

# BRITAIN'S LEADING RADIO WEEKLY

## HOW REACTION HELPS

# Popular Wireless

REAL LIFE  
REPRODUCTION  
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FITTING A  
RADIOGRAM  
SWITCH

EVERY WEDNESDAY PRICE 3<sup>p</sup>

No. 822.  
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1934.

### SPECIAL

# TELEVISION

### NUMBER

THE  
PRESENT  
POSITION  
SURVEYED  
—•—  
PRACTICAL  
HINTS &  
TIPS  
—•—  
PREPARING  
TELEVISION  
PROGRAMMES  
—•—



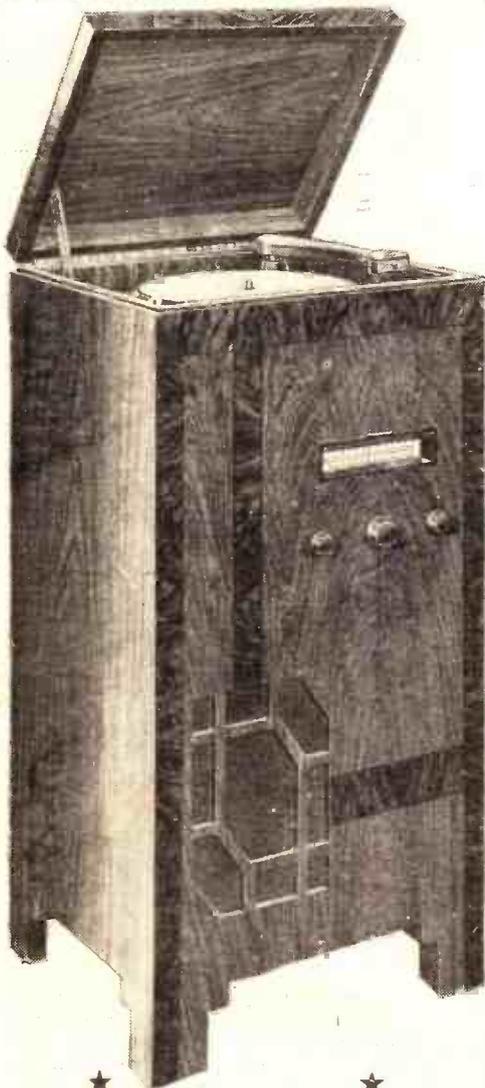
# TWO EASY-TO-BUILD VIEWERS

*Now-RECORDS as well as RADIO reproduced with a fidelity which banishes all thought of mechanism*

# TELSEN

MODEL 1240 ALL-ELECTRIC

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*a luxury instrument for*

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4-valve band-pass tuned circuit for ultra-selectivity

★  
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★  
All-electric gramophone motor and pick-up

★  
Full-vision illuminated scale calibrated in actual wavelengths

★  
Magnificent inlaid figured-walnut cabinet in dual tones

# POPULAR WIRELESS

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

Scientific Adviser: SIR OLIVER LODGE, F.R.S.  
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"TWO SPITS" DEEP  
 LAST JULY  
 ON THE ROAD  
 VERY CUTTING

## RADIO NOTES & NEWS

GRAMO-FILM  
 "DOPE" INDEED!  
 LUCKY LAD  
 BATH NOTES

### The Transformation of a Scribe.

THIS is the time of the year when, impelled by the slings and arrows of outrageous tongues, your humble annotator becomes more than half a horticultural labourer, poking disdainfully at the stony and infertile clods which form part of my freeholding.

As a reaction against the dull, mechanic toil of delving "two spits" deep, my brain meanwhile functions with a clarity with which the midnight oil seldom burns.

Hence it comes about that, just when I am aching in wind and limb, grimed to the

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eyebrows and exercising my sebaceous glands at full pressure, the most wonderful jokes and topics occur to me. Is there a portable dictaphone?

### Summer Calling.

THIS uncalled-for, savage leap of the year into summer weather conjures up memories of last July's glorious hike, when "P.W." went up to the summit of Ben Nevis. (Anyone who finds the copy this year will kindly return it to me!) I have decided to give up my annual walk this year and spend half my holiday in the peaceful ways of the home loafer and odd-job man.

There's a big accumulator wanting an internal operation and some blood transfusion. The aerial simply must be divorced from the copper beech once and for all. My "earth," which I have long suspected of having gone out of the radio business, must be re-engaged on a long-term contract. Something is adrift in the most inaccessible spot of my set! And Arieline wants . . . *ad infinitum!*

### Another Gold Rush.

MENTION of my accumulator brings me sharply back to business, because it reminds me that, in an article about battery acid I read recently,

the presence in the electrolyte of copper, tin, gold and platinum has a deleterious effect upon the cells.

Once this note is published I expect the sale of sulphuric acid to rise to an unprecedented level, though superficial observers must not report a wholesale abandonment of crystal receivers in favour of battery-driven valve sets. (Next week: "How to get the gold and platinum out of your battery.")

### Where is This Car Radio?

OBSERVATIONS made at Easter cause me to believe that we are not yet car-radio minded. I watched a stream of traffic on the road to Hastings for two hours, but failed to see anything like a wireless receiver, though I *did* see (a) a hip bath, (b) a car roof garden with daffodils all a-blowing and (c) a pure white car entirely inhabited by coal-black natives who looked like Seedee boys.

To me the radio set is an indoor toy, not a travelling companion, and it seems to me that I am not in the minority this time.

### REWARD FOR GALLANTRY



An Ekco Model 74 receiver was recently presented to Capt. C. N. Forbes, of the lighthouse steamer *Hesperus*, who has done much gallant work in bringing help and provisions to marooned lighthouse keepers.

### An Aerial for Motors.

WHILE writing on this subject I would draw the attention of would-be "caradists" to an ingenious form of antenna which is now available. Designed for fitting underneath the wings

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or running boards, this aerial is made of copper gauze covered with rubber sheeting.

It takes the form of two strips, each measuring 41 in. by 7½ in. In order to avoid directional effects these are connected diagonally. The whole affair can be fixed in a few minutes.

### The Floor of Olympus.

HAVE you joined the New Explorers—I mean the noble company of adventurers who are going to help Prof. E. V. Appleton plant his flag on an entirely new layer? Understand that Prof. Appleton has observed signal "echoes" 25 seconds after their transmission, and that this is thought to indicate that the signals were reflected from a medium 2½ million miles distant.

The help of listeners all over the world is being enlisted with a view to accumulating sufficient data to show that our wireless waves can bombard the very floor of Olympus—as the deities called their new home after they were driven from their mountain, by Boy Scouts.

### "Persecution" in Germany.

CONSIDERING the many other more important things which the German authorities have on their minds, one cannot but admire the relentless way in which they have been hounding down and routing out interferences with broadcasting.

During the last quarter of 1933 they found and suppressed 60,000 sources of interference. About 28 per cent of those sources were small motors and all sorts of domestic, industrial and agricultural apparatus.

(Continued on next page.)

# HOW TO ACT IN RADIO EMERGENCIES!

The interferences have been eliminated at the source in 47.9 per cent of the cases and at the receivers in 30.8 per cent. Protective devices have been applied to about 20 per cent of the interfering installations.

## Direct Action.

A MODERN Jack the Ripper, a sort of wireless window slasher, has revealed his presence in Bohemia, where he has cut down with a pair of pliers some hundreds of aerials. His skill in snipping is excelled by his cleverness in evading detection.

He may be a misoradist or radio hater, or a radio service man trying to stimulate business, but very probably he is simply a pliers tester getting in some extra practice.

For the sake of his nervous system let us hope that he knows a high-tension power line when he sees it!



## Strange History.

I AM sorry to see that our contemporary, the "Bombay Radio News," in an unsigned article, "The Beginnings of Wireless," referring to the introduction of the two-electrode valve, omits the name of Fleming, though giving Edison credit for the "Edison effect."

This fact, added to the description of Lee de Forest as "a French physicist," calls loudly, methinks, for an Anglo-American defensive alliance!

According to this same article, Marconi introduced his automatic volume control device in 1922. Not A.V.C. as we understand it nowadays, surely!

## Now, All Together, Boys!

I PASS on to you the report that a New Yorker is developing a device for taking listeners' votes—applause, if you like. The invention is based on the measurement

of the increased load on the electrical-distribution system, when listeners on mains-driven sets press a knob on their sets at the request of the announcer.

It is claimed that, from the result of this measurement,

it is possible to calculate the number of listeners who pressed the knob at a given time. Not, of course, outside the bounds of possibility or of human ingenuity, but still—!

"Boy, run round to the power station and find out how many people liked that poetry reading."

## A Novel Competition.

OUR Query men at Tallis House always revel in the unusual and surprising faults which you constructors send them to solve most days of the week.

But next time something really interesting goes wrong with the works, pause a moment, gentle reader, and consider whether you can't turn your troubles to advantage and win a handsome sum of money for your ingenuity.

Would you say no to £1 a week for a year? Or 10s. a week? Or even a lump sum of £10? If you would, then you're not the people I take you for.

Well, the makers of the AvoMinor are offering these very prizes to "P.W." readers in an amazingly useful competition (of which details elsewhere). All you have to do, it seems, is to find some unusual fault with the help of an AvoMinor and then write and tell the makers all about it. Simple, isn't it?

## ON THE AIR NEXT WEEK.

### Parry Jones

(National: Monday May 7th).

Soloist in the second of the London Music Festivals at the Queen's Hall, Parry has been a well-known Rugby player and a cricketer. He still plays cricket occasionally when his song recitals, broadcasting and film work allow. His ambition was to set the Thames on fire as a politician, and, despite his successes with the D'Oyly Carte, Carl Rosa and British National Opera Companies, the old love still pulls very strongly at times. He has been broadcasting for ten years now, which makes him quite a veteran, and has sung in every state of America, from Mexico to Alaska. Parry was also a survivor of the Lusitania disaster.

### Oliver Baldwin

(National: Wednesday, May 9th).

B.B.C. Film Critic since the end of 1933, the son of Mr. Stanley Baldwin has been behind the bars of six separate foreign prisons and assisted in three wars and two revolutions during his career as politician, dramatist, author and journalist. Once he was a vice-consul, but got the sack! His incursion into the realms of schoolmastering nearly ended in financial ruin. Now he tells listeners what films to see, and enjoys his hobbies of microscopes, foreign languages, pathology and travel.

## News for Gramophone Lovers.

I HAVE often written of the need for some means of playing a whole symphony or other long musical work without any intervals for the changing of records. The record-changing devices do not play consecutive sides. Well, here's news!

A French invention, called "Gramofilm," which is a gramophone that plays from films instead of discs, is said to be destined for the English market. Demonstration models were, and may still be, on view in a large London store.

The films, which can be joined end to end and played as an uninterrupted programme, are said to cost slightly less than standard discs for about the same playing time.

## More Indian Magic.

FROM the "Chloride Chronicle and Exide News" I steal with glee and full acknowledgments this amusing tit-bit: A company in Calcutta wrote to the

Calcutta branch of the Chloride Electrical Storage Co., offering them a battery "dope" which, when put in place of the old acid, "actually charges the battery itself, thus doing away with the necessity for any electric induction from without."

As though to guarantee the effectiveness of the "dope" and to stifle all scepticism, the letter ascribed the invention to America—which is not the least funny part of the joke!

## Amateurs' Paradise.

ALTHOUGH "push bikes" are somewhat out of favour with the younger generation, I believe that Leonard Earwaken will be the object of much envy by many "P.W." readers, for he is now pedalling away on a two-years' tour round Australia on a bicycle fitted with a sending and receiving radio station.

He is to generate all the electrical power he needs by a connection to his rear wheel! Leonard is going to have a tough time, I fear, but when he has done what he has planned he should have a fine tale to tell about his travels.



## Done It Again!

TO my list of ex-wireless operators who have risen to important positions in the radio business I am delighted to add the name of Mr. E. J. Emery, who has been appointed General Manager of Electric and Musical Industries Service, Ltd., which does all the "servicing" for the Gramophone Co., the Columbia Co. and the Marconiphone Co.

Mr. Emery began as a marine wireless operator in 1915, and was with the Marconiphone Company at the very beginning of broadcasting.

## Making Them Foolproof.

THE National Broadcasting Company has issued a 126-page Official Manual whose compilation is said to have been a two-years' full-time occupation for three people. This ought to please our B.B.C.

The object of this book is to provide every servant of the company with explicit instructions how to act in every conceivable situation arising in the course of duty. It is very thorough,

and a report is current to the effect that it even contained advice about how often an N.B.C. man should take a bath, though this gem, unfortunately for posterity was deleted from the proof sheets.

I wish I had a copy; it would furnish me with jokes for six months. And I should like to see whether it has anything new to say about the habitual use of "Say, folks!"

ARIEL.



# TELEVISION

## The Present Position

For years there has been doubt in the minds of the public as to the exact position of television development. Is universal household picture reception imminent or is it still many moons away? In this article our Chief of Research briefly explains the present position as it affects the ordinary listener.

THERE has been a great deal of ballyhoo in the papers lately concerning the imminence of high-definition television. Tests and demonstrations with two well-known systems have been witnessed and wonderful results have been achieved. Meanwhile, the B.B.C. has cut down the time allotted for 30-line transmissions to two half-hours per week.

Such is the news. From this many have deduced that (1) high-definition television is an accomplished fact; (2) that broadcasts of it are shortly to begin, if not by the B.B.C. then by other interests; (3) 30-line television is dead.

### A Laboratory Accomplishment.

Now let us examine the facts. (1) High-definition television is accomplished—in the laboratory. It is not available at the moment for public use. With the present state of the ether it cannot be used on broadcast wavelengths, and will, therefore, when it is released, have to be transmitted on short waves.

At the moment the Gaumont-British-Baird interests are transmitting experimental programmes from a directional aerial situated on one of the towers of the Crystal Palace—a site first used for short-wave work by POPULAR WIRELESS in last year's 5-metre tests. The power used is 10 kw. and the service area is—London.

To receive such a transmission you require a good 6-7 metre receiver (there are none yet available) and a cathode-ray television viewer of expensive and tricky construction.

But (2) no regular public service in high-definition television can be expected until the B.B.C. takes it up. And so far the B.B.C. is wisely waiting and watching. There are other systems, including the E.M.I. (H.M.V., etc.) method to be considered before a public service is commenced, and it will be a long time yet before we get definite television programmes on high-definition systems from the B.B.C.

