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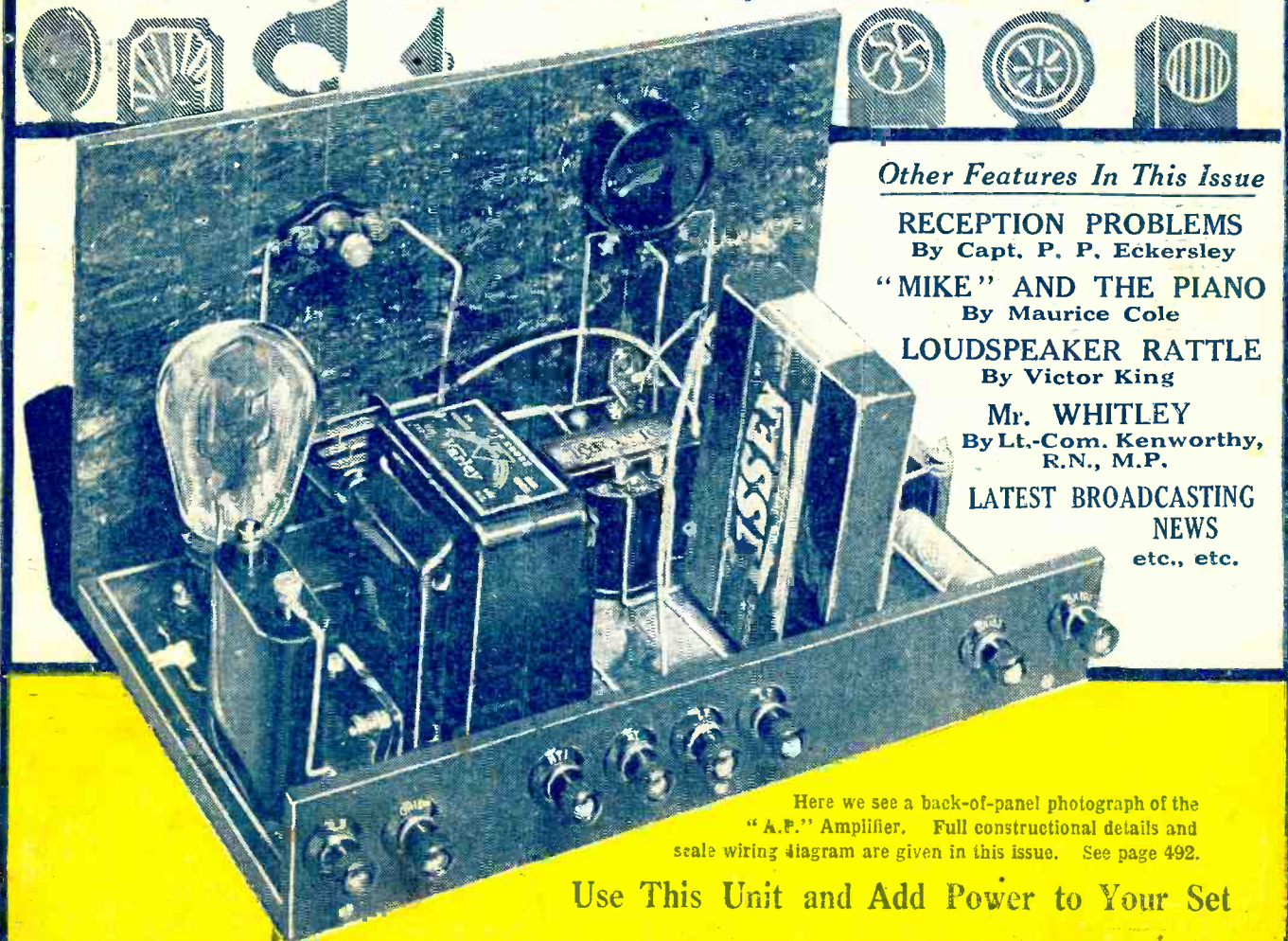
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INCORPORATING "WIRELESS"

July 12th, 1930.

Build the "A.P." AMPLIFIER



Other Features In This Issue

RECEPTION PROBLEMS
By Capt. P. P. Eckersley

"MIKE" AND THE PIANO
By Maurice Cole

LOUDSPEAKER RATTLE
By Victor King

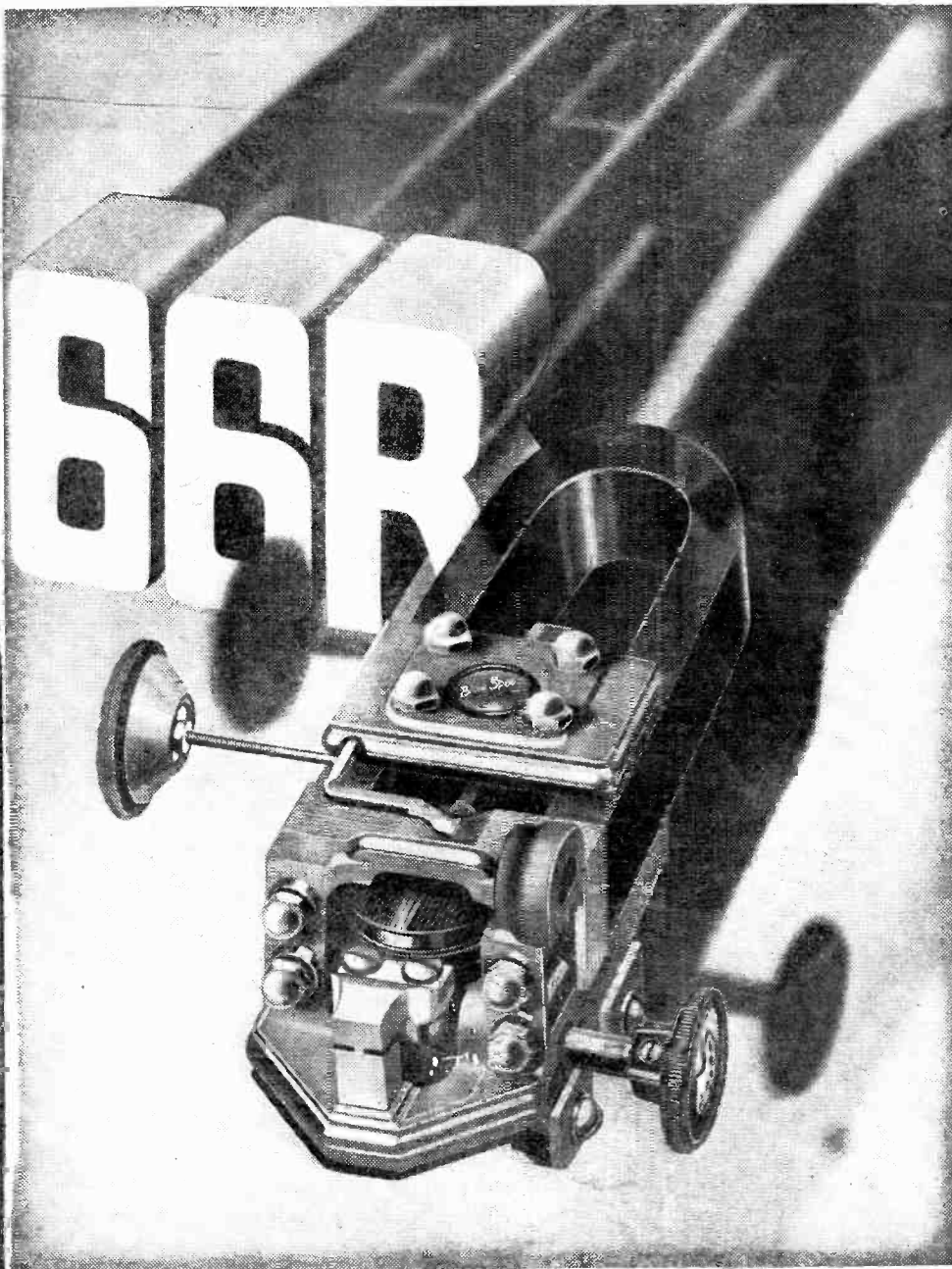
Mr. WHITLEY
By Lt.-Com. Kenworthy,
R.N., M.P.

LATEST BROADCASTING
NEWS
etc., etc.

Here we see a back-of-panel photograph of the "A.P." Amplifier. Full constructional details and scale wiring diagram are given in this issue. See page 492.

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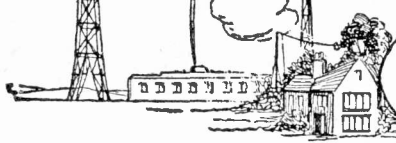
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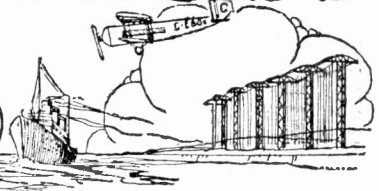
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Popular Wireless



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**THE WORM TURNS
 I TOLD YOU SO!
 THE SLEEPER WAKES
 GRAMMY NOTES**

RADIO NOTES & NEWS

**A HELPING HAND
 WIRELESS WISDOM
 FOREST MURMURS
 MORE MORSE-IANA**

The Worm Turns.

AT last the French radio manufacturers have turned to rend their Government because of the chaotic condition of the wireless industry and the broadcasting arrangements of the country. And I am not surprised. Their definition of the Government's methods as dilatory is moderate and restrained. It is now sought to introduce a certain amount of State control over the stations—just eight years behind "perfidious Albion"!

"I Told You So."

REMEMBERING that in these notes, some considerable time before the present trouble in India began, I plainly urged the desirability of making more use of broadcasting there, not only for propaganda purposes, but also for advising isolated or distant English groups of—well, never mind what!—it is amusing to me to observe that in Volume 2 of the "Simon Report on India," the greater employment of broadcasting is recommended, by Lord Burnham, I believe. The Government of India has in this connection undoubtedly lacked either foresight or enterprise by neglecting such a valuable ally.

"Experts" and Ladies.

VERY pleased to hear from W.L.E. (Caudry, France) again. He tells two little yarns which, being (as he guaranteed) true are more palatable than fiction. A local "expert" fixed a customer's aerial to a telegraph pole and when tackled about the humming which interfered with reception, replied, "Oh, perhaps the aerial is not yet accustomed to its position!" That is typical French humour. Next, our friend says that his wife, indulging in friendly competition with another lady about the performance of their respective sets, asked, "And have you listened to Bruxelles Number Two yet? I think their modulation is very good!" Friend, not to be beaten, answered, "Oh, yes! We heard that the first time it was played!"

The Sleeper Wakes.

THERE is a distinct sign of wakefulness apparent amongst a number of Governments who have in certain radio matters dozed for many years. Italy is now rousing up to the fact that a large proportion of its listeners, is unlicensed. In order to find out what's what, a census is to be instituted and all householders, etc., will have to declare and describe the sets which they possess. What will happen to Italian "pirates" in future one hardly dare

THREE BEARS BROADCAST.



These bruns of the Bronx Zoo, New York, seem to be enjoying the novelty of participating in a radio broadcast, and the kiddy audience also seems to be very interested in the proceedings.

think, judging from some of the penalties devised in Eastern Europe. Boiling oil is interesting, I believe!

Note on My Grammy.

ABSTINENCE from music for ten days during my plunge into Glos., caused me to overwork the gramophone on my return. I have lighted upon a needle which is two-pointed and fits into a tiny tube which screws into the usual place on the sound-box. This fellow is said to be good for 200 playings, but although that sounds

comfortable, I find that as a rule by the time we get to about the fiftieth I become "windy" over the state of my records, for the scratch sounds very loud. Nevertheless, these needles do bring out details which fibres miss, and the whole reproduction is most crisp and sweet. Quite a find!

"Off With His Head!"

I HAVE seen it reported that in Bulgaria a Decree has been passed under which any person who is found guilty of using a receiving set without a licence may be imprisoned, with "solitary confinement," for a term not exceeding a year, and fined any amount up to 5,000 liva. Why this savagery? I often thank Heaven for the distinction made in the more civilised countries between civil and criminal offences, for the tolerance and humanity of our laws, and for the great gift of a "sense of proportion" enjoyed as a general rule by those who administer them. Solitary confinement! Phew! Positively medieval!

The Helping Hand.

AN excellent example of the good which may come in unanticipated measure from helping even the humblest is provided by the story of Miss Eileen Joyce, whose piano-playing was broadcast not long ago. Until she was nine years old, this lady lived in a tent in the Australian bush. Then a priest, to whom he honour, secured her an education. Later, the great pianist Backhaus was attracted by her playing, and had her sent to Leipzig. And here she is! Backhaus and the unnamed priest have indeed laid up treasure which will be bright when the light is dim for them.

The Biggest Yet.

IN conjunction with Mr. J. D. Rockefeller, Jun., the Radio Corporation of America and its subsidiaries have undertaken the building of what has been termed a "radio metropolis" in New York at a cost of 9 million pounds sterling. Three blocks are to be demolished and in their place will

(Continued on next page).

RADIO NOTES AND NEWS.

(Continued from previous page.)

arise a low oval building; the ground floor will be shops, the first floor a bank and the roof will support a restaurant. Behind this building will be a 500 feet wide plaza, containing fountains, statues etc., at the far end of which will be a 60 storey building comprising 27 broadcasting studios, four theatres equipped with broadcasting gear, and goodness knows what else besides. Tons of money!

Correspondent Wanted.

JOHN MUIRHEAD, 103, Roslea Drive, Dennistoun, Glasgow, E.1, would like to correspond with a wireless enthusiast in Germany. John is 14 years old and still at school. He says that the correspondent may write in English or German as he pleases. Good for you, John! Here is your opportunity to serve the cause of international amity.

The Queen's Hall Concerts.

DO not forget that the Queen's Hall Promenade concerts are planned to begin for this year's season on Saturday, August 9th, and will continue nightly for eight weeks, the last concert taking place on Saturday, October 4th. Sir Henry Wood will conduct, and a number of the concerts will be broadcast. If you are a music lover and have not yet attended a "Prom" you have a joy yet to come.

Days of my youth and late-Victorian London, when Queen's was an enchanted hall in which I could stand for hours without fatigue, and when Sir Henry was not a Sir, but a god who directed a sublime harmony—I do not weep for you, but you are very good to recall!

Wisdom Over the Wireless.

WITHOUT a blush but with gratitude to the Australian "Wireless Weekly," I reproduce the following gem from a Woman's Talk given in April from 2 B L: "There are two sides to a question, and the other side may be equally right with yours, and yours entirely wrong." Yes, that seems familiar stuff! And doesn't its beauty grow, the more you ponder on it! Bless their little hearts!

Personal Note.

I REGRET to record the death, which occurred on June 14th, of Mr. Jack Cave, one of the little group of men chosen by Marconi to assist him in his early work. Mr. Cave was selected in 1897 to join the inventor's personal research staff, because of his skill as an instrument maker and, in particular, in glass-working, an art which was necessary to the production of "coherers". Later on, when the coherers went into obsolescence, Mr. Cave became foreman of the machine shop in the Marconi Works, and when he died he was holding the post of Chief Rate Fixer at the Works.

Wonders Will Never Cease.

THE incredible has happened! For the first time since 1492, when Columbus went blundering into the West, a tax on radio receivers is to be levied upon citizens of the U.S.A. And South Carolina is the apostate! Verily, a tax of 50 cents per annum is to be laid on sets valued at

50 dollars, with proportionate increases according to value. Say two shillings a year! What a tragedy! I wonder what the Governor of North Carolina will say to the Governor of South Carolina now.

Indian Affairs.

THE new Indian Central Broadcasting Committee has now been set up. It consists of the member of the Government of India for Industries and Labour, who is its Chairman; two officials from his Department; two non-official Indian members of the Legislative Assembly, from Bombay and Calcutta respectively; and two non-official English members from the same two cities. It seems to be a sound layout, and the Chairman is known to be popular with Indians and Anglo-Indians alike. May they do useful work for the country and its people.

The Latest Sort of Job.

I CANNOT but admire the ingenuity of the young lady of Wandsworth who is reported to earn her living by providing music publishers with daily statistics of the

SHORT WAVES.

Salesman: Our stock of wireless receivers and loud speakers is a most comprehensive one. Can I show you anything just now?

Customer: No, thank you.

Salesman: Is there nothing at all I can interest you in?

Customer: Yes—complete and utter silence!

DANGERS IN DEFERRED DEBTS.

"This is the Blah Radio Company, broadcasting from F O B. We are speaking for the agent in your town: 'Unless all back payments are made on sets bought, your name will be announced from this station on Saturday night.'"

Before Saturday a bank had failed, five men had committed suicide, and several attempts had been made to dynamite station F O B.—"Radio News."

"Whispers are around of a revolutionary wireless discovery that will make possible a crystal set that will be portable and even work around speaker without valves," we read in the "Empire News."

As long as they do only "whisper," that's O.K. with us.

"A lead ceases to be a lead if it doesn't lead the current it should lead to the place you want it lead (pronounced 'led')." And it cannot be called an efficient lead if it leads the current to the wrong place," a contemporary informs us.

Well, it sounds logical enough anyway.

IN THE TRAIN.

Wireless Fiend (with portable set): Now, what station would you like?

Victim: The one you get out at.

"Punch."

broadcasts of songs etc., so that the relative popularity of the "numbers" may be estimated. Surely this matter is proof that even in these hard times grit and the will to work can still bring a living from the world. Doubtless, radio in one branch or another, has room for many more workers with the knack of using their brains!

Forest Murmurs.

