

THE B.B.C. INVESTIGATED (See Page 55)

LATEST TELEVISION NEWS

Popular Wireless

No. 617.
Vol. XXV.
March 31st,
1934.

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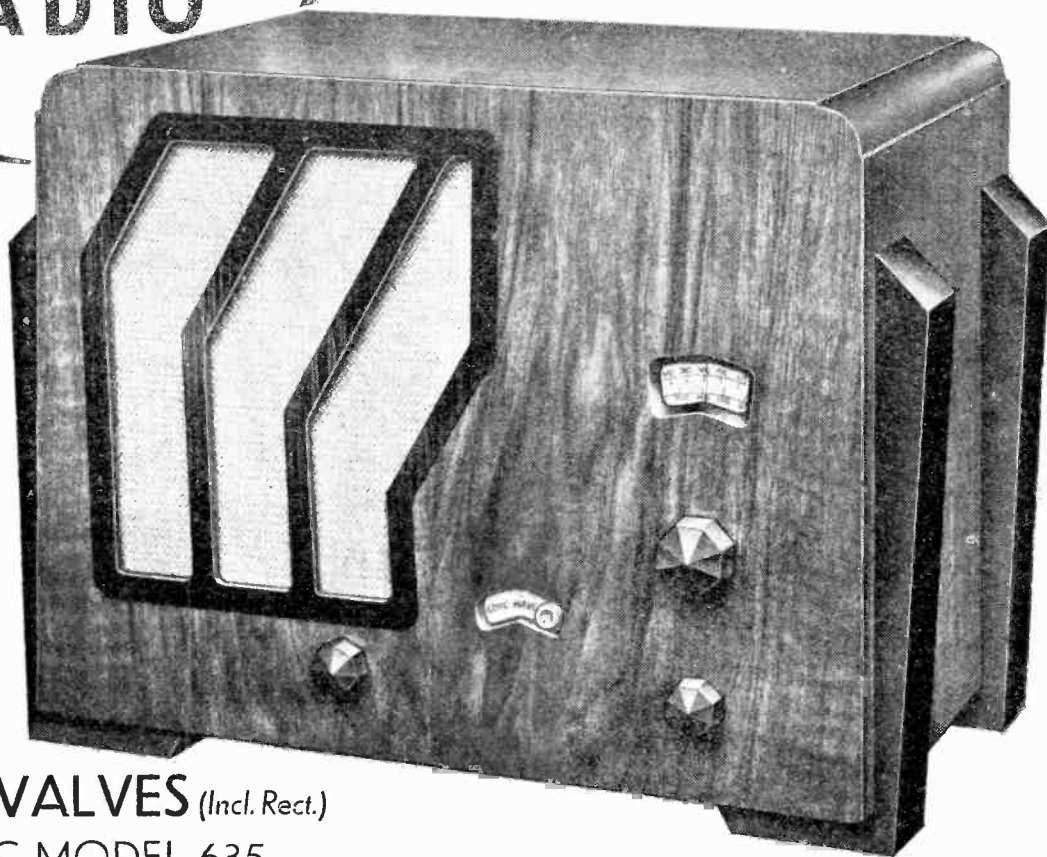
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POPULAR WIRELESS

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TELEVISION PROGRESS
PARENTAL CONTROL
LETTERS, PLEASE!
THE MYSTERY MAN

RADIO NOTES & NEWS

THE B.B.C. BOARD
POLDHU PASSES
"PRIVATE RIBBING"
INDISPENSABLE RADIO

Considered Words on Television.

IN the 1933 report of the Radio Corporation of America, which owns the great National Broadcasting Company, I find the usual note of caution concerning television: "Definite progress has been made . . .," but "Nevertheless some important problems relating not only to the technical side, but also the commercial side of television, still call for solution."

Again: "While it is impossible to anticipate the exact time when this development can be introduced on an industrial basis, it may nevertheless be said that the progress made . . . has brought us much nearer the goal . . ."

What Progress Has Been Made?

THE R.C.A. states that outstanding in television research during 1933 was the perfection by them of the "iconoscope"—an electric eye—which facilitates the "pick-up" of studio action and permits the broadcasting of remote scenes, thereby giving to the television transmitter the function of a camera lens.

By means of the "iconoscope," street scenes have been satisfactorily sent and received on an experimental basis. It is interesting to learn that they have produced valves for ultra-short waves so small that their diameter is five-eighths of an inch and the internal elements fitted into a space about the size of a pea.

Flash Messages.

N. A. C. (Beaworthy).—Many thanks for kind offer I.s. for Science Museum. Letter passed to Briggs. Admiration reciprocated.

R. L. G. (Clacton).—No; frankly I do not think influence of radio *altogether* good, but *so good* that would better for it, beyond all question. Same applies to "films."

D. D. (Liverpool).—Impossible reply your query. Many hobbies (chemistry, astronomy, etc.) as intellectual (probably more so), but radio is one of few *all-round* hobbies. Don't hesitate.

F. H. (Kensington).—In early days wireless operators certainly had simpler apparatus, but it was much trickier to handle and called for greater skill and patience. The usual story.

Why the Diffidence?

THE Hon. Sec. of the Exeter* and District Wireless Society tells me that it is extraordinarily difficult to induce amateurs to join a radio club, and he believes that the cause is the belief of many that clubs are mainly intended for experts and that the lectures will be above their heads.

That being so—for I think he is right—let me assure all hangers-back that their fears are unfounded, and that any club programme committee with vision and experience realises that the beginner is the best material, and acts accordingly.

ON OTHER PAGES

PAGE

55—"Alternatives are unsatisfactory; they should be more definite and continuous. Broadcasting should run from 8 in the morning until midnight."

57—"I have never yet found a play lasting more than an hour receive the undivided attention of more than half its audience."

58—"It might be better for all concerned if there were more uncensored debates and fewer 'middle' talks."

64—"I certainly do not expect Parliament to sanction the starting of any opposition broadcasting concern."

73—"They have decided to scrap valve pins."

In fact, membership of a "live" club soon turns radio greenhorns into expert amateurs. Hence I advise you to join up at once, wherever you are, if there is a club within a mile or so, and enjoy the spring and summer sessions.

Radio and Flight.

THE great importance which Imperial Airways attach to radio is now recognised by the Spanish air line which operates between Seville and the Canary Islands via Rabat, Casa Blanca, Mogador, Agadir and Cansaba and Fuerte Ventura.

The aircraft have been equipped with short and medium wave sets, and are easily able to keep in touch with both Madrid and

Las Palmas during the flight, as well as with other 'planes in flight.

The radio equipment is similar to that used by Imperial Airways on their "Atalanta" class aeroplanes on the African and Indian routes. Listen on 50 and 900 metres.

Why Sleep When You Can Listen?

E. G. W., a Windsor schoolboy—and a very nice one, I am sure—in reporting some glorious adventures amongst the wild Americans on S.W., gloomily adds that he was transferred to his lonely pallet by parental authority just as he was waiting breathlessly for a call-signal. "Why don't parents realise the thrill of S.W. listening?" he asks. Aha! perhaps some of them do, when the rightful owner is asleep, eh?

Never mind, young man; you have many years ahead of you for radio and other thrills—and the day may come when you will thrill at the thought of a good night's sleep. Cheerio!

Do It Now!

THE invitation of the B.B.C.'s Drama Director for correspondence on the subject of radio plays is a new sort of gesture, though none the less welcome because of that. I regard the play as almost the most important of the recreative items of a radio programme and as the one which, despite its satisfactory development so far, needs more study than any other except "talks."

Therefore I hope that there will be a prompt and overwhelming response to this opportunity to let the B.B.C. know what its public wants. Be brief, be clear, be helpful. I am going to write myself!

Licences in India.

I JUDGE from the Indian papers that the new regulations governing the issue of licences and the sale of wireless apparatus are not working quite so well as it was hoped they would. In fact, so far from checking the illegal working of sets, the regulations appear to be merely restricting sales.

Customers are objecting to giving their names and addresses when they are making cash purchases of articles such as grid leaks

(Continued on next page.)

THE BOY WHO SOLD NEWSPAPERS

However, the regulations were made in the interests of the public, and I hope that the authorities will persevere, even if some modifications have to be made as a result of experience.

A Pertinent Question.

REFERRING to an article entitled "An Efficient Indoor Aerial," recently published in "P.W." over the initials J. A. C., a Palmer's Green reader asks what happens when the carpet, through which the wire is threaded, has to be removed for spring cleaning.



Any married man knows the answer; but I will give it here in the interests of science and bachelors: The wire has to be *unthreaded* at the speed of light (186,200 miles per second)!

Dickensian, but Modern.

ONE cannot help noticing things. On my train I almost daily see an elderly man, with hair, face and beard like Thomas Carlyle, who never wears an overcoat, though in winter he permits himself a muffler. He is thin and wears a very short, everlasting buttoned-up jacket. Never has a newspaper, never smokes.

About twice a month he carries a small two-volt accumulator up to town, suspended from a bit of string. Let me be charitable to all men and assume that he *owns* a factory or office where he can get his cell charged for *noddings*.



What the Committee Advised—

SOMETHING recently impelled me to refer to the report of the Broadcasting Committee of 1923, which was set up by the then Postmaster-General. I find that the Committee recommended that the Board of the B.B.C. should be composed of an independent Chairman and twelve members, ten of whom should be "drawn from" the Department of Scientific and Industrial Research, County Councils Associations, Association of Municipal Corporations, Trade Union Congress, Post Office, Wireless Societies, Operating Concerns, Manufacturers, Press and Entertainment Industry.

—And What We Got.

NOW I think we shall agree that some of those bodies most decidedly call for representation on the Board, especially the last five mentioned. What we actually have is a Board consisting of the Rt. Hon. J. H. Whitley, D.C.L., LL.D., Mr. R. C. Norman, Mr. H. G. Brown, the Rt. Hon. the Viscount Bridgeman, LL.D., Mrs. M. A. Hamilton and Sir John Reith, LL.D.

The three LL.D.'s were certainly not drawn from any of the last five bodies; Mr. H. G. Brown is a financial adviser; and you can amuse yourselves by trying to fit in Mrs. Hamilton and Mr. Norman. I should be satisfied if we had *one* Governor drawn from the Entertainments Industry.

The End of a Veteran.

AFTER more than thirty years of useful life the historic Marconi station at Poldhu is to be closed. It was begun in 1900, took part in the immortal "three-dots-across-the-Atlantic" test which put long-distance wireless "on the map," became one of the best-known commercial stations in the world and in 1923 was handed over to Marconi's research men.

Its place in wireless annals and in the affectionate remembrance of the older generation of wireless men is assured, and if it is dismantled altogether I hope that someone will raise a fitting monument on its site.

The New Edison Memorial.

AND talking of monuments brings to my mind the fact that the International Edison Foundation plans to erect a mighty mausoleum and memorial tower over the mortal remains of Thomas Alva Edison. The work is to cost two million dollars and will take the form of a 350-foot marble shaft ending in two hands clasping a great electric light globe. At the base is to be a bronze statue of Edison and, behind, a landscaped park.

Not so bad for the poor boy who used to sell newspapers on the trains; but he really needs no other monument than his work and his character, which are more enduring than marble and more illuminating than artificial light.

"Sculptured Music."

JUST as the war greatly accelerated the study of radio, so the needs of broadcasting and the "talkies" have intensified research on sound. As an example of some of the results, consider the three-dimensional or "sculptured" music which was recently demonstrated by the Bell Telephone Laboratories in New York City.

The effects were produced by three specially designed loudspeakers placed on a stage in the same relative positions as three microphones in a distant studio, and gave the sensation of sound in three dimensions.

The Phantom Bugler.

AMONGST the queer things demonstrated was a "tap dance." It began with the dancer on the stage, but when he walked off the dance continued unaltered and then proceeded to trip all over the stage, finally dancing off in the opposite direction. A similar performance was given by an invisible bugler.

A sketch by hidden speakers gave the impression that they were actually on the stage, though invisible: for they were distinguishable quite easily by their voices and "movements," their positions as they shifted about the stage being plainly determinable. Finally, the bewitched audience

heard a revolver shot whistle across the stage, strike a target and then reverse and whistle its way back!

Thousands "Bifocalise."

STRANGE how this focused radio gets hold of one! I've just seen a joyous epistle from two real enthusiasts who are right under the influence of the focusing "bug."

Their letter makes fine reading and will tell you other constructors a deal more than I ever could in these notes. I believe the Editor is printing some of their remarks this week.

But I shan't be surprised to hear that most of you are building the set for yourselves. This focusing is fascinating. I've tried it, and could I drag myself away . . . ?

This Week's Translation.

HEADLINE to paragraph in American radio paper: "Private ribbing just a yawn to public." An announcer and a news reader employed on Station WGY



developed the habit of using the "mike" whilst gambolling with some private jokes of their own.

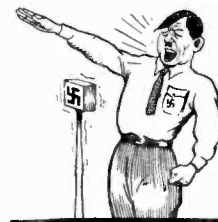
They were ordered to attend strictly to their legitimate business. The secret code quoted above means "The exchange of repartee in pursuance of a private joke bores third-party listeners."

But this one beats me: "Teaberry Gum Expands Mystery Disc Spots."

Radio—though Broke.

A FRANKFURT court has dispelled the idea that nothing but the baby's cradle is sacrosanct to a bailiff by ruling that a wireless set cannot be seized by a bailiff. The court's reason for this is that, in present-day Germany, radio receivers are indispensable.

I can understand that. Mere printing presses could not keep up with the torrent of decrees! All the same, to be left in one's house with a set, the rest of one's household effects being in the auction room, hardly makes for good citizenship.



A Return Match.

I OBSERVE that the New York "Daily News," referring to the B.B.C. commentary on the Harvey-Gains fight, said: "Those English sports announcers are very polite, and oh, so lackadaisical! . . . They describe the blows in the tones of a drawing-room dude asking for another cup of tea."

Slightly overdrawn. And I beg to retort that the American sports dittos describe events in slangful, hysterical torrents of words, in the tones of an excited kid peeping through a knot hole in the fence. I get rather tired of all that "Say, folks" stuff.

ARIEL.

THE B.B.C. INVESTIGATED

A FINAL SUMMING UP

WE have seen how the experimental re-organisation of the B.B.C., introduced last year, needs to be modified.

The division between "executives" and "creatives" should be reconsidered. It just doesn't work, however impressive it looks on paper. The theory that administrators would provide a facilitating service for creators has been disproved in practice. Administrators, whether they like it or not, have become obstructors.

What Really Counts.

Procedure of check and counter-check has reached ridiculous limits. The programme builders should be restored to their full executive authority. The principle of organisation should be confidence in the individual. If the programme staff cannot be fully trusted, then they should be changed. Given confidence in the individual, then the organisation itself should be simplified.

The only thing that counts is the signal that is received in the homes of the millions of humble people up and down the country for whom broadcasting exists. If this fundamental thought is always present there need be little trouble about schemes of organisation.

Having humanised the organisation, let us revert to programmes. The main thing wrong is the tendency to stabilise and reluctance to get out of accustomed ruts. The apportionment of time in standardised divisions is wrong; each programme should be considered as a whole for the listening period from 6 o'clock to midnight.

The irritating intervals should be abolished. There is room for much neater and more compact arrangement without going to the snappy extreme of American practice. Alternatives are unsatisfactory; they should be more definite and continuous. Broadcasting should run from 8 in the morning until midnight.

Let the B.B.C. concentrate on microphone production, keeping the transmitters energised. Announcing should be less stiff. The idea of standardising English should be abolished. Let announcers speak cultivated dialect and, above all, encourage them to be less formal.

Scrap the "Elephants."

The bias towards education and uplift should disappear. It would be an important and perhaps a decisive step in this direction if the two "Central Elephants" were scrapped. I mean the two pontifical and dreadfully respectable advisory educational councils, the one dealing with adult education and the other with schools.

Perhaps the latter could be spared, because, after all, the

By OUR SPECIAL INVESTIGATOR

For the past five weeks we have published exclusive stories about various important aspects of British broadcasting. Programmes, internal administration, the Regions, technical research—all have received their measure of attention. This week the conclusions at which our contributor has arrived are gathered together into one constructive criticism of the machine of broadcasting.

school transmissions do not invade peak listening periods. But there is no case for the former. The reason for starting it was to put the B.B.C. on the map among high-brows and educational pundits generally. It has long since outlived its usefulness and is now a definite menace to the programmes.

Gillie Would Show Them!

With this Council out of the way the B.B.C. would be free to deal with the real function of entertainment. Talks, no doubt, always will be with us, but they need not be dull. I think it would be a good plan to put the talks under Eric Maschwitz, the Director of Variety, who might do much worse than appoint Gillie Potter Director of Broadcast Education! Incidentally, there would be much more real education diffused than at present.

The Empire service needs reinvigorating.

THE NEW DIRECTOR OF EDUCATION?



"I think it would be a good plan," says our contributor, "to put the talks under the Director of Variety, who might do much worse than appoint Gillie Potter Director of Broadcast Education!" Here you see Mr. Potter in one of his characteristic Hogsnoton attitudes.

Malcolm Frost, the B.B.C. "traveller," who has been selling recorded programmes all over the Empire and the United States, has much practical experience of what the listening public overseas really wants. I would let him revise all the programme arrangements. The B.B.C. is spending about £40,000 a year on the present Empire service. Another £20,000 a year properly spent would make a vast difference. Also there should be much more enterprise and brightness in the presentation. Overseas listeners compare British programmes chiefly with American and Dutch competitors, who seem to make better use of inferior programme material.

Strengthen the Regions.

The B.B.C. Regions need strengthening.

They are admirably staffed, their chiefs being better qualified to build programmes than most of their colleagues in London. But they are starved of money and facilities. Regional programmes have been steadily becoming Londonised. About fifty per cent of their contents comes from the metropolis.

This is all wrong. Regions should be allowed and encouraged to put out really full-sized distinctive programmes. Not only would this mean a more varied and better service generally; it would give just that degree of competition that is now so sadly lacking.

In the old days, when there were about a score of stations, with perhaps half of them building their own programmes, there was something of the zest of real competition. Conditions now are much more favourable for this. The Regional transmitters are heard all over the country and far beyond. Each should develop its own tradition.

The B.B.C., as a whole, is well staffed. Once the over-emphasis on "organisation" is removed, the young and ambitious programme builders can be given their heads. And there should be new blood infused constantly.

They're Too Genteel.

Broadcasting House is not adventurous enough in its policy of staff recruitment. Over a year ago it was announced that the B.B.C. was on the look-out for a "reserve corps of bright young men and women" to be trained for jobs. So far as I can discover, the thing did not get beyond the good-resolution stage. There is too much "Is he a gentleman?" touch about the requirements. It would be better for broadcasting not to have so many "gentlemen" about.

On the money side the B.B.C. should be much more active than it is in trying to get the Treasury to disgorge more of the
(Continued on page 74.)

SUGGESTIONS FOR BETTER RESULTS

Tips that you will find helpful.

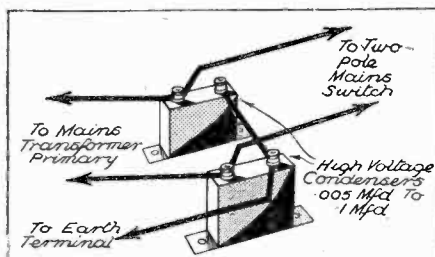
CURING MODULATED HUM.