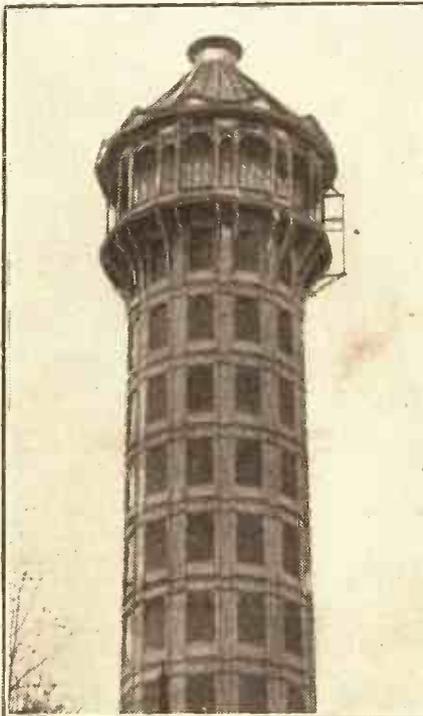
### "The Only Method Living."

Now for point (3). The 30-line television is not dead. As far as the public are concerned, it is the only method living, and, being available on the medium wavelengths, with the proved serviceable nature of those frequencies (unlike the erratic ultra-short waves), it is possible for anyone with a decent set and a simple and cheap televiewer to get pictures.

The mistake the B.B.C. has made is in devoting so little time to a system which, as Eustace Robb, who is in charge of the broadcasts, says, is capable of very much wider expansion and contains definite programme value. You cannot make bricks without straw, and neither can you build up good television programmes without money, nor without time to put them over. Two half-hours a week! Could anything be more ludicrous?

I am willing to admit that high-definition (180-line) television is better than the

### ON SIX METRES



The tower at the Crystal Palace, whence, following "P.W.'s" lead, the Baird television transmissions are taking place.

30-line. But the Rolls is better than the Ford. We cannot all have Rolls cars, but the Ford is within the scope of thousands.

At the moment, and probably for a long time hence, 180-line television will be outside the scope of the average radio listener. He will not be able to afford it, he will not be able to work it and he will not be able to get good service from 7 metres for a long time to come.

But he should not be debarred from inexpensive yet enjoyable television. Because you cannot provide a man with a first-class radiogram (no matter why) you do not hesitate to let him have the next best thing—a cheaper model or a radio set of smaller size. His results will be less perfect, but they will be good, and they will provide genuine entertainment.

### More Broadcasts Wanted.

In that position is 30-line television. Until, in the future (and it may be many years hence), we have high-definition television for the masses, let us make the most of our 30-line system. There should be more broadcasts of it, for, as the following pages show, there is plenty to be done on 30 lines, and quite simple apparatus will receive it.

Really the "to be or not to be" of television programmes in the near future is up to you. You are in the position of the consuming public, the commodity being television.

If you do not want plain "bread-and-butter" in the form of 30-line television, but prefer to wait till you can have jam on it, perhaps years hence (high-definition television), with its naturally greater cost, well and good. Do nothing about it.

But many will prefer something to nothing, and these will go ahead with the construction of the simple 30-line television receivers described in following pages. And they will write to the B.B.C. and point out firmly that they are not being properly treated in the way of programmes.

### Take Advantage of It.

A business concern that said, "We have a good article, but as it is not the best that will be produced in the somewhat distant future we shall not sell it," would be deservedly on the rocks in no time.

That is how I see the television position. The "article" for sale is as good as can be made at the moment, and will probably not be superseded by anything better for a considerable time. Why not sell that article? Why not allow people to take advantage of what there is instead of discouraging them, not only concerning the possibilities of television as it is to-day, but also in the prospects for the future?

Let us get on with the proper public dissemination of 30-line television, and then change over in years to come if and when high-definition systems are available.

# PREPARING *the* PROGRAMMES

"ENTERTAINMENT value *does* exist in the present television programmes, in spite of all that is said about their merely holding scientific interest."

Mr. Eustace Robb, the B.B.C. Director of Television, emphasised this point most strongly during an exclusive interview in which we discussed the preparation of television programmes and their future possibilities.

"This is not merely my own opinion," he said; "it is proved beyond doubt by the enthusiastic letters I receive from 'lookers,' as we call those who participate in the reception of the television transmissions.

## More Money Required.

"The trouble is that so many people criticise adversely from hearsay, and without having seen even a single item by television. But the new morning transmissions will largely overcome this by enabling dealers to give demonstrations at more useful times."

With that I had to agree entirely, for as regards programmes, surprising though it may seem, the biggest handicap is not in technical difficulties or in the degree of definition available with a 30-line picture. It is in the small amount of money that can be allocated to television and the huge amount of work entailed in preparing broadcasters to whom stagecraft is entirely foreign.

"Naturally," Mr. Robb continued, "the greater part of our performers are drawn from the theatre; and to them rehearsals are all in a day's work, and, what is more important, they are adaptable. They soon accustom themselves to new technique and are not 'put out' by repeated requests from the producer.

## Topicality a First Consideration.

"But consider, say, an illustrated talk (a type of item on the production of which I am working). No matter whether the subject is architecture, sport or a more general theme, I must have an expert in the particular line.

"And, having found my talker, the real work is only just beginning. 'Do you think I shall be able to carry it through all right?' he would probably ask nervously, and much patience and hard work would be necessary before he appeared in a programme. Remember, he has to be seen as well as heard.

"Nevertheless, we are able to infuse considerable variety and attraction into the programmes. And topicality is always uppermost in our minds.

"Suppose a famous dancer is over from the Continent for a short season in London, then we always endeavour to obtain her

By  
**EUSTACE ROBB,**  
Television Director  
of the B.B.C., in  
AN EXCLUSIVE INTERVIEW  
with A. S. CLARK

services for one television broadcast at least.

"In this way we give thousands the opportunity of seeing a classic performance that would otherwise be debarred from them. And, incidentally, lookers are not confined to the home counties, nor to Great Britain, for that matter. I have even had letters of appreciation from as far away as the south of Italy.

## VIVID CONTRASTS



A striking example of a costume specially designed for television. It was worn by the television star, Laurie Devine, for an entirely original Pavane.

"Dancing forms a large part of the programmes—not because it is the obvious thing to put on, but because lookers appreciate it. Even so-called 'lowbrows' have written saying how much they have enjoyed classic and ballet dances, and remarking

that, never having seen any before, they did not know what they had missed.

"Talking of dancing brings me to the question of the shape of the area that we scan. It is often criticised as being too high and not wide enough.

"Actually, it is a most admirable size, and was not arrived at by accident, as so many think. It was worked out most carefully both from practical and technical considerations. For films the existing shape would have to be modified.

"Take dancing, for instance. One has got to have what are technically known as 'lifts,' and without a fairly tall scanned area there would be difficulties right away. And without picture depth any form of effective scenery would be quite out of the question.

## Using "Synthetic" Scenery.

"At one time we never attempted to use scenery at all, but now some form of back-cloth is employed for practically every long shot. Considerable use is also made of the caption machine for putting in scenery; in fact, the caption transmitter is proving more and more useful every week, especially in continuous programmes of the revue type."

Let me interject here a remark concerning high-definition transmission. In considering systems using more lines, many people overlook the fact that if the area scanned is increased, definition will not necessarily be improved. Definition is entirely dependent on the number of lines per face, no matter what the size of that face in relation to the picture as a whole.

But to return to what Mr. Robb had to say: "Television is building up a technique absolutely its own. While we like to put over stage items as near to their theatre performances as possible, all programmes are developed specially for television.

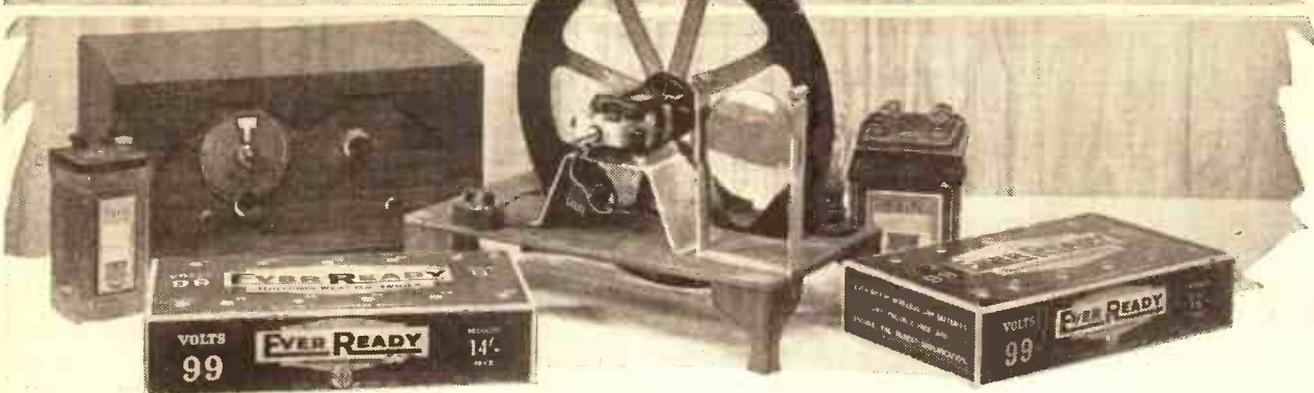
## Specially Developed Costumes.

"Some most effective dresses and head-gear have been designed bearing in mind the traits which stand out best after being televised. Similarly, dances which get their individuality over in spite of the restrictions of television have been devised.

"But we cannot always be sure what lookers like best. For, though we get letters from many of them, there are many more who criticise the programmes to others, but do not tell us what they think."

At this point the enthusiastic Director of Television looked at his watch and remarked that he would have to be getting back to No. 16, Portland Place. I was sorry our talk had come to an end, but realised that Mr. Eustace Robb and his keen staff had much work to get through, and so bid him a reluctant farewell.

# A SIMPLE DISC TELEVIEWER



For a matter of a mere seventy-five shillings and a half-hour or so of assembly it is possible to build a simple television viewer that is capable of surprising results. Here are brief details of a disc type receiver that is available in kit form for every home constructor.

AS those who have followed Mr. Kendall's articles on television will realise, the *elements* of television are simple; it is the design that is difficult. And the difficulty varies in direct proportion with the degree of perfection aimed at in the television transmission and reception.

Here it must be made clear that the ease, or lack of it, with which television pictures can be received is determined by the *design* of the apparatus; it does not depend greatly upon the operator. It is best to mention this, because it would be erroneous to assume that the best type of television viewer—that is, the one giving the most detailed picture—is necessarily the most difficult to operate.

### Easy to Operate.

It is the most difficult to design, but once designed it need be no more tricky to work than the ordinary radio receiver.

The question of good design is the one that has held up television for so long from being an everyday household availability—apart, that is, from any question of high- or low-definition transmissions system and the associated wavelength problem.

At the present time we are still waiting for regular and frequent television programmes on the 30-line system, because the public has been more or less starved of receivers for that system, and therefore there has been no demand for programmes.

One has only to go to a television demonstration to realise how much can be done with 30-line television, and to see that there is very definitely programme value in the transmissions, short and infrequent as they are at the present time.

High-definition television has been promised, but it is a long way from being universally available, and meanwhile most of us are missing what can be obtained with the system now in use.

### Inexpensive Apparatus.

Some can pay large sums of money to get the best televiewers; others can only afford moderate amounts; while still more cannot try television if it is going to cost more than a few shillings.

It is for the latter two that we are bringing to the notice of readers the two television viewers illustrated this week. The disc-type receiver costs but 75 shillings, yet will give surprising results if carefully handled, while the more advanced mirror-screw viewer costs something like £8 and is capable of somewhat better results. **A Progressive Scheme.**

But both are available for home construction in kit form from Peto-Scott, and both have the advantage that they can be commenced in a comparatively "raw"

while automatic synchronising can be added at a cost of another £1 or so whenever one wishes, and a flat-plate lamp, too, can be used to give better pictures at a small increased cost.

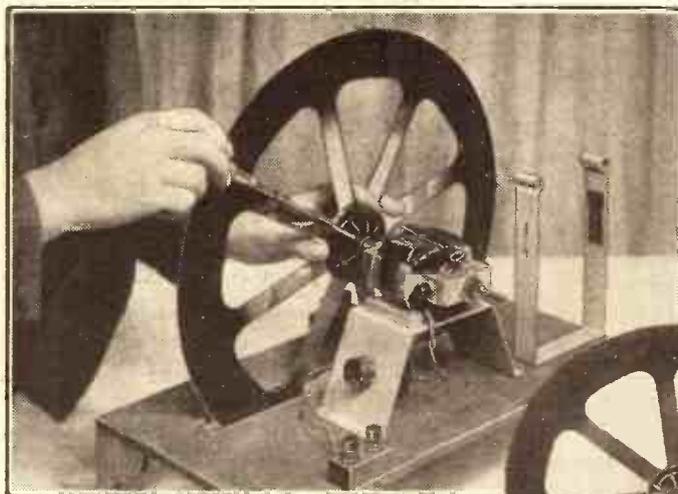
As it stands the viewer has only to be attached to a radio set with a fairly large power valve, the lamp lighted by means of 150-volt H.T. (it takes little current), the disc started spinning and the speed of the motor hand controlled to synchronise with the picture being sent out by the B.B.C.

Some practice is necessary before the

speed can be properly controlled, but with a little skill it is not difficult to get pictures.

There is no need to go into the details of construction here—they are simple and are fully explained by the makers of the kit, and given with each set of parts.

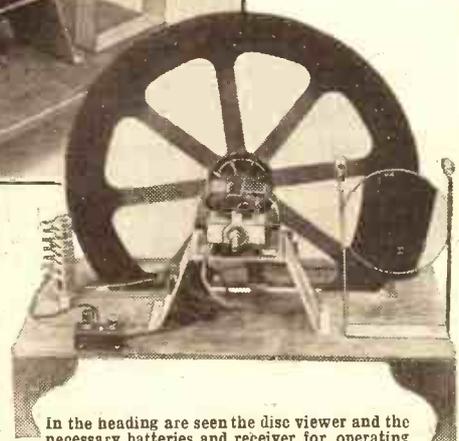
## VERY FEW PARTS ARE REQUIRED



Fitting the disc in place on the motor shaft is accomplished with an ordinary screwdriver. The disc should be held as shown, and on no account held by or rested on its edge, or it will tend to buckle out of shape.

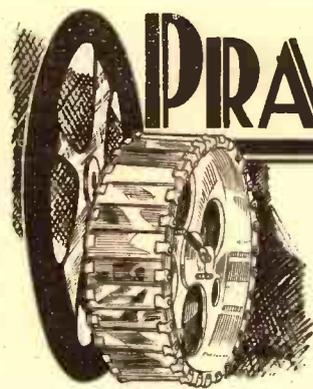
state and improved as experience and the purse allow.

The disc receiver is illustrated on this page, and can be put together in about half an hour. It consists merely of a baseboard, an electric motor (mains or battery driven), a speed control, a neon lamp, a disc with 30 holes in it and a lens. Its construction is obviously simple,



In the heading are seen the disc viewer and the necessary batteries and receiver for operating it. It is obtainable fitted with either a 6-volt or mains-operated motor. The photograph immediately above shows the mains-type motor on the disc chassis.

