasts are there who have not at some time wondered how voltmeters, etc., work?

In writing this article, it is my hope that it will enlighten those who are as yet totally ignorant of the principles of the two types of instruments most commonly in use, the voltmeter and the ammeter.

First, let me remind you that it is useless to think a 3s. 6d. voltmeter is an accurate

Some interesting notes that will help you to appreciate a good meter when you meet it.
By E. BLAKEY.

An *Ammeter* is used to measure the current flowing in a circuit. It is connected in series with the mains, battery, etc., at any convenient point. Its resistance must be as low as possible (just opposite to the voltmeter), in order that there will be a very small voltage drop across it. Reference to Fig. 1 will show how the voltmeter and ammeter are connected respectively.

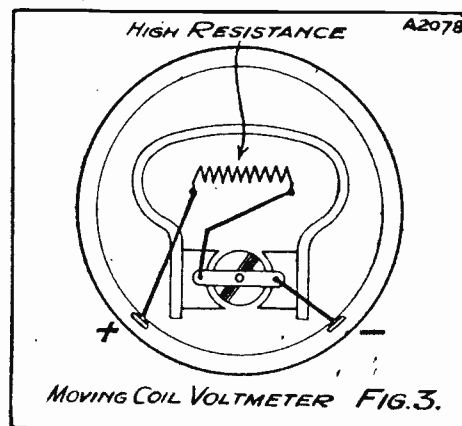
The Moving-Coil Type.

The working parts of a moving-coil voltmeter and ammeter are similar. A fine-wire insulated coil (A) on a rectangular aluminium former, held by two pivots in jewelled bearings and carrying a pointer,

generally constructed from aluminium, is energised by current from the circuit in which measurements are to be made (Fig. 2).

The coil rotates between the poles of a permanent horseshoe magnet (B) which has shaped pole-pieces (C). Between these pole-pieces, leaving very small air gaps, is a fixed iron cylinder (D) to intensify the "flux." It is in the space between the poles and the cylinder that the coil moves.

FOR MAINS UNITS



Especially for measuring mains unit voltages a very high-resistance voltmeter is desirable. High resistances are included in the construction of most good voltmeters.

Two spiral springs (E) which carry current to and from the coil have their inner ends fixed to a pivot (the pivot mentioned in connection with the rotation of the coil) and their outer ends fixed to the standing part of the instrument.

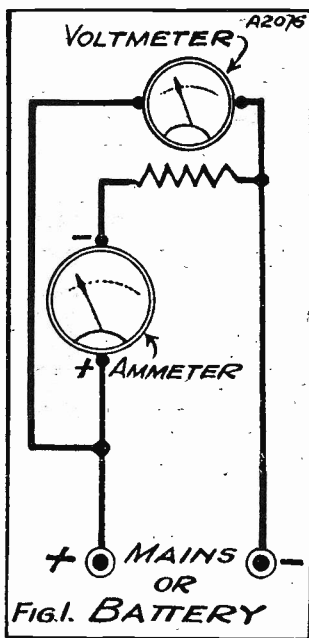
We must now recall our elementary theoretical knowledge in connection with this very interesting part of the function of the instrument.

"Dead-Beat" Instruments.

The coil (A) when carrying current tends to move so that its "flux" is at right angles to the magnetic plane, therefore enclosing as many "lines of force" as possible.

Or to put it another way. A "clock-wise" twisting torque proportional to the current flowing is exerted between the magnet and the coil against the "counter-clockwise" torque of the springs. Therefore, according to the strength of the current flowing, the pointer will take up a certain position on the scale.

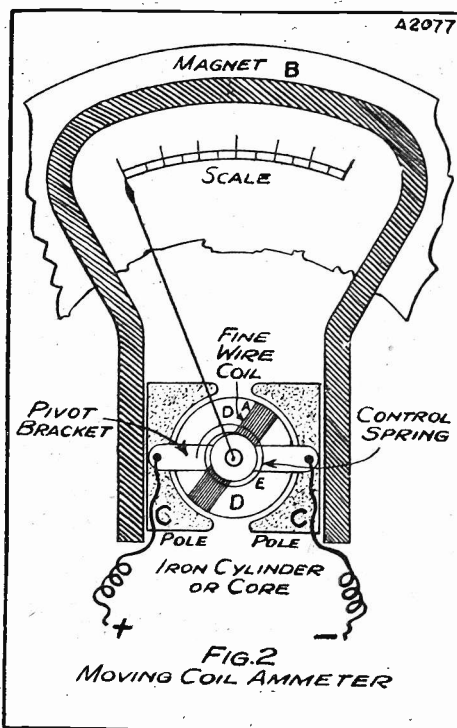
(Continued on next page.)



WHERE THEY WORK

An ammeter is joined in series, so all the current in the circuit passes through it. But a voltmeter is shunted or paralleled right across the two points between which the voltage difference to be measured exists.

MOVING COIL TYPE



Meters that operate on the moving-coil principle are generally very reliable instruments.

testing instrument. Such types of instrument often consume as much current as a power valve. To leave such an instrument in circuit with your H.T. battery means very quick ruination of the battery.

Volt and Amp. Meters.

I will describe the principles of the moving-coil and hot-wire type instruments. The first type is most common to amateurs, and a good make moving-coil instrument provides a means of reliable testing. The hot-wire type is to be found more in the laboratory than on the amateur's bench; nevertheless, it is well worth describing for the benefit of the amateur.

Essentially, a *Voltmeter* is an instrument used to measure the potential difference between the mains or across a battery. It is designed to consume as little current as possible and has a *high* resistance.

HOW THOSE METERS WORK

(Continued from previous page.)

You will notice with no current flowing the springs are "all-out," and when current is flowing in the circuit the springs are tightened up according to the amount of current in the circuit.

In most good-class instruments the pointer comes to rest quickly. This is generally described as "dead-beat" action. This is due to:

- (a) the lightness of the moving parts;
- (b) the current induced in the winding and aluminium frame as the coil moves through the "flux."

It would be perhaps as well if, for the benefit of non-technical readers, I gave a little explanation of the term "flux."

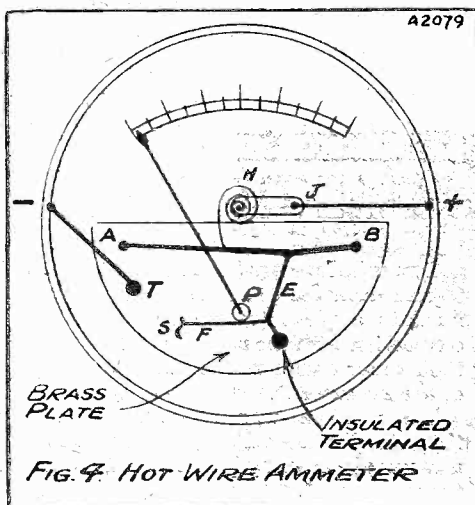
Flux-Density.

You know that current does not flow through a wire just as water through a hose-pipe. When current is flowing through wire, a magnetic field is created round that wire. The "Flux-density" is the number of lines per square centimetre in any part of the "cross-section" of a magnetic field.

By placing iron within the coil (the cylinder), the magnetic properties are very much more pronounced. This is because iron is the best conductor of magnetic lines of force that is known. It is better than air by several hundred times.

You will see, therefore, the iron cylinder is there for a very special purpose; many people think it would be well out of the instrument so that the coil may have more space in which to rotate. This, you will see, is entirely wrong.

HEAT DOES IT!



The current makes the thin wire expand with heat, and so moves the needle.

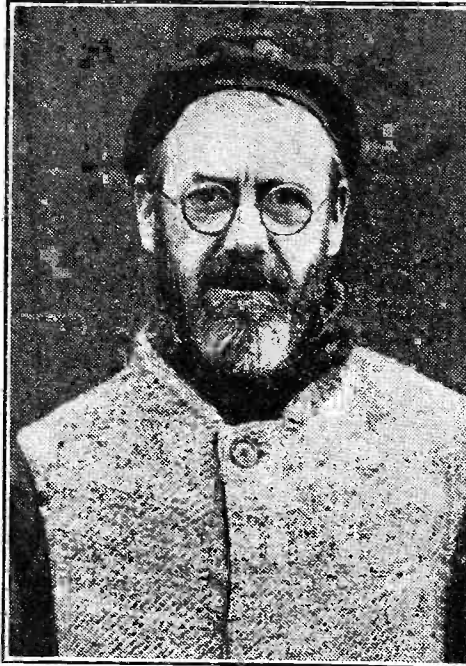
At this point you will realise that the making of instruments of this type is more difficult than is generally supposed, and (I mention this with emphasis) that any tampering can very easily cause "rubbing-contacts," etc. Use your instruments very carefully, just as you would a good watch, for both are instruments of precision.

Now some special points about the ammeter. The coil winding is very fine and can only carry small currents. It is therefore necessary to "shunt-off" the greater

part of the current to be measured by an ammeter shunt in parallel with the instrument. The shunt is usually made of strips of manganin, which has a very low resistance and is unaffected by temperature changes. The resistance of the instrument and that of the shunt and of the leads bear a definite ratio to one another.

Therefore the instrument carries a definite fraction of the main current, but is gradu-

COMPLIMENT FOR "P.W." ?



Mr. Eric Gill, the celebrated sculptor, who has included "Ariel" in his group for the new B.B.C. building at Portland Place.

ated to register the main current. The combined resistance of ammeter and shunts in parallel is so small that it has no appreciable effect on the resistance of, or on the current in, the circuit.

Ammeter terminals are always marked + and —, and must always be connected correctly.

Shunts are not necessary with ammeters designed to measure small currents. (Milliammeters.)

A voltmeter is connected across two points in a circuit to measure their potential difference. A resistance (see Fig. 3) is put in series with it so that it will not appreciably affect the resistance of the circuit, and only carry a small current.

The Hot Wire Ammeter and Voltmeter.

To explain this, let us note each "step" on Fig. 4 before going further with the text.

- AB—Platinum-silver bridge wire.
- S—Spring.
- F—Silk fibre.
- E—Phosphor-bronze wire.
- P—Pulley and pointer.
- H—Hair-spring.

Trace the connection from the + terminal of the instrument and you will see that, disregarding the electron theory and taking the old electrician's current flow hypothesis, which is simpler to understand in this case, current enters at the block marked "J." It is now carried to the platinum-silver bridge wire (AB) by the hair-spring (H). Note the bridge wire is connected to terminals marked A and B, which are connected to a brass plate. Current leaves by the terminal T connected to the brass plate also.

An Ingenious Idea.

Near to the centre of the bridge wire (AB) is connected a phosphor-bronze wire (E) which is much thinner than AB. The other end of E is fixed to an insulated terminal. To E is attached a piece of silk fibre (F) which is wrapped round the grooved roller (P), to which the pointer is fixed, and the other end of F is attached to the small, flat spring S, generally by an eyelet or similar attachment.

And now to describe the action of the instrument.

When current flows through AB its sag increases, naturally E becomes more deflected; this causes a movement by F (which measures the deflection of E) which, seeing it is wrapped round the pulley P, turns it, and so causes the pointer to move. Just run through this again and get a clear understanding of the principles.

Damping Out Vibration.

As in the moving-coil type instrument, there is a device for "dead-beat" action. An aluminium disc attached to the spindle of the needle moves between the poles of a small, powerful permanent horseshoe magnet. When any movement occurs, the current induced in the disc produces a magnetic field opposing the motion, thus delaying it.

The main object of the disc is to damp out mechanical vibration, which you will realise would be inevitable without it, due to the construction and action of the instrument.

As in the case of the moving-coil type instrument, shunts are connected in parallel with an ammeter, and a high resistance is fitted in series with a voltmeter.

CONTROLLED BY RAYS



Mr. Grindell-Matthews and his new boat, which can be controlled entirely by wireless or by light rays.

JAMMED AGAINST A GIANT

A Special Correspondent describes a lightning tour of the Balkans, and a visit to the Istanbul broadcasting station, which broadcasts on the same wave-length as the giant Moscow station.

IN a friend's car I motored through the military zone encircling Istanbul to the centre of the city—which is certainly not the most pleasing form of motoring, nor the easiest method of approach!

Having concluded business visits in Bucharest, and having duly visited King Carol's Broadcaster, as reported in "P.W.," I found myself, some while back, at a loose end in Bucharest and with the rather ambitious desire (at least, if you knew the country you would realise that it was an ambitious desire) to visit Constantinople.

Terrible Journey

Train travel in these parts is a mockery as a service. A business friend in Bucharest had to go to Istanbul—a thing, poor chap, which he had frequently to do—and he kept a large American saloon exclusively for the pilgrimage.

The distance is roughly the same as that from London to York, assuming that one goes as the crow flies; but crows don't fly straight in Turkey! And, apart from the distance, the roads are awful.

We did eventually get through Istanbul and on to Constantinople; but there's no interest in that part of the journey for wireless enthusiasts.

As a matter of fact, there are only two roads worth the name at "Constan," and one of them, to San Stephano, leads through the maze of Istanbul's narrow and Orientally dirty narrow passages, which, because Istanbul is a city, one must call "streets."

The "Radio Dealer"

That American saloon was a real chariot! I am told that motorists are discouraged by the officials as well as by the roads in the Balkans. Certainly our trip to the broadcasting station was as hazardous a thing as one could possibly wish for. The police in Istanbul have a temperament of their own!

No officials in this part of the world are inclined to over-humanitarian sympathies, but the military methods of the Istanbul and Constan traffic "bobbies" are deeply galling; and one has no remedy, for it is made painfully obvious that motorists—private motorists, at least—are not wanted.

And yet the Turks tolerate such a modern thing as radio.

While in the market area of Istanbul, I saw my first Oriental radio "shop," the utter confusion of which would make even Caledonian market blush for shame!

Had I "bitten" I could have bought high-tension batteries which, owing to the heat, could have had little pep left in them; or a selection of German and Austrian valves of doubtful vintage. It all makes one wonder how radio amateurs manage in Istanbul.

There was little time to spare, so, while the Bucharest man conducted his business in the City, I borrowed his car and made an impromptu attempt to find Istanbul's radio station, which is some distance out of the city itself, and faces open country.

I have since learned that for this valiant endeavour I might have been hung, drawn and quartered by the authorities for driving without a foreigner's permit.

Poorly Heard in England.

The giant masts of the station guide one over the undulating country; and so I arrived. A station engineer took me round and showed me the plant, which was rather uninspiring, the aerial and earth arrangements, which are immense, and the studio, which to a Britisher is amusing.

about the eleven-hundred and twelve-hundred mark.

These Russians are picked up at fair strength in England, though nobody wants to hear their propaganda, and the huge wipe-out doesn't give Istanbul much of a chance.

Transmitter Being Revised.

At the moment, Istanbul is "off the air" and the transmitting plant is being revised—a thing which was hinted to me on my visit—and perhaps when it returns it will be more easily received with single H.F. stage sets in this country.

I saw a copy of the monthly wave-length measurements by the Brussels U.I.R. laboratory, and the wave-length line of Istanbul was commendably straight. Right on the line on one or two nights were two Morse stations. There is plenty of shipping and commercial traffic in these parts; but probably Turkish listeners are not very critical.

Afterwards we went along to the studio.

This is heavily draped, infernally hot, and devoid of any external ventilation or illumination. The lighting, I believe, comes from locally-generated power, for I heard a chuffing suspiciously like a gas-engine.

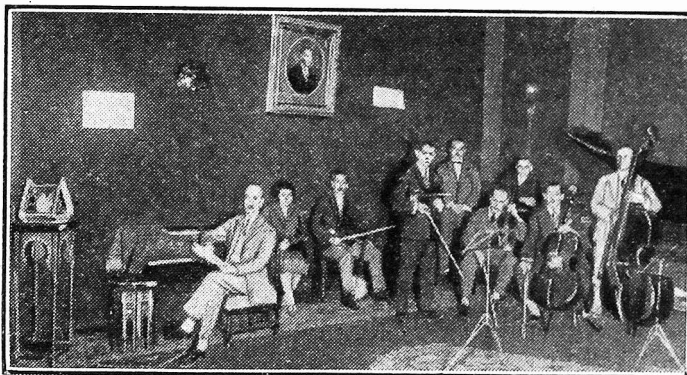
If you have ever heard Istanbul, or the other more powerful Turkish station Ankara, you will know what a weird idea of music these countrymen have. They have their jazz, and our familiar

tunes of two and three seasons ago are twisted to suit their own rhythm. In their jazz bands and light orchestras there is plenty of "string," but precious little bass. In fact, they appear to loathe the drums.

The studio, to be truthful about it, is grossly old-fashioned and hardly in keeping with the national temperature; for, as I have said, there is no proper ventilation.

To spend an evening in Istanbul's studio would certainly not be my idea of Turkish Delight!

THEY HAVE THEIR "JAZZ"!



An orchestra at work in the Istanbul studio. "Our familiar tunes of two or three seasons ago are twisted to suit their own rhythm," says our correspondent.

Also he explained why it is that, although Istanbul has an excellent range, thanks to its wonderful geographical position, it is poorly received in England and well-heard down in the Southern and Western parts of the world.

Istanbul is jammed against a giant. Its own power is 5 kilowatts, which is good; but there is Moscow's new 75-kilowatt on exactly the same wave-length of 1,800 metres. There is also another giant, Khar-kov, which is generally to be found round

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really practical and up-to-the-minute information.

By R. W. H.

THE period of excellent long-distance reception conditions which opened shortly after the beginning of the year shows no signs of coming to an end. We have occasional bouts of atmospherics, which generally affect the long-wave transmissions rather more than the short, and on odd evenings fading may reappear for a time. Never, though, has the latter been so bad as it was towards the end of 1930.

Americans Coming Over Well.

American reception is becoming better and better. Not for many years had I made a real night of it, but recently conditions were so good that I simply could not go to bed until the clock had struck five!

