

HOW TO MAKE A SIMPLE VALVE TESTER

TELEVISION SPEECH!

Popular Wireless

No. 615.
Vol. XXV.
March 17th,
1934.

SPECIAL
SECTION FOR
SHORT - WAVE
ENTHUSIASTS
CONDUCTED BY
W. L. S.

EVERY WEDNESDAY PRICE 3^d

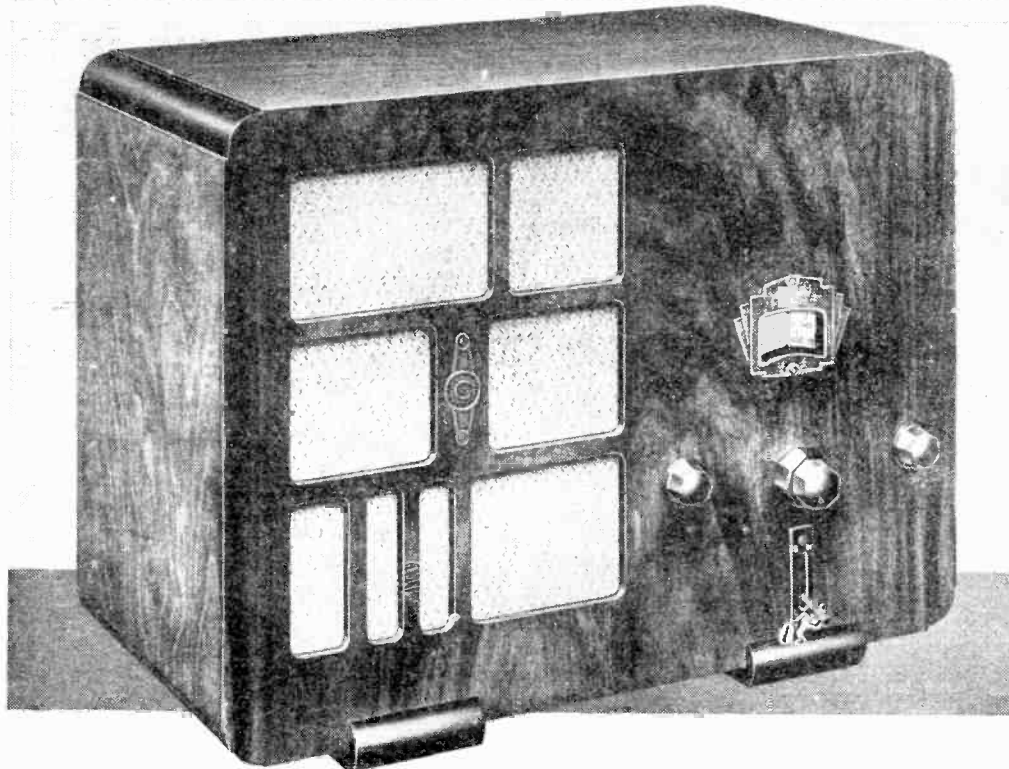
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P.W. 17/3/34

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Hire Purchase Terms 20/- deposit and
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Prices do not include Batteries or
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Complete Kit of Parts, similar to
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A.C. Mains Valves (incl. Rectifier)
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40/100 cycles. Price **£8.19.0**

Hire Purchase Terms 20/- deposit and
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POPULAR WIRELESS

THE FIRST AND FOREMOST RADIO WEEKLY FOR THE CONSTRUCTOR & AMATEUR EXPERIMENTER

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**U.S.A. EVERY NIGHT
TIME RUSHES
ARCTIC REFLECTIONS
THE GOOSLY**

RADIO NOTES & NEWS

**MORE MIKE INCIDENTS
ELECTRIC TROMBONE
SWITCH LOGIC
"SLIGHT KALE"**

Britain's Loss.

BY the death of Sir Edward Elgar we have lost the presence of a composer who, if not our greatest—it is a matter of opinion—seemed to be truly the national composer.

There can be no doubt that his admirers were multiplied enormously by the help of broadcasting, and it is pleasing to think that that man to whom recognition came so tardily eventually had the supreme happiness of knowing that his work was being enjoyed by millions of people and not merely by a small group of highbrows.

Japanese Radio in Africa.

IT is alarming to find that Japanese radio sets, parts and valves have found their way into the South African market, where the indigenous traders cannot meet the competition.

Why? Well, the prices run about a third of British and American goods, and valves normally costing £1 are offered for 4s. 6d.

The South African Association of Radio Industries has resolved not to handle radio goods of Japanese origin and that mechanics employed by its members will be dismissed if found "servicing" Japanese sets.

News from (and for) Norway.

E. BJÖRKMANN (Oslo) kindly informs us that the mysterious station which was heard between 40 and 45 metres, and which we suggested was Oslo, is actually the Oslo short-wave relay station (Jeløy), which relays for northern Norway and for Norwegian sailors in the Antarctic. He asks for constructional details of a short-wave receiver.

We recommend our "Short-Wave Two," particulars of which appeared in "P.W.," July 22nd, 1933, a copy of which (if any are left) can be got from the Back Number Dept., Bear Alley, Farringdon Street, E.C.4, price 4d., post free.

"S.T.500" in Scotland.

T. C. A. (Kilmaurs), in a note of praise for the "S.T.500," rises almost to the lyrical height of Burns. He says

that, although he has assembled dozens of receivers, he has never experienced the equal of this one, and as for getting American stations—pooh! he can tune in from six to nine of them any night at good loudspeaker strength.

Another sentence I liked immensely was: "I have been a reader for five years and have been much the better for it." That's success!

Their Hearts' Desire.

IN "P.W." for March 3rd my revered fellow-scribe, W. L. S., announced that he was enlarging his section. When I read the news a beatific smile played for a moment on my bearded lips, for, thought I, "that will stop the spate of letters from readers who positively demand more short-wave stuff"—letters which are

Rotherhithe, London, S.E.16, who is a representative of the International Short-Wave Club. Other aspirants, please note.

From a New Zealand Reader.

J. RAMSAY, c/o 282, Dominion Road, S2, Auckland, N.Z.—which, I gather, is a place where J. R. is a hospital patient—asks for old radio papers. It might be done, J. R., but when you ask also for sheet music and give me a list of the pieces required—there are about thirty!—I think that you are unaware of the prevailing depression.

Besides, if you are studying music I don't think that those pieces are, to judge from their titles, likely to let you very deeply into the secret. Why not concentrate on radio instead of approaching music through its frothier specimens? Good luck and better health!

What is a "T.R."?

IN his reply to V. G. W. (page 1040, February 24th issue), W. L. S. suggests that V. G. W. misread "D.E." as "T.R." Whilst I agree that this is possible, may I suggest that V. G. W., who is trying to learn Morse, has been listening to ships working with coast stations, and has also really heard "T.R." the abbreviation for "Time Rush"?

I do not know why "Time Rush" is so called; it consists of information which a ship has to give the coast station when it first gets into wireless communication with it, such as course, speed, position, number of messages to be sent and so on. No doubt V. G. W. will verify this.

The Fickle Heavyside Layer.

D. R. E. V. APPLETON told the Junior Institution of Engineers last month that, during his recent expedition within the Arctic Circle, he found that in thundery weather the reflecting power of the Heavyside Layer was abnormally high, and that, though it is 60 miles up, the layer could be thus affected by a storm near the ground.

He said also that sometimes the layer

(Continued on next page.)

YOUR S.T. MANUAL—

has been waiting for you since the eighth—and last—Gift Token appeared in POPULAR WIRELESS last week.

There is nothing else to wait for: the offer will not be repeated: no more tokens will appear.

To make yourself the proud owner of John Scott-Taggart's radio masterpiece—THE MANUAL OF MODERN RADIO—complete your Gift Voucher and send it in at once, remembering that this is

—THE LAST CHANCE

frequently passed to me as though I had W. L. S. in my pocket.

Well, I congratulate you for getting your hearts' desire and W. L. S. on his need for a larger fountain-pen.

Short-wave Information.

J. R. (Brentwood) submits a list of amateur stations abroad which he has received telephonically, and asks whether they would be interested if he applied for confirmation. They would be tickled to death.

I can see from his other questions that he is set upon getting into the short-wave game in earnest, and therefore I can do no better than to recommend him to take his troubles about codes and call-books to Mr. Arthur Bear, 10, St. Mary's Place,

THE WHITE CROSS MARKS THE SPOT

became comparatively non-reflective and would remain so for days. Hence communication from polar regions should be unreliable, and one wonders whether the Byrd Expedition will confirm this.

That's a Great Pity!

THE export of gooslys from Russia has been prohibited. Can such things be?

The goosly, I must explain, is a noise-maker akin to the zither, though it is bigger and stands on four legs.

When one was required for a B.B.C. programme it had to be borrowed from a member of a Balalaika orchestra. Imagine the wrath of the Board of Trade that its returns of goosly imports will be horrid blanks!

Only "Atmospherics"!

NEWS from Los Angeles, California: On February 20th listeners heard confused noises from a radio studio and attributed them to "atmospherics." Actually a lunatic was threshing round the studio, brandishing a knife; people were trying (a) to evade the knife, (b) to capture the madman. In the next room 150 ladies were listening to a cookery broadcast. This gives me an idea. Next time Mrs. Ariel "distinctly" hears a burglar downstairs I shall explain that "it's only an earthquake."



Valve Music.

THE electrone and other similar music-producing valve outfits have a very attractive tone, but I am repelled by them when I picture myself as a performer on them. This waving of the hands! I should feel that I looked like a professor of mesmerism at a fair or like a Spanish gent explaining something.

Therefore I am pleased to learn from "Radio-Craft" that there is now an "electro-musical trombone," which is a sort of electrone, but is played by sliding a lever along a scaled rod—very much less of the Svengali touch required!

On the Spot.

I OBSERVE a report to the effect that the amplifier which has been installed in the Houses of Parliament, in an attempt to render the speeches of the noble lords audible, is located on the very spot in the cellar where Guido Fawkes put the gunpowder which didn't go off.



Well, well—that's fine! How history does repeat itself, to be sure! I remember that Guido marked the spot with a cross in chalk, so that it could be used again. And the Marconi people have found it, even though the place has been rebuilt since the good old days.

Sunday Broadcasts.

MUCH as I admire the B.B.C., I really must agree that it has quite the wrong idea about what Sunday programmes should be. It is elementary gumption to realise that Sunday is the day when most people have most time in which to listen, and that therefore the greatest possible pains should be taken to make the programmes real treats. This could be done without omitting a service.

Shortly I shall construct my model Sunday programme and ask for your opinion of it. Meantime, a dull radio Sunday does not annoy me, because it gives me time for catching up with my reading.

"That's a 'P.W.' Set—That Was."

W. W. (Manchester), bandmaster, solo euphonium and 6-volt dielard, comes forward with a friendly reproach which is at the same time a supreme tribute to our technical staff.

He complains that our designs are published so much in advance that they are obsolete before he can get the components for them, and he instances a certain make of coil and a new type of valve.

No doubt those concerned here will give this point the consideration which it merits; but W. W. knows that we cannot control the output and distribution of components.

A Practical Testing Station.

SOME time ago the Marconi Company established at Mersea Island a station for testing the effects of sea water, sea air, ozone and sunlight on paints, metals, etc., a matter which is of vital moment to manufacturers of apparatus destined for marine and tropical use.

The scope of the station has now been extended, and its services will be at the disposal of the public authorities, manufacturers and engineers who desire independent reports on materials tested under natural conditions.

When is a "Howler" Not?

E. A. W. (Nottingham) thinks he has found a "howler" in someone's explanation of what happens when a loop of wire cuts lines of force: "... A current will flow along the wire and generate a definite voltage between the two ends ... which varies with the current flow."

E. A. W. says that a current cannot flow in a loop whose ends are open—hence he has forgotten Hertz's famous observation of the spark across the gap in a metal ring, which set him on the track of wireless waves.

Jumping at Conclusions.

BUT to return to the case in question. Who said that the loop's ends were open? Not the writer whose words are quoted; my friend E. A. W. jumped to that conclusion.

In some text-book diagrams the ends may, for simplicity, be shown open, but actually they are connected to slip-rings on which rest collectors, known as "brushes," which take the current and lead it to some external circuit such as a lighting system.

The induction or Rhumkorf, coil is an example of an apparatus in which current

can flow in an open circuit—by bridging the gap by means of the spark.

Piece of My Mind.

NO doubt you have often heard people say: "Well, if you don't like the programme you can switch off." Has it ever occurred to you that as an argument that is about as useful as the vituperation in which some unsuccessful debaters take refuge? Personally, I consider it childish.

One might as well say: "If you can't get your number, don't try to telephone"; or "If you don't care for the menu, don't eat." We buy our sets and pay our fees for the pleasure of listening, not for the privilege of switching off.

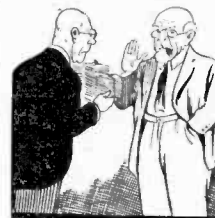
"A Fair Cop."

MY sleuth brigade, on their mettle because of my recent caution not to let zeal outrun discretion, have been firing "howlers" at me harder than ever. No less than seven of these beagles sent me news of the Scottish editor who published an article containing: "The B.B.C. must think in terms of Scots if it is to get on." The poor struggling B.B.C.!

A London "daily's" wireless correspondent said that "ultra-short wave work" is "experiments on channels with frequencies of from a fraction of a metre to ten metres." How long are the kilocycles?

This Week's English Lesson.

WHILST ploughing through a batch of American radio papers I read that somebody named Chic Sale had refused an offer of a broadcasting contract because "the kale was too slight." I asked an American what slight kale has to do with radio.



He replied that "tooslight" meant "insufficient," and that "kale" is "long green" or "spondulix." Questioned further, he said that, in plain American, these words mean "jack." I suppose he means, in plain English, "oof"!

Cheerio to Henry.

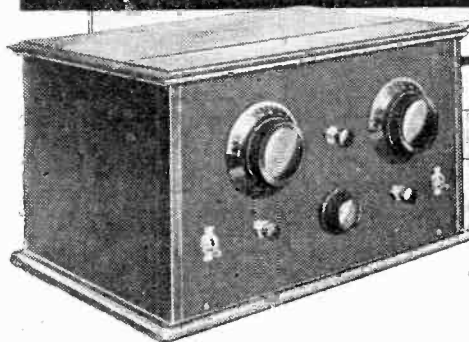
SO Henry Hall now enters his third year as purveyor-in-chief of dance music, and he is firmer in the saddle than ever. The reasons for his success are his quiet confidence, his efficiency, his complete freedom from the B.B.C. bacillus of dictatorship, and, above all, the fact that he is sensible enough to keep his ear to the ground.

His motto might well be, "We strive to please." Just as a wise man will change his views, so Henry is big enough to change his tactics. So here's luck to him—and "his boys"—and many more years of his tuneless company.

ARIEL.

BIFOCAL THREE

—THE INDUSTRY'S GREATEST ACHIEVEMENT



THE success of the "Bifocal Three" receiver is complete. From all parts of the country we are receiving reports to the effect that "Bifocals" are being built by the thousand, and that the interest created by this 1934 wonder set is absolutely phenomenal.

While we are pleased—very naturally—that "P.W." was the medium through which the very first details of this amazing set were made known to the world, we, on our part, hand the laurels to that enterprising group of manufacturers representing the leading component interests of this country for having so skilfully designed and produced it. Their timely intervention in a problem which had every appearance of being practically insurmountable has earned for them the gratitude of enthusiastic constructors all over the country, and we congratulate them.

Distant Listening Saved.

But for the introduction of this great new principle of focused radio there is little doubt that distant listening for many thousands of listeners would by now have been practically impossible, for it becomes more and more apparent, as time goes on, that the problem of ether chaos cannot be solved by Europe's broadcasting authorities alone.

That much may be deduced from some facts which have just come to light concerning a conference of experts which was called to Geneva at the beginning of this month with a view to finding solutions to the difficulties which have arisen as a result of the inauguration of the Lucerne Plan.

A Timely Introduction.

Neither Russia nor Luxembourg, whose failure to abide by the recommendations of that plan is largely responsible for the present chaos, replied to the invitation to be present at Geneva, and the position is therefore much the same as it was before. Moreover, there are many who believe that it is still likely to be.

Frankly, until complete unanimity is reached by all the countries concerned, and not, as at present, by only a certain percentage of them, the hope of finding a solution acceptable to all parties would appear to be remote in the extreme.

That is why the introduction of focused radio is so timely, and that is why the daily Press of this country has been quick to recognise the advantages of tackling the problem from the receiving angle.

The new method of selective reception, focused radio, has already aroused nation-wide enthusiasm, although the first details were given to the public only a fortnight ago in this journal.

Below we tell how this remarkable tuning development has proved its superlative programme-separating qualities to constructors and radio enthusiasts in all parts of the country.

A typical example of the way in which focused radio has been acclaimed as a solution to the interference problem comes from the March 1st issue of the "Daily Sketch." Under the heading of "Focus



Focusing the station, to free it from interference takes only a moment, though it is extraordinarily effective.

Your Radio—and End Jams." "Gold Leak," the well-known wireless authority, wrote: "What might be termed 'focused radio' is the latest and greatest advance in the wireless science. By means of this

new discovery it is claimed that interference can be conquered.

"The Lucerne wavelength allocation plan has done much to clear up the troubles caused by interference with perfect wireless reception, but the failure of certain countries to abide by the recommendations of the conference has meant that if the transmission required has been subject to interference nothing could be done about it.

Every Station Stands Out.

"This position is now changed by a device, simple to use, by means of which broadcasting stations can be tuned in with dead sureness and then focused out of the surrounding jangle, much in the same way as a pair of field-glasses focus a desired object and make it stand clear of all else.

"Focused radio does to distant stations precisely what binoculars do to distant scenes. It enables you to bring each and every one of them into focus. All the transmission detail of the station on which you are focused stands out in brilliant relief from the multiplicity of programmes which to the set of yesterday are a mere blur.

"Each and every station has a 'line of vision' of its own, and now the owner of a wireless receiver, not Europe's broadcasting authorities, can be master of the situation.

Interference-Free Reception.

"The new method comprises two tuning coils, constructed on an entirely new principle, and a simple focusing adjustment will provide interference-free reception for all listeners.

"The insipidness of this astonishing new principle, coupled with the efficient way in which it functions, provides strong grounds for thinking that it will ultimately be adopted in the design of all new receivers, whether commercial or home constructed."

"Grid Leak" is right. The paramount features which he stresses provide very strong grounds indeed for thinking that focused radio will ultimately be adopted in the design of all new receivers. How soon commercial-set manufacturers will (Continued on next page.)

COMPONENTS USED IN THE "BIFOCAL THREE"

- 2 Varley "Bifocal" coils.
- 2 J.B. .0005-mfd. Popular Log slow-motion tuning condensers.
- 1 J.B. .0003-mfd. differential reaction condenser.
- 1 Ferranti A.F.4 L.F. transformer.
- 1 Ferranti 50,000-ohm resistance (new type).
- 1 Ferranti 5,000-ohm resistance (new type).
- 2 Bulgin type S.105 switches.
- 2 Bulgin standard H.F.9 chokes.
- 1 Benjamin "Autocontrol."
- 2 Benjamin 4-pin valve holders, "Vibrolder" type.
- 1 Benjamin 5-pin valve holder.
- 1 Benjamin push-pull on-off switch (type with terminals).
- 1 Dubilier 2-mfd. fixed condenser, type BB.
- 2 Dubilier .0002-mfd. fixed condensers, type 620.
- 1 Dubilier 2-meg. grid leak, 1-watt type.

- 1 Dubilier 100,000-ohm resistance, 1-watt type.
- 1 Westinghouse "Westector," type W.6.
- 1 T.C.C. 2-mfd. fixed condenser, type 50.
- 1 T.C.C. 1-mfd. tubular fixed condenser, type 250.
- 1 T.C.C. .0001-mfd. fixed condenser, type 34.
- 4 Belling-Lee type R terminals, engraved "A," "E," "L.S.+" and "L.S.-."
- 2 Belling-Lee terminal mounts, catalogue number 1039.
- 1 Ebonite panel, 12 in. x 7 in.
- 1 Plywood baseboard, 12 in. x 10 in. x 1/2 in.
- 1 S.G. anode connector.
- 4 Wander-plugs, engraved "H.T.+1," "H.T.+2," "G.B.+" and "G.B.-."
- 2 Accumulator spades.
- 1 Fuse-type wander-plug (black for H.T.-).
- 2 10-ft. coils of insulated connecting wire.
- Flex, screws, etc.