# PRACTICAL HINTS & TIPS



It is not difficult to get results on a quite simple "televiever," but few seem to realise how much affects the quality of those results and what steps must be taken to ensure a clear image. In the receiver, as much as the viewer, lies the secret of success or failure, as is shown in this page of practical advice specially written for the benefit of 30-line television "lookers."

By G. P. KENDALL, B.Sc.

**T**HERE is considerable nonsense talked about the need for a set capable of dealing with extremely high-modulation frequencies, even for the present thirty-line pictures. As I pointed out recently, the conditions existing on the normal broadcast waveband make the transmission of such frequencies impossible.

All the same, I have been discovering from my correspondence that the question has a certain practical importance from the view-point of the ordinary set user. It seems that one is far too apt to assume that "any good set" will deal with all the frequencies involved, forgetting that there are lots of receivers which manage to give quite acceptable audio quality, although they fail to reproduce the highest frequencies.

Only a hyper-sensitive ear can detect the difference, and so it is that such sets satisfy the majority of us. When they are used for television reception, however, the deficiency is quickly discovered, because it leads to a blurring over of the finer detail.

#### Poor Detail

If, therefore, you should find that a given set provides a bright picture which synchronises easily and yet seems to lack proper detail, you may be pretty sure that the trouble is a lack of the upper frequencies. In such a case the first thing to do is to turn a critical eye on the coupling devices in the L.F. amplifying circuits. If these should be transformers of the cheaper type they must be held responsible for the trouble. I'm afraid it is no good blinking the fact that transformers of this kind simply will not give good results on a television signal, whatever they may do on speech and music.

The only way to settle the question is to look at a reliable response curve of the transformer type concerned. Unless the

curve goes up to at least 8,000 cycles before it begins to fall away it is useless to expect to see anything like the full amount of detail.

The easiest way to arrange an amplifier capable of handling very high frequencies is to use resistance coupling, but even here good results will not be obtained without a little care. The great point is to watch all shunt capacities in the anode circuits of the valves from the detector onwards, and keep them as small as possible.

#### A Frequent Cause of Trouble

Again, high-value anode resistances must be avoided. As a general rule, it is safe to use a resistance equal to three times the valve impedance, but this figure

you must make up your mind to the fact that you are not getting so sharp and detailed a picture as you would if you could raise the overall amplification of the set a little and use less reaction.

There is a matter connected with synchronising which I find causes a certain amount of quite unnecessary difficulty to some users of "televievers." What happens is that the scanner is got into synchronism fairly easily, runs correctly for a minute or so, and then begins to drift out of step again.

The picture may disappear altogether, or it may only drift a little, but in either case an adjustment of the speed or framing control, or both, will be needed to bring it back.

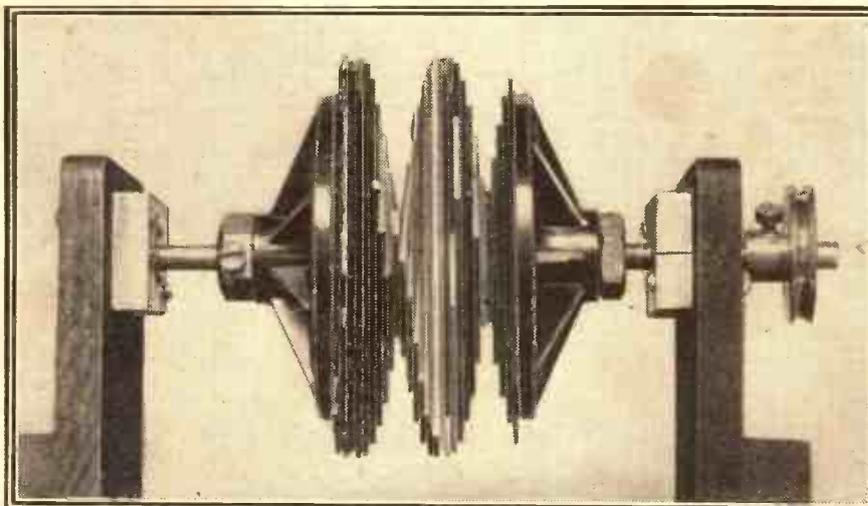
#### Motor Speed

The cause is simply that the speed control was not properly set in the first place, so that, although the motor was at first held in step, it was pulling against the synchroniser all the time and trying to run either faster or slower. Hence, as soon as there came the slightest weakening of the synchronising signal the motor broke loose and went out of control. The remedy is to make a habit of setting the speed by the following method: First get the scanner in step in the usual way,

then move the control gradually in the direction of increased speed until the motor breaks away and accelerates. Note the setting at which this happens.

Now get back in step again and proceed to move the speed control slowly and carefully in the direction of reduced speed until the motor once more breaks free and slows down. Note the place on the control at which this happens, and then try to set the control to a spot halfway between the two points. A stable condition of synchronism should then result.

## THE MIRROR SCREW IS VERY COMPACT



Here we see a close-up of the mirror screw type of scanner. It is a photograph of a part of the viewer described on the next page, and clearly shows how the blades of the screw, with their highly polished edges, are fitted together. On this page Mr. Kendall has some important things to say about the synchronising of such a device.

should not be exceeded. It is to be understood in this connection that very high impedance, high amplification valves are definitely barred from the detector and L.F. stages of a television receiver.

I am only touching on the more important details, of course, but I must not omit the question of reaction. Now, reaction is the champion spoiler of pictures, and the fact cannot be expressed too emphatically. If you find that you have to use any considerable amount of reaction to get the strength of signal that you need



# Making a Mirror Screw Receiver

The system of television reception exemplified by the model of viewer described here is more advanced than the disc type. It makes use of one of the latest devices for scanning—the mirror screw—and incorporates automatic synchronising. Naturally, it is a little more difficult to construct than the simpler model, but it is well within the scope of most constructors, and a complete kit is available at a remarkably low figure.

ON another page we have introduced to you a simple disc type of television viewer that can be built in less than an hour. It will give surprisingly good results for such a simple piece of gear, and at a cost that is remarkably low.

Here we show a more advanced type of viewer, with self-synchronising gear, and a neat cabinet, making it quite an attractive piece of furniture.

The operation of scanning is carried out by means of what is known as the mirror screw, whereas the other receiver in this issue uses disc scanning. Both achieve the same results, though the mirror screw is a better method.

### Synchronising the Picture.

The television image is sent out in a series of strips, which have to be placed side by side in order that the picture may be seen. They also have to be placed in position at the right time and starting in the right place.

The time is fixed by the synchronising signal sent out with the picture by the B.B.C., and the place of starting is governed by the design of the transmitter and receiver.

The disc set obtains its strip placing by means of the sweep of a number of holes through which light shines, each hole making a short strip of light as it travels over the surface of the lamp and is viewed through the lens. There being thirty holes specially placed round the disc, we automatically get thirty lines.

The light and shade necessary for the picture are obtained by variation in the degree of light from the neon lamp, controlled by the impulses coming through the radio receiver which is tuned into the television broadcast. Quite simple, isn't it?

### How Scanning is Achieved.

In the disc receiver we view the light direct through a lens. In the mirror screw we see a reflected image and also do away with the disc for scanning. Instead, we use a series of bright mirrors, situated on the edges of a number of metal strips. These rotate so that one by one they come into the beam of light and reflect it across the line of vision.

As the beam of light (which is varying in intensity with the transmitted picture) is horizontal, and the mirrors rotate vertically, it is easy to see that the reflected light from each mirror in turn

will sweep vertically across the line of vision. In practice it sweeps upwards.

Now, there are thirty mirror faces fixed side by side, but staggered, so that they follow each other in sequence across the light beam from the lamp. This beam is in the form of a very narrow horizontal strip.

### The Reflected Light.

As mirror number one comes into the light it catches it and swings a reflection upwards across the line of vision. When it has disappeared, mirror number two comes round and does the same, but its swing is just to the left of number one (as we look at it), and so we get a line of light running alongside number one. Number three follows, and so on, until the thirtieth has flashed across, and immediately number one begins again.

So we get a rapid succession of lines, thirty in all, and forming the screen on

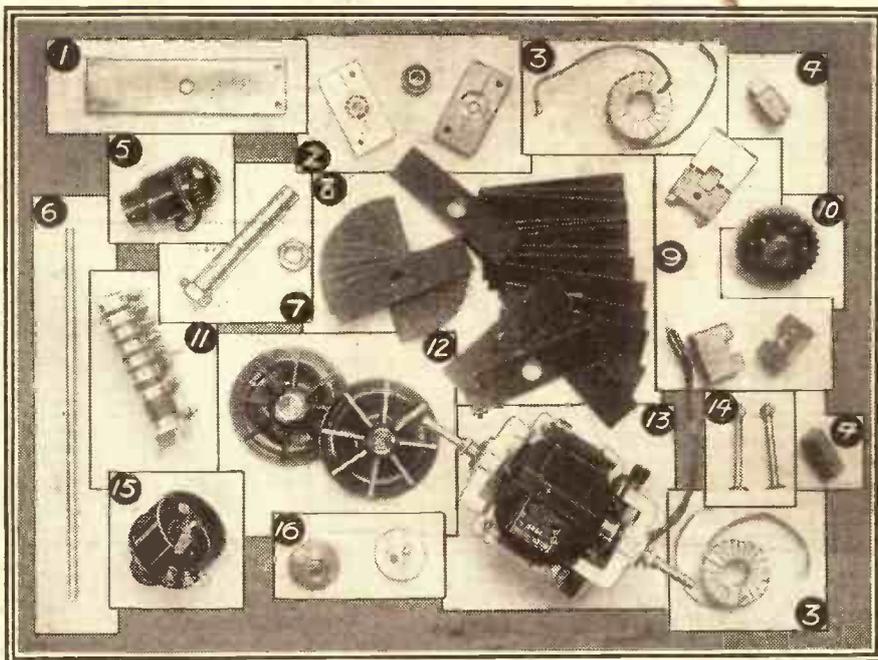
which the variations of light form the picture. The rotation of the mirror is automatically controlled by the synchronising gear on the motor shaft driving the mirror screw, so that the speed corresponds exactly with that of the mirror drum at the transmitting end.

With the kit of Peto-Scott parts it is quite easy to construct the mirror-screw receiver, the only tricky part being the assembly of the blades of the screw. Directions are given with the kit, and care must be taken that they are implicitly followed. Unless the screw is properly built up the viewer cannot hope to work satisfactorily.

### Positioning the Blades.

After getting the blades on the spindles and the end pieces roughly tightened up it is best to mount the whole between some form of wooden jig (two pieces of  
*(Continued on next page.)*

## THE CHIEF COMPONENTS YOU WILL NEED



Above are seen many of the parts required for the assembly of the mirror-screw televiewer illustrated in the heading and the photographs. Here is the key to the numbering of the components: (1) Synchroniser rocker plate, (2) ball races and housings for the screw, (3) synchroniser coils, (4) synchroniser laminated pole pieces, (5) power plug, (6) inner mirror-screw mounting spindle, (7) outer (hollow) mirror-screw spindle, (8) the separate mirror blades, (9) synchroniser pole-piece carriers, (10) synchroniser laminated rotor, (11) voltage-adjusting resistance for motor, (12) mirror clamping plates, (13) mains-operated motor, (14) pole-piece carrier bolts, (15) motor speed control, (16) motor and mirror-drive pulleys.

## MAKING A MIRROR SCREW RECEIVER

(Continued from previous page.)

wood mounted vertically on the table or a framework will do) while the staggering of rotation of the blades is fixed.

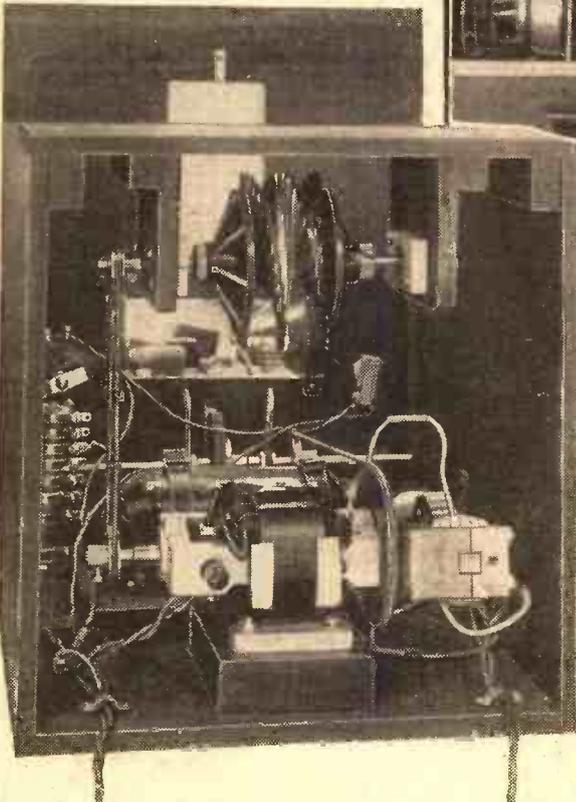
The positioning of the blades must be done very carefully, for if they are the slightest bit out anywhere there is no hope of getting a good picture.

### Reflecting the Light.

The setting of the neon lamp case, too, must be done carefully, for it must be parallel with the mirror fixed on the inside of the front of the cabinet, and the slot through which the light is thrown on to the mirror must be correctly set so that the light falls truly across the mirror

### SIMPLE ASSEMBLY

The fitting of the various parts into the cabinet supplied is by no means difficult, for plenty of room is allowed. It is, of course, important that the mirror and the neon lamp are properly situated in relation to one another. The lamp mounting must be adjusted so that the thin strip of light, when reflected, can be centred on the screw. The lamp must also be square with the screw. The distance of the light from the reflecting mirror is adjustable by means of the rod protruding through the front of the cabinet.



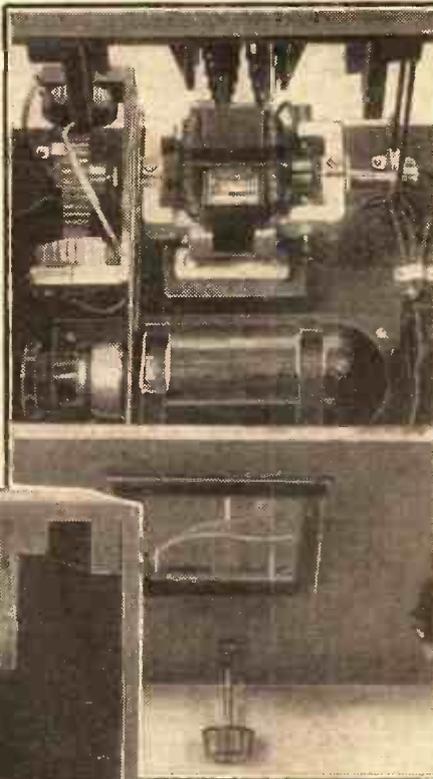
screw. Moreover, the brightest part of the light, which is that coming from the plate area of the neon lamp, must be central to the mirror screw.