With the big set the American stations were coming in with a volume comparable to that of Rome or Hamburg or Turin; the volume control had, in fact, to be turned right back for fear of rousing the rest of the household from their slumbers.

As the big set was doing so well I switched on a four-valve portable (S.G.—D—2 L.F.)

and found that it was easily capable of pulling in the programmes of several stations—not, by the way, tuned to the silent point between squeals.

On that memorable night I picked up thirty-four Americans and could probably have got more if I had by me a complete list of U.S.A. stations with their frequencies and wave-lengths. Amongst the best at the present time are WIOD, WPG, KMOX, WFIC, WBZ, KDKA, WABC, WGY, WJZ, WLW and WEA.

Those below 300 metres are usually the strongest from midnight until about 1 a.m. Then the longer-wave stations begin to strengthen up and fine reception of them shortly becomes possible as a rule.

A New Transmitter.

On this side of the "Herring Pond" there is a very big selection just now. I have a new station for you—or rather an old station with a new transmitter—in Lwow, which we used to call Lemburg.

The name by the way is pronounced Lvoo, or something very like that, in

case you are trying to catch the call-sign. The wave-length is 381 metres (788 Kcs.).

This station comes through strongly and you should have no difficulty in finding him. Incidentally, if you do so you have practically the exact tuning for WGY, so make a note of the settings.

On the long-waves all stations are coming in well. The very best are Radio-Paris, the Eiffel Tower, Kalundborg, Oslo (when not heterodyned) and at most times Huizen, who is now sending out the Hilversum programmes.

The medium band is full of interest. As you have possibly observed, Heilsberg has now worked up to full power, and is receivable even on small sets at excellent loud-speaker strength. I hear, though, that he is not over popular with those who listen to the home relays using not very selective sets.

Listen For These.

Budapest is a little off colour at the moment and Vienna, usually so good, is not quite what he was. Other stations slightly below the mark are Lyons Doua and Munich.

To look on the bright side, there are quite a score of stations now from which fine reception is obtainable if the set has adequate selectivity. Notable amongst these are Brussels No. 1, and often No. 2 as well; Milan, who is generally most reliable; Langenberg, Rome, Stockholm and Katowitz, all of whom may be regarded as regular stand-bys. The list also contains Frankfurt, Toulouse, Strasbourg, Hilversum (Huizen programmes), Breslau and Turin, to mention just a few of the best.

A PROPOS my mention of Radio Saigon in these notes recently, a reader, "F. W.," has been good enough to forward me some particulars straight from the station. The directors take for granted a desire to subscribe twenty-five dollars per annum to give "moral and material assistance" to the development of the transmissions.

Where is Rome?

The chief particulars are: Aerial power, 12 kilowatts; wave-length, 49 metres; call-sign, F3-ICD. The announcement is "Hello, hello, here is Radio Saigon." The brochure concludes by stating that "there are two other stations at Saigon."

These are the Government station, working with Paris and Japan on 24.91 metres, and a privately-owned broadcasting station, power 800 watts, on 31.5 metres. Has anyone ever heard of the last-mentioned? I have had several claims of reception of the Government station on 24.91, or 24.98 metres.

What exactly is Rome doing? From the latest information I have on hand, there is a large, blank space against him on 25.4 metres, followed by the words, "Now on 80 metres." Personally, I have not heard him on 80 for some weeks, and I have at least half-a-dozen letters remarking on his terrific strength, particularly during the afternoons, on 25.4. Can anyone clear the business up?

"N. J. B." is very worried because he has "My Screened-Grid Short-Waver," and can't receive much with it in spite of my frequent statements that conditions have

SHORT-WAVE NOTES

A weekly contribution for short-wave enthusiasts by W. L. S., "P.W.'s" short-wave expert who operates a very well-known amateur station and is one of the leading experts on the subject.

been good. Well, "N. J. B.," don't blame the set, particularly as it has been going so well in the past, for conditions aren't always the same everywhere, and I don't write these notes from Co. Kildare! Quite possibly you are right in a trough of bad receiving conditions still. Even here things are so variable that I am afraid to make any comment on conditions for fear they change while I am writing!

The Vatican.

"B. T." of Hampton sends an interesting list of stations logged recently, awarding the palm to CTIAA, Lisbon, whom no one else ever seems to mention. This is the same station that is famous on the amateur waves for the length of his CQ calls and the number of DX stations that reply to all of them! Sorry, "B. T.," but I have no up-to-date information about EAJ, WEO and WEJ, except that the former is at Barcelona, and the other two, I believe, both at Rocky Point with the other R.C.A. bunch.

Several correspondents have heard Marchese Marconi and others speaking from the new Vatican station on 50.25 metres. This station appears to be received in this country at about the same strength as Rome, I2RO, although I must confess that I have not yet caught him.

A Boston Schedule.

Until February 28th, W1XAZ, Boston, Mass., is transmitting daily on 31.35 metres from 1200 to 0400 G.M.T. and radiating a series of programmes "dedicated to short-wave listeners." I am afraid it is rather late in February to listen for him, but there are some days left yet for those that have not already heard him. The schedule is as follows:

1200 to 1400: Central and South America, Siam, Dutch East Indies, Australia, Japan and Philippine Islands.
1700 to 1800: British East Africa, Madagascar, India and Siam.
1900 to 2100: Great Britain, Spain, Portugal, France, Morocco, West Africa, Italy, Scandinavia, Netherlands, Germany and all Central European Countries, South Africa, India and Australia.
2300 to 0200: Great Britain, India, Siam, Dutch East Indies, Philippine Islands, Japan, Central and South America.

I have given the schedule in full because it is rather interesting to note the best times for transmitting to the different parts of the world, as estimated by people who ought to know something about it!

(Continued on page 1124.)

... sorry you've been kept waiting
but it had to be perfect first !



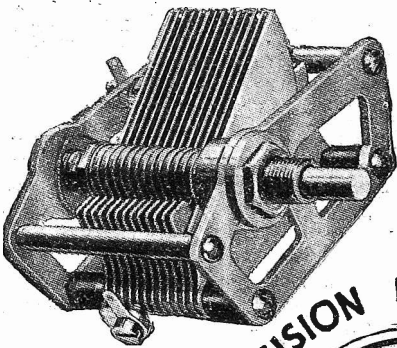


PRECISION INSTRUMENTS for the COMET 3

J.B. Precision Instruments are scientifically designed—they are the work of practical engineers.

J.B. precision ensures accuracy of workmanship and careful finish. J.B. design cuts away all surplus material without in any way impairing strength. The two together combine to give you instruments of high efficiency and unvarying calibration.

Specified for the Comet 3 is a J.B. Junior Log Condenser and a No. 1 Thumb Control.



J.B. "JUNIOR" LOG CONDENSER.

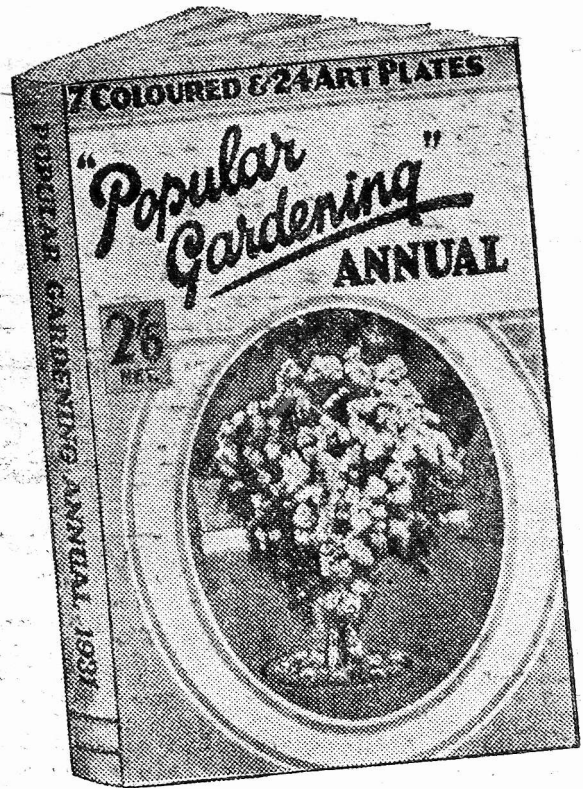
(Prices without dial).

0005 7/- 0003 6/9.
00025 6/6 00015 6/6.

J.B. THUMB CONTROL,
Type No. 1. Plain. Price 4/6.



Advertisement of Jackson Bros.,
72, St. Thomas Street, London,
S.E.1. Telephone: Hop 1837.



An Ideal Gift for your gardening friends!

There is no happier gift for gardening friends than a copy of POPULAR GARDENING ANNUAL. This very useful book is an illustrated budget of information for amateur gardeners. It contains an immense amount of information, seven coloured plates and twenty-four art plates, from photographs and diagrams. The contents include:

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CAPT. ECKERSLEY'S QUERY CORNER

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



TRAMWAY NOISES—WHAT IS OHM'S LAW?—HOW IS A CHARGE DISTRIBUTED?—BACKGROUND WITH FOREIGN STATIONS.

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.

Tramway Noises.

D. O. (Plumstead).—"I have a three-valve receiver which works perfectly, but unfortunately, I am situated rather near a tramway system. I find that when a tram passes my house, I get crackling noises in my loud speaker.

"How can I cut this out?"

I doubt whether you can overcome tramway noise by doing anything to your receiving set. It is, however, worth while trying some things.

For instance, your aerial should be as far away from the tram route as possible, and your set should be reasonably selective and not too sensitive for the station or stations it is desired to receive. The royal road to the elimination of tramway noise is to alter certain connections in the motors of the tramcar, or to get the tramway authorities to use a special form of collector bow.

The B.B.C. know more about this question in detail than I do and it would be worth your while to write to them, explaining your exact situation, when they might be able to help you in some way.

In certain parts of the country tramway authorities have been extremely generous towards the interests of the wireless listener and have done a great deal to modify the tramcar installation so that it shall produce the minimum of disturbance to listeners.

What Is Ohm's Law?

M. S. (Tilbury).—"I am a beginner, and I have often seen the words 'Ohm's Law' mentioned in articles. Will you please explain what Ohm's Law is?"

I am glad that as a beginner, you are beginning at the beginning and not at the ending, like so many beginners!

Ohm's Law expresses the relationship between electrical pressure acting around a circuit, to resistance to electric flow in that circuit, and to the rate of electric flow in that circuit.

Pressure is volts. Resistance is resistance, and rate of flow is amperes.

Consider a water pump, as shown in the diagram forcing water round a pipe. As the pump is driven faster the pressure it exerts on its outlet and the suck it exerts on its inlet is greater: the difference between the push and the suck is the pressure exerted by the pump.

If you put a flow meter in the pipe, then, as the pressure of the pump is increased,

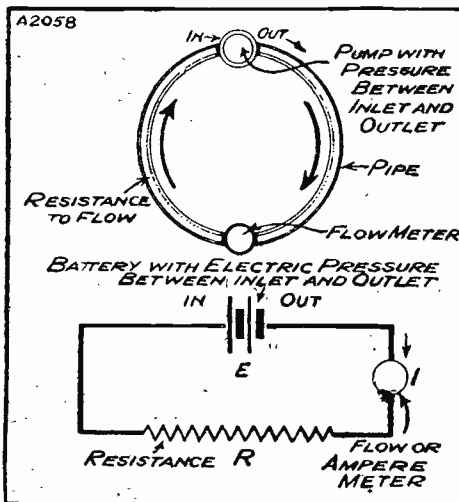
the registered rate of flow will increase. If the pipe (with a given pressure) is narrow and furred-up inside it will take a big pressure to make a given flow.

If the pipe is large and smooth it will take a less pressure to make a given flow.

There is thus a clear relationship between pressure, resistance and rate of flow. Electrically, the pump is a battery having a voltage, the pipe is the conducting circuit and the rate of flow is measured in amperes and is called current.

The greater the pressure or voltage, the greater the current for a given resistance, the greater the resistance for a given voltage, the less the current.

OHM'S LAW



This is an illustration of the most important and valuable law in electricity and radio. Without it we should be almost powerless to design electric motors, lighting supplies, radio sets and transmitters, and a sound understanding of the simple law is essential before you can really grasp the principles of radio.

If we call E voltage, R resistance, and I current, then $E = R \times I$. $I = E$ divided by R . $R = E$ divided by I . This comes out in the right quantities if E is expressed in volts, I in amperes and R expressed in ohms.

That is Ohm's Law. It applies to alternating current as well as direct current, but any resistance to flow is then called impedance.

How is a Charge Distributed?

A. S.—"In a condenser with the dielectric wedge shaped, is the charge on the plates greater at the narrow end, or is it evenly distributed?"

If you have a wedge-shaped dielectric between two plates, and you fill one plate with a surplus of electrons the other plate with less, this is another way of saying that one plate is negative and the other positive.

Although the distribution of the electrons is actually non-uniform, being more dense where the plates are close together, actually the charge on the plate is no different from that when the plates are parallel at a difference of distance apart equal to the average distance apart when they are not parallel, or when, as you say, the dielectric is wedge-shaped.

For the purposes of definition the charge on the plate is equal to the capacity times the voltage. And so the actual charge in the plate—that is, the quantity of electricity—is equal for a given voltage to what it would be if the plates were parallel and of distance apart equal to the average distance apart when they are not parallel.

But the distribution of the charge is different when the dielectric is wedge-shaped from when the plates are parallel. It is a question of distinguishing between the total charge on the plates—which is unvaried if the plate is rocked round the average distance—and the distribution of the charge, which varies across the plate according as one part is brought nearer to the other.

Background With Foreign Stations.

L. R. (Cobham).—"I am rather keen on receiving distant transmissions, but I have never been able to tune in any of these distant programmes without getting some background of atmospheric or other noises.

"Is background inseparable from these long-distance transmissions, or is there a means of cutting this out?"

The degree of background is in direct proportion to the ratio between the absolute value of strength of the station you wish to receive and the absolute value of the background.

The powerful local station drowns all background almost always, the distant station is seldom strong enough to overcome quite feeble background. On the peak of strength a powerful foreign station received in country districts can be free from background, on an average strength a moderate powered foreign station received in the heart of a big city is never free from background.

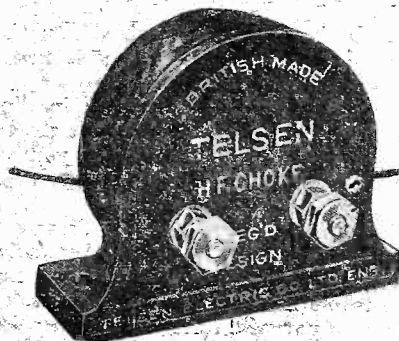
Specified for The **'COMET'** & every other set of importance

If any further proof of the high standard of Telsen performance is needed, it is contained in the fact that in every new circuit of note the designer has chosen Telsen Components, thus assuring maximum results. For vivid clarity of tone, purity and volume of reproduction, Telsen Components are absolutely unrivalled. For perfect reception—fit

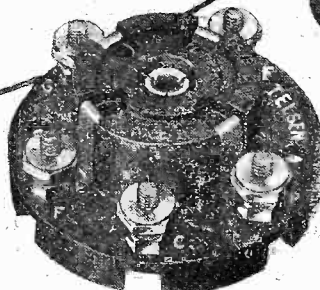
TELSEN COMPONENTS

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

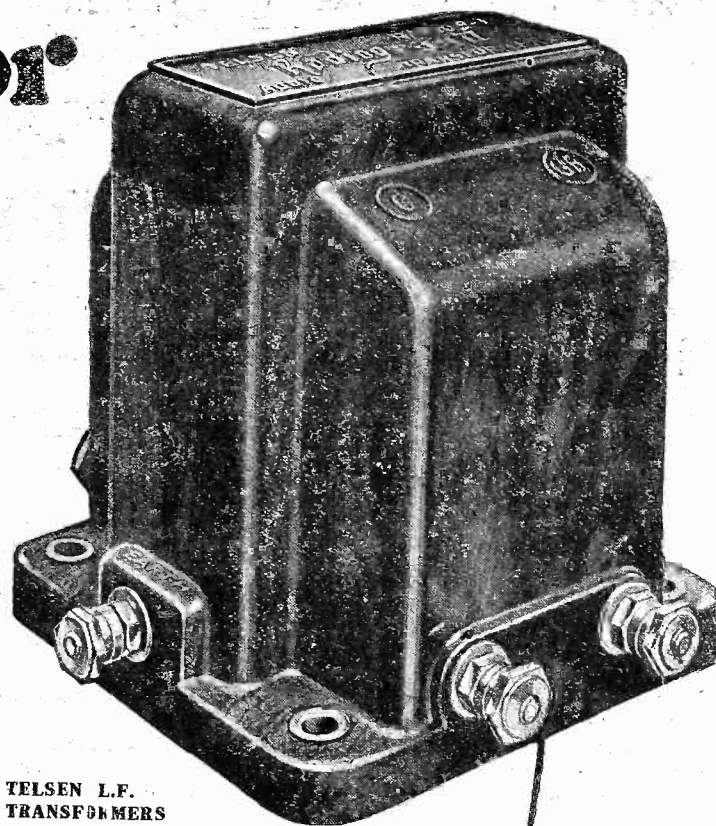
Price 2/6 each.



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



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



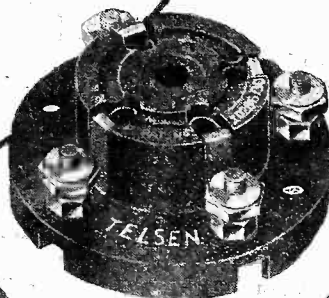
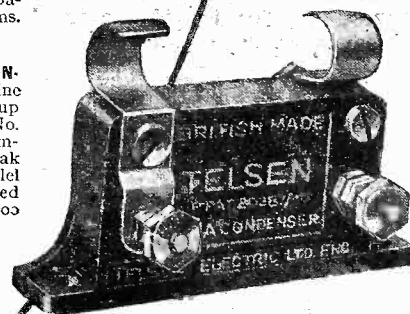
TELSEN L.F. TRANSFORMERS

"ACE" Ratios 3-1 and 5-1	8/6
"RADIOGRAND" 3-1 and 5-1	12/6
(Specially Selected and Specified for the "Comet" 3.)	
"RADIOGRAND" Super Ratio 7-1	17/6

TELSEN GRID LEAKS.—Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out and are unaffected by atmospheric changes. Not being wire wound there are no capacity effects. Made in capacities 1, 2, 3, 4 & 5 megohms. Price 1/- each.