BIFOCAL THREE—

The Industry's Greatest Achievement
(Continued from previous page.)

adopt the idea is a matter for conjecture, but the fact remains that for the present, at any rate, this great new principle is available *only* to home constructors.

The Industry's greatest achievement! How easy it is to be eulogistic in print! Yet how many people realise the magnitude of this great development? Let us try to review it for a moment or two in relation to the problems which have baffled solution by the cream of Europe's broadcasting experts in conference both at Lucerne and Geneva.

The paramount fact on which all these international discussions have to be based is that for satisfactory reception it is imperative that each and every station should be allocated a "channel" 9 kilocycles wide.

Insufficient Room.

If the lower and upper extremities of the broadcast band are considered for the purposes of this explanation as 200 and 600 metres respectively, between 200 metres—equivalent to 1,500 kilocycles—and 600 metres—corresponding to 500 kilocycles—there are approximately 111 "9-kilocycle channels." But there are already more *medium-wave* stations in Europe than there are "9-kilocycle channels" between 200 and 600 metres!

Even if all the countries of Europe were content to abide by the recommendations of a representative committee of experts the problem would be difficult enough. But when certain of them refuse point blank to have anything to do with it the position becomes practically impossible.

Thus, short of an extension of the present broadcasting band, which is impossible on account of the requirements of commercial and governmental stations, the only hope of at least partial solution is on the receiving side.

Already a Firm Favourite.

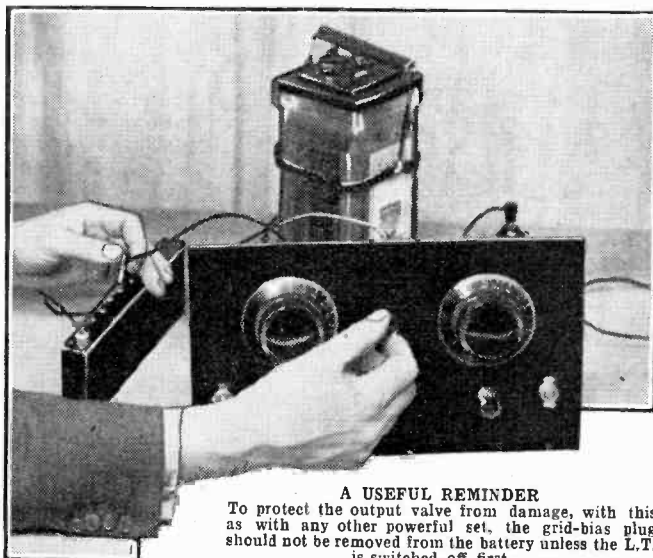
It is desirable to stress that point of partial solution, for neither this set nor any other can sort out a bad heterodyne when the trouble is directly due to a station being appreciably off its allocated wavelength. But, apart from that, the principle of focused radio does definitely give you a chance of sorting out a lot of the muddle, and that is why the "Bifocal Three" has so rapidly established itself as a firm favourite among constructors in every town, village and hamlet throughout the country.

It is the Industry's greatest achievement, and all credit is due to the manufacturers concerned for having so wholeheartedly

tackled the problem in the interests of British listeners generally. The response to their campaign is encouraging, to say the very least of it, but their efforts to raise the general standard of reception in this country are not yet over.

Before this month is out there will not be a single reputable dealer throughout the country who cannot supply free copies of the "Bifocal Three" constructional chart, the chart which was presented to "P.W." readers over a fortnight ago. Window displays are being arranged in every principal town in the United Kingdom, and, great as has been the response already, it is as nothing compared with what is to come.

Those whose sets are relatively old-fashioned will be scrapping them in favour of this latest wonder, while those who have only recently built new sets will be anxious to convert them.



A USEFUL REMINDER

To protect the output valve from damage, with this as with any other powerful set, the grid-bias plug should not be removed from the battery unless the L.T. is switched off first.

That is another important aspect of focused radio. It lends itself admirably to the adaptation of existing designs, and in most cases the modification will require only the addition of "Bifocal" coils and switches. The whole question of conversion is dealt with in a leaflet which has just been published by Varley and which is available free to "P.W." readers on application to Messrs. Varley.

If you want better radio, then you, too, must join in the chorus which is being echoed round the land: "Be wise—Bifocalise," for sooner or later you will have to!



THE VALVES AND BATTERIES FOR THE "BIFOCAL THREE"

S.G. Valve.—Cosmor 220
S.G.

Detector Valve.—Cosmor 210
H.F.

Output Valve.—Cosmor 220
P.T.

H.T. 120 volts.—Exide Type
H.1074.

G.B. 16½ volts.—Exide Type
H.1002.

L.T. 2 volts.—Exide Type
DMG.

WATCH YOUR EARTH

Details of a puzzling fault which points a moral.

THE heading to these paragraphs would seem to indicate that I intended giving old-fashioned advice. But a recent experience suggested the idea.

I had occasion to look at a three-valve A.C. set which was very much below par. I examined the aerial, saw that the earth was truly sunk into the ground, and then tried all I knew in pepping up the set. It was of no avail.

Finally I decided to make a thorough investigation, so with the set still switched on I disconnected the earth wire. Immediately the volume jumped. At once I thought that the ganging was at fault, so I connected the earth again and retrimmed. It was still no use.

It did not seem possible that the earth could be at fault. However, I decided to take a wire from the set to the earth terminal of a three-pin plug which happened to be installed in the house. On using this earth the results were normal.

The only theory I could suggest was that the earth was making a good connection, not with the surrounding soil, but purely to the foundations and walls of the house. The aerial was an indoor one, and as the walls were seemingly well connected to the earth wire, the aerial effect was being counteracted by the earth in a manner which I did not attempt to explain.

The earth tube had been well watered, yet the effect persisted. So look to your earth.

G. L.

REALISTIC REPRODUCTION

The Editor, POPULAR WIRELESS.

Dear Sir,—Mr. Sturrock, in your issue of Feb. 10th, questions my statements to the effect that straight-line reproduction is not necessarily the most faithful to the original, judged by the actual impression received by the listener. As my remarks on this subject were merely the introduction to a constructional article it would obviously have been out of place to have gone fully into the rather difficult theory; but if Mr. Sturrock or anybody else cares to pursue the thing further he can do so by reading an article by Mr. F. M. Colebrook, of the National Physical Laboratory, in "World Radio" dated February 2nd, 1934.

Mr. Sturrock does not take account of the fact that very often people do not want to listen to a programme even at the same *apparent* volume as the original, and it was to take care of this that my system of control was intended. Also it is not very clear what Mr. Sturrock means by hearing the original at less volume. Anything heard at less volume than the original surely cannot be the original.

Yours faithfully,

M. G. SCROGGIE.

A HOME-MADE VALVE TESTER

THERE nearly always comes a time when the home constructor breaks the tenth commandment. Speaking purely from personal experience, I should say that the thing I have coveted most often is a device that would, at one simple operation, tell me which valve of my "super-what-is-it seven" is misbehaving itself, and why.

When a set—and especially a modern set—starts giving trouble the first thing that one wants to find out is the approximate locality of that trouble. Common sense helps a great deal, but there are many cases in which common sense unless backed by a good deal of sound technical knowledge, will not help us out.

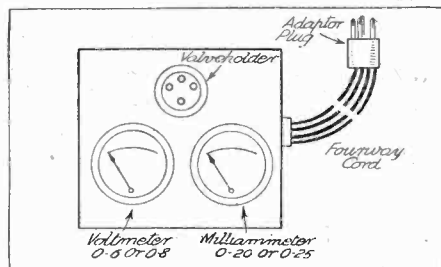
Cost Cut to a Minimum.

This being so, in accordance with the spirit of the age we invent a machine to do it for us. The little tester that I am about to describe has saved me many anxious moments, cost me next to nothing and took about an hour to construct.

The elaborate commercial set-testers, admirable though they are, are priced at a figure well beyond the pocket of the average dabbler in radio. Even a home-made imitation of them would be a costly affair. So I have cut the thing down to a bare minimum.

What are the two things that we want to know most of all about a valve, to say whether it has a chance of working properly in the set? I should say, without any hesitation, that they are the filament volts and the anode current. These can be measured by means of a voltmeter and a milliammeter, it is true, but not without a con-

A COMPACT UNIT



Two inexpensive meters form the main components in the tester described on this page.

siderable amount of diving into the set, not to mention the removal of sections of the wiring.

The tester seen in the diagram employs these two instruments, mounted on the lid of a small wooden box, together with a valve holder. A four-way cord leads from the box to an ordinary four-prong adaptor.

All that one has to do is to remove the valve from its holder, insert the adaptor in place of it and place the valve in the holder on the tester itself. The two meters then

read simultaneously—filament voltage on the left and anode current on the right.

The latter is unquestionably the more useful; but funny things sometimes happen to filament voltages, particularly if the set contains questionable wiring and dirty L.T.

How to build a cheap, simple, but completely effective unit that will enable you to check up your valves in a few moments.

**Designed and Described by
L. H. THOMAS.**

switches, not to mention long, straggly lengths of flex ending at corroded accumulator terminals!

The wiring of this little unit, as shown in the diagram, is perfectly straightforward. The leads that are connected to the "filament" pins of the adaptor simply go straight to the voltmeter and to the filament legs of the valve holder. If the meter is of the moving-coil type, provision may have to be made for reversing its polarity easily, since all the valve holders in the set may not be wired up in the standard manner—i.e. with the L.T.—pin on the same side.

The Anode and Grid Connections.

The lead from the "anode" pin of the adaptor goes to the positive side of the milliammeter, the negative side of which goes to the "anode" leg of the valve holder mounted on the tester itself. The lead from the "grid" pin simply goes straight to the "grid" leg of the valve holder.

The anode-current reading should, naturally, be carefully compared with the maker's figures. If it is too high, in ninety-nine cases out of a hundred the fault will be found in the grid-bias battery—a component which, on account of its long life, is apt to be overlooked, if not forgotten.

If the figure is too low the trouble may possibly be an excess of grid bias, but is more likely to be due to faulty emission if the valve is a veteran. Naturally, the anode-current readings won't mean anything at all unless the filament voltage is at the normal figure.

Endless Possibilities.

Incidentally, the anode-current reading is often useful in the case of a last-stage valve, for checking the presence of distortion. The well-known kicks tell their own story; they generally cry "Overloading" in a very loud voice. Remedy—reduce the volume a little and see if they are still there.

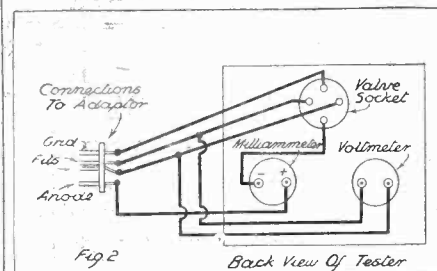
Readers of an inventive turn of mind will see endless possibilities in this idea. It

is, for instance, only one step further to install on the tester a good high-resistance voltmeter for the measurement of anode voltage. This will have to be connected between the lead coming from the "anode" pin of the adaptor to one of the filament pins.

Effect of Anode Resistances.

It is no good trying to do this job with a cheap voltmeter, however, as, if there are any coupling or decoupling resistances in the anode circuit of the valve, an entirely false reading will be given. A valve with 100,000 ohms in its plate circuit may have an actual potential of 60 volts on the anode, but a cheap, low-resistance voltmeter might very well give a reading of 15 or 20.

EASY TO CONSTRUCT



Very few connections are required, as this under-panel wiring diagram shows.

The two "essential" meters, however, need not be expensive instruments, provided that they are reasonably accurate.

The tester, as it stands, is not suitable for use with A.C. valves. That involves a few alterations and the installation of a good A.C. voltmeter. The cathode lead, too, has to be dealt with, and one sometimes finds a few snags in these cases.

"SELECTIVITY WAS AMAZING"

To the Editor, POPULAR WIRELESS.

Dear Sir,—Having raked out an old POPULAR WIRELESS, dated June 24th, 1933, I thought I would build the "Economy Three" to see what kind of set it was and to see if it was as good as it was painted. After a few hours' work I had the set completed, and no sooner had I switched on than there was Budapest at full loudspeaker strength. Selectivity was amazing. London Regional occupied only three degrees of a 180-degree dial.

Being a regular reader of "P.W." I have built many of the sets which have been described from time to time, and not yet have I once been dissatisfied with the results.

I usually buy all the radio periodicals, but never have I been so satisfied with these as with POPULAR WIRELESS.

Wishing your journal every success in the future as in the past.

Yours truly,
E. C. B. JARVIS.

7, Woolwich Road, Greenwich, S.E.10.

MEMBERS of the programme staff of the B.B.C. are notoriously underpaid. In the past they have been able to make up their trifling salaries with fees for programmes prepared in their own time. This extra source of revenue is now to be denied. No member of the programme staff of the B.B.C. is to get anything more than his or her salary.

Unless pay is adjusted accordingly, this will cause a good deal of individual hardship. It is also likely to have an adverse effect on programme standards. Some of the best peaks of broadcasting have been the private brain-waves of members of the staff.

The B.B.C. to Counter-Attack.

I hear interesting news of a change of attitude on the part of the B.B.C. concerning Press attacks. It is stated that the B.B.C. has decided no longer to ignore these attacks when there is evidence that they are due to the instruction of newspaper proprietors. The new policy is to counter-attack. The papers concerned are being put on the black list. No one connected with them will be allowed to broadcast, and all references will be carefully censored. Competing newspapers will be given special notice. Offending proprietors are being carefully watched.

Denis O'Neil as Composer.

The soloist with the B.B.C. Theatre Orchestra, conducted by Stanford Robinson on March 14th (London Regional), is that genial Irish singer, Denis O'Neil, who is to give three groups of songs. He is to appear in a new light in this programme, two of his songs having been written by himself. They are "My Sheepdog and I" and "Nothing for you to-day," and this will be their first broadcast.

Regional Orchestras.

The move to restore Regional orchestras of the B.B.C. is gaining ground. It is not intended, however, to recreate complete studio symphony orchestras. The plan is to co-operate with local authorities in order that a good symphony orchestra may have full-time employment throughout the year in each region. In Manchester, for instance, the Hallé Orchestra will benefit in this way; in Birmingham the local municipal orchestra will benefit.

THE MIRROR OF THE B.B.C.

THOSE "HOME-MADE" PROGRAMMES

Boycotting Newspapers—An Easter Revue—Talks from Foreign Capitals—The Week Abroad.

REFLECTIONS BY O.H.M.

This is an excellent plan from every point of view. It would greatly improve the musical quality of Regional programmes, it would provide much-needed employment for a considerable body of musicians, and it would greatly enhance the prestige of the B.B.C. throughout the country. Such a move, also, would be an admirable preparation for impressing any parliamentary committee of inquiry which may be appointed to examine the B.B.C. next year.

Ernest Longstaffe's Birthday.

Listeners will simply clamour to send birthday greetings to Ernest Longstaffe on Friday, April 6th, the day on which he is to produce his new revue for London Regional, called "Easter Eggs: a Sitting of Idle Idylls."

"A PLAY FOR THE MICROPHONE"



A photograph of the local control-room which commands a view of most of the studios in the Dramatic "block" at Broadcasting House.

The show opens with the whirring of a cuckoo clock, which was given to Mr. Longstaffe by his father when he was six years old. In addition to writing the book, Mr. Longstaffe has composed the music, and he will also produce the show.

He has, however, had the collaboration of Edward Lockton, who has written a

song, "Gentlemen, Good-night," which will conclude the programme. The revue will be repeated for National listeners on Saturday, April 7th.

The Grand National.

Mr. R. C. Lyle and Mr. W. Hobbiss, who have been sharing the task of describing the Grand National since 1930, will do so again on Friday, March 23rd, from their respective positions at the Grand Stand and the Canal Turn.

Two commentators are required because of the impossibility for one man at the grand stand to distinguish the horses nearly a mile out "in the country."

Clapham and Dwyer for the Children.

Mr. and Mrs. Clapham and Mr. and Mrs. Dwyer are to make their first Children's Hour appearance on Saturday, March 24th, a day of the week on which, fortunately, many grown-ups will also be able to listen.

It may not be generally known that Clapham was formerly a barrister's clerk and that Dwyer was a commercial traveller. The story goes that the famous partnership was started over a little light luncheon when the two met in a hostelry.

They had not been long on the halls when they were invited to broadcast, which they have been doing regularly since 1926.

"The Week Abroad."

It having already been stated in Parliament that Mr. Vernon Bartlett's regular series of talks are to finish, listeners may like to know that their place will be taken on Thursday evenings, from April to June, with relay talks from the different capitals of Europe.

These talks will continue to be given under the title "The Week Abroad," and they will be arranged, as far as possible, to coincide with events of special interest or significance in the various countries. The speakers will all be experts on foreign affairs.

Mr. Maxton's Point of View.

Mr. James Maxton, most fiery of all members of the British Parliament, is to broadcast on Friday, March 23rd. He is taking part with Sir Alexander McEwen (ex-Provost of Inverness) in a debate in

(Continued on page 25.)

I HAVE heard lots of favourable comment on James Douglas' talk. Such a remarkable talk deserves recognition, of course. I am not a little surprised, however, that there has been no protest against it from certain quarters. The fact is there is a growing public opinion completely in sympathy with the sentiments expressed by Mr. Douglas.

Another satisfactory point about this broadcast talk is that it was allowed. And wasn't the same freedom given to Mr. Michael Roberts in his talk a few nights later in the "Whither Britain?" series?

The other recent Talks sensation, of course, was provided by Mr. William Ferrie who made use of his privileged position in front of the microphone as representative of the working man to broadcast a personal protest against the censorship of passages in his manuscript.

The full facts of the case will probably never be known. The B.B.C. says that the censored talk was in Mr. Ferrie's

THE LISTENER'S NOTEBOOK

Comment and criticism on the programmes.

hands 48 hours before the broadcast and that he made no protest at his final rehearsal. Mr. Ferrie, on the other hand, maintains that the alterations were made at the last minute.

Whatever the facts, it remains that no broadcast speaker finds it easy to depart from his manuscript. It is so simple to fade out the microphone!

I sat up for "Alibi from the Air." It was all very entertaining, chiefly because of the novelty of the idea behind it. A quite impossible story, of course. So impossible, in fact, that one doesn't want this sort of thing too often. Once in a while, perhaps, it is acceptable.

Having discovered some discrepancies in the story of the previous week's play, I listened carefully to "Alibi from the Air" for similar faults. Here, again, I discovered a point that made one realise that "facts" do not trouble authors over much. I refer to the prisoner's apparently truthful observation (in answer to a question) that the last time he was at a night club was three weeks previous to the date of trial.

This is hardly likely when we remember that the prisoner was being tried on a charge of murder at the Old Bailey—and therefore probably had been in custody at least a couple of months.

I had decided this week to do a bit of straight talking about that broadcast die-hard, the "Foundations of Music." My grouse isn't so much against the Foundations as against their bagging that 6.30-6.50 p.m. period every evening. This is really monstrous. It is usually such a good time for listening-in. An appointment somewhere in one's town isn't generally till a later hour. Most people are free at 6.30 p.m., and we always have to listen to the Foundations. We don't always want to.

I have been very angered lately by this monopoly. Let them keep the Foundations, by all means, but it is quite time now that that very valuable twenty minutes beginning at 6.30 p.m. ceased to be the exclusive property of what is, after all, an exclusive musical public.

The chamber works written by continental composers of the 16th and 17th centuries were much above

(Continued on page 26.)



JUST a month ago—in POPULAR WIRELESS of February 17th—we told you about the new "Superhet Four Forty" which H.M.V. have produced. The tests of that fine receiver were definitely a pleasure. We have now had the added pleasure of trying out the radiogramophone adaptation of this same superhet chassis, which is issued under the name "Superhet Five Forty Radiogram."

The appearance of this instrument is fully indicative of the quality of performance. The walnut cabinet has been designed specially for the job, and the designers have spared no pains to make it ideal for its task, not only aesthetically, but also from the technical point of view. With the lid closed only one control is visible—obviously the volume control for the gramophone side of the instrument. The remainder of the controls are on the right-hand side of the motor-board.