ANY good A.C. mains operated set can be expected to give satisfactory hum-free reception. Occasionally a peculiar form of hum is experienced, and it is distinguished by the fact that it is only heard when a station carrier is tuned in.

This is usually termed "modulation hum," and is frequently caused by a long or inefficient earth connection.

If the earth cannot be improved the trouble can usually be cured by connecting two high-voltage-type fixed condensers of .005- to 1-mfd. capacity in series across the

A DOUBLE "BY-PASS"



The condensers are in series across the mains with their centre point earthed.

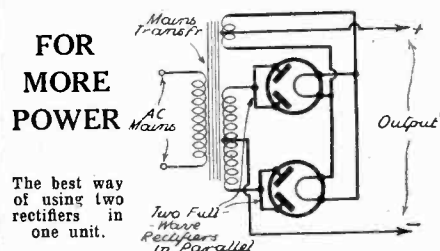
A.C. mains input, the centre point of the two condensers being connected to the earth terminal.

When these condensers are added the mains switch should be of the two-pole type and should be connected between the mains input and the leads to the transformer and condensers.

PARALLELING RECTIFIERS

WHEN it is necessary to use more than one full-wave rectifier valve in a mains unit it might appear that the obvious way to do this would be to connect two similar valves in parallel. Now, although results can be obtained with this

FOR MORE POWER



The best way of using two rectifiers in one unit.

arrangement, it is really very bad practice.

If the rectifiers are connected in this manner and one has a slightly lower impedance than the other—it is almost impossible to get two specimens exactly alike—it will take a heavier load. And eventually the lower impedance valve will take all the load, with detrimental results.

On the other hand, if the two rectifiers are connected in the manner shown above they at once become a pair of single-wave rectifiers, the loading being equally divided between them.

TESTING TRIMMING.

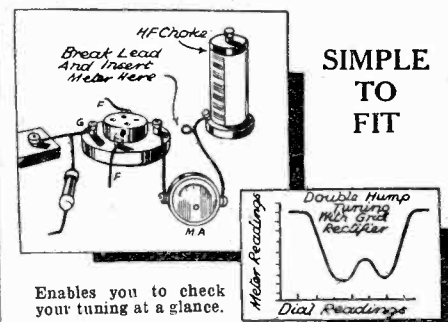
SOMETIMES it is difficult to tell when the trimmers of a gang condenser are adjusted to the best setting, and also whether the tuning is double humped—an undesirable condition if at all pronounced.

A milliammeter reading 0 to, say, 5 milliamps, connected in series with the anode of the detector valve, will soon show how the trimming and tuning is "going on." Its reading will drop, with grid rectification, as the best position of each trimmer is found.

The tuning can be checked by noting the meter's reading as the dial is moved across the tuning position of a certain station. If the reading falls to a certain value, rises well above this value and then drops again, double-hump tuning is present.

Just a slight rise in the middle does not matter very much if the circuit is of the bandpass type. (With an anode-bend rectifier the readings will increase instead of decrease at maximum tune.)

Incidentally an article on visual tuning methods appeared in "Popular Wireless" for February 24th.



Enables you to check your tuning at a glance.

SIMPLE TO FIT

TO-NIGHT is the exciting night. Yesterday evening my brother and I put the last connection in place on our "Bifocal Three," and now, having arrived home with the valves, we are itching to get our fingers on those two magic knobs.

The set looks a real beauty, and the faithful old friend which it is to replace is pushed away in a corner. It looks quite resigned to its fate, as though it knows full well it is a back number unable to cope with modern conditions.

The Great Moment Arrives.

Well, here goes. First of all the aerial and earth leads. Now the L.T. and next the H.T. Thank goodness we shall not have to buy new high-tension batteries so often now, due to the Westector economiser scheme.

On goes the last battery connection, G.B.—. (How strange it seems to be applying such a high voltage! Somehow it brings home the fact that really high-powered reproduction is now at our disposal.)

Last of all, there's the loudspeaker, giving a slight click as its connections are made. The valves are inserted in a moment.

By Jove! Our hands are shaking with the immensity of the moment, and we literally hold our breath as we reach out for the on-off switch.

Click! Silence! We wait a moment to make sure the pentode has warned to its work. Still silence!

Visions of hours spent in fault-finding rise up in our minds. But wait a moment: the tuning condensers are out of step.

TWO ENTHUSIASTS TRY FOCUSED RADIO

An account of first experiences with the "Bifocal Three," the set which incorporates the greatest advance of recent years in receiver design.

Eagerly we turn them and immediately hear stations, foreigners, one after the other, and then the local—a stentorian voice intoning the second news bulletin. What quality! And what selectivity that we should hear nothing simply because the dials were a little out of step!

The fact that the set has worked right away from the first try does not receive much thought from us. After all, we are used to this, for our previous sets have all been from designs set out in POPULAR WIRELESS, and we always make a definite point of keeping exactly to specification.

Fascinated by the sensitive feel of the set, we swing the dials backwards and forwards, revelling in the amazing number of stations rolling in—French, German, British, Russian, in fact all Europe is represented.

Shuts the Door on Interference.

Thought of Europe reminds us of the article in POPULAR WIRELESS for March 10th, "Europe in Focus," and then we realise that the focusing knobs are right out and therefore giving least selectivity. We also realise that many of the stations

have been coming in on top of one another. So we hasten to "be wise and focalise."

Selecting a spot of jazz that is coming through with an accompaniment of guttural wordage and soprano singing, we push in the two focusing knobs. The next moment we know that all the claims made for the "Bifocal Three" are more than justified.

The result is like opening the door of the room in which the dance music originates, going in and closing the door after us. The latter effect is produced by a little touch on the reaction condenser (previously set at zero) which brings the wanted music, now clear from all interference, up to full loudspeaker strength.

A New Experience.

It's all so simple, and we needs must play with the controls like a child with a new toy. It is a new experience for us—we are masters of the European ether.

Even stations formerly unobtainable come in with clearness and strength. Never before have we been so astounded by a single improvement in receiver design.

On the long waves the effect of focusing is similar, and we would be content to go on picking out station after station and then bringing it into focus. But the evening is well on its way, and "Here comes Charlie," so we bow to the wishes of the remainder of the family and tune him in.

Even so we do not cease to marvel. Such quality, such volume! What wonderful times we can look forward to!

Thank you, POPULAR WIRELESS; and thank you, the British Radio Industry.

C. M.

RADIO DRAMA and the ORDINARY LISTENER

In order to assist readers who are entering for the Radio Play Competition, **POPULAR WIRELESS** has published several articles by experts dealing with different aspects of radio drama. This week "An Ordinary Listener" has been asked to give his views—views which are of interest to every radio enthusiast, whether or not he has entered the competition.

By **JOHN C. ROBINSON**



I SUPPOSE, strictly speaking, I am not an "ordinary listener." My wife, who has suffered radio long and patiently, often calls me a most extraordinary listener. At the same time, by the accepted standards, I suppose the B.B.C. Drama Director would regard my listening activities with favour.

I take no credit for the fact that I try to reproduce in my own sitting-room those aids to the enjoyment of a play which the theatre presents to all its patrons.

My chair is a comfortable one. The lights are turned down a few minutes before the time of the play. You see, I enjoy my radio plays. I am ready to listen to anything which may be produced—tragedy, history, even comedy.

One thing only I ask. After I have taken the trouble to put myself in a receptive mood, to follow the instructions and suggestions given me for ideal listening, I do want the author of the play to make some effort on his part to create for me an atmosphere which I can turn to some account.

Radio Drama's Great Advantage.

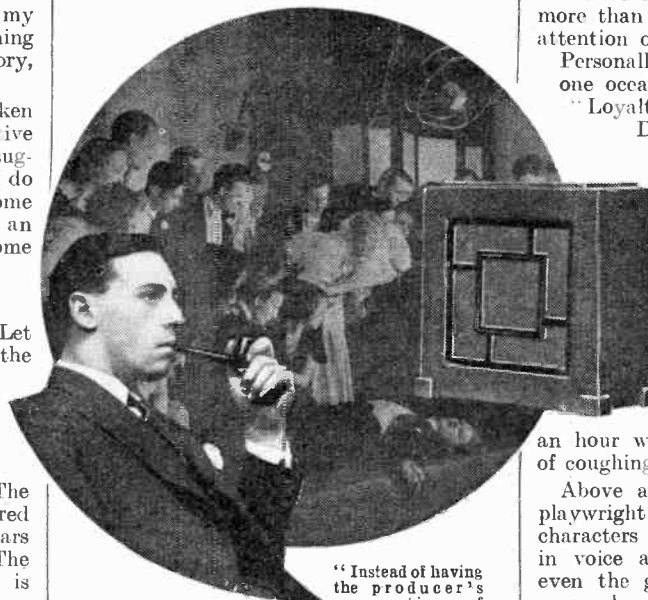
Perhaps I don't make myself clear. Let me explain further. When I go to the theatre and look at the programme of a new play I form my own ideas of what the scenes will be like and, to a slightly less degree, what the actors will look like. When the curtain goes up I am often disappointed. The "glade in a wood" which I had pictured to myself so clearly and in detail appears like no grove I have ever seen. The "lonely cove on the Cornish coast" is made to look like a fashionable watering-place in the South of France.

Here radio drama, as I see it, starts with a great advantage. Instead of having the producer's conception of a scene thrust upon him willy-nilly (as in the theatre), the radio listener is in the happy position of being able to build up his own

scene for himself as he would like it to be. The mind's eye is a useful thing!

Full Play to the Imagination.

And so I would ask the author of a radio play to give me the merest indication of what he wants his scene to be. He can do it by means of "effects"; by part of the dialogue. I leave it to him, but I do not want a narrator who tells me in detail what the author thinks the scene should be. If my imagination is not allowed full play, then the greatest appeal of a radio play is lost.



"Instead of having the producer's conception of a scene thrust upon him willy-nilly (as in the theatre), the radio listener is in the happy position of being able to build up his own scene for himself as he would like it to be. The mind's eye is a useful thing!"

The same reasoning applies—though, perhaps, not quite so strongly—to the characters in the play. To some extent, of

course, our conception of a character must be limited by his voice or by the things which the author puts in his mouth. But even here our imagination should be allowed a little latitude. Let every would-be author of radio plays avoid the stage direction which reads: "he is a small man, growing bald with his fifty years. He stoops slightly, though he wouldn't admit it, and wears a black overcoat and bowler hat."

How long can I listen? Here I speak not only for myself, but as a result of long experience in giving "listening parties" to many of my friends.

I have never yet found a play lasting more than an hour receive the undivided attention of more than half its audience.

Personally, I have managed on more than one occasion to listen to the very end. "Loyalties," "Obsession" and "Wild Decembers" are cases in point.

Patience and Concentration.

But as a general rule I would lay it down that no radio play should last for more than forty-five minutes. Those whose patience and concentration are strong will wish for more, which will do the dramatist no harm. Those who cannot, in the ordinary way, last out more than an hour will not have reached the stage of coughing and shuffling feet.

Above all, I would beseech the radio playwright to keep down the number of his characters and to make them so different in voice and manner that no one—not even the greatest dullard among listeners—can be in any doubt as to who is speaking.

Up to now many radio playwrights seem to have disregarded these obvious listening facts. I suppose they will do so in the future. But I have a feeling I shall listen to their plays all the same. Radio drama is great fun.

THE "POPULAR WIRELESS" FIFTY POUNDS PRIZE

"POPULAR WIRELESS" offers a prize of £50 to the reader who, before March 31st, sends an original radio play which, in the opinion of the judges, is the best submitted. The B.B.C. undertakes to produce and broadcast the winning play. There are no irritating restrictions, and the few simple rules were published on page 29 of last week's "POPULAR WIRELESS." Please note that your entry must bear a postmark not later than midnight of Saturday, March 31st.

THE small but gradually growing band of "Ten-Yearites," meaning those who have completed ten years' consecutive service in the B.B.C., are forming a club. Sir John Reith is senior by a fair margin with his twelve years or so. Sir Charles Carpendale, the brothers Wade, Captain Chilman and Percy Edgar are in the next batch. Then come Mr. Roger Eckersley and Commander Val Goldsmith.

It has become the custom for each official to entertain on the occasion of the tenth anniversary, which the B.B.C. marks by a grant of special leave and a small bonus.

The Colonel and the Programmes.

Now that Mr. Roger Eckersley has gone to America for a prolonged absence, Colonel Dawnay becomes Director of Programmes, in addition to his previous function of Controller of Programmes.

Just what the distinction of duties is I cannot say, but one thing is certain, and that is that the personality of Colonel Dawnay will be much more decisively implanted on the programmes.

With Mr. Charles Siepmann, the Talks Director, also on the other side of the Atlantic, attending an education congress at Columbus, Ohio, the direction of talks, too, will devolve on the colonel.

Politicians and the Talks.

By a curious coincidence both the Conservatives and the Labour Party have set up private committees to study what the B.B.C. is doing in politics and to suggest changes if necessary. There is a feeling at both extremes of politics that it might be better for all concerned if there were more uncensored debates and fewer "middle" talks.

There is, indeed, a strong probability that the two committees will reach much the same conclusions. This will provide a valuable lead for a Government inquiry later.

Television Grievances.

There is a good deal of organised agitation against the decision of the B.B.C. to ease off on low-definition television. But I have it on the best authority that Broadcasting House will not yield.

This determination is concentrated in Sir Charles Carpendale and Mr. Ashbridge, the Chief Engineer, both of whom are anxious to liquidate television liabilities as soon as possible. They claim the support of the best independent technical opinion.

"BIG BUSINESS" justified its claim to be something bigger and better than the usual run of musical shows by several fundamental features. "Big Business" had a story to tell like that successful musical show of a few weeks ago, "Love Needs a Waltz."

These two plays stand in a class by themselves, because, unlike most musical shows—on the stage as well as on the air—they had something more than a flimsy story to link up the series of bright and tinsel musical numbers. There seemed to be something humorous about Mr. Rigby's particular line of business—the manufacture of roller skates.

The dialogue of "Big Business" contained an unusual number of good lines. There was a publicity man, of course. How frequently we come across this brand of funny man in the entertainment world these days! I know this is an age of publicity, but, seeing that the stage and the screen both claim him as theirs, it's no novelty to find him in a radio production as well. Between the three media we are getting our fill of the publicity man. However, I prefer him via the unusual medium, for he isn't a picturesque figure as the theatre portrays him.

THE "TEN-YEAR" CLUB

Exclusive details of a select band of B.B.C. officials, together with other interesting news from Broadcasting House.

By O. H. M.

The Board of Governors.

In view of a recurrence of the rumour that there will be changes in the personnel of the B.B.C. Board of Governors at the end of the present year, I have made careful inquiries in Government circles and can say on the best authority that no changes are contemplated until it has been decided what to do with the B.B.C. after its Charter lapses at the end of 1936.

This, however, does not allow for

YOUR PROGRAMMES ARE HERE!



Somewhere in this maze of cables which is being moved to make room for the new Underground Railway station at Holborn, London, are the all-important B.B.C. telephone circuits! Actually 70,000 telephone circuits in 100 cables are involved, and during the alterations not a single circuit will be interfered with or put out of service.

THE LISTENER'S NOTEBOOK

Observations on programmes and personalities in British broadcasting.

Mr. Charles Heslop scored a distinct success. For sheer hard work his part will take some beating. I was interested also to hear Pat Taylor—of Step Sister's fame—in the cast. I had really never heard her before—I mean as a danseuse.

A clever item from the North Regional was Mr. Dunning's skit entitled "Forty Years On." Mr. F. E. Nichols, as a doddering old gentleman in retrospective mood, gave an amusing account of the adventurous spirit of the "thrilling thirties." Of course, he was speaking in 1974. The turn was remarkable for its refreshing humour.

The Café Collette orchestra succeeds in chasing all

resignations; but I have yet to hear that any of these are contemplated.

Talks by Unemployed.

An important series of talks which will throw a new light on unemployment is to be given at regular intervals throughout April, May and June. The talks will be given by unemployed men and women, and will be chiefly directed upon how they spend their enforced idleness and what they are doing to adjust themselves to the hardships and anxieties of their plight.

The series will no doubt cause a stir, and should result in some considerable interest in the work of voluntary social service, about which the Prince of Wales broadcast some time ago.

Detector Van in East Midlands.

The Post Office is going to have its little April joke by sending its detector van to the Nottingham, Mansfield, Newark, Grant-ham, Loughborough and Derby districts.

Wireless pirates in these localities are hereby warned to have their joke on the P.O. by taking out a licence. It's cheaper to pay 10s. at the post office than £2 to a magistrate, apart from the satisfaction of letting the P.O. sleuth hounds waste their time searching for somebody who does not exist.

The Red Marley Contests.

Since 1928 members of the Birmingham Motor Cycling Club have spent their Easter Monday holidays in competing a freak hill climb at Red Marley. This is not a long way from where the famous Shelsley Walsh hill climb for motor cars is held in Worcestershire.

This year the Red Marley contests will be the subject of a running commentary by Major Vernon Brook, who is an expert in giving this type of broadcast.

The commentary will be included in the National programme, and listeners will be able to share the thrills of possibly ten thousand spectators as the motor cyclists endeavour to negotiate the hill. This has no proper road surface, but some fearsome gradients, varying between one in ten to one in one and a half, which is steeper than most people can walk up, even on a dry surface and by digging their heels into the grass and loose stones!

There are certain to be spills, but motor cyclists were always tough sportsmen.

blues away, though they become a bit exhausting before they are through with their programme. I like them, however, because their style suggests they aren't the least bit jealous of the Cab Calloways, the Louis Armstrongs and the Duke Ellingtons. I am with them entirely. We want melody and more melody. If Henry Hall is still in doubt about his anti-crooners I advise him to listen to Henri Leoni and Aranka von Major. He would see what I mean immediately.

The B.B.C. took elaborate precautions, in the next of the series, to prevent a repetition of the "undelivered broadcast address" sensation. Really, one can't blame them, for broadcasting would be an undignified and ungovernable affair if broadcasters habitually behaved as Mr. Ferrie did. Yet the censorship persists, and listeners to whom this censorship is irritating will see in the measures taken by Mr. Ferrie more than a little justification.

When a Sunday programme contains both a Shakespeare and an instalment of the "Pilgrim's
(Continued on page 74.)

WE
CONTINUE

P.W.S.

COMPLETE SURVEY OF

MODERN

TELEVISION

By
G. P. KENDALL

THE general survey of television theory and practice which I have given in the previous articles in this series has now reached such a stage that I think the reader will feel it is time to pause for breath, so to speak. It is true that we have but skimmed lightly over the ground, but we have covered it after a fashion, and we are in a position to look round a bit and reflect upon the nature of the country we have seen.

Co-ordinating the Facts.

In the study of so large a subject one is apt to get confused by the mass of detail encountered unless a definite attempt is made to keep one's sense of perspective healthily at work, and I imagine a little help from me to that end will not be unwelcome to the reader who has made a conscientious endeavour to absorb all the highly concentrated information which I have been handing out for so many weeks.

There is another reason why it often pays to stop occasionally in the study of any rapidly developing art and make a conscious effort to co-ordinate the scattered facts which one has learned: in acquiring those facts one sees a good deal of the actual progress which is being made all the time, and if time is taken to reflect upon this side of the matter it is often possible to form interesting opinions as to the general direction in which that progress is moving.

