REGISTERED AT THE G.P.O. AS A NEWSPAPER.

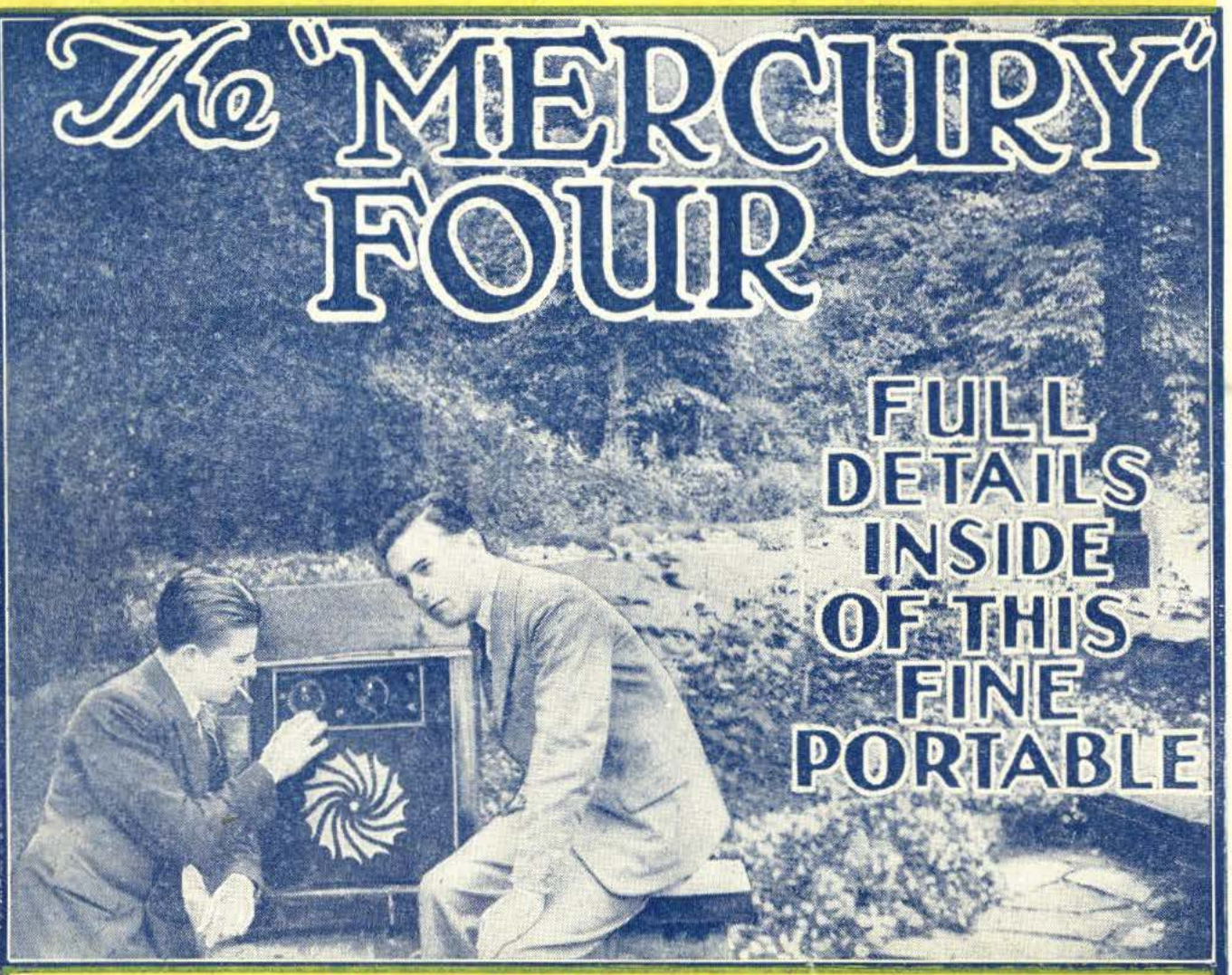
LARGEST RADIO CIRCULATION IN THE WORLD

Popular Wireless

Every Thursday PRICE 3d.

No. 429. Vol. XVII. INCORPORATING "WIRELESS" August 23rd, 1930.

The "MERCURY" FOUR



FULL DETAILS INSIDE OF THIS FINE PORTABLE

OTHER SPECIAL FEATURES THIS WEEK

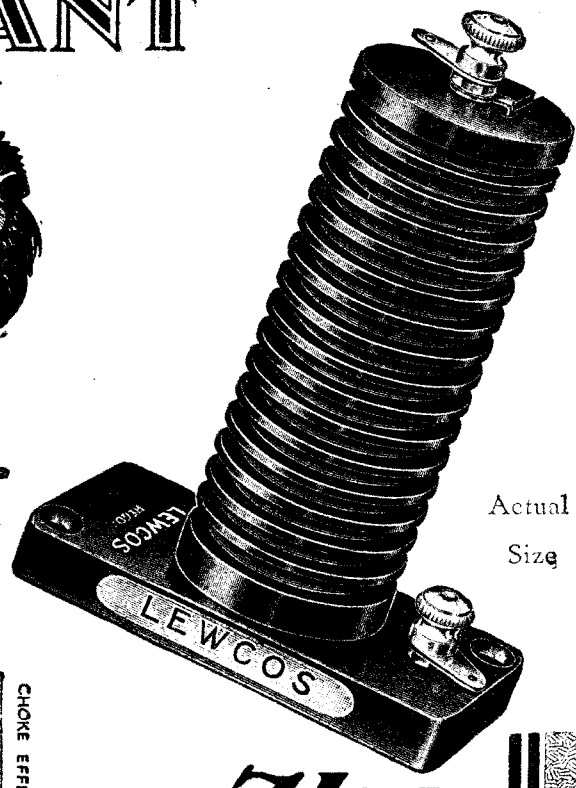
LOSING THOSE LOW NOTES
By C. E. Field, B.Sc.

WHAT WE WANT TO KNOW
By G. V. Dowding, Associate, I.E.E.

CAPT. ECKERSLEY'S QUERY CORNER.

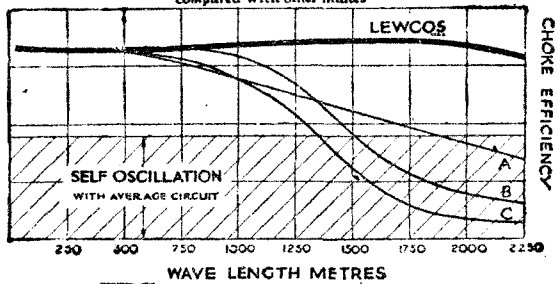
BROADCASTING YORK MINSTER

PREDOMINANT IN ITS OWN SPHERE

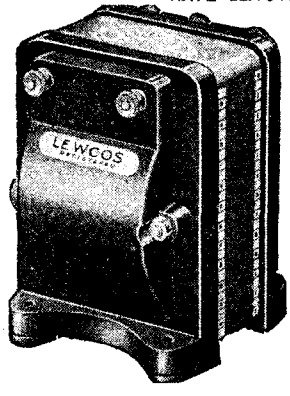


Actual Size

H F CHOKE CURVES
Showing the performance of the Lewcos HF Choke compared with other makes



The LEWCOS H.F. CHOKE



THE LEWCOS L.F. TRANSFORMER

The Lewcos Choke is *"The most efficient choke we have tested,"* and *"Its design places it in the front rank of high-class components,"* writes Industrial Progress (International) Ltd., of Bristol.

A fully-descriptive leaflet, Ref. R.33, giving tested values, will be sent on request.

THE L.F. TRANSFORMER—the latest development of the Lewcos Laboratories—is the natural and inevitable bridge between the High Frequency side of your Receiver (tuned with the world-famous Lewcos Coils) and your Loud Speaker.

A fully-descriptive leaflet will be sent on request.

VISIT OUR STAND, No. 41 AT THE RADIO EXHIBITION.

WE ARE EXHIBITING AT

THE NATIONAL RADIO EXHIBITION
OLYMPIA (NEW HALL)
SEPT. 19th—27th 1930

THE LEWCOS H.F. CHOKE, ILLUSTRATED ABOVE, IS SPECIFIED IN THE 'MERCURY 4" RECEIVER DESCRIBED IN THIS ISSUE.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED,
Church Road, Leyton, London, E.10.

LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

Popular Wireless

Scientific Adviser: Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant: CAPT. P. P. ECKERSLEY, M.I.E.E.
Editor: NORMAN EDWARDS.
Technical Editor: G. V. DOWDING, Associate I.E.E.
Assistant Technical Editors: K. D. ROGERS, P. R. BIRD, G. P. KENDALL, B.Sc., A. JOHNSON RANDALL.

MORE RAIN!
G.B.S. AND B.B.C.
AMERICAN NEWS.
A CANDID FRIEND.

RADIO NOTES & NEWS

RADIO EXCHANGES.
FARADAY CENTENARY.
SPAIN TRIES AGAIN.
HOW NOT TO EARTH.

Ruminations on Rain.

STARING, for inspiration, out of the window, I see a dripping garden waved over by angry trees, wind-swept, and general anti-holiday conditions. *Pro:* Good for the lawn, the ducks and the reservoirs. *Con:* Bad for holiday-makers, cricket, cats, postmen. Worse, there are below me two hefty youngsters, one of each sort, robbed of a picnic. To content them to-day will be as easy as teaching a tortoise to use a sextant! I wonder what a woman would do with 'em! What would Amy Johnson make of the situation? Radio cannot cope with it—they grew weary of that somewhere about 1926. Shall I take off my collar and start something strenuous, or take the coward's way out—and say Daddy "is awfully busy to-day."

Ariel's Criterion.

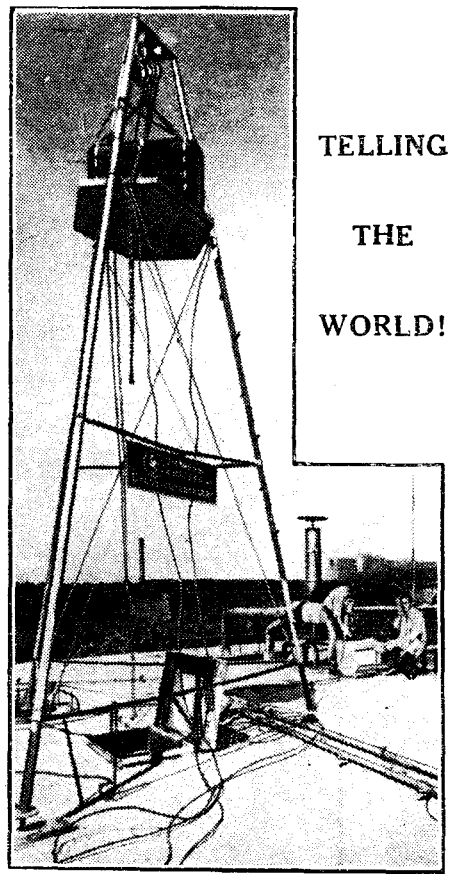
THIS woman business is all very fine and large, all due respect being reserved for Miss. A. Johnson and her sisters of the motor car and speed boat. I am far from convinced that women are men's equals in the field of action. For one thing, they don't originate. Quote me no exceptions, prithee, lest I argue proof of the rule. However, when first a woman produces a real advance in radio practice, based on an original idea, I will bump my head thrice upon the macadam and apologise for my present refusal to be rushed off my feet because of one or two clever and charming dare-devils who don't realise their luck.

G.B.S. and the B.B.C.

MAYBE you missed your copy of this month's "Modern Wireless" because of your preoccupation with the salt sea waves and all that. Don't do it! Now that you have returned to town and your workaday mind, rush round till you find an odd copy. You will want to read about G. B. Shaw and the B.B.C.! Then for consideration, you are offered details of several new sets, a special section about "power for your set", a lot of short-wave matter, and many miscellaneous articles, all fresh and full of punch. A notable shillingsworth.

Another Chance for Explorers.

IT is quite fashionable nowadays to accompany expeditions all over the world—by radio. If you missed making contact with the Byrd boys in the south, why not try for the Rumanian Arctic Expedition. This outfit sailed last month for the north, under Dr. K. Dumbrava, and is well equipped with wireless gear. Call sign: X O R C. Waves: 23, 40, and 65 metres, the last mentioned being for communication with the aircraft attached to the expedition. Who will be the first to report X O R C?



A new terror in loud speakers is this giant Siemens, which can be heard telling the world over distances up to 15 miles.

An Objection Met.

THIS being the season of *alfresco* meals, I may perhaps mention appropriately enough that the objection to the taste of the cork of the vacuum flask, which I raised some time ago, has been met, for a Colombo reader has sent me a page of a dealer's list offering vacuum flasks with glass stoppers. Another useful feature of these improved models is the construction of the lip; odd drips do not get into the casing and thereafter come tumbling into one's drink. Good business.

American News.

LATEST despatch from Mr. Easter. H R B (Tegucigalpa, Honduras) has raised its power to 2 K.W., and is transmitting on 79·9 metres; should be heard in Europe. Station W 8 X K, operates daily between 4 p.m. and 2 a.m., G.M.T.; and on Weds. and Sats. on two extra transmitters, from 12 noon to 4 p.m. (19·7 m.) and from 9 p.m. to 4 a.m. (48 m.). His usual wave-length is 25·4 m. The Federal Radio Commission has authorised the Mutual Telephone Co. of Hawaii to work on wave-lengths ranging from 11·9 m. to 5·36 m., for two-way radio-telephony amongst the islands of the Hawaiian group.

Something to See.

MAKE a note in advance of the International Exhibition of Inventors which is to take place Oct. 1st-11th, inclusive, at the Central Hall, Westminster, under the auspices of the Institute of Patentees. Everything there will be of interest to active-minded people and it is quite likely, indeed it is hoped, that the exhibition will stimulate not only trade but imagination and inventiveness. If you wish to exhibit some of your own work, apply to The Institute of Patentees Inc., 39, Victoria Street, London, S.W.1.

The Candid Friend.

J. A. L. (Cawood) writes one of those letters which are so artfully composed of compliments and bricks that the sum effect upon one is a sort of shot grey feeling. However, we do genuinely welcome his letter, and shall be glad to have another whenever he has something to say "to the point." He wants more short-wave articles—and other things, and this request has been handed to the editor in hope. Our policy is that although we *may* have a circulation of 2,863,947 weekly (or thereabouts!) that is no reason why we should not try to please everybody.

Have You Yachted?

THIS enquiry does not refer to the Liptonish sort of "yot." It is the latest slogan of select short-wave circles, and the "yot" in question is the yacht

(Continued on next page.)

RADIO NOTES AND NEWS.

(Continued from previous page.)

"Elettra," that is, Marconi's yacht. The inventor was still busily experimenting with his telephony apparatus as recently as July 28, when J. P. S. was happy enough to pick up the signals on his Screened-Grid Three, a short-waver described by W. L. S. The yacht was then at sea, 50 miles from Rome. This is an item which no keen amateur should miss; no log is complete without a Marconi yacht intercept.

The British Expedition.

BUT supposing that you have already successfully yotted! Well, have you followed up the British Arctic Air Route Expedition which sailed in the "Quest," Shackleton's ship, on July 6th, to investigate an all-British air route across the frozen north to Canada. There will be a short-wave station at each base camp in Greenland. (Mullard's valves, by the way). I haven't the wave-length and call-sign by me at the moment, but I will try to squeeze them in next week.

Radio Exchanges.

WHEN the idea of a radio exchange first began to be put into practice, I used to record in these columns the opening of each new exchange. But the thing ran away from me, and now the Postmaster General tells us that at June 30th last, there were fifty-six exchanges, with a total of 12,172 subscribers who for small weekly payments receive the programmes at loud-speaker strength. I am of opinion that, subject to the vagaries of Town Councils, who have queer notions about aerials, this system is going to grow enormously.

International Wireless Chart.