The actual receiver has already been dealt with in some detail, but it may help

THE H.M.V. "SUPERHET FIVE FORTY RADIOGRAM."

prospective buyers if we briefly mention the chief points once more.

The circuit is a superheterodyne. That is a bald statement. Let us say, rather, that it is a superhet circuit which has emerged after long and extensive experiment from the laboratories of the H.M.V. engineers. That will explain why no interference is caused to your neighbours listening, why there is no sudden and irritating "blast" when passing local stations on the dial and why the reproduction amazes one at a first hearing for its fidelity and tonal balance.

The model which we tested was designed for A.C. mains. We listened for hum. We failed to hear a vestige of it! There is also a model for D.C. mains. We have no doubt but that this, too, is equally free from any form of unwanted "background."

On a Pinnacle of Its Own.

Those who wish to use the "Superhet Five Forty" as much for broadcast listening as for record entertainment will be glad to know that the new radiogramophone possesses to the full all the characteristics of its table "brother." We found the selectivity no less perfect, its "whistle-suppression" powers no less marked, its tone control no less useful.

But it is as a radiogramophone that the "Superhet Five Forty" must stand or fall. Not only does it stand, but it stands on a pinnacle of its own above others of its class. This is no extravagant flight of fancy. It is a fact. When the qualities of an H.M.V. superheterodyne design are

allied to a gramophone from the H.M.V. factory the result cannot disappoint.

But to return to details. Needle scratch can be reduced almost to nothing by the tone control without appreciable alteration in balance. Output is sufficient even for dancing (and this form of exercise makes bigger demands on volume than many people think). The automatic stop makes operation a pleasure instead of a scramble between instrument and chair.

ITEMS THAT COUNT

1. Superhet radiogramophone (incorporating mains aerial whistle suppressor, tone control, etc.), for use on A.C. or D.C. mains.
2. Electric turntable, gramophone volume control and automatic stop.
3. Manufactured by the Gramophone Company, Limited, Hayes, Middlesex.
4. Prices: For A.C. mains, 20 gns.; for D.C. mains, 21 gns.

And the price? A mere twenty guineas. Almost any radiogram at this price would be value for money. But when it is remembered that this particular model is backed up by the prestige of one of the most famous firms in the country, it will immediately be apparent that the "Superhet Five Forty" is indeed a bargain that should not be missed.

The photograph at the top of this page shows Mr. Christopher Stone selecting records for a B.B.C. broadcast, on the H.M.V. "Superhet Five Forty Radiogram."

"THERE'S MANY A SLIP" By Eric O'Mahoney

I APPEAR to be the possessor of the world's lowest-capacity condenser. It came about in this fashion:

Looking around for a reaction condenser to try out an odd hook-up, I selected, from the spares box, a little air-spaced variable.

Its capacity was, to me, an unknown quantity, which was unfortunate, as the circuit plainly demanded a .0003 mfd. Then a bright idea struck me. Why not calculate it? So much more scientific than just screwing it into place and chancing its being correct.

I expect you all know the time-worn formula:

$$C = 139K \frac{(n-1)(R_1^2 - R_2^2)}{d}$$

Where K=dielectric constant (air=1)

n=number of plates,

d=distance between a pair of plates in centimetres.

R_1 =radius in centimetres of a moving vane.
 R_2 =radius in centimetres of the cut-out portion of a fixed vane.

This presumably gives the capacity of the condenser in billionths of a farad, or, to conform more closely to current laboratory practice, in micro-microfarads.

With the aid of a penny ruler—after all, I was only aiming at a rough approximation—I measured up the various dimensions. I performed the simple calculation. The going was so dead easy that I must confess to a few passing qualms. Nature is rarely like this.

And here I should like to offer a word of advice. If you're aiming at being scientific do the thing properly. There's no sense in giving the other fellow a chance to trip you up.

I repeat, I performed the measurements and calculations, not once, but many times.

There was an additional reason for this. The result was amazing, stupendous! The maximum capacity of this little condenser was .0000006 mfd.

I admit the 6 looked a little doubtful, but the row of noughts was most gratifying. And to think that the maker had failed to stamp his name on it!

Later.—Have just made a dreadful discovery. My suspicions of Nature are confirmed. She had something up her sleeve. On one of the pillars of the condenser are engraved the symbols .0003 mfd.

It's very perplexing, but, as Dr. Roberts, in a recent issue of POPULAR WIRELESS, so aptly remarked: "Where practice, in wireless, confounds theory, then confound theory," or words to that effect. Perhaps, after all, I'd have been wiser just to try the condenser out.

STATIONS WORTH HEARING

A review of the reception conditions existing on the broadcasting bands, showing where we have scored and where we have lost by the adoption of the Lucerne Plan in its current form.

By R. W. HALLOWS, M.A.

IT is rather interesting to sit down now and take stock of our gains and losses on the medium waveband since the coming of the Lucerne Plan. The gains are not yet quite complete, for there are a good many stations with channels of their own which are still working on low power.

By the autumn most of these will have new high-power transmitters in operation. The losses, on the other hand, are probably at their maximum now, for not a few stations that are now interfered with should come back to us when various problems of frequency control and of synchronisation have been solved.

Here are some gains: Beromünster, on 539.6 metres, is now always clear, though under the Prague Plan it was almost invariably heterodyned. Stuttgart, now on 522.6 metres, was formerly so near the London Regional that if the set were selective enough to separate the two, side-band splash was something more than a nuisance. This station was also generally heterodyned by Algiers.

Paris, Berlin and Hamburg

Paris P.T.T., another excellent station to-day, previously worked on a wavelength shared (and wandered into!) by half a dozen or more stations. Berlin, now on 356.7 metres, had hardly been heard for a year or so prior to January 15th, 1934, owing to interference. Hamburg, completely reliable to-day, used to be heterodyned night after night by Radio L.L.

Monte Ceneri was rarely well received in pre-Lucerne days. At one time it worked on the long waves, regularly interfering with Kalundborg. Then it moved to 678.7 metres, a wavelength that few receiving sets can reach. It is now working on 257.1 metres, and if your set is selective enough to separate it from the London and West Nationals, two channels away, it can be heard well.

To the losses side of the account we must put the two Toulouse stations, each of which is now on a shared wavelength. I believe that in these cases, as in those of Strasbourg and the Poste Parisien, the trouble that we now experience is chiefly due to lack of synchronisation.

How We Have Gained.

If it does not disappear altogether the interference should become much less severe in time. The only other stations of importance that are no longer well receivable are Göteborg and Turin.

Göteborg shares a wavelength, and here again matters may improve. Turin, though it has a channel of its own, is next door to the London and West Nationals, and side-band splash is the bugbear.

Actually the loss of Göteborg and Turin is not a very serious matter, since the Göteborg programmes are almost always obtainable from Stockholm or Motala and those of Turin from Florence or Milan.

We seem, then, to have gained distinctly

more than we have lost. We are six alternative programmes to the good as against three only to the bad, for Paris P.T.T. often gives the same programme as Toulouse P.T.T.

To the losses, though, must be added, for the moment, two stations which are temporarily not worth listening to. These are Hilversum, which, at the time, is transmitting the Huizen programmes on 301.5 metres, and Heilsberg on 291 metres.

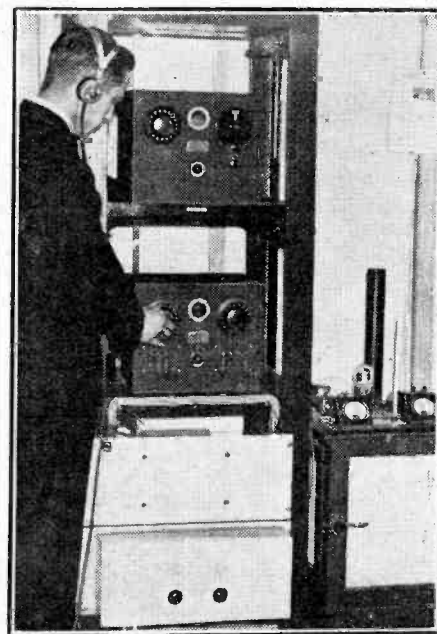
Those Wavelength Wobbles.

Cracow is working off its wavelength and heterodyning Hilversum. Heilsberg suffers from interference caused apparently by Barcelona E.A.J. 15, which, as the latest U.I.R. report shows, has been going on just anyhow!

Perhaps the most marvellous piece of wavelength wandering recorded after the coming into force of the Lucerne Plan is that indulged in by Radio Normandie. The station started on roughly 226 metres, worked there for four and a half days, then went up to just under 227 metres. Then in one day it dived down to 205 metres. It has since wobbled about in the neighbourhood of 206 metres.

Almost as good are the feats of Juan-les-Pins, which in the course of seventeen days

CHECKING THE WAVEMETER



A view of the special multi-vibrator at the B.B.C.'s Tatsfield listening station. This apparatus is used to check up the wavemeters employed in keeping a watch on the wavelengths of B.B.C. and continental stations.

used three different wavelengths—222.6, 247.6 and 240.2 metres.

The records of the Spanish stations make rather sad reading. Barcelona E.A.J. 1 is the only one that managed to keep to its

wavelength, the rest having wandered like lost sheep.

One of Europe's worst wireless nuisances has always been Radio L.L., which, as previously mentioned, used to heterodyne Hamburg in pre-Lucerne days. It is supposed to work on 360.6 metres, sharing this wavelength with Moscow IV. Actually it has never once been anywhere near its proper wavelength, and it has been interfering severely with Bucharest.

The only newcomer amongst stations this month is the new Poznan transmitter on 345.6 metres. The old plant had a rating of 1.7 kilowatts; the new one has ten times the power. Though it is not likely to become a reliable provider of entertainment, since it has the London Regional as next-door neighbour, Poznan is a station that the long-distance enthusiast will probably like to add to his bag. It is transmitting at the time of writing only during the mornings, but will shortly come into full-time use.

There is a certain amount of improvement to record on the long waves, and it is to be hoped that the U.I.R. Conference on the subject will have successful results.

Huizen has background interference on about two evenings each week on the average. Radio-Paris is still interfered with as a rule, though good reception is occasionally obtainable.

Between 200 and 300 Metres.

The Deutschlandsender, Warsaw, Motala, Luxembourg, Kalundborg and Oslo are generally well heard. Motala, Kalundborg and Oslo are gains since last month.

The medium waveband is very satisfactory between just over 300 and 549.5 metres. Between 200 and 300 metres there is, unfortunately, a great deal of heterodyning and jamming. The only stations receivable clear of interference in this region are Rennes, Juan-les-Pins (which has adopted the wavelength originally assigned to Luxembourg), Trieste, Frankfurt and Bordeaux Lafayette.

The upper part of the medium waveband is about as good as it could be, containing as it does a score or so of stations which come in with good volume and fine quality evening after evening. The wise listener uses mainly the band between 310 and 549.5 metres for his foreign listening if he wants to receive transmissions of genuine entertainment value.

Near the top of the band are five stations which invariably provide magnificent reception. These are Budapest, Beromünster, Athlone, Stuttgart, and Vienna. Florence is almost as good as any of them, whilst Brussels No. 1, Prague, Lyons P.T.T. and Langenberg seldom fail to furnish first-class reception.

Working Well.

Söttens would be excellent if it were not next door to the North Regional; as it is, that old enemy of reception, sideband splash, spoils the programmes when the British station is transmitting speech.

Belgrade is fairly well heard on certain evenings, and is sure to prove a fine station when the new transmitter comes into action, as it will within a month or two.

Paris P.T.T. is generally good, though an occasional heterodyne occurs.

On the whole, then, the position is pretty satisfactory, though admittedly a selective receiving set is necessary nowadays for good results. With all its shortcomings, and they are many, the Lucerne Plan is working well.



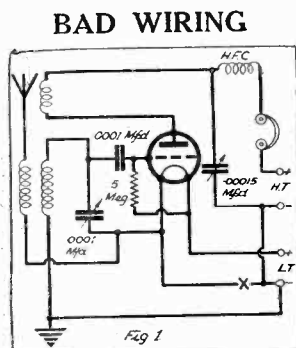
EVERY week, with the utmost regularity, I find in my pile of correspondence a letter from a reader who says: "I always find that the layout is more important than the circuit for successful short-wave work." Not always in so many words, of course, but always with the same meaning.

This is so absolutely true that I want to amplify one or two of my remarks in last week's notes. You may remember that I stressed the importance of connecting the grid coil *directly* across its tuning condenser. I mentioned sets in which the wire from the moving plates of that condenser, instead of going straight to the earth side of the grid coil, first went for a walk right round the set.

Since then I have been at some pains to discover just how bad the effects of this procedure may be on short-wave work, and in the course of my travels I discovered the

extraordinary specimen shown in Fig. 1. That circuit diagram is an absolutely literal "translation" of the wiring of a reader's set.

You will notice that the "earth" side of the tuning con-



This diagram shows the actual connections used in a reader's set which proved unstable.

one leg of the filament, but the "earth" side of the coil which the condenser is supposed to tune is taken straight to the earth terminal, whence it finds its way round to the L.T.—terminal. After leaving this for a circular tour round the baseboard, in the course of which it encounters a fine old 19th-century L.T. switch, it eventually gets back to where it ought to have been!

Some Common Faults.

Now, lest any sceptics among you may be saying, "Yes, but I bet the set worked in spite of all that," let me assure you that it *didn't*. It may have brought in a few stations, but that's not my idea of "working."

Hand-capacity effects were terrible.

There was a large "blank spot" in the middle of the dial, over which the set would not oscillate; and, thanks to the reaction condenser having been "returned" to the H.T.—terminal instead of straight to the filament, the dirty L.T. switch introduced

as one could possibly devise. Precisely the same applies to the reaction condenser, while the bottom ends of both the aerial and the grid coil simply go straight to the foil baseboard.

I can honestly say that I have *never* met a case of trouble from hand-capacity effects in a set which has been sensibly dealt with in this way. As a matter of fact, the foil-covered baseboard is more useful than the metal panel. If the latter is dispensed with, however, the two sets of moving plates must be connected directly to the foil at the nearest possible point.

Now for a few thoughts about the actual circuit to use for short-wave reception. As I have said all along, the best circuit is the one that you are most familiar with. Your nearest short-wave neighbour doesn't

get better results than you because he uses a Schnell circuit and you use a Reinartz; it's more likely because he has taken more trouble over the details than you have.

After all, there is only one detector circuit, fundamentally. All the different names have only been given to various modifications of it. Fig. 2 shows it in its simplest form—and, in my opinion, its best. I cannot emphasise too strongly the advantage of having one side of the reaction at earth potential.

A Well-Tried Circuit.

I don't stick to that particular circuit because I'm a die-hard—if anyone showed me a better one, and *proved* that it was better, I should scrap my ideas immediately; but I *do* know where I am with it, and anyone can make it work well.

The addition of a screened-grid stage (with which I shall soon be dealing) is the simplest possible job; and L.F. amplification, after all, is nothing to do with short-wave work. One ought to have a good L.F. amplifier "on the shelf" and finish all one's experimental sets with the detector. It's waste of good time to build a fresh L.F. stage into every S.W. set one makes.

ABOUT YOUR RECEIVER

That layout is every bit as important in short-wave work as the particular circuit used is the theme of this article by W. L. S.

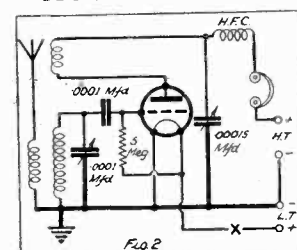
some very nasty noises. The cure for all this was so simple—just a rearrangement of two or three wires, resulting in a saving of about six inches of tinned copper—and the set worked like a charm without any further ado.

Fig. 2 shows my idea of what such a set should be. The thick lines represent the earth returns, facilitated by a metal panel and a foil-covered baseboard.

Low-Resistance Earth Returns.

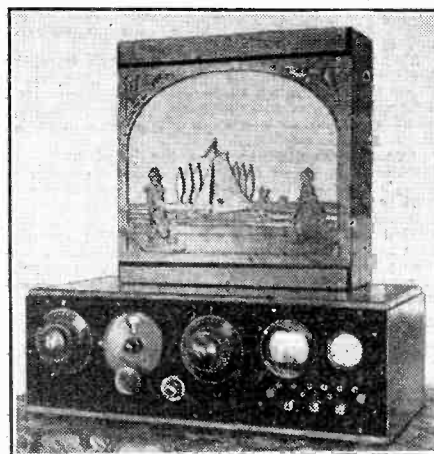
When one does this there is no need to bother about that direct lead from the condenser to the coil (at least, not on the earth side). The moving plates of the condenser, attached to its frame, which is bolted straight on the metal panel, have as direct and as low-resistance an earth return

HOW TO DO IT



When wired as indicated here, the circuit of Fig. 1 worked perfectly.

AN ELEGANT DESIGN



A set which definitely proves that short-wave designs need not be eyesores. It was constructed by a reader in North-West India.

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



FROM the number of queries that have recently reached me on the subject of "man-made static" I am rather afraid that the situation is not improving. Nor can one hope that it will until some regulations concerning the use of "silencers" are drawn up and rigidly enforced.

H. H. (Wolverhampton) wants to know whether a small, amateurish, unscientific "doublet" aerial like that shown in the diagram can ever be any good as a means of reducing the noise-to-signal ratio.

I have often used one myself, H. H., and, although it is vastly preferable to put up one of the proper dimensions, an impromptu one like you mention is quite good.

Details of a "Doublet" Aerial.

The two horizontal arms of the aerial should each be a quarter-wave. In my own case I used a "doublet" for 20-metre reception and made each arm 5 metres (approximately 16 feet) long. But I found that arms not more than 7 feet long were quite good, although naturally one loses a lot of signal strength. But, after all, what good is signal strength to one if the noises are so overpowering that one can't hear the signals?

Incidentally, readers trying a "quasi-doublet" aerial like that in the diagram

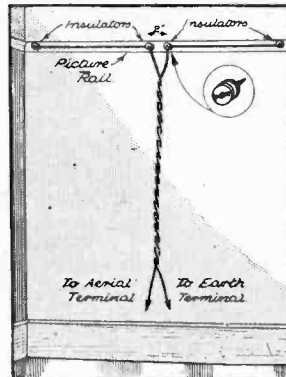
should note that they must use inductive coupling for their receiver. Although I have labelled the ends "earth" and "aerial," they should really be taken to a coil which is coupled to the grid coil. Sometimes it is an advantage to earth one side.

J. W. (Newmains) wants identification of a French-speaking station on about 14 metres, with an interval signal of a musical note (roughly G-C-G).

Will V. J. E. (Liverpool), whose address I am afraid I cannot trace, please make himself known to R. C. W. of the same town? The latter's address is Mr. R. C. Windsor, 5, Barnhill Road, Wavertree.

VERY EFFECTIVE

A type of aerial which will prove helpful when static interference is bad. Even if the lengths of the horizontal wires are not exact multiples of the wavelength of the band to be received, the scheme is still worth employing.



This same R. C. W. wants details of a "band-spread" arrangement for the 49-metre broadcast band, with a '00004 midget condenser. Well, R. C. W., I don't call '00004 a midget for short-wave work! Put in another nought and I might. A '00004

across a biggish coil will easily cover the band of 30-50 metres.

My ideal band-spread arrangement is the conventional series of coils, tuned by something of the order of '0001, with a really tiny condenser in parallel with it. If you can find the smallest condenser in your junk box, and strip off all its plates except one fixed and one moving—and then double-space those—you will have a band-spread condenser.

It is a good idea to reverse the usual procedure: equip your baby condenser with a nice slow-motion dial and leave a plain dial on the '0001. The latter can then be set at the bottom of the band and the searching done on the little fellow.

An Earth is Always in Use.

To your other query—do I think metal chassis preferable to wood-and-ebonite, even when no earth is used—the answer is definitely *yes*. After all, you can't help using an earth on short-wave receivers, even if you leave the actual metallic connection out!

J. B. M. (Glasgow) reports a Swedish station, apparently Stockholm, on 39 or 40 metres. W. G. M. (Southampton) sends in a long and newsy letter ending with a complaint about a nearby D.C. motor. I recommend him to try a "doublet." From his log of DX amateurs, though, one wouldn't know that there was much wrong!