TELSEN FIXED (MICA) CONDENSERS.—Shrouded in Genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/30. .0003 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.



TELSEN FOUR-PIN VALVE HOLDERS

Specially Selected and Specified for the "Comet" 3.
Price 1/- each.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



KITS FOR THE "COMET."

AS I have often said before, there is no better way of collecting the parts for building a set than by purchasing a complete kit from a dependable firm. In such conditions you have all the "collating" done for you, and all the little incidentals, such as screws, etc., are provided. And the panel is prepared and there remains only the simple job of screwing down the components and wiring them up.



One of the H.T. batteries made by the Chloride Electrical Storage Co., Ltd.

"Comet" kits, for example, are being sold by Ready Radio, and first-class kits they are, too. We've tested a "Comet" assembled from one of these kits, and it's just as good as our original model. Could more be said?

DRYDEX BATTERIES.

Many people must have wondered when Chlorides, makers of those world-famous Exide accumulators, would turn their attention to the manufacture of dry batteries for radio H.T., flasblamps, bells, etc.

And now they have at last done so, and you will no doubt already have seen plenty of the advertisements figuring in the nationwide publicity campaign that has been organised to introduce "Drydex" batteries to the world.

We know a bit about Chlorides—I've been up to their works at Manchester—and we also have had the opportunity of inspecting some "Drydex" H.T. batteries, and you can take it from me that they are decidedly good.

With the modesty of a great concern that has achieved its greatness through "service" as against sheer "stunting," Chlorides claim only that "Drydex" is as

good as any and better than most—or words to that effect.

And when you come to think about it, reliability is what is most wanted in a battery, and if "Drydex" won't give you that, nothing so far made can.

FERRANTI CHART.

The Ferranti Screened-Grid Four and the Ferranti Three-Valve A.C. Mains Receiver form the subjects of two new constructional charts Ferranti's, Ltd., now have available for distribution to all those who care to write for them.

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

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

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

A WONDERFUL S.G.

The latest addition to the Mullard range of receiving valves is the type S.4.V.B., a screened-grid valve for use with A.C. mains. It is of the indirectly-heated type, that is, it has a heater element which raises the temperature of the cathode by conduction through an insulating material.

The characteristics of the S.4.V.B. are as follows: Heater voltage, 4; heater current, 1 amp.; anode impedance, 257,000 ohms; amplification factor, 900; mutual conductance, 3.5. The valve is designed to operate with a maximum anode voltage of 200.

A grid bias of 1 volt is recommended. This latest Mullard product is extraordinarily efficient. Its characteristics are wonderful, and there is, of course, nothing like it in the form of a battery equivalent.

An amplification factor of 900 is enormous and the mutual conductance of 3.5 very clearly indicates "goodness." It is, in fact, about seven times as good as what would have been regarded as a first-class S.G. not so very long ago.

We tested the S.4.V.B. in a one-stage H.F. amplifier in the correct conditions as to voltages, etc., and using a high impedance

interval coupling as advised (in this case a particularly efficient tuned anode scheme). Considerable amplification was achieved, and undoubtedly the results were superior to those normally given by two stages of three-electrode H.F. amplification.

The one stage was entirely sufficient for any ordinary purposes. The S.4.V.B. is, in view of its impedance, H.T. volts, etc., a welcome innovation. And Mullards could certainly call a halt and find no occasion to feel dissatisfied with the progress they have made in A.C. valve design for a very long time to come.

OUR DUAL-RANGE COILS.

Among the leading manufacturers who are making the "P.W." dual-range coils are Messrs. Peto Scott Co., Ltd., one of "P.W.'s" very earliest advertisers. It is almost unnecessary, in the circumstances, for us to say that the firm is making our coils very nicely, but I would like to add that it is obvious from the numerous samples I have seen that Peto Scott's are taking vastly more pains with this job than are some other manufacturers.

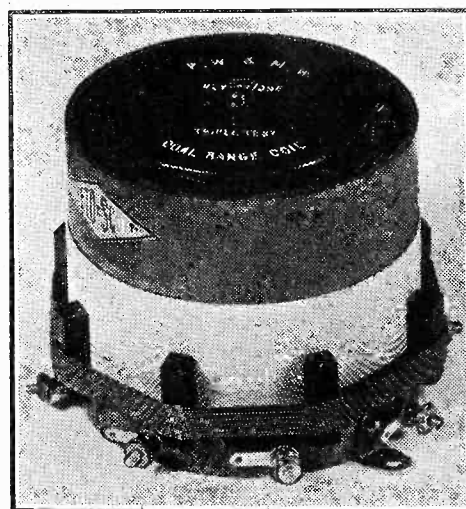
I think altogether there are about twelve firms making, no doubt in large numbers, the "P.W." dual range coils.

We feel absolutely confident that at least half are entirely trustworthy, but we cannot be absolutely certain about some of the others. True, we have had samples from most of them, but then samples sent in for test and report can vary somewhat from the articles sold to the public, a point I would urge "P.W." readers to remember.

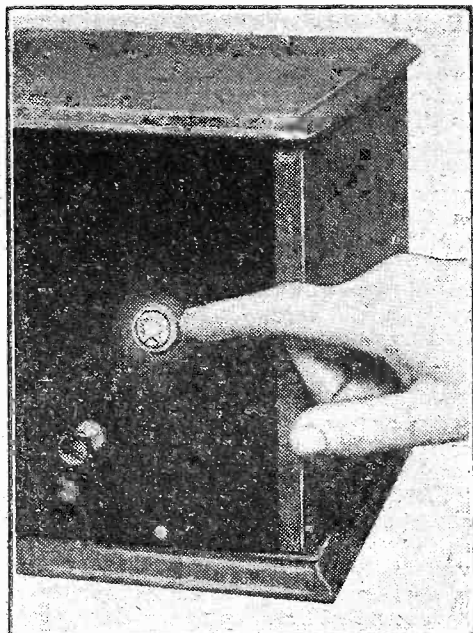
They must not always take it for granted that they are going to be able to buy goods of the quality of the samples that we receive. However, firms like Messrs. Peto Scott, Ltd., and indeed one might almost say the majority of the advertisers in "P.W.," do not carefully pick out their test samples. Anyway it is certain that if you purchase a Peto Scott "P.W." dual-range coil it will be every bit as good as the samples I have been sent for the purpose of preparing this particular report.

A LOUD-SPEAKER CABINET.

The Carrington Mfg. Co., Ltd., inform us that their Melodee cabinet No. 1 size is suitable for the new "Special" chassis marketed by British Blue Spot.



The "P.W." Dual-Range coil, as made by Messrs. Peto Scott.



The panel-light indicates when the set is switched on, and provides ample illumination for tuning.

QUITE early on in the development of the "Comet" we took every opportunity of explaining the general idea of the set to people whose opinion seemed worth having, and then waiting for the inevitable comment.

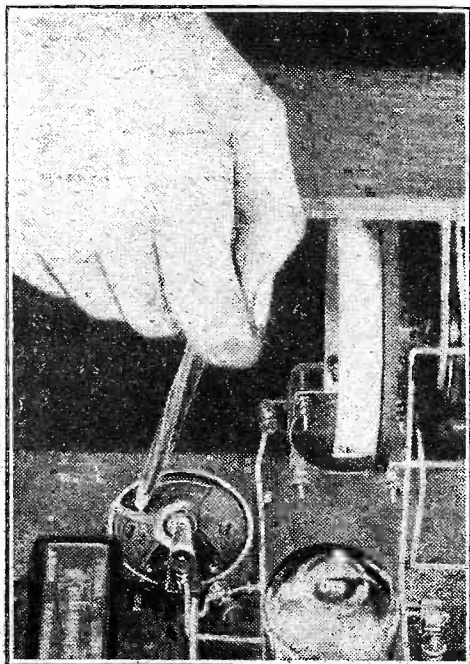
It was quite amusing to note how promptly they told us it was hopeless! The mere idea of producing a "detector and L.F." receiver as "P.W.'s" star effort for the season seemed to amaze them.

The Ideal Set.

They fully agreed that this was the ideal general-purpose type of set, with its economy, simplicity, power and reliability, but they couldn't imagine how it was that we seemed to have forgotten the modern need for selectivity.

Granted that we might have some fine

STILL MORE POWER



The potentiometer that tends to add still further to the power of the set, and makes the reaction wonderfully smooth.

FLEXI-COUPLED

HERE ARE THE FIRST EASY-TO-APPLY ADDITIONS FOR YOUR "COMET" THREE. YOU NEED ONLY FIT THOSE YOU FEEL YOU REALLY WANT.

schemes for obtaining perfect stability and tremendous power and good quality from the L.F. side, they didn't see how we could possibly expect a receiver of this type to cope with present-day "Regional" conditions.

Even the great improvement in sensitivity and selectivity achieved by the new "P.W." dual-range coil did not seem to them sufficient, for with so powerful a low-frequency amplifying side they knew there would be trouble with interference in the difficult areas close around a Regional station.

Privately we quite agreed with them, but since that remarkable "P.W." development, "Flexi-Coupling," was still a close secret we could not explain any further. Indeed, one of our main objects in soliciting these opinions was to get confirmation of our own belief in the need for a new device of this sort.

We have been considering this question of selectivity very closely and carefully of late, and we have come to the conclusion that the ideal should *not* be to raise the selectivity of *all* sets to the excessively high standard necessary in the areas close around a Regional station.

Knife-Edged Tuning.

To do so is simply to increase quite unnecessarily the cost and complication of sets so far as those readers are concerned who live outside the special areas in question. Why do it? Why not standardise two general types of sets, one for Regional areas and one for other places?

Possibly the practical difficulties of such a scheme might be too great, but the special system of progressive development which is such a fascinating feature of the "Comet" lends itself to the idea admirably. You will understand that what we gave you last week was the "Comet" in its simplest form, with just the essentials necessary to produce a really fine receiver.

This standard model has been so planned and designed that you can add very easily a whole range of special gadgets and refinements, and as this series progresses you can

pick out just the ones which appeal to you, and put the others by for future consideration.

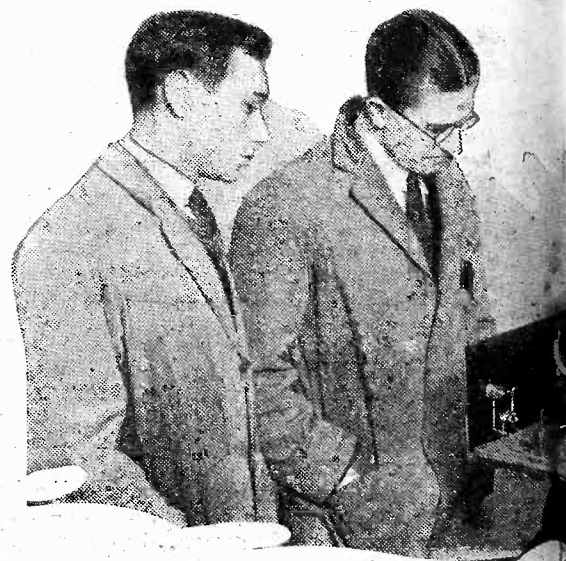
First we are dealing with "Flexi-coupling," the important "P.W." development which we are confident will revolutionise our readers' conception of what can be done with a detector and low-frequency receiver. This wonderful system gives you extraordinary selectivity, yet there remains only a single tuning dial or drum, and there is no ganging and no complicated system of matched coils or other source of unreliability.

All you add is a standard "Selector" coil, already in use for a different circuit in our sister journal

THE NEW

- 1 "Star-Turn" Selector
- 1 Wearite, Paroussi, Key
- 1 400 or 200-ohm baseband
- (Lissen, or Igranie, Read)
- 1 Panel light (Bulgin)

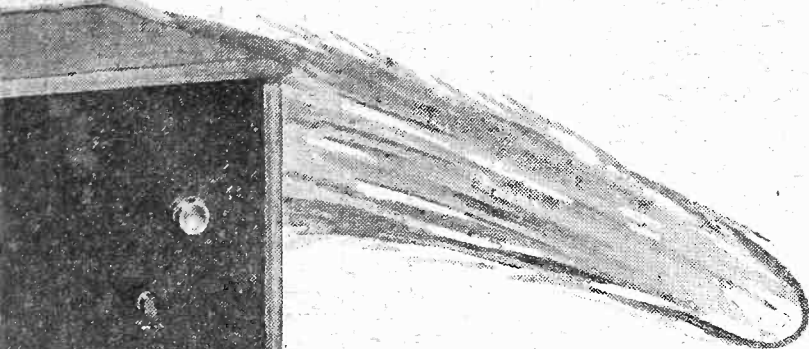
AND IT'S SO SIMPLE!



Mr. G. P. Kendall, B.Sc., demonstrates the extreme simplicity

YOU CAN NOW GIVE YOUR "COMET"

ING the "COMET"



THE MAIN FEATURE OF THIS FIRST BATCH OF REFINEMENTS IS "FLEXI-COUPLING"—A NEW SYSTEM THAT WILL MAKE YOUR "COMET" MARVELLOUSLY SELECTIVE.

Modern Wireless," and a special coupling device which you produce with a little piece of rubber-covered flex (single, not double).

You then have what is really a fully-tuned aerial circuit, instead of the comparatively inefficient "aperiodic" system, used in the ordinary set.

As a result, you then need only extremely weak coupling from the aerial to the tuned circuit proper, and this means knife-edged selectivity.

The fact that the aerial is now tuned to the station being received means better selectivity in itself, in addition to the effect of the weak coupling, and better volume, too. This last may surprise you, in view of the feeble coupling

used, but try it out and you will find it is true.

The Selector coil, you will find, has a knob controlling a stud switch, and this is your means of adjusting the tuning of the aerial circuit. It is not a critical setting, and adds scarcely at all to the complication of handling the set. Put the Selector roughly right, pick up your station on the tuning dial, then seek for the best stud on the Selector, and that is all.

To fit the coil, just drill a hole near the left-hand end of the panel, two inches therefrom and $3\frac{1}{4}$ inches down from the upper edge. (This is a corresponding position on the left to that indicated on the right of the panel in the diagram showing the fitting of a "panel light" to indicate when the set is turned on.)

That done, remove the present wire between aerial terminal and selectivity control condenser. Instead, wire aerial to "A" on Selector coil. Wire "B" on Selector to point on selectivity control condenser from which wire has just been removed.

Now for the "Flexi-coupling." Take a length of single rubber-covered flexible, not too thick (i.e., not the very heavy kind used for aerial leads), bare the end and secure it under "C" on Selector coil. Wind it twice round the dual range coil, at the top edge of the single layer winding or over this winding, and secure the end (bared) under the earth terminal.

As Sharp as You Like.

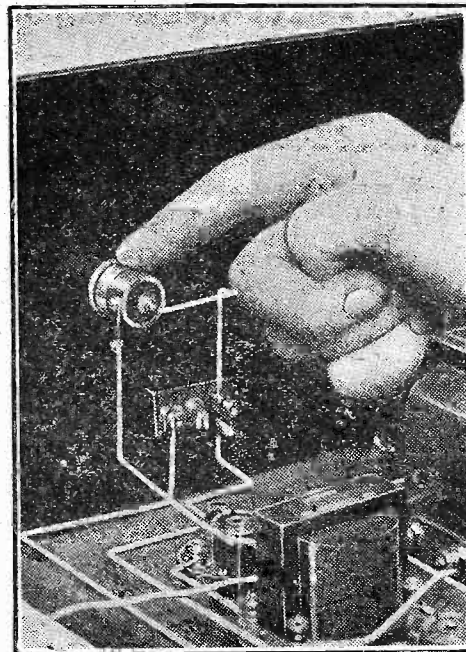
Now try out the set and see what amazing selectivity you get, with even increased volume. The beauty of "Flexi-coupling" is that you can adjust it to suit your exact selectivity requirements.

Thus, for more selectivity pull the two turns up on the dual coil to a position nearer the top and away from the single-layer winding, or try just one turn. For less selectivity and still better volume try three turns and adjust their position as before. You will find these simple little experiments extraordinarily interesting to carry out.



P.W. Flexi-coupling method of super station-selection

"COMET" SUPER-SELECTIVITY



Here you see the panel-light wiring—merely two new leads.

Now about the other refinements suggested this week. One is a panel light to warn you that the set is "on," and a diagram shows how to fit this and add the two new wires needed. Very useful gadget, preventing many a run-down battery.

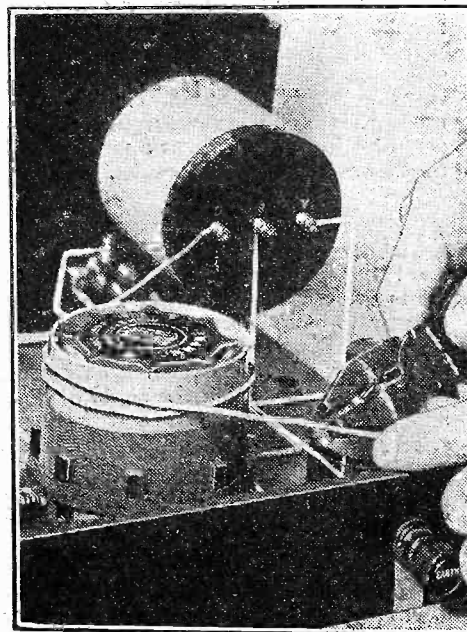
The other is a refinement we advise for all, because it enables you to get absolutely silky reaction with practically any detector valve. This is the potentiometer you see in the second diagram.