NEWs from Vienna is to the effect that a professor of its University has devised an apparatus which is capable of measuring a movement as small as a ten-millionth part of a millimetre. Needless to say, it is electrical. By its means the movements of a growing plant were registered in the form of sounds which

were broadcast by radio. I must take the views of our jobbing gardener on this. He is certain to drag the conversation round and scold me again about my lupins, though!

More Morse-iana.

CONTINUING my notes about the invention and the inventor of the Morse code, it is worth while to record that in March last Mrs. Leila Morse Rummel, Morse's daughter, arrived in New York from her home in Paris, for the purpose of presenting to the Phillips Andover Academy the self-portrait of her father. A point of peculiar interest in connection with this is that until she made this trip Mrs. Rummel had never heard a radio receiver in action. It appears that the lady resides in a very quiet part of Paris and none of her friends there happened to have a radio set. It is understood that she is going back to alter all that.

The First Melba Broadcast.

JUNE 15th, the tenth anniversary of what was virtually the birth of popular broadcasting here, brought back some delightful memories of Melba's first broadcast. I was one of a privileged few who assembled in company with Lady Northcliffe in the "Daily Mail" office and shared a pair of telephones in order to hear the golden voice which was going out from the Marconi Company's experimental station at Chelmsford. Seven valves were used, and no loud speaker! But that was ten years ago.

Offer to Transmitters.

MR. N. M. BRAY, St. Kew Highway, near Wadebridge, Cornwall, having heard G 2 X O (London) and E 15 D (location unknown), states that he would be pleased to give them reports from time to time on the reception of their signals. If they would like this to be done will they please send their addresses to Mr. Bray.

Announcers' Voices.

ROTARIAN A. S. Court is reported to have told the York Rotary Club, "If there is one thing that fills me with terror it is the voice of the average broadcasting announcer. It is anæmic, drained of all vitality. It seems to come from a man with an empty inside, whose veins are filled with mineral waters." I agree that the hearty good humour and natural sympathy of the voices of Arthur Burrows, Rex Palmer, etc., has been replaced by a trained, forced, Robotlike politeness—with certain exceptions—but I warn Rotarian Court not to go to Harrogate!

"Keep Your Eye on the Ball."

AND talking about drinking, let me record with joy that a gentleman who signs himself "Royal Stuart" writes to a Scottish newspaper, asking why there are no wireless sets installed in Glasgow public houses. There are the ingredients of several vaudeville or "Radio Revels" types of joke in this, but I will not anticipate the rich and spontaneous humour of the professional rib-tickers. The scientific explanation of the phenomenon which caused "Royal Stuart" to use some ink is that deeply ingrained in every Scot is the conviction that in order to succeed one should concentrate on the business in hand. No true Caledonian mixes his liquor with anything save Burns or the pipes!

ARIEL.

MR. WHITLEY

by Lt. Commander the Hon. J.M. Kenworthy R.N., M.P.

A highly interesting account of the career and activities of the B.B.C.'s New Chairman, by one who has known him personally for many years, and who was a parliamentary colleague of his for a long time.

IT would be difficult to exaggerate the importance of the position of Chairman of the B.B.C. The great medium of wireless broadcasting already plays a great part in the intellectual, educational, and artistic life of the people. And it will become of even greater importance in the future.

The direction of B.B.C. policy is no sinecure. It is impossible to please all the people all the time. Yet the public who, by paying for the licences find the "sinews of war" for the year's programmes and the whole cost of the service, has the right to get what it wants.

Religion and Politics.

In the case of a newspaper, for example, it is soon possible to know whether the public is satisfied or not with the contents and "make-up" by the sales returns. A theatre or cinematograph hall proprietor can tell from week to week by his box office receipts whether the public is getting what it wants.

But though plenty of people write to the B.B.C. if they are dissatisfied, and a few when they are satisfied, there is no way of knowing whether they are representative of the listening public as a whole. There is, again, the very thorny question of what controversial matters shall be allowed; how far religion and politics should enter into the "Talks."

In connection with politics there is the vexed question of how much freedom should be allowed to the Government of the day in using the ether, and what use of broadcasting should be allowed to the other parties not in office.

No doubt it was this latter question that had much to do with the choice of the Rt. Hon. John Whitley to be the new Chairman on the Earl of Clarendon proceeding to an appointment in the Dominions.

His Early Political Days.

For Mr. Whitley was not only, in his day, a great House of Commons man, but one of the most successful Speakers who has ever presided over that most difficult and exacting assembly. I have known Mr. Whitley personally for many years, and for long before I entered active politics. And for ten years I was a colleague of his in Parliament. During the first of those years, from 1918-21, he was the Deputy-Speaker, and presided over the House of Commons in Committee when the all-important financial business was being discussed. From 1921-28 he filled the high office of Speaker.

"Harry" Whitley, as he was affectionately known to us, first entered the House of Commons in 1900 as Liberal M.P. for Halifax. He retained that seat for twenty-eight years. In his early political

days his party was in opposition, and a small opposition at that.

Most Oppositions, especially if they are in a big minority, seek to defend their position by obstruction. By holding up Government business they are able to bargain on policy.

If they can hold up the Cabinet's programme the Government must, in its turn, buy them off with judicious concessions. As an obstructionist Harry Whitley was highly successful, and played the Parliamentary game, which, it must be remembered, has its serious uses, with the best of them. He was the hero of many an all-night sitting. Never rattled, he could talk on any subject for any length of time, and was the despair of the Government Whips.

On one occasion an exasperated supporter of the Government so far forgot himself

THE NEW CHAIRMAN.



Mr. Whitley, who succeeds Lord Clarendon, was one of the most successful Speakers who has ever presided over the House of Commons.

as to shout across the floor of the House to Whitley, "Shut up, you smooth-bore." This nickname, the exact meaning of which is, of course, an old-fashioned cannon, though quite inappropriate, stuck to Whitley until he himself became a Whip and a Government supporter, and was automatically muzzled.

An Impartial Outlook.

On the Liberal party coming into office in 1907 he became a Whip in his turn. And, after four years as a poacher turned game-

keeper, he went into the Chair as Deputy Chairman of Ways and Means, and then as Chairman and Deputy-Speaker, as I have described.

Altogether he was in the Chair for eighteen years. He there acquired, as only that training can make possible, the judicial and impartial outlook, the faculty of seeing all sides of a question and every point of view that will be so valuable to him in the great office that he has now been called upon to fill.

Valuable War Work.

During the War period, Mr. Whitley was made much use of by the War Governments as British representative on various Inter-Allied Commissions, as, for example, the one for rationing-out the available shipping for commercial purposes between the Allies in the war. This was a very delicate and difficult task.

He proved himself an astute bargainer with the French and Italian representatives. This part of his work was extraordinarily valuable, but the general public knows little of it. And all the time he carried on the exacting duties of Chairman of Committee in Parliament.

As Speaker he upheld the office with great dignity, mixed with the necessary touches of dry humour, and enjoyed an enviable reputation for absolute fairness and impartiality.

His first years of office as Speaker were particularly onerous: for in 1922 the Labour Party came back to Parliament after that election not only in considerable numbers (for the first time in its history), but in a very aggressive spirit.

We had had a period of comparative calm since the days of the Irish Nationalist Party in its prime; but then came a group of wild spirits, some of whom have since sobered down in the political sense, while others remain rather violent and obstreperous.

Saving An Awkward Situation.

It takes all manner of men to make a parliament. The situation might have been awkward. But Whitley handled it with superb tact and won the respect of those who, then and now, were, and are, never tired of proclaiming their contempt for the parliamentary machine and our somewhat variable and, indeed, antiquated procedure. And I myself can testify as to how irritating that procedure can be to those who are in a hurry to get things done.

One of the most tactful things I heard him say was on the occasion when he quelled what might have been a serious disturbance, when a certain gentleman on the other side of the House addressed Ellen Wilkinson as "Miss Perky."

In those days we weren't as used to the
(Continued on next page.)

MR. WHITLEY.

(Continued from previous page.)

presence of lady members as we are now, and there was a great deal of resentment at this ungallant conduct. In fact, the taunt was taken quite seriously.

Whitley saved an awkward situation by reminding the member who had made this remark to Miss Wilkinson that it was his duty to address the Speaker in the Chair. The idea of addressing the sedate Speaker, in his wig and gown, as "Miss Perky" was too much for the House of Commons, members dissolved into roars of laughter, and the incident closed.

Mr. Speaker Whitley, for all his stern appearance, had a great sense of humour, and often used it with great effect. On one occasion, when Russia was being debated in the House, a subject which still arouses a good deal of passion and hot temper, the late Sir Alan Burgoyne was hammering away at the Labour opposition, getting more worked up every minute, and quite forgot to address the Chair, talking only to the Opposition, whom he addressed as "You . . ."

Sir Henry Slessor rose on a point of order, and asked Mr. Speaker if Sir Alan Burgoyne was in order in calling the Speaker all these names?

Restoring Good Humour.

Very mildly Mr. Speaker Whitley replied that he was beginning to wonder what he had done to be accused of all these crimes. This gentle reminder to Sir Alan that he must address the Chair, made the House laugh, good humour was restored, subsequent debaters taking care not to fall into the same error as Sir Alan Burgoyne.

When I was in opposition, I was anxious to bring up the question of the presence of our soldiers on the Rhine so long after the conclusion of the war, but the only oppor-

tunity I could find was on the vote for the Army estimates.

Yet whether we should keep an army of occupation on German territory or not was a matter of high policy, and out of order on the Army vote, when only administration could be discussed.

Always Perfectly Fair.

I tried to get round it by drawing attention to the fact that the British Tommies were marrying German girls through propinquity in their billets. Holding the Army estimates in his hand, Mr. Whitley rose in



Lt.-Commander the Hon. J. M. Kenworthy, R.N., M.P., the author of this article, knows Mr. Whitley intimately.

his chair and asked me, "If these ladies were carried on the vote?"

But, for once, I got the better of him.

"Oh, yes," I replied, "there is a vote for

married allowances, and some of these German ladies become automatically British subjects and receive these allowances."

Whitley capitulated and allowed me to make my points.

I confess myself that I was a thorn in his side on many occasions in those days; but he was always good-humoured, right in his judgments, and perfectly fair.

Seven years in the office of Speaker, certainly the most exacting post in Parliament, is enough for any man. And Harry Whitley retired in 1928.

Characteristically, he asked leave to refuse a peerage, the usual mark of the Royal honour bestowed on a retiring Speaker. But he did not retire to rusticate. Indeed, he accepted the important duty of Chairman of the Special Commission on Indian labour conditions, second only in importance to the Royal Commission, or Simon Commission, as it is generally known.

A Successful Business Man.

I was in India when this committee was in the midst of its labours. Everywhere I heard the highest praise of Whitley's work. He had to preside over a mixed body of Europeans and Indians, employers, Trade Union leaders, and politicians. And he managed the team with adroitness and efficiency. Their report is now being printed and will be a State document of the highest importance.

Before entering Parliament Mr. Whitley had achieved success as a business man in managing the important factories founded by his family a hundred years ago in Yorkshire.

The above is a brief account of the career and activities of one of our elder statesmen who has been a business man and politician of the highest distinction.

He comes to the B.B.C. with wide experience, ripe judgment, and a knowledge of the world and of men that promises much success in the difficult post of Chairman of the British Broadcasting Corporation.

THE attendances at the recent Northern Promenade Concerts were better than was anticipated. They were approximately:

20,000 during the fortnight's season at Manchester; 11,000 during the week at Liverpool; and 10,000 during the week at Leeds.

"Considering the time of the year," said Sir Hamilton Harty, the conductor, to Press representatives after the final concert, "the response has been amazingly good. One of the most gratifying features was the youth of many of the audiences, the majority of them being young people between the ages of 16 and 25.

"I firmly believe that people hearing good music on the wireless or on gramophones are more and more anxious to come and hear the real thing at the orchestral concerts."

Successful Hallé Concerts.

The B.B.C. and the Hallé Society, who jointly organised these concerts, never expected them to pay. They did not. Nevertheless, the experiment is considered to have been a success, partly because the organisers are not judging results merely on financial grounds, and partly because the "programme value" of the concerts from

NOTES FROM THE NORTH.

From OUR SPECIAL CORRESPONDENT.

the B.B.C.'s point of view has to be taken into account.

Mr. E. G. D. Liveing, the North Regional Director, tells me that while the "Proms" were being broadcast there was naturally a saving of funds that would otherwise have been required for studio programmes.

Remembering this, and the general public interest aroused, Mr. Liveing says that the experiment was justified.

It seems probable that in these concerts we have the foundation for what may be a very important artistic innovation in this country. Alone the Hallé Orchestra could not have held the Northern Promenade Concerts. B.B.C. money made them possible, and B.B.C. programmes profited in return.

Thus, the familiar cry for a State subsidy for classical music is answered in rather an unexpected way. There has been a similar

call for a State subsidy for the drama. Will it also be met in the same way?

During the period of the concerts the programmes radiated from North of England stations were rather over-weighted with symphony music. If the "Proms" are held again next year it will be possible to avoid this, as by then the North Regional station at Moorside Edge will be in action, and Northern listeners will have alternative programmes. At present there are no alternatives in the North, and during the "Prom" season it was symphony or nothing on many evenings.

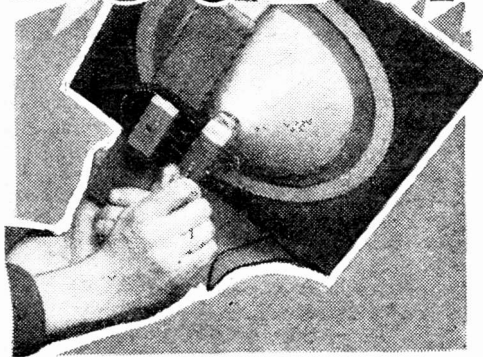
Truly Regional Programme.

I am reassured that the Regional programme to be radiated from Moorside Edge will be much more truly regional than the London Regional programme. In this programme there is little "local interest." In fact, paradoxically, London's so-called regional programme often comes from Birmingham!

But in the North the B.B.C. will have a wider scope for local interest. Outside broadcasts promise to play a big part in the North Regional programme. Already the North Region is probably doing more "O.B." work within its own borders than any other provincial region.

LOUDSPEAKER "RATTLE"

by VICTOR KING



Don't try to remove a fault by "brute force" methods—there are nearly always better schemes.

terribly hopeless as to be more tragic than humorous.

Had the whole article appeared in "P.W." labelled "this week's joke," you would all have laughed heartily, and then the matter would have ended.

As it was, the cause of radio suffered another very nasty jolt.

But to revert to loud-speaker rattle. It is obvious that the "expert" who wrote the above answer knows very little about radio. I am not one who likes to criticise brother scribes and I would never rush into print merely to vent an "expression of opinion."

Loudspeaker Buzzing.

The reason why I have dragged this particular business into the limelight is so that I can do my little bit towards suppressing a common fallacy, and this fallacy is perfectly illustrated by the question and answer.

It is, in part, that the majority of buzzings and rattlings that one encounters in radio originate in a loud speaker and, in

effect has a fixed condenser joined across "the L.S. terminals."?

(There shouldn't necessarily be one there at all, so the "adequate capacity" bit is all "bunk." Generally speaking, it is quite wrong to connect a fixed condenser across the loud speaker.)

Effect of Condenser.

Well, the only real effect is that it would cause a falling-off in the high notes.

Now you can see how such a scheme can cure loud speaker "rattle"—that is, if the "rattle" is a high-pitched one.

The "rattle" is cured because the loud speaker is rendered very inefficient over the band of frequencies where the "rattle" occurs.

That, you might say, is quite legitimate. But you would retract when it was explained that a parallel fixed condenser doesn't just nip off one or two notes, but causes a wastage over an extended range.

And the greater the capacity the worse the drop!

Now enough high notes are inevitably lost at other points without a further massacre being possible without very serious results.

The fixed condenser doesn't exactly "smooth" it just kills those high notes.

Effect on Tone.

You see, the higher the frequency the less a condenser's resistance to L.F. current. The condenser joined across the L.S. offers an alternative path to the energy that should all go to the loud-speaker and the path becomes an easier one and diverts more and more of the energy the higher up the scale of notes you go.

The effect of chipping off high notes is to drop the tone of the loud speaker. You get smoothness and mellowness—but at what a price!

Don't think always in terms of bass and mellowness—remember the high notes, they contribute much more to the character of broadcasts and really are worth cultivating.

Don't take any notice of the parallel condenser mellowness fake, look to your set and valves, and, of course, loud speaker, and treat this last as an electrical device—not as a musical instrument.

QUESTION.—"What causes loud-speaker rattle?"

Answer.—"One cause is the absence of a reservoir condenser of adequate capacity across the L.S. terminals."

Would you believe it? Not, I mean, the veracity of the reply, but the fact that the above appeared in a daily paper in this very year of grace.

But it did. Ten years ago, perhaps even only seven or eight years ago, it would have been excusable, for such periods were the dark ages of this young science of radio.

To-day, however, abysmal ignorance of that kind is quite inexcusable. And yet we come up against quite a lot of it.

Seldom such a bad case as that, although in a minor way there is an incredible amount of bad radio advice being proffered to the radio public.

Becoming An Expert.

Poor old wireless hasn't yet achieved proper recognition as a science. And the lay press doesn't seem to understand that before you can be "expert" at radio you have got to get a grip on the fundamentals of electricity, and that means training and experience.

The theory of wireless is not a mere matter of a handful of facts anyone can learn by heart in half an hour; take a qualified electrical engineer and let him study radio for a further two or three years and he may begin to get a real grasp of the subject.

Then let him have a few years of practical radio engineering experience and, if he has applied himself diligently to his work and has aptitude, he might turn out to be quite an "expert."

Or he might, on the other hand, acquire the standard of only the second-rate engineer.