TO those who love maps and charts I commend the new international radio chart, which has been issued with the assistance of the Dansk Radio Aktieselskab. It does *not* register broadcasting stations, but wireless coast stations and wireless beacons and fog-signals all over the world. It measures about 45″ × 33″ and costs 10s. It was prepared by experts and would be a useful addition to the walls of a club or keen radio "fan." The chart is sold from the office of the Scandinavian Shipping Gazette, Copenhagen, K., Denmark.

"Dagenite."

AT first I thought that the salubrious district of Dagenham had been the scene of the discovery of a new element. But no! "Dagenite" is the name given to the new accumulator by the National Accumulator people.

I make a note of this because it is a good plan to keep an eye lifting for what other folk are using—and I happened to spot that these particular cells were used for the television demonstration at the Coliseum.

The Faraday Celebration.

THE arrangements to celebrate, in September, 1931, the Centenary of Faraday's discovery of electro-magnetic induction, which was the basis of electrical engineering are proceeding steadily under the auspices of the Royal Institution, and the Institution of Electrical Engineers. Faraday came, in 1813, a youth of 22 years, to the R.I. house in Albemarle Street as assistant to Sir Humphrey Davy, whom he eventually succeeded as Professor of Chemistry. The celebrations are fixed provisionally for September 21st, 22nd and 23rd, 1931, followed by a Faraday Exhibition at the Albert Hall for ten days.

The Famous Diary.

THE most important celebration of all will be the publication, in 6 or 8 volumes, of Faraday's diary of his experimental work. It is hoped that two or more of the volumes will be ready by September, 1931. To book-lovers this will be an event. Even now I can smack my lips over the reading of the great man's daily notes, but I hope that in their laudable anxiety to make a good job of the undertaking the Institution will not arrange for a production which will be costly beyond the general public's pocket. At a few bob a volume there may be some hope for you and me.

SHORT WAVES.

A correspondent declares that he always sleeps with his head beneath the bedclothes. We suppose he hasn't the pluck to go next door and ask his neighbour to switch off the wireless set.—"Humorist."

* * *

"All talks on the wireless, political, or otherwise, should be confined to between 2 and 4 p.m., the only period when what pugilists call the 'sleep punch' can be usefully delivered," we read in the "Evening News."

This certainly sounds quite an effective "wipe out."

* * *

OUTSIDE THE BAN.

Coventry City Council has prohibited noises by gramophone or wireless in public places. Politicians and other nuisances, however, will still be tolerated.—"Birmingham Daily Mail."

* * *

Manager of Boiler Factory: "Listen, men, we've stopped the work to tell you the B.B.C. are going to broadcast our noises—so be careful of your language."—"Passing Show."

* * *

TELEVISION AND THE THEATRE.

It is reported that Stanley Lupino, in an interview concerning the ultimate future of the theatre, recently said:

"There won't be any theatres, but people will sit at home and press buttons and get their theatrical stuff by radio and television. But I won't mind, because, having taken monkey glands by then, I shall probably be too young to go on the stage."

* * *

WRONG STATION.

Father was tuning-in the wireless set when suddenly he gave a howl of pain.

"Whatever's happened?" asked his wife.

"I believe I'm getting lumbago," he replied.

His wife sniffed contemptuously.

"Whatever's the use of that?" she asked. "You'll never be able to understand what they are saying." —"Answers."

Valve Development.

NOT for a moment is it to be believed that the valve has reached the peak of development. It is revealed that the chief engineer of the De Forest Radio Company has invented a new form in which the grid is caused to rotate by the impact of the electron stream from the filament, something like the Crookes "radiometer," in which four vanes are rotated by light energy.

This new-old idea appears to present interesting possibilities and we shall watch closely for its emergence in the form of a finished instrument, reporting faithfully to our readers. One claim made for the revolving grid device is that it can be used as a frequency changer.

Try the R.A.F.

DURING this time of widespread unemployment it is well to let as many people as possible know that the Royal Air Force requires five hundred lads between the ages of fifteen and seventeen as aircraft apprentices for entry into its Schools of Technical Training at Halton, Bucks, and Cranwell, Lincs. Amongst the jobs available are some for wireless operator-mechanics. A fine chance for handy, healthy fellows who don't quite know what to do. Details from the R.A.F. (Aircraft Apprentices' Depot), Gwydyr House, Whitehall, London, S.W.1.

Spain to Try Again.

ALTHOUGH Spanish stations can be heard, broadcasting in Spain—as we know the business here—is as dead as mutton. It never has lived. But now there is a scheme afoot for reorganising the system in the hope that the gay Dons will become listeners and pay licence fees. A 30-kilowatts station, four 15-kilowatts stations, and a short-waver, form the backbone of the plan.

A Visit of Inspection.

I HAVE recently had the pleasure of visiting at Croydon the new factory of that firm with the royal and imperial initials, R.I. Everything I saw impressed me with the feeling that I was looking at a model lay-out. The works are all on one level, well-lighted and equipped, with plenty of room for expansion. The most important part of the works—*i.e.* the staff, is excellently cared for; there is even a garage for their private motor-cars! A go-ahead, virile organisation, complete with new electrified sales manager. Good luck to them, and may they succeed in holding up the flag in the export market.

How Not to "Earth."

I AM indebted to S. M. F. (Dover) for three interesting "snaps," a bright letter and an anecdote, part of which I should like to repeat for educational purposes. A friend owned a fine four-valver which ought to have delivered all the goods required, but didn't. Apart from the fact that the valves were being ill-treated (another story!) S. M. F. found that the "earth" lead was 40-ft. long, and made of No. 28 D.C.C. run on insulated hooks all over the house! Inquiry revealed that the local expert who had installed the set believed that an "earth" wire should be as long, as thin and as insulated as possible. No! Keep it short and fat and don't worry about insulation at all.

Another Radio Story.

IT is reported from the U.S.A.—without a blink of an eyelid—that Mr. J. H. Thornton, of Barnegat, N.J., has increased the egg production of his chickens by 15 per cent by installing loud speakers in their houses. This action, says J. H. T., was the result of his observation that the chickens showed "increased animation and cheer" when he was whistling or singing around. Animation, perhaps; but cheer is hard to detect in a domestic fowl, the features being standardised and only slightly mobile! Well, there you are, amigos! America is a wonderful country.

ARIEL.

WHAT WE WANT TO KNOW

by

G.V. DOWDING. ASSOCIATE. I.E.E.

A friendly criticism of the present methods of the radio industry—and an interesting suggestion that merits careful consideration.

WHY is there still so much mystery in radio? There is no need at all for it. What I mean is this. A firm spends no end of money developing something really good in the way of a radio component or accessory and then, instead of telling the public the real facts about it, they waste their advertising spaces by filling them with colourful generalities.

There are a number of exceptions, of course, there always are in this kaleidoscopic universe, but the fact remains that many manufacturers refuse to credit the radio public with any real seriousness.

Where are They?

Is it because they fear to frighten "laymen" with technicalities? If it is, it is high time a leaf was taken from the book of the motor merchants. Here you find perfect amalgamations of the "technical" and "non-technical." You get all the glowing generalities artfully interspersed with solid mechanical data on which the discerning can base their real judgments.

In radio there is frequently little difference between the announcements of the big, sound concerns and the small fry. Naturally, a proportion of the latter are, in their way, just as sound.

But where are to be seen the fruits of the huge organisations, the big research staffs, and what not that are part and parcel with a number of the larger manufacturers? The fruits may be the actual gear manufactured—but that is not always apparent to the uninitiated.

Pretty Pictures!

Whatever pretty pictures were drawn around a car or motor-cycle of a certain make, and whatever the maker's name and brand it carried, you would not buy it if you were not given technical information as to its horse-power, its petrol consumption, its brake-power, its actual road performance, and so on, would you? But would you buy a piece of radio gear without first acquiring similar information about it? I am sure you would, because if you didn't there is a lot of wireless stuff you would never buy at all—as often so few real details about it are made generally available.

Let me get down to brass tacks and point out some examples.

There are many fine H.T. batteries on the market—I could name a dozen makes right away—but where are the advertisements or leaflets that tell you the actual facts about these batteries? And they are facts that no one need be afraid to publish broadcast. You are informed that such and such a battery gives you silky power, that it improves your results and so on. But such statements are mere generalities such as can be said moderately safely about any not-quite-up-to-the-average battery.

What the discriminating purchaser wants to know is how long such a battery might last in various circumstances (a fair approximation being quite permissible), its internal resistance, its maximum life "off load" (its shelf-life—a "dry" battery deteriorates even while it is not in use), etc., etc.

There should be none of this fear of technicalities, because listeners would soon manage to grasp the significance of the more important details. Anyway, what advert. copywriter would admit he couldn't teach them very quickly?

Then again what about the loud speaker?—here indeed is a flagrant case. There are heaps of excellent loud speakers being sold, but I am convinced that those makers who have the best ones would do a bigger trade if they came right into the open with performance curves.

Wonderful Tone!

We are told that the "XYZ" loud speaker gives you terrific bass and colossal high notes, is wonderful in tone, etc. But I am positive that a performance chart would be much more convincing even to the most inexpert listener.

Admittedly the frequency characteristic of the best loud speaker in the world would look pretty "dud" compared with that of a L.F. transformer, but is it not possible to present the case for the loud speaker in other ways? Of course it is, and most of the manufacturers must know how to, although goodness knows why they do not act on their knowledge.

Enterprise Needed.

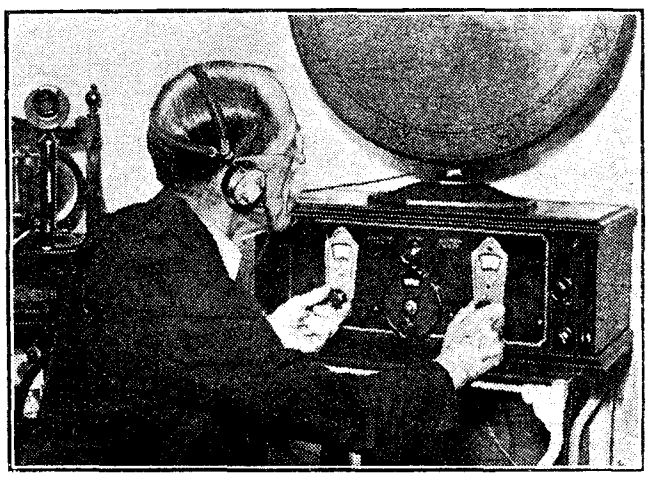
A loud speaker is not a musical instrument that has to play sweet tunes of its own; it is an electrical device the purpose of which is to handle a medley of electrical frequencies as efficiently as it can.

To revert to the motor-car simile once more, if a manufacturer of a motor-car were to keep the horse-power and number and size of cylinders of one of his models absolutely in the dark and shouted that the car had terrific speed, colossal acceleration, etc., he wouldn't get away with it. People would be suspicious—at least, most people would.

But apparently no one worries about a radio component's specification overmuch. However, again I must add that there are exceptions. Indeed, in cases there are very notable exceptions, which only goes to show what can be done.

(*Continued on page* 652.)

THE "DX" DOCTOR



Dr. Fowler, the Health Officer for the district of Columbia, built this four-valve short-waver, and regularly receives programmes on it from Australia, England, Holland, and other distant quarters.

PITY THE POOR ETHER!

Ever since it was first postulated, the ether has been the subject of fierce controversy and contradictory statements. But here is an article showing it in an entirely new light—an object of pity!

By N. F. E.

"THE ether," says Sir John Reith, "should not be put at the mercy of money."

"The ether," says the "Morning Post," "should not be put at the mercy of Party propagandists, who already have ample scope for their activities in the Press and on the platform."

"The ether is overcrowded and no more wave-bands are available for British long-wave broadcasting stations," says an official of the B.B.C., when questioned about the possibility of duplicating 5 X X.

"We must abandon the present hypothesis of the ether," says Professor Einstein. "So-called ether waves are merely the manifestations of the alternating electro-magnetic field of force which extends through all space."

What They Say—

And so on. The above extracts are but a few from the many references to the ether which have appeared in the press during the last couple of weeks or so, and they are sufficiently varied to warrant a little comment in this issue of "P.W."

Sir John Reith has ideals about the ether. To him, it is an all-pervading medium, doubtless designed by Providence for the express purpose of enabling nation to speak unto nation—in a style, manner, mode, call it what you will, as specifically ordained by Sir John Reith.

For example, the ether should be used for the propagation of programmes "under the auspices of the State, but not controlled by the State." In other words, in accordance with the principles of the B.B.C.

And one of the chief principles which have been evolved at Savoy Hill—by no less an authority than Sir John Reith himself—is that the public should be given not what they want, but what they ought to have.

Educating the Public.

The policy of "giving the public what it wants" has no place in the scheme of things at Savoy Hill, and with the indispensable aid of the ether the B.B.C., as listeners are well aware, puts this axiom into practice—especially on Sundays, and during "talks" hours.

Our ether, in short, has been commandeered by the B.B.C., for a considerable portion of each day, for the purpose of aiding and abetting a stated policy of giving the public something it does not want; or at least, something it is considered it does not want.

If by any chance something gets across which the public *does* want, no doubt the ether squirms uncomfortably and hopes the B.B.C. wont blame it. When unfortunate exceptions to a general rule like this do happen the ether, no doubt, does its best, and gives extra assistance to atmospherics and what not; but the ether is in a delicate position, and we, at least, sympathise with it.

After all, how would *you* like to be at the beck and call of someone who had power to make you carry out orders whether you wanted to or not? Orders which *you* were sometimes blamed for and which, when they were carried out, caused, for example, the "Daily Telegraph to state:

"In mere amusement the standard is not above 'what the public wants,' it is not what anybody ought to want. In the matter of information there seems to be no attempt to distinguish the proper function of broadcasting from that of the printed word. The proper medium for elementary instruction in any subject is reading. Broadcasting is, as yet, a new force, and on the whole it has been in our country wisely and usefully organised. But its functions and its limitations are not yet clearly understood by those who control it."

Now, no self-respecting ether likes to hear things like that about its master. If the worm will turn, why not the ether?

HOLED IN ONE?

SIR OLIVER LODGE

Our Scientific Adviser—one of the great champions of the ether—is also a firm believer in the good old saying about "All Work and No Play——"

The ether has another justifiable complaint. It not only wastes our time, but it is like one of the old omnibuses during a perpetual rush hour: it is overcrowded.

"Licensed to carry so many passengers," it has to put up with a number far in excess of the normal.

Its guardians, like the 'bus inspectors, never seem to be there when wanted. No wonder the ether feels a bit fed up with the International Bureau, and turns in pathetic bewilderment to old friends like Sir Oliver Lodge and Captain Eckersley, hoping against hope that something will be done about it.

It Doesn't Exist!

After all, the ether has excellent credentials: its character has been vouched for by Hertz and Clerk Maxwell, and even Marconi treated it with consideration when spark gaps jolted it persistently in the stomach, and C.W. was unthought of.

And to cap it all Professor Einstein now turns round and, supporting the late Dr. Steinmetz, practically tells the ether to its face it doesn't exist!

Well, well, what a life!

"When an electro-magnetic field is disturbed by radiations from a transmitting wire it causes vibrations which affect the receiving aerial, and the receiver translates them back to the music or speech which first produced them . . ."

In short, Einstein now contends that the ether-wave theory is merely a form of words designed to enable scientists to find their way out of a difficulty.

Pity the poor ether! Even though it is told it doesn't exist it still gets all the kicks. However, like the old soldier, it refuses to die; perhaps it will just fade away.

HAVE YOU HEARD THEM?

Katowice, Poland, sometimes indicates the industrial nature of its neighbourhood by hammer strokes on an anvil as interval signals.

* * *

The Cracow station uses sleigh bells as its interval signal.

* * *

The call of the cuckoo has been chosen by Leningrad, Russia, on 1,000 metres, and Ljubljana, Yugo-Slavia, on 575 metres, as a distinctive call-sign.

* * *

Instead of sounding a gong or ringing a bell the Wilno (Poland) station sounds a huntsman's horn during pauses in the programme.