Adding a Potentiometer.

Note the removal of the wire between grid leak and detector filament. Wire leak instead to slider. Break present lead between filament of V_2 and filament of V_1 , and insert new wires to join same points, but also to call on the way past, so to speak, at one terminal of "potmeter."

(Continued on next page.)

THE MAGIC TURN



The only coupling is via this turn or two of flexible wire—and yet you lose no power!

FLEXI-COUPLING THE "COMET."

(Continued from previous page.)

Wire remaining terminal of "pot'meter" to any convenient spot on the opposite side of the filament circuit, i.e., the negative side. A good point is the earthing terminal on the first L.F. transformer, as shown.)

To adjust, first turn slider round fully clockwise, then gradually bring it back until reaction just becomes smooth. Don't go too far or volume will suffer.

An Important Point.

This last is rather an important point. You can practically always get perfectly smooth reaction by turning the slider right round in an anti-clockwise direction, but

easily. When you have tuned-in a given station, for example, you will find it is a good scheme to keep moving the Selector switch a stud or so at a time to follow-up the movement of the condenser dial as you search for other stations.

To go over to long waves, by the way, there is a special setting of the Selector switch, since "Flexi-coupling" is not used on the long-wave range. (The normal selectivity of the "Comet" is ample here.)

Accordingly, the Selector must be turned round fully to the right until you feel it come up against the stop. It must be kept here all the time you are working on long waves, and only brought into operation again when you switch back to the lower wave-band. It is most important to follow this procedure exactly, or you cannot get the proper effect.

Now a wiring-up hint about the Selector coil. Be careful to check up your connections by the lettering of its terminals. Their position may vary a little in the different makes, but this doesn't matter a bit if you connect up according to the markings.

Volume Control.

If the coil is a home-made one, of course (see article elsewhere in this issue), you will remember the function of each terminal clearly and there will be no risk of any mistake. It is very important to see that there is no such mistake, because if the terminals are wired up in any other way than that

described, proper results cannot be obtained.

The question of volume control requires a little consideration now that "Flexi-coupling" has been added. The power of the "Comet" is so great, you see, that precautions must be taken to prevent overloading and consequent distortion on the local station.

With the "Foundation" model it is pretty obvious what to do: Keep reaction at minimum, reduce the "selectivity control" condenser practically to minimum, and then de-tune a trifle if the volume is still too great.

When the "Comet" has been "Flexi-coupled" according to the instructions we have given on these pages you can no longer do this. The selectivity control now only operates on long waves, for which purpose it will usually be kept somewhere near maximum, by the way.

The necessary adjustment of selectivity on the medium

wave-band to suit individual conditions is obtained by varying the "Flexi-coupling" in the manner we have described, but this cannot be pressed into service as a means of controlling volume.

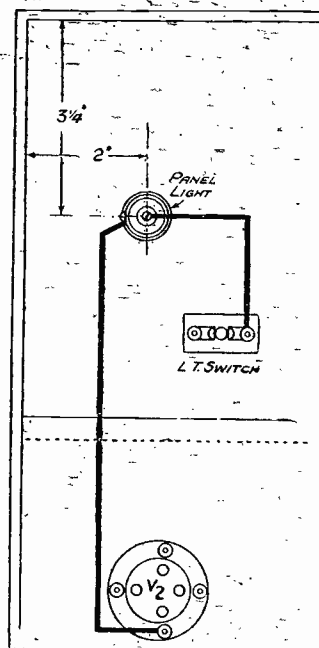
Instead, you can use a very simple scheme involving the de-tuning of the aerial circuit. As a rule, you will get quite a useful effect by turning the selector knob fully to the left, then just tune in the local on the condenser dial alone.

In this way the aerial circuit is thrown right out of tune, and the reduction of efficiency which then results is sufficient to cut down the volume of the local sufficiently in the majority of cases. If in some situations it does not, of course, all you have to do is to de-tune the condenser a little as well.

If in other localities rather further from the local transmitter too great a reduction takes place, the remedy is obvious: Just bring the aerial a little more into tune, or use just a mere trifle of reaction.

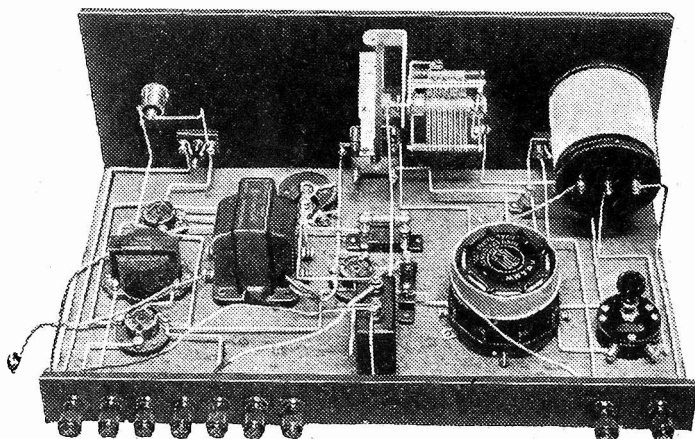
This method of setting about the solution of the problem of volume control enables quite good effects to be obtained, and a very little testing will show you what to do in future to meet the needs of your particular circumstances. Once determined the right adjustments for local reception with the best quality of reproduction can be found again in a moment.

SO SIMPLE!



A panel-light looks "posh" and takes no time to mount.

JUST BEGINNING TO GROW



The Foundation "Comet" Three with the first batch of additions built in. Can you see now how "perfectly progressive" the design is?

with most detector valves you do not then get the best volume.

The idea is to keep the slider turned as far as possible in the clockwise direction without losing the wonderful silkiness of reaction control which a potentiometer provides. The best point is quickly found, and no further adjustment is needed. (That is why the potentiometer is not on the panel.)

Now let us add some final hints about the operation of the "Comet" when "Flexi-coupling" has been added. We should very much like to tell you more about the theory of "Flexi-coupling," but we must keep for the moment to its more practical aspects.

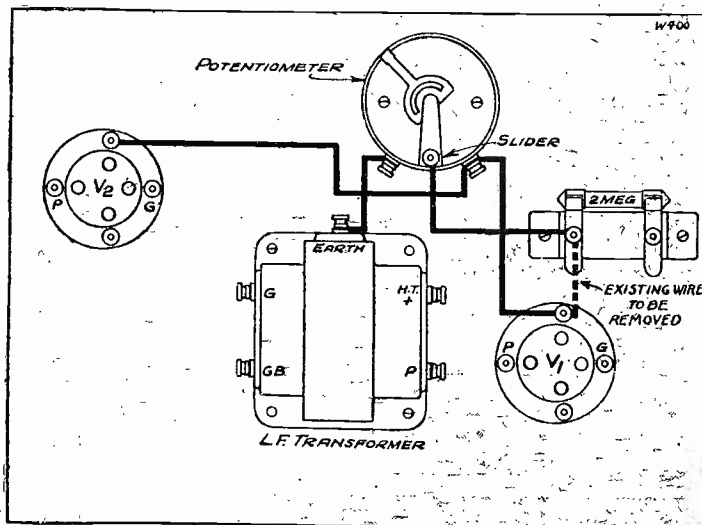
A Selector Hint.

The general idea we have already given you; the Selector is not critical in its adjustment, and so the set remains practically as easy to operate as ever. You see, you can leave the Selector switch almost anywhere, pick up your station weakly on the tuning dial, then bring the aerial into tune and get the extra power and knife-edge selectivity characteristic of a "Flexi-coupled" receiver.

It is important to understand that you will only get this wonderful selectivity when you have set the Selector switch to the right stud. Do not expect to get your station absolutely clear of all interference, therefore, until you have adjusted the Selector.

Just a little practice will show you how to make these adjustments quite quickly and

FITTING THE POTENTIOMETER



Here is the wiring for the potentiometer. You will find the trifling cost and time expended in fitting it very well worth while.

THE "COMET" TEST

TALLIS HOUSE,
TALLIS STREET,
LONDON, E.C. 4

POPULAR WIRELESS (Weekly).
MODERN WIRELESS (Monthly).
THE WIRELESS CONSTRUCTOR (Monthly).
P.W. BLUE PRINTS
BEST WAY WIRELESS BOOKS

11th February, 1931.

Messrs. Ready Radio,
159, Borough High Street,
S.E.1.

Dear Sirs,

We have now completed our tests with a P.W. "Comet" Three embodying Flexi-Coupling and assembled from one of your kits.

We find that it equals our original model in every way, its selectivity and sensitivity both being excellent. Indeed, these qualities are so pronounced as to ensure loudspeaker reception of every station on the medium and long-wave bands of any real programme value.

Our experiences with the Ready Radio "Comet" provided conclusive proof of the soundness of design of this remarkable receiver; and its operation, with stations coming in at practically every degree on the dial, remained delightfully simple - a high tribute in every sense to Flexi-Coupling.

The Ready Radio components in the kit have definitely established their claims for places in a receiver of this outstanding nature, and constructors need have no hesitation in taking advantage of the very easy method of obtaining the required parts provided by your excellent service.

Yours faithfully,

H.V. Dandridge

Technical Editor.

Ready Radio

159, BOROUGH HIGH STREET,
LONDON BRIDGE, S.E.1

Telephone: HOP 5555 (Private Exchange). Telegrams: READIRAD, SEDIST.

See also pages
1104 & 1107



**Flexi-couple your
'COMET' with a**

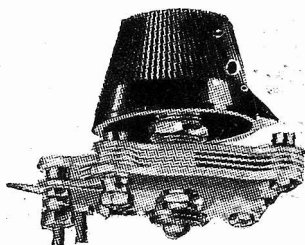


READIRAD 'STAR-TURN' COIL



No ReadiRad Coil leaves our Test Room until it satisfies the conditions laid down by "Popular Wireless" and has received an actual broadcast test.

**ReadiRad Reaction
Condenser**



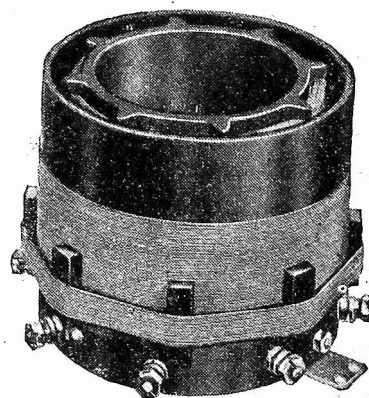
Maximum capacity 00015 mfd. —the extra capacity range will give you beautifully smooth reaction control. Moving plates cannot short-circuit and all risk of earthing your H.T. positive is consequently avoided. Price 5/-.

*This is the coil chosen
by the designer for
Flexi-Coupling the 'Comet'*

An entirely new system of tuning which will give you an absolutely amazing degree of selectivity and actually increases the volume of distant programmes. You can add the ReadiRad 'Star-Turn' Coil to your 'Comet' Three quite easily and quickly, yet you will be amazed at the difference it makes. The ReadiRad Coil was chosen by the designer because of its high efficiency and accuracy of construction. Like all ReadiRad Components and Kits it is thoroughly tested and guaranteed before despatch. You naturally want the best possible reception from your 'Comet' Three—*make sure of the best* **12/6** —use the ReadiRad 'Star-Turn' Coil.

**ReadiRad "Popular Wireless"
Dual Range Coil**

The Coil which is so largely responsible for the excellent performance of the 'Comet' Three. Covers medium and long wavelengths with an entire absence of the usual dead-end losses. Incorporates reaction winding. Made strictly in accordance with "Popular Wireless" Specification. Price 12/6.



READY RADIO for IMMEDIATE DISPATCH



NOTES FROM THE NORTH

Topical news and items of interest particularly to Northern readers.

Contributed by OUR SPECIAL CORRESPONDENT.

WHAT a pity the relay of the Leeds pantomime on February 7th was not given in the National programme! Savoy Hill has not attempted any pantomime "O.B.'s" this year, whereas the Northern region has done three, and the last one, "Jack and the Beanstalk," from Leeds, was one of the finest theatre broadcasts ever given by the B.B.C. anywhere. It was also the occasion for an interesting experiment in broadcasting technique.

With many types of stage show, difficulty has hitherto been experienced in giving a continuous broadcast, owing to quick change of scene and rapid movements of the characters, and the previous pantomime broadcasts had avoided difficult scenes by going over to the studio for musical interludes.

A Wonderful Relay.

At Leeds, Mr. Victor Smythe, and Mr. Lionel Harvey, the engineer in charge, carried out experiments to see whether by the use of a greater number of microphones these difficult scenes could be effectively broadcast.

During the rehearsals of the broadcast, they found that it was possible to give a continuous relay of the entire first act (lasting two hours), and on the night of the broadcast eight microphones were used and the first act was transmitted in entirety.

It was a complete success. The pantomime was of a spectacular character, involving the movement of singers and speakers over a wide area of stage, but by the eight microphones (which I believe is a record for theatre broadcasting) distributed in various positions it was possible to transmit every sound clearly, and at even strength. The programme value of the pantomime was excellent and Mr. Smythe excelled himself as commentator.

Outside broadcasting has been one of the strongest features of Northern broadcasting during recent months. With test transmissions starting from Moorside Edge, there is a growing public interest in what programmes the new station will broadcast when it is in full service.

It will radiate both the National programme and the North Regional programme, and chief interest naturally surrounds the latter, as we all know what to expect on the National wave-length.

Splendid "O.B.'s."

The North Regional programme, on the other hand, is something new. Whether the programme organisers in the North of England can put up a satisfactory alternative programme in competition with Savoy Hill's National programme remains to be seen. They are hard at work at Manchester, Leeds and Newcastle with their plans, and here seems to be an atmosphere of confidence in B.B.C. circles in the North.

Judging them by their recent programmes from the present North Regional stations, the musical programmes and outside broadcasting are their strongest lines.

This year, particularly, the Northern

region has a splendid "O.B." record—the Manchester circus, the flyweight boxing championship at Manchester, a relay of Gracie Fields from the stage at Rochdale, an excerpt from Tommy Handley's stage show when it was at Blackpool, and the pantomimes at Manchester, Newcastle and Leeds, have been the chief "O.B.'s" and only one of them fell short of real success: the Newcastle pantomime.

Orchestra to be Disbanded.

As engineering achievements and for programme value, the rest were feathers in the cap of the North. It is questionable whether, since January 1st, the National

quote the wireless critic of one of the leading Northern papers, the "Yorkshire Evening Post." He says:

"It would be interesting to know why an orchestra which has made its mark in Northern programmes should be disbanded, especially at a time when we have been led to believe that with the advent of Moorside Edge the Northern standard will be improved."

"Unwise Move."

"It is not very difficult to trace the finger of London in the new move, and I can imagine that every effort has been made by the Northern authorities to convince headquarters of the unwisdom of their proposal. London, however, have not a very flexible mind, and are not too well tutored in provincial tastes, and it is hardly surprising therefore that the pleas made for the retention of the orchestra have been of no avail."

Note the phrase I have put in italics. It is an opinion held widely in the North of England.

We are told that the "monet" which will replace the orchestra will be augmented from "time to time," and I gather that this may be fairly frequently. I hope so.

I understand that Mr. T. H. Morrison, the Northern Music Director, is to become musical adviser to both the Northern region and the Midland region. This is good news. In the North Mr. Morrison has steered the musical programmes on a very happy course, satisfying the demand for popular music, and yet maintaining a high standard.

No Proms.

The Northern "Promenade" concerts held experimentally last summer at Manchester, Leeds and Liverpool, are not to be repeated this year, but the relays of music from Northern holiday resorts will be a feature of the summer programmes as usual.

* * *

As we go to press we learn that during the past month satisfactory progress has been made in the installation of the transmitters and the equipment in the control rooms at the North Regional station.

It is probable that the North Regional

transmitter, on 479 metres, will be heard testing outside programme hours before the end of February, but listeners should not attach any importance to the results of these unannounced tests, as we understand that the power or modulation may be widely different from that which will obtain during publicly announced test transmissions which will follow.

Statements have been made that there is some technical hitch in the design or equipment of the station. This we are told is quite incorrect, as there have been no delays other than those brought about by weather conditions and causes entirely outside the control of the Corporation.

COMPLETE WITH TRANSMITTER!



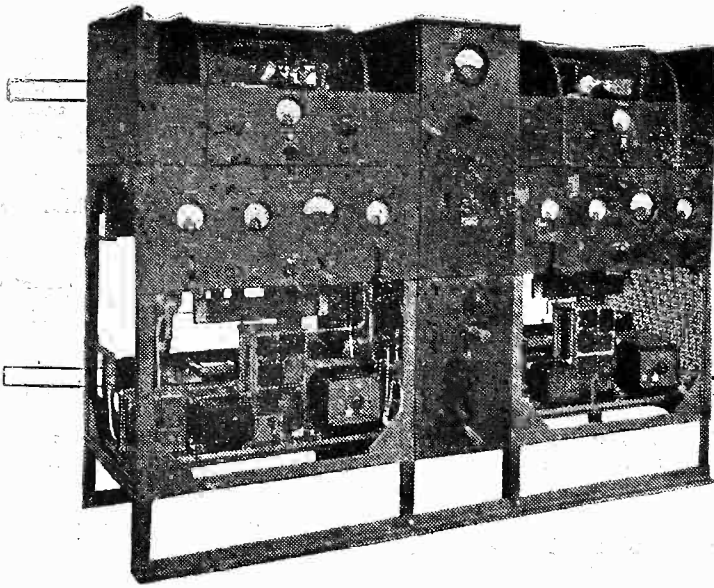
They are experimenting with kites carrying radio transmitters at the Slough Radio Research Station. They are one-valve transmitters using tiny cells for L.T. and H.T. and weighing less than a pound. The kite goes up to a height of about 500 feet, and 100 feet of the cable is aerial. A range of about one mile is achieved.

programme has provided either such a variety or such a high standard of outside broadcasts.