The motor is mains driven, and a rough voltage adjustment for the mains is provided by the tapped resistance

mounted near the neon lamp. This is connected between the motor and the mains switch, and in series with it is connected a variable resistance of 150 ohms, controllable from the panel, so that the speed of the motor can be finely regulated.

### Adjustments for the Speed.

The tapped resistance is divided into sections of 150 ohms, and the resistance has to be adjusted in accordance with the instructions supplied, so that the motor will run approximately at the right speed. The correct speed of 750 revolutions per minute should be arranged to come when the variable resistance on the front of the cabinet is about half-way round, so that the motor can be speeded



### THE NEON LAMP

Above is clearly shown the position of the black metal cylinder which envelops the neon lamp. Along the side of the case facing the camera can be seen the thin slot through which the light from the lamp is thrown on to the mirror placed inside the cabinet, just below the vision window. From this mirror the light is reflected across to the mirror screw, which can be seen at the back, and the screw reflects and scans the light, giving an image viewable through the glass window. The thumbscrew below the window controls the synchronising magnet's position in relation to the wheel on the shaft of the motor.

up beyond the correct speed or reduced below it. The main speed control of the motor is done from the variable resistance, and unless the speed is obtained

correctly the automatic synchronising cannot be expected to operate.

The synchronising gear is very simple, consisting merely of a magnetic wheel on the motor shaft with a number of pole faces, and two electro-magnets which are set diagonally across the wheel, and through which pass the synchronising impulses.

These should coincide in time with the passage in front of the pole faces of a tooth on the wheel, so that the impulses exert a direct pull on the teeth. If the teeth are passing too early the impulses will tend to pull them back, and so retard the motor; while if they are too late in arriving in front of the pole pieces the magnetic pull will tend to speed them on, and so speed up the motor.

### The Synchroniser Control.

The relative positions of the two pole pieces of the synchroniser and the teeth on the wheel are adjustable by means of the thumb drive on the front of the cabinet, which actuates a pulley wheel, which in turn is spring-belt coupled to the two magnets and rotates them round the magnet wheel on the motor shaft.

In order to get a bright image the mirror-screw television viewer needs a bit more power to drive it than the disc receiver. The light is reflected light, so that this in itself is apt to reduce the luminosity somewhat.

The neon lamp requires between 140 and 160 volts to "strike," and this can be supplied best from dry batteries. The batteries are placed in series with the secondary of a 1:1 ratio output transformer, whose primary should be connected to the loudspeaker terminals of the set from which the television is to be received.

The set should be capable of giving a fair amount of output power, a mains-operated set being preferable to a battery model, provided that the reproduction is free from hum and of good quality.

The use of a transformer for the output coupling to the television viewer is an advantage, for it enables us to change the image from a negative to a positive should the former be received.

### Overcoming a Negative Picture.

To change this state of affairs, all that is necessary is to reverse the primary or the secondary leads of the output transformer.

In connecting the H.T. to the neon lamp, remember that polarity counts, and the battery should be joined up that way round which gives the most light from the neon. It will be found that one way gives about twice as much illumination as the other.

Patience, too, will be required when you first get the machine working until you get the television image properly. Adjustment of motor speed must be deliberate and very gentle. Rough alteration of the rheostat will only result in sudden speeding up or slowing down of the motor, and you will shoot past the correct speed without having a chance to recognise it by the commencement of formation of the television picture.

# REAL LIFE REPRODUCTION

## The more about NEW INFRA-SONIC TECHNIQUE

IN my previous article I told you something of the circumstances which led to the series of investigations undertaken during recent months by Mr. G. V. Dowding in connection with loudspeaker reproduction of sound. You will remember that we discussed the limitations of present-day loudspeaker reproduction and pointed out that these limitations applied to the system, and not necessarily to the particular loudspeaker instruments themselves.

### Quality that is Almost Quantity.

As a matter of fact, as I emphasised in my first article, it is amazing how good the modern loudspeaker really is when you consider that one small diaphragm is called upon to reproduce, at one and the same time, the music of many instruments of totally different quality—in fact, a whole orchestra—and with the complicated over-tones of the human voice thrown in.

It is not in quality, in the ordinary sense, that the modern loudspeaker fails, but in that quality that is almost quantity—that quality that is yet *not* quantity, but is the something that just makes the difference between the real thing and the imitation—no matter how good the imitation may be.

You will remember, also, that we took as a typical example the organ—the church or cinema organ. When the organ is in full blast we have an immense instrument “taking hold” of an immense quantity of air; often enough it seems to shake the very walls of the building. This is what I called the “grip,” the “mass of sound” which we get from the real thing, and which is lacking from the copy.

With the real thing you do not merely hear the sound: you positively feel it. But with the loudspeaker reproduction of the same sound, although you may have to admit that it is an extraordinarily good copy—“perfect,” in a sense—nevertheless it isn't the same thing at all: it is, in fact, a copy, a ghost; it lacks the “body” of the original, although in superficial characteristics it may be well-nigh perfect.

### The Missing Link.

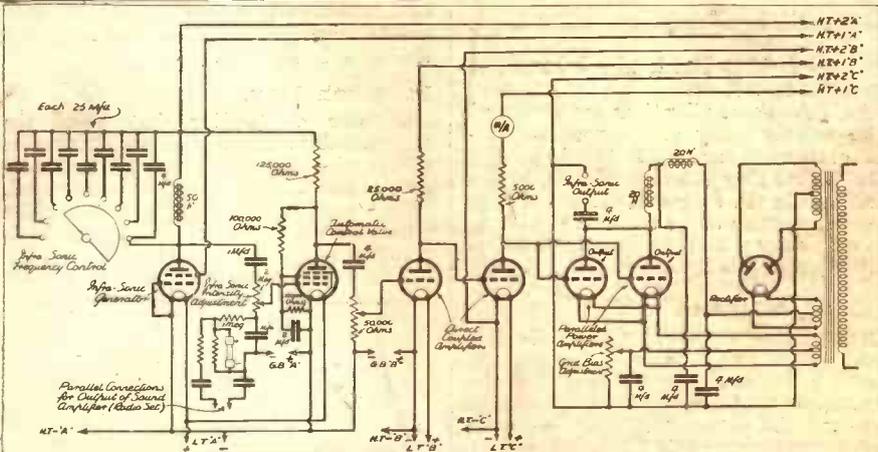
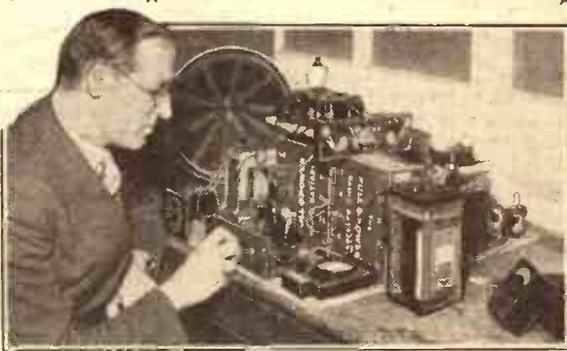
The loudspeaker, then, as we have seen, is a “keyhole” of a “bottle neck” of sound and allows only a puny imitation of the real thing to pass through.

The alternatives we considered last week. At first sight the only alternative is to go back to the real thing itself—to give up listening to reproduced music, and instead to go out to the theatre or concert. Up to very recently this would certainly have seemed to be the only alternative.

But, as I said last week, that was before I had been privileged to hear the results of the remarkable investigation which has been

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

Last week we published a preliminary account of the remarkable investigations and discoveries of Mr. G. V. Dowding, Technical Editor of “Popular Wireless,” in connection with loudspeaker reproduction. This week Dr. Roberts gives you some details of Mr. Dowding's new system of sound technique, and shows that it may well have immense possibilities in relation to large-scale sound reproduction generally—and especially the talkies—not to mention its use on a smaller scale in the homes of millions of listeners.



This is the circuit of the original experimental apparatus, which in the photograph above is being adjusted by the inventor. The intensity of the Infra-Sonic vibrations, developed by a Dynatron oscillator, is automatically controlled by a kind of “forward” A.V.C. scheme. But the output is a pure Infra-Sonic frequency, and this is handled by a separate reproducer.

undertaken during many months past by Mr. G. V. Dowding, Technical Editor of this journal.

Mr. Dowding has been studying this problem of the limitations of the loudspeaker from all angles, and he has now evolved an entirely new technique which gives what he calls “the realistic effect of volume without mere loudness.”

I only wish I could now proceed to give you a demonstration of his apparatus,

because that would be more convincing in a few moments than hours of description. In the absence of a demonstration I can only say that this new technique supplies the “missing link”; it puts back that “something”—that extra something—the others haven't got.

### Sounds that are Felt.

It gives that sense of size, of bigness that you get from a large source of sound and that is lacking from the reproduction from a small source of sound, such as a speaker diaphragm.

Now, this new Dowding technique, to which the name Infra-Sonics has been applied, comprises the addition of feeling to radio or gramophone reproduction. The feeling experienced in the direct hearing of an orchestra or band comprises two factors: overall loudness—that is, a relatively great amplitude of all the audio-frequencies—and families of low frequencies which are so low in pitch that they cannot be heard as musical notes at all.

These latter, although they cannot be heard in the ordinary sense, can, nevertheless, be felt. And the curious thing is that there is no sharply defined line of demarcation between the lowest notes that can be heard and those that may be said to belong to the realm of feeling.

Probably they are still heard—that is to say, experienced mainly by the ear—but

as they are so low they cease to form any musical note.

Now you will see that if the loudspeaker cannot bring with it, as it were, this fundamental basis of sound and feeling, the other alternative is to provide this basis and to add it to the reproduced sound artificially. This is precisely what Mr. Dowding does in his new technique.

It may sound a bold step—it is a bold  
(Continued on next page.)

# FITTING A RADIOGRAM SWITCH

By C. ROBINSON.

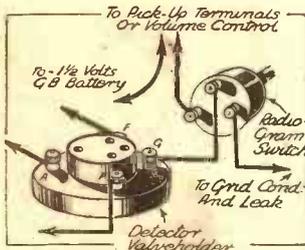
To adapt a set to reproduce gramophone records electrically by means of a pick-up is said to be a simple matter, but, nevertheless, little difficulties do crop up in practice. This article smooths them all away and tells you exactly how the job should be done.

A RADIOGRAM switch may easily be added to almost any set having one or more L.F. stages. A single-pole double-throw switch is required.

If the detector valve holder is near the panel the switch may be mounted on the panel; but if the detector valve holder is near the back of the set the switch should be mounted on the terminal strip or on a baseboard bracket, an extension rod being provided for panel control.

### The Wiring Alterations.

The leads connected to the grid terminal of the detector valve holder should be



disconnected from this point and connected instead to one of the outer terminals of the radiogram switch. The centre (or moving arm) of the switch should be connected to the detector valve holder grid terminal.

One of the pick-up leads should be connected to the remaining outer terminal of the radiogram switch, the other pick-up lead being connected to  $-1\frac{1}{2}$  volts on the grid-bias battery. This method is also suitable for use with an A.C. or D.C. set using indirectly-heated valves and a leaky-grid-type detector.

In this case, however, the leads connected to the C terminal of the detector should be disconnected and attached instead to one terminal of a 1,000-ohms resistance and also one terminal of a 2-mfd. condenser.

### Grid-Leak Connections.

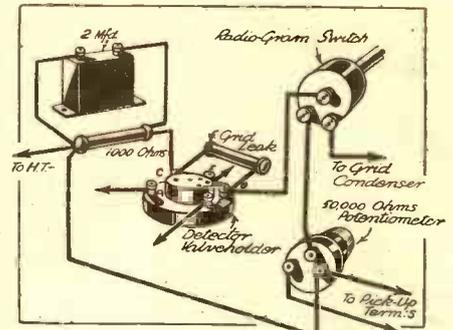
The pick-up lead which is not connected to the radiogram switch should also be connected to these resistance and condenser terminals. The remaining terminals of the resistance and condenser should be connected to the C terminal of the detector valve holder. The grid leak should be

disconnected and connected instead to the G and C terminals of the detector valve holder.

### Arranging the Volume Control.

A volume control for gramophone reproduction is often required, and this may be a 50,000-ohms potentiometer. The two pick-up leads are attached to the two outer terminals of this volume control. The centre (slider) terminal and one outer terminal of the volume control should be connected to the correct points on the set—that is, the radiogram switch and G.B. battery (or 1,000-ohms resistance and 2-mfd. condenser in a mains set).

It is sometimes necessary to enclose the leads from the set to the pick-up in metallic screening sleeving, this sleeving being connected to the earth terminal.



# REAL LIFE REPRODUCTION

(Continued from previous page.)

step, and perhaps that is why it has never been done before.

The Infra-Sonic vibrations are generated quite independently of the receiving circuits of the radio receiver. But the important point is that they automatically follow the variations in the output of the set. Every single fluctuation of the loudness level from the set carries with it an exactly balanced proportion of this Infra-Sonic energy.

### Artificiality is Removed.

Now you begin to see how the artificiality is got rid of. The Infra-Sonic energy is, as it were, placed at the disposal of the output from the set—"offered" to it, as you might say—and the output "decides" of itself just how much of this "I.S." energy it will take up from moment to moment.

This is the crucial point of the whole technique, and this is the remarkably clever way in which an artificial effect is absorbed into a natural effect and made part of it.

For the Infra-Sonic energy a fixed frequency is used, for remember that an Infra-Sonic carries no tonal content, and is therefore not called upon to fit into harmonic structures.

And now a word as to how it is done. A valve generator develops the low frequency, and the output from this is passed on to a control valve, the amplification of the

latter being varied in strict coincidence with the volume level of the output from the set. You will gather this from the accompanying circuit diagram.

Then follows a straightforward amplifying chain. I say this is straightforward, but, of course, it is very specialised owing to the special character of the frequency that is to be handled.

### Fundamental Tones.

Another outstanding feature of the system is this: There must be no harmonics developed—the vibrations must be fundamental tones. If harmonics were generated, clearly we should have audible notes, which would be directly contrary to the basic principle of the whole system.

And now you want to know how these fundamental low-frequency Infra-Sonic

vibrations are communicated to the air and mixed with the reproduction. Well, they are produced from one (or more) diaphragms precisely after the fashion of ordinary moving-coil speaker diaphragms, but, of course, suspended and adjusted in a special way to permit not only of the very low frequencies involved, but also of the very large amplitudes of vibration. Believe me, when these diaphragms are in action you can see them move.