R. H. R. (Llanrwst) wants the whole truth about my reception in that part of the world when I had a portable up there two years ago. F. N. B. (Hale), whom I met up there, will back me up when I say that it appears to be a perfect locality for short-wave work.

ANOTHER pot-pourri of film-star voices has been published, this time by Regal Zonophone in "The Voices of the Stars." As in the case of the Decca, reviewed recently, the proceeds of the sale of the record is to be devoted to the Cinematograph Trade Benevolent Fund.

Four gramophone companies have co-operated in a big "disc" drive in aid of this fund, and the Regal Zono record is the latest to be released. The voices are, of course, taken direct from the various films in which the stars are appearing. So we have George Arliss delivering part of one of his speeches in *Voltaire*, Diana Wynyard recites the final peroration from *Cavalcade*, and Marie Dressler and Jean Harlow give vent to the final satire in the film *Dinner at Eight*.

In addition to the above named we have an assortment of songs, wisecracks and general remarks from Janet Gaynor, Laurel and Hardy, Katharine Hepburn, Norma Shearer, Charles Laughton (Henry VIII), Leslie Henson, Jack Buchanan, Jack Hulbert, Cicely Courtneidge, Gracie Fields, Evelyn Laye, Mae West, Wallace Beery, Jackie Cooper and several others.

It is a record packed with typical sayings and is a very good souvenir of many of the world's leading film stars. At 1s. 6d. it should successfully swell the coffers of the fund, and it is expected that at least 500,000 will be sold within a week of the release of the record. Don't forget your copy.

How a Dance "Hit" is Made.

I am interestingly watching the building up of a "hit." I am convinced that, in ninety-nine cases out of a hundred, a hit is *made*, not *born*. Repetition, plugging if you like, has its desired effect in stimulating interest in a number—always provided the number is good and has some claim to be plugged—and the result is that people like it, they hum and whistle it, they buy the gramophone record—it is a *hit*.

Did *You Ever See a Dream Walking*? was well plugged till it became a *hit*—never would it have attained such eminence otherwise, nor would most of the other modern numbers. Not because they are poor, but because so many are good. The level of dance composition from the melody or character point of view, is exceedingly high. Consequently if no items were starred, they would all remain *en masse*, with few outstanding numbers, and therefore few outstanding record sales.

Thus it is necessary, from a business point of view, to *make* a hit. Occasionally the choice of the future "star" is faulty—the public psychology is misjudged and the hoped-for acclaim is not forthcoming. But usually the hit grows apparently naturally—

ROUND the RECORDS

Selections and recommendations from the latest gramophone lists

By K. D. ROGERS.



Carefully fostered by a knowing publisher—until every dance band is playing it, crooners are burbling its melody, wondrously out of tune, and the gramophone companies are busily pressing records of it.

The latest ewe lamb of the music-publishing world is "Play to me, Gipsy," which is being groomed for stardom. Gradually more and more of it is heard from dance bands on the air, and the recording companies are busy making discs with its plaintive melody on board.

The number is good, and is a change from the rhythms we have had starred lately—"Play to me, Gipsy" is sometimes a tango and sometimes a foxtrot. Probably the powers that be will succeed in building another success, to last some two months or so till another has to be launched.

Decca alone have recorded the latest arrival at least four times—by Roy Fox, Frank Titterton, Don Sesta's Accordion Band and Alfredo Campoli. There's variety for you! Roy Fox and his Band need no introduction, Frank Titterton's tenor voice is accompanied by Fred Hartley and his Novelty Quintet, Don Sesta has collected a group of first-class accordion players, and Alfredo Campoli is a violinist who is rapidly establishing himself. I specially recommend the Roy Fox and Campoli versions.

Out-of-Tune Tunefulness.

I wonder if there is anyone who can sing so delightfully out of tune as Elsie Carlisle. This is not a criticism, but a commendation. "Straight" singers must shudder when they hear her, but none could honestly deny that, judged apart from a purely musical standard, Elsie Carlisle is a great artiste. She has many copyists, too, which itself is a sure sign of success, though none has yet given me the same pleasure as Ambrose's famous lady crooner.

Her latest exposition of out-of-tune tunefulness is "This Little Piggy Went to Market," and with it, on

Decca, is "Gosh, I Must be Falling in Love!" Both are in the best Carlisle style and are exquisite pieces of artistry. By all of which you will gather that I am something of an Elsie Carlisle "fan." When she sings like she does on Decca F3887 I am.

Harlem has come to London in the persons of Cab Calloway and his Orchestra, which have been booked for the Kit-Cat and the Palladium. I have just been listening to a Brunswick recording by Cab and Co. of "Dinah," that immortal Harlem classic which keeps on popping up on the gramophone lists. Naturally, Cab Calloway and his boys do it more than justice. With "Beale Street Mama" it is played in the best Cab style. (01688.)

Guy Lombardo does not show up so well on his Decca records as he did some time ago on another make. His band seems to be coarser and rougher, and I should like to see him get better technical assistance. The Royal Canadians are an excellent combination and have a style and finish that are recognisable the moment they begin to play. This month they have recorded "Time to Go" and "Inka Dinka Doo." The latter has particularly intriguing piano interludes, and the piano backgrounds and breaks of Lombardo arrangements are always worth hearing.

Some Appetite Whetters.

As we go to press H.M.V. and Columbia releases arrive—vast selections of the latest recordings of classical and dance music, ballad and humour. These records I shall have to leave till next time, with the exception of two or three appetite whetters. Here's the first:

Richard Crooks, church soloist at age of nine, joint star performer before 15,000 people at twelve, sings "Smilin' Through" and "My Song Goes Round the World" on H.M.V. DA1360. Whether or not you have seen the Norma Shearer film of the former name you will enjoy its plaintive Irish sweetness. The second item also is perfectly rendered by the famous tenor.

"In Town To-night," played on Columbia and H.M.V. by Henry Hall and Ray Noble Orchestras respectively, features the popular *Knightsbridge* movement from Eric Coates' *London Suite* used by the B.B.C. for their weekly Saturday feature. Ray Noble does not do himself justice—he makes the whole number too monotonous; it is played in strict dance tempo without much originality in orchestration to help it out.

But more of these late arrivals next time; there is plenty of variety among them.



TELEVISION ALL-ELECTRIC SCANNING

by G.P. KENDALL B.Sc.

THE ADVANTAGES

Almost any number of pictures can be handled, and any number of lines, because the control of a cathode-ray tube is completely electrical. There is no inertia to overcome and no tricky speed control to bother about, the movements of the spot of light being merely a matter of the circuit values. Although beautifully efficient, the operation is fundamentally simple, as Mr. Kendall clearly shows in this account.

IN the early days of radio quite a number of attempts were made to use sundry mechanical relay devices for the purpose of amplifying the signals. In all these the idea was to cause the tiny currents set up by the incoming signals to control a much more powerful local current, but for the most part they were not very successful.

The trouble really was that mechanical devices could not deal efficiently with the high frequencies involved. Effective amplification became possible only with the coming of the valve, because here was a relay device in which there were no mechanical moving parts to limit the speed at which it could respond.

There is No Speed Limit.

The place of the moving parts of the old relay was taken in the valve by a stream of electrons and some static charges, and since these are things which have no mechanical inertia effects they can be made to operate at any speed you please.

Now, there is a rather similar position in television at the present time. We have a problem which is not unlike that of the early radio experimenters, in that we want to produce certain effects with currents of rather high frequency, and we are having a certain amount of trouble with mechanical devices.

Our exact object, of course, is not in this case to *amplify* the television signals, for we can solve that part of the problem with valves in the usual way, but rather to make them produce the effects we require in the beam of light in the viewer.

First, we want them to produce what I have previously called "light control"; that is, they must vary the *strength* of the beam. Secondly, they have to govern the speed of the scanning process and keep it in step.

In the first case mechanical methods have already been given up as hopeless, and purely electrical methods of light modulation are now used almost exclusively.

Will They be Displaced?

In the matter of scanning, however, mechanical devices are still largely used, and it is interesting to wonder whether we shall not see these also displaced by purely electrical systems before long.

It so happens that there is a device which is capable of doing for the scanning process pretty much what the valve did for radio. This device is purely electrical in its working

and has no mechanical moving parts whatever, their place being taken by an electron stream and sundry static charges, very much as in the valve.

Nevertheless, it is capable of making a spot of light scan a screen, and by its very nature it has many advantages to offer. It is able to produce scanning of practically any number of lines and any number of pictures per second, and every phase of its operation is under the most complete electrical control.

The name of this wonderful device is, as the reader has probably guessed by now, the

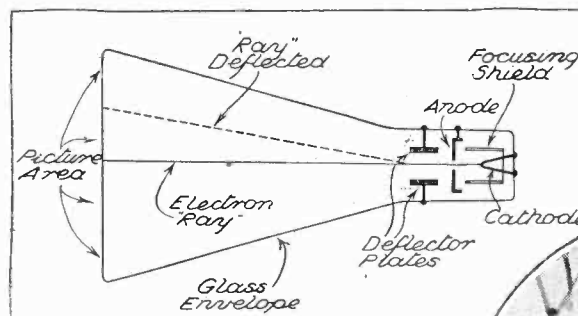
inherent in the cathode-ray system, and so it is reasonable to hope that they may one day be eliminated. When that is done there is little doubt in my mind that the cathode-ray system will provide a very nearly perfect receiving system.

So far as present conditions are concerned it can be taken that a picture space of some three or four inches square is the limit of size of the cathode-ray tube of moderate cost. As regards illumination, it is quite good within these limits, but there is not enough light to permit anything in the nature of a projection method to be used. (This rather cryptic remark will be understood more clearly when we begin to study the actual functioning of the cathode-ray tube.)

Complete in Itself.

The working of the tube is rather a large subject, and I am not going to try to cover it in detail this week. I think the reader will find it very much easier to get, first of all, a clear idea of the general outline of the subject, and then go into detail later.

The first point which we must realise is that the cathode-ray tube forms practically a complete televiewer in itself, for it does its own light control, its own scanning and even includes the necessary screen on which the picture appears.



HOW THE SPOT IS SHIFTED.

The sketch shows how electrons from the cathode pass in a ray through the hole in the anode and strike the end of the cathode-ray tube, where they produce a spot of light. If a voltage is placed across the deflector plates the ray is deflected, and thus the spot can be moved electrically, and without the aid of mechanics.

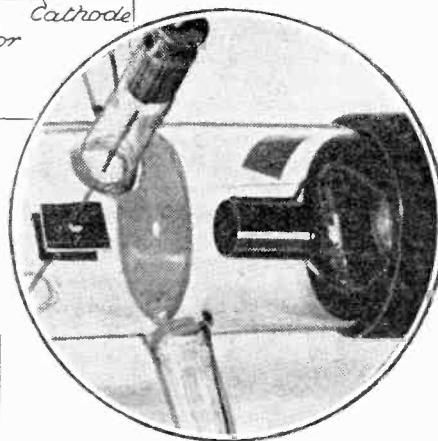
A close-up of some of the actual electrodes is shown to the right, the hole in the anode being clearly visible.

cathode-ray tube. Whether it will or will not replace the mechanical systems of scanning I should not like to try to predict, but it certainly has some very weighty advantages.

If I allowed myself to think of nothing but its attractions I should undoubtedly commit myself to the prophecy that it would become the universal scanning method quite soon, but, unfortunately, the matter is not quite so simple as that.

Unlike the valve, the cathode-ray tube has some definite drawbacks when compared with the mechanical methods, these being chiefly a matter of limited illumination and picture size. A minor weakness is the slightly unnatural colour usually given to the picture.

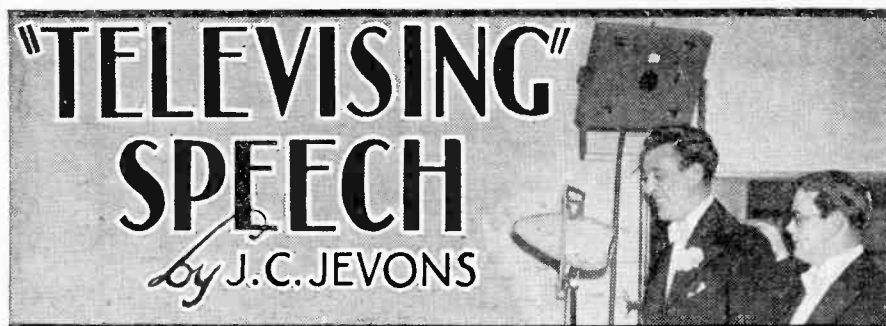
These defects, although they are at present difficult to remove, are not actually



The basic principle of the tube is comparatively simple. Our knowledge of valves tells us that a heated filament will give off showers of electrons, and also that those electrons can be influenced by the attraction and repulsion of positive and negative charges in their neighbourhood.

It is upon just these simple facts that the working of the cathode-ray tube is based. The tube contains a filament which emits the desired supply of electrons, and there is a positively charged anode which draws them away in a fast-moving stream.

(Continued on page 26.)



IN principle there is a certain similarity between transmitting light and transmitting sound, the photo-electric cell in television taking the place of the microphone in broadcasting.

Unfortunately, however, there is a very considerable difference in practice, the problem of television being enormously complicated by the necessity for keeping the picture signals related in space as well as in time. In addition, a much larger band of frequencies is required to transmit a clearly defined picture than to cope with the most elaborate orchestra.

Solving a Troublesome Problem.

At first sight, therefore, the idea of applying the methods of television to the comparatively simple problem of broadcasting sound would seem to be the height of absurdity. Why, it may be asked, should one deliberately adopt a complicated procedure when a far simpler one is already available?

The answer is that it offers one possible solution to the very troublesome problem of finding room in the ether for a combined programme of television and sound.

In a recent number of POPULAR WIRELESS (March 3rd, 1934) a description was given of a scheme for radiating television signals without the use either of a carrier or sidebands. This is the invention of Mr. G. W. Walton, and utilises his well-known system of "Scophony" scanning.

Mr. Walton has now gone a step farther, and proposes to combine a speech programme with his "non-spreading" system of television.

To do so it is necessary to convert the speech signals first of all into "visible" form, i.e. to put them on "all fours" with the pictures to be televised. Once in this form, both the speech and picture signals can be handled by the same photo-electric cell and radiated by the same type of "non-spreading" wave.

Sideband "Spread" Eliminated.

The broad idea of converting sounds into corresponding "light" effects is not particularly novel in itself. It is done, for instance, in talkie film production, where the vibrations of the voice are made to control a "light" valve so as to mark out a visible track, which is afterwards reproduced by means of a photo-electric cell.

Mr. Walton, however, employs a very different arrangement from this for transforming speech into an equivalent light signal. In addition he wipes out the ordinary differences of frequency (which determine the pitch of a note) and converts them into differences of position in space.

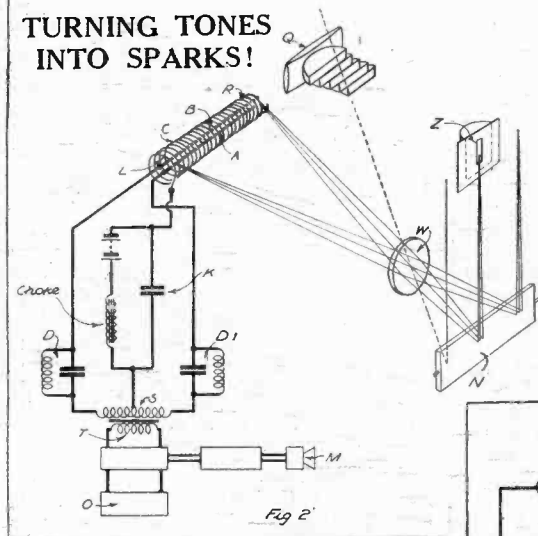
At the receiving end the new "spacing" is, of course, converted back into the original sound frequencies, but meanwhile

Did you know of the latest scheme for making more room in the ether for television transmissions? It consists of turning the sound accompaniment into light impulses, so that no separate channel is needed for them, and the ingenious method by which this is done is described below.

he has managed to get rid of those frequency differences which produce sidebands. In other words, transmission through the ether can now take place without sideband "spread."

The first step in the change-over from sound into light consists in applying the microphone current to a pair of electrodes which have already been charged up to a point just short of that at which a spark will pass. The addition of the microphone voltage "does the trick" and produces a

TURNING TONES INTO SPARKS!



SOUND CREATES A BAND OF LIGHT.

When the microphone (M, Fig. 2) is spoken into, corresponding voltages appear across the transformer (T), causing sparks to occur along the large coil, C, at points depending upon the frequencies. The resulting band of light is passed through the lens W, and transmitted as explained. Fig. 1 shows the coil, etc., in greater detail.

spark. Actually each individual voice frequency produces its own spark, so that the result is a "band of light."

In order to secure the spacing effect already mentioned, advantage is taken of the fact that, as the voltage builds up, each spark prefers to discharge itself at that particular point at which the circuit

"behind it" is in resonance with the applied frequency.

This will be made clearer by reference to Fig. 1, which shows two rods or electrodes A, B placed in close proximity to a long coil C, which is charged up by the battery H.T. to a voltage just below that at which it would normally spark across to the rods. The electrodes and coil are, in practice, enclosed in an evacuated valve so as to reduce the required voltage to a comparatively low value.

Resonant Discharge Oscillations.

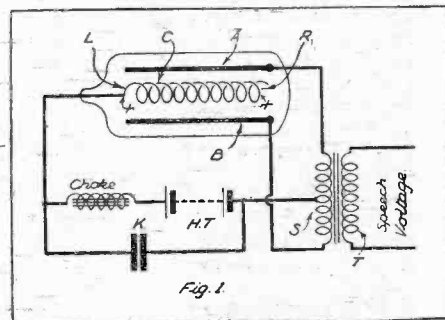
The output from the microphone transformer is now applied across the transformer T to the two rods, as shown, and serves to increase the voltage on one or the other until a spark results.

For a low-frequency note the spark will pass at the open end of the coil marked R, because the resulting discharge oscillations will then be in resonance with the circuit containing the whole of the inductance of the coil C, together with the by-pass condenser K and one half of the transformer winding S.

For a high-frequency note the discharge occurs at the near end L of the coil, because the resulting discharge does not then have to pass through the windings of C, but goes direct through the condenser K and the half of the transformer windings S. In other words, a low-frequency note takes a path containing more inductance (i.e. more turns of the coil C) than a high-frequency note.

For other frequencies the discharge occurs at some intermediate point along the coil, such that the circuit opened up to the discharge is "in tune" with the particular frequency in question. In this way a complex of speech frequencies is converted into a band of light.

In the combined scanning system shown in Fig. 2 the current from the microphone M is first modulated on to a local carrier-wave O before being applied to the transformer T, and the circuits D and D1 are tuned to the upper and lower sidebands. No sideband frequency is actually radiated. The band of light, when produced, is



thrown by a lens W on to a vibrating mirror N, together with the picture elements produced separately by the "Scophony" scanner marked Q. The combined picture and voice signals are then swept by the mirror N across the face of a photo-electric cell Z, and the resulting currents, are applied to the transmitting aerial.

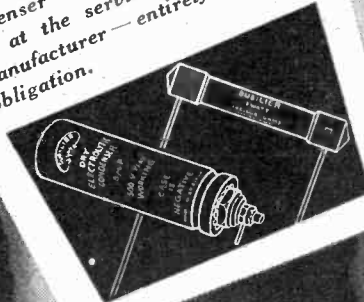
Throughout the world... the acclaimed the finest

Throughout the length and breadth of Great Britain and in every country in the world you will find Dubilier Condensers and Resistances in use. Giving faultless, never-failing service in two-valve sets and super-radiogram alike.

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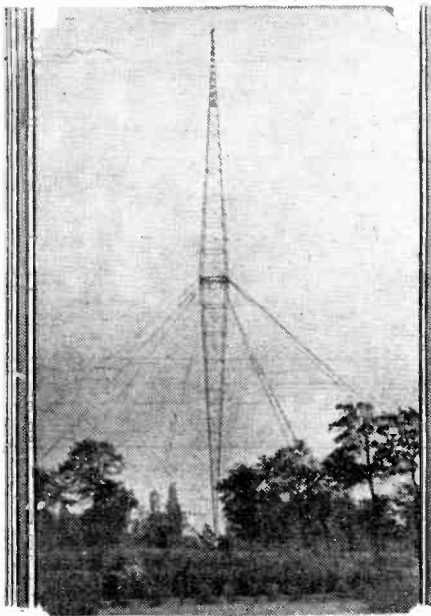
No greater proof can possibly be brought of the outstanding superiority of Dubilier Condensers and Resistances—famous for dependability and 100% BRITISH. The outcome of long consistent research.