* * *

A melodious gong struck seven times denotes that you are listening to Stamboul, which works on 1,200 metres.

* * *

The nightingale's song used by Turin (Italy) as a call-sign is well known, but it is not usually realised that a gramophone with electrical pick-up is responsible for this.

* * *

The loud ticking of a clock or metronome is often the signal by which you can identify stations, as many of the Europeans use this, ticking at a certain specified speed, to help identification by long-distance listeners.

* * *

The Rabat (Morocco) station uses a metronome that beats 60 times a minute.

Losing those Low Notes

By C. E. FIELD, B.Sc.

A thoroughly practical and fascinating account of one of the most vital aspects of radio reception.

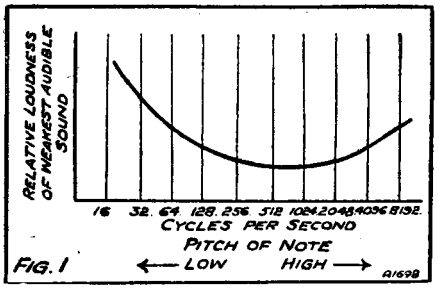
YOU are probably all quite familiar with the main types of distortion encountered in wireless reproduction.

You know, for instance, that if signals are too loud for your receiver, or, in other words, if your valves are too small or are not operated correctly, overloading occurs, and your results acquire a harsh, rasping quality.

Again, if on account of the use of poor transformers or a badly designed circuit, your set does not amplify high notes and low notes to the same extent, your results will be either "woolly" or high pitched.

In addition to the above troubles, however, you have probably experienced what can only be described as an "unnaturalness" about your reproduction. You have felt instinctively that the transmission was

HOW EARS HEAR



As the pitch of a sound becomes lower, the strength must be very much increased before it becomes audible.

all that could be desired and that your own set was behaving perfectly. There was no sign of overloading and no reason to suppose that the very high or very low notes were missing, and yet something was not quite right.

If this is the case, it is highly probable that the trouble is due to the fact that you are not obtaining from your receiver the volume that is most suited to the type of programme to which you are listening.

An Interesting Experiment.

Consider first the case of speech, and try for yourself the following experiment: Read to a friend a short passage from a book in an ordinary conversational voice. Now move fifty or a hundred feet away from him and read again, but this time make your voice louder until your friend hears it at the same strength as before. But (and this is the important part of the experiment) *do not shout or raise the pitch of your voice.* You will find, and your friend will confirm the impression, that your voice sounded very low-pitched and boomy.

There you have it! As soon as the voice becomes louder than normal, without being raised in pitch (as in shouting), an impression of boominess is produced.

"That is all very well," you may say, "but making your own voice louder without shouting is an unnatural physical effort, whereas a broadcast transmitter and receiver take a natural voice and *magnify it electrically* without altering the pitch." That is quite true, but the effect is very largely psychological. You will realise this if you think for a moment of the difference between a conversation as rendered on the stage or on the "talkies."

The Case of the "Talkies."

In the first case, you are quite well aware that the players are shouting (i.e. raising their voices, both in volume and pitch), but if the acting is good, even at the back of the theatre, speech is somewhat what you expect it to be.

In the case of the "talkies," however, the players are not shouting, but *talking* so loudly that they can be heard all over the theatre, the result, as you know, being a boomy quality to which it takes you some little time to become accustomed.

So much for speech.

When we consider the reproduction of a band or orchestra we have to deal with a very large volume of sound, consisting of music from several instruments, some high-pitched and some low-pitched. Even though the wireless transmitter and your own receiver may be almost perfect, there is another link in the chain which is *not* perfect, and that is *your own ear.*

Your ear is in some ways like a crystal or anode-bend detector, in that when sounds fall below a certain strength it fails to detect them. This does not apply equally to all sounds, however, for very low tones require to be much stronger before they become audible than do higher tones. We can plot a characteristic curve of a typical ear, just as we can of a valve, showing how the loudness of the weakest perceptible sound varies according to the pitch of the sound.

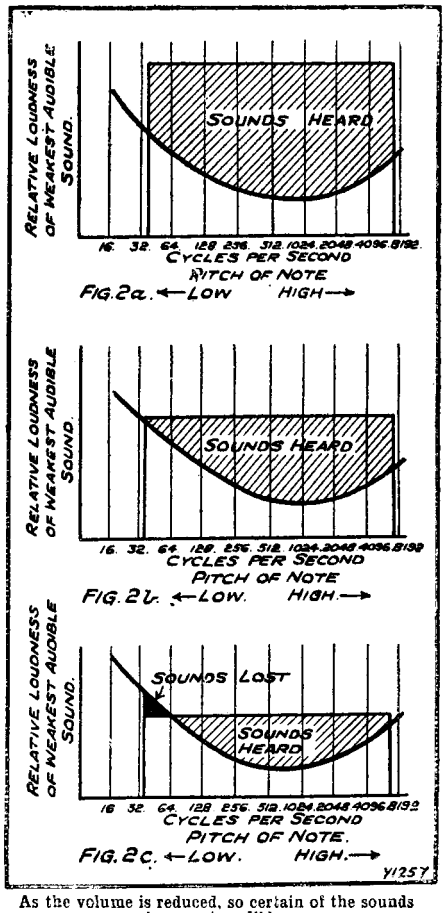
Such a curve is shown in Fig. 1, from which you will see that as the pitch of a sound becomes lower, the strength must be very much increased before it becomes audible.

"The Lowest Sounds Disappear."

Evidently, then, if a complicated sound such as orchestral music is reduced in volume, at a certain point the lowest sounds will commence to disappear, and more and more of these low tones will vanish as the volume is further weakened.

(Continued on next page.)

NOTES THAT VANISH



As the volume is reduced, so certain of the sounds become inaudible.

PRACTICAL POINTERS.

Some Useful Hints and Tips for Home Constructors.

TAPPING A FRAME AERIAL.

IF you do any experimenting with a frame aerial, you will find at some time or another that you wish to make a tap on it. Many frame aerials are, of course, centre tapped, but this tap does not answer all purposes of reaction and inductance variations.

A simple method of making a tap at any point, no matter of what type of wire the aerial is constructed, is provided by an ordinary pin. You will find that it is an easy matter to push it through the insulation and between the strands of the wire, which is almost certain to be flexible.

A flex lead can be twisted round, or soldered to the head end of the pin for making connection to the tapping.

'WARE WET GROUND.

IN nearly all portable sets a frame aerial is wound round a frame of some sort just inside the case, and generally this means that when you place the set on the table one side of the frame is parallel with it and barely an inch away.

With a table or other insulator this has no effect whatever, but if you were to replace the table by a sheet of metal joined to earth, it is quite possible that it would cause sufficient damping to stop reaction effects. This would more or less stop the set from giving results because, as you know, there are few portable sets which will work without some reaction.

When you are out of doors with your portable, you probably place it on the ground, and therefore if the ground is damp you may get poor results. Wet ground is a very good conductor, and would have a similar effect to an earthed copper plate.

So if you find results from your portable are not very good with it on the ground, try raising it a foot or so.

TESTING FIXED CONDENSERS.

HERE is a good way to test all your fixed condensers. Connect them momentarily across an H.T. battery of about 60 volts, and then leave them for a couple of minutes. (It is necessary to give them a good dust before starting the test.)

After the two minutes connect a pair of telephones across them, when you should hear a good click, which will be louder on the larger-capacity ones.

Condensers above about 0·3 mfd. should not be discharged with telephones, as they hold a large enough charge to cause damage to the receivers. All you need do with large-capacity condensers is to short them after the two minutes with a piece of copper wire.

A spark, whose size will vary with the capacity, will indicate that they are O.K. You will soon know how loud a click or how large a spark to expect from a given capacity condenser.

A REAL COMPARISON.

IT is an unfortunate fact that it is impossible to keep the mind completely unbiased. For instance, if you are trying to decide which of two loud speakers is the better, and one is an expensive one of well-known make and the other, say, a cheap foreign one, you will find that you are inclined to feel that the expensive one sounds nicer even against the judgment of your own ears.

Here is a simple tip by which you can make a truer comparison of two, three or more speakers. Arrange them close together and all pointing the same way.

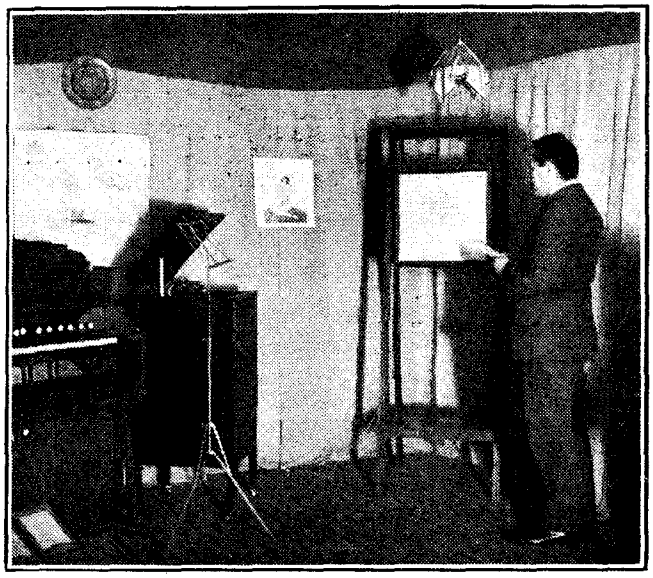
Next connect one side of each together, and join the common lead to one output terminal of the set. To the other sides of the loud speakers connect leads of exactly the same sort of wire and twist them together until you cannot distinguish which is which.

Now sit with your back to the speakers and connect up each one separately to the other output terminal of the set. You will find it very difficult to tell which is which loud speaker if they are at all alike, and will be able to judge them entirely from what you hear.

The object of sitting with your back to the loud speakers is to overcome any directional effects that might give away which speaker was which. The backwards stunt is surprisingly effective in doing this.

Afterwards it is a very easy matter to find out which speaker was the one which pleased you most.

HILVERSUM'S STUDIO



The studio at Hilversum. Hilversum employs 6·5-kw. power, and operates on a rather low wave-length of 298 metres up to 5.40 p.m. After this a wave-length of 1,071 metres is employed. In the above photo an announcer is broadcasting news.

LOSING THOSE LOW NOTES.

(Continued from previous page.)

In order to obtain a clearer picture of this effect look at Fig. 2. In Fig. 2a is shown the same curve as in Fig. 1, and a rectangle is marked out to represent a uniform loudness at all pitches, which we might, for the sake of illustration, imagine to be the sound received from a loud speaker reproducing an orchestral item.

If the volume is reduced, first a little, and then considerably, we get the conditions shown in Figs. 2b and 2c respectively. A glance at Fig. 2c shows that not only is sound *as heard by the ear* reduced in volume, but that the lowest tones are absent.

Reducing the volume of orchestral music thus has the effect of raising the pitch, so that in order to obtain the most realistic results the volume must be such that the true pitch of the music is obtained. Obviously the volume which will furnish these results is that which originally comes from the orchestra, or, rather, the volume which would reach your ear if you were listening at a reasonable distance from the concert platform.

Vary the Volume.

It evidently pays, therefore, when receiving an orchestral programme, to obtain the maximum possible volume from your receiver, providing that you do not overload it, and this will generally be louder than the volume which will give you the most pleasing results when listening to speech.

In short, if you really desire to get the best possible quality of reproduction from your set, you require to be able to adjust the volume to suit the programme.

The various means for accomplishing this cannot be considered here, but the ideal is obviously to have a set capable of providing a really loud volume, fitted with a convenient volume control for reducing the signal strength to the most suitable level, according to the type of programme that is being received.

FOR YOUR NOTEBOOK.

All H.T. accumulator contacts must be kept perfectly clean, the insulation must be dry, and the accumulator must be kept properly charged, if H.T. supply coupling effects are to be avoided.

* * *

A large set employing a super-power valve may take 20 to 30 milliamps from the H.T. supply, and it is quite useless to expect a small mains unit designed for 15 milliamps' supply to work this satisfactorily.

* * *

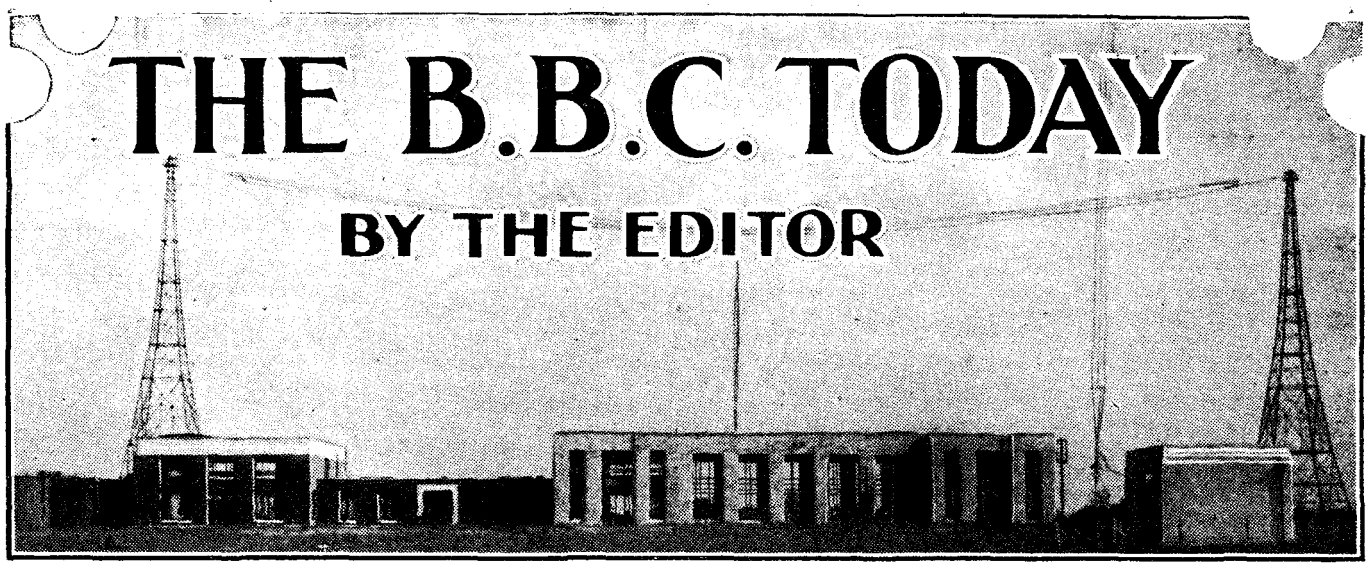
Whatever form of H.T. supply is used, it is generally an advantage to have a separate H.T. plus lead to the different valves or stages in a three-, four-, or five-valve set.

* * *

If your L.F. transformer is provided with a terminal marked "earth" or "E," a connection from this point to the filament-earth circuit can be made to improve stability.

THE B.B.C. TODAY

BY THE EDITOR



THE more picturesque public personalities of broadcasting used to be in the ranks of those actually engaged on microphone work. But the persistent application of anonymity has had its effect at the programme end. Public interest is now more concerned with some of the administrative personalities.

Sir John Reith remains the outstanding figure, intellectually, physically, and administratively. When I last reviewed the personalities of the B.B.C. I paid due tribute to Sir John, but I expressed the hope that he would cultivate some greater measure of toleration and urbanity than had characterised him so far.

Sir John's Idealism.

Although I have not the temerity to claim the credit, I am naturally glad to be able now to record that when I met Sir John at lunch the other day after a long interval, I was captivated by just those qualities of sympathetic understanding which I had accused him of lacking.

I believe that a process of evolution has gone a long way in mellowing and enriching the character and personality of the executive chief of British broadcasting. For one thing, I cannot imagine that there is now any substance in the rumours of Sir John's tyrannous temper and Mussolini methods.

For another thing, I do not believe there is any reasonable chance of Sir John leaving the broadcasting service for many years. He remains, of course, among the first half dozen chief executives of the English-speaking world; but he is much more than this.