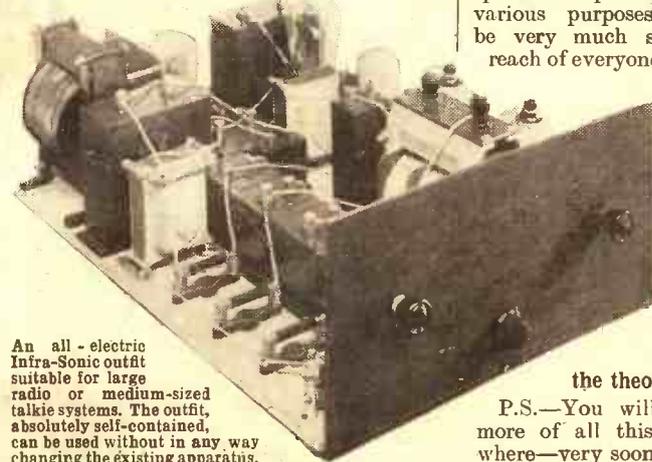
There are a few minor problems to be solved yet. The components which are designed and used for audio-frequencies are in general unsuitable for Infra-Sonic frequencies. So Mr. Dowding and his co-workers had before them special problems of this character.

The apparatus and layout may seem somewhat elaborate at present, but when special components are available for the various purposes this new system will be very much simpler and within the reach of everyone.

So far as the talking pictures are concerned, this is "the thing" par excellence, and I for one shall be greatly surprised if this doesn't shake us up into new activity.

It all sounds very curious, doesn't it? But you haven't heard it, and I have. And, believe me, whatever the theory may be, it works!

P.S.—You will no doubt be hearing more of all this in "P.W."—and elsewhere—very soon.



An all-electric Infra-Sonic outfit suitable for large radio or medium-sized talkie systems. The outfit, absolutely self-contained, can be used without in any way changing the existing apparatus.



"No major change in transmission technique has taken place during the last five years," says P. P. Eckersley, who, while discussing perfect reception, advocates once again that wireless should never be used for entertainment where the wire could serve.

THE other day I handled a typical superhet as sold to the public for the order of fifteen guineas. Wonderful—and awful! Wonderful that for so little money you can get so much; awful that so much of what you got was not worth any money.

I am asked again and again: "Tell me—you ought to know if anyone does—what is the best set to buy?" My invariable reply is: "The same money will buy the same sort of set. The results, so far as I can judge, are much the same for the same price whatever the set. Go, then, and listen for yourself and choose which kind of noise you like the best. I would not dream of recommending one more than another, because to me they are all about the same."

**My Own Preference.**

Frankly, I would far rather listen to a well-tuned and well-made 1 H.F. det. and 1 L.F. set than to any modern superhet that I have so far heard. You may not get so many stations with the simple set, or, if you get them, they may be more difficult to separate one from another; but their reproduction is the better as the selectivity is worse.

My own set is a "defector and 2 L.F." It gets either London Regional or London National. I use an outdoor aerial which climbs up a roof somewhere (and is at present shorted). It is a very good set; it energises a moving-iron speaker. There are five valves in all, because the penultimate and output stages are in paraphase, i.e. their grids are energised in phase opposition. I think it makes a very good kind of sound—it is, that is to say, a good compromise.

I am thinking over the design of a purely "local-station" set even now. I doubt if I shall use a high-frequency valve if I can use a big aerial.

**No Progress is Being Made.**

But something needs to be done about this whole wireless art. No progress is being made. You will remember the exciting days when the result kept on being improved for the same cost. The only changes to-day consist in making the same noise cheaper. Of course, the game has become stereotyped because the transmission authorities have failed to give a lead. No major change in transmission technique has taken place during the last five years. Instead of progress there has been retrogression; if you want to see the memorial, listen around you. Nothing can be done until stations are separated by more than 10 kc./sec. About 15 kc./sec. would be right.

Then the next thing to do would be to change the wavelengths around so that broadcasting had better facilities, because, at present, wavelengths are allocated without any regard to technical necessity. A wise technician who had power and wasn't afraid to use it (he would have to have the assistance of a world dictator) would arrange broadcasting waves from 3,000 metres down to 500, and separate all stations by 15 kc./sec. and insist upon powers of 200 kw. minimum.

The International Union was strong once, and it could have forced its way to better things, governments or no governments. But it got into the hands of politicians who, under the guise of helping it, undermined it. And, having proven its inability to arrange its own affairs, it had no case to demand better facilities. So, at Madrid, it failed rather ignominiously, only to complete the fiasco at Lucerne. Excuses there may be, but facts are stronger. Broadcasting is stagnant, both in technique and in programme material.

The result of the bureaucratic failure may be to change technique and use ultra-short waves for urban broadcasting. Undoubtedly, the ultra-short wave has possibilities, but it is curious that no one has done much or said much about them.

**Ultra-Short Wave Advantages.**

I take it that ultra-short waves have the supreme advantage that they do not penetrate far, and therefore the same wavelength can be used over and over again in different localities. Moreover, there are a great many available wavelengths—almost infinite.

The difficulties in contrast are, while not perhaps insurmountable, at any rate considerable. I am told that motor-car ignition systems interfere with reception. I believe reception is very patchy; one may get huge changes of level even in a living room of ordinary size. Steel-frame buildings are said to act as shields and prevent signals from being picked up unless outdoor aerials are used—and not always then.

Then, again, television will only be possible if these waves are used. (One has been saying this for six or seven years, and now with undisguised naïveté some of the old-guard television people are announcing the same discovery!) Aircraft can be guided in fog by the use of these waves. Police cars, beam connection across narrow seas instead of costly cable—there are a number of uses besides broadcasting to which these waves can be put.

**The Best Solution.**

My own solution is, I think, the best. I have spent a great deal of time thinking about these things, and I don't think it is the best only because it's mine, but rather because it just *is* the best. I would rule that in no circumstances must wireless be used where the wire could serve. The cost of fitting every urban listener on to the wire system would be of the order of twenty-five million pounds, saving the public, as compared with ultra-short wave technique, the order of fifty-five million pounds. And the upkeep would be less.

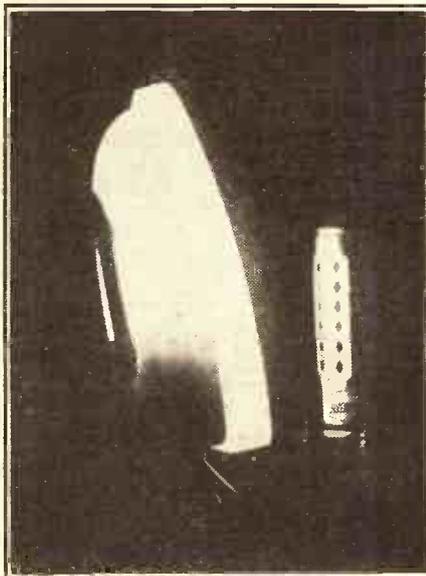
Then, again, to re-equip every urban listener with a set costing, say, £20 would cost the public eighty million pounds. (This recommends the project to the manufacturer.)

But the rural listener could have a "long wave," i.e. any wave between 3,000 and 600, technique and plenty of choice.

The wire user would have local, Regional, National, continental and world programmes to choose from.

Pity someone doesn't do something!

**AN INFRA-RED PHOTOGRAPH**



This impressive photograph illustrates one of the ways in which the infra-red process can be employed to make a striking picture. In the photograph are a Marconi M.H.4 Catkin valve and an electric iron, and as far as the human eye could see, the objects were in total darkness. The exposure given was 6 hours, and it is interesting to note that the electric iron, which appears to be white hot, was merely warm! The photograph was taken by an amateur photographer in Cardiff.

**S**ECRET negotiations between the various television companies, the Post Office and the B.B.C. are coming to a head. As I have already exclusively recounted, the B.B.C., while being anxious to prevent anyone else from giving a television service, wishes to put the responsibility for the decision as between rival processes on the shoulders of the Postmaster-General.

The latter, while ready to help, is not unnaturally alive to the possibilities, in the publicity sense, of the Post Office taking over from the B.B.C. the development of television experiments. So there is a strong possibility that the B.B.C. will be relieved entirely for television transmissions.

**"In Town To-Night."**

The "In Town To-night" feature, recently introduced into the Saturday evening programmes to provide topical interest, has been a great success. I understand it will be suspended during the summer, to be resumed in the autumn.

This is a wise move. The B.B.C. is inclined normally to run a good thing to death. After the summer the feature can be revived with fresh interest.

Two points, however, must be kept in mind: the first that incidental advertisements should be carefully controlled; and the second that there should be a due proportion of music.

**FOR NATIONAL LISTENERS**

**Outstanding programmes of the week**

**Feature.** "SCRAPBOOK FOR 1914" [Monday, May 7]. Leslie Baily's memories for the first year of the War.

**Variety.** "ROYAL COMMAND VARIETY PERFORMANCE" [Tuesday, May 8]. A relay from the London Palladium of a "bill" which includes Henry Hall, and Elsie and Doris Waters.

**Music.** "LONDON MUSIC FESTIVAL" [Wednesday, May 9]. The third B.B.C. concert from the Queen's Hall.

**Drama.** "PURSUIT OF ADONIS" [Thursday, May 10]. A new play by Farjeon and Horsnall.

**New B.B.C. Reorganisation.**

The Board of Governors of the B.B.C. is about to consider a complete new scheme of organisation, based on the experience of the plan which has been operating during the past year. It is likely that the fresh plan, which will be enforced next October, will involve important changes of personnel and a general reshuffling of functions.

**Concentrating Responsibility.**

The idea this time will be to concentrate responsibility and restore a greater unity of endeavour. Experience of the divided responsibility as between creative and administrative officials has not been satisfactory.



"Are you listening?" says Harry Roy as he conducts a stage rehearsal with his band.

**P.M.G. TO RUN TELEVISION?**

—Latest News of Broadcasting Activities—

Indications are that the distinction will disappear and that the administrative authority will be recombined with the creative.

**Wireless Trade Restive.**

The Radio Manufacturers' Association is far from satisfied with the recent concessions which it has had from the B.B.C. True, these have involved the promise of longer morning transmissions, alternatives to dance music late at night and a brightening of Sunday programmes.

But in no respect has the B.B.C. gone as far as the trade desired, and the impression in the trade is that satisfaction will not be secured until the wireless industry as a whole acquires direct and continuous representation on the Board of the B.B.C.

**The "Mike" at Elstree.**

John Watt, the B.B.C. producer, will undertake a new rôle in programme work on Saturday, May 5th, when he acts as guide to listeners on a microphone visit to the Imperial Studios at Boreham Wood, Elstree, for an intimate glimpse of the making of a film, "The Private Life of Don Juan."

The artistes and other officials taking part whom listeners will meet are Douglas Fairbanks, Alexander Korda, Frederick Lonsdale, Merle Oberon, Benita Hume, Elsa Lanchester and Joan Gardner, as well as many of the technicians connected with the making of the London film production.

**Welsh Children's Message.**

The Rev. Gwilym Davies, M.A., the most active critic of the B.B.C. in Wales, has just won a resounding victory. Mr. Davies, under the inspiration of Lord Davies, has established in Wales, on Good-Will Day (May 18th), an arrangement whereby the children of Wales send a message of greeting to the children of the world. It has always been part of the plan to have this message broadcast generally, but the B.B.C.

has made difficulties, restricting transmission to Wales and the West Country. But Mr. Davies has clung on. He has agitated in season and out, latterly with the powerful assistance of Mr. Lloyd George himself.

**To the Empire.**

The result is that, this year, the message of the children of Wales to the children of the rest of the world will be radiated by West Regional, Midland Regional and North Regional in a special programme which will include songs by Welsh children as well as a

feature about the great Welsh heroes of antiquity.

The programme will be sent to those parts of the Empire receiving the short-wave service at that time. Mr. Davies is now developing his campaign to get a separate station for Wales.

**Burglars' Night Out.**

It will be "Burglars' Night" at the West Country Club, when the microphone pays a visit there for the entertainment of listeners on Saturday, May 19th.

To gain admittance that evening you must be dressed as a burglar—a fact which may induce some real members of the fraternity to look in, especially as some of the non-revelling guests (specially invited for the occasion) will be displaying the ancestral jewels.

**THE PROVINCIAL PROGRAMMES**

**Selections for your radio entertainment**

**Drama.** "AFTERNOON" [Midland Region, Monday, May 7]. A play relayed from the Opera House, Coventry.

**Variety.** "FROM BLACKBURN" [North Region, Tuesday, May 8]. Part of the "bill" from the Grand Theatre, Blackburn.

**Feature.** "BLACK COUNTRY BLUES" [Midland Region, Wednesday, May 9]. New Midland tunes presented in a new way.

**Commentary.** "THE CHESTER CUP" [North Region, Wednesday, May 9]. Mr. R. C. Lyle gives an account of this popular race from the Roodee Racecourse.

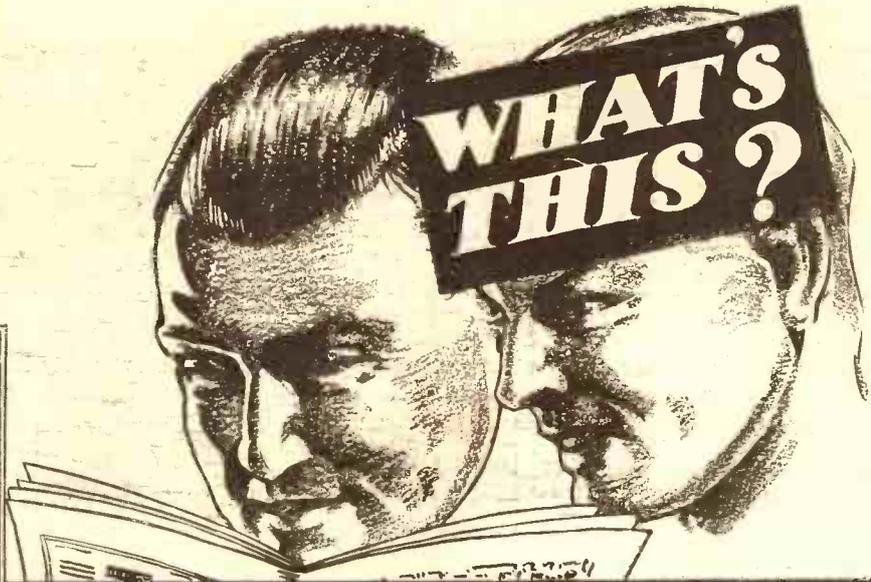
**"Good Running!"**

However, the authorities are alive to such dangers, and, when the police vans arrive towards the end of the broadcast, listeners will have enjoyed the show so much that they will wish the burglars good running until the microphone can catch up with them some time in the near future.