Dubilier's technical advisers, who are in the forefront of modern condenser and resistances design, are at the service of any radio manufacturer—entirely without obligation.



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CONDENSERS & RESISTANCES



1,000 FEET UP

-RADIO BUDAPEST BUILDS A NEW MAST-

The new Budapest radio station boasts the tallest aerial mast in the world—which is also the highest structure in Europe. But its claim to fame is based on more than a very remarkable engineering feat, as this description of a visit to the new transmitter shows.

By A. A. GULLILAND.

the Hungarian Broadcasting Company has always found the necessary courage for some pioneer experiment. They have it now in the aerial mast; they also have it in the 120-kw. transmitter.

Everything in Duplicate.

Driving the 18 km. out from Budapest to Lakihegy (which means "great hill"—in reality there is only a small mound which warrants the name!), we were challenged on arrival by a fine-looking Hungarian soldier, complete with rifle, bayonet and cock's feathers on his hat. After a short parley we were allowed to pass and were taken to one of the Standard Company's engineers who was in charge of the building operations.

One remark of his seemed to recur at every moment. At first I thought it was his favourite catchword; later on I found that it actually was the case. "One hundred per cent spare," were his words. Yes, the new Radio Budapest has a "100-per-cent spare part" at every turn.

After passing the guard we entered the

central part of the transmitter building which contains the offices. To the right there is the old German 18.5-kw. transmitter, built in the "open" style. To the left is the new 120-kw. British apparatus, well protected from human hands as long as it is under power. This is achieved by the famous interlock system which my guide spoke about.

Prevents Wavelength Wobbling.

One first enters a room containing the metal rectifiers for the grid circuits, etc., and a hot cathode mercury vapour rectifier producing 22,000 volts for the anodes of the last-stage valves. Then you come to the large transmitter hall. On the left there is the speech output panel, followed by the oscillator stages.

Crystal control is provided, in conjunction with a thermostat to prevent temperature variations. Should a breakdown occur there is a second crystal to switch in, and should the whole circuit fail (which is extremely improbable) there is another circuit which can run the transmitter for a few hours at least.

Leaving the oscillator and modulator stages, one enters what resembles a low-lying hut. A passage goes down the centre. On one side you have the "push" and on the other the "pull" of the last two stages. In the case of a valve breaking down a turn at a single wheel and all high-tension current and cooling water are switched over to the "100-per-cent spare" valve built in alongside.

Seeing How it Works.

The control desk with four buttons for setting the transmitter in motion, stands facing the front wall of the "hut." The desk is fitted with a cathode-ray oscillograph, so that the engineer can actually see the modulation of the transmitter.

The water pumps for the elaborate cooling system are in the cellar immediately below the transmitter.

The porcelain tubes containing the anode cooling water are also there. These porcelain "coils" now take the place of the rubber used in "the olden days." (Lorenz, the inventor, first used this type of cooling spiral at the Leipzig station.)

Budapest is not only a tip-top station in the sense that it embodies the latest developments, but its position on the medium-wave tuning dial is also right at the top. The actual wavelength is 549.5 metres.

And now may you have good reception of the station which British brains and Hungarian brawn have made to carry the call "Itt Radio Budapest" into space!

IT is perhaps not quite correct to call an aerial mast a "cigar." But in the case of Radio Budapest's new mast there are points which force one to a comparison. If you place a lighted cigar vertically on the table and hold it a cloud of smoke will very shortly surround its upper end. At Budapest clouds do the same to the mast. Then, again, a cigar of the torpedo type is thin at the bottom, thick in the centre and thin at the top.

Some Handful!

Budapest's new aerial mast rests on a surface of 160 square centimetres, about the size of a man's hand. It widens out at the centre, where it measures a little over 14 metres across, and it thins down again to a circular hole 30 cm. in diameter. The mast is 284 metres high, and to this must be added the projecting length of the telescopic steel pole at the top of the mast. This brings the height up to 314 metres, or about 1,030 feet.

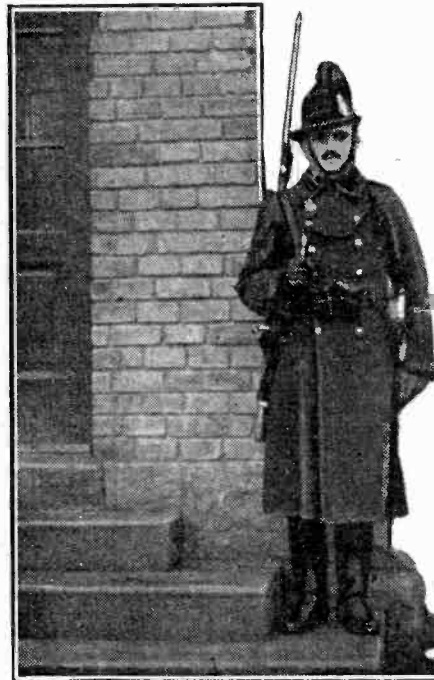
Budapest's radio mast is the world's highest aerial—the highest structure in Europe and the third highest structure in the world. Seven hundred metres of feeder-line connect the mast to the transmitting station, situated in a new wing of Budapest's present transmitter house.

Built by Standard Telephones & Cables, of London, at their Hungarian works in Budapest, the new 120-kw. transmitter is one of the very few stations in Europe which, under special international agreement, are allowed to operate on more than the international limit of 100 kw. The station, which commenced testing about the middle of November, has already proved to be one of Europe's "big noises."

British Built.

Before going into some of the special features which make the new Radio Budapest one of the most interesting transmitters in Europe I would like to draw attention to the fact that this wonderful aerial mast was constructed by a British firm, and that work, with Hungarian labour and material, was carried out under the supervision of a British engineer—a Scot, by the way. In 1893 a Hungarian engineer discovered broadcasting (at that time it was still over a system of wires). Ever since,

NO TRESPASSERS!



The Budapest station buildings at Lakihegy are permanently guarded by Hungarian troops in their picturesque uniforms. Visitors are subject to a close examination before being allowed to enter.

PERSONALITIES AND PECULIARITIES

AT THE BIG HOUSE



By OUR SPECIAL INVESTIGATOR

who brings up to date the human scene behind the walls of Broadcasting House, and explains how the reorganisation of 1933 has had its effect upon the principal exponents of broadcast entertainment.

THE B.B.C. is staffed by young men, and consequently there are fewer changes than in comparable organisations. There are, however, internal rearrangements which involve a kind of "ebb and flow" in the popularity, prestige and importance of the principal officials. It is, therefore, of interest to bring up to date the human scene behind the façade of Broadcasting House.

Of course, the reorganisation of 1933 was expected to make important changes in various directions. Not all these expectations have been fulfilled. First of all, Mr. Whitley, the Chairman, is much more actively engaged in the general scheme of broadcasting than he was this time last year. Mr. Whitley has an office to himself, and this he occupies with a regularity which would do credit to most heads of businesses.

The Chairman, in addition to keeping an eye on policy matters, takes a direct personal interest in the Empire Service and in the Talks. His training as Speaker in the House of Commons makes him useful in pouring oil on troubled waters, both inside and outside "The Big House." Among the other Governors the influence of Mrs. Agnes Hamilton is perhaps the most evident. Mrs. Hamilton's active mind plays on a great many of the problems of broadcasting.

Sir John Reith, as Director-General, continues to focus on himself the direction of the whole of the activities of the B.B.C. Since the reorganisation last year he is freer from details of the business and deals directly with only two or three people instead of with about two dozen.

One result of this new freedom is that Sir John is able to attend more diligently to his social duties, and his name now appears more frequently in the published lists of those present at social gatherings. Apart from his duties in broadcasting and his new social responsibilities, Sir John is making a close study of modern organisation, commercial and public, possibly with a view to overhauling some industry or public utility when he tires of the B.B.C.

Sir Charles Carpendale.

As the hour for his retirement draws nearer Sir Charles Carpendale naturally disengages himself from some of the burdens of administration. But he still carries a heavy responsibility as President of the International Union of Broadcasting, the

duties of which take him across the Channel with increasing frequency and for longer periods of anxious deliberation.

In Charge of Programmes.

Colonel Alan Dawnay, at the head of Programmes, is making his presence felt. He is liked personally. He pays special attention to the political aspects of Talks, and his influence is reflected in the greater care which is being taken to avoid expressions of extreme views. Colonel Dawnay shares with Admiral Carpendale great keenness for outdoor sports.

duction, continues to share with his friend Mr. Maschwitz the "programme honours." They are, incidentally, joint authors of the book "Murder at Broadcasting House," which is a current "best seller." Mr. Gielgud thinks in terms of romantic drama, and he, too, imposes his personality increasingly on the products of the microphone.

Dr. Adrian Boulton gains ground as Music Director. He is determined to make the B.B.C. Symphony Orchestra unquestionably the best in the world, and, given the support and resources he deserves, he alone can

attain this important objective. Dr. Boulton is a non-smoker and a total abstainer; he feeds and sleeps scientifically, all to the end of general efficiency; and he manages this without submerging any of the qualities of sympathy and humanity that endear him to all with whom he comes in contact.

Mr. Noel Ashbridge, the Chief Engineer, continues unobtrusively to keep the B.B.C. ahead of all other broadcasting concerns on the technical side. The

opening in July of the transferred Daventry at Droitwich will be an occasion of triumph for Mr. Ashbridge. Although he was concerned in carrying out the Regional Scheme, the origination of the idea and most of the planning had been contrived by his predecessor, Mr. P. P. Eckersley. But Droitwich, and the new stations in the north-east of England, the Highlands of Scotland and in Ulster are Mr. Ashbridge's particular jobs.

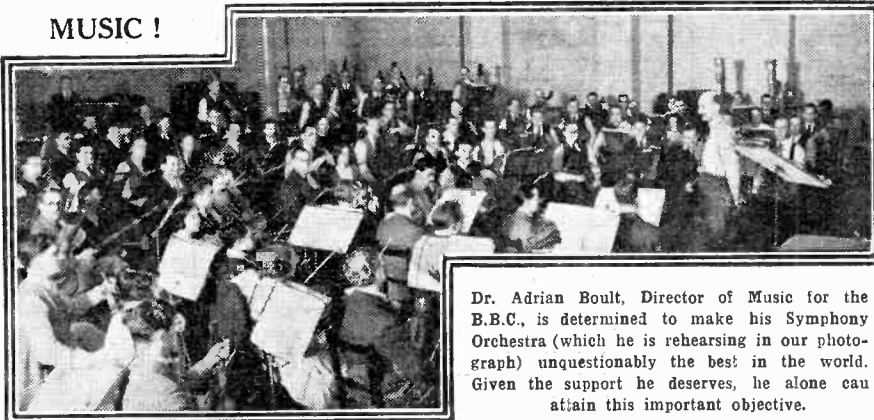
Entertainment Balance.

Mr. Ashbridge has very definite ideas about programmes and programme building, and it would be better for the service provided by the B.B.C. if more attention were paid to his views in matters outside his official province.

A new programme personality is Mr. Lindsay Wellington, who, as Director of Presentation under the new organisation, is responsible for the arrangement and

(Continued on page 25.)

MUSIC !



Dr. Adrian Boulton, Director of Music for the B.B.C., is determined to make his Symphony Orchestra (which he is rehearsing in our photograph) unquestionably the best in the world. Given the support he deserves, he alone can attain this important objective.

Mr. Gladstone Murray, still in charge of Public Relations in all their aspects, finds his position strengthened by the new organisation. Both as framer and interpreter of B.B.C. policy his position is pivotal, although internal complacency and outside jealousy make it unusually difficult. Mr. Murray's good will, however, is firmly established in the friendship which he has attracted in a remarkable area comprising the extremes of Fleet Street and of politics.

Mr. Eric Maschwitz, alias Holt Marvell, is the programme personality who has made most headway in the past year. His versatility and insatiable appetite for work, combined with rare originality, have already made him the "Noel Coward of Broadcasting." To him goes the credit for the great improvement in light entertainments and vaudeville. The cinema industry has its eyes on Mr. Maschwitz, and it is to be hoped that the B.B.C. will not let him go easily.

Mr. Val Gielgud, head of Dramatic Pro-

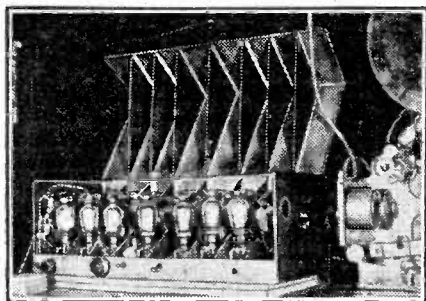


When the B.B.C. contract with the Baird Company expires at the end of this month, there is likely to be great interest and competition in the world of television. Several firms have, without help from the B.B.C., developed new systems of transmission, and the whole question of the future of "looking-in" is here discussed by our Chief Radio Consultant.

THINGS are moving. You can distinguish their movement quite clearly. The definition is not perfect . . .

I went to hear a lecture and see a demonstration of a velocity-modulation cathode-ray system. I came away tremendously impressed with the ingenuity of the inventors of the system, but more than ever convinced that my point of view about television is a right one.

A NEW SYSTEM



This picture and the one in the third column show the transmitting apparatus for the new Cosgor cathode-ray system of television, successfully demonstrated a few weeks ago.

The velocity-modulation system is very ingenious. The spot of light travelling over the screen dwells longer on the screen when it wants to leave the impression of a white, but moves quickly when it, vice versa, wants to indicate a dark. Moreover, the system has the uncanny prescience to tell itself when it has seen a white or a dark, and to slow itself down or speed itself up automatically.

Velocity Modulation.

Certainly the results achieved are far ahead of anything I have ever seen done by the B.B.C. But then, of course, so long as you try to do television with only a side-band spread of 9 kc., you are bound to have poor results. This is no fault of the B.B.C. engineers. This has been and is true for all time.

The "amplifier" used in the velocity-modulation system had a fairly even response from 50 cycles to 250,000 cycles! The authors obviously realised the absolute necessity to secure an even response over a very wide frequency spread. There is a considerable difference between a spread of 250,000 cycles and one of 10,000 cycles! Even with this big spread the definition, in my opinion, left a great deal to be desired. But that is purely a matter of opinion.

Some think that the demonstration showed that television, using such a system,

has definite entertainment value. After all, they thought, or said they thought, that about the system now figuring on the B.B.C. broadcasts. They may be right. It simply does not entertain me, however.

All the time it's a question of entertainment value. Is the result worth while? Directly you could broadcast intelligible speech, broadcasting had entertainment value because it was a full-scale experience to listen to people talking. But a shadow show demands, for its enjoyment, real, definite and full-scale content before it can please.

"Far More Serious Problem."

We are, at present, in a position to send from one place to another a somewhat blurred impression of a home movie. Do not think that I am trying to be superior and pretend that I could do much better. The problems are quantitatively so terrific that I am amazed at the ingenious and painstaking way they have been partly successfully tackled. But the entertainment result is not with us as yet—at least, so I feel.

But suppose, at long last, it will, by more and more ingenious and painstaking and inspired effort, come about that, with a million cycles of spread, perhaps, we shall be able to "transmit films" from one room to another. One has then to face the, to me, far more serious problem of being able to broadcast the result.

The only means to do this that I can envisage is via ultra-short waves, because, with carrier-frequencies of tens of millions, side-bands of millions are in sensible proportions. But ultra-short waves are, I suggest, tricky, involve problems with motor-ignition interference, and bring about large frequency discrimination over the necessarily wide spectrum transmitted.

Land-line Difficulties.

Then, again, we are talking of film transmissions. It is another nasty problem to transmit, with any degree of clarity, a running commentary to all and sundry. For instance, we might want to televise the Derby, but how could we connect Liverpool and London? A land line to be non-frequency discriminating over a million cycles? No sir! Not yet, anyway. So, if we would use ultra-short waves, we are limited to the transmission of films from a studio.

Now, the next thing is to ask oneself if one likes films on a home screen. Perhaps the majority do, but a "fan" like myself, educated to the standards of the "talkies,"

finds even a poorly lighted screen intolerable; and as to a small screen—! But let me not seem to invade these pages with too personal a note; my preferences, likes and dislikes may be unimportant if they are not shared by the majority.

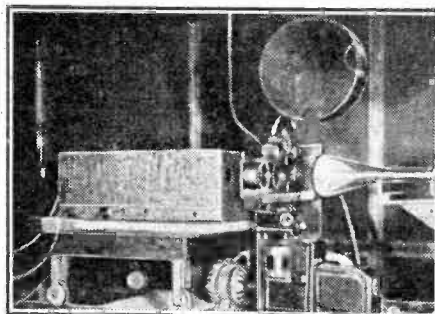
Unbounded Admiration.

In any case, my admiration for the ingenuity of the inventors of modern systems where scanning discs and synchronisation problems have disappeared and where a proper number of lines has been secured knows no bounds.

However, it is essential that we keep our perspective clear. It was always obvious that we should one day get a good picture "from this room into that," provided someone sat long enough over the problem: it still remains to know how to transmit, not from here to there, but from anywhere to everywhere. Even when that's good I may not like it, but, as I say, it remains to be seen if others do.

Incidentally, the B.B.C.'s position is a curious one. They took up one firm's system to aid "its wonderful invention." At least two firms, without any help from the B.B.C., have developed greatly improved systems which cannot be used on the normal wavelengths. So apparently B.B.C. help was not essential.

TRANSMITTING FILMS



The apparatus has been used for televising films, as seen here. The transmitting tube is on the right of the picture.

But presumably they must, having given facilities to one firm, give them to others. Will they build special stations? And, if they do, could I be guaranteed that my receiver will not become useless through obsolescence? And . . . ?

Yes! I think I was right!

But good luck and hearty congratulations to the technicians for the work they have done!



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S.T. 500

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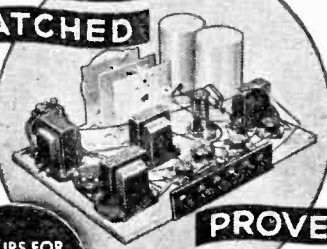
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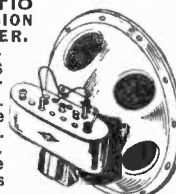


Power and Pentode Output. Complete with input transformer. Cash or C.O.D. Carriage Paid, 19/6. Or send only 2/6; balance in 5 monthly payments of 4/-.

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Suitable for 1001 Receivers, including CLASS B, Q.P.P., Super-Power and Pentode outputs. Instantly adjustable ratios. Cash or C.O.D. Carriage Paid, 29/6. Yours for 2/6; balance in 6 monthly payments of 4/9.



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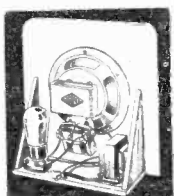
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Converts your present Battery Set to Class B Amplification. Complete with all necessary components, including driver transformer, Class B output choke, W.B. 7-pin valve holder, B.V.A. 240B valve, wire and screws, etc. Full-size Blue Print, assembly instructions and diagrams. Cash or C.O.D. 37/6. Balance in 7 only monthly payments of 5/6.

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RADIO STEP-BY-STEP

Our
**SPECIAL
SUPPLEMENT
FOR
BEGINNERS**

MAGNETIC FIELD.

THE field of magnetic influence set up around a magnet or a conductor through which current is passing.

MAINS UNIT.

The D.C. type of mains unit comprises smoothing circuits for eliminating irregularities and series resistances or a potentiometer (generally styled potential divider) for regulating the outputs.

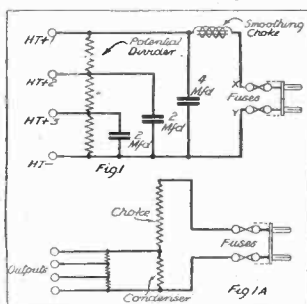
In the case of A.C. mains rectification is necessary, and this is carried out either by a valve or a metal rectifier. In addition to a rectified and smoothed output for H.T. purposes some A.C. mains units embody low-voltage outputs of "raw" A.C. for the heaters of A.C. valves.