In this direction one has no qualms about the future, but so far as music is concerned, one's estimate of the future North Regional programme from Moorside Edge is thrown completely out of gear by the decision to disband the Northern Wireless Orchestra.

If this orchestra were to be maintained, one would say without hesitation that the Northern programme will completely hold its own with the National.

I have expressed my opinion on this subject previously, and will not weary readers by repeating it. Instead, I will



HIGH-POWER PICK-UPS

ELECTRICAL reproduction of gramophone records, which is now becoming so popular for home use, reaches probably its highest development in the cinematograph theatre where, of course, it is used in providing the synchronised sound for talking pictures (in cases where disc-records are used), and also for the musical and instrumental accompaniment effects to otherwise "silent" pictures.

In principle the electrical reproduction used in the cinema is the same as that used at home, but at the same time there are, as you may well imagine, many additional features, modifications and refinements necessary to suit the more serious and exacting conditions.

Enormous Volume.

In the first place, the volume of reproduction which is required is enormously greater than anything required in the home, and this fact alone greatly increases the problems involved in the design of the amplifiers and the loudspeakers.

To obtain enormously amplified volume without appreciable "scratch" or "background," and also without any serious distortion, is by no means an easy matter, and calls for the highest skill and care in the design and construction of the amplifiers and the loud speakers.

There are a number of gramophone equipments available for cinematograph purposes, and these usually comprise a turntable arrangement with electrical pick-up for playing the record and the necessary amplifiers and controls, these being enclosed or mounted for convenience in a metal container.

Non-Synchronised Records.

Where the record is synchronised with the film its rotation must, of course, be synchronously related to the movement of the projector, and usually the turntable is built up as part of the projector itself.

There is, however, a very large field for the entirely separate or non-synchronous turntable system, where the reproduction from the records, and the features projected upon the screen, although corresponding to one another in a general way, are not definitely synchronised. In this case the gramophone turntable unit is entirely separate from and not connected with the film projector, and may simply provide what is known as "incidental" music or "effects."

An interesting article that shows you the inner workings of a talkie theatre, where the disc method of sound reproduction is in use.

By J. H. T. ROBERTS,
D.Sc., F.Inst.P.

There are various types of cinematograph gramophone and amplifier units, and as a rule these employ at least two turntables, so that when one record is finished it is not necessary to interrupt the music whilst

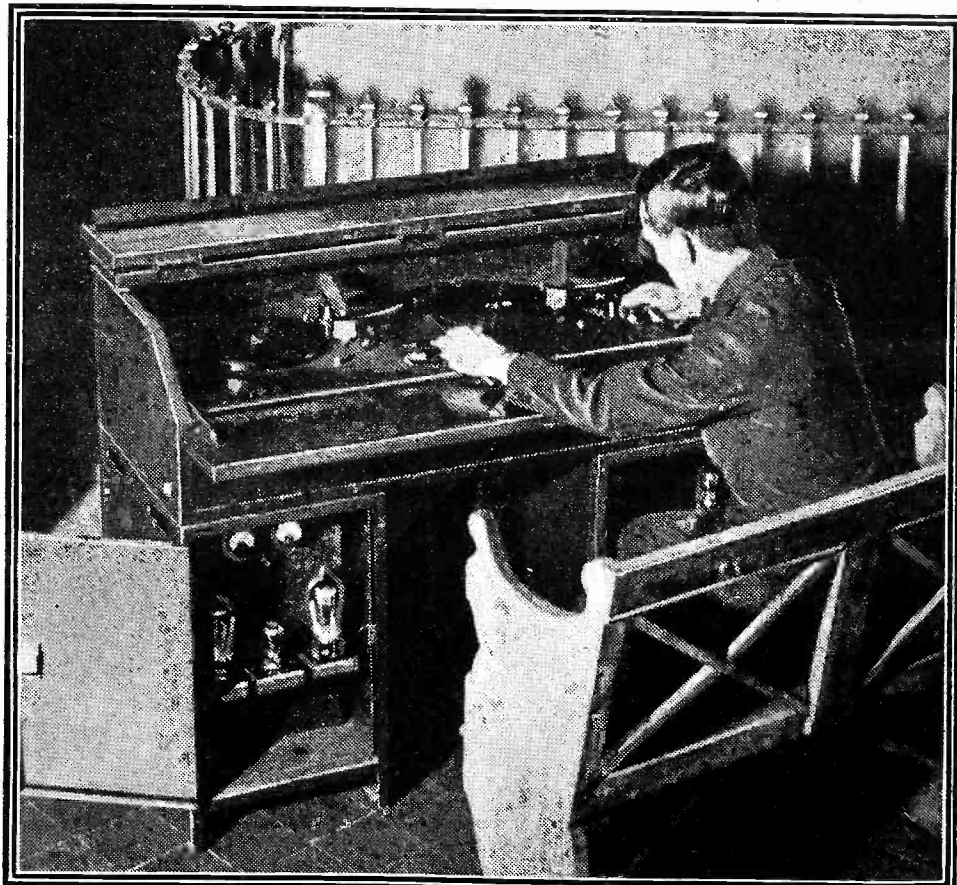
another record is substituted; the second record is already rotating on the adjacent turntable (each turntable being provided with its own pick-up), and by means of a control switch the completed record is "faded out" whilst the second record is at the same time "faded in."

Arrangement of Amplifiers.

The turntables, driving motors, pick-ups, amplifiers, switches and controls are usually made up into a complete unit, which is encased in a metal container both for

(Continued on page 1108.)

"BROADCASTING" BOW BELLS



The double turntable electric gramophone system installed in Bow Church, whence, by means of a speaker in the steeple, records of the famous Bow Bells can be "broadcast." This is being undertaken in connection with an effort to raise money for the putting of the old bells in order again.



Approved Kits ready for immediate despatch



LIST OF APPROVED COMPONENTS

	s.	d.
1 Ebonite panel, 18 in. by 7 in. (drilled to specification)	6	0
1 J.B. or Cydon '0005-mfd "thumb-control" variable condenser	11	6
1 ReadiRad '00015 differential reaction condenser	5	0
1 ReadiRad L.T. Switch	10	
1 ReadiRad 3-point on-and-off wave-change switch	1	6
1 ReadiRad "P.W." dual-range coil	12	6
3 Telsen valve holders	3	0
1 ReadiRad '0003-mfd. fixed condenser	10	
1 T.C.C. 2-mfd. condenser	3	10
1 ReadiRad 2-meg. grid leak and holder	1	4
2 L.F. Transformers: Telsen "Radiogrand"	12	6
and Igranic "Midget"	10	6
1 ReadiRad 10,000-ohms spaghetti resistance	1	0
1 ReadiRad 25,000-ohms spaghetti resistance	1	6
1 Lewcos '001-mfd. maximum compression type adjustable condenser	2	6
1 Formo '002-mfd. maximum compression type adjustable condenser	2	3
1 ReadiRad drilled terminal strip, 18 in. X 2 in.	1	9
1 ReadiRad sheet of copper foil, 18 in. X 10 in.	1	6
9 Belling-Lee terminals Type "R"	2	3
3 Belling-Lee G.B. plugs		6
1 Packet of Jiffilinx, for "wiring-up"	2	6
	£4	5 0

Additional Components for Flexi-Coupling

	s.	d.
1 ReadiRad 1931 "Star-Turn" Coil	12	6
1 ReadiRad 400-ohm Potentiometer	2	9
1 Bulgin Signal Lamp (D.9)	2	6
1 Low Consumption Bulb 2, 4, or 6 volts (when ordering please state which voltage is required)		6
	18	3

ANY PART CAN BE SUPPLIED SEPARATELY.

THE COMET THREE

KIT A Complete kit of components as specified. Price **£4.5.0**

or 12 monthly payments of **7/9**

KIT B Complete kit of components as specified with set of three Mullard Valves. Price **£5.12.6**

or 12 monthly payments of **10/4**

KIT C Complete kit of components as specified with set of three Mullard Valves and attractive oak cabinet. Price **£7.2.6**

or 12 monthly payments of **13/-**

THE FLEXI-COUPLED COMET

KIT A As Kit A above but with additional components specified for Flexi-Coupling. Price **£5.3.3**

or 12 monthly payments of **9/5**

KIT B As Kit B above but with additional components specified for Flexi-Coupling. Price **£6.10.9**

or 12 monthly payments of **12/-**

KIT C As Kit C above but with additional components specified for Flexi-Coupling. Price **£8.0.9**

or 12 monthly payments of **14/8**

THE COMPLETELY ASSEMBLED FLEXI-COUPLED COMET — READY FOR USE — AERIAL TESTED. Including Royalties. With Flexi-Coupling tuning, valves and cabinet.

£9.5.9 or 12 monthly payments of **17/-**



READY RADIO NON-SOLDERING KITS: Save time and trouble and give you perfect connections throughout.



ORDER FORM

To **READY RADIO (R.R.), LTD.**, 159, Borough High Street, London Bridge, S.E.1

Telephone: *Hop 5555 (Private Exchange).*

Telegrams: *READIRAD, SEDIST.*

Please send me—

- 1 **Comet Three Kit A** at **£4-5-0** or 12 monthly payments of **7/9**.
- 1 **Comet Three Kit B** at **£5-12-6** or 12 monthly payments of **10/4**.
- 1 **Comet Three Kit C** at **£7-2-6** or 12 monthly payments of **13/-**.
- 1 **Flexi-Coupled Comet Kit A** at **£5-3-3** or 12 monthly payments of **9/5**.
- 1 **Flexi-Coupled Comet Kit B** at **£6-10-9** or 12 monthly payments of **12/-**.
- 1 **Flexi-Coupled Comet Kit C** at **£8-0-9** or 12 monthly payments of **14/8**.

(Cross out items not required.)

CASH ORDER FORM

Please dispatch to me at once the item marked above for which I enclose payment in full of **£**.....

C.O.D. ORDER FORM

Please dispatch to me at once the goods specified for which I will pay in full on delivery the sum of **£**.....

HIRE PURCHASE ORDER FORM

Please dispatch my Hire Purchase Order for the item marked above for which I enclose first deposit of **£**.....

FREE. Every purchaser of a Ready Radio Comet Kit will receive free one Atalanta Radio Screwdriver with full sized blue print and full instructions for building the Comet Three.

Nearest Railway Station.....

HIGH-POWER PICK-UPS

(Continued from page 1106.)

mechanical protection and also for electrical shielding.

In one well-known unit of this kind transformer-coupling is used for the amplifier, transformers being arranged in parallel, with an output of about ten watts from four valves also arranged in parallel. Additional power can also be obtained if necessary by the addition of extra valves in parallel.

The Induction Motor.

The record turntables are driven by electric motors, and in some cases these are of the "induction" type, whilst in other cases they are of the "universal" type, employing a commutator. The universal type of motor, as its name implies, can be used on either A.C. or D.C. supply, and if it is wound for, say, 100 volts, it also becomes "universal" for different voltages by the simple process of including an adjustable resistance in series with it.

The Universal Motor

The objection is sometimes raised to the universal motor that sparking at the commutator causes crackling in the loud speaker, but with proper precautions this objection really amounts to very little. Another small point is that the universal motor generally runs at a fairly high speed, and this is sometimes apt to give rise to a certain amount of mechanical vibration of the record.

Completely Isolated.

On the other hand, the induction motor has the undeniable advantage that the armature is completely isolated electrically from the rest of the motor; consequently there is no need for any commutator or any other type of electrical connection to the armature.

It goes without saying that sparking troubles must, therefore, be non-existent. Furthermore, it is possible, by a suitable design, to arrange for the armature to be

'TWIXT LONDON AND LINER



The little daughter of the assistant chief engineer of the "Majestic" speaking to her father, from a recent exhibition in London.

directly mounted upon the turntable spindle so that it rotates at turntable speed and, in view of this very slow speed, mechanical vibration troubles are also virtually eliminated.

Of course, the induction motor, although it can easily be made universal for voltage, can only be used on alternating current supply, and therefore is ruled out where the supply is D.C.

Watching for Distortion.

As a rule a milliammeter is constantly in

STOPPING STATIC



Trying out a new German device for the elimination of radio interference caused by sparking trolley-poles on tramcars. It consists of a scheme that bypasses the spark energy to earth, thereby preventing the spark forming.

circuit with the amplifier so as to indicate the anode current of the output stages, and also a careful watch on the needle serves as an instant indication of distortion due to overloading.

The high-tension current for the amplifying valves is often provided by means of a small motor-generator unit, the generator usually developing something between 600 and 1,000 volts D.C. If the mains supply is alternating current, the motor to drive this generator may also be of the induction type, which again helps to avoid any interference troubles.

Accumulator L.T.

Of course, it is impossible to adopt the same principle with the D.C. generator, which must have a commutator in the usual way, but by making the commutator with a large number of segments the commutator ripple becomes high-pitched and is comparatively simple to smooth out.

Generally the filament current for the amplifying valves is supplied by a heavy-duty low-tension accumulator-battery; in some cases this serves as a "buffer," and is actually on charge whilst it is in use, but preferably the battery is disconnected from charge whilst in use, and a second battery is on charge ready to be instantly switched in in substitution if necessary.

Usually a third battery is also available as a standby in case anything should go wrong with either of the other two.

The controls include the change-over switch mentioned above, the main switch for connecting up the gramophone motors and the supply to the amplifier, speed control for the motors and a volume control for the reproduction.

RECORDING AND REPRODUCING

How Records are Made

By C.M.

QUITE an interesting way of considering the electrical recording of gramophone records is to look at it as just a reversal of the process so many of us employ to play our records electrically.

Fundamentally, the apparatus used is very similar, although, of course, the power employed in the recording amplifiers is much greater. Instead of a loud speaker which gives out sound by changing electric currents into sound waves, a microphone is used to "take in" sound by changing sound waves into electric currents.

"Pick-up" Working Backwards.

Having thus obtained our varying electric currents, they are amplified by the valves just as the varying pulses from our pick-ups are amplified. When the pulses, much magnified, arrive at the amplifier output, they are fed into what is really a glorified pick-up working backwards.

Instead of the needle movement causing current to flow in the windings as in the case of a pick-up, currents flowing through the windings from the amplifier cause the needle to move. This needle, or stylus, as it is called, is arranged so that it traces a wavy line on a soft wax record which is afterwards specially treated and used to provide moulds for making the ordinary records.

HELLO, AUSTRALIA!



Another example of trans-oceanic telephony. A well-known Australian singer ringing up her home after her recent marriage in London.

MR BARTON CHAPPLE

Wh. Sch. B.Sc. (Hons. London) A.C.G.I. D.I.C. A.M.I.E.E.

SAYS —



“I HAVE recently conducted a series of experiments with a view to proving whether any advantage was to be gained from the use of anti-phonic valveholders as applied to valves of modern design. The results prove in a conclusive and striking manner that the employment of sprung valveholders of good British manufacture can effectively reduce, almost to elimination point, the distortion which is frequently caused by vibration and mechanical shock. Such sprung valveholders also tend undoubtedly to assist in retaining the emission qualities of valves by protecting the filaments from the disintegrating action caused by mechanical shocks.”

A description of Mr. Barton Chapple's experiments is given in a booklet “The Elimination of Pong,” and every Constructor and Manufacturer who values pure reproduction will find this booklet highly instructive and valuable. A copy will be sent per return upon application to either of the addresses given below.

THE BENJAMIN ELECTRIC LTD.,
TARIFF ROAD, TOTTENHAM, N.17.

IGRANIC ELECTRIC CO., LTD.,
149, QUEEN VICTORIA ST., E.C.4.



All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

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

QUESTIONS AND ANSWERS

USING COMPACT TRANSFORMERS.

"MORRIS COWLEY" (Torquay).—"My intention is to pack the whole set into a small attaché case, and with this in view I would like to use one of the nickel-iron-core transformers instead of the larger one. I have been warned that they are inclined to saturate rather easily and cause distortion.

"Although the set will not be used for powerful loud-speaker work, I particularly do not want any form of such distortion, so I dropped a line to the transformer people, and they suggest using 'parallel feed.' Would that be likely to help, or shall I do better to stick to the older types?"

You do not say what valves you are using or the circuit position of the transformer in question, but if it is to be in the detector with a small plate current you should not be troubled with saturation distortion. To shunt-feed the transformer is certainly a step in the right direction; but, on the contrary, you would then have to use a resistance and coupling condenser, which might rather offset the advantages of the smaller size of the nickel-iron transformer compared with its larger brother.

THE "CLEAR-CUT" CONE.

The Editor, POPULAR WIRELESS.

Dear Sir,—We wish to congratulate you on producing another winner, viz., the "Clear-Cut" Cone. Having made up this cone to your directions, and being amazed at the life-like reproduction, we decided to increase the size of the cone to twelve inches, and can say without any exaggeration that its truthful representation of music and speech surpasses anything we have heard before; in fact, its faithful interpretation sets it far above any other cone speaker, irrespective of price.

This cone, used in conjunction with the "Titan" Four, is as fine an outfit as anyone could wish for.

In conclusion, we should like to add there are in our circle ten faithful adherents to your "Titan" sets, who have nothing but praise for the originators of same.

Thanking you for a reproducer which is par excellence.

Yours faithfully,

CYRIL J. BROOKS.
ALEC S. S. RYLAND.
B. MARCH.

Plymouth.

OUR "DUAL-RANGE" COIL.

The Editor, POPULAR WIRELESS.

Dear Sir,—As a regular reader of POPULAR WIRELESS, I thought I would let you know my experience with the new Dual-Range Coil.

I have incorporated one of these coils in my "Magic" Three, and results are simply splendid, giving better volume and purer tone.

I might add, I am using an indoor aerial, and can bring in a great number of foreigners at full loud-speaker strength.

Have recently built "Interchange" Three, which is an excellent set, although it has not the same punch as the "Magic" Three, which I consider one of the best circuits published.