I think it will have been apparent that the general trend of television research is at present following two main directions: one concerned with reception and one with the transmitting end.

At the receiver the great practical problem is undoubtedly to devise ways and means for obtaining a bigger and brighter picture, and we have seen many examples of the success which is being achieved. It is only a little while, really, since the practical limits of picture size were fixed by the dimensions of a little neon tube, and it was so feebly illuminated that it had to be observed in almost complete darkness.

The Question of Size.

Now, the common size for the picture in receivers such as anyone can possess is three inches by seven, and it is sufficiently bright to be seen quite clearly so long as a very moderate degree of darkening is provided.

This advance is largely the result of the development of receiving systems using a very powerful local source of light controlled by some sort of valve which is operated by the television signals, a typical example being found in the combination of a high-power electric bulb (run from the mains) and the Kerr cell, or the more recent Okolic-sanyi device.

On these lines active research is still proceeding, and I believe we shall see considerable further advances before very long. The ideal, of course, is a picture comparable in size and brilliance with that provided by a home cinematograph projector, and what I know of the work which

of detail would probably be rather disappointing if it was regularly seen on a really large screen.

Here we must turn to the transmitting side of the question, and we then find that we are up against what is really a radio problem. To get more detail we need more scanning lines on the picture, and it turns out that this in turn means a greater range of modulation frequencies in the transmitted wave.

A Difficult Radio Problem.

Unfortunately, such an increase is not permissible in a transmission on the present broadcast wavelengths, and so we find that the solution of the problem of a better picture by most of the existing systems is closely bound up with the exploration of new wavelengths for television.

Such exploration is proceeding, in this country, at the Crystal Palace, in Germany and America and elsewhere, and some very interesting results are being obtained. So far as the television apparatus is concerned, it is not unduly difficult to transmit and receive a picture with 120 or even 180 scanning lines, and such a picture is extremely satisfactory, giving really good definition and detail.

It is really a matter of finding a wavelength where such a transmission can be accommodated and which is capable of giving the desired results from a radio point of view. The search is a difficult and probably slow one, and there are those who consider that it is doomed to failure; but I notice that the people who are most closely concerned with it are also the most optimistic of final success.

The Search on Short Waves.

The subject is really a very large one, and I cannot hope to deal with it in any detail here.

The first experiments all tended towards really ultra-short waves of the order of seven to ten metres, but it now seems that the purely radio problems associated with such waves are so difficult that it may be some time before their true possibilities can be assessed. It appears, however, that there is considerable interest in waves around 50 metres.

be replaced by extensions of the mineral crystal and extra pairs of electrodes, a steady bias voltage being applied to these.

The scheme interested me, because I found it difficult to understand how adequate polarising effects could be obtained in this way. It now appears that it is actually very difficult, because I hear that one of the problems involved is to prevent the higher bias voltages from puncturing the thin plate of the mineral!

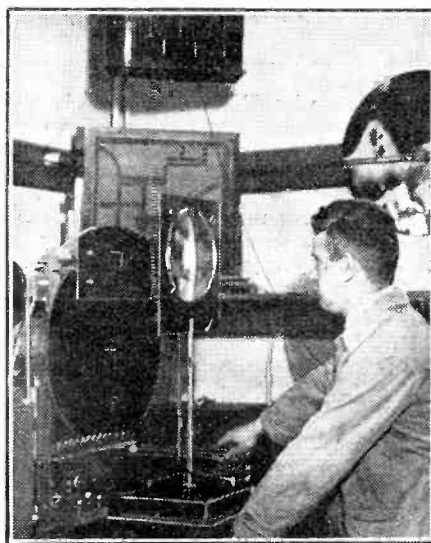
This would seem to suggest that the bias must be extremely high, probably running into thousands of volts, so I very much doubt whether the scheme has much of a future for amateur work.—G. P. K.

This article is in the nature of a summary, for in it Mr. Kendall "pauses for breath" and briefly reviews the progress we have made in our survey of modern television methods.

With his usual genius for accurate compression, our contributor here manages to put the position into the proverbial nutshell.

goes on ceaselessly behind the scenes convinces me that the realisation of that ideal is not so very far off.

To be sure, a larger and brighter picture is not the only improvement we want to see: more detail and better definition are required, too. The results we now get are highly interesting, but the present amount



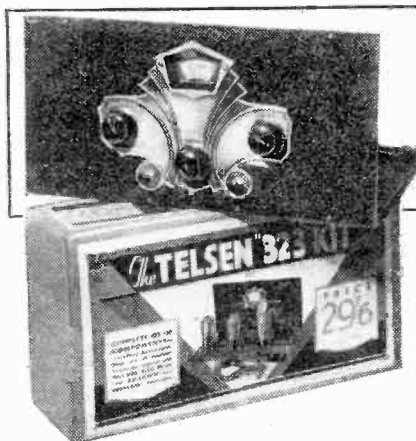
TO ENLARGE THE PICTURE

This German experimenter has mounted a large magnifying glass to increase the picture area, for, as Mr. Kendall points out, a great drawback of all the earlier apparatus is the small size of the received image.

A NEW LIGHT-CONTROL METHOD

Some further details of a recent American invention.

SOME few weeks ago I referred in these columns to a report I had received from an American source concerning an apparent improvement on the Okolic-sanyi light valve. In this it will be remembered that it was claimed that the Nicol prisms of the original arrangement could



KIT KRITICISMS

The TELSEN "323" KIT

By MR. PETER SIMPLE

THAT same extraordinary popularity of broadcasting which has seen the six million mark in licences reached and passed has brought with it a very natural demand for cheaper and simpler sets. Although the high-price level of commercial sets has been gradually dropping over the past years until an all-electric receiver of really reputable manufacture can be bought for less than a crystal set cost in the earliest days of POPULAR WIRELESS, there are still thousands of would-be listeners who must have something which costs not *comparatively* little, but really little.

That this means something which he can build for himself is obvious. The abolishing of factory costs is the first step towards cheaper radio in the home.

At the same time, the financial consideration is not always foremost in the mind of the man who sets out to build a kit set. There is a never-ending fascination not only in the actual process of building a receiver oneself, but also in the pride of owning and operating something which can be shown off to friends and neighbours with a well-justified "alone I did it"!

Obviously, then, it is no good a kit being cheap if it is not at the same time simple to build, simple to operate and satisfactory in its results.

Fulfills All Required.

Perhaps if one says that the Telsen "323" Kit is all these things it is the best praise we can give it. If any receiver fulfils all that is asked of it there can be nothing wrong with it either in conception or in practice.

But the "323" happens to cost only 29s. 6d., and because of this very fact there is a possibility that its merits may be overlooked.

There are several ways of building a cheap receiver—a receiver which costs less than thirty shillings. One way is to visit the side streets and markets and buy a lot of components from junk barrows. A bargain of any sort is beloved by the average Englishman. But a radio bargain is doubly enjoyed!

And what temptations there are! Transformers at half-a-crown, coils for a shilling or so, tuning condensers at a fraction of their original cost, valve holders for little

more than a song. I once built a receiver for myself at a cost of less than twelve shillings in this way, just to prove that it could be done!

That, as I say, is one way. It is a very excellent way—if you just want to have the fun of building a receiver and don't worry about getting any results out of it.

But there is another way. And that is to take advantage of the years of patient and exhaustive research, of the months of practical experiment which go into the preparation of every receiver issued to the public by the house of Telsen.

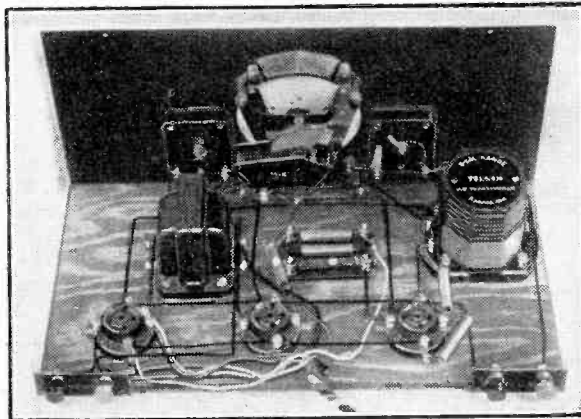
A Guarantee of Efficiency.

Every separate part in the "323"—and there are some twenty of them—is manufactured by Telsen themselves, a guarantee not only of initial efficiency but of long and faithful service.

Just a word about the arrangement of the "323" circuit and the results which you may expect from it. It is a proved fact that a modern three-valve receiver, built with simple apparatus, gives a performance which surpasses the complicated and expensive multi-valve receiver with which constructors were struggling only a short time ago.

That is why Telsen have made the "323" a "detector and two L.F." circuit. A dual-range aerial coil, with which is associated the tuning condenser and an aerial series condenser for greater selectivity under exacting modern conditions, forms the first stage, while the detector is resistance-capacity coupled to the low-

A SET THAT ALL CAN BUILD



The ease of construction of the "323" is greatly increased by the escutcheon assembly, front and back views of which are seen in the two pictures on this page. This photograph clearly shows the extreme simplicity of wiring which makes this new Telsen receiver a set that anyone can construct.

frequency stage. A transformer provides the coupling for the output stage.

Quality and volume, therefore, are the principal features of the design. The receiver is by no means limited to a few British stations. You will be able, under reasonable conditions, to secure quite a good bag of programmes. But as a result

of my tests I am sure that also as a quality receiver on local programmes the "323" is going to please innumerable listeners.

Finally, let me point out that the entire construction of this receiver can be carried out in less than an hour, and that, when it is complete, it presents that well-finished appearance associated with a commercial instrument. The only tools required are a screwdriver and a pair of pliers, every part (and this includes wire and screws) is included in the kit, the blue print is clear and gives no opportunity for mistake, while, above all, no technical knowledge of any kind is needed. In short, this is a family receiver not only in operation but also in building. Young Horace will find it as easy as anyone else—though I doubt whether many owners will let the building go out of their own hands!

GOING-GOING-GONE!

A timely warning against rushing haphazard into the search for radio bargains.

A BARGAIN is dear to the heart of man. Quite often it turns out to be dear in a sadder sense of the word.

That twin condenser, looking so alluring and so cheap, may prove a snare and a delusion. Ganging may be a hideous, perhaps impossible, task. Those tempting coils, gaily placarded "Originally cost £2 10s. Sale price, 7s. 6d.," will go to swell your junk box.

Just reflect a moment. Wound to suit the valves and conditions of bygone days, the bogies of instability and bad selectivity are firmly entrenched. And, talking of valves, avoid the unknown valve like a plague, the motley collection one sees lying in window corners ticketed from 1s. upwards. The nameless valve is notoriously greedy, and, apart from doubtful results, you will soon pay the difference in L.T. and H.T.

Beware of Cheap Mains Parts.

Switches, again—but volumes have been spoken of and to these little pests. You can get a switch for 1d. I have seen them. What's more, I have bought one. It worked. The setting was hypercritical, but it did work—at one point.

If you are a collector of antiques it may be worth your while to inspect those transformers modestly hiding behind the loud-speaker. If not—pass on.

Above all, don't buy components for D.C. or A.C. mains, particularly the latter, on the cheap. It is simply courting disaster. If your pocket must be considered, a good plan is to choose the products of some reputable firm squeezed out of business by economic conditions.

Recently, out of curiosity, I chanced an old demonstration three-valve S.G. receiver. Excluding valves, its cost was nearer 10s. than £1. For quality and pep it was excellent. But it has one trifling drawback.

The spread of the "local," over 100 miles away, is 30 degrees on the dial. Have you ever visited the annual World's Fair? If so, you will have a rough idea of its performance.

Still, there is no need to be too pessimistic. Perhaps, in years to come, first editions of famous sets and components may be topping the list at Christie's.

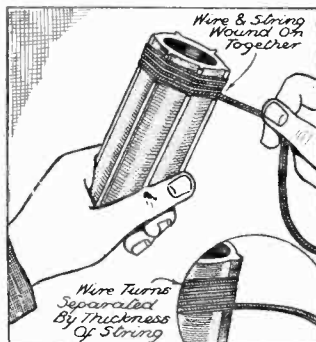
E. O'M.

Recommended WRINKLES

WINDING SPACED COILS.

WHEN winding coils for radio work it is not always desirable for the turns to touch one another. A very good method of obtaining good even spacing between turns is to wind on a piece of string at the same time as the wire.

After the coil has been completed, the string can be removed and you will then have a nicely spaced winding. The



This diagram shows the method of winding string and wire on to a former to give equal spacing, the string being removed later.

distance between the turns will, of course, be approximately equal to the diameter of the string.

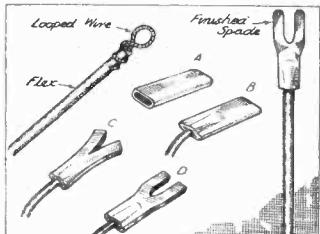
"TRANSPORTABLE" AERIALS

WIRE netting, suitably arranged, constitutes an excellent indoor aerial. The writer has in use a transportable receiver which is operated in one of several rooms.

To keep the receiver down to minimum size, the frame aerial was omitted and, instead, fine wire netting was tacked over the back of the sideboard in the dining-room and under the settee in the lounge. When the set is to be used in either room it is only necessary to connect the plug attached to the aerial terminal on the set to a socket fixed to the wire netting. See also column three.

NON-CORRODING SPADE TERMINALS.

VERY effective spade connectors for accumulator leads can be made up in a few minutes out of old pieces of lead casing from ordinary electric light cable in the following manner:



One of the many handy uses for the lead casing of electric light cable.

ONE GUINEA FOR THE BEST WRINKLE!

Readers are invited to send a short description, with sketch, of any original and practical radio idea. Each week £1 ls. will be paid for the best Wrinkle from a reader, and others published will be paid for at our usual rates.

Each hint must be on a separate sheet of paper, written on one side of the page only. Address your hints to the Technical Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4, marking the envelope "Recommended Wrinkles."

Will readers please note that the Editor cannot, in any circumstances, guarantee to return rejected Wrinkles, and that payment for published hints is not made until ten days after they appear?

The best Wrinkle last week was sent by Mr. E. C. Nickson, of 132, Worsley Road, Winton, Patricroft, Nr. Manchester, to whom a guinea is being awarded.

Cut off pieces of the lead tubing, about 1 1/2 inches long, and brighten up the insides with a small file. The pieces will appear as A. Next, bare the end of the flex or rubber-covered wire to be used. Make a loop, and insert about half-way into the lead tube, and flatten the latter with a hammer or pliers, as shown at B. This will securely grip the flex, at the same time making perfect electrical contact with the wire loop.

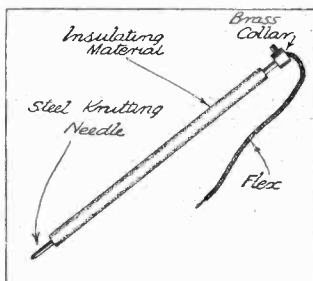
Then, with a pair of scissors or snips, make a cut about 1 in. long, as at C. Bend the two sections in to form a spade (D). Smooth off the rough edges with a file, and the connector is complete.

SIMPLE TESTING PRODS.

METAL prods are invaluable for testing purposes, since with a completed set it is rarely that one's fingers can be got into the nooks and crannies.

When the circuit is being tested for continuity some means of making contact from point to point is essential.

A very effective pair of suitable prods can be improvised from a couple of steel knitting needles. A length of systoflex or similar insulating sleeving



Systoflex covering a steel knitting needle makes a useful testing prod.

on each will ensure that no short-circuits can result, and to make a neat job for a permanent pair the ends of the sleeving can be bound with thin wire.

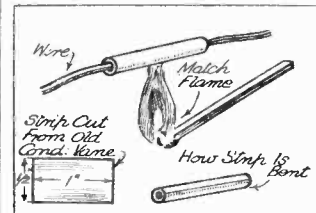
Flex wires can be attached to one end of each prod by means of small brass collars, such as are used for coupling switch spindles.

SOLDERING WITHOUT AN IRON.

HERE'S a tip for soldering together two wires when a hot soldering iron is not at hand:

Bare and twist together the two ends of wire to be soldered, and smear the joint lightly with flux. Cut one or two little pieces off a stick of solder, and press them into the joint also. Next fit

over the joint a tubulous aluminium shield which has been made from an old variable condenser vane. (See sketch.)



The solder inside the metal tube is heated by a match flame.

If a flaming match is now held underneath a fine connection will be the result.

AVOIDING UNSIGHTLY WIRES.

IT is not always necessary to erect a special aerial for a radio receiver. Very often a set is installed where it is inconvenient to fix an outside wire, and perhaps it is not desired to disfigure a room with untidy inside wires.

A very good substitute for an aerial can be obtained by connecting any fairly large unearthed metal framework to the set. A metal fender, a bedspring or any similar framework will suit quite well. It should be connected to the aerial terminal of the set in the same manner as an ordinary antenna.

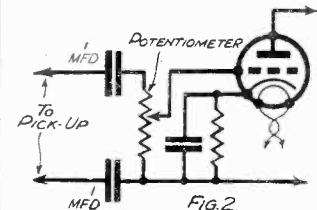
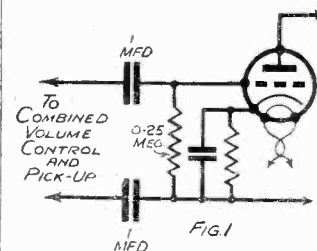
ALL-WAVE TUNING.

RECENTLY the writer had occasion to dismantle his S.G. three, using ganged condensers, in order to build an all-wave straight three, using six-pin coils. To get over the difficulty of the difference in maximum tuning capacities needed on the ordinary and short wavebands, he utilised the ganged '0005 condensers in rather a novel and certainly very useful way. The two sections of the condenser were simply connected together in series, and a shorting switch arranged on the panel to remove one of them from the circuit at will. In this way, with only one tuning dial, the maximum tuning capacity may be varied from a very useful '00025 on the short waves to the usual '0005 on the medium and long waves.

THE PICK-UP AND D.C. MAINS.

IT is advisable completely to isolate the pick-up from all D.C. potentials when working on D.C. mains. Using normal connections, the pick-up leads, and often the casing of the pick-up, are at the same potential above earth as the negative mains lead.

Consequently, when the positive main is earthed there is a potential difference between the pick-up and earth of the full mains voltage. If by any chance the pick-up and some earthed object are touched at the same time a shock will be received.



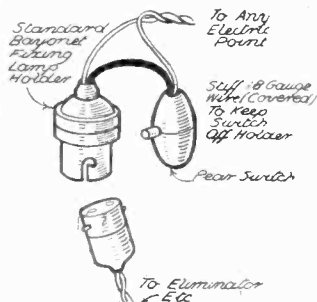
By using the condensers shown in this diagram a pick-up can be disconnected completely from D.C. mains.

Any chance of this happening can be overcome quite simply. Fig. 1 shows the circuit to be used when the volume control is combined with the pick-up. The circuit shown in Fig. 2 should be used when the volume control is on the amplifier. The value of the potentiometer should be that recommended by the makers of the pick-up.

HANDY SWITCHING.

MOST wireless enthusiasts want a light or electric point for eliminator, electric soldering iron or for some experiment, and when they do not desire to go to the expense or bother of fitting wall switches, etc., the following idea is useful.