He stands for the Christian ethic in no uncertain way, and his high idealism has placed the characteristic stamp on British broadcasting. Now that he is taking a more active interest in imperial affairs, Sir John will become a powerful ally of those who believe that the salvation of Britain is bound up with the development of Greater Britain.

Those Sunday Programmes.

I still have my quarrels with Sir John. For instance, I think he is quite wrong about the Sunday programmes in not tolerating appropriate musical alternatives to religious services. Nor do I hold with the present educational policy of the B.B.C.; these National Councils of adult education and school education and so on have far too much to say about programme matters. But such complaints are not crucial.

The principal new personality of British broadcasting is Mrs. Philip Snowden. To understand Mrs. Snowden and her place in the broadcasting firmament, one must begin with her background. Mrs. Snowden is the embodiment of Yorkshire sincerity, frankness, and unbending strength of character.

Her powerful advocacy has been on the side of all the great progressive movements of the past quarter of a century. For peace, international and industrial; for temperance; for democracy; for women's rights; for better and wider education; for music and the arts; for good causes too numerous to recount here, Mrs. Snowden has toiled unremittingly, always with distinction, and usually with marked success.

When she became a member of the Board of Governors of the B.B.C., Mrs. Snowden threw herself wholeheartedly into another field of public service. Realising the tremendous potentialities of broadcasting, she regarded the present organisation of the B.B.C. as a preliminary to a Department of State in which the officials would have the security and advantages of the Civil Service.

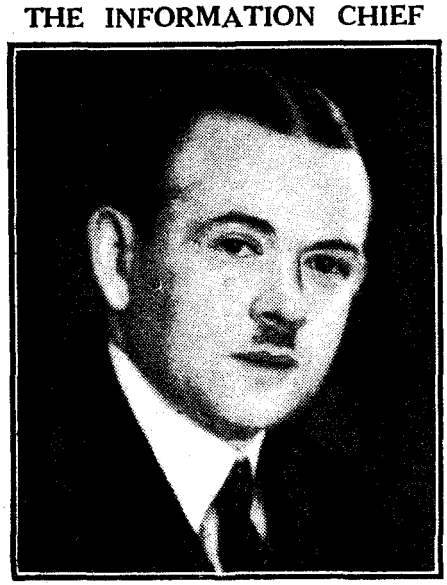
A Woman of Ideas.

Mrs. Snowden also has very definite ideas about the development of the musical side of broadcasting. She wants the B.B.C. to take a more definite and constructive lead

(Continued on next page.)

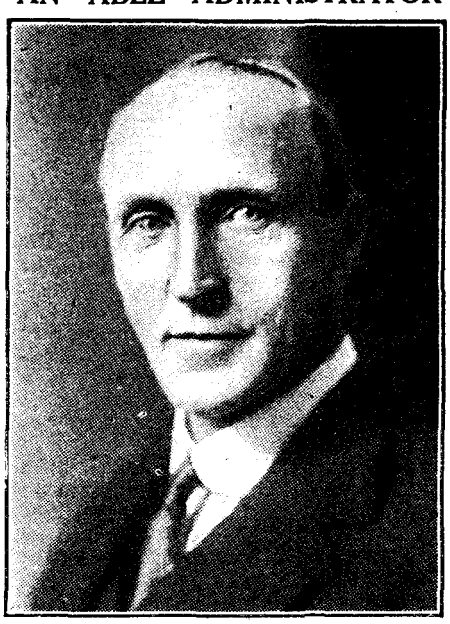
This fifth article of a vitally informative and interesting series comprises a review of Savoy Hill's great administrative personalities. The work of Sir John Reith, Mrs. Philip Snowden, Mr. Gladstone Murray, Mr. Noel Ashbridge and Admiral Carpendale in the furtherance of the ideals of British broadcasting is discussed, and an estimate of their success, individually and collectively, is advanced.

THE INFORMATION CHIEF



Mr. Gladstone Murray is "establishing a reputation for courageous and skilful public service."

AN ABLE ADMINISTRATOR



"Admiral Carpendale has become a stronger factor for considered counsels and stable development."

THE B.B.C. TO-DAY.

(*Continued from previous page.*)

in all such movements as the county festivals, and also to encourage the popularisation of opera.

There is, too, the scheme of a National Theatre. I think I would not be far wrong if I said that Mrs. Snowden looks upon the B.B.C. as a potential Ministry of the Arts. Such ability, idealism, and character are obviously a tremendous gain to the B.B.C.

A Popular Personality.

But the collision of temperaments has delayed their being turned to full account. I believe, however, that co-operation between Sir John Reith and Mrs. Philip Snowden will be fostered under the ægis of Mr. Whitley, the new Chairman. If this co-operation can be made effective, the broadcasting service will gain tremendously.

I would say that next to Sir John and Mrs. Snowden the other chief personality now at Savoy Hill is my friend Mr. Gladstone Murray. He is both an old and a new personality of broadcasting, but he has come very much to the fore in the past year or so.

Intrigue and strife ebb and flow, but the Information Chief manages to focus in himself the elements of stability and continuity. His success in politics, high or low, is due, I believe, to an astonishing capacity for detachment, and patent disinterestedness.

His sole object is the success of the broadcasting service, an object which he finds it useful to obscure by a smoke-screen of gentle cynicism and convincing misanthropy. That the B.B.C. has now embarked on comparatively calmer seas is due in no small measure to Gladstone Murray.

The universal esteem with which he is regarded in Fleet Street, and the steadily augmenting profits from publications revealed in the annual reports of the B.B.C., are proof that he does his ordinary work efficiently. But it is in the things that he does outside his ordinary work that he is of chief value and in which he is establishing a reputation for courageous and skilful public service.

And now I come to Admiral Carpendale, whose very efficiency as a disciplinarian caused me some doubts when last I discussed his place in broadcasting. But here, as in the case of Sir John Reith, there is progress to report.

The gallant admiral has much more to think about now than whether the office-boys are correctly dressed or the typists are on time. For five years he has been the President of the International Union of Broadcasters, and is now an established figure in the life of Europe.

He is extraordinarily and deservedly popular on the Continent, where it has been discovered that he is not only a typical and picturesque product of the British naval tradition, but also a most conscientious and able administrator as well as a shrewd and effective diplomat.

The New Chief Engineer.

His success on the Continent has had its effect at Savoy Hill. Admiral Carpendale has become a stronger factor for considered counsels and stable development. Moreover, his views are counting on the programme side as well as on the purely staff side.

Next to Mrs. Philip Snowden, the most interesting new personality at Savoy Hill is Mr. Noel Ashbridge, the new chief engineer. Mr. Ashbridge had the advantage of many years close association with his predecessor, Captain P. P. Eckersley; but, even so, he had a particularly difficult problem in taking over from one who had become a national figure in the job.

But it speaks worlds for Mr. Ashbridge's personality and reserves of character that he set to work quietly and confidently and within a year is as firmly established as was his brilliant predecessor.

A Beneficial Influence.

Mr. Ashbridge is a very sound technician, which, of course, is invaluable now that the regional scheme is being completed under his administration. His technical qualifications are also as catholic as they are thorough. For he is also able to handle the Broadcasting House venture literally "in his stride."

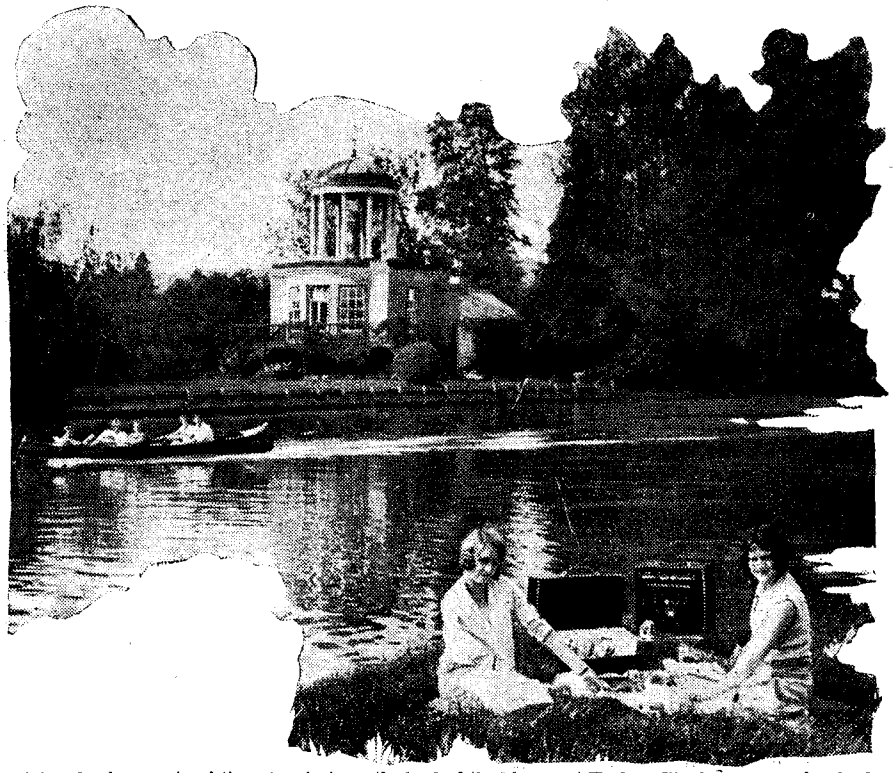
But it would be a hopelessly inadequate account of the new chief engineer that stopped with a recital of his technical qualifications. Behind his self-effacing, quiet demeanour is a very decisive personality, with clear-cut views, and a steady strength of character accustomed to get its way perhaps more by incisive penetration than by frontal attack; but, nevertheless, to get its way.

Mr. Ashbridge is a close student of the programmes, and is aware that as a member of the Control Board of the B.B.C. he shares the responsibility for the content and quality of what his engineers put on the air.

I regard it as extremely fortunate that there should be this influence in the inner counsels of the B.B.C. Mr. Ashbridge is eminently sane, and detached from any specialised interest in programmes.

He would interpret the wishes of the sane "man-in-the-street" rather more faithfully than any of his colleagues, and certainly more exactly than any of the various programme specialists. More power to his elbow!

RADIO ON THE RIVER



A broadcast concert assisting at a picnic on the bank of the Thames at Henley. The famous Temple Island is in the background.

NOTEBOOK NOTIONS.

The Bucharest station on 394 metres opens its programme with five minutes of metronome-ticking, at the rate of 160 beats per minute.

* * *

The Konigswusterhausen station (Zeesen), on 1,635 metres, uses a 40-beats-in-ten-seconds metronome as an interval signal.

* * *

Sixty beats per minute is the interval signal for the Belgrade station on 432 metres, and Breslau 325 metres.

* * *

There is often very little difference between a circuit used for short waves and that used for ordinary waves, so that a great many ordinary broadcasting sets when fitted with short-wave coils can be operated as short-wavers.

* * *

Nearly all novices at short-wave work turn the dials much too quickly until experience proves how easy it is to lose stations altogether in this way.

* * *

Short-wave enthusiasts nearly always wear telephones instead of using a loud speaker, so as to make sure that nothing is missed when tuning-in.

CAPT. ECKERSLEY'S QUERY CORNER

OVERLOADING A UNIT?—MORE OVERLOADING—THE MOVING COIL'S FIELD—A CURIOUS G.B. EFFECT.

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

Overloading a Unit?

J. N. (Catford).—"I have an A.C. mains unit which was giving very satisfactory results when used in conjunction with a straight two-valve receiver. I have now converted this receiver into a three-valver by adding an extra L.F. stage, and I have placed a super-power valve in the last socket.

"When I attempt to use the mains unit there is now a loud hum, and signals are rather distorted. Could this be due to the fact that the mains unit is now being overloaded?"

Your explanation is correct—almost certainly, I should say. The mains unit constitutes a rectifier which feeds unidirectional pulses of electricity into a condenser. This condenser fills up to the brim and then you can take steady current from it. If, however, the load across the condenser is such that it could never keep full, you become aware of the gulches of electricity feeding into the condenser intermittently. If you want an analogy think of a pump which feeds water into a tank intermittently in gulches. If there is a tap in the bottom of the tank you can get a steady flow of water from the tank even though the pump is putting water into the tank intermittently. But if you turn on the tap so full that the tank never gets full, you will get an intermittent feed. The cure in your case is a mains unit with greater output, which feeds in more electricity per gulch than the present one.

* * *

More Overloading.

L. H. (Stamford Hill).—"Can you give me an idea of the type of rectifier valve I should use so as to prevent it overloading when I tune in fully the Brookmans Park transmissions at fifteen miles, assuming I employ an S.G. H.F. stage without volume control and an outdoor aerial?"

Do you not think it is better to cut down the volume coming into the aerial than to be in danger of overloading your detector? Do you not think that a good method of doing this would be to connect variable resistances in series with any of the tuned circuits that happen to be convenient and which are connected in the pre-detector stages? I personally would much prefer this arrangement, and always prefer to think that the different volumes of different stations are adjusted in the pre-detector stages, so as, ideally, always to bring the detector to the same condition. There are so many ways of cutting down a signal that, provided you have a sensitive set, it should not be difficult to choose one, and the one I suggest is to put a resistance in series with any particular tuned circuit. If this is not enough, have a switch which throws in a potentiometer across a closed circuit; keep a rectified feed meter and always adjust the rectified feed to the same value, unless, of course, the station you are receiving is too weak.

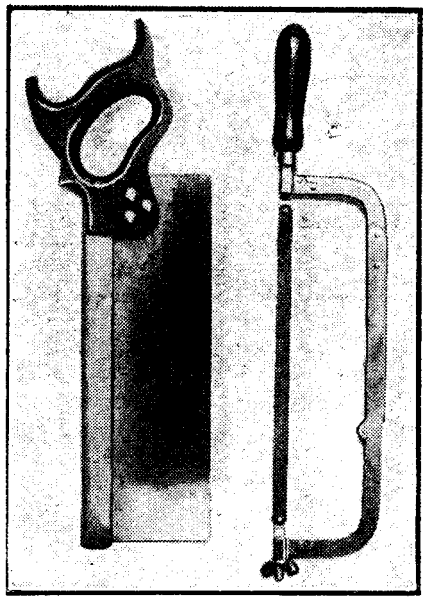
* * *

The Moving Coil's Field.

A. M. V. (Winchester).—"The field of my moving-coil loud speaker is fed from a large 6-volt accumulator. I notice, however, that the instrument still functions when the accumulator is disconnected, but the volume is decreased.

"From this it seems to me that a good arrangement of volume control could be effected by adjusting the field current by means of a rheostat in one of the leads from the accumulator to the magnet field. Is there any objection to doing this?"

FOR THE SET BUILDER



Of course you have a hacksaw, like the one on the right, but have you a tenon saw? (left). It's surprising how much better the small woodwork goes when this is used instead of a larger saw.

The moving-coil loud speaker works, of course, by putting A.C. currents in a coil which is free to move in a strong magnetic field. The magnetic field is created by passing current through a coil which magnetises an iron circuit; switching off the current from the accumulator weakens, but does not destroy, the field, and so the loud speaker continues to work—but with far less volume. Unfortunately, however, the effect of a weak field is to give a partial distortion, and the designers of the speaker would be careful to work out their quantities so that the necessary movements, eddy current losses, etc., were worked out for a constant field; while the value of this need not be kept absolutely constant, its variation might be deleterious to quality. The suggestion is ingenious, but in practice might not give the best quality throughout the range of volumes.

* * *

A Curious G.B. Effect.

H. A. C. (Southampton).—"The last valve of my receiver is of the super-power type, and I usually adjust the grid bias so that the anode current is within the limits stipulated by the makers for the value of H.T. I use.

"Recently, when so adjusting the bias, I carelessly omitted to switch off the filament when I removed the G.B. — plug. Much to my surprise, the milliammeter did not show the violent increase of anode current which should have occurred. Why is this?"