More Tragic Than Humorous.

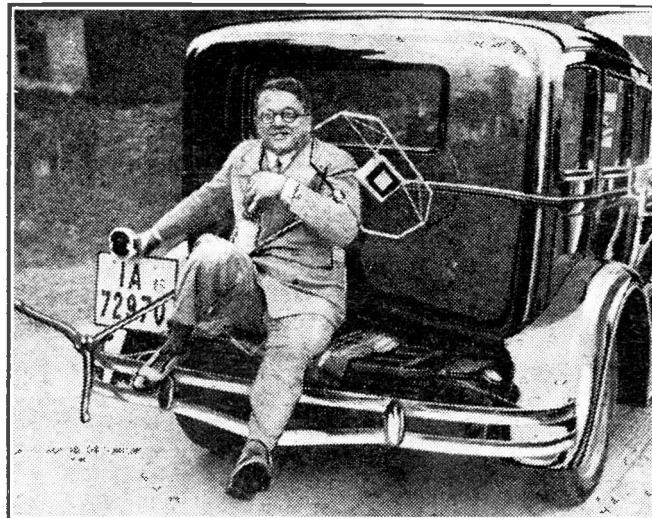
I wonder how the B.B.C. would get on if it chose its engineers in the happy-go-lucky way some newspapers seem to pick up their experts.

Seemingly anyone who can use a few nice words such as "heterodyne" and "component" qualifies!

One of our national dailies once gave constructional details of a selectivity device the purpose of which was stated to be to stop 5 G B from interfering with 5 X X!

That in itself was sufficiently ridiculous for one day's venture into radio, in all conscience, but the device itself was so

ABSENT-MINDED ?



Herr Franz Baumann, the famous German radio singer, takes the microphone home with him after giving a broadcast recital.

part, that a fixed condenser is "a smotherer of irregularities."

Let us handle these points in order. A "mechanical" scraping or rattling or buzzing in the loud speaker can be caused through all sorts of things in a set. Valve overloading is a frequent source of such trouble.

Of course, loud speakers themselves do develop their own rattle, but my point is that often there is something else at fault.

Now, wherever the trouble lies, what

LATEST BROADCASTING NEWS.

NORTH REGIONAL CONCERTS

AN AVIATION BROADCAST—
FROM WALES—NOTABLE RUNNING COMMENTARY—CHOICE PROGRAMME MOMENTS.

IT is seldom that a week's programmes are so truly representative of the whole of the Northern Region as those arranged for the period beginning on Sunday, July 20th. In addition to the relay of organ music from Manchester Cathedral as part of the evening programme that night there is also a church service from Manchester; and concerts from Harrogate, Scarborough, Morecambe, Whitby and Buxton in the same week, as well as one or two talks from Leeds.

The programme builders at Manchester are apparently endeavouring to get into their stride with really representative Regional programmes in good time so as to avoid being "caught napping" when they become responsible for feeding one of the two transmitters now being erected at Slaithwaite, near Huddersfield. Work on these transmitters has been going on since last autumn, and will probably be finished in about six months.

An Aviation Broadcast.

Mr. Ashley Hall, who is a pilot officer in the Royal Air Force Special Reserve, a director of the Bristol and Wessex Aeroplane Club, and a member of the racing committee of the Royal Aero Club, is to give a talk to West Regional listeners on Saturday, July 19th, on the International European Air Race which is to start from Berlin on Sunday, July 20th.

This race, which is second in importance only to that for the Schneider Trophy, is over a course of thousands of miles, covering Belgium, Holland, France, England, Spain, Italy, Austria, and Poland, and this year has attracted a record number of entries.

Among the six British pilots to compete are Captain H. S. Broad, who secured second place in last year's race, and Mr. A. S. Butler, who formerly lived at Bristol and who will fly one of the new Puss Moths. Competitors are due to arrive at the Bristol Airport on Monday, July 21st.

From Wales.

Llanelli has been chosen, for the third occasion, as the venue of this year's Royal Eisteddfod of Wales, the other dates being 1895 and 1903. One of the features of the event will be the Arts and Crafts Exhibition which is to take place in the Coles Hill Central School adjoining the Eisteddfod grounds, where a wonderful collection of old masters, as well as works by living masters, collected from all over the world, will be on view.

There will also be a section devoted to competitors' works, of which there are over 10,000 entries from Great Britain, the Continent, Egypt, India, America, and even the Argentine. A talk on this exhibition will be given for West Regional listeners by Mr. E. Willis Jones on Thursday, July 17th.

Notable Running Commentary.

By arrangement with the Dublin broadcasting authorities, Ulster listeners will be able to hear running commentaries on the second Irish Grand Prix Motor Race which this year is to take place in Phoenix Park on Friday and Saturday, July 18th and 19th. Actually there are two distinct races of 300 miles each—one on Friday and the other on Saturday, the time for starting being fixed for 2.15 p.m. on each day.

Friday's race is for small cars, with engines not exceeding 1,500 c.c., while on Saturday the battle of the giants takes place between big cars, driven by such famous motorists as Wolf Barnato, Glen Kidston, Malcolm Campbell, S. C. H. Davis, Earl Howe, and Carraciola, the German crack driver who won the race which last year took place on the Ards Circuit.

The prizes, in addition to the Phoenix Trophy, which is the Irish Grand Prix award for the car putting up the best performance during the two days, include two gold and eleven silver cups. The com-

mentator will be Mr. F. M. Summerfield who will describe the progress of the race on both days from the start until 3 p.m., and also the final part from 6.30 to 7 p.m., when the winner will be known. This should provide some thrilling broadcasts.

Choice Programme Moments.

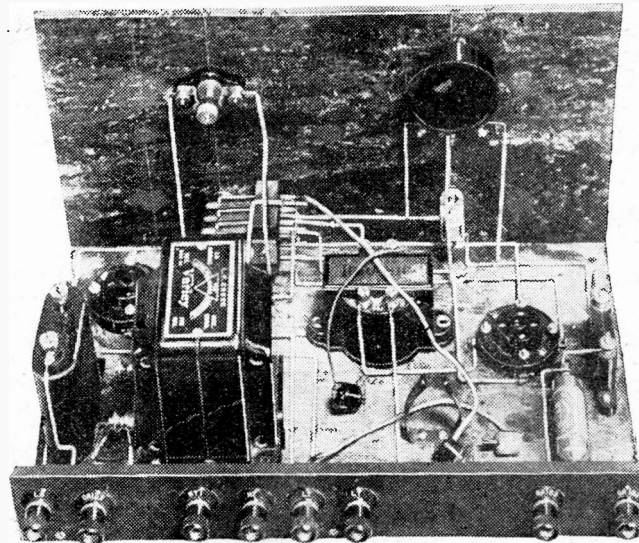
Paul Robeson, the famous negro singer who has made several appearances in the broadcast programmes during the last few months, will appear in the name-part of the "Emperor Jones"—his original role on the stage—if the discussions, which are now taking place, for the broadcast of the work in the autumn can be satisfactorily settled. Further details of this will appear as they come to hand.

Lupino Lane is taking part in a vaudeville programme for National listeners on Saturday evening, July 19th, in a bill which also includes Flotsam and Jetsam, Nora Blaney, Stuart Robertson, Tommy Handley, and the Two Pairs—Claude Hulbert and Enid Trevor, Paul England and Pat Pater-

son. This will be Mr. Lane's fourth appearance before the microphone since his return from Hollywood; the first being a surprise broadcast, the second an extract from the "Love Parade" talking film, and the third the recent excerpt from "Silver Wings."

Bruno Frank's German play, "Twelve Thousand," is to be produced in the London studio by Cecil Lewis for the evening programme on Friday, July 25th. The theme of the play deals with the time when the States of Germany were ruled by autocratic princes who sold their subjects as conscripts to foreign powers.

A POWERFUL AMPLIFIER.



Another view of the "A.P." Amplifier, a powerful unit that is fully described in other pages in this week's issue of "P.W."

FOR THE LISTENER.

A Specially Contributed Criticism of Current Broadcasting Events
By "PHILEMON."

Who will long be remembered for those wise and witty broadcasts
entitled "From My Window."

A Great Day.

FOR once in a way, Saturday was a great day. I seem to be falling into rhyme! Hooray! End of said poem, as Stainless might put it. We had the Britannic leaving Liverpool on her maiden voyage, Wimbledon, Hendon, the Test Match, the third chapter of "Behind the Screen," and—Albert Whelan. It was like a glut of strawberries. Just the sort of programme for a Portable in a Punt.

The Britannic.

I liked this O.B. very much, especially because I know the Landing Stage at Liverpool very well. It was very brisk and business-like. The peep into the Purser's Office and the chat with Captain

Summers on the Bridge were excellent examples of how to do it.

The fellow who occupied the microphone on the landing stage, when the ship was getting on the move, tried his best to create the atmosphere of "parting," and suggested streaming eyes and quivering lips. Somehow, I don't think! Not in these days. But with the help of the sirens he gave us a good idea of the scene. The good ship Britannic had a great send off, and a voice wished her a "good trip and soldier's weather."

There is something very impressive about 27,000 tons of steel moving under her own steam down the tideway and out to sea.

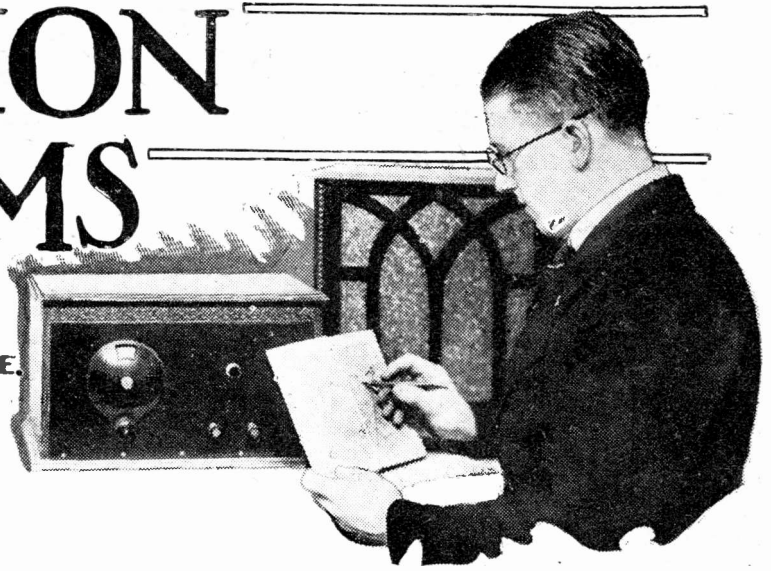
(Continued on page 500).

RECEPTION PROBLEMS

by

Capt P.P. ECKERSLEY M.I.E.E.

Our Radio Consultant - in - Chief continues his fascinating survey of the problems of achieving better quality in Radio reception.



IN two previous articles I indicated the probable main requirements that had to be fulfilled if progress is to be made towards better quality of reproduction.

I held that possibly we have been too long held by the tradition of the dead studio, and that music rooms should fulfil the needs of music, and that there was too much finicky purism in the attitude towards acoustics in general.

I indicated that probably the reproduction of transients in their pristine form was as important as the equal reproduction of actual frequencies between defined limits.

Where Receivers Fail.

I hinted that there was little or no use refining the receiver which in its best form does full justice to the transmission, before transmission itself reforms in the matter of transient reproduction.

Thus while the transformer is theoretically inferior to properly designed resistance-capacity connection, I indicated that it would be useless to scrap transformers before reformation in transmission overtook us.

But assuming perfection in transmission, wherein does the receiver fail? Firstly, and this applies to the present as much as to the future, linearity of valve response over the portion of the characteristic used in practice would seem to be the first desirable requisite in any and every receiver.

I have heard people forgive high-frequency valves a non-linearity. I cannot feel in agreement with such a view. Any non-linearity must introduce second power terms and produce new frequencies not present in the original disturbance.

Distorting Detectors.

The same with detection. The same with low-frequency amplification. Designers would be repaid in a study of the dynamic characteristics of all valves. Grid current must be foresworn unless the circuit is loaded by a resistance small compared to the effective resistance of the grid filament circuit.

In the new type of transmitter used by the B.B.C. it was necessary for efficiency to use the fullest possible sweep of the characteristic curve of the output high-frequency valves, and both the positive and negative regions of grid potential had to be swept through.

Thus distortionless high-frequency magnification legislated for a constant resistance between the grid and filament of the high frequency valve, which resistance was less than the effective grid filament resistance of the output high-frequency stage.

There is, however, no necessity for such an arrangement in receivers as long as the grid excursions on the high-frequency stages are limited to the negative region of the grid volts anode current characteristics.

The problem is made easier as the anode voltage is increased (within reasonable limits), and it surprises me to find in certain designs a shyness in this respect; the criticism is more particularly directed where mains are available and the battery problem not paramount.

As to detection, some admirable work has lately been undertaken by the B.B.C.

It is clear from the experimental and theoretical explanations that straight-line detection is possible using grid leak rectification. True, for some years past, Mr.

But Mr. Greenwood shows that grid leak rectification can be both practical, efficient, and linear, provided the detector stage is treated as a partial power stage, and provided the value of the grid resistance is not made too high.

Bottom-bend rectification is, in light of modern requirements, clearly out of the running, most particularly because with the new type of transmitters the depth of transmitted modulation is much greater than of old.

"Bottom Bend."

The very term "bottom bend" quarrels with the idea of linearity, but, of course, in older days, and with a limited modulation depth, the excursions of grid voltage are largely confined to the straight parts of the characteristic.

Mr. Greenwood shows that there are certain inherent advantages in using push-pull connection, for grid-leak detection if the very best is required. It is hardly worth time and space to discuss the question of linearity vis à vis the low-frequency side of a receiver, the methods of achieving linearity being so well known.

However, Mr. Rupert Carpenter, who has done so much and received so little recognition for what he has done towards better quality reproduction, has devised an ingenious method of low-frequency amplification which has the basic advantage of push-pull linear amplification.

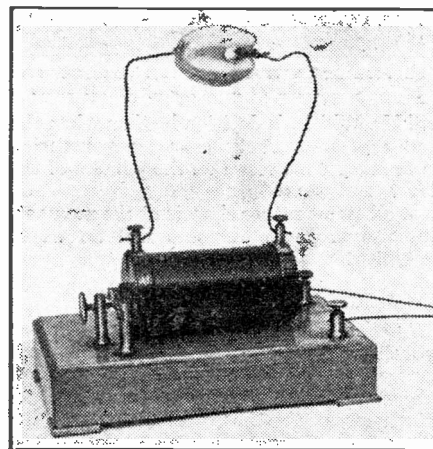
The "perfect" reproducer would, in my opinion, do well to rely upon the work of Greenwood and Carpenter and push-pull to the output stage. However, it would seem redundant to push-pull the high-frequency side.

Push-Pull Expensive.

Of course, the supreme disadvantage of the push-pull method is the cost of valves.

The output stage is a bothering matter; if whole capacity is used we are defeating transient transmission; if transformer connection the same trouble arises, and if we stick the loudspeaker slap in the anode, impedance may not match and the whole speaker is alive. The former disadvantages are killed in push-pull connection, the last-mentioned can, after all, be guarded against, since a lamp or a vacuum cleaner is, after all, equally alive too, and is a common domestic appliance.

TESTING AN INSULATOR.



A small induction coil can be used to provide a fairly good indication of the efficiency of an insulator.

Kirke's circuit (I have never known if he can claim this circuit, but it is commonly called the Kirkeifier!), where positive grid bias is essential fulfils the need of linear rectification, but the circuit has certain practical disadvantages, as wasting the battery power, and a lack of sensitivity compared with the grid leak method.

ANOTHER B.B.C. DILEMMA.

How far the B.B.C. should permit political broadcasts and keep abreast of current controversies is a question that is causing a good deal of hard thinking at Savoy Hill, and this article summarises a piquant situation.

By THE EDITOR.

AT the moment of going to press a peculiar situation has been created in view of the fact that Lord Beaverbrook's proposed broadcast talk will be of a political nature.

When Lord Beaverbrook applied to the B.B.C. to be allowed to broadcast a talk on Empire Free Trade (which "Popular Wireless" reported exclusively some time ago and, in fact, long before Mr. Whitley took over the chairmanship of the B.B.C.) the matter was postponed from time to time for certain reasons. It is obvious that if Lord Beaverbrook is to be allowed to broadcast a political talk on Free Trade, his opponents must also be allowed to broadcast. This is but in keeping with the B.B.C.'s policy of fair play.

Although it is understood that Mr. Lloyd George will broadcast a reply to Lord Beaverbrook, the question of the claims of other political leaders still presents a difficult problem. If Mr. Whitley allows Lord Beaverbrook and Mr. Lloyd George to broadcast, it is obvious he cannot refuse to allow the Prime Minister to make a reply if he wishes to. And how can he refuse Mr. Baldwin? After all, Mr. Baldwin is very much involved in this argument about Empire Free Trade, and from the point of view of the public, Mr. Whitley could hardly refuse to let the leader of the Opposition express his view.

No Escape?

And if, in fact, the leaders of all four Parties are entitled to broadcast on a matter of political controversy, under what rule can Mr. Whitley deny, say, the leader of the Communists broadcasting? Or why shouldn't the leader of the Scottish Nationalists have a word to say as well?

It has been suggested that Mr. Whitley might get out of this dilemma by deciding that all these proposed speeches are not political at all, but are simply a public entertainment. But again, would Lord Beaverbrook, Mr. Lloyd George, Mr. Baldwin, and others, be satisfied to have their political policies described as public entertainment? We think *not!*

We are rather inclined to think the "Daily News Chronicle" is right when it says that Mr. Whitley and the B.B.C. have been caught in a net from which there seems no real escape.