**An Old Cornish Custom.**

An eye-witness account of the Helston Furry Dance will be given for West Regional listeners on May 8th by Mr. A. K. Hamilton Jenkin, who has given many talks on Cornish customs and whose latest book, "Cornish Homes and Customs," is recognised as an authoritative work.

O.H.M.



**WIN**  
**£1 A WEEK**  
**FOR A YEAR**  
**10/- A WEEK**  
**FOR A YEAR**  
**£10 CASH**  
 or one of 25 other Prizes

**SIMPLE! EASY TO WIN**  
**FREE! CASH PRIZE**  
**COMPETITION**

**THE MOST INTERESTING COMPETITION**  
**YOU'VE EVER SEEN!!**

**MILLIAMPS**

0-6 milliamps.  
 0-30 "  
 0-120 "

**VOLTS**

0-6 volts.  
 0-120 "  
 0-300 "

**OHMS**

0-10,000 ohms.  
 0-60,000 "  
 0-1,200,000 "  
 0-3 megohms.



**40/-**

DEFERRED TERMS IF DESIRED.

*The Instrument that gives the getting of better results.*

As a radio man, could you do with some free, unmortgaged extra cash? Here is a rare chance of tuning in to a welcome windfall by simply being a radio man—by being sufficiently interested in radio to win an easy prize.

Not only easily but very enjoyably, too, you can win £1 a week for a year, 10/- a week for a year, £10 cash, or one of twenty-five other useful prizes. You have only to be interested in the performance of your set. Not technically; just spend a pleasant evening or two as a true radio man, and win a prize in this easy, free competition.

*Open to All!*

As long as you know the rudiments of radio, you can win a prize—without any difficulty or cost, without being technical, intellectual, clever or lucky. Ask at your nearest radio dealer's for particulars and free Entry Forms for the novel AvoMinor competition.

If any difficulty, post the coupon below.

THE **AVOMINOR**  
 REG. TRADE MARK

**TEN TESTING INSTRUMENTS IN ONE**

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.  
 WINDER HOUSE, DOUGLAS ST., LONDON, S.W.1. Phone: Victoria 3404-5-6-7.

**POST THIS COUPON FOR FREE ENTRY**

To THE AUTOMATIC COIL WINDER & ELEC. EQUIPMENT CO. LTD.,  
 Winder House, Douglas Street, London, S.W.1.

I enclose stamped, addressed envelope for Free Entry Form and full particulars of the AvoMinor Competition.

Name .....

Address .....

P.W.1

WHAT is, perhaps, the most-sought-after ideal among commercial set manufacturers of the present day is the production of the quality article at a "reachable" price.

The fallacy of catering only for those with expensive ideas—a necessarily restricted market—has long been exploded, and the astonishingly low level of prices which has been reached this year is evidence of the industry's determination not to rest until every home in this country is equipped with radio.

But a word in season to those who are waiting in the hope that ere long prices will touch still lower levels. The gradual but perceptible improvement in the country's economic position is a state of affairs for which we should all be grateful, but the rising tide of prosperity is hardly likely still further to reduce the level of prices. On the contrary, the improvement in conditions and the resulting increased demand are almost bound to bring in their wake an upward rather than a downward price tendency. Present indications, based on "inside information," give strength to this contention.

#### Certainly a Bold Experiment.

But it is hardly right to think that the depression has been wholly or even principally responsible for the present low level of prices. It is due to the zealous pursuance of a policy by a company who have probably done more to popularise radio than any other one firm in this country. We refer to the Telsen Electric Company. When Telsen first started to think about radio in a big way they fearlessly embarked upon a policy which was thought in many quarters to be little short of suicidal. Telsens said: Let us give the public what it wants at prices that it can afford to pay, and the increase in turn-over will more than justify the effort.

It was certainly a bold experiment, but that it has more than succeeded is very evident from the present popularity of their products. Telsen has led where others have been content to follow, and who would deny the tremendous advantage of being there first?

#### Such Amazing Value.

With all sincerity it may be said, we feel that Telsens have reached the peak of their enterprising achievements in the production of their latest radio-gramophone. No matter from what point of view it is considered—whether from that of price, performance or even appearance—one is inevitably forced to the conclusion that this enterprising firm has again scored a bull in the design of the new Model 1240.

It is, in every sense of the word, a receiver of renown, and at the attractively low price at which it is offered we confidently anticipate that it will be the deciding factor in the minds of many who have been wavering on the brink, undetermined whether to buy now or to hope for still lower prices.

Barring the arrival of some revolutionary

reception principle, it's a safe gamble that such amazing value can never be offered at a lower price while raw-material prices are maintained at the present levels, and we have already indicated what is likely to happen in this respect with the return to industrial prosperity.

combination, representing all that is best in radio and gramophone practice, at a price which, twelve months ago, would have applied for the radio part alone.

The Telsen Model 1240, ignoring for a moment the technical aspects, has obviously been designed with a careful eye on the questions of both appearance and operation. Broadly speaking, the cabinet is a radical departure from the conventional type of thing, but, in our opinion, nothing has been lost by the skilful attempt

to introduce into its general layout a touch of the future. In fact, the general appearance of the cabinet, which is carried out in different shades of walnut veneer, is consistent with that of an instrument costing double the price.

#### Additional Aid to Selectivity.

Then, too, from the point of view of operation, there is abundant evidence to show that every consideration has been given to domestic requirements. The number of active-controls has been kept down to three—the very minimum for the type of circuit employed—and they consist of a master tuning control actuating a knife-edge pointer over tuning scales calibrated in wavelength, a dual-purpose volume control which is effective on both radio and gramophone, and what might be termed a single booster in the shape of a reaction control. With the present congested state of the ether this latter control may, in certain circumstances, be regarded as an additional aid to selectivity.

The circuit consists of a screened-grid high-frequency pentode amplifier, an H.F. pentode detector (both Mullard), followed by a Mazda A.C./2/Pen. in the output position. The rectifier—the set, of course, is for A.C. mains—is a Mullard IW3 full-wave rectifier.

There are the usual refinements such as, for instance, the provision of sockets for additional speakers, the inclusion of a mains aerial device and the incorporation of an adjustable hum neutraliser for particularly "dirty" mains.

#### A Firm Favourite Among Listeners.

Our practical tests of the Model 1240 have convinced us of its capabilities as a distance getter. Using the mains aerial alone, we found it easily possible to tune in no less than 30 different programmes, and with a short length of wire (40 ft.), attached in place of the mains aerial, there seemed to be no limit to the number of stations that could be received. The quality of reproduction, too, left nothing to be desired.

In fact, judged from the point of view of tonal balance—that is to say the right proportions of bass and treble—it is our considered opinion that the Telsen 1240 is not only completely satisfying, but decidedly above the average.

Summed up, there is no doubt in our minds that the new Model 1240, on grounds of merit and consistent with the amazingly low price charged for it, will rapidly establish itself as a firm favourite among listeners throughout the country.

### RECEIVERS OF RENOWN:

## THE NEW TELSEN RADIOGRAM MODEL 1240.

A first-class, all-electric radiogramophone at an extremely moderate cost.



The handsome cabinet of the Model 1240 is carried out in different shades of walnut veneer.

### TECHNICAL SPECIFICATION

**GENERAL DESCRIPTION.**—All-electric radio-gramophone for A.C. mains, in veneered walnut cabinet of the upright pedestal type.

**CIRCUIT ARRANGEMENT.**—Three pentodes. A Mullard S.P.4 is used as an H.F. pentode amplifier, and a similar type of Mullard valve is used in the detector position. The output consists of a Mazda A.C./2/Pen. super-power pentode. Rectification is carried out by a Mullard I.W.3, which is of the full-wave, indirectly-heated type.

**SPECIAL FEATURES.**—(1) The circuit employed.  
(2) Dual volume control operative on both radio and gramophone.  
(3) Incorporation of unique hum-adjuster.  
(4) Provision for connection of mains aerial and external speakers.

**PRICE.**—18 guineas.

**POWER SUPPLY.**—A.C. mains, 200-250 volts, 50-60 cycles.

**MAKERS.**—The Telsen Electric Co., Ltd., Thomas Street, Aston, Birmingham.

Let us, then, count our blessings while we may, and be thankful that for the present, at any rate, it is possible to obtain a

# ON THE SHORT-WAVES

## OUR SPECIAL SECTION for SHORT-WAVE ENTHUSIASTS

CONDUCTED by W.L.S.

SHORT-WAVE stations heard, but not identified, have a way of becoming something phenomenal unless one takes a good hard grip on one's conscience. Actually they are worth nothing whatever, because, however much one hopes that the funny little noise just tuned in may be Sydney, he may be a commercial station in Poland or something similar.

All short-wave enthusiasts worthy of the name should possess either a reliable heterodyne wavemeter or a reliably calibrated receiver. The latter proposition being the most simple and straightforward, I want to deal with it right now.

Everyone knows how to calibrate a receiver in some rough fashion. The mere fact that you turn almost automatically to

W 8 X K on 19.72 or D J B on 19.73, about 10 kc. apart? Especially if W 8 X K is giving a German lesson and D J B is playing fox-trots!

So let's get this one cleared first. You must give up all idea of covering the whole Brave New World on one nonchalant sweep of a three-inch dial. It can't be done. It is inevitable that the 16- and 19-metre bands should be received on the same coil, but

bands; and carry that logic into your graph drawing by using nice open scales.

Now for the business of getting the original readings from which the graphs are to be drawn. That is mostly what my dear old maths. master used to call "common gump." There must be half a dozen stations that you do know definitely. Even if there aren't, you've only got to put the phones on when you are feeling nice and lazy and stick to one or two until they do give an announcement.

Then put them straight down on the graph paper, not leaving out noughts or decimal points en route. Work in kilocycles if you find it possible to cast off the wavelength complex. You can take it

### IDENTIFYING STATIONS

Don't "kid" yourself a programme comes from the station you hope it does; calibrate your set and be sure of your log.

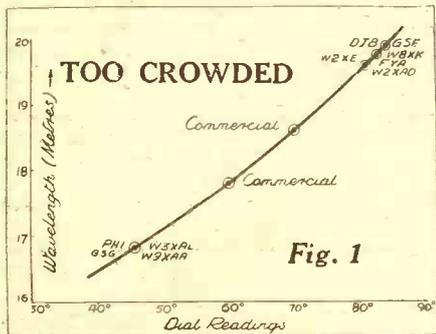


Fig. 1

If you cover too wide a waveband with your tuning condenser, you will never be able to read your calibration chart with sufficient accuracy.

35 degrees (or whatever it is) and say "Now for W 8 X K" (or whoever it is!) proves that. My contention is that a badly calibrated set is capable of leading one farther up the garden than one that is not calibrated at all, since a station on an unfamiliar spot on the dial can so easily be put down as what you hope it is rather than what it is.

#### Spreading the Waveband

Take a look at Fig. 1. Quite a nicely drawn graph (though I did it), but, I venture to suggest, almost useless. The 16-metre band is shown in the left-hand bottom corner; the 19-metre band in the right-hand top corner. The wave-range covered, roughly 16-20 metres, is quite moderate; yet the thing's no good.

If you don't believe me, just ask yourself how you'd fare on the 19-metre band with seven stations crammed between 19.56 and 19.84 metres.

Enter snag No. 1—can you read your tuning dial to a tenth of a degree? If not, how do you know whether you're listening

you can spread them well out, as you will see that I have done, by using the smallest possible size of condenser.

Look now at Fig. 2. This is a kind of enlarged reproduction of the 19-metre part of Fig. 1. It is possible, on this graph, to separate all the stations on the 19-metre band. Whether you can tell one from t'other by looking at your dial is another matter, which I can't help you with except for the advice I've already given you.

What this little homily, so far, all boils down to is simply this: Make your tuning as easy as possible by spreading out the

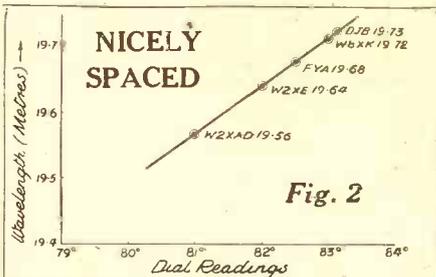


Fig. 2

Use as large a scale as possible for each waveband and your graphs will be of real use, providing you can read your dial to a tenth of a degree.

from me that kilocycles are much easier and much more convenient in the long run.

One piece of advice that I should like to rub in very strongly is that potential "calibrators" should not shy at coil changing. It is very nice to have all the short-wave broadcast accommodated on two coils—16, 19 and 25 on the small one and 31 and 49 on the big one—but it's much better to make a threesome of it.

That makes quite a convenient spread-out, with 16 metres at the bottom of the smaller coil and 19 metres half-way up or near the top; 25 and 31 similarly placed on the middle one; and 49 metres in its lone glory on the top one.

#### Convenient Placing

Then, if you're interested in the amateurs, you will probably find the 40-metre band conveniently placed on your top coil, with 20 metres at the top end of the smallest size.

Finally, three DON'TS: Don't plot any station until you have definitely identified him. Don't be in too much of a hurry. Don't forget that if you change a valve, alter your aerial coupling or play about with H.T. you may upset the calibration.

#### A RIDING COMMENTARY



How a commentary was broadcast on Japanese army manoeuvres. The first horse carried the announcer and his microphone, the second a short-wave transmitter and the third an engineer with a check receiver.

On the Short Waves—Page 2.



THE response to my request for help on 5-metre Field-Day work has been positively embarrassing. Will readers who wrote on this subject please accept this intimation that (a) I thank them very much, and (b) their names have been carefully filed for future reference? I hope to describe a 5-metre receiver shortly, and also to announce the first series of tests.

"A. S. W." (Burnley) wants identification of X P A-o C R M. I imagine it's a Dutch ship with a "ham" operator on board. Regarding "H. A. C." membership, "A. S. W.," I have had to drop the scheme owing to the fact that practically every owner of a short-waver is now qualified and there's no distinction in it. We'll have to think of a more difficult one.

#### On Forty Metres.

"W. G. M." (Southampton), together with a nice letter about our new section, encloses a beautiful list of D X amateurs heard. He finds that the 40-metre band is not so reliable nowadays, and that summer conditions seem to be arriving.

"A. R. M." (Doncaster) has an unusual scheme for a short-wave adaptor. He incorporates an L.F. transformer in the adaptor, which is, of course, otherwise a straightforward short-wave single-valver, and he takes two leads from its secondary to the grid leak of the first L.F. valve in his "S.T.400." Incidentally, in spite of this transformer coupling, he finds an S.G. valve excellent for short-wave detection.