Fig. 1 shows the theoretical circuit of a typical mains unit for D.C. mains. The main smoothing is accomplished by the choke and the 4-mfd. fixed condenser. The choke offers a high resistance to current fluctuations, while that of the fixed condenser is comparatively low.

Reducing Hum.

These two components constitute a potentiometer arrangement in so far as current irregularities are concerned, and the idea is theoretically expressed at Fig. 1a. It will be observed that the output of the unit is tapped across only a small part of this "potentiometer," and therefore only a small proportion of the "hum" irregularities are taken off. The larger the inductance of the choke and the greater the capacity of the condenser the smaller it will be.

SMOOTHING CIRCUITS



This diagram illustrates the way the smoothing circuits of mains units work.

This potentiometer arrangement applies only to voltage fluctuations; the condenser plays no part in the regulation of the smoothed output voltages.

This is done by the potential divider. The maximum voltage exists across the H.T.+1 and H.T.- terminals, while the voltage across H.T.+2 and the negative point and this and H.T.+3 will be decided by the positions of the "taps."

current-carrying capacity of the choke.

If the current exceeds a certain value either the windings might not be able to carry it or, more usually, the inductance of the component might drop considerably and its smoothing effect depreciate.

Obviously, the current limits of the other two outputs will be additionally limited by the potential divider.

RADIO TERMS

by
G.V. DOWDING
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A Practical Survey covering every Phase of Wireless.

The 2-mfd. fixed condensers are for purposes of "decoupling." Portions of the potential divider (which is merely a resistance) will be common to the anode circuits of various of the valves in the set with which the unit is used.

This would create undesired coupling effects and result in howling and motor-boating if decoupling steps were not taken. The condensers decouple to a considerable extent by lowering the impedance of the potential divider.

But additional decoupling by means of series resistances and by-pass condensers in the set itself is often necessary.

The current that an H.T. unit will pass to a set is limited by its smoothing components and by its potential divider, or series-voltage dropping resistances if these are used.

Current Limitations.

In the simple D.C. unit (Fig. 1) the D.C. resistance of the smoothing choke offers some resistance in the H.T. +1 output, but there is a further practical limit to the useful current that can be taken from this point, and that is fixed by the

It is always advisable to work a mains unit well inside its rating.

When a particularly sensitive set is being used it is frequently necessary to apply additional smoothing if it is desired to eliminate hum entirely. This can be added

externally to a mains unit. A smoothing choke in series with the "tapping" to be smoothed (the one serving the detector is commonly the one needing such treatment) and a 4-mfd. fixed condenser joined between the set side of the choke and H.T. minus are all that are necessary. It is essential that a D.C. mains unit should be connected to the mains a certain way round, but it does not matter which way the mains-connecting plug of an A.C. unit is inserted in the power or light point.

An A.C. unit is similar in its smoothing and voltage-distribution principles to a D.C. unit, and the Fig. 1 circuit can be transformed into an A.C. mains unit circuit by the addition of the rectifying circuit shown at Fig. 2, this being joined to Fig. 1 at the points marked X and Y.

This arrangement shows a

valve rectifier operating on the half-wave principle.

When an A.C. unit is used an ordinary earth connection to the set is permissible, but this is not so with a D.C. unit. One or other of the mains will be earthed, and should it be the positive one a direct short circuit occurs with a direct earth connection to the set.

Often the set will work quite well with a D.C. unit without the usual earth connection, but in the event of one being employed a series fixed condenser of, say, 2-mfd. capacity, with a working voltage in excess of the voltage of the mains, must be introduced.

A mains unit for a Class B or Q.P.P. set needs to be able to cope with widely fluctuating conditions of load. That is to say, its outputs should retain a reasonable evenness of voltage at considerably different current outputs.

The Neon Stabiliser.

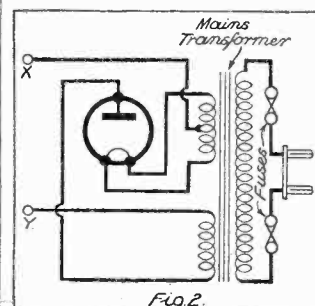
The ideal method of ensuring this is to employ a neon-tube stabiliser.

All mains units should embody fuses, and it is also desirable that they should be totally enclosed within metal casings.

Their outputs cannot be checked accurately with an ordinary moving-iron voltmeter of the usual average resistance type, owing to the fact that such an instrument will itself draw current and thus provide misleading readings.

In the absence of a high-resistance voltmeter the outputs can be checked with a milli-ampere, this giving indication as to whether or not the tapping being tested is providing the correct current for the conditions.

A.C. TO D.C.



The addition of a unit of this type will convert a D.C. mains unit for use on A.C.

THERE'S A DARIO VALVE FOR EVERY NEED AND THEIR PRICE MAY SAVE YOU POUNDS

● A full range of battery valves for 2-volts and 4-volts. A complete series of mains valves including H.F. pentodes, Diode-tetrodes, and D.C. valves with 20v. heaters. On one and all you'll save shillings.

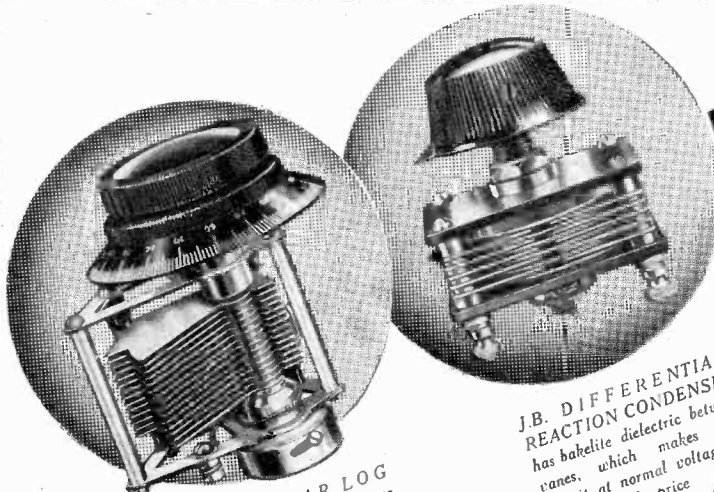
Why! In equipping a 5-valve mains set with DARIO, you'd be something like £1.10.0 in pocket—and the saving wouldn't mean the slightest sacrifice in performance. The full DARIO range covers more than 39 efficient, up-to-the-minute valves for every position in any set.

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J.B. POPULAR LOG SLOW MOTION. The two Popular Logs are fitted with J.B. "D" type Slow Motion mechanism. The price complete with 3-inch dial and knob, is **7/6**

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Designed by nine of the leading component manufacturers—Therein lies the success of the Bifocal Three—Every component used is therefore the best of its kind. J.B. is universally acknowledged to mean complete efficiency and advanced design in J.B.'s special field. The J.B. Popular Logs and Differential Reaction Condenser for instance.

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TESTED AND FOUND

Being Leaves from the Technical Editor's Notebook

NEW BULGIN TERMINALS

HAVE you ever noticed how much time you sometimes spend doing something that is supposed to occupy "only a few minutes"? On such occasions one wonders whether it is personal incompetence or an unquaffing number of minutes compressed into that qualifying "few"!

Take, for instance, the hooking up of a new set. No one begrudges a whole evening or even two evenings on its building. But how long does it take to connect up the batteries, aerial and earth and to get the instrument ready for the first test? After years and years of set construction I still find myself leaving "only a few minutes" for the job! It still seems a job that ought not to take more than a few minutes. And yet frequently it does take many more minutes than ought honestly to be described as a "few."

I think that quite often the terminals are largely to blame. Leads of correct length must, of course, be prepared, but how seldom they can be hooked on to the terminals "in a jiffy"!

But A. F. Bulgin & Co. Ltd., of Abbey Road, Barkin, Essex, have produced a new-type terminal which definitely does expedite connections and, moreover, ensures that the connections are good when made.

It has what is styled a "battlemented base." This replaces the more usual smooth metal base on to which the terminal head screws in order to clamp the wire down.

Often the area of these bases is small because of generous bevelling, and unless loops are made in the lead ends they are squeezed out and the head fails to clamp them. Especially is this the case when the wire happens to be stout in gauge or there are several wires to go to the one terminal.

The Bulgin "battlementing" prevents all this, and the leads simply cannot stray away as the head is tightened.



The speed with which wires can be connected to these Bulgin terminals is nearly as big a point in their favour as the excellence of the contact when made. The price is 3d.

The new terminals have nicely moulded bakelite knobs or heads which are excellently engraved in all the usual indications.

But—and this is the second great feature of the device—the head cannot accidentally come off. Therefore you can't be landed with two or more detached heads, wondering vainly which came off which of the terminals!

Nevertheless, the heads can be taken off quite easily with the fingers should it be desired to use ring tags or wire loops.

I consider this a valuable practical development, and one that alone would make the new Bulgin terminal one of the outstanding products of this season.

Now I must give you the catalogue details. The terminal is listed as the New Type T.L., and the retail price is 3d.

GOLTONE FIVE-WAY CABLES

When a mains set employs a separate "power pack," the question of connecting leads assumes some considerable importance. It is neither tidy nor, perhaps, safe to employ separate wires. At least, I always hold the view that the fewer leads the better where any kind of mains link is concerned.

However, there are not many radio arrangements for which there are not special expedients these days. And in this case the requirement is very simply met by Messrs. Ward and Goldstone, of Frederick Road, Manchester.

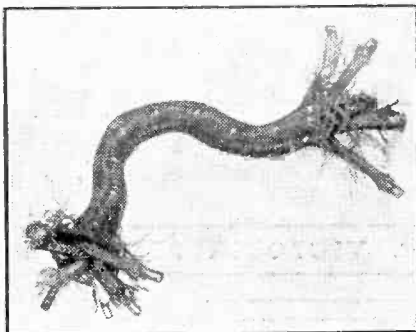
As a matter of fact, it would be astonishing if there were any job for which Messrs. Ward and Goldstone were not able to supply a perfectly suitable wire or cable!

This particular Goltone manufacture is a 5-way cable comprising three leads of 23/36 stranded wire (i.e. twenty-three wires of 36 gauge) and two leads of 70/36.

The latter pair is intended to carry the L.T. for the valve heaters, and it will easily handle six amperes at four volts with negligible voltage drop and with perfect safety.

The individual leads are distinctively coloured, and each is rubber and fabric covered, the whole being lunched by a stout outer woven-fabric covering.

This cable costs 7d. per yard, plus 20% for quantities less than 100 yards.



Two leads in this five-way cable are intended for filament or heater wiring, while the other three may be used for H.T. or grid bias.

Messrs. Ward and Goldstone also make a similar 5-way cable of somewhat lighter nature at 6d. per yard, plus 20% on lengths smaller than 100 yards.

NEARLY a month ago I forecast in my notes that the "Bifocal Three," incorporating the great new principle of focused radio, would create a tremendous sensation. That much seemed certain on the merits of the scheme alone.

To-day, as I write these notes, I have before me press cuttings from practically every part of the country testifying to the enthusiastic way in which focused radio has been received. Without exception, all of them are eulogistic about the merits of the scheme, which at last makes distant listening worth while, and in every quarter the principle is hailed as the greatest development for years.

While we are pleased, quite naturally, that "P.W." was able to give you exclusive practical details before you read about it in your daily paper, the spontaneous way in which the Press of this country has acclaimed the development is proof, if proof is wanted, of the universal confidence which is placed both in the future of focused radio and in the recommendations of "P.W."

I make no apologies for the fact that this is the fifth consecutive week in which I have started my notes with a reference to focused radio, for the simple reason that, in order of importance, the "Bifocal Three" is the topic of the day. Thousands upon thousands of "P.W." readers have already decided to make the "Bifocal Three" their set of the future, and others are on the brink.

Take my tip, if you want radio as it should be don't even stop to think about it. Follow the lead of the experts and build the "Bifocal Three," for what is good enough for the technical experts of nine of Great Britain's leading radio component

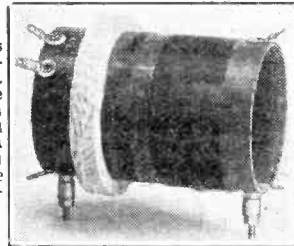
This lighter cable consists of three 14/36's and two 70/36's. By the employment of a large number of strands the cable becomes very flexible and easy to handle, despite its large current-carrying capacities. Messrs. Ward and Goldstone point out that either cable can be employed with five-pin plugs and five-pin valve holder connectors of the flush-mounting type. A most convenient and neat scheme.

MAGNUM DUAL-RANGE COIL

Messrs. Burne-Jones & Co., Ltd., 296, Borough High Street, London, S.E.1. have produced a Dual-Range Coil to retail at the attractively low price of 2s. 6d.

It comprises three windings on a stout bakelised former. The medium-wave and reaction windings are of enamelled wire, and are straightforward single-layer solenoids, while the long-wave winding is in multi-layer form, and for this latter cotton-covered wire is used.

Half-a-crown is all this new dual-range coil costs. There are three windings on a stout bakelised former, and a separate aerial coil can easily be wound on it desired.



The connections are taken out to soldering tags, and I would suggest to Messrs. Burne-Jones that their coil would prove even more popular among home constructors if a terminal model were to be made available, perhaps at a slightly increased price.

A good feature is that the reaction winding has its two ends free, and this renders the coil adaptable to a greater number of different circuit arrangements.

The coil provides for a tapped aerial connection, and I cannot say I care much for that. Break-through of medium-wave stations on to at least the lower part of the long-wave band almost invariably accompanies a direct aerial connection.

However, with this unscreened Magnum coil there is nothing to prevent the constructor from winding on a separate aerial coil himself. The job is a quite easy one.

Tested as a straightforward aerial coil, I found the results given to be right up to standard in point of wavering and general efficiency. The 185 to 560 metres approximately with an aerial of average dimensions was excellent coverage on the medium waves, and the 850 to nearly 2,000 metres on the long waves was also perfectly adequate to cope with the new ether conditions.

manufacturers is surely good enough for you!

A New H.F. Metal Rectifier.

An entirely new metal rectifier for use at radio frequencies up to 1,500 kilocycles has just been released by Westinghouse. When the original "Westectors," or "cold" valves, as they were popularly termed, were first released, the old difficulty of capacity due to the use of a large area of rectifying element had been virtually overcome, and on frequencies up to about

200 kilocycles they were entirely satisfactory.

It was recognised, however, that these first introduced units, although functioning perfectly as rectifiers, failed to be practical at frequencies appreciably above 200 kilocycles, on account of the heavy damping thrown on the circuit.

The new "Westectors," to be known as the "WX" type, have been designed to overcome that objection, and they function perfectly on frequencies up to 1,500 kilocycles. The first one to be released is the WX.6, and it is provided with a distinctive blue and white label to distinguish it at sight from existing types.

Ferranti Conversion Charts.

Wavelength conversion charts for the original Ferranti Superheterodyne receiver type A1, and for their present "Gloria" and "Arcadia" models, can be obtained from Ferranti Ltd., Hollinwood, Lancs.

Interested readers can obtain them free of charge, but kindly mention POPULAR WIRELESS in your application.

(Continued on page 26.)



Jottings of Interest to Buyers.

By G. T. KELSEY.

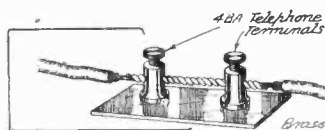
Recommended WRINKLES

STRONG AERIAL JOINTS.

HOWEVER undesirable it may be in theory, it is sometimes necessary to make a joint in the aerial, and usually it is in such a position as to render soldering difficult.

With a few oddments from the junk box a little device can be made up which will not only ensure sound electrical contact but will guard against the possibility of the wires being pulled apart.

Take a strong strip of sheet brass (say 2 in. \times $\frac{1}{2}$ in.) and drill in same



The wire is secured by the terminal screws.

two 4 B.A. clearance holes (say $1\frac{1}{2}$ in. or $1\frac{1}{4}$ in. apart). Now procure two 4 B.A. terminals of the old telephone type. Pass one over each wire to be joined before firmly twisting the bared ends together. (Some 2 in. should be bared on each wire for this purpose if they are insulated wires.) Now slide the two terminals down to the joint and attach the brass plate to their shanks, and screw down the nuts firmly with small spanner or pliers.

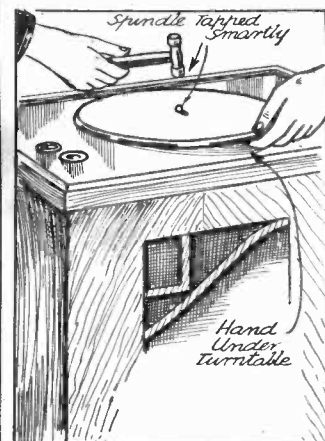
The set-screws on the heads of the terminals must also be screwed down tightly and the joint is complete. The wires cannot now possibly come apart while the brass strip provides an additional path of low resistance across the joint.

The whole can be protected from corrosion, if desired, by covering with insulating tape.

TURNTABLE REMOVAL.

I WISH to offer you a suggestion for the removal of gramophone turntables.

Having been in the business for a number of years, I know the dangers of too much strain. An obstinate turntable would probably go out of true or possibly crack, as they are only cast and are much stronger round the rim than in the middle of the plate.

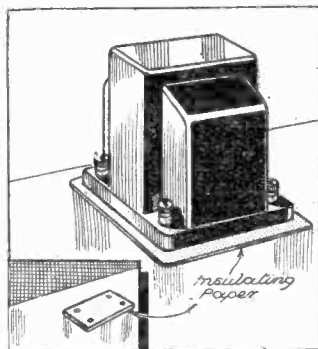


Distortion is avoided if a turntable is removed in this manner.

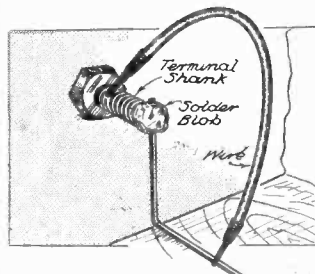
The best and safest method is to take up the play in the spindle shaft by inserting finger tips between plate and cabinet, when it will be found to lift about $\frac{1}{2}$ of an inch. Hold up in this position, without applying any force, with one hand, and with a light-headed hammer give a smart tap on top of spindle and the plate will be free.

METALLISED BASEBOARDS.

FOIL-COVERED and metallised baseboards are very useful in many respects, but when mounting such components as valve holders and resistances thereon great care has to be taken to see that shorts to earth do not occur.



How components may be insulated from a metal baseboard.



Suspected joints are shorted by the test lead.

So it proves that "one job at a time" is true: always make each connection a job on its own. To test for a "dry joint," all that is needed is a piece of wire to bridge the joint, as in sketch.

FIXING A LEAD-IN.

WHEN door, window or ventilator is not conveniently located for a minimum length of aerial down-lead in a brick building with inside plastered walls, the danger of damaging the plaster unduly is disturbing.

A simple means of locating the brickwork joint at the desired point is to examine the picture rail closely until in the paint or varnish one can see the putty covering the fixing nail; at this spot a wooden wall plug is under the picture rail in the mortar joint. Therefore at this level, about 3 in. away, drill a $\frac{3}{8}$ -in. diameter hole in the picture rail with a "keen-cutter" wood bit, until the mortar is encountered. Now, with a piece of 4-in.

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. M. B. Fitzgerald, 38, Hargate Lane, West Bromwich, Staffs.

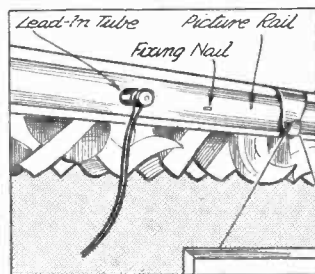
Inexpensive mass-produced parts—particularly resistance holders—seem to be the worst offenders, many of their screws actually protruding below the bakelite moulding, so that a short to the baseboard is inevitable. If, however, a piece of paper, carefully cut to size, is placed under each component before screwing down, the risk of a short occurring is greatly reduced.

A TEST FOR JOINTS.

AFTER testing components for causes of poor or no results, it is worth while trying the soldered connections to the terminals, as what is known as a "dry joint" may be the cause. These joints are the result of an insufficiently heated iron and badly cleaned parts.