A pear-type switch is wired in series with a lampholder, as shown in the diagram, one connection being of stiff rubber-covered wire to hold the pear switch and holder apart.



The stiff wire (shown black in the diagram) is used to keep the switch clear of the lampholder.

HOW GOOD IS YOUR VALVE?

The method of calculating the mutual conductance, or "goodness factor," of a valve is given this week as part of our **Beginners' Supplement**. Other useful radio terms are also lucidly explained.

By G. V. DOWDING, Associate I.E.E.

Mutual Conductance.

It is this which indicates the "goodness" of a valve and is the ratio of the change in plate current to the change in grid voltage.

It is the purpose of at least all amplifying valves to provide as large a change of anode current for a given grid-voltage variation as the conditions permit.

The amplification factor denotes the theoretical maximum of amplification possible with a valve, but, generally speaking, the higher the impedance for a given amplification factor the smaller will be the proportion of this theoretical amplification that is obtained in practice.

This will be clearly understood when it is realised that the impedance of the valve has to be "matched" by the external circuit, and that there are numerous restrictions on this latter.

It will also be easy to see that for a given amplification factor the lower the impedance the greater the mutual conductance, or grid-plate transconductance, as it is sometimes called.

GLOWING TESTIMONY



The many uses for a neon lamp (seen here in an ordinary lamp-holder) depend upon its curious property of glowing and becoming conductive only when the impressed voltage reaches a predetermined value.

The relationship between these three factors is, then, a straightforward one. A rough calculation of the mutual conductance of a valve can be made by multiplying the amplification factor by 1,000 and dividing the impedance into this.

Thus a valve has an amplification factor of 18 and its impedance is 12,000 ohms. 18 multiplied by 1,000 equal 18,000. This, divided by 12,000, is 1.5, and that roughly is the mutual conductance.

Often the mutual conductance appears in this manner: Mutual conductance—2 mA/V.

Interpreted, this means "two milliamperes per volt." In other words, a variation of grid voltage of 1 volt produces an anode-current change of 2 milliamperes.

It should be noted that "mu" is not an abbreviation of mutual conductance, but that it refers to amplification factor. Mutual conductance is usually denoted by Gm. or just "G."

It is the best single factor for judging the goodness of a valve, but it should not be indiscriminately used as a basis of judgment.

Mutual Inductance.

The degree of coupling that exists between two coils.

Natural Frequency.

The frequency at which resonance occurs in a circuit containing inductance and capacity; the frequency at which the circuit naturally tends to oscillate.

Likewise, the natural wavelength of a tuned circuit or of an aerial is that wavelength at which oscillation most readily occurs by virtue of the particular capacity and inductance that are present.

The term natural frequency or natural period is also mechanically applied. For example, if a loudspeaker diaphragm is said to have a natural frequency of 600 cycles it is at that frequency that it will tend most easily to vibrate.

Negative Pole.

A point at which exists a superfluity of electrons. Electrons, therefore, tend to flow from a negative pole to a positive pole, for the latter term indicates a point that is relatively deficient of electrons.

According to the old theory, electrical current flows from a positive to a negative pole, but the modern electron theory maintains that the flow is in the reverse direction.

Neon Lamp.

A device that has many electrical and radio uses. It

comprises a glass bulb filled with neon gas and containing two electrodes.

At a certain voltage current passes between the electrodes, and a glow is caused.

The intensity of the glow will vary as with differences in the applied voltage, and this is made use of in television in order to transform voltage variations into light fluctuations.

As a neon lamp will not glow at all before the voltage across its electrodes reaches a certain value it can be employed as a visual indicator for various special purposes.

For instance, it can be included in a tuning circuit to indicate when the current in it rises to a maximum point and resonance exists. One application of this idea is the neon lamp wavemeter, often used for checking transmitters. Another, the tuning indicator on receivers that shows when a station is tuned in by a small neon lamp glowing.

Neon lamps are also used as voltage stabilisers in mains units and in various forms of testing apparatus.

Ohm.

The unit of resistance.

Ohm's Law.

The most fundamental law of electricity, and fortunately one that is very simple. It epitomises the relationship between current, voltage and resistance in a circuit.

It can be expressed as:

Current (in amperes) = Voltage (in volts)

Resistance (in ohms).

From this it will be seen that, providing any two of these factors are known, it is easy to work out the other. The centre figure illustrates this clearly.

The letter indicating the unknown factor should be covered with the finger, and then the other two show the calculation necessary. Thus, to find current, cover the "C" with the finger. This leaves V divided by R.

To find voltage, cover the "V" with the finger. CR is left, and that is the arithmetical expression of C multiplied by R.

Working must always be done in volts, amperes and ohms, and milliamperes, megohms and other such units must accordingly be translated before the law is used.

The following are some examples of Ohm's Law:

1. A resistance is included in a circuit, and it is desired to know what voltage drop occurs across it. The resistance has a value of $\frac{1}{2}$ megohm. It is discovered that the current flowing through it is .1 milliamperes.

Ohm's Law states that voltage equals current multiplied by resistance. Therefore we multiply 500,000 (for $\frac{1}{2}$ megohm is 500,000 ohms) by .0001 (being .1 milliamperes expressed in amperes).

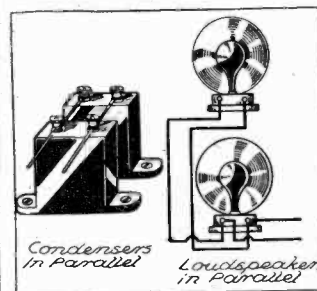
The result is 50. Thus 50 volts are "lost" in the resistance.

2. The filament rating of a valve is 2 volts, .1 ampere; what is the resistance of the filament?

Resistance equals voltage divided by current.

Therefore we divide 2 by .1, which is 20, and that is the resistance in ohms.

IN PARALLEL



Illustrating the meaning of parallel connections. In the two examples shown each component provides an independent path for the current.

3. A resistance of 500 ohms is connected across the terminals of a 2-volt secondary cell (accumulator); what will be the current flow?

Current equals voltage divided by resistance.

2 divided by 500 is .004. The current flow will be .004 amperes, and that is 4 milliamperes.

Open Circuit.

A broken circuit; a circuit that is incomplete and through which current cannot flow.

Oscillation.

Electrical vibration; the flow of high-frequency current in a circuit. When the power supplied is not sufficient to make up for the wastage of the current in heat while overcoming the resistance in the circuit, the oscillations die away or, in other words, are "damped."

If the wastage is made up the oscillations will be maintained, and this is what happens in a valve receiver when the reaction coil is closely coupled to the grid coil.

Oscillatory Circuit.

A circuit containing inductance and capacity and not more than a given resistance (dependent upon the resistance and capacity).

Such a circuit will oscillate at its natural frequency when supplied with energy from an external source.

The tuning circuits of a radio receiver are oscillatory circuits, and variable condensers are employed to vary their natural frequencies.



Continuing his search after quality reception, our Chief Radio Consultant explains how, in certain cases, a receiver designed to receive the carrier and only one set of sidebands from a "wanted" station can cut out "monkey chatter" and heterodynes.

SO last week you got the appearance of the European ether! In case your memory is week by week anaesthetised, let me tell you again what we found out. I expect the most compact revision of the facts is contained in Fig. 1.

Here you see a picture (purely imaginary) of a mass of stations spread over the frequency gamut. The technical committee of the European Union have arranged them to be much too close together—9 kc. apart.

The Perfect "Window."

When you "tune" you really slide a window across the spectrum. In Fig. 1 (b) I show this. I show a perfect "window"—no halation occurs, only the wanted light shines through.

"But not by tuning windows only comes the light." Unwanted stations shine through . . . and they might! See Fig. 1 (c), showing how some other stations shine through. The whole problem is to design a receiver which accepts all the wanted-station carrier and sidebands and rejects all others.

Now, I showed last week that you might get a weak unwanted station next to a strong wanted station, but a strong unwanted on the other side of the wanted.

If you could devise a receiver with a window only half as wide as the window in Fig. 1 (b), then you could accept the wanted-station carrier and one set of sidebands, but you would reject those sidebands of the wanted station interfered with by the powerful unwanted.

Single Sideband Reception.

This so-called "single sideband reception" is only effective, of course, when the wanted station has one weak neighbour. But cases do occur where the wanted station is interfered with by only one neighbour, so that there is a practical value in the consideration of the hypothetical case.

Question: How can a receiver be designed to accept only one set of sidebands plus carrier? Answer: The superheterodyne receiver can be designed to accept only one set of sidebands plus carrier.

This is the real recommendation for this type of receiver. I see no other advantage. Permeability

tuning, where the all-important ratio, coil inductance to coil resistance, is kept constant, achieves a perfectly uniform response over the whole waveband.

True, it introduces mechanical ganging problems, but also—and more so for perfection—does the superhet. There never was a purely technological problem that fails to get solved at long last. So I say: "Don't let's hold up the argument for detail."

Let's stick to the point that the superheterodyne can achieve, more easily than any other type of circuit, that desirable square-window tuning so narrow that it lets through only carrier and one set of sidebands (not carrier and two sets of sidebands) and as clear cut as in Fig. 1 (b).

You know why, of course. The superheterodyne works by introducing an oscillation of, say, 100 kc. difference

frequency from the frequency of the wanted carrier and rectifying the component to make always that same 100 kc. frequency.

Thus, if the wanted station is 1,100 kc./sec. frequency, then the oscillation is made 1,200 kc./sec. (1,200 minus 1,100 = 100). If the wanted station is of 600 kc./sec. frequency, then the oscillation is tuned to 700 kc./sec. (700 minus 600 = 100).

A Constant Beat Frequency.

Thus, by adjusting the oscillator to be always the same difference frequency from the carrier of the wanted station, we get the same "beat" frequency set up (after rectification). This rectification is done in the so-called first detector. So this intermediate or beat frequency has always the same frequency—and it is a much lower frequency than the wanted carrier. There is

thus the intriguing possibility of doing all the filtration at a fixed, same, invariable, inviolable frequency and to make that frequency low.

Thus a great difficulty—avoided in a superheterodyne—is to design sharp cut-off filters to perform their proper functions at different frequencies and to make them adjustable by one handle to those frequencies. It can be done, and is done well, by permeability tuners, but it can be more easily and better done at a fixed frequency.

Eliminating Heterodynes.

So that, if I were asked to design the perfect receiver, I would design it on the superheterodyne principle, because it would give me this facility of making a very good sharp "window." I can, in fact, make my window so narrow that it will accept only carrier plus one set of sidebands. And this may be a great facility, and will allow me to cut out monkey "chatter" and heterodynes.

Of course there are lots and lots of difficulties. I very much doubt if, in cheap commercial designs of superheterodyne receivers, the advantages I have outlined as possibilities can be realised as practice at the price. Perhaps, however, the user automatically adjusts his receiver to do the best possible. I don't know.

Thus our summary is that the super gives us, if properly designed and if properly adjusted, a new facility—that of single sideband reception. Next week I shall deal with the transmission end.

PROBLEMS OF TUNING

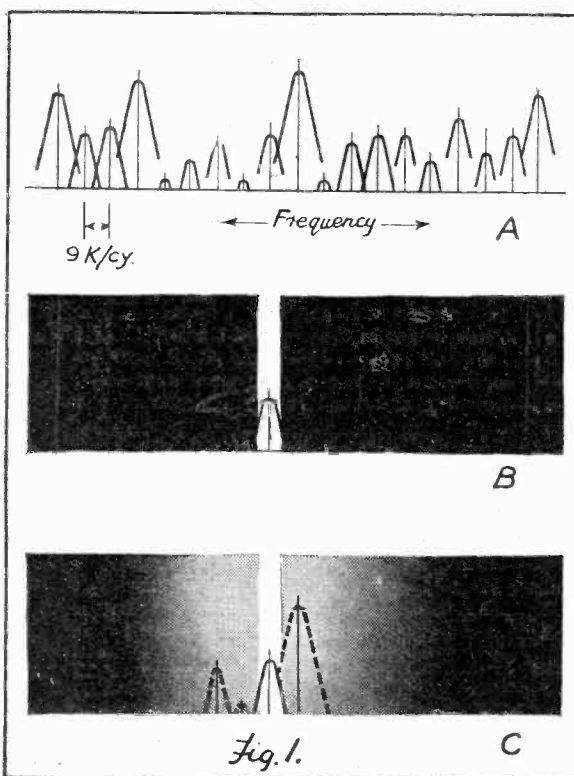


Fig. 1. Fig. A is a rough diagrammatic representation of the state of the European ether with stations so close together that their sidebands must, in many cases, overlap. Fig. B is an ideal tuning "window" with the wanted station only appearing clear-cut in the opening. Fig. C is more akin to common practice with unwanted stations shining through on each side of the opening.

OUTSIDE "THE BIG HOUSE."

THE B.B.C. IN THE PUBLIC EYE

"SHOOTING" THE BROADCASTERS

Exclusive details about the new film of broadcasting.

"O. K. Cut. Save 'em." The giant arcs dimmed as the cameras stop clicking and the microphone is switched off. "And now, Sir John," the director is saying, "we want a little more austerity in that scene where you are letting the rest of the B.B.C. Board know what you think about the latest indiscretions of the programme staff."

The B.B.C. is starring in a film to be made during the next few months and shown in the early autumn—and is this a brief picture of a scene at the film studios, or at Broadcasting House during the shooting of it? It is *not*.

When we heard that the B.B.C. was going to follow America's lead and be the star in a British "Big Broadcast" we shuddered.

Haunting visions swept over us of the Director-General hanging on to several telephones at once, the while he vigorously rolled chewing gum from one side of his face to the other and yapped down the phone to the various departments. It surely could not be true.

No Sloppy Sentiment.

Yet the B.B.C. is to be filmed. That much is true. And the click of the cameras may even now be heard in the otherwise soundless corridors and rooms of the stately seat of British broadcasting. But of desecration there will be none.

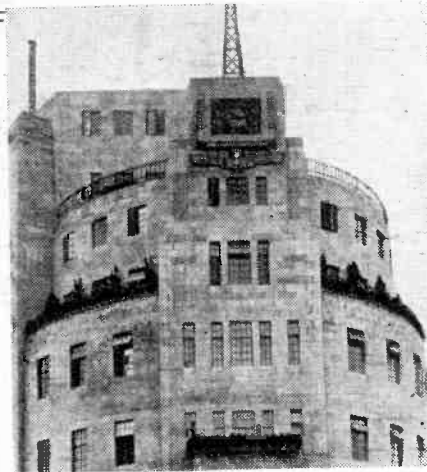
No sloppy sentiment is to come into the story, and we suspect that even the Eight Step Sisters, should they appear, will be heavily veiled and most decorously covered!

But Henry Hall and his band will be well to the fore, having about 10 out of the total 50 minutes. The theme of the film is the history of the B.B.C. and there will be shots of the new long-waver at Droitwich.

The Post Office is making the film; it is to last about 50 minutes and will cost £7,000 or £8,000 to produce.

We are looking forward to the release; we want to see how the B.B.C. wishes to appear to the public it serves. We hope it will not be too coldly formal.

While critics inside and outside Parliament are hard at work pillorying broadcasting in its administrative aspects, the technical department of the B.B.C. continues to expand on all sides.



WHY TELEVISION LAGS BEHIND

Sir Ambrose Fleming criticises the monopoly of the B.B.C. as a drag on progress.

THE views of thousands of listeners were accurately expressed at the recent meeting of the Television Society in London, when Sir Ambrose Fleming referred to the B.B.C.'s attitude to television as "over-cautious and unenterprising."

There has long been a feeling among those whose entertainment comes, chiefly, from over the air that any chance television might have of being brought into the realms of "practical politics" is being minimised by the monopoly control—so far as public presentation is concerned—of the B.B.C.

"Television," said Sir Ambrose in his presidential speech, "has not yet had a fair chance to prove its entertainment value. There should be programmes at an hour when people want to listen. Television is in the grasp of the B.B.C. and its small group of Governors. Premature legislation can easily cripple a nascent industry and bind it in bandages of red tape."

It is interesting to note that Sir Ambrose, who for more than fifty years has been practically connected with all forms of sound transmission, should now be turning his attention so seriously to the transmission of light. He advocates an extension of the period of patent protection from its present 14 years, as well as a broadcasting court of appeal representative of the public.

THE CONTROL OF THE B.B.C.

Parliamentary protest against the present constitution.

THE rumblings at the foundations of the B.B.C. continue. Parliament has been talking about the complaints concerning the administration and the programmes that have been voiced abroad lately.

Mr. Holford Knight, K.C., has done much to bring the matter to a head, and with other members of the House has handed in a motion asking for the setting up of a Select Committee to investigate thoroughly the powers, administration, finance and expenditure of the B.B.C.

"The Charter expires in 1936," said Mr. Holford Knight, "and these things ought to be looked into well in advance of the expiry date."

"So many complaints have reached not only the Press, but myself and other members, that the setting up of a Committee is a vital necessity. Obviously something is wrong with the B.B.C. for so many listeners to be dissatisfied."

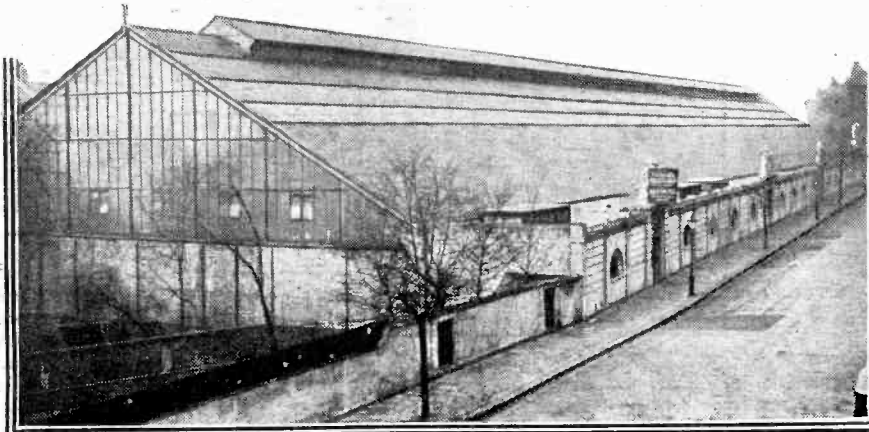
"It is Preposterous."

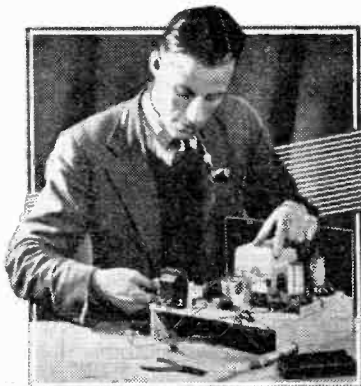
"There is no question of the Charter not being renewed. I certainly do not expect Parliament to sanction the starting of any opposition broadcasting concern, as has been suggested, and certainly not any company organised by American interests. Such an idea is preposterous and we should not stand for it."

"We are not picking any particular holes in the B.B.C.; it is just a matter of a general overhaul of the Charter viewed in the light of the recent mass of criticism that has been levelled at the Corporation by British listeners."

In other quarters the storm against a "hush-hush monopoly," as the B.B.C. is called, is rapidly growing and is liable to break at any moment.

To the new research laboratories in Balham have been added the television studio in Portland Place and the old Maida Vale skating rink, which you see here before the engineers started on its conversion into the latest studio.