Attempts have been made before to regulate political broadcast speeches, but it seems now that such an attempt is really absurd, and in any case is doomed to failure. It is really the public, and not the Government, nor the B.B.C., which will eventually decide what politics it wants to hear by wireless.

Already Lord Beaverbrook's application for a broadcast talk has given rise to a good deal of argument at Savoy Hill. We know for a fact that Lord Beaverbrook has had a talk with Mr. Whitley and Sir John Reith, and Lord Beaverbrook (not at all pleased, we understand, at having his talk

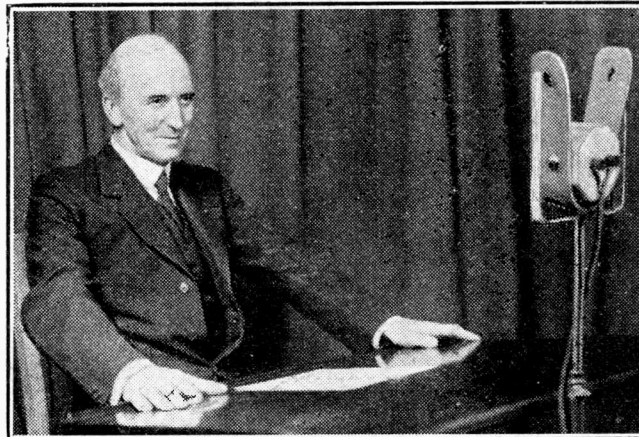
postponed, as it has been in the past from time to time) more or less demanded a decision *re* his application for permission to broadcast a speech on Empire Free Trade.

A Chaotic Position.

The result of this meeting was, we understand, that it was stated that if Lord Beaverbrook decided to broadcast so must Mr. Lloyd George be allowed to reply to him. Exactly what will happen if Mr. Baldwin decides that he wants to reply as well remains to be seen; and the question is still further complicated by the fact that the Prime Minister and other Labour Party leaders may want to broadcast their views! We may hear a lot of political broadcasts in the near future!

And supposing, as is quite likely, somebody else starts a new Party shortly? What

A MOMENTOUS BROADCAST



Sir John Simon broadcasting his wonderful summary of the situation in India as investigated by the India Commission.

will Mr. Whitley's decision be then, when the leader of that Party asks for permission to broadcast his views on the politics of the day?

It all seems rather chaotic at the moment, but the ultimate outcome will be worth watching.

Those Sunday Programmes.

Another problem which Mr. Whitley will have to solve very shortly is that concerning Sunday programmes. As our readers know, there is one school of thought which maintains that Sunday being a day of rest there should be no broadcasting at all, while another school of thought maintains that because of the very fact that Sunday is Sunday the B.B.C. should choose programmes on that particular day of the week which are of the brightest and cheeriest possible.

These two extremes of opinion are constantly clashing, the battle rages and sways back and forth, but no real decision seems yet to have been taken about the matter. Obvious it is, of course, that Sir

John Reith leans towards the first school of thought, viz., that the programmes should be rather "chaste and severe" on Sundays, with a very strong dose of religious broadcasting matter in them.

Pleasing a Minority.

It has been said with truth that the main consideration to be borne in mind when considering this problem is that it is no use the B.B.C. pleasing 10,000 people if, at the same time, they irritate a million.

But we should like to know what evidence the B.B.C. has for assuming that the majority of listeners in Great Britain would be shocked by jazz or vaudeville on Sundays. From evidence in newspapers, at any rate, it seems pretty clear that the majority of listeners in this country are all out for better and brighter Sunday programmes. But the B.B.C. has taken it as an axiom that the people who would be upset by brighter broadcasts far outnumber those who would like more entertainment.

It must be remembered also that, on Sundays, the hours devoted to broadcasting are limited by arrangement with the churches. Some time ago the B.B.C. was asked not to broadcast during the hours when religious services are being held, and Sir John Reith was undoubtedly right in paying heed to this request, coming as it did from the highest ecclesiastical quarters.

It is really difficult to find a formula for the Sunday programmes, for one constantly hears people say that the concerts broadcast on Sundays are not in any sense highbrow, and that what is highbrow in the programme—for example, the Bach Cantatas—are usually broadcast in the afternoon, when the majority of people are not inclined to listen in.

"Evidence"

The B.B.C. says it has evidence to show that these Sunday programmes

meet with general approval, but the B.B.C. is constantly saying it has "evidence" for this, that or the other. Why doesn't it produce it; and why not form an impartial committee to consider, on its merits, the "evidence" which the B.B.C. maintains it holds and which supports its Sunday programme policy?

As a matter of fact, the solution really is at hand. We are supposed to be having alternative programmes these days, but if you observe the Sunday programmes you will notice that the National, the Midland Regional and the London Regional stations all devote a considerable amount of time to religious broadcasts, and that in practically all three cases the entertainment side of the broadcast does not begin until nine o'clock.

Surely one of these stations every Sunday could be "excused" from broadcasting a religious service, and could devote its transmitting energy to the propagation of programmes which would satisfy the clamourings of those who want better and brighter broadcasts on Sundays?

THIS article is addressed to one special section of "P.W." readers—the noble order of headphone wearers. Are any of you getting tired of cramped ears and that tethered feeling? Yes? Well, then, what about taking the plunge and graduating to loud-speaker reception?

It's not necessarily a very expensive business, you know. Really good loud speakers can be bought very reasonably nowadays, while if you care to assemble one for yourself with the aid of a frame and one of the excellent "units" now available it need not cost you more than about twenty-five or thirty shillings.

An Economical Method.

Remember, too, that it is *not* necessary to scrap your present set and build a new one. There is a much easier and less expensive way of doing it, and that is to build a good two-valve L.F. amplifier, and tack it on to your present outfit.

Then, practically every station which you were previously able to hear at all will be boosted up to loud-speaker strength, and you can sit back and enjoy yourself, or move about when you want to without being tied by the ears to the box of tricks which used to keep you anchored in one spot.

We have designed a special amplifier for you to enable the conversion to be carried out to the best advantage, and it has some special advantages which we think you will like.

For one thing, it has been arranged so that it can be used as an electric gramophone when desired, and if you give it a suitable super-power valve and plenty of H.T. it will provide tremendous volume and superb quality.

With any reasonably sensitive pick-

up the volume available under these conditions is even adequate for dance purposes.

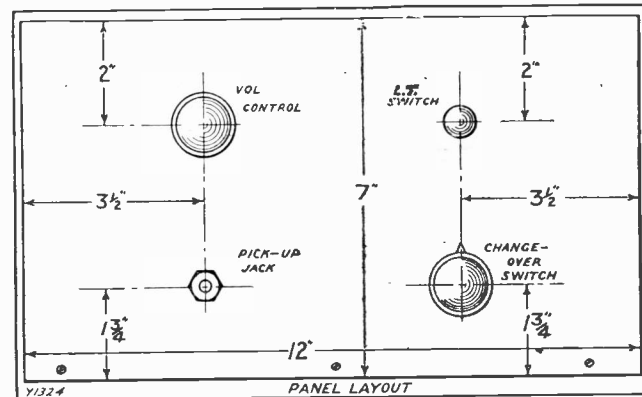
Under more normal conditions of a moderate sized power valve and just the usual 120 volts H.T. it will still give most excellent quality, but, of course, you will not be able to get so much volume without overloading.

It will still be sufficient, however, for domestic purposes, so do not let us give you the impression that here is an instrument which calls for a big output valve and colossal H.T. to make it work properly.

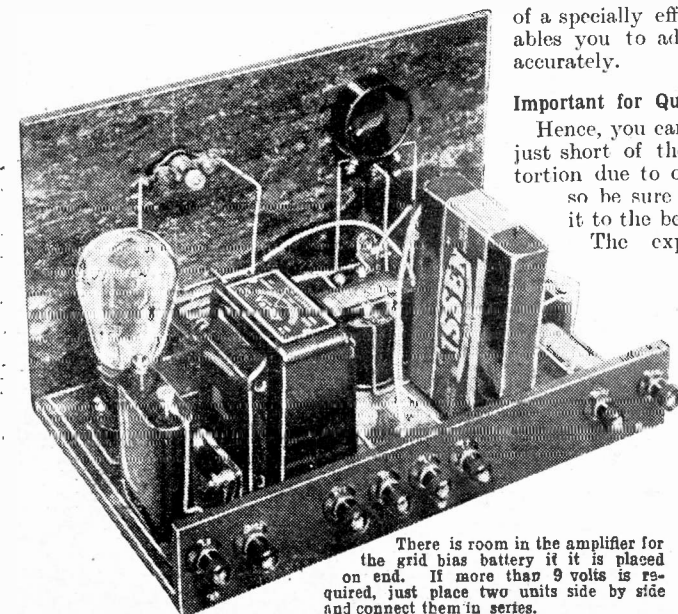
On the contrary, you can treat it just as you like, and give it much or little H.T. and a small or large power output valve just according to the volume of undistorted output you require.

As a matter of fact, this amplifier is a particularly suitable one for anybody who has not got much H.T. available, because it has a volume control

A NEAT PANEL.

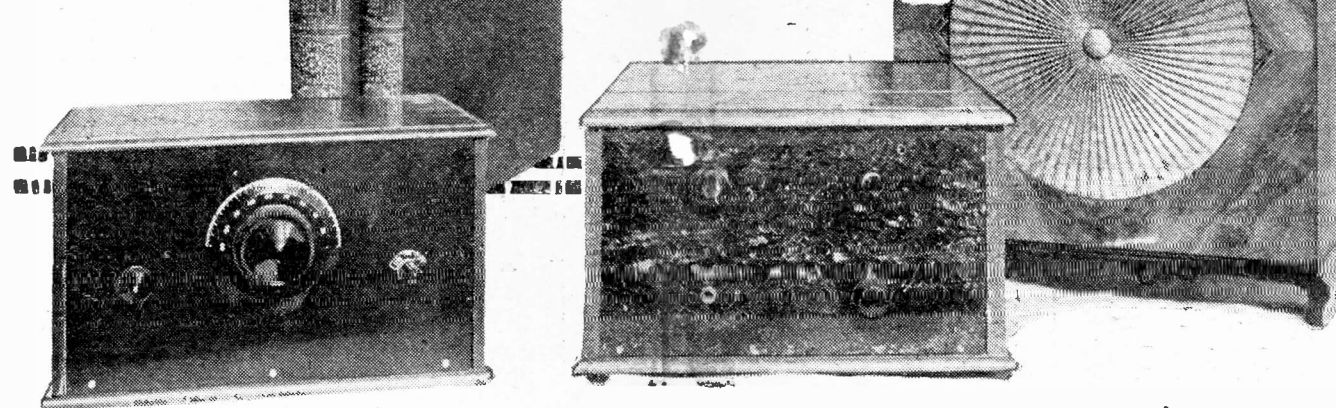


The panel lay-out is perfectly symmetrical, so you can do your marking out on the back without troubling about right and left.



There is room in the amplifier for the grid bias battery if it is placed on end. If more than 9 volts is required, just place two units side by side and connect them in series.

The "A.P." Amplifier



easiest to go over the various diagrams and photos, so let us set about it.

You will already have noted that the instrument contains two valves, and a glance at the circuit diagram will show you that the first one is resistance-capacity coupled to the detector valve in the receiving set which will precede it.

The anode resistance can be identified by the marking R_1 , the grid condenser is C_1 , and the grid leak (actually the volume control) is R_2 .

An Excellent Combination:

Transformer coupling is provided between the first and second valves, the transformer being marked "L.F. T." in the diagram. We thus have the popular and efficient arrangement of one resistance and one transformer stage, which we have found best suited to the special purposes for which this amplifier is intended.

It gives a very good combination of excellent quality, extreme stability and sufficiently high magnification.

The arrangements for inserting a gramophone pick-up in the circuit you will see are located in the "R.C." stage. They are very simple indeed, and take the form of a jack of the "single

Here is a design for an "All Purpose" two valve L.F. amplifier, with which you can add power to your headphone set, assemble an electric gramophone, and do hosts of other useful things.
By The P.W. RESEARCH AND CONSTRUCTION DEPT.

open" type wired across the volume control. To use the pick-up you just place upon the end of the flex lead therefrom a plug to fit the jack, insert it in the latter and switch off the wireless receiver.

With any of the modern sensitive types of pick-ups you will find that you get ample volume from just the two valves in the amplifier. Indeed, you will quite likely have to keep it down a little with the volume control to prevent overloading in many cases.

Left or Right?

The volume control, as we have remarked, takes the place of the grid leak in the R.C. stage, and there are a couple of points we must mention about it. First, please note that it *must* be of the high resistance potentiometer type, of $\frac{1}{2}$ or 1-megohm. The ordinary .200 or 400 ohm potentiometer will *not* do.

Next, about the direction in which it operates. In our original instrument we arranged it so that it comes into action and cuts down the volume when the knob is turned to the right, so that to obtain full volume you must turn it right round to the *left*. If you like your volume control to work the other way (it's a matter of taste), just re-

verse the two wires going to the two outside terminals on the component.

In your examination of the circuit diagram you will have observed a rather complicated-looking switch marked S_2 . This is a three-pole double-throw component, but it is not really so complicated a business as it looks at first sight, and all it means is just a little care in following out the wiring diagram.

The special sketch thereon will make it all quite clear, and you will find it perfectly easy to identify the various contacts when you have the switch before you. Just note, though, that "B" on the diagram means the contacts nearest the panel, and "F" means furthest from the panel.

This switch is actually one of the very special features of the amplifier, and its action was worked out with a deal of care. What it does is to enable you to use either the full two stages, or just the last valve

both stages and adjust matters with the volume control.

This system of switching has many other advantages, besides the important one we have explained, and, indeed, it is one of the only really efficient methods we have encountered. One of its minor attractions, by the by, is that the volume control remains fully effective whether one or two stages are in use.

There, that completes our general survey of the design, beyond pointing out that a properly arranged output filter is provided and there is space upon the baseboard for the grid-bias battery.

Mounting the Anode Resistance:

Now there is just one constructive point to which we must draw your attention, and then we can leave you to get on with the job.

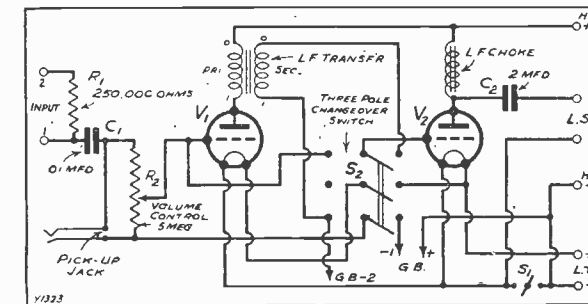
The point we have in mind concerns the 250,000-ohm anode resistance R_1 . The one we used in the original amplifier was provided with terminals, so that a holder was not needed. We just "hung" it in the wiring, but if you use some other type you must remember to furnish it with the usual holder.

All the rest of the work is quite straightforward, so now all you want are some instructions for putting your finished instrument into operation. The battery connections are all quite obvious, except in one detail. You will see that there is a terminal for H.T. negative on the amplifier.

If you run the amplifier from the same L.T. accumulator and H.T. battery as the receiver, make *no* connection to this terminal. If you use a separate battery for either purpose (L.T. or H.T.) connect up as usual, also if you use the amplifier with a crystal set, or by itself as a gramophone amplifier. Be careful over this, for it is important.

(Continued on next page.)

SIMPLIFIED SWITCHING.



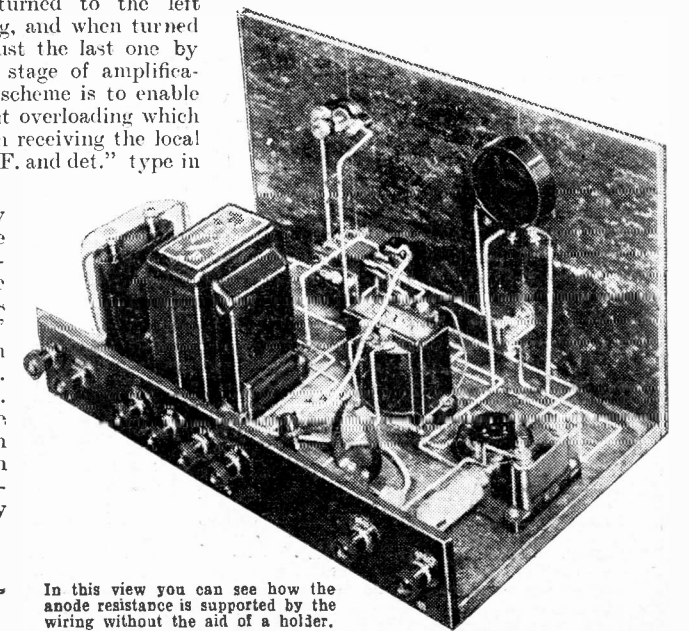
The switch S_2 gives you the choice of one or two valves. In the one valve position it also turns off the filament of the unused valve.

by itself, and it turns off the filament of the unused valve in the latter case.

Using One Stage.

When the knob is turned to the left both valves are working, and when turned to the right you have just the last one by itself, giving only one stage of amplification. The idea of the scheme is to enable you to avoid the violent overloading which is so apt to result when receiving the local with a set of the "H.F. and det." type in front of the amplifier.

We have accordingly arranged so that, the R.C. coupling is in circuit when only the one stage is working, so as to keep the "mag." down to a figure which we have found suitable. In all other cases—i.e. when receiving more distant stations or when a less powerful set is in use, the normal procedure will be to employ



In this view you can see how the anode resistance is supported by the wiring without the aid of a holder.