The effect you mention is quite common; when you remove your grid plug you leave the grid completely disconnected. Negative particles of electricity were collected on the grid because your grid-bias battery had charged it negative. If the charge never leaked away that would constitute a negative charge on the grid and would prevent the electron flow from filament to anode. (You could probably find that this is true, because if you caught hold of the grid-bias plug with one hand and put the other on the earth, you would see the current gradually rise because you would be removing the negative charge from the grid.) If you have any leaky components between the grid and earth that also would allow the anode current gradually to rise by leaking away the grid negative charge. You can try all this in practice if you promise to switch off H.T. directly the current gets to a foolishly high value.

LATEST BROADCASTING NEWS.

ANOTHER CONTINENTAL RELAY.

SIR FREDERICK COWEN'S MUSIC—NATIONAL ORCHESTRA OF WALES—A BACH CANTATA HOLIDAY—BLACK COUNTRY COMEDY, ETC.

A MOZART concert, relayed by the Continental land-line system from the Salzburg Festival, will be heard by London listeners on Saturday, August 30. It will be conducted by one of the most distinguished German musicians, Herr Bruno Walter. The programme will include the "Hoffner" Symphony and a Concerto in E flat, for two pianos and orchestra.

Sir Frederick Cowen's Music.

The music of Sir Frederick Cowen, the eminent Midland composer, will figure largely in a concert to be given in the Birmingham studio on Saturday, September 6.

Part of his "Scandinavian Symphony," a work inspired by Sir Frederick's several visits to Norway and Sweden, will be included, and also a pianoforte concerto, written for Paderewski and played by him thirty years ago, will be heard.

The concerto will be played on September 6 by Winifred Browne, who has made a name for herself by broadcasting pianoforte concertos which are rarely heard by listeners.

National Orchestra of Wales.

The National Orchestra of Wales returns from holiday on Sunday, August 31, when with Kate Winter (soprano) as singer, they will be heard in a string orchestral programme from the Cardiff studio.

Other concerts during the same week will be given by the orchestra as follows: Monday, Sept. 1, Museum Concert; Tuesday, Sept. 2, Afternoon concert in the studio with Bernard Ross (baritone): Wednesday, Sept. 3, Symphony Concert at the Museum (1.15 p.m.), a Light Orchestral Programme from the studios (4 p.m.), and a programme of excerpts from English Light Opera with Mai Ramsay (7.45 p.m.); Saturday, Sept. 6, Museum Concert at 12 noon.

A Bach Cantata Holiday.

The Bach cantatas which have been suspended during the summer holidays, are to be resumed on Sunday, August 31. Some would say it is a pity the B.B.C. remembered!

Black Country Comedy.

A play by a Staffordshire doctor and playwright will be performed in the Birmingham studios for Midland Regional listeners on Monday, September 1. Its author is Dr. F. G. Layton, and the play, a Black Country comedy is said to be founded on a true story of life among the people where he has his practice. Dr. Layton calls the play "The Invalid."

"Through the Looking Glass."

Two performances of Lewis Carroll's "Through the Looking Glass," specially adapted for the microphone by Cecil Lewis, will be given in the London studios on Monday and Tuesday, September 15th and 16th. The first performance will begin at 8 p.m., but the second is to start at 6.40 p.m.—a most unusual time for serious radio drama to be heard. The reason for this is to give children an opportunity of hearing the performance.

Talk Features.

Major Walter Elliot, M.P., who is no stranger to the microphone, is to open a series of twelve talks, the aim of which is to give a comprehensive picture of Africa from all aspects, and which is one of several new series arranged for the autumn. Equally interesting is a series entitled "International Conversations," which will consist of debates between an Englishman and a foreigner, and a description of how people of other nations look at England.

The foreigners so far selected represent America, France, Germany, Italy, Turkey and Russia. "Science and Religion" is the title of yet another series of talks to which many well-known personalities will contribute.

Old Favourites.

Albert Townsend and Miss Grace Field, two artists whose first appearances before the microphone goes back to the days before there was any B.B.C., when they took part in Captain Eckersley's experimental transmissions from Writtle, in Essex, are taking part in the Midland Regional programmes on Thursday, September 4th. Miss Field is now soprano soloist at the Church of the Messiah, Birmingham.

BEHIND THE SCENES AT 2ZY

This is not a power-house, but a view of the apparatus room at the B.B.C.'s Manchester Station.

Cockles and Cockling.

An antiquarian, who has devoted many years of study and inquiry to that somewhat despised shellfish, the cockle, is visiting the Cardiff studio on Thursday, August 28th, to tell listeners all about his discoveries.

He is Mr. George Eyre Evans, the Hon. Secretary of the Carmarthenshire Antiquarian Society, whose research work reveals that there are no fewer than 200 living species of the cockle, one of which is sold in large quantities in some towns round the coast.

The title of Mr. Evans' talk is "Cockles and Cockling," and he will deal particularly with the village of Llansaint, where the husbands do the housework and mind the babies, while their wives go cockling on the Ferryside.

FOR THE LISTENER

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

By "PHILEMON."

The Proms.

BY the time these Notes appear, the new Promenade Concert season will have opened. The advance programme has reached me, and it is full of attractive items.

Most attractive of all will be the appearance of the new B.B.C. Symphony Orchestra which has been organised and trained, and will be conducted by Sir Henry Wood. It is not yet quite at its full strength, but may be expected to give a good account of itself, and in time should take its place high in the first flight of the great orchestras of the world.

We shall meet with old friends among the vocalists; and Arthur Catterall will be there! Few parts of the B.B.C. programmes give more widespread pleasure than the Symphony Concerts; and it is pleasing to note that, although old and favourite music will dominate, new works are to be presented, notably a new Concerto by John Ireland with Helen Parkin at the piano.

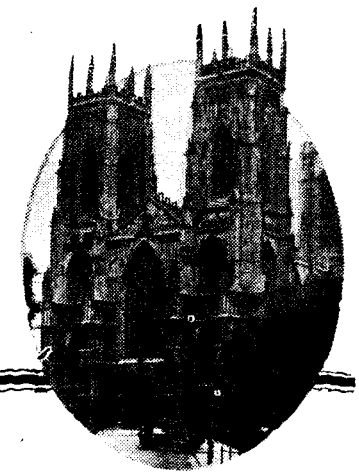
Alice in Wonderland.

I hear that there is to be a revival of the Radio version of this immortal fantasy towards the end of September.

When I told Belinda about it, "And I will be the Red Queen!" she cried, I said that Athene Seyler, who made a hit in that part on the first production, would not be likely to stand down for her. "Tweedle-

(*Continued on page* 650.)

Broadcasting York Minster



An intimate inside view of the complicated control work which is necessary when a broadcast from the famous cathedral is taking place—work which makes all the difference between a well-balanced broadcast and a failure.

By OUR CORRESPONDENT.

I HAVE just spent a bewildering morning in the B.B.C.'s most extraordinary control-room.

The paraphernalia of broadcasting seems completely out of place in the venerable room near the minster organ (so near that its panelled walls shiver audibly in resonance with certain of the bass notes).

York has such a genius for elaborate ceremonial that a broadcast from the minster generally involves almost as much fading and cross-fading of microphones as a complicated radio play.

The last time I was at York was on Military Sunday. It was half an hour before the broadcast was due to commence when I introduced myself to the three engineers in the vestry.

"I suppose that now you have nailed all those terrific echoes which used to distract you here, and now that the minster is permanantly wired with microphone circuits, a broadcast from here is just a matter of routine?"

That Echo.

"Well, not quite," he replied. "It's one of the worst places for echo. These massed bands, you know. They are playing in the minster to-day right under the great tower, and the resonance. . . We had a test last night (the bands very kindly came along), and at first the resonance of some instruments was extraordinary. We spent a long time shifting them about until we got the right balance."

I was impressed then, and several times later, by the close collaboration between the B.B.C., the military forces, and the minster authorities.

A bell rang. One of the engineers spoke into a telephone and then reported that the lines were through to Leeds.

"We have two land lines from here to Leeds," explained the "O.C." to me. "One for 'music' and the other for 'control.' From Leeds the broadcast is distributed to the various stations on the usual land-line circuits."

The Microphone Tests.

"Ask Leeds if they want atmosphere," he added to the man at the 'phone.

"Atmosphere?" I queried.

STATELY AGE AND MODERN SCIENCE

In a little room, hidden by the architectural grandeur of our forefathers, sits the broadcast engineer, surrounded by amplifiers, switches, telephones, etc., looking after the very heart of the system which links cathedral and broadcast station.

"Crowd noises in the building before the service," explained the O.C.

With ten minutes to go he and his mates made a final test of all the microphones (getting an engineer in London to listen on each of them in turn) and it was arranged on the telephone that the announcer at Savoy Hill should make his announcement at 9.47 a.m. and that all stations should "come over" at 9.49.

Last-Minute Trouble.

At 9.43 an engineer noticed that the "music" line had become noisy. So had the other. The fault was reported to Leeds.

At 9.45 the lines were still noisy. The engineers looked distressed.

At 9.46 "London" reported that from his end the lines "sounded" quiet. The relief of this news was immediately followed by the tension and suspense of "going over."

Through the vestry door I could see the vast audience which packed the great minster. They waited patiently for the service or ceremonial (call it which you like) to begin. But they did not know that really they were waiting for a young man in a little room in London 200 miles away to say his piece.

The engineer-in-charge had seated himself at the "mixer"—the boxes containing microphone potentiometers. Eight large knobs, one of which was a spare, faced him.

He made sure that they were all at the "off" position except one—the one controlling the microphone suspended over the massed bands. Engineer No. 2 sat at the telephone. No. 3 stood at the door.

"Over!" cried No. 2.

The Relay Commences.

No. 3 walked into the aisle outside the vestry where he could see the bandmaster. He made a signal. Immediately the music crashed out up to the vast roof throbbing and re-echoing and out from the aerials of a score of transmitting stations up and down the land.

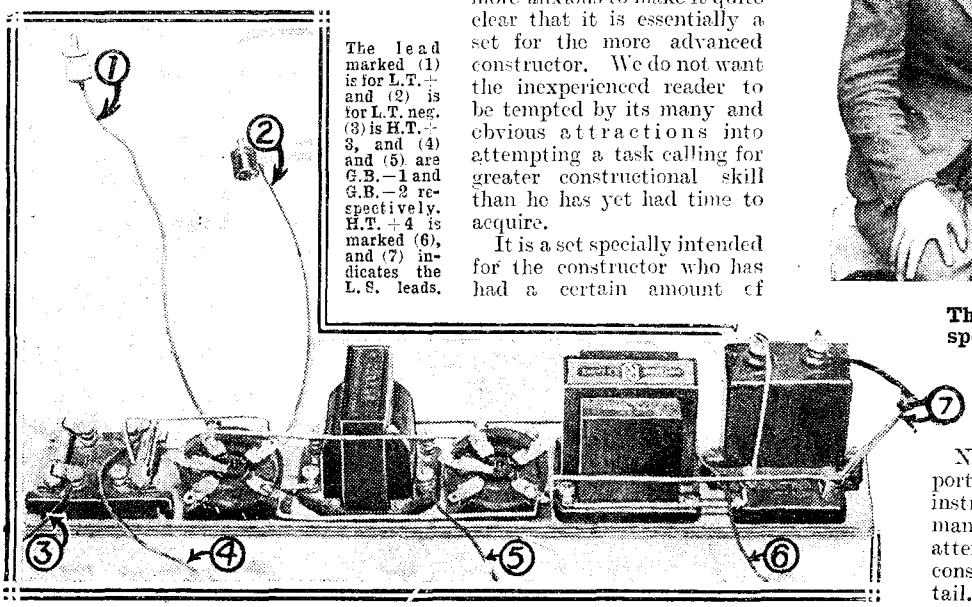
My watch showed 9.50.

The second band piece was Rawlinson's "Maid of Orleans" overture. "Watch this carefully for blasting," said the O.C. There came a thunderclap of drums and a blare of trumpets. Swiftly the "mike" control was turned back a bit.

After the preliminary band music the service proper commenced and then the engineer at the "mixer" really got busy.

WE have been receiving requests for some time now for a portable set design of a really ambitious kind, giving a superlative performance and requiring no external accessories of any sort, more particularly no aerial and earth.

Our correspondents mostly seemed to require such a set for convenient home use rather than as a true outdoor receiver, and so did not mind whether we gave them what they wanted during the holiday season or not. Moreover, they were emphatic that they were not afraid of tackling something elaborate, so long as it gave the results they craved.



The lead marked (1) is for L.T.+ and (2) is for L.T. neg. (3) is H.T.+3, and (4) and (5) are G.B.—1 and G.B.—2 respectively. H.T.+4 is marked (6), and (7) indicates the L.S. leads.

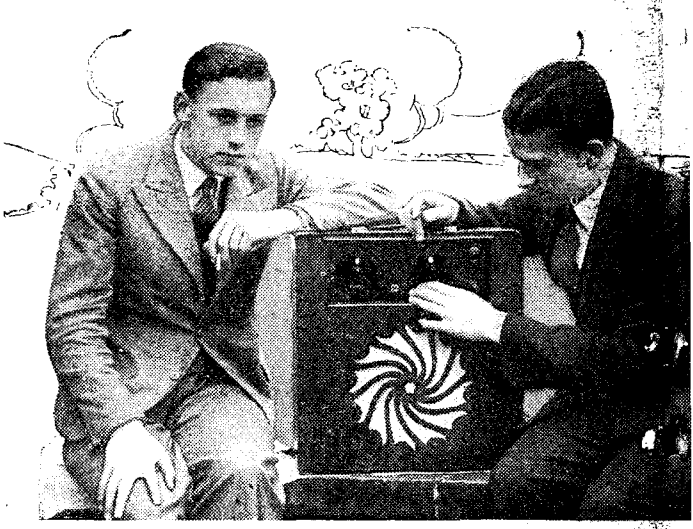
Truly, Some Set!

Here, then, is our response. We have taken our inquirers at their word, and produced for them a set which is truly "all in," gives a fine performance on its built-in frame aerials, and *is* elaborate and no small job of work to undertake.

Its sensitivity and selectivity are both exceptionally good, and it is an extremely attractive proposition, but that just makes us all the more anxious to make it quite clear that it is essentially a set for the more advanced constructor. We do not want the inexperienced reader to be tempted by its many and obvious attractions into attempting a task calling for greater constructional skill than he has yet had time to acquire.

It is a set specially intended for the constructor who has had a certain amount of experience, particularly with screened grid valves, and who feels that he can turn out a job which is 100 per cent correct, and knows how to adjust it and get it working properly.

This may sound rather a strange way to write about a set which we have praised so whole-heartedly, but it is only part of our settled policy of trying to make perfectly clear the exact application of every set we design. Only by helping our readers to choose just the right set to suit them can we serve their interests best.

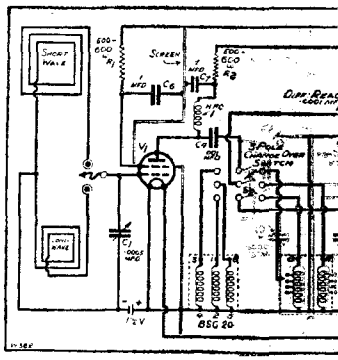


This fine "all-in" set was evolved by going[illegible] all speaker are inside the cabinet, but you get simply to choose from. Readers have often asked "P

Now, the fact is that the more advanced type of portable is really a set in a class by itself. It is an instrument which will stand no liberties, and demands that it be made up with extremely careful attention to every constructional detail.