The CONTRAPHASE 4

THE Contra-phase principle of economy has proved one of the most successful and popular ever introduced to "P.W." readers. Of that there is not the slightest doubt.

A very large number of constructors built the "Double X Three" in which the scheme first appeared, but an even larger number applied it to their existing sets.

It is not hard to find a reason for this; "Contra-phasing" saves money. Its first costs, the costs of including it in a set, are a matter of only two or three shillings, and these are very soon wiped off by the saving of H.T. that results.

"Electric Gearing."

But although, as I have said, many readers have added the system to existing sets, this is not a course we recommend. We prefer to see it introduced as an integral part of a design.

It requires only a couple of fixed condensers over and above the volume control, which would, in all probability, be used in any case.

It is, in fact, largely a circuitual development and one that is as novel as it is effective and valuable.

Obviously, it is one of the special features of this "Contra-phase Four"—the name of the set indicates that. Many of you already know all about the scheme, but we have garnered so many new readers during the past few months that a few words of explanation are called for.

The object of the Contra-phase is to give the set a kind of electrical gearing.

In the ordinary way a receiver works full out all the time, whatever the programme that is being received.

This is as bad as having a car of forty horsepower roaring away with the full strength of its forty horses at all speeds. Clearly, to use power in such a manner is decidedly uneconomical.

Considerable Economy Effected.

The Contra-phase control comprises a potentiometer with a switch mechanism incorporated in it. (A quite standard component, by the way.)

The potentiometer operates as a volume control, but in a very special way. It moves the aerial input of the set over from the S.G. valve to the detector, and at minimum the S.G. valve is automatically switched right out of action.

AN ABSOLUTELY UNIQUE FOUR-VALVER of astounding range, exclusively

FEATURING—

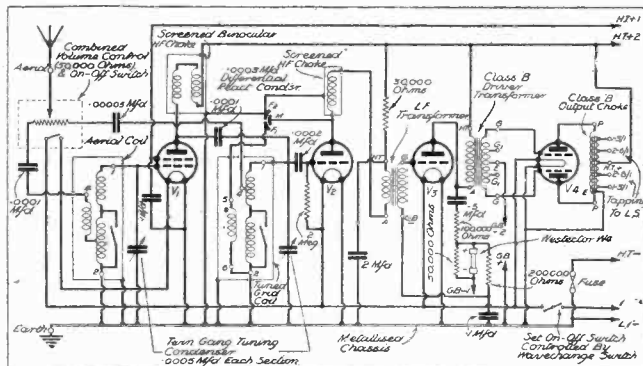
AUTOMATIC QUIESCENCE CONTROL

for Economy.

CLASS B OUTPUT STAGE for Power and Quality.

CONTRA-PHASE CONTROL of the S.G. Stage for using either 3 or 4 valves, as necessary.

Designed and described by
G. V. DOWDING, Associate I.E.E.



A CIRCUIT TO STUDY

The combined volume control and on-off switch (left) is the Contra-phase control that switches the input from the aerial either to the S.G. valve or direct to the detector. In this event the S.G. valve is automatically switched right off and uses no H.T. or L.T.

Note, too, the "Westector," which is used in an ingenious economiser circuit between plate and filament of the driver valve V3. The last valve is one of the Class B type, with tapped choke output for matching your loudspeaker.

So the power of the set is exactly set for the requirements of the moment. Were the "Contra-phase Four" of normal design all its four valves would be in action for the reception of the local station as well as for distant listening.

If the total hours per month when the average set is used only for local reception were totalled up, it would be found that considerable wastage must occur by this extravagant method.

The Output Stage.

For local and other powerful station reception the screened-grid valve, with its none-too-light consumption of H.T. current, is usually absolutely unnecessary, and in such circumstances the "Contra-phase Four" becomes a three-valve set; but even then not an ordinary three-valve set, for the Contra-phase principle is extended.

There is a stage of Class B for great output and good quality at a low average H.T. As you will all be aware, Class B draws an H.T. current proportionate to the volume. When there are only quiet passages of speech or music the current is small, and it drops even lower during programme pauses.

With every increase of volume the current rises—but only in proportion. You pay for the volume that is delivered by the loudspeaker—not continually and all the time for the probable peaks which normally must be legislated for, but which, in practice, seldom occur.

Further Saving Accomplished.

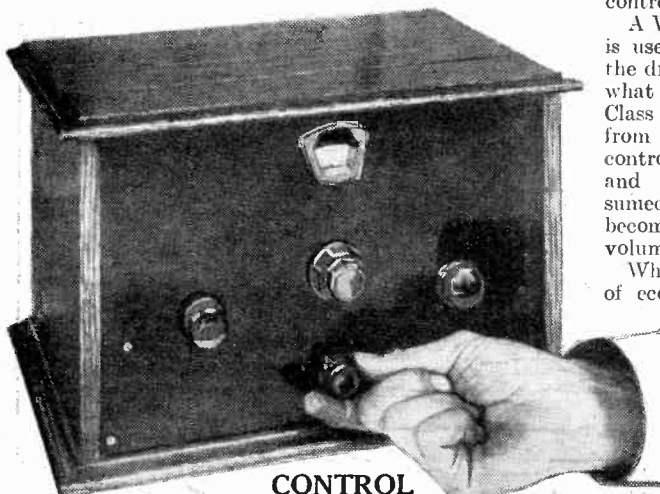
But our economy does not stop there. The driver valve, the L.F. valve which follows the detector, incorporates another "P.W." scheme—automatic quiescence control.

A Westector metal rectifier is used for this, and it makes the driver valve act in a somewhat similar manner to the Class B stage. The output from the driver is made to control the driver's grid bias, and the H.T. current consumed by this valve, too, becomes proportionate to the volume.

What a magnificent team of economy workers!

The Contra-phase control adjusts the sensitivity of the set, and, when it does not require the S.G. valve in order to pull in a station with the desired power, the mere act of adjusting

(Continued on next page.)



The vital Contra-phase control is placed centrally at the bottom. Above it is the tuning condenser, with reaction to the right, and the combined wavechange and on-off switch to the left.

THE "CONTRA-PHASE 4"

(Continued from previous page.)

for the volume and taking this down to minimum switches the valve out of action.

Meanwhile, and during the whole time the set is working, both the driver valve and the Class B valve (both of them, note) take only that proportion of H.T. current required for the volume the loudspeaker is delivering.

Yet the quality is unaffected. The same purity is there, whatever the dimensions of the sound waves created.

It may stagger some of you, but it is, nevertheless, an absolute fact that the "Contra-phase Four," at minimum sensitivity and for quiet passages of music, takes only a mere five milliamperes or so of H.T. current!

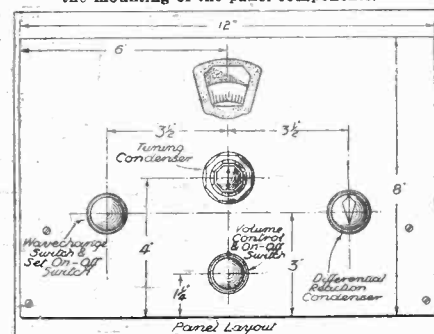
Handles Big Output Power.

And yet its power-handling capabilities are immense. It will work a large moving-coil loudspeaker and give "mains" results. And a touch of the Contra-phase control will make it spring into an abounding energy, with a sensitivity such that the far-distant transmitters are pulled in with uncanny facility.

Its selectivity is that of its coils—two screened units of modern design.

DRILLING THE PANEL

Follow the few dimensions shown here for the mounting of the panel components.

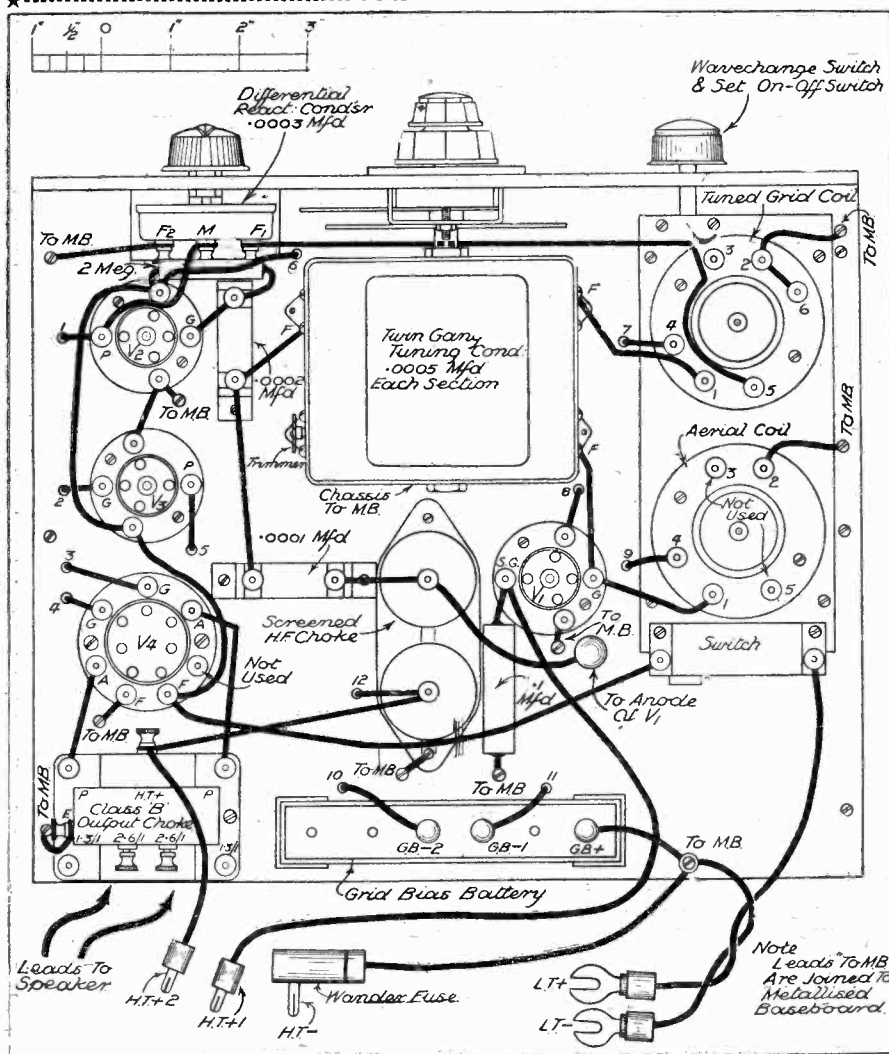


THE "CONTRA-PHASE FOUR" COMPONENTS—MAKES AND TYPES TO USE

- 1 J. B. Unitune 2-gang .0005-mfd. tuning condenser.
- 1 Lissen 2-gang coil unit with on-off switch, type L.N.5161.
- 3 W.B. small-type 4-pin valve holders, or Telsen, Benjamin, Lissen.
- 1 W.B. 7-pin valve holder, or Benjamin, Telsen, Lissen.
- 1 Telsen screened binocular H.F. choke, or Graham Farish.
- 1 Graham Farish screened H.F. choke, type H.M.S., or Bulgin, Telsen, Wearite.
- 1 Telsen .0003-mfd. differential reaction condenser, or Graham Farish, B.R.G., Polar.
- 1 R.I. Hypermite L.F. transformer, or Varley, Lissen.
- 1 Igranic Class B driver transformer, or Varley, Ferranti, Lissen, R.I., B.R.G.
- 1 B.R.G. Class B output choke, or Ferranti, R.I.

- 1 T.C.C. 2-mfd. fixed condenser, type 59, or Graham Farish.
- 1 Dubilier 5-mfd. fixed condenser, type 4408, or T.C.C.
- 2 T.C.C. 1-mfd. fixed condensers, type 250, or Dubilier.
- 1 Dubilier .0002-mfd. fixed condenser, type 620, or T.C.C., Lissen, Graham Farish.
- 1 Dubilier .0001-mfd. fixed condenser, type 620, or T.C.C., Graham Farish, Lissen.
- 1 Dubilier .0001-mfd. fixed condenser, type 670.
- 1 Dubilier .00005-mfd. fixed condenser, type 685, or T.C.C.
- 1 Graham Farish 100,000-ohm 11-watt type Ohmite resistance in horizontal holder.
- 1 Graham Farish 50,000-ohm 11-watt type Ohmite resistance in horizontal holder.
- 1 Graham Farish 200,000-ohm 11-watt type Ohmite resistance in horizontal holder.

- 1 Erie 30,000-ohm 1-watt type resistance with wire ends or terminals, or Dubilier, Graham Farish, Bulgin, Varley.
- 1 Lissen 2-meg. grid leak with wire ends, or Varley, Bulgin, Erie, Dubilier.
- 1 Westinghouse "Westector," type W.4.
- 1 Bulgin 50,000-ohm potentiometer with on-off switch, type V.S.36.
- 1 pair Bulgin grid-bias battery clips, type No. 1.
- 1 Peto-Scott panel, 12 in. x 8 in., or Goltone, Permcol.
- 1 Peto-Scott Metaplex chassis, 12 in. x 10 in. with 2 1/2 in. runners.
- 1 Bulgin twin-plug strip, type P.30A.E.
- 2 Clix accumulator spades, or Belling-Lee, Bulgin, Ealex.
- 5 Belling-Lee wander-plugs, or Clix, Bulgin, Ealex.
- 1 Belling-Lee fuse type wander-plug.
- 1 Belling-Lee anode connector, or Clix.
- Flex. screws, etc. (Peto Scott).



The controls are extremely few in number: only one tuning knob (with concentric trimmer for close adjustments), reaction, on-off and wavechange and the Contra-phase volume-sensitivity adjustment.

What could be simpler? What could be more completely effective and attractive from every point of view?

And the whole set makes up into a pleasing chassis design on most up-to-date lines, as betrays the ultra-modernity of the circuit formation.

Anyone can make and operate with success this newest Contra-phase receiver, but it will cost a little more than some of those cheap affairs—cheap in price and cheap in quality!

An Astounding Performance.

You simply cannot expect to be able to build such a set as this for the same cost as a "straight" four of low performance and high H.T. consumption.

The output of the "Contra-phase Four" is on a par with the average A.C. outfit; such a performance was not dreamed of with batteries a year or so ago. And this, mark you, with a current outlay less than that of many normal threes!

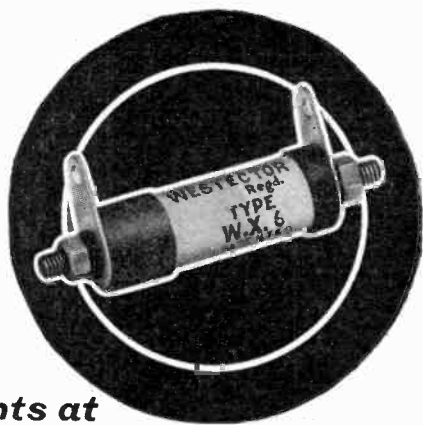
It's a grand set, and one which we are exceedingly proud of, the more so because it has been made possible only by specialised "P.W." developments. The old tag, "Nothing like it anywhere else at any price," is aptly applicable.

There are no components in it which are not readily accessible, for they are all quite standard lines.

(Continued on page 68.)

IT'S VERY EASY WIRING

This bird's-eye view of the baseboard shows the relatively simple nature of the wiring. Where a lead goes through to a component underneath the baseboard the hole is numbered to correspond with the number on the under-baseboard diagram which is given on page 68.



**Currents at
frequencies of up to**

1500 KILOCYCLES

*may now be adequately
rectified by means of the*

WX WESTECTOR

—the new metal detector

WRITE FOR DESCRIPTIVE LITERATURE.

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.
(Dept. P.W.), 82 York Road, King's Cross, London, N.1

REPEAT ORDERS for the
"GOLTONE" AIR-SPACED
METAL-SCREENED DOWN-
LEAD have been received from
BRITISH AND DOMINION
GOVERNMENTS, BRITISH
BROADCASTING CORPOR-
ATION, and LEADING
CONCERNS.

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IN

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MAN-MADE STATICS

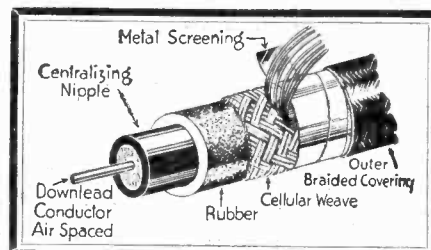
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THE "CONTRA-PHASE 4"

(Continued from page 66.)

But be careful that you purchase the recommended makes and types. This is particularly important in regard to the Class B items, for it should be noted that Class B is rather critical in respect to its associated parts.

If you diverge from the specified components in any way you are diverging from our design, and the results which follow cannot be our responsibility.

Perfectly Simple Construction.

The use of a Metaplex baseboard greatly simplifies the wiring, although, of course, this is not its only purpose.

As the under-baseboard diagram shows it, the baseboard is cut away to accommo-

ACCESSORIES

LOUDSPEAKER: W.B. Celestion, Magnavox, Rola, B.T.H., Epoch, Marconiphone, R. & A., H.M.V.

BATTERIES: H.T. 120 volts.: Siemens, Lissen, Ever Ready, Pertrix, Ediswan, Drydex, Marconiphone, Grosvenor, Hellesens, or Block H.T. accumulators.

G.B. 9 volts.: Drydex, Siemens, Lissen, Ever Ready, Pertrix, Ediswan, Marconiphone, Grosvenor, Hellesens.

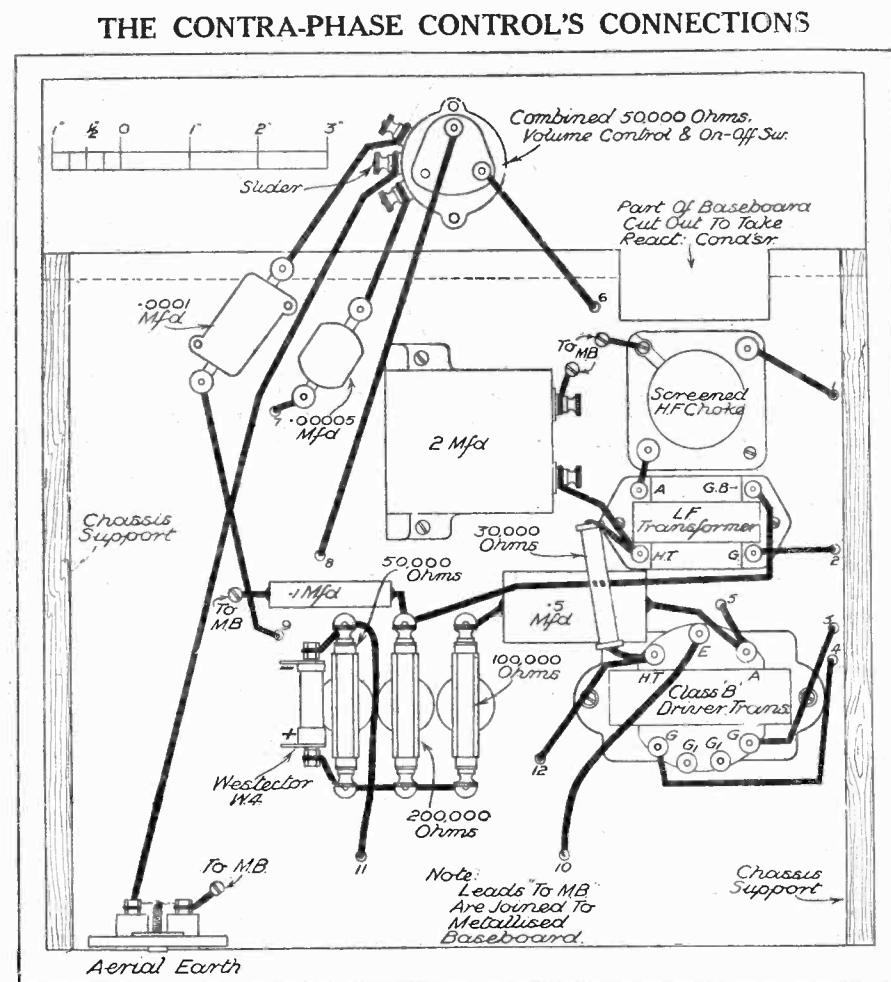
L.T. 2 volts.: Block, Lissen, Pertrix, Ediswan, Exide, Oldham, G.E.C.

date the reaction condenser so that this can be symmetrically placed on the panel.