A POWERFUL MAGNIFIER FOR ANY RECEIVER

THE "A.P." AMPLIFIER.
(Continued from previous page.)

For use with a valve receiver, connect the "input" terminals on the amplifier to the 'phone terminals on the set. If you get only weak signals or none at all, reverse the two connections to "input 1

and 2" on the amplifier terminal strip.

With a crystal set, you can proceed in exactly the same way, or you can plug in to the jack with a plug on the end of a twin lead from the 'phone terminals of the receiver. Reverse the connections if necessary exactly as before. This latter scheme is usually better with a crystal set. (It must not be used with a valve receiver).

Now, you just want the valve types to use, and we have done. Valve V₁ should be of the L.F. type, with an impedance of

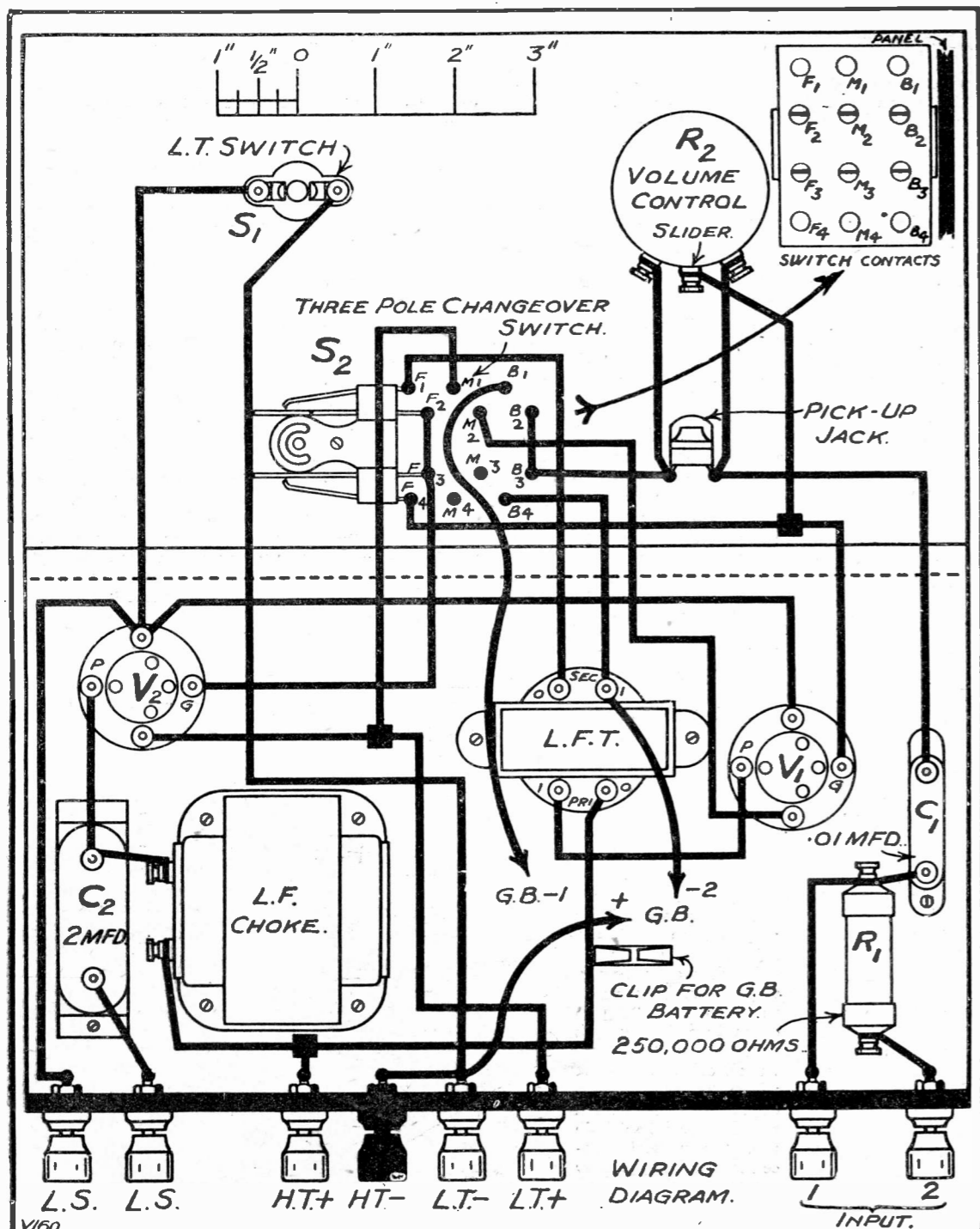
about 10,000 to 18,000 ohms for normal purposes, although if you will be dealing mainly with very weak signals, one of the H.F. type is to be preferred. For V₂ you want either a power or super power type, as usual, and grid bias should be adjusted according to the valve maker's instructions.

We have just had a final look over the wiring diagram below in search of any little points which might be the better for additional explanation and it seems that the switch S₂, and its connections could be made a little clearer. The key diagram in the corner gives the positions of the contact points to which you must solder, and this will be a sufficient guide if you understand the viewpoint from which S₂ was seen by the draughtsman in making the sketch.

He was looking along the back of the panel from the end nearest these words of type, i.e., he was seeing the switch from the direction of the pick-up jack.

Note, too, that his key letters "B," "F" and "M" mean back, front and middle respectively, "back" being nearest the panel and "front" furthest from it.

CHECK UP YOUR CONNECTIONS.



DID YOU KNOW THAT?

To halve the effective capacity of a condenser all that is necessary is to connect another condenser of the same capacity in series with it.

Pentode valves of the indirectly-heated filament type are now available.

Three-quarters of a metre (75 centimetres) is one of the wave-lengths allocated by the U.S. Government to amateurs for experiments, transmission and reception having already been carried out on this wave-length.

Take care not to kink your aerial when putting it up, as this may lead to a liability to break at some future date.

V160

The wiring is easy enough to carry out, but just a little care is needed in making the connections to S₂, and checking them up. There is a key to the positions of the various contacts in one corner of this diagram which you will find makes everything quite plain when you have the switch before you. The H.T. negative terminal is marked in black to emphasise an important point which is explained in the text.

OUR REJECTOR IN AUSTRALIA.

The Editor, POPULAR WIRELESS.
Dear Sir,—It might be of interest to English readers to know that the "Brookmans Rejector" was very much appreciated here in Perth, W.A. 6 W F, the local station, until about six months ago, had a wave-length of 1,250 metres, but when the Commonwealth Government took over broadcasting, the wave-length was brought down to 435 metres, and for some time 6 W F was all round the dial, and with the coming of winter, listeners in Perth found it hopeless to tune into the Eastern States, but the good old POPULAR WIRELESS found the very thing, and there was a rush for "Brookmans" Condensers.

I also tried the "Rejector" using a variometer, described by Mr. Randall in a later issue, which gave splendid results.

In your Free Booklet, the short-wave station 6 W F on 104.5 metres is now off the air.

Broadcasting conditions in Australia are showing a marked improvement, although W.A. is somewhat isolated from the Eastern States. It is only in the winter that Eastern States stations can be received without very bad static.

There are what are known as A Class and B Class stations. A Class stations receive revenue from licence fees of which the annual fee is 24s. The B Class rely solely on advertising for revenue. 3 L.O. Melbourne, is about the most popular station in Australia, and can be received in W.A., 2,000 miles away on 1 H.F., D.F. and 2 audios on the loud speaker as loud as the local station on three valves.

Short-wave work is very popular here, as there is less static in the summer-time on short waves. 5.8 W can be received here, but not very strong, also Manila comes in very strong on 48 metres. This station alters its wave-length very frequently. Several Dutch stations around about Java are also strong.

It is very disappointing to see the large number of electric sets of American manufacture on the market here instead of the British products.

Wishing POPULAR WIRELESS every success.

Yours faithfully,
J. REID.

Hollywood, W. Australia.

THE "ECONOMY" THREE.

The Editor, POPULAR WIRELESS.
Dear Sir,—I have made the "Economy" Three, and I am so pleased with the results from this simple circuit that I have just had to write and let you know. Having a badly-screened aerial only 25 ft. high at its highest point, and only using 90 volts H.T., I have logged 20 foreign stations at (good) L.S. strength on the medium-wave coils. When conditions are good Toulon, Turin, Leipzig, Munster, and Cologne come through as loud as the London stations. The set is very selective, and by using the most selective tapping on the X coil 5 G.B. can be tuned out by 3° and the two B.P. stations by 1½°. I hope to try the set on the long and the short waves later on, and if I have any success on the short waves I will write and let you know. Wishing "P.W." the best of luck,

Yours faithfully,
D. BAINBRIDGE.

Leicester.

THANKS largely to the special facilities granted to them by the G.P.O. for the purpose, members of the R.S.G.B. were able to pull off an excellent piece of work during the two week-ends preceding June 23rd, the birthday of H.R.H. the Prince of Wales, the Patron of the Society. Messages of loyal greeting to the Prince were received from amateur radio societies in the following parts of the Empire: South Africa, Iraq, Canada, Jamaica, Ceylon, Egypt, Newfoundland, and the various divisions in Africa apart from the Union.

As a result, two days afterwards, the stations concerned were asked to forward the following return message: "The Prince of Wales sends you sincere thanks for your good wishes, which His Royal Highness much appreciated."

Amateur Successes.
It is a pity that conditions throughout this year have been so bad that it was quite impossible to receive messages from Australia, and New Zealand, but perhaps next year the whole of the British Empire will be able to take part in the "Birthday Relay."

The "Southern Cross" flight also provided amateurs with a good opportunity of proving their mettle, and I know personally

CORRESPONDENCE.

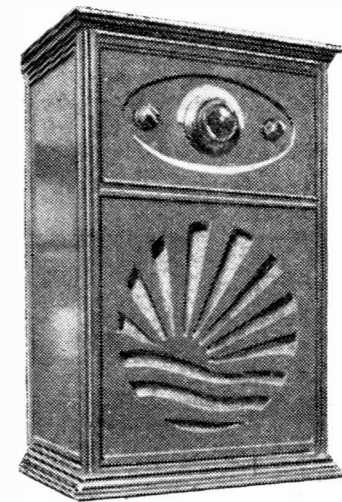
OUR REJECTOR IN AUSTRALIA.
THE "ECONOMY" THREE — THE "MAGIC" TWO — THE REGIONAL SCHEME.

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

THE "MAGIC" TWO.

The Editor, POPULAR WIRELESS.
Dear Sir,—I am enclosing two photographs of what I consider is your best effort in two-valve sets yet. (We reproduce one of them.—Ed.) Although

AN ARTISTIC "MAGIC"



Mr. Floyd built his "Magic" Two into this fine cabinet, which he also constructed. The cabinet accommodates the batteries and loudspeaker

my construction is hardly according to instructions given, I feel that it might interest some of your readers who like to make their own cabinets.

Perhaps by now you have guessed the set in question is the famous "Magic" Two, and is completely self-contained. The lower part contains the speaker (Squire chassis and cone, No. 97b), and Blue Spot (Unit) and also the H.T. and L.T. batteries and the upper part the set and G.B. battery.

This makes the set, while not exactly a portable, the next best thing, as the only outside connections are the aerial and earth.

It has the advantage over a portable in that it contains full-size components all properly spaced. For efficiency, well, it comes as a revelation as to what can be done on two valves when working under proper conditions.

Thanking you for this wonderful circuit, and wishing your paper every success.

I remain,
Yours faithfully,
HAROLD W. FLOYD.

Forest Hill, S.E.23.

THE REGIONAL SCHEME.

The Editor, POPULAR WIRELESS.
Dear Sir,—Now that this scheme has got well into its swing, it seems appropriate to draw attention to its very serious limitations, at least, from the point of view of the writer, and, he believes, of many other people.

The apparent aim of the B.B.C. is to supply the whole country with one programme, or, at the very most, two: a recent Sunday evening being a typical example when every station in the country broadcast the same programme.

As compared with the service of a few years ago this seems a very retrograde step.

Further, the power of these new stations is so great that it would appear to be the intention of the B.B.C. that everyone shall be in a position to operate their moving-coil speaker from a crystal set, whilst at the same time making foreign reception out of the question to anyone who cannot afford a small fortune for a multi-stage receiver capable of cutting down the local stations adequately.

The position is, of course, not yet at its worst, but I would suggest that the ideal solution of this, probably from the B.B.C. point of view, would be to shut down all stations except 5 X N, which everyone can receive, although possibly this might have the unfortunate effect of giving listeners too much latitude in the way of being able to listen with ease to continental transmissions that actually have the merit of being more interesting for a greater part of the time than the majority of B.B.C. transmissions.

Finally, the B.B.C.'s idea of contrasted programmes on the rare occasions when such are given, frequently takes the form of, on the one hand, chamber music, and on the other, symphony concerts. Each of these forms of entertainment is acceptable, but that one should be considered as an alternative entertainment to the other is somewhat strange.

Yours truly,
F. BAGGS.

Manchester.

SHORT-WAVE NOTES.

By W. L. S.

ally of one who kept watch for fifteen solid hours, during which time he hardly lost a single word of V M Z A B. And he assures me that the thrill was worth the price of the ice-bags that were required next day, not to mention the aspirin tablets! Listening to a weak signal on headphones for fifteen hours is no mean feat.

Looking through my files lately, it struck me that hardly a single important expedition has set out during the last two years without short-wave radio equipment on board.

The doings of Commander Byrd are, of course, famous. Many of the smaller fry, however, doubtless found their short-wavers just as indispensable, and, what is more, economical.

Please will some of the "big brains" in radio get down to it and devise a "mush filter." Apart from the more violent interference that we all know, one of the bug-bears of short waves is the gentle "sh-hh-

h-h" going on all the time at just sufficient strength to swamp out those signals that are interesting because of their very weakness.

A "peaked" L.F. amplifier appears to do a little towards it, providing the peak is in the right place, but I have not yet had the success I should like in filtering it out.

Bringing Up the Mush.

I believe I am right in saying that the general favour of readers is towards a series aerial condenser on short-wavers other than those using a stage of S.G. This, to my mind, is a pity, as, while it undoubtedly improves signal-strength, it certainly also brings up the mush quite a lot. Whether the proportions are the same I don't pretend to know.

The amateur "3.5 megacycle" band (from 75 to 85 metres) should be interesting if only enough amateurs could be persuaded to start up thereon. It is a cross between the "local" 150-metre band and the more long-range 40-metre wave, which is, after all, just what is wanted for good work in this country and with the nearer European countries.

At present it is only open to British amateurs during the week-ends, but, so far as I know, there is no one there at present!

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

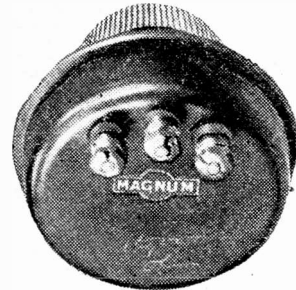
Tested and Found—?



there are eight types in this 4-volt range, including pentode, screened grid, and super power valves. There is also a full-wave rectifying valve. I notice too, that Lissens now have a big 6-volter, the TX 6L, which has an impedance of only 2,000 ohms, and an amplification factor of six.

MAGNUM WIRE-WOUND POTENTIOMETER.

THE latest Burne-Jones component is the Magnum Wire-Wound Potentiometer. It is available in the following resistances: 5,000; 10,000; 25,000 and 50,000 ohms, all priced at 7s. 6d. each, and each will carry 10 milliamps. Its uses are manifold.



The Burne-Jones potentiometer.

I was particularly struck by its very smooth adjustment, and this is obtained through the employment of a floating disc contact arrangement which, incidentally, prevents wear being imposed upon the fine wire used.

MAZDA A.C. PENTODE.

Here is some news of particular interest to the "all-from-the-mains" enthusiast. The Ediswan Electric Co., Ltd., have produced a Mazda A.C. pentode valve, with a normal A.C. filament rating, that can be used with any of the standard Mazda A.C. valves.

It has a four-volt heater taking one ampere. Requiring only 250 volts maximum, it has the exceptionally good mutual conductance for a pentode of 2.2.

It makes a fine output valve and the "high note lift" that results provides excellent compensation for any of those moving-coil speakers that tend to be boomy.

On the other hand, of course, when one of those rather high-pitched speakers is used, a resistance capacity by-pass needs to be joined across the output terminals as advised by the makers of the valve. Very considerable amplification is given by this new pentode, and it certainly does go a long way towards saving a complete stage.

DONOTONE LOUD SPEAKER.

The Donotone people, whose address is 40, Fumival Street, Holborn, London, E.C.4, announce that they have a new catalogue ready and are prepared to forward a copy to any reader upon request.

LISSEN FOUR-VOLTERS

Lissens, Ltd., have now very greatly increased their range of valves by the introduction of a bunch of 4-volters. Actually

A VALUABLE BOOK.

The Department of Scientific and Industrial Research has now published the report of the Radio Research Board constituting a critical review of literature on amplifiers for radio reception. It is available at all H.M. Stationery Offices, price 5s. net.

There are copious notes and the bibliographies cover a much wider range than perhaps the price of the publication would suggest. No one with any pretensions to real radio enthusiasm will miss getting a copy of the report.