The solder, instead of having a strong hold of the face of the shank, links itself to one or two of the threads with a thin layer of dirt and flux between. Mechanically this is strong, but electrically a failure, as, after a time, this layer completely insulates the two parts.

diameter iron rod, 12 in. long and flattened to screwdriver shape at one end, continue to tap the mortar out of the joint, twisting the rod during the

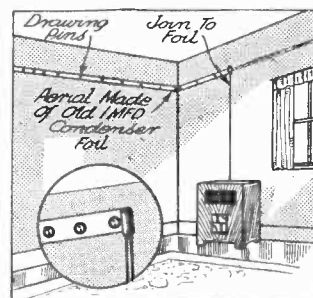


The lead-in tube is brought in through the picture rail.

tapping with a hammer. When the rod has been tapped right through the wall, one has a neat hole for the insulated lead-in tube.

AERIALS FROM CONDENSERS.

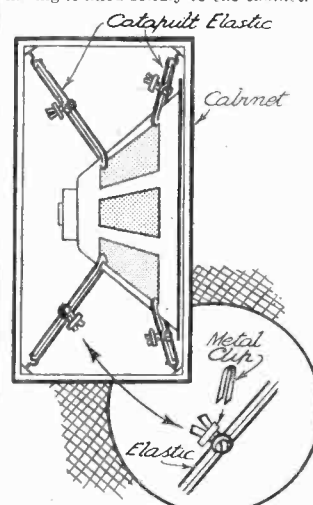
IF you have an old paper dielectric condenser in your junk box, remove the pitch at the bottom and draw out the paper foil. Unroll same and cut off 25 ft. Open one end, pare lead coating, take a piece of rubber-covered flex about 8 ft. long, strip off the rubber about an inch from one end, place in the fold of lead foil and bind up tightly with sticky tape. Attach to picture rail, as shown in diagram, either with drawing pins or glue; couple flex as down lead to set, thus making a complete indoor aerial.



How lead foil may be used for an indoor aerial.

AN ELUSIVE RATTLE

FOR some time past I have been troubled by an elusive rattle from my loudspeaker cabinet, and I cured it recently by simply suspending the speaker chassis from the cabinet with thick catapult elastic, instead of having it fixed solidly to the cabinet.



A loudspeaker chassis can be suspended by elastic to overcome rattles.

I screwed four eupboard hooks into the corners of the cabinet, and from these ran lengths of the elastic to convenient points of the loudspeaker chassis, pulling the elastic taut to prevent the unit sagging when moved. To prevent the knots in the elastic slipping I pinched stout lengths of lead around the loose ends, as shown.

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

"WORSE ON LONG WAVES AND NO REAL PUNCH."

F. P. (Warwick).—"Can you help with my set? It works, if you call it 'works,' but not like an S.G., det. and power should do."

"It is worse on long waves and no real punch. What can I do?"

Without more symptoms on which to base a diagnosis it is difficult to estimate the precise cause. Inability to obtain proper reaction effects, for example, will prevent such a set from giving satisfactory results, especially when an indoor aerial is used, as in your case. This type of aerial will invariably affect long-wave results more than it does the reception from the medium-wave stations.

Lack of proper reaction may arise from a multitude of causes, including insufficient voltage on the detector, a reaction condenser with too low maximum capacity, a high-resistance contact, etc.

The lack of voltage may be due to an overloaded mains unit or worn-out battery.

Check up the voltages when the set is working, and if these are in order you will find one of the following is the cause of the trouble: Faulty component; wiring error or high-resistance joint; faulty valve; inefficient aerial-earth system; insensitive loud-speaker.

If the valves, loudspeaker and aerial-earth system prove to be O.K., the best way to locate the fault is to check results stage by stage, preferably with a pair of phones, or failing that by a really sensitive loud-speaker.

The idea is to first try out the set as a one-valver by joining the aerial lead to the coupling condenser between the S.G.'s anode and the detector grid-coil,

and by connecting the phones (or loudspeaker) in the place of the L.F. transformer primary (H.T.+ and A terminals)

(Or, if resistance-coupling is used, in place of the detector's coupling resistance.) This cuts out the S.G. and last valve, and allows you to listen to the detector alone.

When the aerial is replaced in its original position the effect of adding the S.G. stage will tell you whether this valve is "pulling its weight." And, finally, you can bring in the last valve by restoring its output connections, to test this also.

Such tests, however, require a certain amount of skill and practice in wiring alteration, etc., so they should be carried out by someone of experience in set construction.

ANODE CURRENT CONSUMPTION AND THE CORRECT H.T. BATTERY TO USE.

C. C. (near Gravesend).—"It looks like being a long time before we get the electricity mains up to this house, so I propose to run the set from H.T. batteries at first and change over to a mains unit later on."

"It is the 'S.T.500' circuit, and I suppose it will be too powerful for the small type of H.T. battery. I know it is more economical to get a big battery rather than try to make do with smaller ones which cannot cope with the demand on them, but I do not know how much to allow for Class B, as this will be my first experience of it."

When using the valves and voltages specified for the "S.T.500" the total anode current will be only about 8 to 10 milliamps when no programme is being received. But the current rises when the loudspeaker is active, and may go up momentarily to as much as 20 or 30 milliamps, depending upon the strength of the programme.

(As you apparently realise, the anode current is not steady for Class B working, but is proportional to the volume which is being handled.)

This over a period of normal reception the average H.T. current would probably be of the order of 15 milliamps, the actual figure depending upon the level of volume which you obtain. The power type (double or triple-capacity) H.T. battery is therefore recommended, as these will give lower running costs in the long run than the smaller type.

A MILLIAMMETER READING WHEN A CONDENSER IS IN SERIES WITH IT.

G. B. A. (Trumpington).—"As a matter of curiosity I wired up the suspected condenser (it is a .0002 mfd.) in series with the milliammeter, and connected first a grid battery and then, getting no reading, an H.T. battery right across the two."

"When the plug is in the latter at 120 volts or so I get a small but quite definite reading on the milliammeter if connected the right way round, and a similar small but reversed reading when the battery connections are changed over."

"Does this show the condenser is faulty?"

Yes, quite definitely. There should be no steady reading, as the condenser should be equivalent to a complete break in the circuit.

In such a test, however, when first connected the milliammeter will often "kick" as the condenser (if of sufficiently high capacity) charges through the instrument, so no notice need be taken of a momentary reading when it is first connected.

But there should be no steady flow, and if a permanent deflection, however small is obtained on the milliammeter the condenser is definitely faulty.

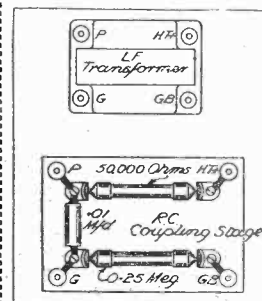
SHORT-DISTANCE LOUDSPEAKER RECEPTION ON A CRYSTAL SET.

Should this catch the eye of the reader referred to, perhaps he would like to advise a "P.W." pal, who writes from South Africa, as to the circuit he uses.

The letter, which is self-explanatory, is as follows:

"Having seen the note in POPULAR WIRELESS dated December 23rd, 1933, in which 'F. W. W.' (Woodford Green) states that he works a loudspeaker with a 3-volt battery and a crystal set, I kindly ask if I can have a plan of same."

"I have been using a crystal set for the last nine and a half months, and find in it a very



CHANGING
OVER
TO R.C.
COUPLING

It is sometimes desired to change a low-frequency transformer-coupled stage to resistance-capacity coupling (i.e. a stage employing two resistances and a small condenser, instead of the transformer).

The R.C. components—usually of the values shown above—are often assembled in the form of a unit. Its terminals can be marked "P" (or "A"), "H.T.+", "G" and "G.B.", like the transformers, as indicated.

To change over, all that is necessary is to remove the transformer and wire up the corresponding points.

interesting hobby. But seeing that it can be used to work a loudspeaker I should like to try.

"Our new station is opening, as perhaps you know, very shortly, and is to work on a wavelength of 500 metres. I live approximately, as the crow flies, six and a half miles from it."

"Thanking you in anticipation,

"Yours sincerely,

"LOUIS NANTON.

"Beatrice Cottage,

"Coronation Road,

"Maitland,

"Cape Town, South Africa."

PICKING UP TELEPHONE CONVERSATIONS.

We have recently received inquiries from readers who find their sets unexpectedly capable of picking up unwanted conversations from telephone subscribers, etc.

This peculiar effect (fortunately it is a comparatively rare one!) would generally appear to be due to some unusual local condition, such as an aerial wire running close beside the telephone line, the use of a common earth, or similar circumstance.

Any such possibility of interlinkage should be guarded against; but when it proves impossible to locate the cause of the fault it is best to drop the local postmaster a line, to see what can be done by the other parties to eliminate the effect.

Naturally, they will be pleased to assist. And some idea of the "trickiness" of such

(Continued on page 24.)

STATION IDENTIFICATION TRIESTE

Trieste's transmissions are in a difficult-to-place section of the waveband, unless you know Cork's dial reading. In that case Trieste will appear about two degrees higher, on 245.5 metres.

Failing Cork, as an aid to identification, Gleiwitz or Lille will do, Trieste being immediately above the former and below the latter dial reading. Its "placing" with regard to British stations is just about halfway between the London (or West) National and Aberdeen dial readings.

Trieste's power is 10 kilowatts. The usual announcer is a lady, and the programmes are linked with Turin (pronounced "Torino"). Trieste is pronounced like "Tree-ess-tay."

WHAT SET IS YOURS?

FOR EVERY SET ON THE MARKET THERE IS A SUPER-LIFE GROSVENOR BATTERY

For instance, is yours a

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There is a Super-Life Grosvenor for every Kolster Brandes Model. Ask your Dealer.

WHATEVER the make, you would get the most out of your set with a Grosvenor Battery. A Grosvenor would give it just the silent, superabundant power it needs—and last far longer than any battery you have ever had. The Grosvenor MERCURY process is the secret—guarding against corrosion and enabling the cells to be hydraulically crammed with extra chemicals.

Next time, insist on a Grosvenor. There is one made for your own particular set!

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MURPHY

your Dealer has a Super-Life Grosvenor made specially for your set.

KOLSTER BRANDES K.B.247 Pup. Ask for Grosvenor DBA546 (99+7½v.) 10/-
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MURPHY B.5. Ask for Grosvenor DBA539 (135+9v.) 13/-

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The Longest-Lived Battery
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A delightfully cool
sweet smoke, burning
free and evenly....
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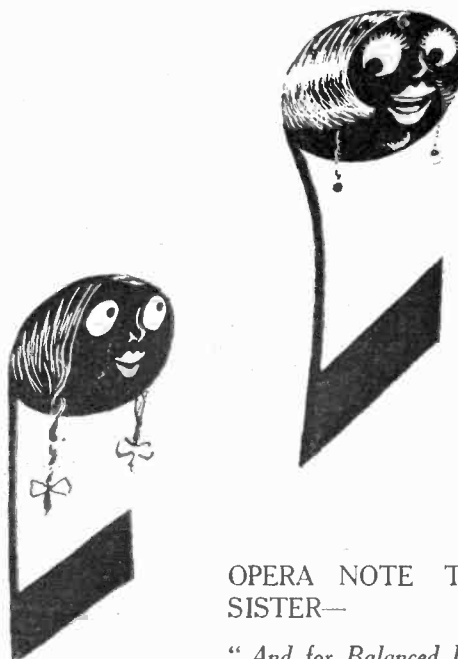
PLAYER'S AIRMAN MIXTURE

ALSO AIRMAN
NAVY CUT AND
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NAVY CUT DE-LUXE 11*00



10 D
PER
OZ

the technically supreme valve
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OPERA NOTE TO LITTLE
SISTER—

"And for Balanced Frequency Response—tone without loss of volume, my dear—use a Tungsram valve! Why, I always thought I was only the scenery squeaking—and now it turns out that I'm really the soprano's best top note!"



Highest performance, due to unrivalled technical resources! Yet moderate prices! Experts always choose Tungsram—for quality, power and sensitivity. The way they rejuvenate old sets is nothing short of marvellous. There is one for every radio need—write our Technical Dept.

TUNGSRAM VALVES

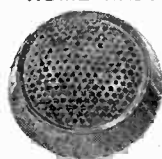
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No. 11, 5/6.

high ratio transformer in case 10/6.

"P.W." CONTINUITY TESTERS, 7/6.

Bakelite case with test bulb, battery and switch. Test Prods and pair of Headphones and Cords, 7/6.



4/6 for 2 pairs, post free.

THE DIXONEMETER.

COMPLETE IN CASE 60/-
The ideal of multirange, moving coil meters. Built to first-grade British Engineering Standard. 50 ranges on 1 meter. Measures Microamps to 20 amps, millivolts to 2,000 volts, 50 ohms to megohms. Six terminals. Two clear scales, mirror, and knife-edge pointer for accurate reading. Multipliers extra. Send stamped addressed envelope for Radio Bargain List "P."

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No. "P.W." 11

10/6



PERMANENT H.T.



LASTS YEARS
AT LITTLE COST

Any voltage supplied.

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MORE AMAZING PROOF

"Had your battery in use for 2½ years, think it best solution to H.T. problem. I study economy as much as performance."—A.R.P., Dagenham.
"I have used battery for last 5 years and have found it good and superior to dry batteries."—J. M., Edinboro.

"14 months going every day on 30v. set and still kicks up 80v."—E. K., Reading.

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"POPULAR WIRELESS"
when communicating with
Advertisers. **THANKS!**

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 22.)

cases may be gained from the following interesting letter to the Editor from Mr. L. J. Little, of 6, Norfolk Crescent, London, W.:

"I think the following might be of interest, but am at a loss for an explanation. This house, a four-storey one, has a G.P.O. telephone extension on each floor.

"When the telephone on the first floor is being used my receiver picks up the two-way conversation at full strength.

"The curious part about it is that it only comes through on the London National and Regional wavelengths, and only when either of these stations are working.

"I might add that the extension is at the front of the house and my aerial is outside at the back.

"P.S.—My receiver is situated in the basement."

FITTING A PICK-UP FOR GRAMOPHONE REPRODUCTION.

F. F. Y. (Cardiff).—"You may be surprised to hear it, but I am still using the set you gave in blue print form on October 11th, 1930. It was one on a sheet of four, and was called the 'Maxipower,' four valves.

"About six months ago I put it aside for a new one, going cheap, but after a few weeks

NEXT WEEK

FULL DETAILS OF HOW TO MAKE AN ULTRA-EFFICIENT WAVE-TRAP

A simple and inexpensive unit that will cut out interfering stations and improve your selectivity.

WEDNESDAY PRICE 3d.

of ups and downs, crackles and uncertainty, I went back with a sigh of relief to the 'Maxipower.'

"The sole advantage that the other had was that it was capable of playing gramophone records. I suppose the 'Maxipower' could be supplied with terminals for this.

"If you will describe the alterations in words I should like to have a go at it. I have got a Bulgin S86 switch on hand, which I am told is O.K. for this purpose."

The switch in question is suitable, and should be mounted on the panel between the 0005-mfd. variable condenser C2 and the filament resistance.

The two leads connected to the grid terminal of V2 should be disconnected from this point and connected instead to the centre terminal of the radiogram switch.

One outer terminal of this switch should be connected to the grid terminal V2.

The other outer terminal of this switch should be connected to a "pick-up" terminal mounted as one of a pair on the terminal strip. The other "pick-up" terminal should have a flex lead attached to it, carrying a black plug, to connect to the appropriate negative-bias socket on the grid-bias battery.

When the pick-up leads are connected to these terminals you should get the required results, but you may find that the indicator of the radiogram switch reads incorrectly—"Grano" when working radio, and vice versa.

If this happens all that is necessary to correct the indicator is to change over the two connections to the outer terminals of the radiogram switch.

INEXPENSIVE VALVES

I WONDER how many valves there are on the British market. Many hundreds, of course, so that the choice of an exact type to fit a particular need is quite easy—if you know the valve types well. They are not classified in any fixed nomenclature scheme, so that comparative tables are invaluable when you want to pick out a valve for any particular purpose.

I have been inspired to write all this by the arrival of a batch of Dario valves for test and by the clear, sensible list that accompanied them. This list contains not only the full complement of Dario valve types, with their various characteristics, but also a most useful comparative table that shows at a glance how Dario valves fit in with other makes. It is a useful list, and I shall keep it handy for future reference.

A Huge Range Covered.

Turning to the valves themselves, I must say at once that it is impossible in this space to give more than a glimpse of the huge range covered. There are eleven two-volt battery valves, including a Class B valve; fourteen A.C. valves—twelve being of the indirectly-heated type—and four rectifiers, covering 400 volt half-wave 60 m/a., 300 v. full-wave 75 m/a., 350 v. 120 m/a. and 500 v. 120 m/a.

The 9-watt dissipation directly-heated pentode (TE434) at 12s. 6d. is a fine proposition. It has an amplification factor of 130 with a mutual conductance of 3.5. With 250 volts H.T. it will give something like 3-3.5 watts output. There is also an indirectly-heated counterpart in the TE634, which has a mutual conductance of 2.7 and impedance of 37,000 ohms. It also dissipates 9 watts at 250 volts H.T. Price 12s. 6d.

Battery-set owners will do well to consider the variable-mu S.G. valve (TB452), which is excellent value at 10s. 6d., while the Super detector (TB172) at 5s. wants some beating. This valve has an impedance of 13,000 ohms.

Versatility and Cheapness.

The Class B valve (TB402) is of the zero grid-bias variety, and costs only 10s. 6d. It has a good power output and takes up to 150 volts H.T.

And so I could go on—picking out valves here and there to show the versatility and remarkable cheapness of the Dario valves. They are good valves, and as such deserve due recognition by set owners. The list I have been looking at gives all the details you require to enable you to pick any valve you may need, and should certainly be in the hands of every set constructor. Dario will be pleased to send it free if you write for list DV2.2.34 to Impex Electrical Ltd., 47, Victoria St., Westminster, London, S.W.1, and mention that you are a reader of POPULAR WIRELESS.

K. D. R.

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PIX

PERSONALITIES AND PECULIARITIES AT THE BIG HOUSE

(Continued from page 15.)

balancing of all transmissions. Within the limits of the resources and policy laid down for him, Mr. Wellington does a very fine job. His usefulness would be further enhanced if he were able to get more into touch with intelligent outside opinion.

In the Talks part of broadcasting Mr. Lionel Fielden deserves notice. To him is due the credit for most of the new ideas and liveliness that have made the talks so much more acceptable in the past year. It is fortunate for the B.B.C. that they have managed to keep Mr. Fielden. He is one to whom any suspicion of bureaucracy is anathema. With more authority he can accomplish much more in his present field.

New Blood Required.

Mr. Walton O'Donnell and Mr. Joseph Lewis are the two conductors to be commended next to Dr. Boulton. The former has evolved the finest military band of its kind in the world; the latter handles those programmes of popular music, which assuredly have bigger appreciative audiences than any other broadcasting features.

Mr. Stuart Hibberd, the chief announcer, more than holds his own. He has gained in popular favour since he began recently to put more of his own personality into his work. Let this tendency go on, and Mr. Hibberd, supported by Mr. Freddie Grise-wood, will gain a reputation as great as, if not greater than, the chief American announcers.

Other broadcasters whose "stock" is rising, either inside or outside Broadcasting House, are Messrs. John Watt, King-Bull, Lance Sieveking, Henry Hall, John Sharman, Howard Rose, Stanford Robinson and R. A. Rendall.

Comparing the present situation with that surveyed similarly every year for eight years, one suggests that the same names crop up frequently. No doubt they deserve to, but it would be better for the health of broadcasting to see new names alongside the established ones.

THE MIRROR OF THE B.B.C.

(Continued from page 6.)

the Scottish "Points of View" series of talks on Internationalism, which should not be confused with Scottish Nationalism, in whose interests Sir Alexander McEwen was formerly candidate for Kilmarnock.

We can take it that Mr. Maxton's views will uphold the brotherhood of man, and that Sir Alexander will be equally emphatic in stating his beliefs in the essential right of small nations to live their own lives.

Van Phillips' "All-Stars."

What do you know about Van Phillips, whose All-Star Orchestra is to present an hour of popular music in the modern manner in a programme for National listeners which Christopher Stone will announce, on Monday, March 26th?