The positions of the baseboard fixing screws are clearly shown on the panel diagram. The chassis supports each measure 10 in. by 2½ in., and can be of five-ply wood, though, if Metaplex is used also for these, the appearance of the chassis will be improved.

They are fixed to the baseboard by means of screws driven down through this, as illustrated in the wiring diagram.

Those leads which are connected to the Metaplex are all marked "to M.B." Make loops in the ends of the wire and hold these down with small wood screws, supplemented, to make the job better, with washers. Use any spare soldering tags



At the top of this diagram will be seen the connections to the combined 50,000-ohm volume control and S.G. on-off switch, which is mounted on the panel and effects the "Contra-phasing." This view of the under-baseboard components also shows how a cut is made (top right) to accommodate the reaction condenser.

from the components as washers if you are not stocked with ordinary ones.

Certain leads pass through the baseboard. These are numbered so that they can easily be identified in each of the wiring diagrams.

There is ample room for the grid-bias battery on the baseboard, and this can be held in clips which you can buy for a few pence or which you can easily fashion from sheet aluminium or even tin plate.

Now, don't forget that some Class B valves do not need grid bias, and that, if you employ one of these, G.B.2 becomes unnecessary, and that this point on the driver transformer needs to be taken direct to L.T.

Use about twice the normal grid-bias voltage for the driver valve. The exact figure can be found by referring to the valve makers' instructions and noting how much grid bias will be needed to cut the H.T. down to about one-tenth of the normal for the H.T. used.

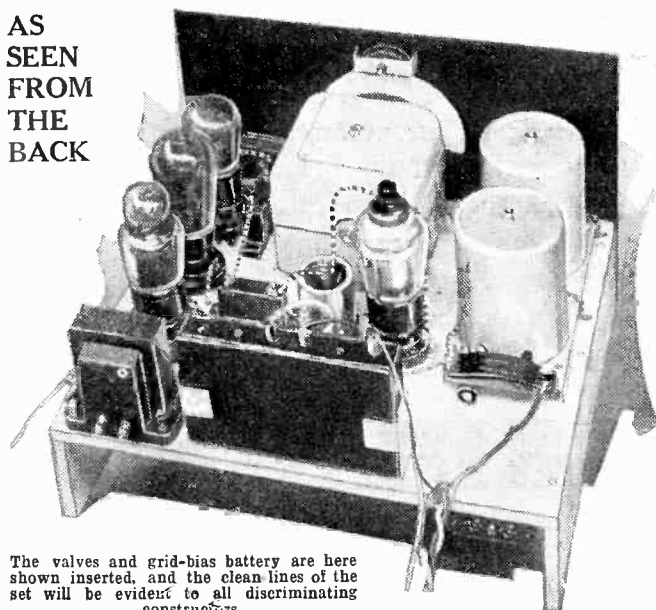
Setting the Trimmers.

When the Contra-phase control is right over to the minimum position the whole H.F. stage is out of action, so obviously the trimming adjustment should be made with the control moved away from this minimum position. Preferably, adjust it for full volume.

Set the panel trimmer control at about a midway point and then adjust the trimmer on the body of the condenser so that the best possible results are obtained with at least two distant medium-wave stations, one at each end of the dial, and one long-wave station.

As this description is necessarily brief we shall have more to say about this unique receiver next week.

AS SEEN FROM THE BACK



The valves and grid-bias battery are here shown inserted, and the clean lines of the set will be evident to all discriminating constructors.

ALL ABOUT THE VALVES

Make	S.G.	Detector	Driver	Class B Output
Cossor	220S.G.	210H.F.	220P.A.	—
Mullard	P.M.12A.	P.M.1H.L.	P.M.2A.	—
Mazda	S.G.215	H.L.2	P.220	—
Marconi	S.22	H.L.2	L.P.2	B.31
Osram	S.22	H.L.2	L.P.2	B.21
Hivac	S.G.220	H.210	—	—
Tungsram	S.220	H.R.210	—	—
Dario	TB422	TB282	TB122	—



THE idea seems to be gaining ground nowadays that practically any old aerial will do for short-wave reception. The fact that a few feet of wire strung up indoors will bring in distant broadcast stations has led people to believe that there is no need to use even ordinary common sense in aerial design.

Let me assure readers right away that this is not so. Broadly speaking, practically any type of aerial will work satisfactorily on short waves, but any given type of aerial can be put up either well or badly.

I have been surprised at the number of hopelessly inefficient aerials that I have come across lately, and the time seems to be opportune to make a few remarks on the subject. Without further preamble let us look into Figs. 1 and 2, which show the same type of aerial erected badly and well.

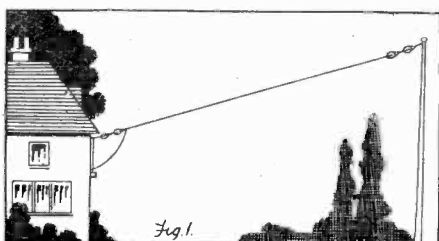
Fig. 1 may be seen in practically any suburban back garden. It is not downright *bad*, but it is capable of much improvement with very little trouble.

To start with, the down lead passes much too close to the gutter; similarly, at the far end of the garden the end of the aerial is too close to the mast. The mast may be of metal or, even if it is a wooden erection, the halyard will probably be of wire, and a vertical length of either kind may easily have a bad effect upon the operation of the aerial.

Variations in Capacity.

As for the gutter, the worst point about that is that the aerial will probably swing in windy weather, and there will be a nice

A COMMON ARRANGEMENT



In this particular scheme there is insufficient clearance between the aerial wire and the gutter, a point which may result in inefficiency.

varying capacity between the aerial and earth at that point. The owner will probably remark that such and such a station "swings about terribly sometimes," blissfully unconscious of the fact that his own aerial is doing the damage.

Fig. 2 shows a much better version of the same aerial. I have suggested an improvement that may not be strictly necessary—the increasing of the effective height of the system by attaching the home end to the chimney stack—but the chief differences

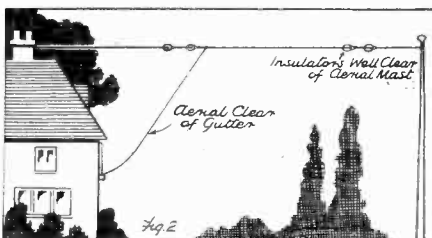
ABOUT YOUR AERIAL

"How well will your aerial work?" is the question where short waves are concerned, not merely "Will it work?" Here are some helpful suggestions for designing an efficient "pick-up" system.

are, of course, the spacing at the far end and the pulling away of the lead-in from the gutter.

My own aerial is made fast to the roof in a rather similar way, but it did not necessitate the laborious business of climbing about on the roof. I simply tied several yards of light string to a tennis ball and

AN IDEAL SCHEME



The scheme illustrated in Fig. 1 would be considerably improved by the alterations indicated here.

threw it over the house! Provided that the string doesn't catch up among the tiles, there is no difficulty in hauling a wire over the roof and making it fast somewhere in the front of the house.

If there is any difficulty in throwing the ball clear of the roof, simply hold the string a few feet away from the said ball and throw it sling fashion. Incidentally, it is a bit of a work of art to tie string securely to a tennis ball; I found the best way was to tie it across two diameters, like a parcel. Even so, the small boys of the neighbourhood were enriched by one or two balls before the aerial was finally up!

You will note that I have said nothing about the best length, best shape, etc., of your aerial, because, candidly, I don't think it matters so long as the details are right.

A fortnight ago I showed a sketch of a

crude indoor "doublet" aerial. Fig. 3 shows a rather better arrangement of the same scheme, which may easily be erected out of doors. I can say definitely that the general interference level is very much lowered by using an arrangement of this kind.

Strictly speaking, a doublet should be designed for one wave-length only, but it works remarkably well over the whole short-wave spectrum, particularly if one tunes the feeders at the bottom end. The two horizontal lengths are equal, and the lead-in is a length of ordinary lighting flex, one end going, of course, to each

half of the top section.

It is advisable to keep the feeders at right angles to the top for the first part of their journey, hence the staying arrangement shown.

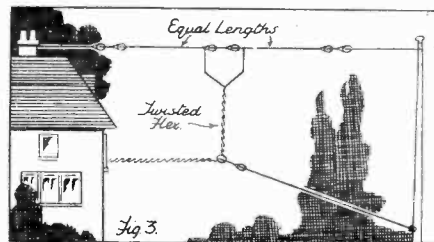
At the "home" end the feeders are simply connected one to each end of a coil, which is coupled to the grid coil of the receiver. This coil may be centre-tapped, the mid point being connected to earth, but that is not essential. Don't spoil the whole thing by earthing one end of it!

Why Not Try It?

A small variable condenser may be used across the coil, and, if the two halves of the aerial are each about 20 feet, quite good results are obtained on all the short-wave broadcast bands.

I am not quoting this as an extra-efficient aerial for the ordinary man, but as a way

AVOIDING INTERFERENCE



When interference is bad, this type of outdoor "doublet" aerial is advisable. Note the arrangement of the "feeder" wires.

out for people troubled with local interference from electric motors, trams, etc.

We used to say "a good aerial is worth an extra valve." I rather think that is still correct.

(Continued on next page.)

On the Short Waves—(Continued from previous page.)



I RECEIVE so many letters from readers who ask me to tell them "what I consider the most important point about a short-wave receiver" that I have drawn a diagram which is a sort of compendium of important points.

Observant readers glancing at the sketch will note at least five of them. For the benefit of the less observant I will list them herewith.

Getting Maximum Efficiency.

(1) Grid wiring as short as humanly possible; in the sketch the grid condenser itself forms the lead from the valve holder to the coil—an excellent plan.

(2) The coil is placed in such a position that it is fairly close both to the valve holder and to the tuning condenser, but yet is not crammed up so tightly that inefficiency results.

(3) The tuning condenser is wired *directly* across its coil. I seem to repeat this week after week, but you will hear more of it even yet!

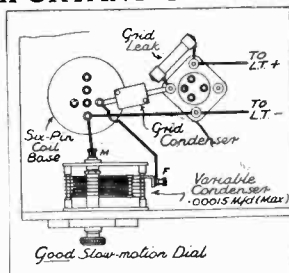
(4) The tuning condenser is not larger than .00015; and (5) it is equipped with a good slow-motion dial.

If ever there were five "secrets of short-wave success," there they are. Just look to your set right now and see how many of these five points might be improved.

W. S. C. (King's Lynn) suspects me of using a superhet, and wants particulars. Quite wrong, W. S. C. I don't use anything so large and luxurious; but I won't say that I'm not working on one! W. S. C. wants to form a short-wave club in the King's Lynn district. Will anyone interested get into touch with him? His address is W. S. Cornwell, 68, High Street.

FIVE IMPORTANT POINTS

This diagram illustrates what our short-wave expert, W. L. S., considers the five most important points in the design of a short-wave receiver. They are enumerated at length in the text.



Mr. N. P. Spooner (G 2 N S) has very sportingly offered to lend a helping hand to any short-wave enthusiast in the Bournemouth district who aspires to a transmitting licence. He will coach him in Morse and show him round his own gear. Mr. Spooner,

who is an ex-Eastern Telegraph Co. man, is sub-county representative for the R.S.G.B. in that district. His address is 18, Warwick Road, Boscombe. Many thanks, G 2 N S!

J. C. P. (New Brighton) calls attention to two strong harmonics of Radio Normandie (206 metres). They are his fourth on 51.5 metres and his fifth on 41.2 metres. J. C. P.—who is only thirteen, but fairly bursting with enthusiasm—finds W 2 X A D coming over R9 after dark, which, as he says, looks as though conditions might be improving at last.

The "Threshold Howl" Problem.

A. J. L. (Harrow) is sore vexed with our dear old friend "threshold howl," which, by the way, hasn't been mentioned in these pages for quite a long time. Let me repeat my previous statement that the best cure of all is to scrap a transformer-coupled stage and substitute resistance-capacity coupling for it.

Threshold howl is definitely tied up in some way with the L.F. transformer, and may be cured by shunting its secondary with a resistance; but this is a beastly business, as it only results in killing off the amplification of that stage. It's more healthy to change right over to R.C., which brings other advantages with it.

V. H. C. (Northfleet) reports that conditions down in Kent seem to be good. He finds the 40-metre amateur band more interesting than the 20, as do most of us these days. "20" is going to be good this summer, though. W. L. S.

ALL the music-loving world mourns Sir Edward Elgar. Highbrow and lowbrow are losers by his recent death, while he was still occupied in the composition of a special Symphony for the B.B.C.

An untiring worker, Sir Edward was directing the recording of one of his works as lately as January 22nd last, when he was on what was to prove his deathbed. The piece was the *Triumphal March* from "Caractacus," played by the London Symphony Orchestra, and is just released by H.M.V.

Made at the great composer's wish, it was personally directed by Elgar through the medium of two telephone lines connecting his bedroom at his home in Worcester with the studios in St. John's Wood.

The recordings were heard by Elgar on a loud-speaker in his room, and his remarks and instructions for further recording were reproduced in the studio on another loudspeaker. The *March* was recorded again and again until Sir Edward had expressed his approval of the final interpretation. DB2142 is a record that makes musical history—Elgar's last recording, a touching memorial in wax.

Which is the most beautiful melody in the world? An impossible question to answer, as you think of *Londonerry Air*, *Swirlin' Through*, *Drink to Me Only*, *Annie Laurie* and many others. The first named is often given the title, and it has probably been recorded more often than any other, either under its usual name or that of *Danny Boy*.

A Best Seller.

Kreisler has just made a record of it (H.M.V.), and so has Alfredo Campoli (Decca), to mention only a couple. Campoli's record I reviewed recently, but Kreisler's is only just released. It should be a best seller—what more praise can I give?

From the sublime to the ridiculous. Whatever you do, if you are a follower of Walt Disney's *Silly Symphonies* on the films, do not miss the Columbia "Disneysque" record "Crazy Overtures." It is a twelve-inch disc and deals with two well-known overtures, that to *Raymond* and *Poet and Peasant*, in a fashion that can only be described as a musical cartoon. The former overture is, I think, the better of the two, and when I ask you to think of Walt Disney's film characters, and to picture Raymond as a cat, you will begin to see possibilities of a unique recording. Get the record and you will realise how far those possibilities have been realised.

I vouch every ordinary music lover will thoroughly enjoy the record if he has imagination and a sense of humour, though certain humourless highbrows, while not considering the normal Raymond overture as worthy of serious attention, might reckon the "cat" version as extreme musical profanity. I loved it—but then I am only an ordinary sort of person who can laugh.

I have lately had some hard things to say about the much-discussed B.B.C. Dance Orchestra. Now

ROUND the RECORDS

Selections and recommendations from the latest gramophone lists
By K. D. ROGERS.



let me hand them a bouquet. Two of their recent Columbia records need special commendation—"Play to Me, Gipsy" (yes, the making of the "hit" is still in progress) and "Unless." With these can also be recommended "Faint Harmony" and "God Bless You," in which the lady vocalist "appears." Get them played over for you at the dealer's and give yourself a treat.

Gracie! The inimitable comedienne par excellence has broken out again in "Keep it in the Family Circle," with which she provides an excellent contrast in "Play to Me, Gipsy." I hear from H.M.V. that Gracie Fields has led the maddening crowd of admirers in England and has bought a villa in Capri, Italy. I hope we shall have no diminution in her record output, for Gracie's recordings are some of the top notes in the gramophone world, in more ways than one.

A voice we do not hear very often nowadays, either on radio or record, is that of "Jetsam"—Malcolm McEachern. But the latest Columbia list has done its best to make up for past neglect in that respect—Jesam sings two solos on DB1320, and provides, with his accompanist and duettist Flopsam, two more on DB1324.

Excellent Bass Rendering.

The first disc contains "Up From Somerset" and "Devonshire Cream and Cider." They show up McEachern's fine bass voice to its full advantage, and I was pleased to hear how true he was, even on the lowest notes.

"Pipe and Cigarette," on the other record, is a rather messy sort of duet, not attractive musically and not particularly interesting lyrically. I prefer its fellow, "Bats in the Belfry." Both are composed and written by Flopsam and Jetsam.

But with our welcome back to Flopsam and Jetsam we must couple a good-bye. As I write this I hear that, for the time being at any rate, the popular duo act is to come to an end. Flopsam and Jetsam are separating, the former to go on the halls with Olive Groves and George Baker in a new combination, and he of the deep voice to appear in talkies.

At the moment Jetsam is engaged at Shepherd's Bush with Gaumont British, who are doing *Chu*

Chin Chin, and I understand Jetsam is really fascinated with his new work and will want to do more of it.

I trust that the old combination will not break up permanently, and that, even if we do not see them on the stage or hear them over the ether, Flopsam and Jetsam will get together and give us some more of their records.

Eight years in one act is a goodly time, but the public are not tired of it, and it is a pity that it should break up, even temporarily.

Mr. Whittington, now on in London, has produced several good numbers, of which "Oceans of Time" is probably the best. Played by Carroll Gibbons and the Savoy Hotel Orpheans on Columbia CB709, it is shown to its best advantage. It is a number that suits this soft-toned, melodious band, and they certainly do it full justice. On the other side is "You're Gonna Lose Your Gal."

At the Dorchester Hotel we find Jack Jackson and his Orchestra, one of the leading bands in the country, and one that can always be relied on to give an interesting rendering of any dance number that is worthy of the name. H.M.V. have recorded "Lullaby in Blue" with this band on B6458, and it is one of the neatest pieces of work I have heard.

It will show up any weakness in your radio-gramophone tonal quality without causing overloading. Muted trumpets are not easy to reproduce accurately, in spite of their quietness. Try this record at home and hear for yourself. The number is good and the playing excellent.

Well Worth Hearing.

On the other side is "Dixie Lee," a hotter recording, but very enjoyable, and again a good receiver test.

Finally, followers of Noel Coward will want Ambrose and his Orchestra playing "I'll Follow my Secret Heart" and "Nevermore," from *Conversation Piece*, on Brunswick 01708. It's a very good recording of these two waltzes, and is worth hearing.

For the first time in history an album of records, each constituting a little scene from a musical play, have been made and will be released shortly.

Officials of the "His Master's Voice" Company concluded a large gramophone recording contract with the chief artistes of "Conversation Piece" immediately after the first night for them to make an album of records of the principal songs.