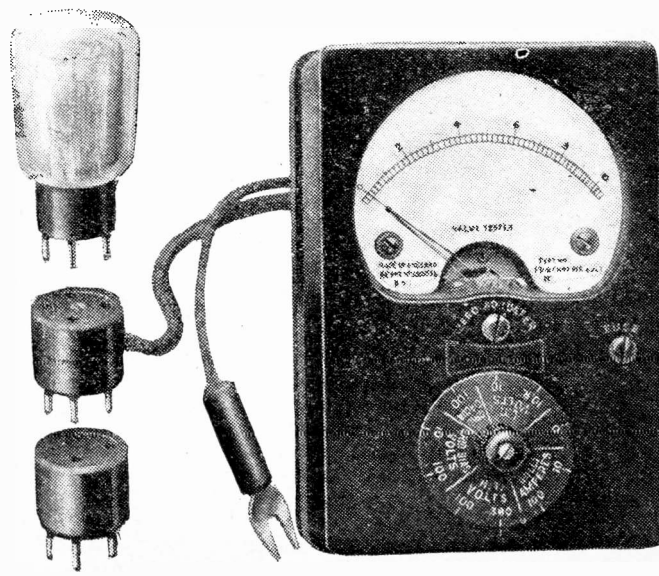
THE FERRANTI VALVE TESTER.

This is a multi-range instrument with which practically all the necessary testing measurements, etc., can be carried out, while the set is still in operation. There is a neat little meter having a small rotary switch for selecting the various ranges. And there are two leads, one for a grid bias connection and the other joined to a plug that is inserted in the set in place of any one of the valves. (The valve itself takes its place in this tester plug).

The rotation of the selector switch gives the following readings: L.T., 0 to 10 volts; an indication of the continuity of the grid circuit; grid bias, 0 to 10 and 0 to 100 volts; H.T., 0 to 100 and 0 to 300 volts in the type B.21 Ferranti Tester. (In the type B.22 the H.T. ranges are 0 to 100 and 0 to 500 volts). Anode current 0 to 10 and 0 to 100 milliamps.

Also, leads are provided to enable the valve tester to be used as an ordinary voltmeter or milliammeter. And it is possible to get a special adaptor which enables five-pin valves to be tested quite as easily.

The Ferranti Valve Tester by its name might seem to imply certain limitations as to its use, but a moment's thought will show you that to test all the valves



Showing how the Ferranti Valve Tester plug takes its place between a valve and its ordinary holder.

while they are in use in a set is equivalent to testing the set itself, and it would be hard to conceive a more thorough or quicker test of a set than to run round the valve stages with the Ferranti valve tester.

The instrument is particularly robust, and an accidental overloading does not hurt it in any way. It is equipped with a fuse and a spare fuse is provided. The meter is, of course, accurate and its fine,

When you are Buying— 22.— A VOLTMETER.

You do not want a "scientifically" precise and expensive voltmeter for checking L.T., G.B., and H.T. battery pressures.

You will find that the medium quality "moving-iron" types of not too low resistance are quite good enough for such jobs.

Nevertheless, you want one having a wide scale and a moderately fine needle. Also the action of the needle needs to be fairly "dead-beat." By this we mean that it flies over to a reading and stays there without wagging agitatedly about, as this makes taking readings a great nuisance.

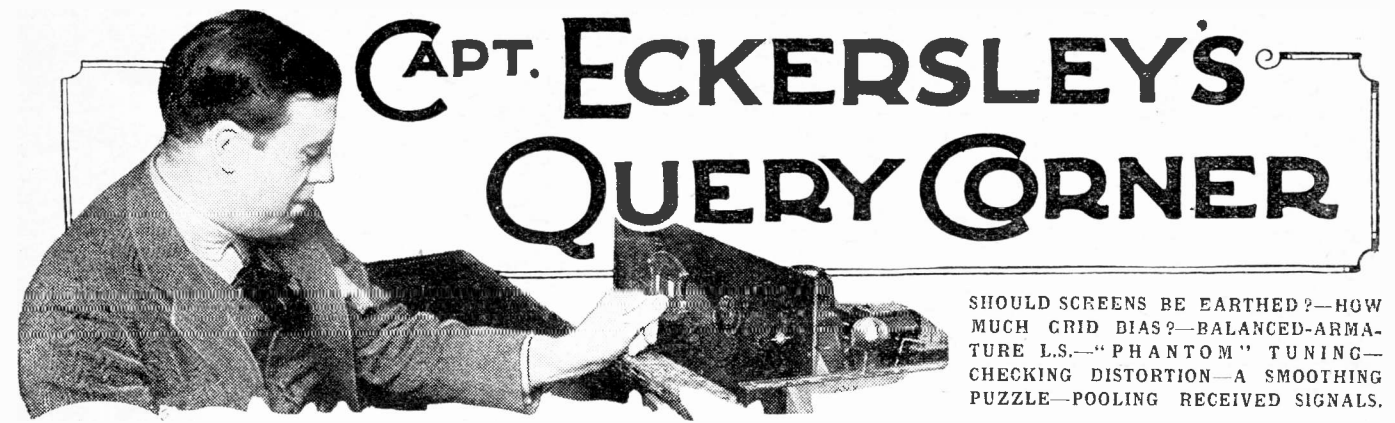
Also you want the voltmeter to be of such design that it will read equally well in almost any position.

A high-resistance voltmeter (1,000 ohms per volt or so) is needed for giving accurate mains unit voltage readings, and such high-resistance meters are more expensive.

sensitive needle is alert yet dead beat in action.

The scale is wide and close readings are possible. The resistance of the device is 1,000 ohms per volt, and it does not matter whether a mains supply or battery H.T. is employed.

Altogether I consider the Ferranti valve tester an excellent proposition, and one that should be in the hands of every serious radio experimenter and constructor. Its price, £6 15s. 6d., is reasonable in view of the wide range of duties it fulfils. Separate meters would cost much more and would be much less simple in use.



Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, will comment upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

SHOULD SCREENS BE EARTHED?—HOW MUCH GRID BIAS?—BALANCED-ARMATURE L.S.—"PHANTOM" TUNING—CHECKING DISTORTION—A SMOOTHING PUZZLE—POOLING RECEIVED SIGNALS.

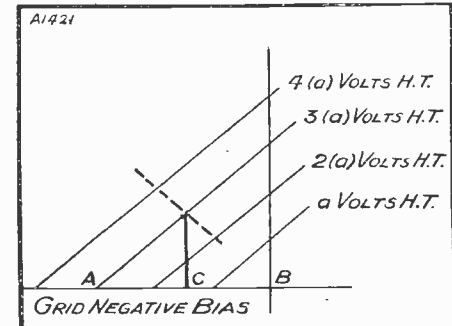
Should Screens be Earthed?

J. H. T. (Camborne).—"When totally screening a coil in an H.F. stage is there any advantage to be gained by earthing the screen as against leaving same free?"

There's not much in it, but it's a good general principle to earth a screen.

How Much Grid Bias?

P. A. V. (Crantock).—"Is there a rule of thumb by which to calculate the



approximate amount of grid bias to use with any given valve?"

Not one which is easy. Look up the valve characteristic curves, and you'll find something like the arrangement shown in the accompanying figure.

I assume you work with an H.T. corresponding with 3 (a) volts. Then find a value of grid negative to bisect A B at C. I am using transformer connection. Put a bit less with resistance capacity.

It is much the best way to get a milliammeter in the plate circuit and adjust the grid negative until, on modulation, the milliammeter does not flick.

Balanced-Armature L.S.

T. D. (Hemsley).—"What is the difference between a balanced-armature loud speaker and one with an ordinary reed movement?"

A balanced armature is worked "push-pull" electrically. The ordinary reed movement comes back to its static position by virtue of its elasticity.

"Phantom" Tuning.

D. B. U. (Uxbridge).—"Why is it that when 2 L O is eliminated on my det. and L.F. set by means of a wave-trap, 5 G B is

received at three separate positions on the tuning dial at equal strengths?"

The rejector is probably in some way giving, by its associated condensers and capacities, separate natural periods to the aerial (1) (say) through inductance to aerial terminal through tuning device to earth; (2) (say) through capacity to aerial terminal through tuning device to earth; (3) (say) through a combination of rejector, condenser inductance and tuning device to earth. It's all rather strange though!

Checking Distortion.

F. T. G. (Southampton).—"My set seems to distort a little. What is the best method of making sure that I am applying the correct grid bias to my power valve?"

Get a milliammeter and put it in the plate circuit of your valve. Does it go up with modulation? Then put less

negative in the grid. Does it go down with modulation? Then put more negative on the grid. Find a place where it is steady on modulation or just kicks up a fraction.

A Smoothing Puzzle.

G. S. W. (Streatham).—"My neighbour and I have similar sets run off the mains. Why should I need more smoothing with my full-wave rectifier than he does with a half wave?"

I want to start by saying I'm not very confident in my explanation. But, double-wave rectification gives (say) 100 impulses into the set, single (say) 50. The loud speaker is a great deal more sensitive to frequencies of 100 than to those of 50; so although it's easier to smooth in the case of double-wave rectification, it's much easier to eliminate single-wave rectification in the loud speaker.

I mean, the loud speaker does it for you, showing the great advantage of cutting out the bass even if it is wonderful stuff!

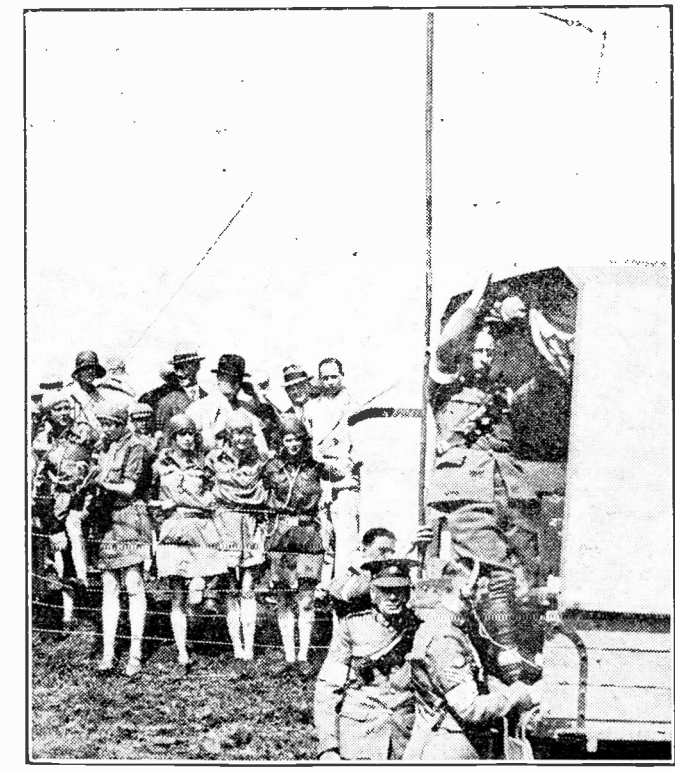
Pooling Received Signals.

"CURIOUS" (Egham).—"I have been told that fading on short waves is very inconsistent, and that whereas a signal may disappear on one receiver, the same signal on another receiver at the identical moment may remain at full strength.

"This being the case, to make a success of transatlantic relays why should not the B.B.C. use, say, three receivers in different localities, coupling the outputs for modulation purposes?"

This in effect is exactly what they do do, and is what in effect happens with the Marconi Beam system.

AN ADMIRING AUDIENCE.



Girls Guides on holiday taking great interest in the operations of the radio section of some troops carrying out local manoeuvres.



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

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

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

QUESTIONS AND ANSWERS.

THE CAUSE OF CRYSTAL-SET FALL-OFF.

G. M. (nr Slough).—"Mine is a crystal set, and it used to be very loud indeed, but during the last month it seems to have fallen off quite badly, and although I have had two new crystals nothing seems to result from that. Do you think it is the 'phones or how else can you account for it?"

It might be the 'phones, for if you have dropped them you may have injured the magnetism (which is liable to suffer from mechanical shock), or you may have allowed them to get rusty, which often impairs their sensitivity. In either case, they may be repairable, but it is not advisable to unscrew the carpieces and interfere with the "internals" unless you have had some experience of this kind of thing.

CAN WE HELP YOU WITH YOUR SET?

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.

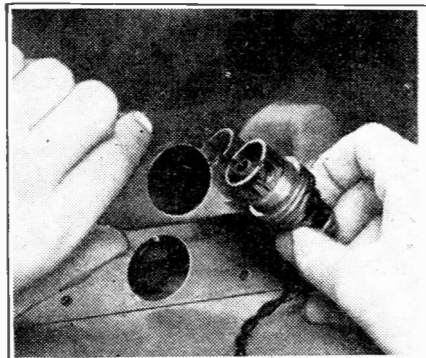
LONDON READERS PLEASE NOTE: Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

Quite possibly it is not the 'phones at all, but your aerial or earth system which is causing the falling-off in signal strength. The lead-in contact may have become dirty, or high resistance may have developed in the joints of the aerial wire, if you were not wise enough to put it up "all in one piece."

Where joints must be included in the aerial they should be soldered if possible, and do not forget that from a crystal-set point of view the earth connection is just as important as the aerial, and a poor earth is a certain source of poor results. Not only the wire's joint to the earth plate, but the latter's connections with the surrounding soil should be made as good as possible. During dry weather it is often necessary to pour water over a buried earth in order to keep proper contact with the surrounding soil.

USING THE MAINS WITH SAFETY.

C. L. (Lowestoft).—"Instead of using batteries I should like to get my high-tension from the mains, but I have been told that



A "close up" showing the beautiful simplicity of P. W.'s Safety First scheme.

there is always danger in such cases. Is this an 'old wives' tale,' or is there really more likelihood of trouble with H.T. than there is with running a vacuum cleaner from the electric light?"

"Old wives' tale" is right. There is no more danger about the running of a properly made H.T. unit than there is in the use of any other electrical machinery.

As a matter of fact, the current taken for H.T. is ridiculously small compared with that for a vacuum cleaner or a lamp. In all cases, fuses protect the wiring, and many other precautions are taken, so that the only danger comes from people interfering with the "internals" of a mains unit whilst the current is switched on.

To overcome even this possibility we have designed the "P.W." Safe Power series of mains units. They really are safe, too!

From the accompanying illustration you will see that the connection from the supply mains is made by a flex lead terminating in a lamp holder. This engages with the unit's wiring when plugged in, but to do this it passes through two holes *one in the cover, and one in the mains unit itself.*

That hole in the cover is a stroke of genius. To get at the "internals" of the unit—however much of a hurry you are in—you have to take that cover off. And to get it off you simply *must* disconnect that mains plug first!

Having disconnected the plug, the "internals" of the unit become accessible, but they are then harmless, because the mains are disconnected!

"HALF A MO!"

"STUDENT" (London, S.E.6).—"My only contact with electricity in practice has been by wireless sets made under the direction of 'P.W.' And I found electrical theory rather stodgy stuff until I came across the 'mho.'"

I said to myself, 'Half a mo', I shall have to ask 'P.W.' about this.' What is a mho?"

A "mho" is the unit by which conductivity is measured. As you know, resistance, which is the opposite of conductivity, is always measured in ohms.

Conductivity being the opposite to resistance, you can always remember exactly what a mho is if you remember that it is exactly the *reverse* of ohm, in letters as well as in effect.

You can express the relationship in figures by remembering that the mho is the reciprocal of the ohm. The higher the ohms the lower the mhos.

AVOIDING INSTABILITY.

"CONSTRUCTOR" (Aberdeen).—"Can you tell me some of the practical points to watch to avoid instability? I do not mean so much battery coupling and circuit stuff as the actual work behind the panel and on the base-board, which is liable to give rise to trouble when the complete receiver is hooked up?"

There are so many causes of feedback that yours is a rather difficult question to answer satisfactorily and yet briefly. However, the following hints cover practically all the ground, and should always be carefully watched when making a set for which an exact "pattern" or blueprint is not available.

The question of spacing the coils is very important. Not only will they couple or interlink if not placed far enough apart, but the strength of coupling depends upon the orientation of the coils, being at a maximum when the coils axes are placed in line and at a minimum when they are at right angles.

Coils should usually be of fairly small dimensions, and where binocular coils are specified it is useless to expect good results if other types are employed, as these "binoculars," or field-less coils, are specially used by designers on account of their non-coupling characteristics. Remember that H.F. chokes are a form of coil and their positions should always be carefully chosen in order to avoid the possibility of their coupling with other components.

Tuning condensers should be kept well apart and on no account must bypass condensers be omitted for economy's sake, for in a properly designed set they are one of the most important guards against instability.

The wiring itself may cause instability if the grid leads and plate leads are not as short as possible, and well separated from one another. Wires which run parallel to one another or close to H.F. chokes, tuning coils, etc., are often a source of unsuspected feedback, so all the wiring should be kept as well separated as possible.

Proper shielding of the stages with metal screens is necessary when using modern valves for high-frequency amplification, and both the size of the screen and its exact position are important. Similarly, the spacing of L.F. transformers and L.F. chokes must be watched carefully. If mounted close together they are a likely cause of trouble, and, in general, the spacing and arranging of the components is a job for the expert, and is better left to a set designer.

(Continued on page 498.)

WHAT DO YOU THINK ABOUT THIS

When 2 L.O. was moved to Brookmans Park a St. Albans reader of "P.W." raked out a big old-fashioned crystal set to take advantage of the now powerful local station. He had a new panel put in, the brass-work re-lacquered and the whole set re-wired and "poshed-up" But it wouldn't work, even on a good aerial, though all the new connections were as shown in the instructions, and another set tried on the same aerial and earth worked well.

WHAT WAS WRONG?

N.B.—There is no prize for answering this but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to above next week.)

Last week's Leytonstone poser was a very easily-made and easily-corrected fault. All that had happened was that in putting back the mains plug it had been reversed in the wall socket.



A famous radio artist describes some of the difficulties and pitfalls that confront the studio performer. Mr. Cole, however, does not agree that a "special technique" is necessary for successful broadcasting.

SINCE broadcasting first commenced, we have heard much of the new so-called "microphone technique." What this phrase actually means it is difficult to say, but that broadcasting does, in certain classes of entertaining, demand a different technique from concert work is undeniable.