Wishing your paper every success, I remain,

Yours faithfully,

W. J. SMITH.

Needham Mkt., Suffolk.

THE "CHEF D'ŒUVRE."

The Editor, POPULAR WIRELESS.

Dear Sir,—May I take this opportunity of thanking you for a fine receiver, namely, The "Chef D'Œuvre." On December 31st, 1930, I decided to scrap my old set and build the Chef D'Œuvre; January 2nd, 1931, stations coming in all over the dials with clearness and power, which I have yet to hear a three to beat. I might say, for example, of pulling power, that situated in Lines I can receive Midland or National 5 X X without an aerial, which I think speaks well

CORRESPONDENCE.

"P.W." SET SUCCESSES

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

for a three-valve receiver. The selectivity is really great, the set laughs at the idea of interference from Mühlacker when you are listening to London Regional. May I thank you once again for a fine set?

Yours truly,

A. E. SYKES.

Near Scunthorpe.

THE "MAXI-POWER" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir,—Referring to T. C. C.'s letter in a recent "P.W." If it is not too late, my experience with the "Maxi-Power" Four may be of some help to him.

I built up that particular circuit soon after it was published, and experienced the same difficulties as T. C. C. It was not until I had tested all and sundry in the set (and not without some gnashing of teeth) that I discovered the 3-point switches I was using were not 3-point "wave-change."

After these had been replaced by wave-change switches the trouble was not entirely cancelled out, for I found that a variable condenser I was using in the anode circuit was not of the .0005 capacity.

This was replaced by a new one of the .0005 capacity, and the trouble ceased, in fact, the tuning is so sharp on both ranges it almost severs the aerial.

Wishing "P.W." continued success, I am,

Yours faithfully,

ALFRED HITCHENS.

Coventry.

THE "NIGHT-FLIGHT" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel I must write to congratulate the "P.W." staff for that splendid circuit, the "Night-Flight" Three. Using Clix valve holders and Lissen 8s. 6d. transformer, in first evening's test, W & Y,

We are afraid that in the absence of definite data as to size, etc., the question is one you will have to settle for yourself, taking into consideration the relative space demands and the recommendations of the manufacturers. If these latter are faithfully observed there should certainly be no distortion from the method.

GETTING SOME MORE STATIONS.

"AGE 15" (Westcliff-on-Sea).—"I have a good one-valve set with only one centre-tapped coil. The National comes in at 60 and the Regional at 130, using a 60 coil.

"Are there any other short-wave stations I could bring in? If so, would you be good enough to tell me what coil I should need?"

"If there is any need I am willing to add one more valve to my set."

(Continued on page 1112.)

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.

Radio, Maroc, R F L and Nancy! Since then countless amateurs, K D K A, Bandoeng, 5 S W, and T. Telephone. I have built for myself and friends several short-wavers, including the white print "De Luxe" Short-Wave Three-two-valve white print short, waver, the "Lo-Wave" One, "Reacto" One, "Magic" Three, Two and One. One thing I cannot understand is, practically every week "W. L. S." has something to say about land capacity and threshold howl.

Why? Tuning the earth lead with a variable again, why? The only hand capacity I have met, and only slight, was with the "Magic" Three, this stopped at once on rewiring with 18 S.W.G. bare wire and Triotron S.D.2 in place of P.M.1.H.F. Threshold howl definitely never.

My short-wave aerial is 20 feet long and the earth six feet, and hangs from the same mast that carries the broadcast aerial, but vertically. I should very much like you to convey my thanks to Mr. L. H. Thomas (G Q B) for his short-wave set, the "Digger," which I am also using, with the exception of 4 mfd. for the anti-mobo instead of 2 mfd. My most consistent stations are Rome, 80 metres, and W 3 X A L, Bound Brook, N.J., 49-18 metres, night after night. Re the letter in a recent "P.W." from R. L. S., Sutton, Surrey, I have also had this trouble, A P.M.2 power valve I have works fine in the "Magic" (Benjamin valve holder), but not a whisper in the "Night-Flight." The legs are well open, clean, and both valve holders are in perfect condition, neither will it work as first L.F. in the "Digger." I took it out for a walk one evening and tried it in "Sharp-Tune" Two and "Neutype" Four. Quite O.K., and I think I will leave it in the "Magic" till it dies, and then have it stuffed. And now I'll get on with the "Globe Trotter."

Thanking you and your staff once again,

Yours truly,

Romford.

G. W. CLAYTON.

THE "EASY-CHANGE" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I felt I must write to tell you about your wonderful set, the "Easy-Change" Three, the blue print of which you gave away some little time ago. I am sixty to seventy feet above the road, but have a "gas-pipe" earth, and an interior aerial. In spite of this, I get twelve foreigners at L.S. strength, audible at ten feet from the L.S., and fifteen others at moderate volume, with no interference from London. Even Graz and Mühlacker are not interfered with by London. I have NO wave-trap!

With many thanks for such a fine, inexpensive set.

Yours faithfully,

Upper Street, N.1.

IVOR B. M. LOMAS.

READY WITH RADIO IN 1920

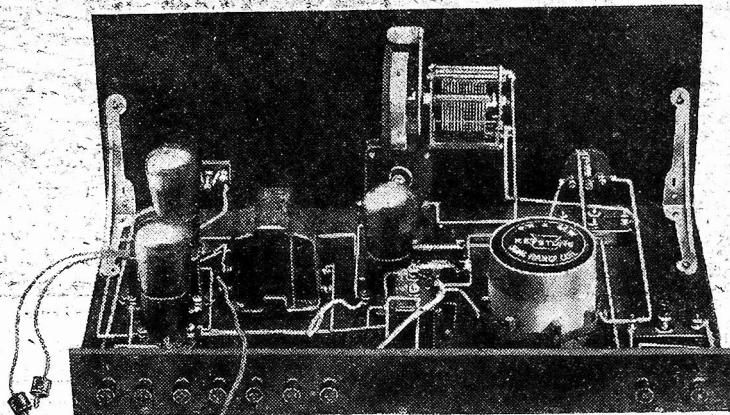
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3rd February, 1931

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(Signed) G. P. Kendall,
Research & Constructional Dept."

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FIRST WITH THE "COMET 3" IN 1931

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1110.)

Most long-distance one-valve sets intended to get foreign as well as local stations use *two* coils, so we are a little uncertain as to what kind of circuit you have. Apart from the switch which puts it on and off, have you only *one* variable control, or are there two, one for tuning and one reaction?

If the former is the case, your set is definitely unsuitable for long-distance reception, and you would do better with one of the "P.W." sets of the one-valve type, which employ reaction and are suitable for foreign stations, such as the "Dual-Coil" One, "P.W." No. 440.

If, however, your set has a reaction control or a control marked "increase" or "strengthen," you should now be able to get plenty of stations besides the two London ones if it is handled properly. This is vitally important.

Full instructions for handling such a receiver were given in our free booklet called "The Key To The Ether," which was presented with "P.W."

THE "P.W." "SAFE-POWER" CHARGER.

It was stated on page 984 of "P.W." No. 453 (Feb. 7th issue) that 2 amp. is a usual rate for charging, and on mains of 200 volts or over this means one lamp of 40 watts in either socket. (Not in *both* sockets.) Constructors of the "Safe-Power" Charger should note that on 100-volt mains a lamp of 20-watts (not 80 as stated) is needed, or a pair giving a total wattage of 20.

CONDENSER CONNECTIONS.

H. H. B. (London, N.6).—"I notice in the diagram of the 'P.W.' Crystachoke, on page 689 (No. 445), and in the instructions given for wiring on page 930, the leads to variable condensers are reversed (different).

"Should earth be connected to the fixed vanes or to the movable vanes, or does it not make any difference?"

In a crystal set, where hand-capacity effects are never troublesome, it does not matter which way

round a variable condenser is wired, results being just as good one way as the other.

Usually with valve sets the *moving* vanes of the variable condenser should go to *earth*, so this has somehow generally come to be regarded as the right method of connection.

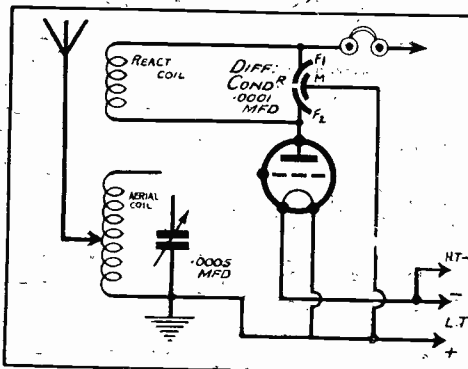
In the Crystachoke it will not make the slightest difference which way round you connect the condenser.

THE SWITCH FOR THE "CRYSTAPHONE."

As not every constructor is able to read dimensional drawings with ease, a few additional details of the 'phone switch for the Crystaphone are given below.

The drawing on page 1029 ("P.W." No. 454) shows the switch as seen sideways. One inch from the left-hand end of it you have

MISSING LINKS, No. 2.



Here is the second of our "Missing Link" diagrams, purposely left incomplete. You will see that the grid of the valve is not connected at all, and one side of the aerial coil, and one side of the aerial condenser, are "in the air."

CAN YOU COMPLETE THE DIAGRAM?

(Look out for the answer in next week's "P.W.")

a 5-in. wide wooden supporting pillar, on which is hinged a long crossbar. A home-made spring (turned up from odd wire) tends to hold this arm or crossbar level with the baseboard.

But on the right-hand end of that arm, half an inch from the end, is a long piece of twisted wire shaped into a hook and passing through a hole in the baseboard. When the 'phones are placed on that hook down comes the crossbar, until it reaches the "stop," which is fixed in the middle of the baseboard.

This stop is a little wooden block, carrying a strip of metal foil to make electrical contact with a flex wire. That wire, you will see, goes to the bottom end of the adjacent coil and to the terminal marked A₂.

Underneath the crossbar at the point where it touches the stop below, is a cheese-headed screw carrying another flex wire, this one going to the A₁ terminal and to the tap on the coil.

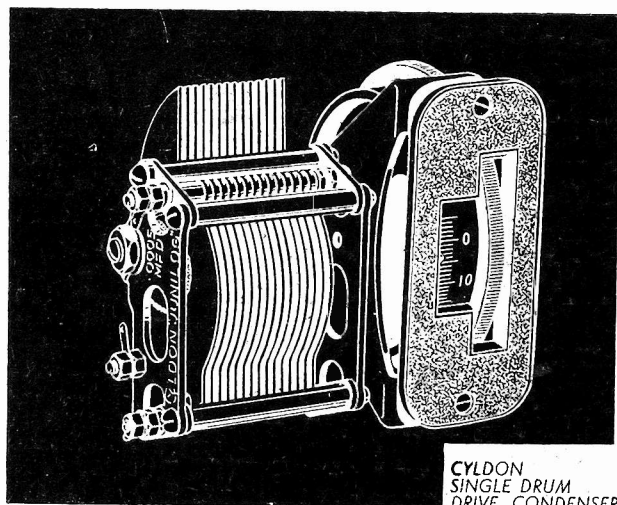
The only mechanical requirements are easy movement and robustness, and correct tension on the spring, which is easily arranged. Electrically the switch is equally simple, all that is necessary being good firm contact when the 'phones are hanging on the hook.

THE "CLEAR CUT" TWO.

"RAILWAY MAN" (Crewe).—"One of our chaps here has a Blue Spot unit to which he fitted a home-made cone which is a fair treat to listen to. The man he got it from made it from directions in your paper, but all we can find out about it is that it was called the 'Clear Cut,' and it is a kind of double cone, one pushed through the other. Can you tell me what number of POPULAR WIRELESS it was described in?"

The "P.W." "Clear Cut" Cone to which you refer was described in our December 27th, 1930, issue, No. 447.

(Continued on page 1114.)



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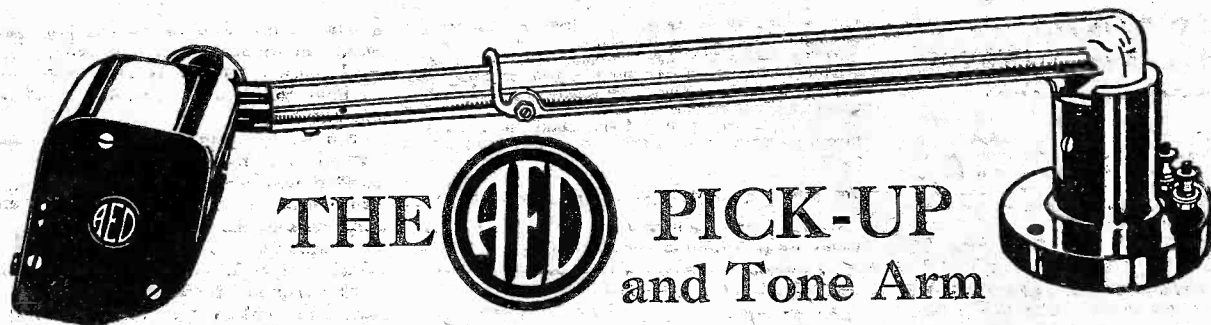
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1112.)

HOT STUFF!

"THERMO" (London, S.W.3).—"As my mains are alternating current I took the advice of a friendly dealer and fitted an A.C. power valve, and to me it was a surprise. The volume and quality are simply wonderful, but I am a little bit worried about the way it gets hot. The other two valves in the set are cool enough, but this last one gets very much hotter than my other power valve used to do. Probably it hands out quite double the power, but is it right for it to get so hot that I dare not touch it?"

It is quite in order for a power valve to get much hotter than any of the other valves, but it should certainly not get so hot that it is impossible to touch it while working. If you are getting about double the power you had from the last valve you probably should be getting about double the heat also, but just to make sure all is O.K. we should watch the valve carefully to see that there is no trace of blue glow whilst it is working, and make quite certain that it is getting the correct grid bias and H.T. voltages recommended by the makers. If at these voltages the anode current as measured by a milliammeter (your dealer friend would lend you one) is normal, you can be sure that the valve is working O.K., but if you have any doubts you should drop the makers a line rather than go on using a valve which did not behave normally.

VIOLENT OSCILLATION.

D. G. G. (Colchester, Essex).—"Results were far above my expectations and, in fact, were excellent except for one peculiarity. That is violent oscillation on any wave-length above 500 metres.

"It is impossible for me to use the top end of the scale because of this, which is all the more surprising when I tell you that the actual results are very smooth and sweet from just

below this point to the bottom of the scale. What do you think the trouble is?"

The circuit shown on your diagram is so straightforward that it is free from suspicion, and one of the components must be causing the trouble. We are inclined to suspect the H.F. choke. If the inductive value of this is rather low there may be an unwanted tuning or resonance effect which would be overcome by wiring in series another H.F. choke, or by using a choke of greater inductive value. Alternatively a large plug-in coil can be employed for medium waves if it could replace the present choke without spacing trouble arising.

THE PENTODE'S PLATE CURRENT.

D. F. Y. (Cheltenham).—"I reckon I can safely call on my H.T. supply to give quite ten milliamps to the power valve, but the pentode I propose to use takes a plate current normally of 12. I was thinking of biasing down a little and probably reducing H.T. a bit to make this change, but a friend has pointed out that I am not reckoning on the current taken by the pentode's extra screened grid. Will this be enough to matter?"

Probably it would make all the difference in your case, for you admit that you are prepared to supply only ten milliamps where twelve would be better for the plate current. It is not unusual for the screening grid to take three or more milliamps, as a milliammeter inserted in this part of the circuit will show, so we certainly should not attempt to run the pentode unless you are prepared to increase your H.T. supply.

HOW TO START.

T. L. (Ashton-on-Ribble).—"My latest venture is a detector-pentode, run straight off the electric light. With only its two valves

it is an absolute revelation of what can be done in distance and quality.

"It is streets ahead of any three-valve I have yet known, and, of course, very easy to handle. For foreign stations reaction has to be adjusted properly, but that is nothing to worry about.

"What does puzzle me is why it is so slow to start. At first when you switch on nothing happens. Silence.

"After about 30 second's time—generally just over a minute—the loud-speaker gives a 'click,' and then more silence. A little later I get very, very weak voices or music.

"Then this slowly gets louder and louder, till the strength is tip-top, after which the set works in fine fashion. Why is it so slow to start?"

"I ought to say it is always like this—always has been. But switching off is normal.

"As soon as I put the switch 'off,' the programme goes snap. Like an ordinary set, no dying away, but a direct cut-off. So why, the delay in starting?"

Both the unusually good results and the slow start when first switched on are quite normal when working with A.C. indirectly-heated valves. The special construction of these valves results in remarkably good characteristics of magnification, etc., owing to the fact that the "filament," or rather the cathode, has no heating current flowing through it, as in an ordinary valve.

The actual heating is done across an insulator, the heater being run direct from the mains through a suitable step-down transformer. The cathode is

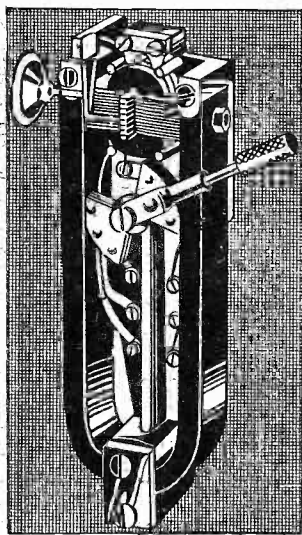
(Continued on page 1116.)

"P.W." PANELS, No. 7.—REACTION.

Reaction is usually varied by alterations in the capacity of a variable condenser.

It is to some extent dependent on the tuning, and should therefore be operated in conjunction with the tuning controls.

Usually, increasing the wave-length has the effect of decreasing the degree of reaction, and vice-versa. Other factors which noticeably affect reaction control are the H.T. on the valve in question, the value of its grid leak, and (in short-wave work) the aerial coupling.