A SLICK-LOOKI

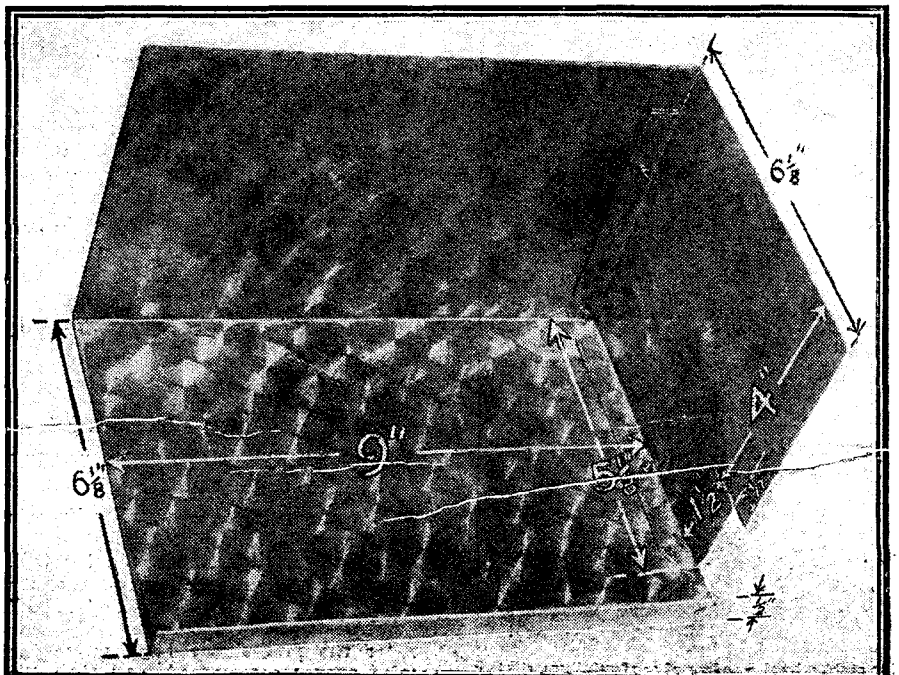
For one thing, it has not the powerful help of the large pick-up of energy of an outside aerial. It depends upon the very much smaller pick-up of a frame aerial, and so a very slight lowering of its efficiency due to imperfect workmanship, unsuitable components, or what not, may make all the difference.



Note the simplicity of the frame aerial one coil unit to the other. Differential r able refinement is the output

Again, it lacks the soothing influ-

"SEEN ON THE SCREEN"



All the necessary screen dimensions are shown on this illustration.

THE PARTS YOU NE

- 1 "Favourite" type cabinet with 5½-in. baseboard (Cameo).
- 1 14 × 7 ins. panel.
- 2 ·0005-mfd. variable condensers (Lotus or other compact type, e.g., Formo).
- 2 Small vernier dials (Igranic Junior, or similar type).
- 1 ·0001, ·00013 or ·00015-mfd. differential reaction condenser (Lissen or Lotus, Ready Radio, etc.).
- 1 L.T. switch (Igranic or Lissen, Lotus, Benjamin, Bulgin, etc.).
- 1 Double-pole change-over switch (Wearite, small type).
- 2 1-mfd. condensers (Lissen, etc.).
- 1 2-mfd. condenser (T.C.C. or Lissen, Dubilier,
- 2 600 or 500 (Ready R Parousi, Weari
- 3 Horizontal type (W.B. or B etc.).
- 1 Ordinary valve type necessary Lotus, Formo,
- 2 H.F. chokes (Lew or Lissen, Bulgi etc.).
- 1 ·0003-mfd. (T.C.C., or Lissen lard, Ediswan,
- 2 ·001-mfd. fix (T.C.C., or Lisse

THE SET THAT WILL

The "MERCURY" FOUR

Designed and Described By The "P. W." RESEARCH DEPT.

all-out" for efficiency. Aerial, batteries and loud ply-magnificent volume and plenty of programmes P.W." for a hot portable 4-valver—this is IT !

ence of an earth connection, and so its stability can only be ensured by careful attention to matters of screening and lay-out. This is rendered particularly important by the way everything must be compressed to get it into a reasonable sized cabinet.

There, we have said enough to make it pretty clear that the design is one for the more advanced reader, and we must not go too far and alarm even this type of constructor. There is no reason why he should not build it successfully, and we are sure that if he does he cannot fail to be delighted with the result.

Our own model gave an extraordinarily fine performance on test. It separated the two Brookmans Park transmissions with the greatest of ease, with quite a large space between them, and it brought in the Midland Regional at excellent volume with only just a trifle of reaction. (It could be heard at moderate strength on the speaker with no reaction at all.)

The strength of the local programmes (about 15 miles) was so great as to overload the last valve heavily. It was necessary to cut the volume down, and to do so sufficiently we found we had to turn the set so that the frame aerial was nearly at right angles to the direction for maximum strength.

Punch from Paris

The reader will understand, of course, that in common with all frame aerial sets, this receiver must be turned about in various directions to get the maximum volume from the different stations.

On going over to long waves by shifting the plug controlling the frame aerials and moving the wave-change switch 5 X X came in at excellent volume with very little reaction. On tuning with a little more care and using a moderate amount of reaction, Radio-Paris was picked up, and likewise gave loud-speaker strength quite sufficient to be enjoyable.

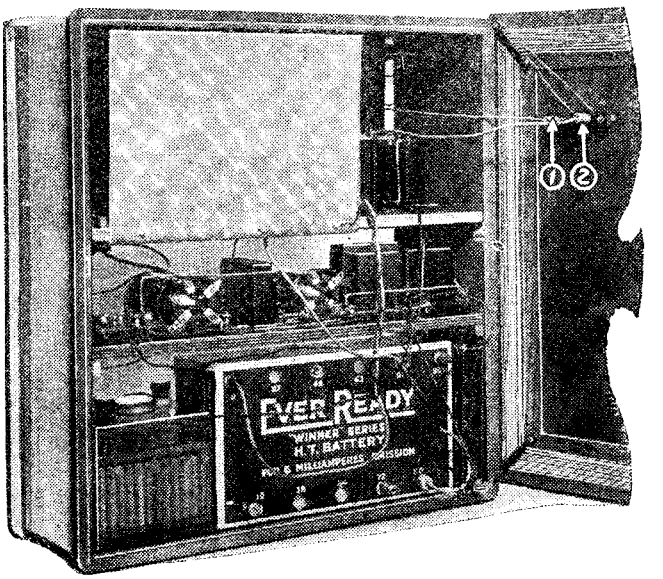
Selectivity was extremely good on both wave-bands, and tuning was consequently very sharp on the dials. Indeed, just a little practice is required to get the knack of running them in step before searching can be accomplished successfully.

Sharp Tuning

It is not really difficult, but we think it as well to mention the point for the benefit of those readers who have been accustomed to the relatively broad tuning of the average set working on an outside aerial. They might otherwise be inclined to imagine there was something wrong on finding that quite close tuning was needed before they could hear even the local station !

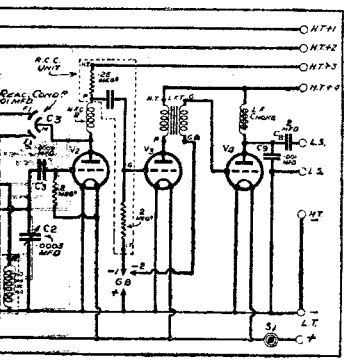
A little practice will show you how to handle the dials, and then you will discover

(*Continued on next page.*)



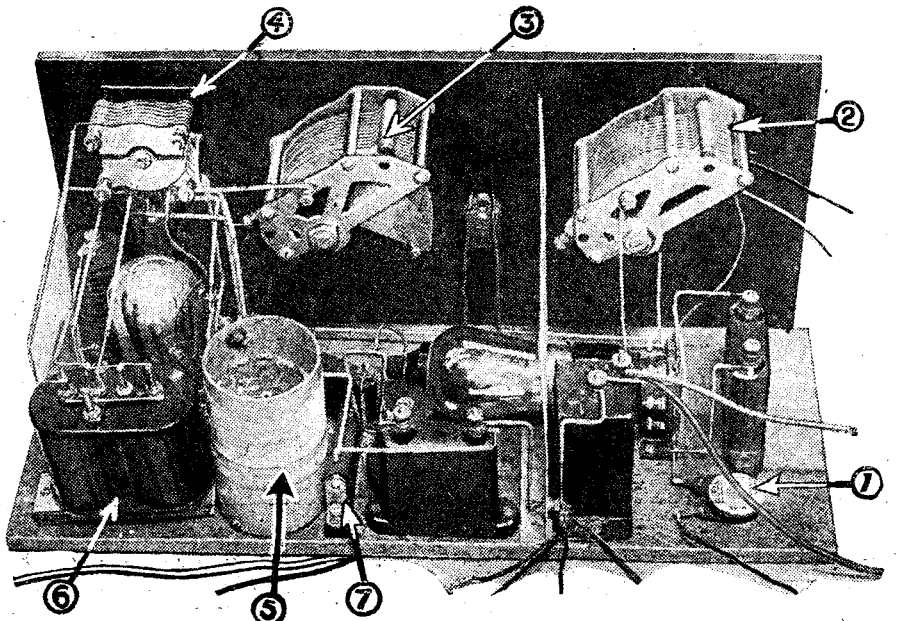
This shows the general arrangement of the interior—a triumph of compact efficiency.

KING CIRCUIT



...ial switching, and the easy change from ...l reaction is embodied, and another valu... ...put filter for the loud speaker.

HOW THE POWER IS PACKED IN



Compare this with the wiring diagram overleaf. (1) is the S.G.'s resistance, R_1, and (2), (3) and (4) the aerial tuning, H.F. tuning and reaction condensers respectively. (5) is the home-made coil, and (6) the B.S.G.20 coil. The decoupling resistance R_2 is shown at (7).

NEED TO BUILD IT.

...ier, etc.).
...hm resistances ...y and Climax, or ...arite, Bulgin, etc.).
...ype valve holders ..., Junit, Paroussi,
...ve holder (small ...y here). (W.B., or ... Benjamin, etc.)
...eweos and Wearite, ...lgin, Ready Radio,
...fixed condenser ...sen, Dubilier, Mul..., Ferranti, etc.).
...fixed condensers ...sen, etc.).

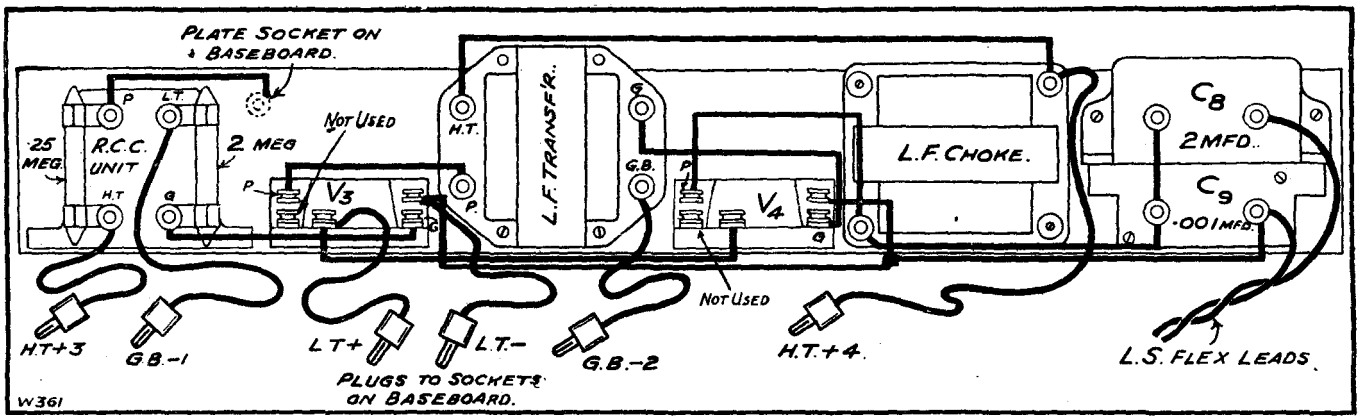
1 2-meg. grid leak and holder (Dubilier, or Lissen, etc.).
1 B.S.G. 20 coil (Lewcos).
1 R.C. unit, anode resistance ¼ meg., grid leak 1 or 2 meg. (Lissen, etc.).
1 L.F. transformer (Lotus, or other very small type, e.g., R.I. Hypermite, Lissen Hypernik, Varley Nicore, Igranic J., etc.).
1 Output filter choke (R.I. Hypercore, or other very compact type).
Materials for coil and frame windings (see text), piece of wood 15 by about 2 ins. for amplifier baseboard, sundry plugs and sockets, loud speaker assembly (see text), screens, etc.

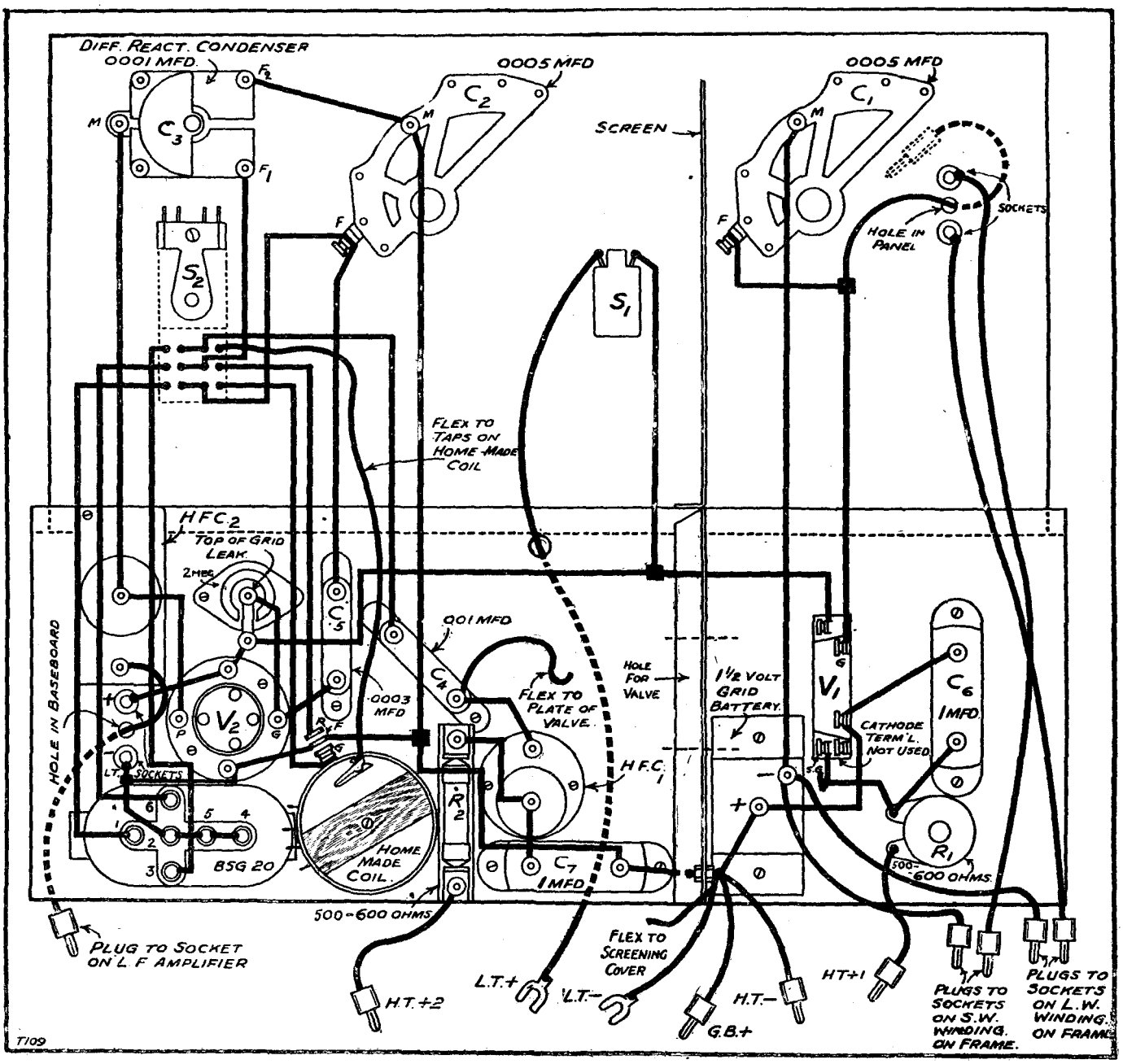
THE "MERCURY" FOUR.