No "Special Technique."

Comedians and singers especially have found it necessary to approach the microphone in a manner quite foreign to the old-established traditions of the platform. Indeed, I have heard it said that when an artist enters a wireless studio, he should forget all that his previous experience has taught him.

As a pianist who broadcast before the earliest days of the old British Broadcasting Company, it might be assumed that I have by this time thoroughly acquainted myself with all the difficulties and pitfalls of microphone technique as applied to pianists. But I have not done so. I have evolved no special technique for my wireless performances in the whole eight years of regular broadcasting in this country.

I am fully aware, of course, that certain styles of playing are more suited to broadcasting work than others, and I will enumerate later those special qualifications which I believe necessary to the success of any pianist on the wireless. But it is a fact that I have never attempted to alter my natural style of playing to suit the whims and foibles of the microphone.

As far as I am concerned, a wireless studio and a concert platform are one and the same thing, although, of course, one misses the atmosphere of a concert hall in the studio, and can never be in close touch with one's audience.

In this attitude I am not alone, for I have yet to meet the wireless pianist who considers his success due to a studied form of wireless technique.

Play Naturally.

From which it may be gathered that the natural style of playing peculiar to each individual pianist is more responsible for his success—or otherwise—than any specialised technique. Here, then, we see that the radio pianist is in quite a different class from the many other forms of wireless entertainer.

One must remember that an individual style of playing must come as naturally to

the really good pianist as an individual style of games comes to a really good sportsman. What happens if that sportsman attempts to alter his style? His game immediately goes to pieces.

Similarly, the pianist who attempts to change his natural style of playing to suit a new medium of entertainment is courting trouble. Although it may be said that in time a new style will be perfected, I do not believe that real success can be obtained as the result of a change of method.

Consequently, a successful wireless pianist must have certain natural qualifications which will suit his style to wireless work. If a pianist lacks those qualifications then he is unlucky, for they cannot be thrust upon

Lastly, there must be a generally "tidy" conception of the works to be played. By this, I mean that the pianist should be well acquainted with the works he intends to perform, and should have a well-defined idea of the manner in which he intends to interpret them.

Watch the Details.

If you are a pianist, you may point out that the essentials I have mentioned are those that are necessary for ordinary concert work. This I readily admit, for I have always maintained that they must be present for any kind of public performance.

It does not necessarily follow, however, that the successful platform pianist will be

a successful radio pianist. Defects in any of the three points I have mentioned might possibly pass unnoticed in concert performances, but they would be considerably accentuated by the microphone.

If a pianist possesses these attributes—and other minor ones which I have not set down—and does not attempt to force his style in the broadcasting studio, he will stand an excellent chance of becoming a successful radio artist. Without them his chances are extremely poor.

From the arguments I have outlined, it might be assumed that wireless broadcasting

is less trying to the average concert pianist than to any other class of entertainer. This might be so—at any rate, after one has become accustomed to playing in the studio.

The First Broadcast.

But it is generally agreed that the first broadcast performance, whether of a pianist or anyone else, is always something of an ordeal if only on account of the novelty of the experience. And the pianist who plays under the excessive nerve strain of a "first appearance" is not likely to do himself, or the composer of the works, full justice.



Solomon, the great virtuoso, who has frequently given recitals for the benefit of radio listeners.

“Using Two Transformers”

of the same type

The AYES have it!

A few extracts from the many letters received commenting on the FERRANTI advertisement in “Popular Wireless” of June 14th, 1930:—

★ *“I also would like to confirm your advert. in ‘P.W.’ June 14th. While it is difficult, if not impossible, to obtain perfect reproduction with two of other makes of transformers, I shall be only too pleased to demonstrate . . . that two of YOUR transformers can and do give results that are as near to perfection as is possible with any present components.”*
(Signed) G. W. SMITH, Hinckley.

★ From the Wireless Dept. of Uwins’ Orthopaedic Centre, Bath.
“We firmly believe in using identical FERRANTI A.F.3’s, A.F.4’s, and A.F.3 and A.F.4 combination in transformer-coupled reconstructions, and our results are admitted to ‘beat the local efforts.’ We agree that certain makes will not make a combination . . .”
(Signed) HERBERT HART, Managing Partner.

★ *“I was also very much surprised at the article in ‘Popular Wireless’ regarding transformers. . . . I am quite in agreement with the correspondent whose letter you publish. . . . I have been using a Det. and 2 Trans. L.F. receiver, the transformers of which are your A.F.3’s. . . . I have never had any trouble from L.F. ‘howling, feed-back, or distortion,’ of any kind.”*
(Signed) JOSEPH JEAKINS, Newcastle-on-Tyne.

★ *“I, too, having noticed the article in ‘Popular Wireless’ on Transformer Troubles, would like to express my entire disagreement of it. . . . I remodelled my set and included two A.F.3’s with very gratifying results. I am working my set off A.C. mains, using the same two A.F.3’s which are now four years old, and results are so good that everyone who hears my set envies me my possession of it.”*
(Signed) WM. HARDING, South Shields.

★ *“It may interest you to know that for the last 18 months I have been using a demonstration receiver . . . which contains three of your transformers, viz., A.F.5, A.F.5C., and an O.P.3(c) . . . its quality is universally admired. This experience . . . confounds, I should think, the argument against using a plurality of similar makes of transformers in the same receiver—at least when Ferranti are used.”*
(Signed) REGINALD J. H. NUTCHELL (Devonport).

★ *“I decided to build a quality amplifier for my pick-up. In the first stage I put an A.F.3, and in the second an A.F.5 . . . and the result is, when a moving-coil speaker is attached on the output, quality is truly amazing, and there is not the slightest suspicion of an L.F. oscillation at all.”*
(Signed) ADRIAN EVANS, Birmingham.

★ Two identical Transformers WILL work well together——if they are

FERRANTI TRANSFORMERS

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 496.)

INSERTING A SPARE H.F. CHOKE.

H. H. (Keighley).—"I have a three-valve set (Det. and Low-frequency) with a tuner unit. I have a spare high-frequency choke which I would like to use in my set. Would it be of any advantage, and what would be the best way to put it in? (I am enclosing a spare wiring diagram.)"

Probably the choke will make but little difference if you are using the exact L.F. transformer which was specified for this set. But if you are using a different transformer it might make a world of difference both to quality and to ease of handling.

As you have the choke we should certainly try it in any case. All you have to do to give it a trial is to disconnect the H.T. and L.T. batteries first, and then wire the H.F. choke between the points marked 36 and 37 on your diagram.

Then join up the batteries again and see what difference has been effected in the results obtained.

If you notice a big improvement it will be because the primary of the first L.F. transformer was not acting as an H.F. choke as well as the designers intended, but needed another H.F. choke in series with it to separate your H.F. and L.F.

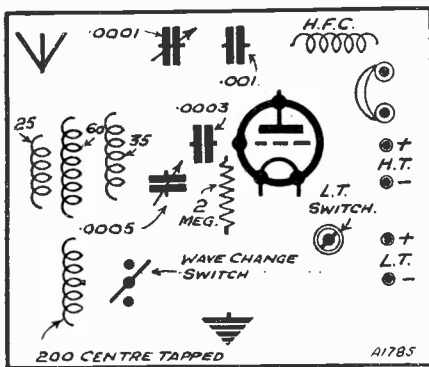
SHORT-WAVE COIL WINDINGS.

S. M. (Lound).—"Left over from a previous set I have a tubular coil and a coil holder of the type which has four pins in a straight line, one being spaced well away from the other three. I want to use this for going down on the short waves."

"My idea is to have a tapped aerial primary coil close to a grid coil and a separate reaction coil. The coil former has eight ribs, and is 2 in. diameter and nearly 3 in. long. Would 24 D.C.C. wire be all right for the coils, and if so, how many turns should I want for 20 to 35 metres?"

For this wave-band we should use a 5-turn primary tapped at the second and third turns as well as at the ends; a 6-turn secondary or grid coil; and 8 turns for the reaction.

POPULAR "WIRELETS" No. 14



Here are the "components" required for a plug-in-coil one-valver, with easy switching for long waves. The coil sizes are shown (near the three-contact wave-change switch), and very good results can be obtained with the set connected up for condenser-control of reaction. To do this a separate aerial coil is used for lower waves and half the long-wave aerial coil is brought in series with the reaction coil for long waves. Could you wire up the circuit? (Look out for the answering diagram next week.)

Between the first pin and the edge of the coil wind on the five turns for the primary (24 D.C.C.), allowing tapping places at the second, and, if you like, at the third and fourth turns as well as at the end of the coil. Next, between the first and second pins on the former, and spaced about three-eighths of an inch away from the aerial coil, wind on 6 turns for the secondary winding, the direction of the winding being the same as the aerial.

Finally, on the other side of the second pin, and spaced about three-eighths of an inch from the secondary winding, wind on the reaction coil of 8 turns, the direction in this case being the same as for the other two windings.

Connect up one end of the grid coil to the first pin,

this being the grid end. The other end of the grid coil (or "secondary") goes to the beginning of the aerial coil and to the second pin (which goes externally to earth, filament, etc.). The reaction coil goes across the other remaining pins, one of which will make contact with the H.F. choke, and the other with plate, etc. (If reaction effects are not at first obtainable, simply reverse these two windings).

EARTH WIRE EFFICIENCY.

D. D. N. (Chislehurst, Kent).—"I am very keen on trying the short-wave stations, and with this in mind, have arranged a really good aerial. But my earth lead cannot possibly be good."

"However I arrange it there will have to be a long run across concrete, and I am told this may be a great drawback to short-wave reception. Is the earth connection very important on the very high frequencies used in short-wave working?"

A good earth wire connection is always well worth while if it can possibly be arranged, but you need not despair if you are unable to arrange a short direct connection to earth, as the same effect may sometimes be obtained by means of a "counterpoise."

This, as you probably know, takes the form of a "False Aerial," being simply a well-insulated "aerial" system placed close to the ground instead of high in the air, and connected to the earth terminal in place of the usual direct connection.

Such an arrangement is usually very efficient on the short waves, in fact, more so than on ordinary wave-lengths, and you may find that with quite a small counterpoise in conjunction with your good aerial you will get good reception.

Often in similar circumstances the American short-wave broadcasters can be picked up even without any earth-wire at all, or with such a simple "counterpoise" as is made by a coil of insulated wire joined to the earth terminal and placed below the table on which the set is standing.

"WHO'D A THOUGHT IT?"

V. G. T. (Derby).—"I had a rather annoying breakdown which has taken me a week to locate and incidentally enlarged my flies' skating rink. Of course, I ought to have known better, but I did not, and have now learned something else."

"The symptoms were, it just faded nicely away and never a sound or an oscillation could I get. I tried fresh valves, coils, tested L.T. and H.T., but nothing doing. Every wire was alive and no connections broken."

"My set, by the way, is the 'Magic' Three, which contains a 25,000 ohms resistance, and whilst moving this, holding both ends, music suddenly burst forth. I said, 'Who'd a thought it!'"

"The component was what I thought a reliable make, and I cannot understand it breaking down. Can you explain it?"

Although a breakdown in such circumstances is very rare there are many ways in which it might be caused. Sometimes it is an imperfectly-made joint between the sections of the resistance itself, and sometimes it is a connection between one end of this resistance and the terminal or end-contact that makes connection with the external wiring of the component.

Wire-wound resistances are less likely to give rise to such breakdowns because mechanically the strength of wire is very considerable, and nothing in the way of expansion or shrinkage is likely to affect its electrical contact. This is not always the case with other types of resistance, and it sometimes happens that conductivity is greatly affected by temperature, etc., instead of remaining constant as it was designed to do.

In your case there was evidently a complete break until your fingers bridged across from one end of the resistance to the other, thus restoring a conductive path momentarily, and putting you on the track of the fault.

CENTRE TAP OR X COIL?

T. L. (Middlesbrough).—"Which is the more selective for an aerial coil, a centre-tap or an X coil?"

The X coil gives greater selectivity as only a small proportion of its turns are in the aerial circuit instead of the 50 per cent. which a centre-tapped aerial connection gives.

WIRELESS DIRECTION-FINDING.

"Zonc" (Torquay).—"When a ship is approaching a foggy coast and wants a wireless indication of her whereabouts, does this come from a direction-finding station on shore, or is the necessary apparatus on the ship itself?"

Various direction-finding (or "D.F.") systems are employed, in some of which the direction-finder is on the ship, and in others a direction-finding station ashore sends out a radio beam, like the revolving beam of a lighthouse, which tells all ships within range in which direction the radio lighthouse lies.

A further development which is actually under trial in the Clyde uses a microphone close to the syren of the lightship or lighthouse. With this system the wireless operator first hears the syren in the headphones, and later picks it up by ear, the time interval between the two (ether waves and air waves) giving the distance of the ship from the source of the waves.

TECHNICAL TWISTERS

No. 18.—THE LEAD-IN.

CAN YOU FILL IN THE MISSING LETTERS?

Like the aerial, the lead-in must be well or signals will leak away to

The lead-in must be spaced well away from metal surfaces, gutter-pipes, etc., or capacity leakage may take place across the so formed.

As the lead-in should be as as possible, the set should be placed as near to it as can be arranged.

The lead-in wire should be a continuation of the if possible, as losses will be likely to occur at any however well made.

Last week's missing words (in order) were: Less; Divides; Two.

TEST VOLTAGES FOR CONDENSERS.

S. T. B. (Clapham Common, London, S.W.).—"I have been surprised to notice that although it is usual to find condensers used for wireless have a sort of "safety margin" (in that they are tested on a higher voltage than the working voltage), there seems no fixed relationship between the two voltages."

"Sometimes twice the working voltage is specified, e.g. the "tested-at-500-volts" condenser in a 230 D.C. mains unit. Sometimes more than twice is said to be necessary. Why should there be these differences of opinion? What is the real position as regards safety?"

The differences that you have noticed are partly due to the fact that condensers are used for very different purposes, and partly because they are employed on mains of different classes.

Full details of the insulation requirements that are considered necessary for radio by The Institution of Electrical Engineers can be obtained on application to the Secretary of the Institution, at Savoy Hill, London, W.C.2.

It will be found that where radio apparatus is connected to the ordinary type of direct current supply mains, the minimum test voltage for most "mains" condensers is twice the supply voltage.

Where the apparatus is connected to Alternating Current (A.C.) mains, the minimum test voltage should be three times the R.M.S. value of the A.C. volts across the condenser. (For the purpose of this requirement any condenser connected through a rectifier to a source of A.C. shall be deemed to be operating at that voltage.)

When a condenser is used in an output filter circuit to isolate loud-speaker terminals from the anode voltage, the minimum test voltage shall be three times the D.C. voltage used to energise the anode (or anodes) of the last valve, or valves.

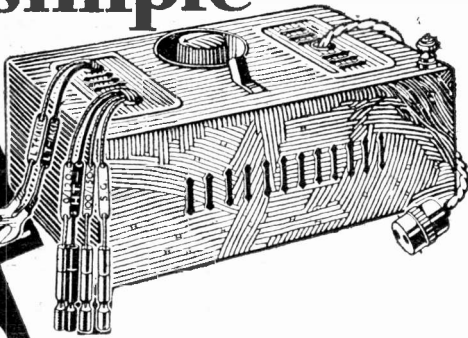
THE "NEUTYPE" FOUR.

J. N. (Haarlem, Holland).—"The 'Neutype' Four. I cannot have the publication from my newspaper agent in Haarlem. Where is it I send to obtain?"

The "Neutype" Four was described in "P.W." No. 417 (May 31st issue). Any back number of "P.W." which is still in print can be obtained from The Amalgamated Press, Ltd. Back Number Department, Bear Alley, Farringdon Street, London, E.C.4. Price 4d, post free.

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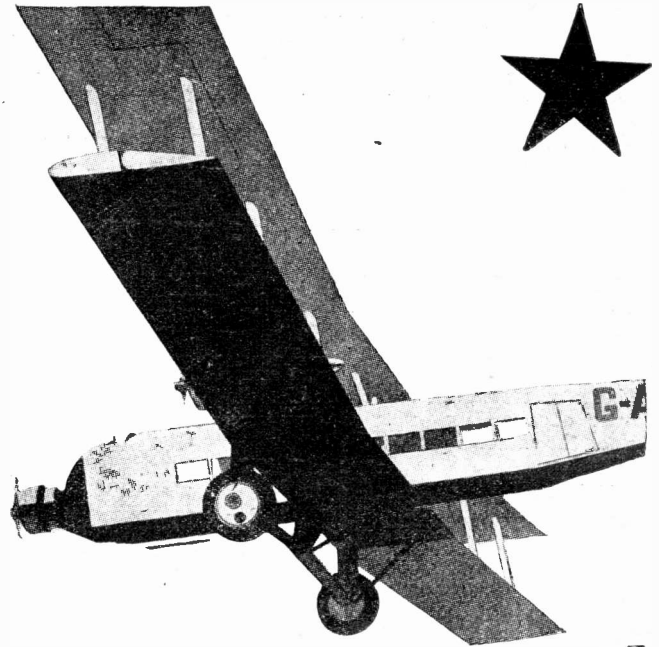
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Marconi Experts produced the first British Screen Grid Valves. That lead is still maintained.

**MARCONI
VALVES**



FOR THE LISTENER.

(Continued from page 486.)

Hendon.

Hendon was difficult to visualise, in spite of the noble efforts of Squadron-Leader Helmore and Captain McCulloch. It is something to be seen with the bodily eye—a crowd of a quarter of a million, and fifty planes in the air at one time.