"M. K. J." (Bilston), sore troubled by

hand capacity, has evolved a marvellous scheme for overcoming it. He has his set on a card table, and runs a wire at shoulder height round the table and the chair. True, as he says, "you have to stand on the chair and jump out," but why worry about a little thing like that?

All the same, "M. K. J.," I'd sooner see you getting rid of the trouble at the root than by external appliances. It's only one step farther from yours to have the whole affair—chair, table and all—in a sort of huge birdcage. Thanks for your log.

#### Skeleton or Solid Coils?

"W. F. D." (Wifney) joins issue with me about my recent article on "Coil Construction." He avers that a ribbed skeleton former is streets ahead of a solid former for short-wave coils, but, as he is comparing a home-made "skeleton" with a commercial

on the best type of triode for short-wave detection. He has been using, of all the strange things, one of the dear old Dutch valves (of the blue-glow variety!). He finds sensitivity terrific, but, naturally, spoilt by background noises.

#### The Question of Comfort.

For a short-wave detector I favour a valve of, say, 10,000- or 15,000-ohms anode impedance, with which one generally gets a mag. of about 18 and a mutual conductance of 1.5 or so. I am thinking of the Mullard P.M.2D.X., Marconi or Osram L.21, Mazda L.2, Cossor 210 Det., etc. The "H.L." class (impedance 20,000, mag. 28, mutual conductance 1.4) is better for resistance coupling, but even then there isn't much to choose.

"R. H." (Pitdown) doesn't quite approve of my sketch of a "comfortable operating position." He thinks the gentleman portrayed therein was too upright for real comfort, and advises a table not higher than 2 feet 6 inches, so that one can loll back in an easy chair.

Personally, "R. H.," I like to be closer to my receiver than, from your sketch, you appear to be. Also it's nice to rest one's elbows on the table when one is

listening or tuning round for long periods. But every man to his taste.

"A. W." (Cape Town) very kindly sends me cuttings from the "Week-end Argus Radio Section," and offers to become my official correspondent in S.A. Offer accepted with thanks, "A. W."

Several readers have asked me how I recommend them to keep a log, and I have accordingly drawn up a specimen, which is shown herewith. The various headings are self-explanatory.

#### HOW YOU SHOULD ARRANGE YOUR LOG BOOK

Date	Time	Station Heard	Calling	W/L	Dial Reading	Remarks	
Apr. 6	16.00	W3XAL	B'cast	16-87	a45	R7-QRM	Tel.
	16.50	W2XAD	"	19-56	a81-5	R6-F	Tel.
	18.00	ZS4M	CQ	21	a100	R5-T4	C.W.
Apr. 7	18.05	W2GOQ	G2XX	21	a100-2	R6	Tel.
	07.00	VK2ME	B'cast	31-28	b21	R4-R2	Tel.

NOTE.—Under "Dial Reading" the small a and b indicate coil sizes.

"solid," his argument may not hold water. The commercial coil, for one thing, may have been unsuitable from the point of view of turn numbers and the like.

#### A Blue-Glow Detector.

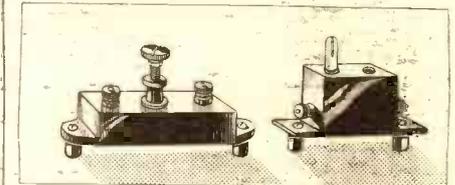
I don't think I ever said that a solid former was definitely as good as a skeleton, but I do say that solid formers will give much better results than many people believe.

This same "W. F. D." wants my views

Buenos Aires, on 28-98 metres. The recent relay to this country was handled through the latter station.

The famous low-power station TI4NRH, in Costa Rica, will probably be back on the air by the time you read these notes.

#### FOR METAL CHASSIS



When working on short waves, close proximity of such components as pre-set condensers and coil holders to an earthed metal chassis may be detrimental to results because of the capacity by-pass effect. All possibility of trouble from this source can be overcome by small ebonite distance pieces slipped over the bolts which hold the components to the chassis.

The wavelength, as before, will be 31 metres approximately. The owner has been out of the country and, I am told, is only too anxious to get his "little TI4NRH" back in action.

W. L. S.



PERIODICAL variations in conditions are "news" for short-wave listeners, and I have decided to keep my remarks on this subject under this heading in future.

The only outstanding item of news of this kind at present is that the 25-metre band seems extraordinarily lively. For two or three evenings I have listened to W 8 X K at 10.30 p.m. or thereabouts, and have held him for an hour without missing a note or a syllable.

#### Another Club.

This is to announce the formation of the Heathfield (Sussex) Short-Wave Radio and Television Society. Anyone interested is asked to get into touch with the acting Hon. Sec., Mr. R. J. Lee, 9, Theobalds Green, Heathfield.

My recent note about the formation of the "Society of Wireless Pioneers" has brought forth a letter from the chief of the publicity department, Mr. R. L. Rawles, Blackwater Corner, I.O.W. All inquiries should go to him. Without comment I reproduce herewith some of the questions to be filled in on the application form: (a) Give the exact length of a short circuit. (b) How many feet into the earth's core does the Heaviside Layer extend? (c) Is the Wheatstone Bridge located in Virginia or New York State?

#### Have You Heard "Little America"?

Among new stations reported on the air (and definitely heard over here) are the following: TI O, Costa Rica, on 39 metres; O P M, Leopoldville, Belgium Congo, on 29.6 metres; C M 6 X J, Cuba, on 36 metres; V Y 5 B M O, Venezuela, on 49-39 metres.

I understand, also, that CP 5, the notorious Bolivian station, has shifted its wavelength and is now to be found (if you're lucky) on 32.9 metres.

The station of the Byrd Expedition in "Little America," using the call-sign KFZ, is transmitting on about ten different wavelengths at various times of day. Late at night he may often be heard via L S X,



The Pilot Kit SERVICE was founded in 1919.

# PETO-SCOTT TELEVISION KITS

## S.T.500 • NEW EVERYBODY'S 3 •



See the PILOT on the carton. It's a real guarantee.

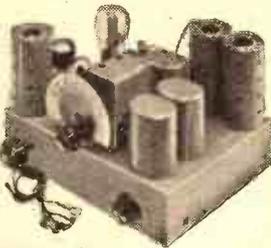
# PILOT AUTHOR KIT EXACT TO SPECIFICATION

**IMPORTANT** Miscellaneous Components, Parts, Kits, Finished Receivers or Accessories for Cash, C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid (GREAT BRITAIN ONLY.) OVERSEAS CUSTOMERS CAN SEND TO US WITH CONFIDENCE. We carry a special expert staff and save all delay. We pay half carriage—packed free. Send full value plus sufficient for half carriage. Any surplus refunded immediately. Hire Purchase Terms are NOT available to Irish or Overseas customers.

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**47/6**

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38 in. high  
22 in. wide  
15 1/2 in. deep  
Speaker Compartment, 17 in. by 19 in. by 14 in.

YOURS FOR **8/3**

CONVERT YOUR EXISTING SET INTO A MODERN RADIOGRAM

As illustrated. **63/-** Direct from Factory. No MIDDLEMAN'S PROFITS. Built by master-craftsmen of the piano trade. Real inlaid walnut—mortised, tenoned. French polished. With motor-board ready to take your set, speaker and power equipment. Plain front or vignotted panels, 14 in. by 7 in., 16 in. by 7 in., 18 in. by 8 in. Baffle-board, 3/6 extra.

## PETO-SCOTT 75/- DISC TELEVISION KIT



As described in this issue.

### ASSEMBLED IN 30 MINUTES

Peto-Scott, Pioneers in Television since 1927, have, after considerable research, produced this "up-to-the-minute" Disc Television Receiver Kit, of which Efficiency and Economy are the keywords. Peto-Scott's huge production resources, coupled with their Easy Way System, put this splendid Kit within the reach of all.

### NO SPECIAL TOOLS REQUIRED

Designed to work from almost any 3-valve battery or mains set, the Peto-Scott 75/- Disc Television Receiver is supplied in Kit form, and comprises Peto-Scott Universal Television Motor and stand; controlling resistances; laminated and ready assembled chassis; Stroboscopic 16" scanning disc; Lens and lensholder; Neon Lamp and holder, together with sundry small parts. It is absolutely complete down to the last screw and piece of wire. Full-size Blue Print with assembly, wiring and operating instructions included with every Kit. Cash or C.O.D., Carriage Paid, 75/-.

YOURS FOR

**15/-**

and 11 monthly payments of 6/3.

### SPARES LIST

	£	s.	d.
Peto-Scott Universal Television Motor, A.C. or D.C., 200-250-v.	1	10	0
6-volt (Battery)	1	15	0
Motor Stand		2	6

	£	s.	d.
2 Motor Resistances (1 Variable, 1 Fixed)	11	6	
Scanning Disc, 16" (6-ribbed)		7	6
Lens and Holder		7	6
Neon Lamp and Holder		4	7
Wood Chassis (ready slotted for disc)		4	6

## MIRROR SCREW TELEVISION RECEIVER KIT "A"

As described in this issue. Kit of First Specified Components, less lamp and cabinet. Cash or C.O.D. Carriage Paid **£7-12-6**.

1 Neon Osglim flat plate lamp ... 1 5 0  
1 Peto-Scott cabinet ... 17 6

## MIRROR SCREEN SPARES LIST

	£	s.	d.
Mirror-edged plates, drilled, finished dull black, each	1	0	
Brass Centre Boss, complete with locking nuts, each	2	6	
Moulded Bakelite end plates, 8 ribbed, the pair	4	6	
1" mild steel spindle, accurately ground, each		6	

## SYNCHRONISING GEAR KIT

Complete kit of parts comprises one Mild Steel frame with end bobbin supports, 2 assembled laminated pole pieces, 2 ready wound bobbins, 2 ebonite handles. Ready to mount on either end of Peto-Scott Universal Motor. Cash or C.O.D. Post free or Deposit 5/- and 7 monthly payments of 5/-.

**37/6**

ANY ITEM SUPPLIED SEPARATELY—ORDERS OVER 10/- SENT C.O.D. CARRIAGE AND POST CHARGES PAID

## S.T. 500

**KIT "A"** Comprising Mr. John Scott-Taggart's Kit of FIRST SPECIFIED Components, including Telsen Class B Output Choke, Peto-Scott "Metaplex" Baseboard and Ready-drilled Panel and Terminal Strip, Lens Valves and Cabinet. With FULL-SIZE Blue Print and copy of "Popular Wireless" £5-5-0 or 12 monthly payments of 9/6

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As Kit "A," but including 4 Specified Valves. Cash or C.O.D. Carriage Paid, **£7-10-3** or 12 monthly payments of 13/9.

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As Kit "B," but including Peto-Scott Specified Walnut Cabinet. Cash or C.O.D. Carriage Paid, **£8-9-9** or 12 monthly payments of 15/6.

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As Kit "B," including Peto-Scott Specified Walnut Console Cabinet. Complete with Baffle Baseboard Assembly, but less Speaker. Cash or C.O.D. Carriage Paid, **£8-19-9** or 12 monthly payments of 16/3. If Peto-Scott Permanent Magnet Speaker required add 19/6 to Cash Price or add 1/9 to each monthly payment.

## NEW EVERYBODY'S 3

**KIT "A"** Author's Kit of First Specified Parts, including Ready-drilled Panel, Baseboard and Terminal Strips, but less Valves and Cabinet. Cash or **£2-15-0** C.O.D. Carriage Paid or 12 monthly payments of 5/-.

### KIT "B"

As for Kit "A," but with Set of Specified Valves only. Cash or C.O.D. Carriage Paid, **£4/6/3**, or 12 monthly payments of 8/-.

### KIT "C"

As for Kit "A," but with Valves and PETO-SCOTT Universal Table Cabinet, Cash or C.O.D. Carriage Paid, **£5/1/3**, or 12 monthly payments of 9/3.

PETO-SCOTT Co. Ltd., 77, City Road, London, E.C.1. Telephone: Clerkenwell 9406-7. West End Showrooms: 62, High Holborn, London, W.C.1. Telephone: Holborn 3248.

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(b) I enclose Cash/Deposit.....

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P.W., 5/5/34.

IMMEDIATE DELIVERY—CASH—C.O.D. or H.P.

OUR PAGE FOR BEGINNERS.

# HOW REACTION HELPS

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

## REACTION.

The feeding back of energy from the anode circuit of a valve to its grid, or to the grid of a preceding valve, for further amplification.

When it is properly controlled reaction greatly assists the sensitivity and selectivity of a circuit; but if it is applied in too great a degree continuous oscillations will be set up. If reception is then at all possible, which is unlikely, there will be at the least serious distortion.

The simplest method of introducing reaction is by the "magnetic" method. This is shown in the first diagram. The circuit is a straightforward grid-detection arrangement, and instead of an L.F. transformer to lead the energy into an L.F. amplifying stage, telephone receivers could be used.

### Tuning is Affected.

It will be seen that the anode circuit embodies a coil which is variably coupled to the tuning coil. The amount of H.F. energy passed back from the anode circuit to the grid circuit is regulated by the coupling between these two coils.

For instance, they can be moved nearer or farther apart in order to increase or decrease the reaction as required.

The disadvantage obtaining with this method is that the tuning is considerably affected as the reaction coil is moved, owing to the consequent variation of mutual inductance between the coils.

A better scheme is to arrange for a capacity control, and one such is illustrated in the second diagram.

In this case the position of the reaction coil is fixed in relation

alternative route that it can take through the reaction winding and reaction condenser.

As the reaction condenser is in series it controls the H.F. feed-back merely by regulating the flow of H.F. in accordance with its (the condenser's) capacity. Thus, as its capacity is reduced, so less energy is allowed to pass through the circuit, while an increase of its capacity offers an easier path to the energy.

In this way a very smooth control of the reaction effect is possible providing the circuit conditions are correct.

A popular modern method is to use a differential type of

## COIL COUPLING

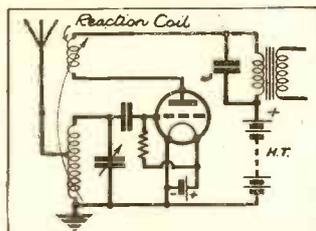


Fig. 1. Here the reaction and tuning coils are moved nearer or farther apart to adjust reaction.

reaction condenser. This comprises two sets of fixed vanes, and the moving vanes mesh with either the one set or the other in varying degrees as the knob of the component is rotated.

Referring to the third illustration, it will be noted, if the F2 set of fixed vanes of the differential reaction condenser and its single connection to earth are neglected, the circuit becomes a straightforward capacity reaction circuit.

### Increased Capacity.

But the introduction of the F2 vanes, which connect direct to earth, has this effect: As the reaction is reduced by a reduction of the capacity between the moving vanes and the F1 vanes, so is the capacity existing between the moving vanes and F2 increased.