Yvonne Printemps, Noel Coward, Heather Thatcher, Moya Nugent, Maide Andrews, Louis Hayward and the His Majesty's Theatre Orchestra, conducted by Reginald Bunston, have been responsible for the records Nos. DA1363-1366.

Each disc constitutes a little scene from the play itself. The listener is acquainted with the action by the words preceding each song, spoken by the artistes in the same way as they do on the stage.

TESTED AND FOUNDED?

Being Leaves from the Technical Editor's Notebook

LOEWE PAPER CONDENSERS

IN other quarters there is mild controversy around the question "To solder or not to solder?" We found the definite answer to that years ago. Our experience of home-constructor affairs dates back to the days before the B.B.C. came into existence.

And so we are able to state as a fact that many constructors simply will not solder. Give them a set in which there are components without terminals, provide them with the most lucid and detailed description of the process and they will resort to any subterfuge rather than ply the soldering iron. That is, if they build the set at all. Many will not do so.

Even a journal that professes a strong pro-soldering policy failed, in an attempt to obtain support from its readers, to achieve anything like a unanimity of opinion.

Therefore, if soldering is insisted upon as an essential element of the home construction of radio sets, the movement is artificially restricted. That is a strong enough argument against it in all conscience.

And it becomes quite needless to point out the many advantages of "terminalised" wiring.

So I am glad to see that the new Loewe Paper Condensers are equipped with terminals. There are also soldering tags for those to use who want to solder.

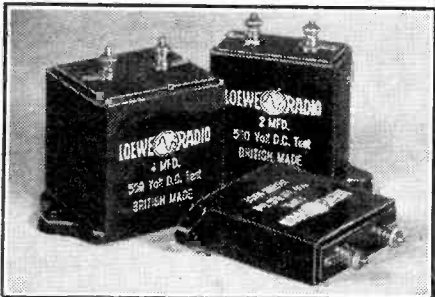
These condensers are, of course, made by the Loewe Radio Co., Ltd., of Fountayne Road, Tottenham, London, N.15.

There are three values available, 1 mfd., 2 mfd. and 4 mfd., at the reasonable prices of 2s., 2s. 6d. and 4s. respectively.

They are designed for a working voltage of 250 volts D.C. and a plus and minus tolerance of 10 per cent. That is to say, they are guaranteed not to vary more than 10 per cent from their capacity ratings.

They are compact in construction and are built into neat bakelite cases having feet for baseboard mounting.

It is said that the condensers are impregnated and sealed with carefully selected waxes under vacuum, in order to eliminate the influences of air and moisture as far as possible and thus ensure high insulation resistances.



The three values of Loewe condenser mentioned in this report are illustrated here. The compact construction and the neat bakelite cases are shown to advantage.

My tests definitely prove that they have these, and that they are in the other ways, too, good condensers that can be fully recommended to the discriminating constructor.

THE BULGIN "SENATOR" TRANSFORMER

Radio has provided more contrasts in one way or another than almost anything else on earth. Take dimensions as an example. It is not so very long ago that it was generally believed that only a big coil could be a good coil. But some of the very best

of modern coils are found to be little larger than thimbles when their "cans" are removed.

And then, again, do you remember the sizes of some of the earlier L.F. transformers? Compare the sizes of a range of modern transformers. They dwindle from constructions as big as coconuts down to mere matchbox sizes!

And that is no exaggeration at all, for the Bulgin "Senator" L.F. transformer is, if anything, rather smaller than a matchbox.

But we have got used to such extremes, and no one would dream of ignoring it because of its small dimensions. On the contrary, it is recognised that compactness can often be achieved without loss of efficiency. In which event the component in question naturally attains great popularity.

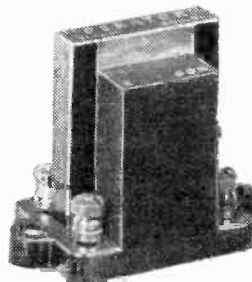
The Bulgin "Senator" L.F. transformer (made by A. F. Bulgin, of Abbey Road, Barking, Essex)

is small because it has a nickel-iron alloy core. Nickel-iron alloys possess great permeability, and so a given inductance can be obtained with a relatively small quantity of the alloy, as compared with, say, silicon-iron, and it is also possible to reduce the numbers of turns in the windings.

Actually the primary inductance of the "Senator" reaches the most satisfactory value of approximately 85 henries. Although it is primarily intended for use in parallel-feed circuits, it can be used in the direct connection and still maintain a useful efficiency so long as the current flowing through its primary does not exceed 1 milliampere.

The ratio is 1-4, and as I write those figures it is with intense satisfaction that I reflect that, after nearly ten years of effort on my part, this logical manner of placing ratio figures is at last becoming universal.

But I digress. The Bulgin "Senator" is built into an excellently moulded bakelite casing of the familiar Bulgin green colouring, and is from every point of view a well designed and made little component, able to provide a first-class performance. Its response is, to all intents and purposes, quite straight over the whole band of working audio frequencies. It retails at 6s.



The "Senator" transformer is, in reality, very little larger than this photograph. It is no larger than a matchbox!

ERIE CARBON TYPE RESISTORS

Although it is surprising what a lot of trouble can be caused by a quite small fault in a radio set, some outfits seem nearly to fall to pieces before they finally "pack up" altogether.

No doubt you have seen some of those dust-covered, aged specimens that look only fit for the dustbin, but appear to satisfy their owners completely.

They will give only a tithe of the results that they should be giving, but—they work!

And a close examination of such a specimen would, I fancy, reveal an interesting fact, and that is that it was living on its resistances, as it were.

Faults of many kinds can occur which do not actually stop a set working. There can even be broken circuits, but so long as capacity "bridges" will, for instance, enable H.F. energy to get across, the set will go on functioning.

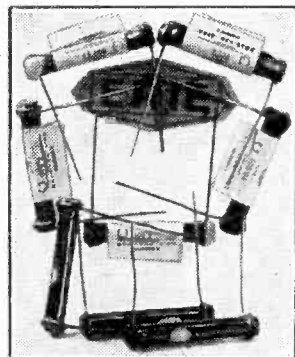
The "bridges" may merely be condenser actions between leads, etc.

But almost invariably resistances have to act as current carriers. And that is why they are in very truth key components, the importance of which cannot be over-rated.

So, above all, constructors ought to exercise the greatest care in the choice of resistances.

Among the makes which I personally have great faith in are the Erie Carbon Type Resistors, made by the Radio Resistor Co., Ltd., of 1, Golden Square, Piccadilly, London, W.1.

It is a long time since I first was able to publish a very favourable report on them in these notes, and my tests of some of the very latest Erie Resistors made prove that the original high standard has been fully maintained.



A representative group of Erie products, the new range of which is fully up to the standard of the earlier models. A wide range of values for all purposes (from 100 ohms to 2 megohms) is available, and constructors can have every confidence in their performance.

I can also add that, although we have from time to time used Erie Resistors for various purposes, we have not yet experienced the slightest trouble with them, and that is, in view of the arduous duties much of our gear has to carry out, by way of doing a record in reliability, I believe.

Erie Resistors suitable for use as grid leaks, decoupling resistances and, indeed, for all the usual purposes are available in a wide range of values from 100 ohms to 2 megohms.



Jottings of Interest to Buyers.

By G. T. KELSEY.

I AM very glad to observe, as a result of a recent survey of the commercial-receiver market, that the battery user is now catered for almost to the same extent as the mains user.

Those of you who have followed my notes for the last twelve months or so will recall that I have repeatedly called attention to the failure of commercial-set manufacturers generally to give adequate attention to the requirements of those without mains, and it is gratifying now to feel that my efforts in this direction have not been in vain.

What pleases me particularly is that those firms who have tackled the question of battery receivers (and there are few these days that haven't) have tackled it well and truly, and some magnificent examples of modern scientific achievement are now available at extremely moderate prices.

Two New Models.

Two of the very latest models to be released bear the Ferranti hall-mark, and they have every appearance of being first-class instruments. Indeed, from my cursory examination of them, I have formed the opinion that they are two of the most ambitious battery designs so far to be produced.

The "Lancastria Battery Console," the retail price of which is 14 guineas, is a five-valve superhet with all the very latest refinements, and it is built into a most attractive-looking cabinet. This particular instrument is capable of providing an undistorted output of 2 watts.

The other new Ferranti battery set is

(Continued on page 74.)

RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but 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 Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, 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 subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

THE NEW WAVELENGTHS FOR THE LONG-WAVE STATIONS

The number of inquiries about the re-shuffle of long wavelengths—recently suggested at a radio conference in Geneva—shows that it is not generally realised that the changes then decided upon do not threaten British listeners with reduced programme facilities.

As a matter of fact, the re-shuffling leaves the relative positions of most of the stations very much as they were.

Daventry, for instance, remains unaffected on 1,500 metres. And it is not expected that this wavelength will be altered when the new "Daventry"—now building at Droitwich—starts testing in a few weeks' time.

Eventually Droitwich will take over the 5 X X programmes completely, and ample notice of this will be given. As high power is to be employed, reception should be greatly improved.

Exactly how the wavelengths of the other long-wavers may be affected is shown in the table below, which gives the old and the new wavelengths side by side.

Name of Station	Old Wavelength	New Wavelength
Kaunas	1,935 metres	1,948 metres
Huizen	1,875 "	1,886 "
Brasov	1,875 "	1,886 "
Lahti	1,796 "	1,807 "
Moscow No. 1	1,714 "	1,724 "
Radio Paris	1,796 "	1,648 "
Deutschlandsender	1,571 "	1,571 "
Daventry	1,500 "	1,500 "
Kalundborg	1,261 "	1,250 "
Leningrad	1,224 "	1,209.6 "
Oslo	1,186 "	1,145 "

No position for Eiffel Tower is given, it will be noted, as it is expected that this station will discontinue its broadcasts.

Radio Luxembourg, too, is unnamed, and although it is not yet certain what that station will do, it is predicted that it will share 1,304 metres with a new Russian station.

For the other stations which now broadcast on long waves four wavelengths have been suggested, and if the scheme is adopted, the following arrangement will come into force:

Name of Station	Old Wavelength	New Wavelength
Minsk	1,442 metres	1,442 metres
Motala	1,357 "	1,389 "
Warsaw	1,415 "	1,339 "
Kharkov	1,345 "	1,293 "

It is hoped that as a result of this scheme the conditions for long-wave reception—notably unsatisfactory since Jan. 15th, when

the Lucerne Plan was enforced, will improve until station separation above 1,000 metres is as good as on the medium waves.

FOR GRAMOPHONE-RECORD REPRODUCTION WITH THE "BIFOCAL THREE"

M. L. W. (Pontefract).—"What I should like to do is to arrange a switch for gramophone reproduction. Preferably one of the S86 type (Bulgin), and necessitating no alteration to the panel, but using instead a long extension rod to project the control over the edge of the baseboard.

It seems to me that the following wiring alterations to the blue-print arrangement would then give the needful change-over—viz., remove wire marked 'EE' from G of valve holder and wire up switch in the following manner:

STATION IDENTIFICATION TURIN

Every regular listener to the London National programme who uses a sensitive set has noticed, during programme pauses, etc., the song of the nightingale butting in as a kind of background noise. This comes from Turin, who occupies the neighbouring wavelength of 263.2 metres.

If the dials are readjusted to a wavelength slightly higher than that of London National, and reaction is applied, Turin can often be heard very clearly in this country—which is rather remarkable, considering that his power is a mere 7 kilowatts and the distance (from London) is 575 miles.

The usual announcer is a lady, and the programme is that of the north Italian group, comprising Florence, Genoa, Milan and Trieste, as well as Turin itself.

(The names of the stations are often given in the announcements, the respective pronunciations, in Italian, being: "Fi-ren-ze," "Gen-ova," "Milano," "Tree-estay" and "To-rino.")

"G terminal of the V2 valve holder to the centre contact of the radiogram switch. 'Radio' terminal of this to the vacant EE wire (that is, to the terminal of the .0002 mfd. which is connected to grid leak).

"Gramo" terminal of switch to one of the new pick-up terminals, arranged like the other terminal pairs at the edge of baseboard. Other

pick-up terminal by flex lead to the negative of grid-bias battery (1½ volts in my case).

"With this arrangement all the apparently important leads can be quite short, with the exception of the one from the 'gramo' terminal of switch to the pick-up terminal. Would it be advisable to screen this one?"

The proposed arrangement is quite O.K. As you suppose, the only lead which is in the least likely to need screening is the one from "gramo" to pick-up terminal, and we do not expect you will find that trouble arises if this is left unscreened. If, however, you wish to be sure, use the metal-sheathed type of wire for this and earth the metal covering.

NEW BELGIAN STATIONS.

P. A. (Banstead, Surrey).—"What is all this about Belgium having new broadcasting stations on the air?"

"On my set I can get Brussels No. 1 and No. 2 stations (latter speaking French, of course), but apart from this I have not heard any other broadcasting from Belgium. Yet this is what I read in a letter (from an old friend who knows my interest in wireless) received last week from Antwerp:

"Have you heard Courtrai or any of the eight or nine new broadcasting stations of Belgium on your set?"

"From what I can make out they are not very powerful ones, like the B.B.C.'s, but, as you always seem to get such good foreign reception, I thought perhaps you may have heard something of them.

"As a matter of fact, this reference to them in his letter is my first intimation that there are any others besides the Brussels stations, so if you can give me any particulars of wavelength, etc., I shall be pleased to hear."

Apart from the Brussels No. 1 and Brussels No. 2 stations, which, as you know, work respectively on 483.9 metres and 321.9 metres, Belgium now has a number of low-powered stations working on low wavelengths.

They are of but little interest to British listeners on account of the fact that they do not "get over" sufficiently well to this country, partly because of their low power and partly because of their shared wavelengths.

The wavelengths are as follows: Binche, Clatelineau, Antwerp, Courtrai and Wallonia all work on 201.1 metres, which they share with three other stations, viz., Bordeaux-sud-ouest (France), Nîmes (France) and Turku (Finland). The power of the Belgian stations in this group is 1 kilowatt for each station.

There are six other Belgians working on a wave length of 200 metres, viz., Liège Experimental Radio-Comité, Wallonia, Seraing, Verviers I and Verviers II.

These also are all 1-kilowatt stations, and there is another foreign station upon 200 metres as well, namely Pietarsaari (Finland). It is thus improbable that any of the Belgians (except, of course, the Brussels stations) have programme value for British listeners.

NO RESULTS, BUT MILLIAMMETER GIVES NORMAL READINGS.

K. B. (Southampton).—"I came up against something the other day which seems to contradict the idea that a milliammeter inserted in the H.T. supply to check the anode current of a set is an infallible indicator of where to find a fault.

"The fault in this case was a nasty one—complete silence, in fact. Yet the loudspeaker was perfectly O.K., and examination of all connections, etc., failed to show up anything wrong.

"To make it worse, there was the milliammeter showing exactly the correct reading for H.T. supply. What would you advise?"

We cannot agree that the milliammeter was not of service, because it indicated, by showing normal anode current flowing, that the valves were getting their voltages correctly, and thus saved wholesale checking of this important part of the equipment.

Apart from the break in one of the anode leads, there is always a chance that some important component has become shorted, so we should first check over this.

Failing any trace, the next thing would be to ascertain that all grid wiring was intact, with nothing shorted, as obviously this might equally well have the effect of cutting out the programme.

The valves themselves could be presumed to be in order, and consequently a stage-by-stage test would be all that was necessary to show in what part of the set the fault was situated.

(Continued on next page)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

NO BIAS FOR A CLASS B VALVE.

T. A. (Middlesbrough).—"In the diagram the lead from the transformer is marked 'To Bias for Class B Valve.'"

"But the Class B valve I have got must not have any bias, the makers say."

"So what do I do with the lead from the transformer? Leave it in the air?"

No. If no bias is required for your Class B valve, the lead in question from the transformer goes direct to the filament circuit, instead of going to this via the G.B. battery.

Take it to the same point as G.B. + goes to—that is to say to the G.B. + terminal itself, or to any other point directly connected to G.B. +, such as L.T. —, H.T. —, or earth.

USING A VALVE SET FOR PHONES AND CRYSTAL RECEPTION.

J. A. (Watford).—"Will you be kind enough to give me the information you gave to a reader last year about using a valve set for phones and crystal reception?"

"I cannot find the back number with this in, but I remember the idea clearly. It was telling how to use a pair of phones and crystal detector, when the L.T. battery was on charge, by wiring an extra pair of terminals in the set."

"When the battery was returned all that had to be done was join it up in the ordinary way and undo the phones, which converted the set back to valve reception."

"This is exactly what I want to do for a friend of mine living near here, and I understand that plenty of people in her neighbourhood get excellent results from old crystal sets, so there seems no need for the set to be 'off' for days at a time just because there is no second L.T. battery."

Almost any sort of valve set can be adapted in this way, especially if it is one using an outdoor aerial, but for good reception it is usually necessary to be situated fairly near to a broadcasting station. This condition is fulfilled at your distance from Brookmans Park, so good results can confidently be expected.

The scheme is to mount a pair of extra "phone" terminals near to the tuning condenser or tuning coil, in an accessible position, so that when the battery has been disconnected for charging and the set is normally useless these extra terminals can be used for phone reception.

If the phones are reasonably sensitive and the aerial normally good you should have clear results from both National and Regional programmes.

Here is the necessary new wiring for the extra pair of terminals, which, as stated, should be accessibly placed, but must be quite near to the tuning coil or condenser.

One of the extra terminals goes to the moving vanes terminal of the variable condenser, or to some nearer point which is directly connected to that terminal.

The other new "phones" terminal is then joined by a short lead to one terminal of a crystal detector. The other side of the crystal detector is then joined to the fixed vanes of the tuning condenser.

(Or, alternatively, if it is more convenient to wire to the aerial tuning coil than to the tuning condenser, do this, as the effect will be the same because the fixed and moving vanes of the tuning condenser will be found to be joined across the coil in question.)

There is no switching, etc., and no other wiring. So all you have to do when the above modifications have been carried out is to join the pair of phones to the new terminals when the accumulator is away.

This gives you a crystal set in which the tuning is carried out in the ordinary way, but upon the valve set's first condenser.

When the accumulator is back again, simply disconnect the phones, which restores the valve set to its original condition.

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A large packet of seeds of the beautiful Orange King Marigold is included FREE this week in every copy of POPULAR GARDENING (now on sale, 2d.). This hardy annual will make a wonderful display in the garden or in vases for indoor decoration.

NO MORE VALVE PINS

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LEADERS in so many valve designs of the past, Mullard have taken a bold step in the production of their latest range of valves, universal types for A.C. and D.C. They have decided to scrap valve pins and use a system of flat studs which project beyond the side of the base a matter of a few millimetres.

The special holder for the new valves is a cup-like moulding having let into the wall springy clips. The whole base of the valve sinks into the holder, while the studs make contact with the clips all round the circumference of the valve.

Two Types of Mounting.

The grid connections of all the valves, triodes and pentodes alike, are made to the top cap, to which externally connection is made by a spring clip. This separation of the grids from the other electrodes is a very sane proceeding, and one that the Americans have carried out for some time.

The new valves, owing to their lack of pins, obviously are very much shorter than the orthodox types of British valves, and so will be more convenient for use in small universal mains sets and car radio designs.