The lively commentators did their job in a light-hearted almost boyish rivalry, turn and turn about, weaving their tale, and—yes, once or twice they helped me to see quite plainly. I saw the airship R 101, and I saw Major Sandbag drop with a bump from the flaming Blimp. But, next year, by hook or crook, I shall be one of the quarter of a million—with a very tired neck at the end of a perfect day!

Wimbledon.

As it happened, I had been to Wimbledon the day before, so I had the background perfectly; the gallery of packed faces turning in unison now to the right and now to the left as the ball flew; the green of the court, worn bare of grass on the baselines; the voice of the loud speaker shouting the score continually in the ear; the sighs, the cheers.

The umpire on his high step-ladder with the microphone arching his head, and the lithe, muscular, amazing players. Captain Wakelan's quiet and tense commentary, shot by shot, was a work of art. Yes, sport is great stuff, and I hope I shall never have to choose between Bill Tilden and Chamber Music!

Albert Whelan.

Mr. A. C. MacLaren, sounding rather gruff and slightly peeved, had depressed me with his account of the second day of the Second Test, but Albert Whelan's stories put me right again. Albert at his best is a top-notch.

He can serve up an old story with his own sauces and flavours to make a chestnut taste succulent as a pod of green peas just picked from the row. I liked that one about the captain of a ship and his engineer who changed places. I like the old ones. There is that lovely story about—(Quite so! Ako, tut, tut!—Ed.)

The Brass Bottle.

Cecil Lewis's production of Anstey's amusing fantasy, on July 10th, should be worth listening to. Fakrash-el-Asmash is a name to conjure with. So is any Oriental bottle, for that matter. Any amount of fun came out of this brass one.

Belinda.

May I introduce you to Belinda? We are going together to Italy to-morrow. It may sound a bit scandalous, but "Honi soit—" She is, to be precise, my portable. I call her by a feminine name because she is capable of talking all day and all night without stopping, and if ever she does stop it isn't her fault. I will tell you next week how she behaves on the journey. She wears a mackintosh, and carries her luggage inside her. So I hope she may get through the customs all right. She is well-charged. I shall probably be overcharged! But I want you to meet Belinda. Please meet Belinda!

TECHNICAL NOTES.

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

Wave-Traps.

I HAVE at various times been told by readers that the addition of a wave-trap to a receiver has not only had the effect for which the trap was intended—that is, separating out interfering stations, but has actually increased the volume of reception.

This increase in volume is not merely an imaginary increase (due to the cutting out of the interfering station), but is a real independent increase of volume.

Questions of Efficiency.

At first sight it seems rather queer that a wave-trap, which in one sense is nothing to do with the set itself, should increase the efficiency of the set. Probably the reason is that the wave-trap in the aerial circuit may have the effect of preventing oscillation in the circuit—or rather of making the set less liable to oscillate—in which case the operator is able to adjust the circuit to a condition of greater efficiency.

comparative efficiency of this type of speaker and others is always cropping up, and readers who wish to take advantage of the volume obtainable from a moving-coil speaker often complain of the fact that the reproduction is "boomy."

The High Notes.

As a matter of fact, you will quite frequently find this quality from the moving-coil speaker. Indeed, some people actually prefer this particular type of speaker for this very reason. It brings out some types of reproduction particularly well—for instance, the drums and many kinds of musical instrument.

So far as the high notes are concerned, these generally do not come out so well, or if they are reproduced at proper strength they often seem still to have a certain "boominess" surrounding them.

Raising the Frequency.

The natural resonance frequency of the moving-coil speaker can be raised by reducing the mass of the moving parts—that is, making the moving coil itself and the diaphragm as light as possible, and also by stiffening or tightening up the diaphragm controls.

Instead of leaving the diaphragm almost

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of "P.W." will be a

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Thus on this theory the wave-trap does not *directly* increase the efficiency of the set, but rather helps to remove other causes which were previously preventing the set from being worked at its maximum efficiency.

At any rate, whatever the explanation may be, it is useful to know that a wave-trap often does two good things at once—cuts out interference and also improves receiver efficiency.

"Boomy" Reproduction.

A letter from a reader says "I have constructed a moving-coil loud speaker which gives a very 'deep' response and appears to have no high note output. Can you please tell me how I might improve it? I believe my set is above suspicion. I believe you were discussing this question some time ago, but I cannot find the reference."

The question of the particular characteristics of moving-coil loud speakers and the

freely floating, it may be supported at its edge by paper having a little extra stiffness, and this may be shellac varnished or cellulose varnished.

Anything which reduces the mass of the moving system, or increases the restoring force called into play when the moving system is displaced, will raise the natural frequency, and consequently will tend to make the speaker more responsive to the higher frequencies.

Test the Amplifier.

Incidentally, I suspect from the above letter that the receiver itself is *not* all that might be desired, and that the fault does not lie entirely in the moving-coil speaker. This, however, can very simply be discovered by trying one or two other types of speaker on the same receiver.

Personally, I have always had a great fondness for the moving-coil type of loud
(Continued on page 502.)

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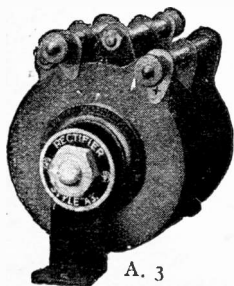
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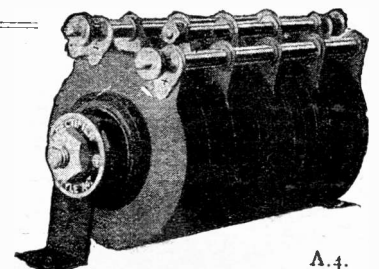
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TECHNICAL NOTES.

(Continued from page 500.)

speaker, notwithstanding its rather boomy quality, as by attention to simple precautions in the receiver and in the speaker this effect can be reduced to a minimum.

The baffle board is an important and essential feature of a moving-coil loud speaker, to which careful attention must be given if the best results are to be obtained.

Local Interference?

Another of my readers wants to know whether he is likely to suffer any inconvenience owing to the fact that in the neighbouring house two different radio receivers are usually in operation in two different rooms, one being a three-valve receiver working on an outdoor aerial, the other a portable set comprising five valves.

He says that "Inasmuch as there are eight valves in close proximity to my own three-valve receiver, there is probably a serious adverse effect caused to my reception."

It is extremely unlikely that the portable set will cause any interference whatever, and the only other possibility is that the three-valve set with the outdoor aerial receiver may produce some interference, but this again I think is very unlikely.

It is not a question of how many valves are employed in the aggregate, but rather the type of receiver in which they are used and the manner in which it is operated.

I should say that, in the circumstances in question, any interference from these two sets would be entirely negligible, and even the "absorption" effect would be quite inappreciable.

Receiver Design.

Ever since the early days of broadcast reception attempts have been made to produce a simple and practical receiver which can be operated on the "press-the-button" principle, so that an entirely unskilled listener can instantly receive any desired station within the range of the receiver.

To a certain extent these attempts have been successful, and, so far as a single station is concerned, there are plenty of radio sets which can truly be described as "press-the-button" sets.

When a number of different stations are to be included in the range of the instrument the problem, of course, is not quite so simple, but it has been solved with more or less success by providing a series of "buttons" marked with the different stations, or a dial upon which the names of the stations are marked and which only has to be turned to the desired station.

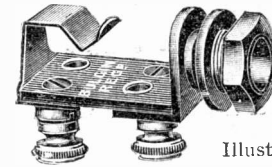
Simplified Operation.

Variations in the operating conditions of the receiver itself (as well as slight variations in the transmitted wave-lengths) have always made this problem a rather difficult one. Still, there is no doubt that to a large extent the receiver of the immediate future, at any rate so far as its really popular appeal is concerned, must be reduced to something like "press-the-button" simplicity of operation.

In the United States the radio industry is giving serious attention to this aspect of the design of wireless receivers, and at the forthcoming Radio Exhibition in London

(Continued on next page.)

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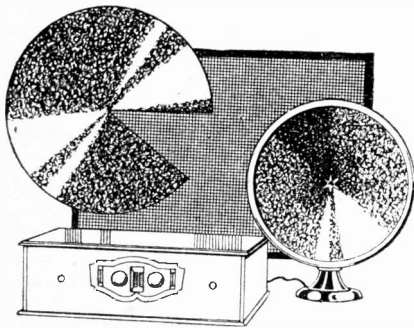
This is the question that Professor D. Fraser-Harris, M.D., D.Sc., the well-known lecturer and author, is asking in an intriguing article in this week's THIS AND THAT. The state of things on our roads at the present moment, in which every fine week-end brings a dozen deaths from motor accidents and every Bank Holiday a score, is one which too many people are apt to take for granted. "Is it true," Professor Fraser-Harris asks, "that Man's inventions have carried him over the border of the safety line?" Britain is the only country in the world where a licence to drive a car can be obtained without a medical certificate. How many drivers at present on our roads could honestly obtain such a certificate? Read this fascinating article TO-DAY in

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TECHNICAL NOTES.

(Continued from previous page.)

there will be several examples of wireless sets designed and constructed with this object in view.

"Losser" Volume Control.

One of the many methods of volume control which, in certain cases, is particularly convenient is to introduce a variable resistance of fairly high value into the secondary circuit of the receiver (for example, a detector and, say, two low-frequency amplifiers).

The resistance may be up to about 500 ohms, and when used in this way it has the advantage that it does not interfere with the quality of the reproduction; this, of course, is an essential to any proper system of volume control.

There are some methods of volume control which introduce distortion, and therefore cannot be considered as pure volume control methods. For instance, the simplest of all volume controls consists in slight detuning, but this is liable not only to cause bad quality of reproduction, but also actually to bring up (in the case of a selective set, and with two stations very close together) actual interference from a second station.

Flattens Tuning.

The method mentioned above, which is sometimes described as the "losser" method, although it does not upset the quality of reproduction, has the effect of flattening the tuning and consequently of diminishing the selectivity of the set. If you are working with stations close together on the dial, where selectivity is very important, this method of volume control may for this reason be unsuitable.

In a case where the losser method cannot be used, for the reasons mentioned above, it is better to use some form of volume control on the low-frequency side.

Counterpoise.

Although we are always advised to use a very short earth lead, many people find it impossible, owing to local conditions, to use a lead of less than, perhaps, 20 to 30 feet in length. I have several times been asked whether it is better in such a case to employ a counterpoise earth, that is, a kind of dummy aerial near the ground, or, at any rate, below the true aerial, which gives a counterpoise capacity effect similar to that produced by the earth itself.

It is difficult to state any general rule in the matter, but I should certainly say that in most cases it would be better to use even a longer earth lead than to go in for a counterpoise.

For one thing, the counterpoise is apt to be troublesome to instal, and for another thing, it is not so efficient as even a moderately good earth connection. The main point to bear in mind about the earth connection is not so much the length as the resistance and inductance.

Its inductance will almost certainly be negligible compared to the inductance already in the aerial circuit, and provided its ohmic resistance is kept very low (by using stout copper wire) there should be no serious drawback in an earth lead even 20 feet long or more.

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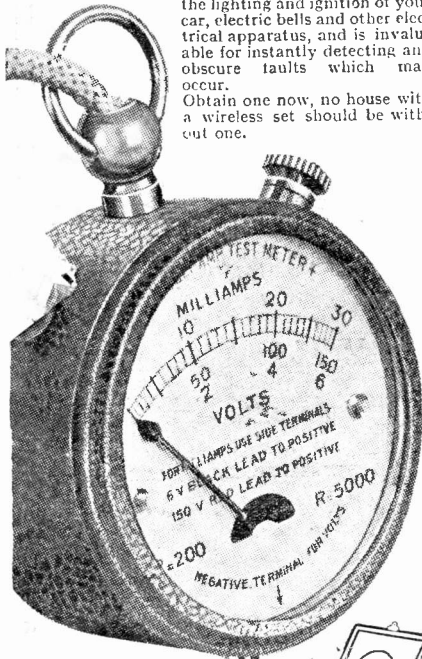
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FURTHER NORTHERN NOTES.

From our SPECIAL CORRESPONDENT

THE strange silence of the B.B.C. with regard to the disbandment of the Northern Wireless Orchestra has been cleared up by a decision which is surprising and totally unexpected.

Although the Glasgow orchestra was disbanded months ago and the B.B.C. announced its decision in April to disband the Birmingham orchestra next September, no definite statement concerning the future of the Northern Wireless Orchestra at Manchester has been made until I secured an announcement of policy from a B.B.C. official, the other day.

Local Talent, and Octets.

Previously it was known that the Manchester orchestra had been re-engaged on contracts which expire in September, and it was generally assumed that the Northern Wireless Orchestra would disappear at the same time as the Birmingham orchestra.

After the definite announcement regarding Birmingham, a similar statement was expected concerning the Manchester orchestra, but for two months B.B.C. officials met all the inquiries with non-committal answers; which leads one to assume that there has been a good deal of discussion on the subject within the B.B.C.

Now, however, I am told officially that the Northern Wireless Orchestra will certainly not be disbanded until the end of this year. Indeed, its existence may continue into the first quarter of next year. And then—

"The policy in the North Region will be the same as that in other regions," I am told, "namely, that instead of maintaining complete B.B.C. orchestras, tangible encouragement will be given to local orchestras and local talent generally. It is believed that smaller formations, such as octets, will be adequate for studio purposes."

Apparently the Northern Wireless Orchestra is to continue to exist until the North Regional station is in full service, after which North Regional broadcast orchestral music will be obtained from "outside" orchestras supplemented by an octet at Manchester.

Summer Relays.

During the summer concerts are regularly being relayed from such holiday resorts as Scarborough, Blackpool, Harrogate, Buxton Southport, Bridlington, and Whitby, and recently there have been such outstanding events as the running commentary on the T.T. motor-cycle race, on the "Britannic's" departure on her maiden voyage from Liverpool, and on the historic Tynwald Ceremony in the Isle of Man.

The Tynwald relay was part of the "Manx Week" featured by Northern stations, in which an excellent effort was made to "put across" something of the rich history, the haunting music, and the lore of the Isle of Man. An enterprising spirit was shown in these broadcasts—so far as they went. One could wish, however, for a little more showmanship.

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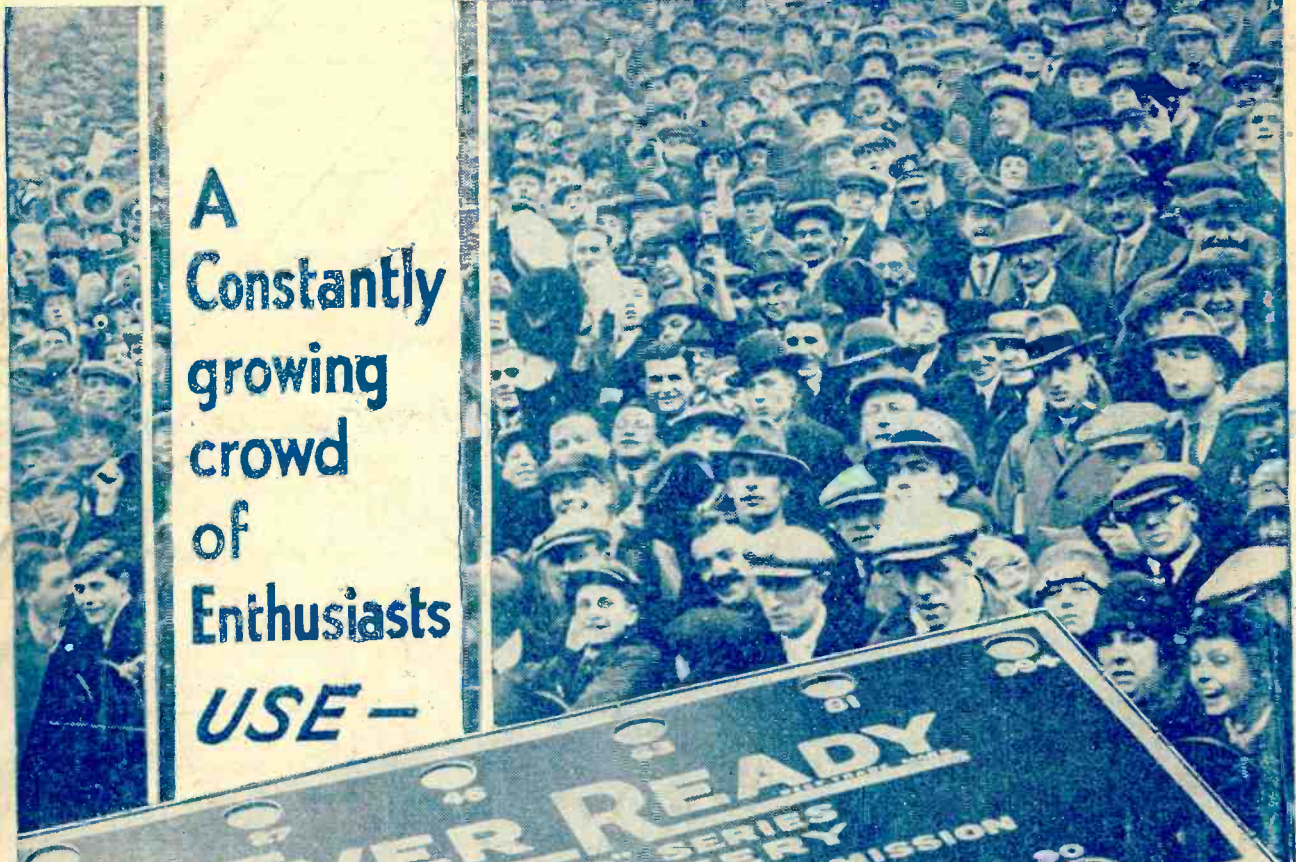
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