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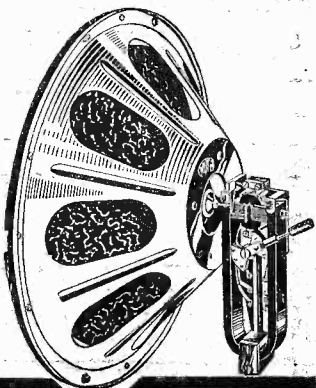
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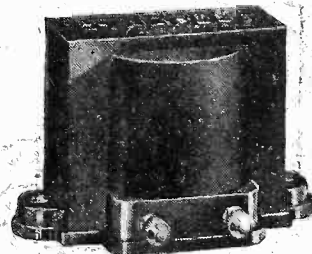
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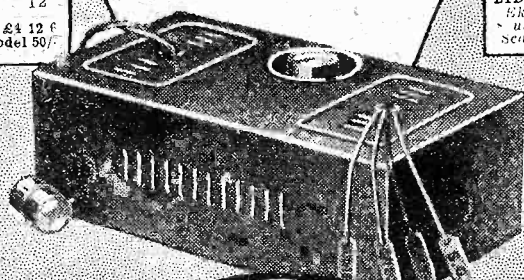
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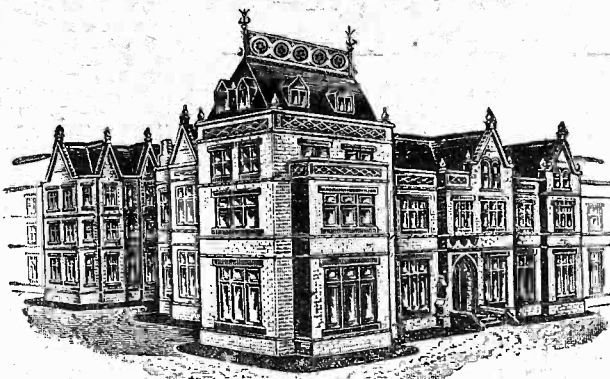
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SHEFFIELD
(Dept. 106)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1114.)

close enough to the heater to be activated by it, but it is completely separated electrically.

Because of the space between heater and cathode a certain time lag is always noticeable, whilst the cathode is "warming up." When cool no electrons are emitted from it, and it takes about two minutes to warm it thoroughly.

The "cluck" you hear from the loud speaker is probably the beginning of an appreciable plate current in the pentode's outfit circuit.

A SHORT-WAVE PHONE FILTER.

M. C. Y. (Wallington, Surrey).—"Being lured to it by W. L. S., I have had another go at short waves, and found more luck there this time than ever before. But there is one snag.

"Hand-capacity. If I put my phones on I can't go near the tuning without shifting it.

"Looking back in the old 'P.W.'s I came across the idea of tuning the earth lead with a variable, and that certainly helped a lot. But what I want, I think, is a phone filter—referred to, but not described by W. L. S.

"What parts are needed, and how do you fix them for this?"

All you need is two H.F. (short-wave) chokes, two .001 fixed condensers, and five terminals, as well as a little baseboard, etc., to mount them on.

If you like, you can make the chokes by winding for each 50 turns of fine insulated wire such as 30 D.S.C. on a two-inch diameter tube.

Fasten them to the baseboard, with the .001's conveniently close. Three terminals should be arranged at one end of the baseboard, and two at the other.

These two should be marked, "Phones + " and "Phones - " respectively, and each should be joined to an H.F. choke. The other end of that H.F. choke, which is joined to "Phones + " goes to one .001 and a terminal that should be marked "Input +." Similarly the "negative" choke should go to the other .001 and to an "Input - " terminal.

Now all that remains is to connect the third terminal (marked "E") to the remaining terminals on the two fixed condensers.

Thus "E" goes to the earth terminal on your set, and the others as marked, the result being a very efficient phone filter for short-wave reception.

VARYING THE VOLUME.

E. H. (Welwyn Garden City).—"The circuit is one screened-grid, detector, and low-frequency amplifier (transformer), and, as given originally, there was a 600-ohm resistance fitted between plate and screen of S.G. valve.

"Not having a 600-ohm fixed on hand, I put in a 1,000-ohm variable (good one, of the power class), and this I find gives me a wonderful smooth control of volume on all stations. Why?"

"Being placed, where it is, apparently putting more resistance in simply means cutting down the screen current a little. Why should that act as a volume control?"

We don't quite see your contention about the effect of increasing resistance. Certainly this does "reduce screen current a little," as you say, but so would a reduction in screen voltage. In fact, by increasing the external resistance as suggested, you are definitely dropping the voltage applied to the screen.

And that, of course, is one well-recognised way of adjusting volume with this class of valve. Its response is largely dependent upon the voltage at which the screen is placed, and altering this by means of alterations in the resistance placed between it and the supply is sure to have a direct effect on volume.

"POT" CONNECTIONS FOR A MOVING-COIL LOUD SPEAKER.

L. B. (London, S.E.18).—"Using a moving-coil loud speaker run from D.C. mains, does it matter which way round the 'field' winding is joined to the mains?"

Not in the slightest, generally speaking. But as some people claim one-way to be better than the other on their speakers it is worth while trying for yourself to see if one way gives better reproduction than the other.

HORIZONTAL VALVE HOLDERS FOR S.G.'S.

F. N. C. (St. Leonards, Sussex).—"The only kind of valve holder I can get for mounting the S.G. valve through the upright screen is one with five sockets, not the usual four. And

one of them (in the centre) is marked 'C'—the others being as usual.

"What am I going to do about that?"

These are five-pin valve holders, for use with either battery or mains valves. They are quite suitable for use as four-pins if you ignore the terminal marked "C." Simply treat it as though it were not there.

TECHNICAL TWISTERS

No. 49.—GRID-BIAS FOR DETECTORS.

CAN YOU FILL IN THE MISSING LETTERS?

The ordinary grid-leak-and-condenser type of detector works best with a slight grid bias.

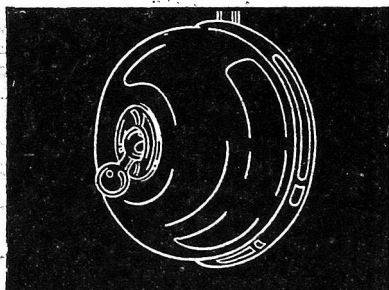
Usually a separate battery is unnecessary, the bias being obtained by connection to the leg of the filament.

Indirectly-heated valves have a instead of a filament, so with such valves it is sometimes the practice to supply the necessary bias separately.

The anode bend type of detector was worked with a grid bias, but this type of detector is now comparatively unpopular because it is not so as the leaky grid type.

Last week's missing words (in order) were: Transformer, Choke, Transformer, Auto-choke, Low-frequency, Detector.

YOU CAN SIMPLY SWITCH ON!



Wherever electric current is available, batteries are out-of-date. Running your set from the mains means less trouble, less uncertainty, with better reception and greater economy. Where mains provide alternating current, it must be converted to direct current by means of a rectifier. Our Rectifier is different from all others. It is all-metal and contains nothing to burn or wear out. It converts—in conjunction with other components—existing battery-run sets to mains sets; it is ideal for use in constructors' kits, and it is incorporated in most good makes of mains receivers. If you are purchasing, make sure that it is in yours. We cannot give details here, but full information is given in our forty-page booklet, "The All Metal Way, 1931," which will be sent to you on receipt of the coupon (please enclose 3d. for your copy).



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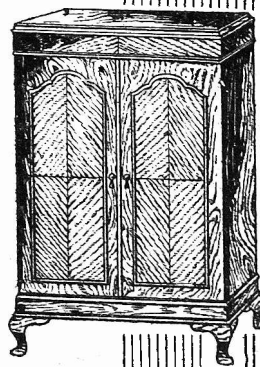
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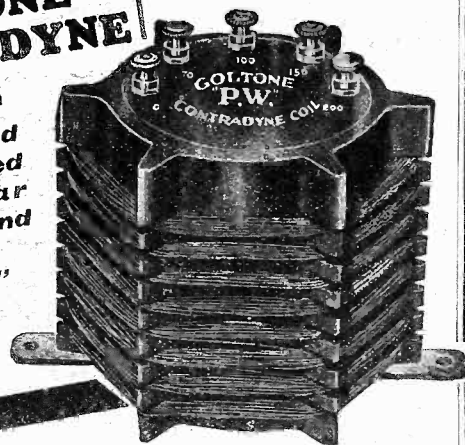
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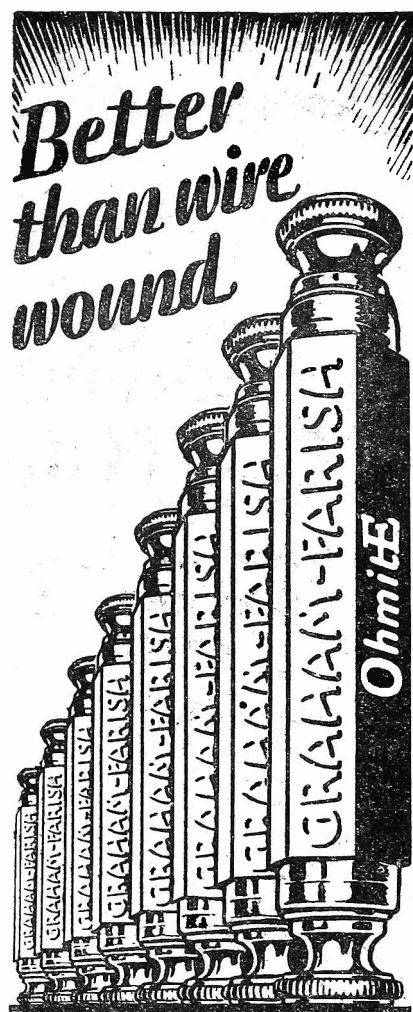
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PRESENT THOUGHTS AND FUTURE POSSIBILITIES.

(Continued from page 1085.)

If new methods could be found whereby more channels were available, television could well take place; to my mind, its prospects of immediate success are very small to-day, and on the basis of modern technique.

So I say at the end as I did at the beginning, that nothing will be allowed to stand still. The way of progress is through technical development. Technical development is barred by the inadequacy of the number of available wave-lengths. This one great fundamental problem stares us in the face.

How it will be solved is not for me at this moment to say, but it is my prophecy that the physical conductor will play a larger part in the dissemination of alternative programmes in the future than does the ether to-day. The physical conductor conserves its energy practically within its material boundaries and does not therefore interfere with the conduction of other physical conductors far away.

FOR THE LISTENER.

(Continued from page 1088.)

the broadcasting game; may they long continue!

Old Dishes, New Sauces.

A good cook can make an old dish very welcome by a new sauce. We get a good many old dishes in the programmes at one time or another; it is inevitable.

The ingredients, for example, which went to make up "Bumpkin Pie" have frequently occurred in other dishes; but Ernest Longstaff provided a new setting and a new sauce. It was a bright little affair.

There was a very clever duet between a Cock and a Hen, with a Black Leghorn in the offing, which I found extremely amusing.

Discretion.

Mr. Harold Nicolson was inclined to defend the sculptor of the statue of Earl Haig on Horseback against his critics. He did it very discreetly, not to say gingerly.

I find this brilliant talker much more amusing when he is not quite so discreet, not so determined to hold the balance even. He has an irony, sometimes a malice, even an apparent rudeness, which are very salty.

I trust that he has not become afraid of the next morning's postbag! It is odd, by the way, that we talk about handling a theme gingerly when we mean the opposite of "with ginger!"

The Talks on Persia.

The talks on Persia have not quite kept up to the standard which Miss Sackville-West set for them; but Mr. J. B. S. Wilkinson, on "Persian Legend and Story" came pretty near to it!

He sounded shy and slightly nervous. I liked him for that. Every listener loves a modest man.

I enjoyed immensely the stories he chose to tell us from Persian literature; they were simple and "of the soil," with a strange, rare flavour in them.

Ann the Artist.

Ann Penn gets my vote for the best vaudeville broadcast in recent programmes.

She impersonates celebrities of her own world. They are not only recognisable—which is more than you can say of some—but she puts her own original stamp on them, being herself an artist to the fingertips.

A B.B.C. Chaplain?

Parsons do not get much of a look in in this column of mine. Perhaps I reverence them too much; or perhaps I am frightened of them. But many listeners will be glad to hear that the Rev. Patrick McCormick is to conduct a series of broadcast services.

Which reminds me of something which has long been vaguely on my mind—the wish that the B.B.C. had a chaplain of its own. In religious matters I am not one of those who wishes to hear a new voice and a new point of view every week. I also fight shy of the popular parson; and I have observed that many of those who have not made a name for themselves in the Churches are the most effective in a broadcast service.

I should like one man, chosen for the job, all the time. I think he ought to be a layman. I also think that he should be, and should remain, unknown.

Unemployment.

The experts have had their say on this problem, and now the politicians (of each party) are handling it.

The expert states the problem, and makes some tentative suggestions as to how it might be tackled; the politician says how his party will immediately tackle it if the electors will only entrust them with the government of the country.

We trust the expert, who never gets further than the paper he is writing on, we suspect the politician (especially if we be of another party) who tries to "get a move on."

A Lovely Singer.

I mean Elena Gerhardt. I have praised her before. I will not cease to praise her. She sings old songs—Wolf, Schubert, Brahms—but she makes them new.

Somehow or other these lovely songs achieve a resurrection in her singing of them; as a tree puts forth new leaves in the spring. It is partly her voice; partly her technique; but I think it is chiefly herself.

She is not one of the great geniuses who sweep you off your feet; but one of the quieter ones who come into your room and open windows for you.

Dickens.

Sir Arthur Quiller-Couch spoke with authority. He made much of what may be called the reforming influence of the writings of Dickens.

The great gift, however, of this immortal writer was not that he reformed the existing world, but created and peopled another one into which we can withdraw for good company. I know Mrs. Gamp better than I knew my grandmother; and Pickwick better than I know my neighbour.

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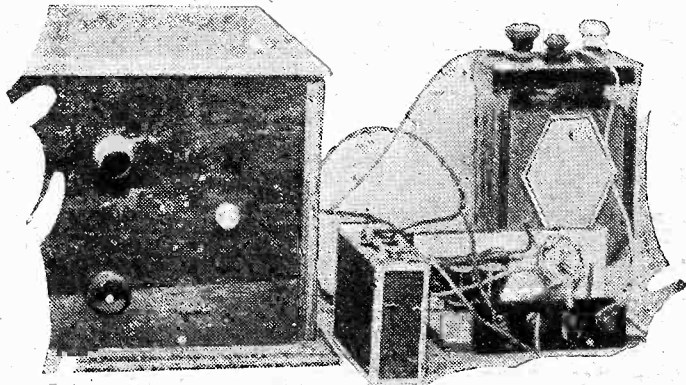
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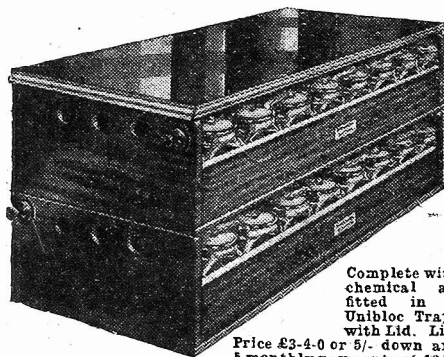
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TECHNICAL NOTES

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

I HAVE many times referred to the vital importance of a correct value of grid bias if the best quality of reproduction is to be obtained from the set. Also, as you know, any grid bias, whether of the correct value or not, has an influence upon the amount of anode current which flows through the valves.

It is, for this reason, an advantage to increase the grid bias as much as possible, but if it is increased beyond the proper amount then the reproduction will begin to suffer. From the point of view of saving H.T. current and taking care of the valves, therefore, it is desirable to have as high a value of grid bias as possible, since this has the direct effect of cutting down the anode current. From the point of view of quality of reproduction, however, you want to have the grid bias of just the correct amount, neither more nor less.

Ruining a Valve.

Now the importance of this is still further emphasised by a letter which I have had from a reader who has had the misfortune to ruin a super-power valve, owing to mistakes in connection with the grid bias.

For one thing, he has been accustomed to adjust grid bias values whilst a high value of H.T. was "on" the anodes of the valves in his set and, for another thing, he found that owing to a disconnection there was for a long period no grid bias applied to this super-power valve at all.

If you adjust the values of the grid bias whilst the H.T. is "on," it means that for short periods, while shifting from one grid bias connection to another on the G.B. battery, the valve is left "up in the air," without any grid bias at all. The moment the grid bias is withdrawn the anode current shoots up in value exactly as it would if the H.T. voltage were increased.

Inasmuch as a comparatively small variation in the grid bias voltage makes a large difference to the anode current, it is obvious that disconnecting the grid bias altogether is equivalent to an enormous increase in the H.T. voltage.

Now just think what the effect upon the valve would be if you left the grid bias alone but, say, doubled the anode voltage. It goes without saying that the valve would very quickly become overheated and in all probability, if the filament itself was not actually destroyed, the electronic emission might be reduced out of all recognition.

Super-Power Peculiarities.

What I have said above is important with all types of valves, but it is most particularly important with power and super-power valves where a high value both of H.T. voltage and of grid bias voltage is used, and where a heavy anode current is normally flowing.

You should take particular care, therefore, if you value your valves, always to switch off the H.T. voltage before attempting to tinker about with the grid bias.

(Continued on next page.)

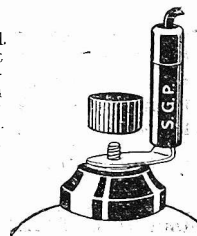
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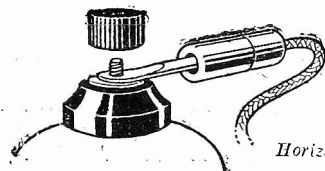
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Price - 3d.

Vertical Type.