Van Phillips is an American, and although he came to London in 1925 to play the saxophone in the Savoy Hotel bands, he is

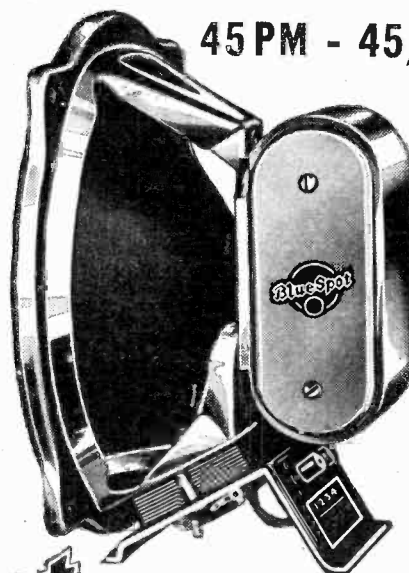
(Continued on next page.)

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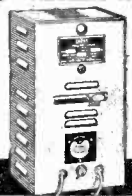
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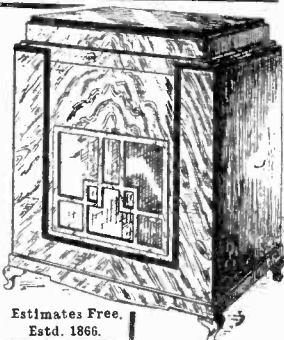
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THE MIRROR OF THE B.B.C.

(Continued from previous page.)

still not yet thirty. He left his job to take up arranging and to write his own music. "The Two of Us" was one of his "hits."

Since then he has been studio manager for a gramophone company, has made records with his own band, has scored two revues ("Bow Bells" and "Fanfare") and has done orchestrations for "Nymph Errant," "Gay Divorce," "Mr. Whittington" and "Ballyhoo."

With hundreds of arrangements for dance bands—Jack Payne's, Ambrose's, Henry Hall's, Marius Winter's and Roy Fox's among them—to his credit, it is to be expected that he will do the same for the programme he is to direct on March 26th.

An Orchestra of Soloists.

How he found time to do it all is a mystery, because he is now scoring and directing music for films, of which a selection from the recently completed "Love at Second Sight" will be in his broadcast.

And what, too, do you know of his All-Star Orchestra? It is one of those combinations that can only be got together occasionally, consisting as it does mainly of soloists, more than half of whom have appeared in radio programmes.

The hour which has been given to this programme should be outstanding.

TELEVISION—ALL-ELECTRIC SCANNING

(Continued from page 11.)

In the anode is a very small hole, and the effect of this is important; it allows a tiny stream of electrons to pass through and shoot out on the farther side of the anode, where they keep on going as a result of their high velocity.

The result is a sort of "ray" of electrons travelling at high speed, and the tube is so made that this stream falls upon a large, flat surface of glass at the end. This is shown in the sketch on page 11, and it makes the ray visible by virtue of the phenomenon of fluorescence: the glass is coated with a substance which emits a glow of light when an electron stream falls upon it.

A Tiny Spot of Light.

Thus, if the ray is made to remain in one place, we see a single tiny spot of bright light on the flat end of the tube, and if we could make this move about and vary in brightness in the usual way we should have a complete television receiving system.

Just how that is actually done must be a subject for my next article, but I must give just a hint at the method here. Very briefly it is a matter of putting charged electrodes on either side of the electron ray and causing it to bend one way or the other, according to the usual laws of attraction and repulsion.

This bending of the ray naturally shifts the spot on the screen at the end of the tube, and so gives our basis for a scanning system.

RADIO SUMS SIMPLIFIED

Owing to extreme pressure on space, this feature of our Special Beginners' Supplement has been unavoidably held over this week.

THE LISTENER'S NOTEBOOK

(Continued from page 6.)

the average for interest. So I softened somewhat towards the Foundations this week, though I am pretty certain to break out again before long. I am usually averse to the average sort of chamber music. I never feel such music was intended for entertainment. I go so far as to think that a lot of it was never meant to be heard outside the practice-rooms of a musical college.

I am no authority on chamber music, but it always strikes me as being ideal music on which player-musicians should practice, especially those who hope to perform in orchestras or smaller combinations, when the art of playing together has to be mastered. I can say no more for it than that.

The St. David's Day celebrations followed the usual form of these national celebrations. There were excerpts from Welsh history, with a couple of narrators declaiming more than ever and literally bursting with importance. Though these chapters are interesting enough, they aren't as terribly exciting beyond the border as they are within it. There was something very incongruous, however, about the inclusion of a famous Rugger match, as it preceded a piece of quite ancient history.

If there should be a sudden outbreak of errand-boy whistling in your street you must blame John Southern and his Hour of Old-Time Music-Hall Hits. We asked for more old music-hall songs, and we are getting them thick and strong. Almost every week, now, something of the sort is put on. The Southern Hour is certainly the most ambitious that has yet been conceived. It was the real stuff, of course. And what a triumph for some of those famous old artistes! Their performances made one wonder why they ever retired.

Mr. Charles Austin was great. So was young Bill. He quite deserved to have his name on the programme. The humour of this pair was first class, but I thought the patter of some of the artistes was a bit feeble in places. Their songs are gems. More of these shows of a Saturday night, if you please! You can't beat 'em.

Miss Dorothy Sayers gave a rather amusing account of a week's doings. A series of irritations, surprises and vexations (especially those occasioned by a certain newspaper's correspondence columns) must have consoled many listeners who find life pretty much the same. Miss Sayers should expect another surprise this week, this time from her publisher in the shape of a memorandum reporting an increase in the sales of her books. C.B.

THE LINK BETWEEN

(Continued from page 20.)

Scales calibrated to meet the new wavelength conditions can also be obtained for the Radio for the Million "Stationmaster 34" and Stationmaster Class B" receivers.

Procureable from your local dealer, or direct from Messrs. United Radio Manufacturers, Ltd., 63, Lincoln's Inn Fields, London, W.C.2. The price is 2s. post free.

British Radiophone Supers.

Two very fine "world-wide" seven-valve Q.A.V.C. superheterodyne receivers have just been produced by the British Radiophone, Ltd. They were shown at the British Industries Fair for the first time.

The "Continental" is an all-wave model designed for reception from 10-50 metres, from 200-550 metres and from 1,000-2,000 metres. In the design of the "Empire" model the long-wave band is excluded.

Both models are available as complete receivers with valves, moving-coil speakers and specially treated pinned teak cabinets, or alternatively they can be supplied in chassis form.

Just the very thing for overseas listeners in remote corners of the Empire. Full details from British Radiophone, Ltd., Aldwych House, Aldwych, W.C.2.

More "replacement scale" news. If you are the owner of an Ekco model SH25, C25 or R625 receiver you can obtain new scales in pairs of two sections at 9d. per pair. Available from all Ekco dealers.

Wearite have now produced a new Q.P.P. input transformer designed to match up with the Marconi and Ostram Q.P.21 valves. The ratio of the Wearite transformer is 9 to 1.

A New "Ever Ready."

A new H.T. battery suitable for replacement purposes in the latest model McMichael "Lodex 5" has just been introduced by the Ever Ready Co. (G.B.), Ltd. The e.m.f. is 126 volts tapped at 70 and 120, with 6 volts for grid bias, and the price is 17s. 6d. Specify model W1252 when ordering.

Standard Telephones & Cables, Ltd., are shortly to market a range of Micromesh A.C./D.C. valves designed for series running at 2 amp. The voltages are to be 13, 26 or 40. Full details later.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

Electrolytic Condensers.

I CAN'T just remember how long it is now since electrolytic condensers came into popular use—I suppose it will be about a couple of years, although I recollect at least five or six years ago receiving samples of the earliest types of these condensers from the United States.

In most so-called dry condensers a cotton material is used for absorbing and carrying the electrolyte and also for spacing the anode and cathode. In an improved condenser the anode stands free of the cathode, but there is an electrolyte which is of the jelly type, something after the fashion of the jelly accumulator.

In the accumulator with jelly electrolyte—in view of the relatively large charging and discharging current—there are certain important difficulties met with, owing to the fact that the jellied electrolyte cannot flow in the same way as a liquid electrolyte.

Jelly Electrolytes.

In the case of the electrolytic condenser, however, these difficulties are not nearly so great and here the jelly type of electrolyte seems to be particularly suitable. Of course, a certain degree of "jellification" has already been used by manufacturers, whilst in ordinary dry cells (for example, high-tension battery cells) the electrolyte is often in this form.

With the jelly-electrolyte condenser there is plenty of electrolyte around the anode, so that the condenser becomes self-healing in the event of breakdown, whilst at the same time there is very little evaporation or loss of electrolyte, and this gives a longer life and more dependable working to the condenser.

In addition to these advantages it is claimed that when the voltage is applied to the condenser the current quickly drops to a very low value, and remains so even after the condenser has been working for long periods.

Radiometric Condensers.

A very interesting paper was read a little while back before the Royal Society of Arts, entitled "Radiometric Condensers and Inductances," by G. G. Blake, M.I.E.E., the well-known radio engineer.

This paper is interesting not only for the account of the experiments on the radiometric condensers themselves, but also for a large amount of information which is included on light-sensitive cells and related matters.

The light-sensitive cells, of course, include the copper-oxide type, which in one form consists of a copper electrode chemically sensitised to light by the action of copper formate in a solution of formic acid; this electrode, together with a second electrode of lead, is immersed in a solution of lead nitrate.

The Weston Electrical Instrument Company of U.S.A. introduced about two years ago a dry copper-oxide cell which, with the proper circuit, is capable of generating a

current of 5 milliamps when exposed to direct sunlight. This cell, by the way, was exhibited for the first time in England at the exhibition of the Physical Society at South Kensington in 1933.

Another Type of Cell.

Another type of light-sensitive cell devised by Mr. Blake is very simple, and consists of two copper strips immersed in a glass tube containing methylated spirit—one of the strips is previously light-sensitised by heating it to bright redness in a gas or spirit flame and allowing it to cool gradually. This type of cell, when properly made, is very sensitive and remains stable over long periods.

There is a mass of interesting information in this paper which I could not possibly extract for you here, and I advise any of my readers who are interested in the type of subject indicated above to consult the original paper; it gives all manner of applications and uses for the radiometric condenser, and concludes with an immense list of references to original papers which is most valuable to anyone pursuing this subject seriously.

The Heaviside Layer.

We have all been familiar with the Heaviside Layer for many years past, and I think most of us know that in the absence of this or some such layer we should be entirely at a loss to explain the fact that radio waves travel around the curvature of the earth.

The Heaviside Layer, however, leaves much unexplained, and therefore it is not surprising that more recently a second layer has been discovered at a height of about 150 to 200 kilometres above the earth's surface.

This layer is often called the Appleton Layer, although Professor Appleton himself modestly refers to it as the "F" region, as distinct from the "E" region, which is the Heaviside Layer; this latter is at a height of about 50 kilometres or more.

I should explain that the height of these regions varies considerably at different times, and particularly with day and night.

Day-and-Night Effects.

Waves of about 100 metres or less will pass through the Heaviside Layer and be reflected by the upper layer, at any rate at night time; but during the daytime there is a certain amount of reflection even from the lower layer.

There is a growing belief that another reflecting or refracting layer exists between the Heaviside Layer and the earth's surface, and that this region is responsible, to some extent, for the absorption of short waves, which is particularly pronounced at certain times.

Notwithstanding the ingenious methods which are now available for automatic volume control, there are still many difficulties to be faced in long-distance radio

(Continued on next page.)

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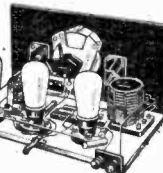
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TECHNICAL NOTES

(Continued from previous page.)

transmission and reception, and especially in connection with short-wave working which is of increasing importance in several different directions.

Therefore these investigations into the electrical conditions above the earth's surface are not merely of theoretical interest, but are of the utmost practical importance in relation to long-distance radio transmission on all wavelengths.

Automatic Volume Control.

Automatic volume control seems to have come to stay. Not so very long ago this was really standing its trial, and certainly there were quite a number of objections to it; but one by one these have been got over, and now it is used in a great number of commercial receivers not only in this country but in other parts of the world as well.

I expect anyone who uses a set employing automatic volume control will have noticed that the tuning has to be handled somewhat differently from that of an ordinary set. The set with the A.V.C. acts in some ways

coming signals, or, if you like, variations in the strength of the signals applied to the detector. When the strength applied to the detector is lessened the variable-mu valves increase in amplification and vice versa.

An A.V.C. Effect.

We can see, then, why it is that, with a set using an effective automatic volume control, we can sometimes go appreciably off the tuning point without losing very noticeably in volume—that is, a broad tuning effect—whilst at the same time, although this causes distortion, the distortion is not of that very fierce and instantaneous type that we get with a very sharply tuned receiver.

Band-Pass Filters.

I said something in these Notes a short while back about band-pass circuits, and a reader mentions something with regard to these circuits which I think is a very practical point and perhaps worth going into. The point in question is that the wiring of the circuit may often have quite an important effect upon its characteristics.

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as though the tuning had been flattened, but there is one important difference.

In the ordinary way the set with flat tuning can be tuned quite a considerable amount on either side of the true tuning point without any very serious alteration either in the volume or in the quality of the reproduction. This is "flat tuning" in the ordinary sense of the term.

Distortion and Selective Tuning.

If you have an ordinary set which is very selective you will find that the moment you go off the true tuning point for any station you will get pronounced distortion, so that, quite apart from the question of volume, there is no difficulty whatever in knowing when the set is correctly tuned.

Now, when it comes to the set using automatic volume control you get a result which is somewhere between the two; that is, the set behaves in some ways as though it were broadly tuned, whilst on the other hand this distortion effect is still noticeable, although often not so much as with an ordinary set which is very sharply selective.

The object of automatic volume control, of course, as its name implies, is to keep the volume reasonably constant notwithstanding variations in the strength of the in-

This is due to a number of causes, amongst them the fact that by bad arrangement of the wiring you will get various stray capacities. The result of this is that instead of getting a proper band-pass effect you get a curve which is peaked or, on the other hand, too broad.

You want particularly to take care that the wires do not run too close together; for example, the connections to the tuning condenser may cause a coupling or capacity effect which will completely upset the tuning.

The Results of Inefficient Wiring.

The sensitivity and the selectivity of a set employing a band-pass filter can be affected to quite an important extent by the way in which the filter itself is wired up. My correspondent mentions that he has tested one or two other sets employing a band-pass filter identical with his own in which the sensitivity or the selectivity has been inferior owing to no other cause than the inefficient wiring of the filter.

This question of wiring applies to almost all parts of a radio receiver and is nothing new, but I don't think people always realise its importance in the little extra units and outside circuits which you sometimes add on to the main circuit.

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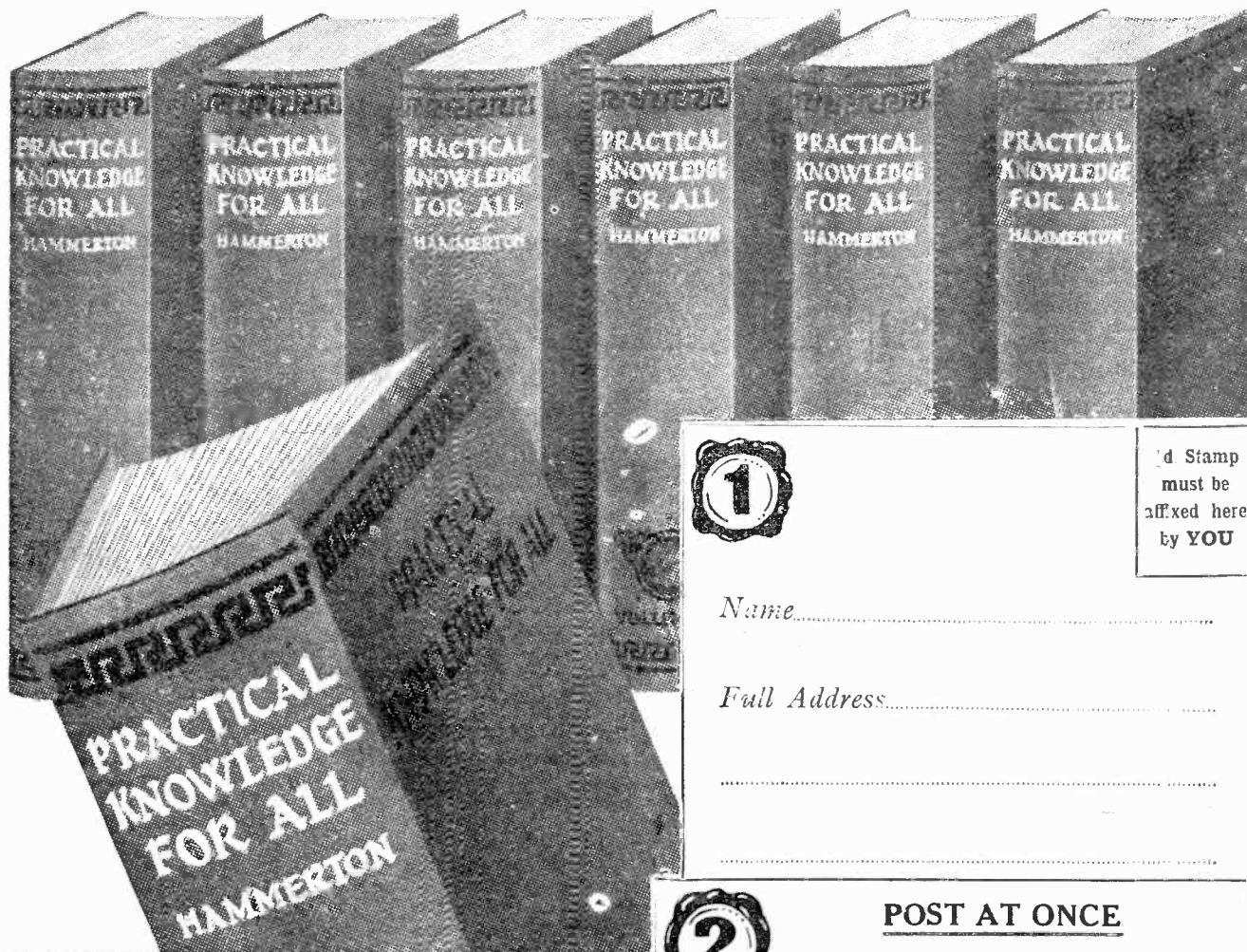
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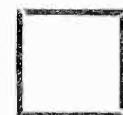
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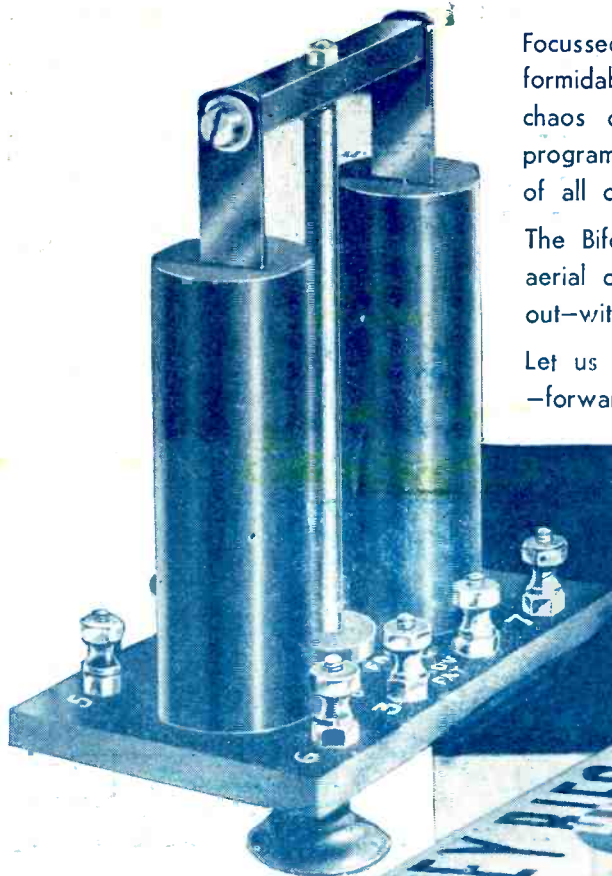


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