(Continued from previous page).

that it is even possible to tune-in the foreigners quickly and easily, in which the differential control of reaction is a great help. Actually, you will discover the set will bring in quite a lot of foreign stations on the speaker after dark.

We have now given you a general idea of the set's capabilities and characteristics and there we must stop. A receiver like this calls for pretty detailed treatment and this we shall be continuing in our next issue.



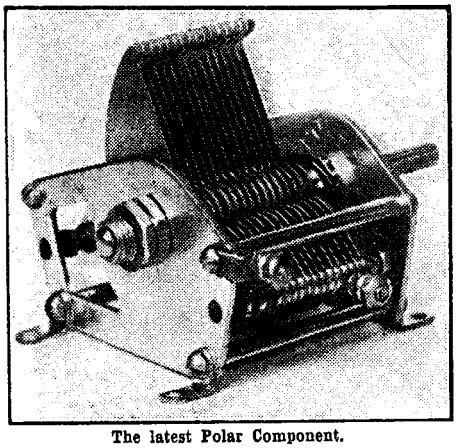


FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?

POLAR UNIVERSAL CONDENSER.

THE new Polar Universal Condenser is so designed that it can be used singly in the usual way, or ganged in two or three units, and the single hole fixing is duplicated at both ends so that it can be attached to screens.



The latest Polar Component.

It is one of the trimmest and yet most robust condensers that I have come across. It is made of hard brass throughout, and you will find it a difficult job to make the moving vanes bend over to the fixed vanes, even if you tried to do so.

Nevertheless, it is not cumbersome, and has clean lines and is very nicely finished.

It can be fixed down to a baseboard by means of four screws in addition, or as well as single hole panel mounting. There are ball bearings, and the movement is well up to Polar standard, which is saying a lot.

There is an extremely small amount of solid insulating material in the structure, so that its dielectric losses are practically nil.

Altogether it is an excellent production. It is quite apparent that Messrs. Wingrove and Rogers are still manufacturing "to form"!

The price of the single Universal Condenser is 7s. 6d. for the ·0005 mfd. and 7s. for the ·0003 mfd.

WONDERFUL VALVE CHARACTERISTICS.

If valves continue to improve at the same rate as they have been improving this last few years, the future has some marvels in store for us! At present there is no sign at all of a slackening—indeed, the pace seems to be growing faster.

For instance, I have just received one of the new Osram P.X.4 valves. The P.X.4 was a very good valve, but with its new characteristics I do not know of another valve in its class that can touch it.

It is an output power valve with a 4-volt filament taking ·6 amperes. It only needs 200 volts on the plate. It has an amplification factor of 3·5, and the extraordinarily low impedance of 1,050 ohms. Its mutual conductance is 3·3.

It is, of course, primarily designed for use in A.C. sets, the filament being directly heated. But it can be operated in a D.C. outfit, the filament current being supplied by a 4-volt accumulator.

And in this connection it is obvious that the P.X.4 is ideal for D.C. mains, as with these voltages above about 200 are seldom available. It enables the D.C. enthusiast to get results comparable with those given by the L.S.5A type of valve, a valve which necessitates an H.T. voltage of some 400.

Naturally the P.X.4 demands a fairly high anode current, and even with about 30 volts grid bias some 50 milliamps will be recorded when 200 volts are used. However, you get full repayment in the way of undistorted power.

On test we found the new P.X.4 just as excellent as its characteristics would indicate. It enabled a large moving-coil loud speaker to be operated at robust volume with a margin of power to spare. The P.X.4 costs 25s.

PILOT RADIO COMPONENTS.

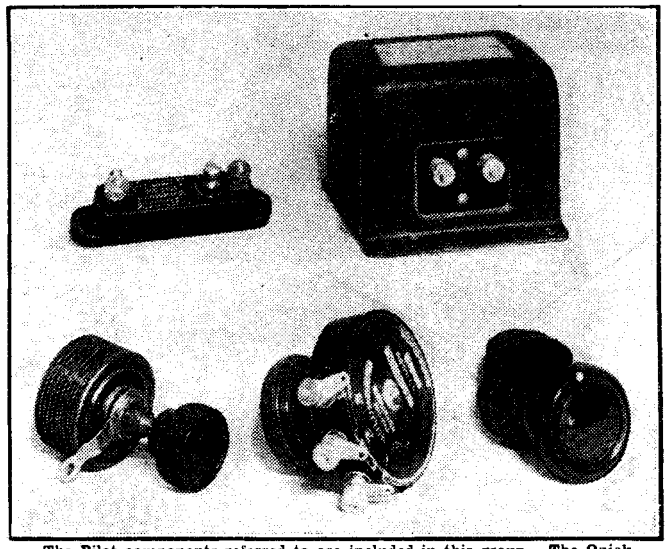
I recently spent an hour or two testing a bunch of American components. From a patriotic point of view, I can only hope that this particular bunch represents the best that America can do. If they are merely of ordinary American standard, then all I can say is that the British manufacturer must pull himself together!

But I do not think they are because they are Pilot Radio components, and the name Pilot is of world-wide eminence.

These Pilot components were sent to me for examination by Thos. A. Rowley, Ltd., of Birmingham. These people are the sole distributors for Gt. Britain of Pilot Radio gear.

I like particularly the Pilot Knob Type Switch which is of the quick action variety, and is capable of handling three amperes at 220 volts. It is a quite small one-hole-panel mounting component, and it is provided with a large insulating knob. The easy turn of this knob is accompanied by that most excellent snap action which represents my ideal in switches.

Then there is the Pilot Volugrad, a potentiometer device full of good points. And the Pilot L.F. transformer is a component that speaks for itself in a set! If it is not better than any British transformer it is certainly superior to many.



The Pilot components referred to are included in this group. The Quick-Action Switch is at the extreme right, and the Volugrad is to be seen in the centre at the bottom.

When you are Buying—

(28) A KIT OF PARTS.

Make sure that it really is the bargain it is claimed to be and that all the components are of good quality.

You are quite safe with kit suppliers of known reputation, but a kit that is proffered by an unknown concern or a local supplier may be full of concealed snags.

Little items of vital importance may be represented by absolute junk.

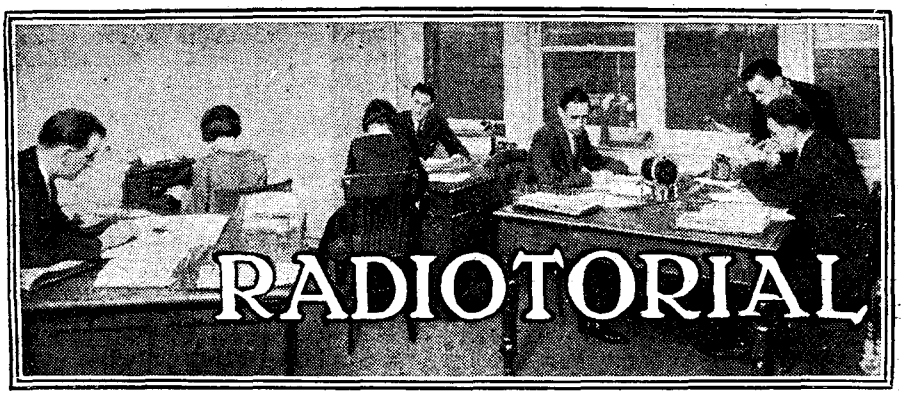
Also, the panel drilling might prove a very roughly-carried-out job. (The big kit people drill their panels by the dozen at a time, and use "jigs" to ensure absolute accuracy.)

The above applies to kits of parts for "P.W." and other such designs; the special kit-sets due to various manufacturers are generally only sold in special sealed cartons to ensure that the parts are not replaced.

FOR CONE LOUD SPEAKER.

Messrs. J. H. Weedon, Ltd., of East Ham, recently sent me a sample of their self-centre extension rod which is designed expressly for double linen or single-cone loud speakers.

The retail price is 1s. 6d. Its use obviates the usual stretching rods, while a small ball-socket movement enables exact centreing to be obtained. It is a very ingenious, though a quite simple and easily-used article.



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

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

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

QUESTIONS AND ANSWERS.

IMPROVING SELECTIVITY.

G. M. (Coventry).—"My aerial is nearly 100 feet long, and I am told that if I cut this down a bit I should get the flat tuning reduced, and almost the same strength. Is this true, or is there any better way of doing away with the flat tuning?"

The idea that the *longer* the aerial is the better has long since been exploded. Although one hundred feet in length is the limit imposed by the P.M.G., it is very rarely that there is any need for more than 70 feet of aerial wire (including the lead-in).

In a great many cases 50 feet is more than sufficient, and at distances within 25 miles or so of a broadcasting station this length may very often be reduced.

A set often appears to be troubled with flat tuning because the lead-in is unnecessarily long. If you can move the set closer to the point where the lead-in enters the house, instead of having it on the far side of the room, or if, by taking up a floor board, you can get the earth lead by a short cut to a water-pipe or to an outside earth, you should do so.

THE A.C. SAFE-POWER SENIOR.

We learn that the Ferranti Power Transformer, suitable for use with the U5 rectifying valve is the E.V.3. The Ferranti E.V.2 model also can be used in the A.C. Safe-Power Senior, in conjunction with the U.8 rectifying valve when large currents and high voltages are required.

Alternative makes of transformer can be chosen from the particulars of voltage ratings given for the various windings in the original descriptions of the A.C. Safe Power Senior.

USING A MILLIAMMETER.

A. C. F. (Sale, Nr. Manchester).—"During the summer holiday I acquired a milliammeter, with which I have been checking up anode currents to the various valves, etc.

"I have found this so interesting and, incidentally, so useful in checking distortion, and improving quality generally, that in my new set I should like to arrange for some easier method of inserting the instrument.

"It occurred to me that a good way of doing this would be to break every plate lead and take each to two sockets on the panel, and then to bridge across these with a flexible lead and two plugs as used for switching, etc. Does the scheme sound right to you, or is there a snag I have overlooked?"

In its essentials the scheme is a very good one, and we should certainly try to incorporate some easy method of inserting the milliammeter as required, if you can possibly do so. Its advantages are simply innumerable, and the only difficulty you are likely to meet with is in selecting a good place for the various sockets.

If you take them to two holes on the panel, as suggested, it would certainly be possible to insert the instrument very quickly, but there is a danger (on the H.F. side of the set, at any rate) of making the leads too long and causing unnecessary interference with other wiring. If, however, you bear this point in mind when wiring up, and arrange that all the leads are well spaced, we think your scheme is unobjectionable.

CAPACITY OF THE GRID CONDENSER.

H. R. (Weddington).—"By mistake I bought a ·0002-mfd. grid condenser instead of a ·0003, as in the list of components. After the shops closed for the holiday I couldn't change it, so I thought I would try the ·0002, and results justified the decision. (Wonderful for a one-valver).

"Do you think they would be better still if I now get a ·0003 instead of ·0002? It's so good at present that I don't want to alter it unless it is going to be a worth-while alteration."

We should leave well alone in the circumstances. The value of the G.C. is usually not very critical, although there are combinations of grid leak and condenser values that give best results in various circumstances so that deviations from specified values should not be lightly undertaken.

FADING ON FOREIGN STATIONS.

J. H. C. (Old Trafford).—"I have just completed the "Neutype Four," which is functioning well except on distant stations, where it is inclined to fading. I am using correct components, and have attended to aerial, earth, etc. What are your suggestions to dispense with this fault?"

It all depends upon what you mean by "fading," for if you really mean honest-to-goodness fading, there is no cure at all. *All* long-distance reception carried out over hundreds of miles is liable to fade.

You see, the trouble is that broadcasting stations are constructed to serve the population around the specific districts. Even the powerful ones have a range of quite a limited number of miles—we will say thirty or forty, like our own Brookmans Park, or like the new North Regional station now being put up near Huddersfield.

These are really powerful modern stations, intended to serve a large district, but note that that "large district" only covers an area extending around it for a distance of a few dozen miles. In that area reception is reliable and good.

But Brookmans Park is picked up literally all over the Continent, and although the British listeners living in the local area served by this station do not find any fault with its performance, yet on the Continent it always *fades*. The reason is that it uses different routes to serve its two classes of customers.

Immediately around the station the listeners' aerials are energised by *direct* waves travelling along the ground to the receiving aerials. These waves die away a few miles from the station, and become so weak as to be of no use. At great distances most of the radiation is done by what is known as the "*sky*" *waves*.

Instead of travelling along the ground, these sky waves travel up into space unhampered by the earth. At a distance of about sixty miles or so from the earth they encounter the Heaviside Layer, which in effect bends them back to earth again. And they come down at great distances from the transmitter.

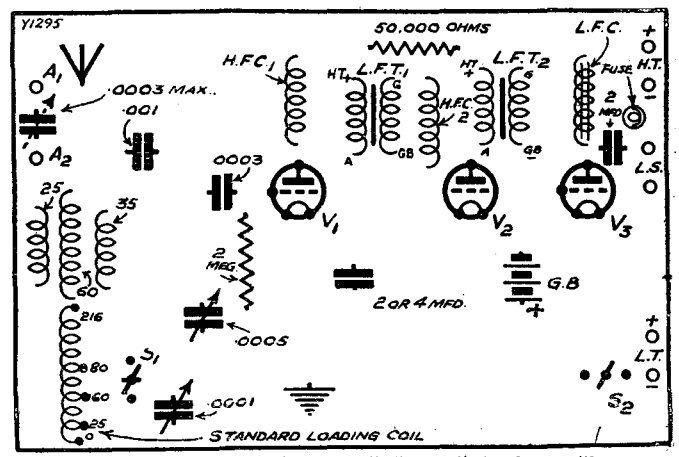
Unfortunately, this reflective effect provided by the Heaviside Layer is not regular and reliable, but is erratic and constantly varying. Consequently, the reflected signals are erratic, and are inclined to come in now strongly, now weakly, especially as they often combine with the direct rays, and will then be weak or strong according to whether they are in or out of phase.

From this you will see that really long-distance reception is always a matter beyond the control of either the transmitting station or the receiving set, and thus such far-off stations never achieve the reliability that we expect from local broadcasters.

Nevertheless, so great is the sensitivity of a good set like the "Neutype" Four, that the wide variety of European stations you have to choose from always enables you to find plenty of interest, for when one station fades out it will often be found that another

(Continued on next page.)

POPULAR "WIRELETS" No. 17



Here are the "components" for an "all-wave" 3-valver, with easy change of wave-length. It employs a standard loading coil, brought in or out of action by means of a switch (S_1), and also an "output filter" for the loud speaker. Can you "wire up" the circuit?
(Look out for the answering diagram next week.)

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from previous page.)

one will have faded in, just as strongly, although previously it may have been inaudible.

Apart from such true fading, there are many things like a swinging aerial or faulty battery connections which cause in-and-out effects that have been termed fading, though this term is really incorrect. The true fading is that due to conditions over which we have no control.

WHAT DO *YOU* THINK ABOUT THIS ?

A Yarmouth reader of "P.W." had an H.T.-from-the-mains set which suddenly developed a puzzling fault. Normally very quiet and crackle-free, it suddenly took to crackling loudly as soon as anyone in the house went to bed !

For most of the evening it would run perfectly, but as soon as the first of the family (usually grandma) went to roost it crackled and spluttered until everyone else was glad to go. Of course, as soon as this peculiarity was noticed the cause was easy to find. But could you have said

WHAT WAS WRONG ?

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

The trouble which was described last week was found to be due to an accidental knock which had bent the loud-speaker's driving-rod a little, and thus spoilt results.

FOR THE LISTENER.

(Continued from page 642.)

dum, then," she said. "Or Tweedledee," I said; and a silence seemed to fall between us.

She is rather touchy on her powers of acting, is Belinda, since the other evening when she gave a complete English programme here to our neighbours all by herself, impersonating in the space of one hour Tommy Handley, Mabel Constanduros, Sir Oliver Lodge, Dr. Cyril Burt, and Mr. Farrar.

Budapest.

I have tried several times to get Budapest, but without any luck. Last night, however, it walked in all by itself and held Belinda's undivided attention for the whole evening.