Two bases are standardised, one of eight contacts for most of the valves and one of five contacts for the small diode valve only. But more of these valves and their characteristics later.

A FINE BOOK ON RADIO

Radio enthusiasts will find the book described below of special value as a work of reference.

A FIFTH edition of the "Handbook of Technical Instruction for Wireless Telegraphists," by H. M. Dowsett, has just been published by Messrs. Hiffe and Sons, Ltd.

The "Dowsett Handbook" is, of course, a standard work and provides a thorough theoretical course; it is used by a large proportion of those desirous of qualifying for the P.M.G.'s certificate.

But in addition it embodies a vast amount of practical information dealing with all aspects of wireless transmission and reception, particularly in regard to marine apparatus. Direction finding, for example, is dealt with in great detail.

There is much new matter in the new edition, including up-to-the-minute details of the latest technique in short-wave marine transmission and reception and constant-frequency oscillators.

There are no less than 525 diagrams and illustrations in this excellent 570-page book, and the text is simple and readable and is broken up into conveniently short sections.

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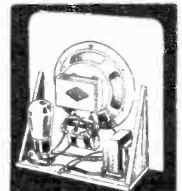
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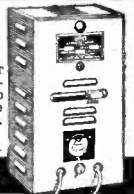
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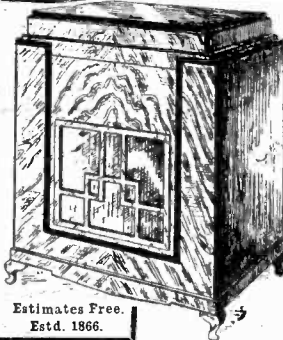
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THE LISTENER'S NOTEBOOK

(Continued from page 58.)

Way," that Sunday must be something of a red-letter day for lovers of poetry. "Pilgrim's Way," No. 3, was beautifully done. Humbert Wolfe's selection of poems was superb. Janet Taylor, Robert Harris and David Tennant all spoke their lines as they should be spoken, though one did just hope to hear Humbert Wolfe again after the prologue. Unfortunately, we were not favoured. The only fault I could find was in the reading of the 150th Psalm. The two readers who read alternate verses followed one another much too quickly, often at the expense of the last two words of each verse.

As usual, I followed "As You Like It" from a book. I can recommend this practice, although in an abridged edition one is inclined to lose the place too often. Frankly, this broadcast wasn't the best we've ever had of Shakespeare. But the fault wasn't the B.B.C.'s. It was the play itself, for "As You Like It" lacks the dramatic force of the big tragedies. Nor is the poetry as grand.

All the same, there were great moments in the play. The contemporary music was again supplied by the Dolmetsch family, and this was one of the broadcast's biggest features. This may seem to belittle the contributions of Felix Aylmer and Gwen Frangcon-Davies. Their acting was superb. Though a stage presentation of this particular play may have certain advantages over the radio, it is true to say that the singing on this occasion has never been surpassed.

I heard a new and curious reason for not listening to a certain light musical show the other evening. It was just because the band concerned has a signature tune. Well, if we wash out all the bands that have signature tunes we shall make a number of big holes in our programmes. Broadcasting would be very much poorer, for instance, if Henry Hall faded out for good. I must say I can't understand this aversion to a signature tune, but my informant was quite adamant about this, though he couldn't state anything more definite than that it branded the band as an inferior one. **C.B.**

THE B.B.C. INVESTIGATED

(Continued from page 55.)

proportion of licence revenue it appropriates. If the B.B.C. were really active and serious about this there would be lots of outside support forthcoming, especially if the B.B.C. would agree to curtail its publishing activities. It is all wrong that the B.B.C., through using the advertising power of the microphone, should take rather more than £500,000 a year of advertising from a none too prosperous publishing industry. Let the B.B.C. stick to the job of broadcasting and insist on getting the money to which it is entitled on that account.

As to personalities, we have seen how Sir John Reith is still the controlling spirit. There are periodical rumours of Sir John leaving the B.B.C. to take up a big job elsewhere. First it was the Electricity Commission. Then it was the American Ambassadorship. Then the Vice-Royalty of India. Now it is a Cabinet post, with a seat in the House of Lords. The Ministry of Pensions is mentioned. Another rumour is that Sir John will go straight into parliamentary politics, standing for the House and assuming the leadership of a new party on "business" lines.

My view is that Sir John will stay where he is—at least until the end of 1936. At the end of the licence and Charter he is practically certain to get another honour.

As to who will succeed him, if and when he hands over the B.B.C., it is obviously too early to say.

Sir John's Successor.

Col. Dawnay has been "tipped" as a Government nominee for the job. And the fact that he left the Imperial General Staff when he was within sight of getting to the top suggests that he may have expectations of the succession at Broadcasting House. My own view is that Sir John Reith will be followed by someone whose name has not yet been mentioned for the job.

Sir Charles Cappendale, the Administration Controller, reaches the retiring age of sixty this year, and it is not known yet whether he will accept the invitation of the Board of Governors to stay on for another year. If the job of Administration Controller is maintained it may be given to either Commander Goldsmith or Major Nicolls, who are now neck and neck for the preferment.

THE LINK BETWEEN

(Continued from page 71.)

the "Lancastria Portable Console," and the price of this model is 15 guineas. It is similar in many respects to the cheaper model, but incorporates an extra valve, and the particularly attractive cabinet is provided with a ball-bearing turntable.

Full details of these sets, as well as of all the other famous instruments in the Ferranti range, are given in a catalogue which is available under (No. 79.) our postcard literature scheme.

Those Conversion Leaflets.

Having just dug my way out of a deluge of postcards (phew!), may I crave your indulgence—if yours happens to be among them—for any slight delays which may occur in the dispatch of Varley "Bifocal" conversion leaflets? This morning, as I write these notes, it is very much a case of postcards to right of me, postcards to left of me, and even, I am afraid, postcards on top of me.

Well, let it only go to prove what I have felt all along. Focused radio has definitely caught on, and there is little doubt that the interest—already phenomenal—will be even greater.

For the benefit of readers who are requiring copies of this interesting leaflet, may I remind you that all applications under our postcard scheme are dealt with in strict rotation, and that, in these circumstances, if you have not already sent in your application you would be well advised to do so without delay?

All you need to do is to put a large number "73a" on a postcard, together with your name and address (in block capitals, please), and address it to me at Tallis House, Tallis Street, London, E.C.4. Full conversion details will then be sent to you free and post free.

A New Cossor "Melody Maker."

The name of Cossor's famous kit set for home constructors will require no introduction to our readers. For years it has held an esteemed place in the realm of home construction, and now I am delighted to learn that still another model—the "340"—has been introduced.

Next week I am going to endeavour to give you full details of this very latest model. Meanwhile, I will just add that it is intended for battery operation.

OUR POSTCARD SERVICE

Application for trade literature mentioned in these columns can be made through "P.W." by quoting the reference number given at the end of the paragraph. Just send a postcard to G. T. Kelsey, at Tallis House, Tallis Street, E.C.4. Any literature described during the past four weeks may be applied for in this way—just quote the number or numbers.

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P I X

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

Trouble with a Radiogram.

I HAD an experience with a radiogram recently which seemed very puzzling at first. This radiogram was used for only a few minutes at a time, and had been working in this way for a long period quite satisfactorily. Later on it began to be used more extensively, and it was then that the trouble showed up.

I found that the rectifier in the unit which supplied the field current to the moving-coil speaker was getting very hot, and matters went from bad to worse until eventually it was hardly possible to switch on the radiogram without blowing the fuses—I mean the fuses inside the radiogram, of course, not the mains fuses.

The unit in question was taken out and opened up, and it was then seen that the rectifier had tiny metal beads all over the discs, showing clearly that it had been very hot and that the soft white metal had melted out.

The "Moving-Coil" Rectifier.

In order to make sure that this was really the cause of the trouble a separate high-tension mains unit was brought into use, and leads from this were run to the field of the moving-coil speaker. Incidentally, I wanted to know the value of the resistance in series with the speaker field, and this was found approximately by the very simple process of connecting a three-volt battery to it in series with a milliammeter. The milliammeter, which was a fairly accurate one, showed 3 milliamps, giving a rough idea of the resistance in series with the field, about 1,000 ohms.

With this separate H.T. unit everything worked all right, showing that the original mains unit was definitely at fault.

The problem then was to decide why the rectifier should go wrong, since, as you know, these Westinghouse metal rectifiers are usually exceedingly reliable. In point of fact, I have known them subjected to all sorts of abuse and to stand up to it in the most remarkable way.

A Case of Shorting.

However, in the present case I found that the resistance in series with the field was probably touching the metal base of the case and shorting. There was another place where one of the leads to the rectifier looked as though it might have been shorting also. I do not know which of these it was, but certainly there was every evidence that shorting had been taking place and that the poor old rectifier had been very heavily overloaded.

At first I suspected a couple of smoothing condensers which were across the output leads of the unit, but strangely enough these proved to be quite all right. At any rate, when a new rectifier was put in and care taken to insulate the series resistance properly, everything worked quite O.K. and there was no perceptible heating of the rectifier whatever.

Due to a Condenser Breakdown.

Another trouble which I had with the same radiogram, although not on the same occasion, was with the high-tension supply unit, which, of course, is entirely separate from the unit which supplies the field of the speaker. In this case also the rectifier showed signs of heating, although not to any very serious extent. After testing all the various tappings, I came to the conclusion that one of the condensers

was causing the trouble, and so made a separate test of each of the condensers. The particular ones which came under suspicion were in a 16-microfarad block of four condensers.

Eventually the source of the trouble was traced to one of these condensers in the block having broken down. Accordingly, the leads were simply disconnected from the terminals of this particular section of the block and separate leads were run out to another 4-microfarad condenser, which incidentally could not be connected within the metal case of the mains unit and had to be placed outside. When this was done everything worked perfectly, and the rectifier ceased to warm up any more.

I mention all this because it is quite likely that some of my readers may have the same sort of experience at one time or another, and it is just as well to know

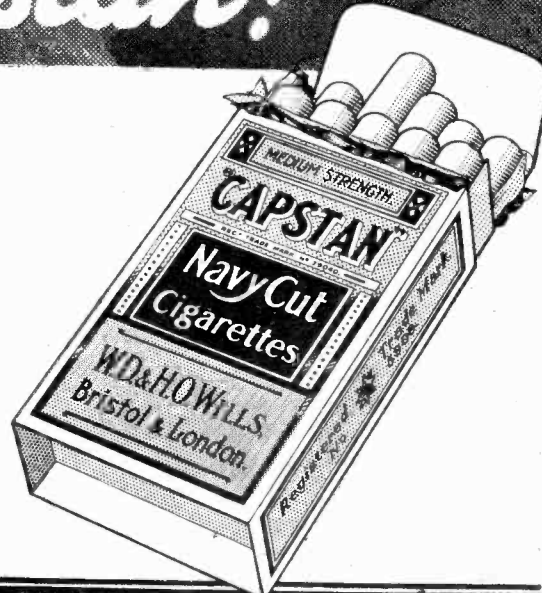
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TECHNICAL NOTES

(Continued from previous page.)

what to look for. It was rather curious that both these particular troubles should have arisen, as there was probably no connection whatever between them.

Puzzle: Find the Motor.

Talking about radiograms, I was listening to one in a friend's house the other day; he had not had it very long and was displaying it with the usual pride of the new owner. On switching on the radio, however, this was accompanied by the most appalling crackling, which had a rhythmical sound about it, very suggestive of a motor, but the crackling was so bad that I started to look about for bad contacts or broken leads.

At any rate, after a few minutes of this it suddenly dawned on me that the best place to look for a motor was in the gramophone part of the cabinet, and on lifting the lid there, sure enough, was the cause of the trouble. The gramophone motor had been left switched on whilst the radio was working, and all the crackling we were picking up was from the motor, which was of the commutator type. On switching off the motor everything was quite all right, and the radio part of the set worked perfectly. My friend heaved a sigh of relief at finding that this beautiful radiogram was really quite in order, and everybody wondered why everybody else had not had the sense to look under the lid!

This sounds very silly, I know, but since mentioning it to one or two other people I have been told that it is a thing that has many a time happened before. Probably some of you have had precisely the same experience, which only goes to show how you can look for the cause of trouble in distant places when, in point of fact, it is under your nose all the time.

A Curious Fault.

While I am on this subject I may as well take the opportunity of mentioning another rather curious thing which cropped up the other day. I was listening to a record, and the reproduction was "rattly" or "reedy," the owner of the set explaining that it was due to a fault in the diaphragm of the moving-coil speaker. It sounded to me, however, like something wrong with the pick-up or indeed with the needle itself; it gave me the impression that the needle was not properly tightened up in the needle holder.

On examining the pick-up I found that the needle could not be pushed very far into the holder, with the consequence that it was a bit wobbly, and, of course, this was more so with a fine needle than with a thick one. I decided that it was worth while to have the pick-up off and look at it, and, in doing so, it dawned on me that probably there was a piece of broken needle up at the top end of the holder. Sure enough, when we got the pick-up under the light and used a pin for probing down the holder we found that there was some loose object at the bottom.

Cutting Out Mush.

Noises in a set come from a great variety of causes, and different remedies must be sought accordingly. But "mush," as it is vaguely called, can often be cut down by means of a high-note filter, cutting off frequencies above, say, 5,000 cycles. This will probably be found a very useful adjunct, especially to a very sensitive set which is being used near its highest sensitivity.

If you adjust the filter to cut off somewhat lower frequencies, say down to 4,000 or 3,000 cycles, you will almost certainly begin to notice a preponderance of bass: actually it is only an aural illusion, due to the absence of the high notes and the relative strength of the bass.

Noise v. Signal.

When you are listening to a local or powerful station, however, where the ratio of signal to noise or mush is much higher, you may not need the filter, and so it is useful to have a switch to cut it out when not required. It is no easy matter to design a set that will bring in very strong and very weak stations indiscriminately—perhaps I

NEXT WEEK

TWO FINE FEATURES:—
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should say equally efficiently—and therefore a filter which can be put easily in or out of circuit is very useful for equalising things. Such a device is included in a good many commercial sets on the market.

Recent Television Developments.

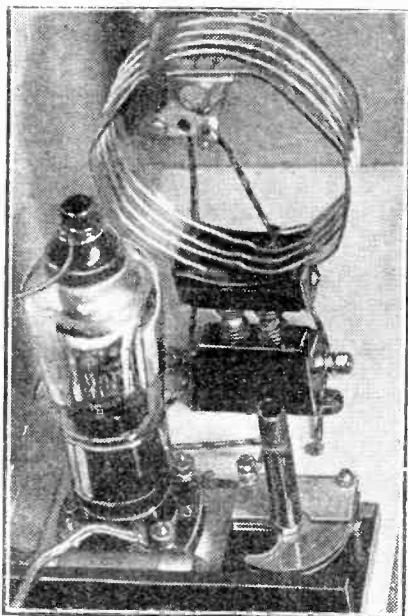
An interesting and probably important development is being made in connection with television. I expect you know that the television of a film is much less difficult than the television of a direct subject, especially an outdoor scene. Consequently there has been a tendency of late to concentrate upon the televising of films of events rather than upon the actual events at the time of happening.

This, of course, is not television as ordinarily understood, but clearly the shorter the "delay" between the event and the transmission the more nearly the system corresponds to true television. With this idea in mind some German inventors have now developed a system in which a film of the event is taken by film camera in the ordinary way, the film, however, passing straight on into developing and fixing tanks, and then before the television transmitter.

The actual "delay" is only 10 seconds, and the film is televised whilst still wet. As it is a negative it is "reversed" in the process of transmission by a simple electrical device.

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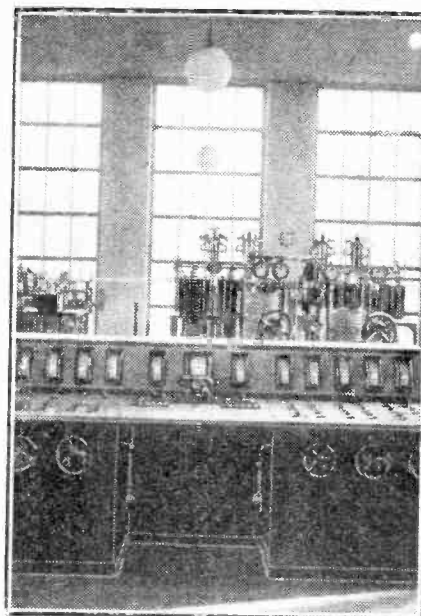
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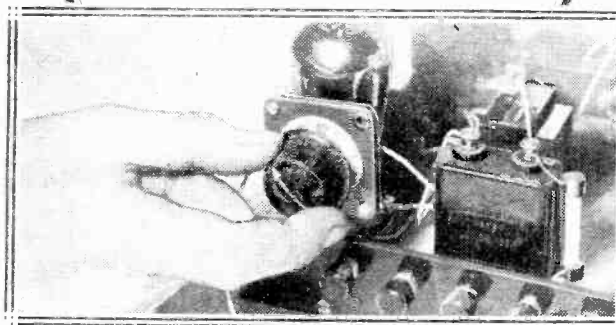
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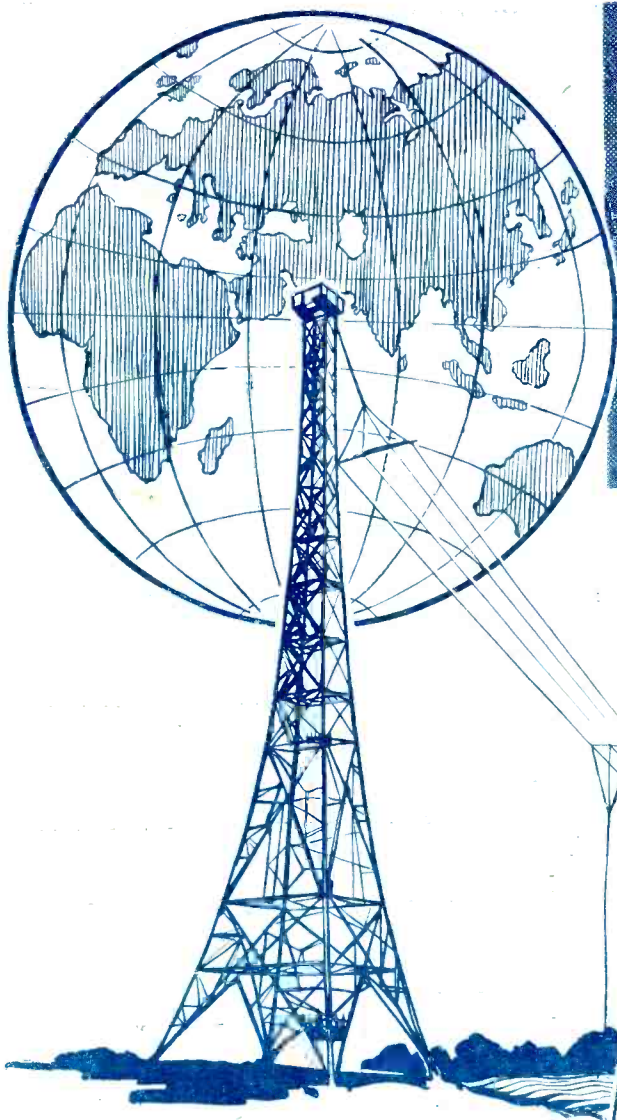
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