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The only valveholder giving perfect contact with SOLID or any type of valve pin, is being regularly specified by designers everywhere.

Type B for baseboard mounting.

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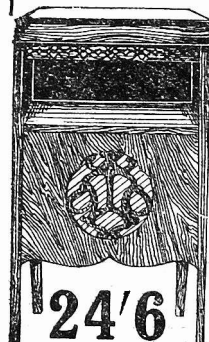
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TECHNICAL NOTES.

(Continued from previous page.)

connections, and also to make absolutely certain that the grid bias voltage is really being applied to the grids of the valves, and that there is no possibility of a disconnection.

Altogether apart from quality of reproduction you have to bear in mind the load thrown upon your H.T. battery (or whatever the source of H.T. may be), the H.T. current consumption and, above all, the life and safety of the valves themselves.

Powerful Amplifiers.

Most experimenters realise full well the importance of using a correct value of grid bias, but it is surprising how common is this practice of fiddling about with the connections on the grid bias battery whilst an H.T. voltage of anything from 150 to 200 volts is on the anodes—or, in fact, with a powerful amplifier a voltage of even twice this amount.

With an H.T. voltage of 300 to 400 volts and a grid bias voltage of perhaps 100 to 150 volts you must exercise far more than ordinary care, and the conditions are very different from those where you have perhaps 80 or 90 volts on an ordinary L.F. valve and are working on a grid bias range of from 3 to 6 volts.



SCREENING

by means of sheets of metal, copper foil, etc., is often necessary in powerful sets to prevent unwanted interaction between the circuits.

It is particularly important on the high-frequency side, in view of the high magnification there and the ease with which H.F. impulses "stray" to adjacent circuits.

A Coil Hint.

When using a coil with special connections such as the "X" type of coil, whilst you obtain certain definite advantages over the ordinary plug-in type, at the same time there is a possibility of error,

and I have more than once had letters from readers in which they tell me of trouble due to coils being connected the wrong way round, this trouble only having been discovered after every other possible cause had been "gone over."

When using an "X" coil to get better selectivity you may find that it does not come up to expectations and it is quite possible in such a case that it is because the coil is wrongly connected. Usually the pin of the coil holder for an "X" coil will be connected to "earth," whilst the terminal corresponding to the socket of the holder goes to "grid."

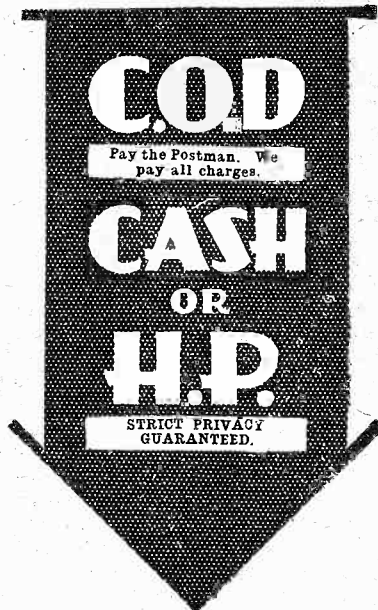
Connections.

If the results you obtain are not satisfactory it may be that you have got the wiring to the coil holder the wrong way round or, if this is correct, it is not impossible that the connections of the coil itself are reversed. In any case, without interfering with the coil, it is quite a simple matter to try reversing the connections to the holder in order to see which arrangement gives the best results.

Loud-Speaker Units.

In a somewhat similar way it is often worth while trying reversing the connections to the loud speaker, more particularly when this is of the permanent-magnet

(Continued on next page.)



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PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks

TECHNICAL NOTES

(Continued from previous page.)

type. All experienced radio experimenters are fully aware of this, but newcomers to wireless sometimes do not appreciate that many loud speaker units are polarised devices and that they work much better when the current passes through in one direction than when it flows in the opposite direction.

It is unnecessary to investigate the polarity of the loud speaker unit at all; all you have to do is to try the connections to it one way round and then reverse them, and see which gives the better results.

Due To Steady Current.

I am assuming that some steady current is flowing through the loud-speaker windings, as it will be when the loud speaker is connected directly into the output or anode circuit of the receiver. If an output filter circuit or transformer arrangement is used as between the output of the set and the loud speaker, then the steady current is kept out of the loud-speaker windings; only the fluctuating signal current being allowed to get through. In this case it makes little or no difference which way the connections to the loud speaker are made.

But where a fairly large steady current is passing through the loud speaker, clearly, in most cases, it will be better if this current is in the direction to reinforce or assist the permanent magnetism of the unit rather than in the direction in which its electro-magnetic effect will be in opposition to the permanent magnetism of the unit.

For Quick Comparisons.

In passing, I may mention that sometimes the difference in the operation of the loud speaker, one way round and the other way round, is not very pronounced. This makes it difficult to judge which arrangement is the better, owing to the time taken in disconnecting the leads and reconnecting the opposite way.

Usually, by the time you have done this, the particular musical passages in the programme have changed to something of a different character; and altogether it is, as I say, not at all easy to make the comparison.

In actually making the test, it is a good plan to introduce a reversing switch into the leads to the loud speaker so that the connections can be reversed instantly. In this way you can get a change-over whilst on a particular type of reproduction.

Radio-Gram Points.

When using a radio-gram outfit, or a pick-up with the L.F. amplifier of the receiver, you cannot fail to notice how very liable the pick-up and leads are to interference of various kinds—capacity effects, humming and so on.

This is because the pick-up is itself connected into the most sensitive part of one of the valve circuits—that is, into the grid circuit, and frequently the pick-up itself is actually "live."

(Continued on next page.)

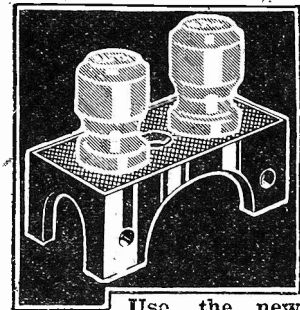
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THE PICTURE PAPER WITH THE MOST NEWS
—SUNDAY GRAPHIC—

TECHNICAL NOTES

(Continued from previous page.)

You will notice the instability and hum effects more particularly when a mains unit is employed for supplying H.T. voltage in connection with the outfit.

Short Leads.

As you know, it is very desirable to keep the leads between the pick-up and the set as short as possible. With a combined radio-gram outfit this is fairly easy; but with a separate gramophone, operating in conjunction with a low-frequency amplifier, often it is inconvenient to have the two adjacent, and a fair length of pick-up leads becomes inevitable. In these cases there is often a great tendency to howling and low-frequency instability generally.

It is very important to earth the metal casing or the metal frame of the pick-up, and in bad cases it is necessary to resort to the use of shielded leads; these may take the form of lead-covered electric-light flex, the lead covering being, of course, connected to earth.

Leads and Capacity.

This again brings with it its own peculiar disadvantage, however, because the lead-covered cable acts like a condenser and you get a capacity to earth, the effect of which is to by-pass the higher frequencies from the pick-up. It goes without saying also that the tone-arm, and any other metal parts in the vicinity, should preferably be connected to earth, otherwise they may acquire unknown and variable potentials and may react upon the pick-up circuit and cause trouble.

I should particularly mention that, when you are using a D.C. mains unit for either H.T. or L.T., it is desirable to connect to earth through a fair-sized fixed condenser.

Unsuspected Troubles.

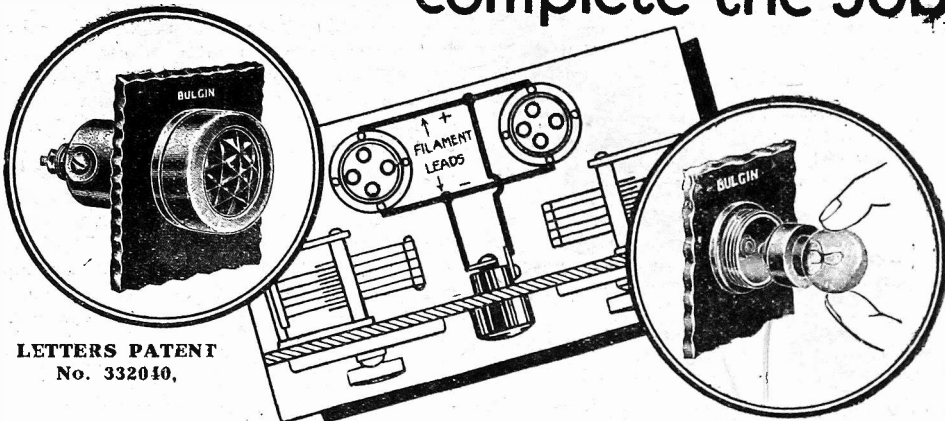
I have had one or two further instances reported to me lately of trouble arising owing to materials being used in the construction of a receiver which were supposed to be insulators but which were, in fact, partial conductors.

A peculiar instance, somewhat of this character, was mentioned in "P.W.," a few weeks back, when a reader found that placing his set on a table covered with a particular kind of American cloth, caused low-frequency oscillation troubles, whereas the set behaved itself perfectly when placed in other positions in the room.

In the case in question certain investigations were made with the cloth and it was found that it had quite an appreciable conductivity. It was thus producing a

(Continued on next page.)

Two Simple Connections complete the Job



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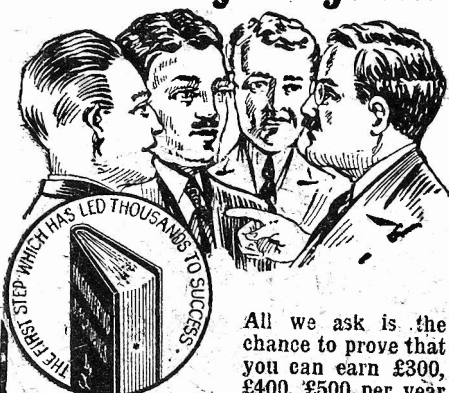
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High-Grade SET & SPEAKER CABINET

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THE ACME OF CRAFTSMANSHIP.

£8.8.0, carriage paid.

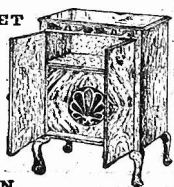
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TECHNICAL NOTES

(Continued from previous page.)

capacity-reaction effect and was upsetting the receiver.

Examine the Cabinet.

The wooden baseboard of a receiver or, in fact, any wooden parts adjacent to the set, may act in a similar way if they are coated with a paint or varnish which is slightly conductive. Some classes of paint have a remarkably good electrical conductivity and are very far indeed from being insulators, whilst some kinds of varnish are hygroscopic—that is, have the property of attracting water vapour and becoming damp, so that they also may in that way act as partial conductors.

SHORT-WAVE NOTES

(Continued from page 1094.)

Full details of reception of any of these transmissions should be sent to "International Short-Wave Radio League, Jamaica Plain, Boston, Mass., U.S.A."

Those readers who have asked for particulars of the Short-Wave Radio League might take note of this address also.

I make no apology for returning to the theory of the "eleven-year cycle," particularly as Q S T has given it a kind of "official sanction" in its Editorial this month. Further, Q S T gives the European amateurs credit for anticipating trouble on the ultra-short waves, and preparing for it by opening up the longer bands again.

This Editorial predicts a definite falling-off in conditions on the 20 and 40-metre bands until the summer of 1934! This same time should be a "peak" year for long-distance work on the two longer bands, 80 and 160 metres.

Wonderful "Peak" Year.

There is no denying that the facts all point to this. 1923, eleven years back from our coming "peak" year, was a wonderful year for U.S.A. stations even on 200 metres. Unfortunately, short waves hadn't been discovered then, so we can't tell whether it was a poor year for them.

The middle of the eleven year cycle from then, however, turns out to be the summer of 1928, which is remembered by all who were "on the air" at that time as being a marvellous season for short-waves D X, particularly on 20 metres, and interesting even on 10 metres.

Ever since then short-wave conditions have been going off, and in the recent R.S.G.B. 10-metre tests not a distant signal was heard by anyone.

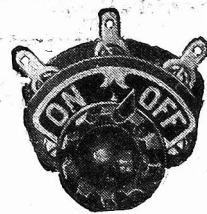
And if all this were not convincing enough, we have the additional fact that conditions on the longer waves (from 80 up to 500 metres) have been absolutely marvellous this last season, and are still improving.

Until anything to shake my faith arrives, I am afraid I shall remain an "eleven-year cycle" fan.

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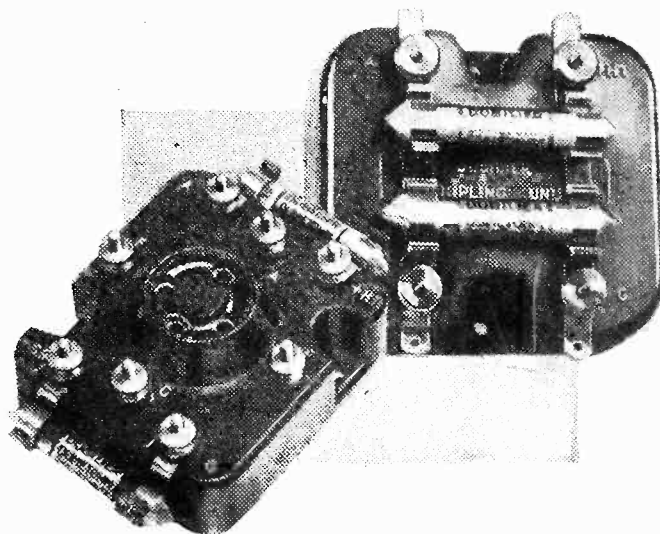
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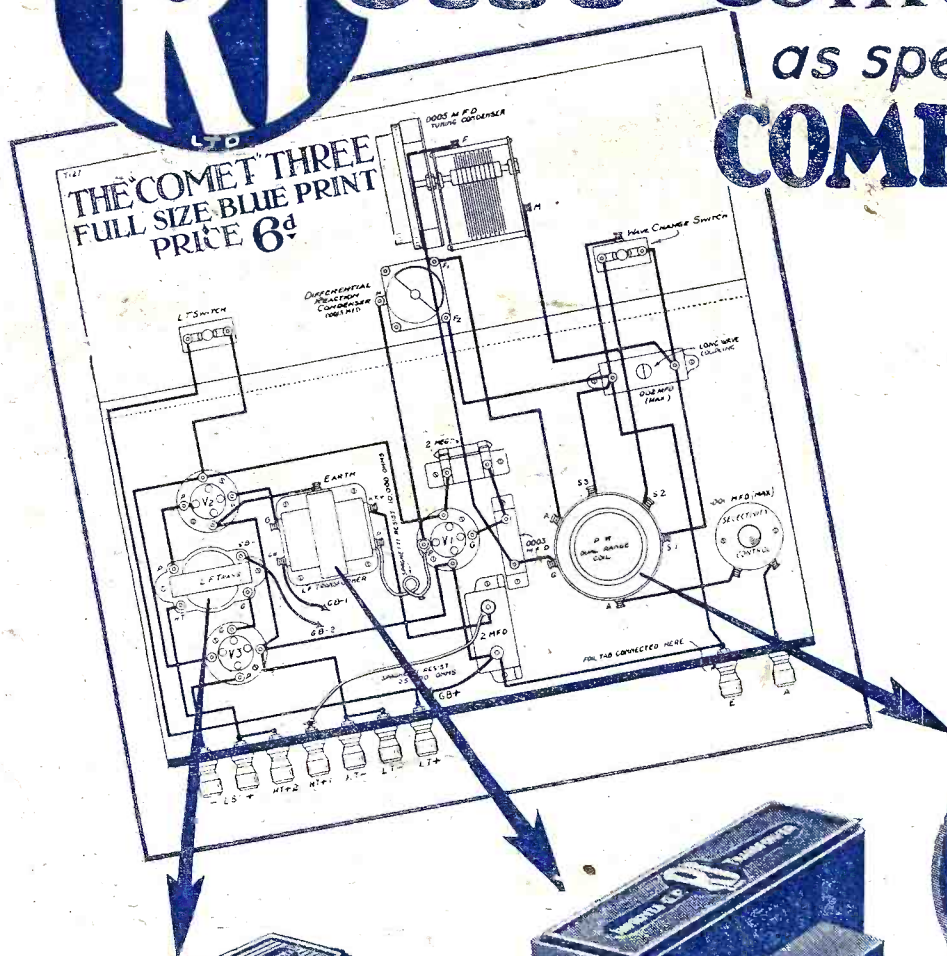
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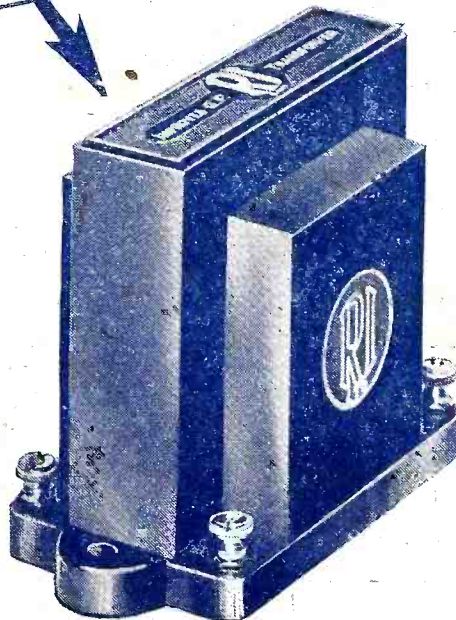
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For best results in the "Comet" 3.
Gives the generous tone of deep bass and brilliant treble to reproduction. A marvel for its weight and size. Indispensable for efficiency in compact set assembly.

Primary inductance, OVER 50 HENRIES.
Ratio, 3½-1 Weight 7 oz.
Walnut-finished bakelite case.
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For best results in the "Comet" 3.
An improved model of the famous original G.P. Transformer, and the lowest priced transformer in existence with such a high primary inductance.

Ratio 3½ to 1 Primary inductance 35-40 henries. Weight 18 oz.; in beautiful green bakelite case. Price **10/6**



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