A Military Brass Band was playing selections from the works of Kalman. I don't know Kalman, but it was one of the finest military bands I have ever heard.

Dan Godfrey must take second place for once in a way. The swing and blare of it !

I have always understood that the Hungarians are not particularly good fighters, but that their uniforms are all right. So is their military band. The "March of the Hussars" out-Sousa'd Sousa.

Afterwards there was some Tzigane music from one of the Budapest cafes. I should like to go to Budapest. It must be a very gay place to live in.

With the possible exception of Germany these continental programmes have nowhere near the educational value ours have; but their entertainment value is much, higher. Budapest began with a Literary Talk, which I missed, and which, being in Magyar, I shouldn't have understood; but afterwards, for almost three solid hours, it was pure entertainment.

Noise Effects.

They do not need a special Studio for "noise effects" on the Continent. One station serves the purpose of another.

I was listening the other day to Hermann Kessler, from Berlin, telling the story of his life; and in the background, most appropriately, Berne was transmitting Chimes from the Cathedral at Basle.

And always, for us in this place, there are the storms in the mountains, which would satisfy even the heart of Lance Sieveking !

Vernon Bartlett.

Belinda and I were distressed to hear of the retirement of Mr. Vernon Bartlett. Belinda said that, with the exception of Mr. Farrar, she thought he had the nicest voice of all.

"How he has thrilled me," she said, "when he has been speaking of the politics of Poland and Ruritania !" "You mean Roumania," I said. "No, I don't," she said, "I mean his voice."

She began to cry softly. While she was crying, I recalled Mr. Bartlett's wisdom, his steadying and restraining hand, his refusal to be chivvied by anybody, his unerring instinct in spotting the permanent among the impermanences of passing politics.

"I don't think I can ever speak again," whimpered Belinda. "If you talk like that," I said, "I will tune you in to Toulouse !" That brought her round.

WHAT WE WANT TO KNOW.

(Continued from page 635.)

Take the case of valves. Nearly every valve advertisement gives you all the relevant technical details concerning the particular types advertised. And these details generally show absolutely the technical efficiencies of the articles.

Given the impedance, amplification factor and filament details and you have pretty well the whole story. You are then in a position to judge for yourself just how modestly—or otherwise—the rest of the "dope" is framed up.

Now and then you get frequency curves for L.F. transformers and, although these do not tell the whole story, they go a fair way into it.

What an Opportunity!

By the way, one concern is prepared to guarantee every one of its L.F. transformers to be within 5 per cent of its published specification (a fairly full specification at that). But I have not noticed that they impress this fact on possible purchasers. What an opportunity missed! How many other makers would go to such limits?

You see it is quite evident that much of the widely-advertised apparatus really is good stuff—it must be, for it has achieved popularity and has stood the test of time. And the shoddy gear stands but little chance of securing a continued success even if, by cunning booming, it gets pushed into some prominence for a short period.

Therefore it is all the more pity that greater endeavours to present "cast-iron" cases for the first-class products are not made.

One of these days the radio industry will appoint some central committee to frame a system of classification, or a method of standardising specifications and performance charts and formulae. America has taken steps of this kind and tentative attempts have been made on similar lines in this country.

Here is a Suggestion.

When the industry sees that it will benefit itself as much as it will protect the "consumer" by doing such a job properly, real progress will be made.

If it is considered that fine technical distinctions such as are drawn by the N.P.L. might prove embarrassing, here is a suggestion. What about a National Radio Institute that would issue graded certificates yearly for all the various products? The public would soon learn that any wireless article carrying the current year's brand A, say, of the Institute conformed to some pretty high standard set by the industry as a whole.

The Institute's services being open to all, those goods not bearing its brand could be regarded with justifiable suspicion.

Anyway, that is my suggestion.

TECHNICAL NOTES.

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

Frames for Portables.

WITH regard to the use of frame aerials in portable sets, I often receive enquiries from listeners who want to take advantage of the well-known directional properties of the frame aerial, but who are in doubt as to whether this type of aerial will work with their ordinary receiver.

It is not at all easy to say off-hand whether a frame aerial will work with any type of receiver: it depends a good deal, of course, upon the receiver itself and also to some extent on local conditions as well as upon the size and design of the frame aerial which you propose to use.

Detector Operation.

There are one or two general rules which, however, may be borne in mind. One is that the frame aerial brings in a very much smaller amount of signal energy than the outdoor type of aerial and, therefore, if it is to be effective, some amount of high-frequency amplification is necessary.

I should say that at least one stage of screened-grid H.F. amplification will be necessary in most cases to bring up the signals from the frame aerial to a sufficient intensity for proper operation of the detector. At the same time it is very desirable to have a power valve in the output stage.

Special Purposes.

Apart from the advantage of being able to dispense with an outside aerial and with an earth connection, the frame or loop aerial is sometimes very convenient when you wish to cut out interfering stations or, indeed, to cut out other types of interference especially from local sources.

Although beginners often seem to be very much intrigued with the idea of using a frame aerial, I do not in general recommend this type of aerial, as the number of cases in which it is really satisfactory is comparatively limited. I think it is much better to recommend the average experimenter or listener to use a fair outdoor aerial and good earth connection.

Pentode Peculiarities.

Those of you who use pentode valves in the output stage have no doubt discovered how important it is to find just the right type of loud speaker to suit the receiver. Of course, this applies to all receivers, but it seems to be particularly important where the pentode is used.

Probably you may have found, especially if the output transformer primary impedance is rather on the low side, that the lower frequencies in the register tend to be less reproduced than the upper. This is a fairly common fault in many radio components, and consequently you have to do what you can to counterbalance the effect by introducing a component which gives extra prominence to the lower frequencies—or, should I say, *less* prominence to the *upper* frequencies.

The moving-coil loud speaker generally favours the low frequencies rather than the

(Continued on page 654.)

TECHNICAL NOTES.

(*Continued from page 652.*)

upper, and consequently, if you use a suitable moving-coil speaker with your pentode output stage, you should generally get satisfactory results.

A Headphone Problem.

I have been asked whether it is practicable to introduce headphone receivers directly into the anode circuit of the output stage of a receiver when a D.C. mains unit is being employed. In the particular case in question my correspondent wants to receive distant stations which he cannot obtain on his loud speaker, and therefore he proposes to put his telephones direct into the anode circuit.

So far as reception is concerned, this scheme is quite O.K., but there may be a serious danger in it, inasmuch as the mains are connected to the receiver *via* the eliminator.

It is, therefore, very important to use an output filter circuit, or some equivalent, so that the telephones are not directly connected into the anode circuit, a condenser being introduced in series with each of the telephone leads. In this case (assuming the condensers are satisfactory) the danger is overcome.

The Earth Condenser.

In the same connection I should mention that it is a good plan—in fact, very important—to put a large fixed condenser in series with the earth-lead in a case of this sort, as it is possible that the positive pole of the electric mains may be earthed; the danger thereby created is overcome by the use of the earth-lead condenser.

R.C. Amplifiers.

Referring to my remarks some little time back, on resistance-capacity-coupled amplification, there was a point which I ought perhaps to have mentioned, and of which I am reminded by a reader; this relates to the use of a particular type of coupling-condenser for the purpose.

As you know, it is very desirable to use mica condensers for coupling in an R.C. amplifier, not paper condensers. Paper condensers are usually made of layers of tinfoil separated by layers of wax-impregnated paper. In the present-day type of paper condenser, great precautions are taken in manufacture and a high degree of efficiency and reliability obtained.

The paper type of condenser is particularly suitable for large-capacity condensers, inasmuch as it enables several microfarads to be compressed within quite a small cubic space. This type of condenser is much used for mains smoothing and suchlike purposes.

Neutralising the G.B.

But for the R.C. coupling condensers, not only is there often a fairly high voltage across the condenser, but the slightest leak will have its effect upon the grid of the valve and may completely neutralise the effect of the grid bias. In fact, the grid may even become positively charged—which, of course, will mean serious distortion.

A mica condenser (mica sheets are used as insulation instead of paper sheets) is more expensive than a paper condenser

(*Continued on next page.*)

TECHNICAL NOTES.

(Continued from previous page.)

but the mica is very much more reliable as an insulator. In view of the importance of avoiding even the slightest leak in R.C. coupling condensers, it is well worth while to use the mica type, and this type is invariably used for the purpose.

Crystal Set Selectivity.

There are apparently quite a large number of listeners who still swear allegiance to the crystal receiver. Since the introduction of the Brookmans Park station, crystal users, whilst often getting excellent reception from this station, find it difficult to cut it out and to tune in 5 G B, and I am often asked whether it is possible to improve the selectivity of a crystal set so as to overcome this difficulty and enable the latter station to be tuned in without Brookmans Park.

Unfortunately, it is not an easy matter to increase the selectivity of an ordinary crystal receiver, sufficiently for the purpose in question, and the advice I would give you in such cases is to go a step further and to fit up a single-valve receiver—using, of course, a tapped coil in the aerial circuit and employing reaction.

With this type of circuit it should be comparatively easy to cut out Brookmans Park and tune in 5 G B as well as other stations at good headphone strength, without any background from the local station. If the operation is not sufficiently selective, you may employ a simple device specially designed for cutting out Brookmans Park, such as the "Brookmans Rejector," which was described in "Popular Wireless" some little time back.

Question of Signal Energy.

One of the principal reasons against attempting to increase the selectivity of a crystal set beyond certain limits is the fact that the volume is apt to be reduced in the process and, inasmuch as a crystal set relies entirely upon the incoming signal-energy without amplification, it is obvious that you cannot afford any reductions in signal strength.

A valve set is always so much more manageable, because what you lose on the swings you can easily make up on the roundabouts.

Amplifier Stability.

Those of you who use an electrical gramophone pick-up will find that the L.F. amplifying circuit in some circumstances tends to become unstable and howling and whistling noises may cause a good deal of trouble. This is often particularly the case if you increase the filament current to the valves beyond a certain limit or if you endeavour to force up the volume.

Of course, the circuit should be stabilised and this depends largely upon the values of the H.T. and grid-bias voltages and also, as already mentioned, upon the filament current. At the same time, quite apart from this, the addition of a suitable earth connection will often make all the difference to the stability of the amplifier.

Earthing Important.

One of the simplest ways to make an earth connection is to the negative side of the low-tension battery. I should mention

(Continued on next page.)

TECHNICAL NOTES.

(Continued from previous page.)

here, however, that if a D.C. mains unit is employed with the amplifier (as is very frequently the case) the earth connection should be made *via* a series fixed condenser of fairly large capacity, say 2 microfarads.

In the Grid Circuit.

Another point to remember is that the pick-up is connected directly or indirectly to the grid of the first valve; that is, it is directly or indirectly in the grid circuit and consequently the leads between the pick-up and the valve should be kept as short as possible.

It is often an advantage also to run an earth wire along to the frame of the pick-up itself, or at any rate to the metal part of the pick-up arm or holder. Some experimenters object to earthing the pick-up itself, on the ground that this tends to reduce the sensitivity, but I think you will generally find that any alleged effect upon the sensitivity is much more than counterbalanced by the stabilising effect of the earth connection.

TECHNICAL TWISTERS

No. 23 FREQUENCY

CAN YOU FILL IN THE MISSING LETTERS?

In radio work the period of time over which the frequency of current is reckoned is one . . . . . .

Frequency does not enter into consideration when dealing with direct current, but only in connection with . . . . . current.

Starting from zero, alternating current rises to a maximum in one direction and falls to zero; rises to a maximum in the opposite direction and falls once again to zero. The complete operation is called one . . . . .

The number of . . . . . per second is called the . . . . . .

In radio we are concerned with both . . . . and . . . frequencies.

Last week's missing words (in order) were Capacity; Condenser; Condenser, Grid, Plate; Equal, Phase.

Capacity Effects.

The effect of hand-capacity will often be noticed when you put your hand forward to take hold of the pick-up to remove it or place it in position. If the movement of the hand in the vicinity of the pick-up causes whistling noises, or has a marked effect upon the loudness of the reproduction, you may be sure that there is instability in the amplifying circuit, which can be cured by proceeding along the lines indicated above.

You must remember that instability does not always show itself by a definite howl or other noise. It may just simply introduce distortion, and therefore every step should be taken to keep it down.

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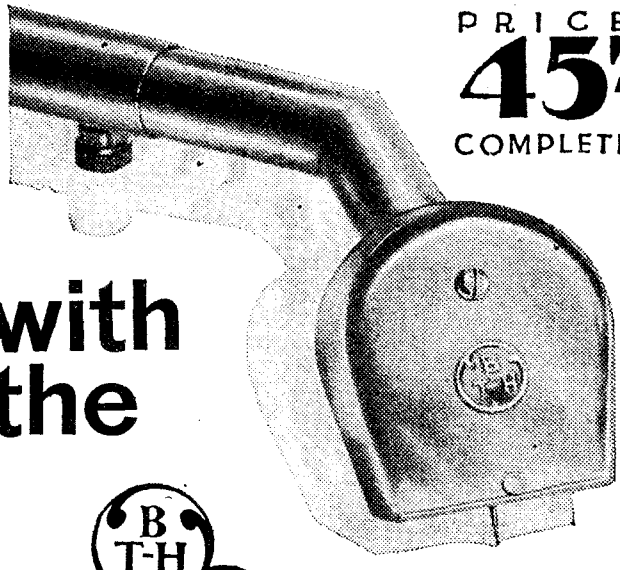

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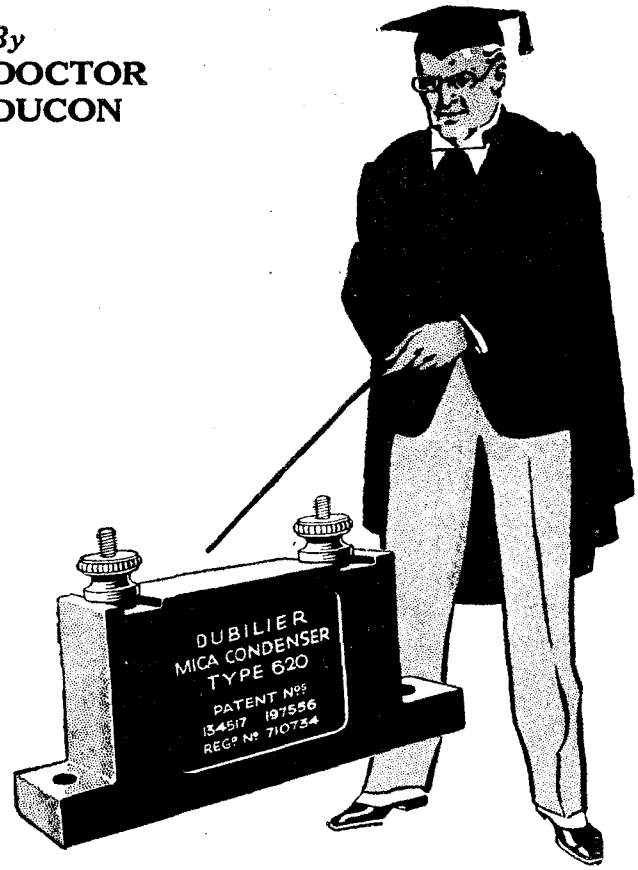
By DOCTOR DUCON



FACTS ABOUT MICA CONDENSERS

The most important things in designing fixed Condensers are to ensure constant capacity and to provide against all sorts of climatic conditions. If these points were not provided for, totally unsatisfactory condensers would result.

Small-capacity Mica Condensers such as are used in radio sets and amplifiers must have special care, because the whole performance of an otherwise fine set can be completely ruined by only one faulty condenser.

Dubilier type 610 and type 620 condensers are designed and manufactured with the utmost care. They are specially clamped to avoid change of capacity and hermetically sealed to combat climatic conditions, you can therefore be certain that, with Dubilier Condensers in your set, its performance will be remarkable and you are certain never to suffer from Condenser breakdowns. Specify Dubilier for your next Set.

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