With this compensating effect the capacity between the anode of the valve and the filament remains substantially unaltered; a further advantage is that adequate reaction with a relatively low-capacity condenser and a consequent smoothness obtains.

All the circuits shown illustrate "reaction on the aerial." That is to say, the tuning coil into which the feed-back takes place is in part actually in the aerial circuit.

In such an instance the over-enthusiastic use of reaction will cause considerable disturbance to neighbouring listeners, for a condition of maintained oscillation turns the circuit into a small transmitting outfit.

And it is very difficult to avoid running into such a condition, especially when attempts are being made to tune in a foreign station by close adjustments of reaction. Such attempts are nearly always accompanied by bursts of oscillation unless very skilful operation is carried out.

### Vigorous Oscillation.

When, however, a detector circuit embodying reaction is preceded by a screened-grid H.F. stage, interfering radiation is reduced to a negligible degree, if not entirely eliminated, even when the detector circuit is vigorously oscillating.

Reaction effects are possible with H.F. valves, but are seldom used these days. (H.F. reaction must not be confused with the instability that results in a poorly designed or installed H.F. stage.)

It should always be remembered that, no matter how expertly reaction may be applied,

## SMOOTH CONTROL

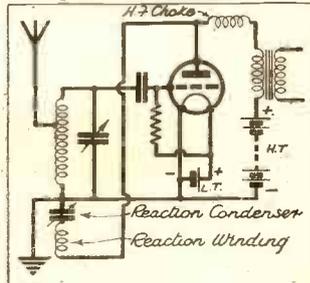


Fig. 2. Instead of the coils moving, they are fixed in relation to one another, and electrical adjustments are made with the condenser.

it always causes distortion. The distortion takes the form of a reduction of the higher audio-frequencies. That is why a distant station sounds muzzy and boomy when it has been received only after the application of considerable reaction.

It is possible to compensate for reaction distortion by a proportionate emphasis of the high notes in the L.F. amplifier, and this can be done with a suitable tone-correcting arrangement.

### REACTANCE.

This is the resistance offered to alternating current by either or both the inductance and capacity in a circuit.

## RECTIFICATION.

Alternating current is current which alternately flows first in one direction and then the other. Rectification is the process by which such current is converted into unidirectional current—i.e. current which flows in only the one direction.

Our diagram shows a simple rectifying circuit. A metal rectifier is used. This device provides an easy path for the current in one direction, but to current which attempts to flow

## A.C. TO D.C.

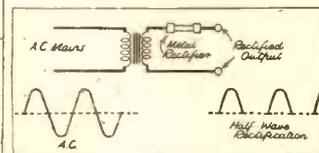


Fig. 4. In this diagram the alternating current is passed to a metal rectifier which produces pulsating D.C.

in the reverse direction it will offer considerable resistance.

So it rectifies by suppressing the current during every other half-cycle. The result is a pulsating D.C., which can be evened out by smoothing apparatus, as has been explained under the appropriate heading. You can also refer back for details of "half-wave" and "full-wave" rectifying circuits in which thermionic valves are used.

When a valve is employed the principles are the same. A rectifying valve enables current to flow in one direction (from its cathode to its anode), but not in the other.

A full-wave rectifying valve has two anodes and two filaments, and is really two valves in the one bulb.

### RECTIFICATION (Power Grid).

From a purely circuital point of view, this is similar to ordinary grid-circuit rectification, and a grid leak and a grid condenser are used. But the values of these are lower. The leak will have a resistance of only 250,000 ohms or so and the condenser a capacity of .0001 mfd.

A high voltage is needed on the anode, and as much as 200 volts is employed. The object of power-grid rectification (or detection) is to enable greater inputs to be handled and a good quality achieved.

As most readers will by now know, the grid-circuit detector operates in the following way: Detection occurs in the grid circuit, and the low-frequency impulses are then amplified by the valve acting as a low-frequency amplifier.

It is largely to ensure that the valve works under the best possible conditions for this latter that power grid-detection is adopted.

The arrangement is less sensitive than normal grid-circuit detection, and is not now often used. Where it is desired to handle large inputs faithfully the diode system is more frequently employed.

## A MODERN METHOD

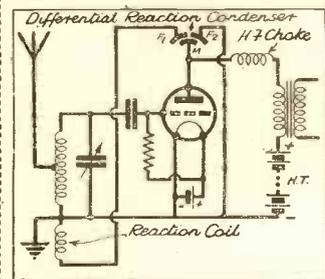


Fig. 3. The use of a differential reaction condenser is illustrated here. The explanation is given in the text.

to that of the tuning coil. Generally, the two coils are wound on the same former.

The purpose of the H.F. choke is to offer a very high resistance to H.F. energy as compared with the more or less easy

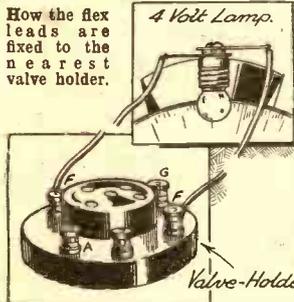
# A PAGE of Recommended WRINKLES

## DIAL ILLUMINATION FOR A.C. SETS.

OWNERS of A.C. mains receivers who are desirous of illuminating the dial by means of a dial light are sometimes doubtful about the connections owing to the extra cathode terminal.

In practice such an addition is by no means a difficult one, and, so far as the wiring is concerned, the five-pin valve holder can be regarded as one of the battery type.

A four-volt lamp, of course, will be necessary, but the two leads are connected to the heater, or filament, terminals of the most convenient valve holder in the ordinary way. If preferred, the leads can be taken direct to the four-volt L.T. winding on the mains transformer.

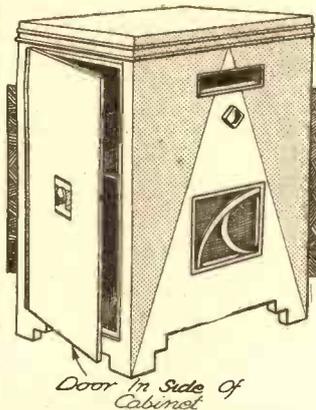
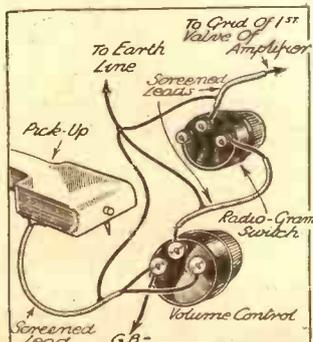


## SCREENING PICK-UP LEADS.

UNLESS pick-up leads are screened, low-frequency oscillation may occur in the form of a high-pitched whistle. A very common arrangement of pick-up volume control and radiogram switch is shown in the accompanying diagram.

It is not necessarily sufficient to screen only the leads from the pick-up to the volume control, but also those which connect the radiogram switch to the volume control and the grid of the first valve in the amplifier. Unless these leads are very short, it is absolutely essential that they should be screened.

Just one more point. Do not let the loudspeaker leads come near the pick-up. This is one of the easiest ways to cause low-frequency oscillation.

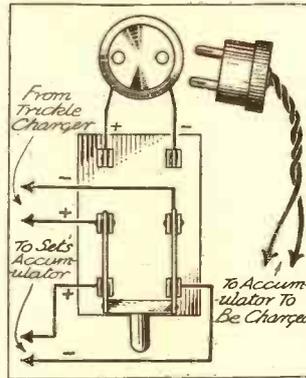


## A RADIOGRAM CABINET IDEA.

THOSE who are making or intend having made a radio or radiogram cabinet of the usual pedestal type would do well to consider incorporating the following feature which has proved itself to be extremely useful in practice: The sides of the cabinet, instead of being fixed in the usual way, are made in the form of hinged doors or lift-out panels, as shown in the diagram, thereby making the whole of the inside of the instrument (set, batteries or eliminator, speaker, gramophone motor, etc.) immediately and readily accessible for adjustments whenever required without the necessity of moving the cabinet round to get at the back.

small accumulators. To facilitate this charging, I fitted to one side of my radio cabinet a small D.P.D.T. switch and a socket for a two-pin plug.

These I connected to the trickle-charger inside the cabinet, as shown in the diagram. All that is necessary when the small accumulator is to be charged is to connect it by a short piece of flex to the two-pin plug, insert same in socket and move the D.P.D.T. switch. This simple scheme saves all outside charging costs, as well as the inconvenience of being without the accumulator while it is at the charging station.

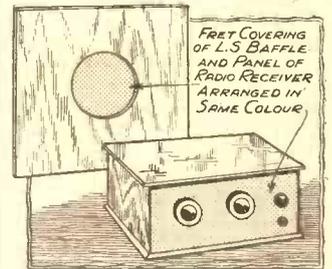


Here is an excellent idea for owners of trickle-chargers who have very small accumulators like the one mentioned by our contributor above.

them down as in sketch (2). Straighten out the frayed ends of cotton or silk and twist the two spare strands of copper flex round it. The result makes a neat and permanent end and takes practically no time to do. See sketch No. (3).

## COLOURING A PANEL.

IT is not always due to economy that a constructor makes use of a plywood panel in preference to one of

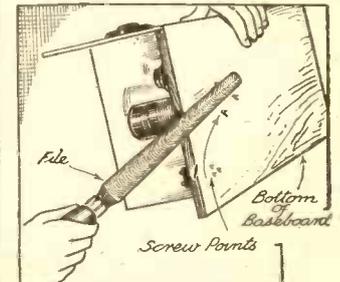


ebonite, because in many instances this is due to the fact that the former can be stained and polished to the tone of the wireless cabinet.

A very good contrast, however, can be effected by enamelling the panel the same colour as the loudspeaker fret covering, as shown in the diagram. This method not only gives an exceedingly pleasant appearance, but by clever arrangement can be made to match the colour scheme of the particular room where the radio receiver is incorporated.

## MIND THOSE SCREWS!

WHEN screwing the components of a set on to the baseboard, it sometimes happens that the points of



Before placing the new set in its cabinet be sure to file off any projecting screws, or you may later scratch a polished table or cabinet top.

some of the screws come through the bottom of the baseboard. These are not always noticed at the time, and it is not until the set is stood on a polished table or other article of furniture that their presence is realised.

For this reason it is advisable always to inspect the underside of your newly made set before putting it into commission. A few rubs with a good wire file will soon remove obtrusive screw points.

Where the screws protrude some little distance through the baseboard, wire cutters can be employed to nip the ends off before filing is commenced.

## ONE GUINEA FOR THE BEST WRINKLE!

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

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

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

The best Wrinkle in the issue dated April 21st was sent by Mr. L. A. Bullard, 28, St. Petersburg Place, Bayswater, London, W.2, to whom a guinea has been awarded.

Indeed, parts inaccessible from the back are easily reached from the sides. Ball-catches keep the sides closed, while a finger-hole or small knob (which may take the form of a Jacobean ornament) enables the doors to be easily opened. If desired, records may be kept inside the cabinet, and this will not affect the reproduction unless the cabinet is nearly filled with them.

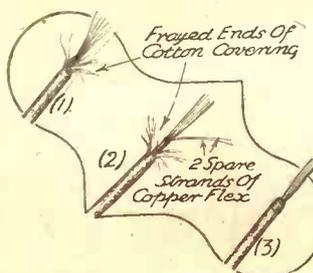
## A MINIATURE CHARGING STATION.

THERE are probably many readers of "P.W." who, like myself, have a small electric hand-lamp for use about the house, the lamp being fitted with an unspillable accumulator instead of dry batteries. This accumulator can be kept fully charged at practically no cost by charging it from the set's trickle-charger.

Once a week is sufficient, as the ½ amp. provided by the trickle-charger is nearly the full-charging rate for these

## NEAT FLEX BINDING.

IN baring flex the result is usually as per sketch (1), getting worse as time goes on. Two strands of the wires can usually be spared, so bend two of



Use two of the loose strands to keep the wire trim.

# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## EELEX SHORT-WAVE COIL

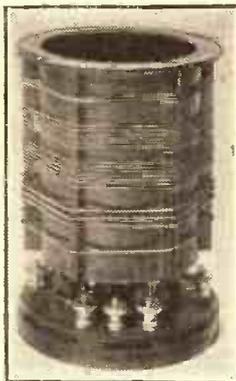
ALTHOUGH wave-range switching is not particularly difficult to arrange on the short waves, it is to be avoided if possible, as is anything else that tends to add extra wiring and components to the high-frequency end.

Messrs. J. J. Eastick & Sons have designed a coil which incorporates a simple but very effective and, so far as I am aware, quite original alternative. The coil is of the plug-in type, and has eight pins arranged more or less in two groups of four.

In order to change the wave-range all that has to be done is to pull the coil out of its socket and turn it round the other way!

The ranges claimed by the makers are 15-30 and 28-60 metres, and on test I found these to be substantially correct. I could not get quite down to 15, although 16 was coverable.

The upper limit was, on the other hand, quite a bit above that claimed.



Wavechanging between 15 and 60 metres is possible merely by reversing this new short-wave coil in its holder.

A practical point of value is that, although the coil slips in and out of its sockets easily, it is not possible to insert it in any other than either of the two correct positions.

The coil is wound on a ribbed bakelite former, and the base is neat and strong.

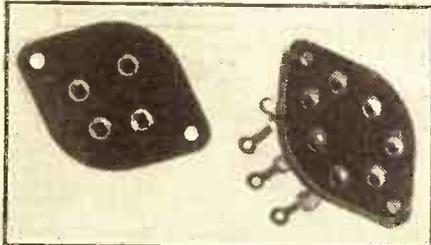
## NEW FERRANTI COMPONENTS

As readers will no doubt have gathered from recent reports appearing on this page, Messrs. Ferranti, of Hollinwood, Lancs, are in the process of greatly extending their range of radio components.

The new additions are inexpensive articles, which, however, maintain the technical standard for which this famous firm is noted.

I have before me as I write samples of the new Ferranti valve holders. There are both four- and seven-pin types. They are for chassis mounting and are eminently satisfactory components in every way.

A special design of socket ensures that smooth and efficient contacts are made with every pin of the valve inserted.



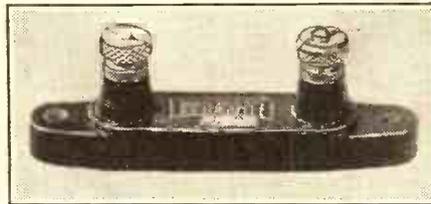
Four- and seven-pin types for chassis mounting are now available in the Ferranti range of valve holders.

This is a matter of more importance than is commonly realised, for if bad contact does arise at valve pins it may produce very puzzling symptoms and give the constructor a thoroughly bad time until the fault is found.

Two spring pieces lie in each of the new sockets, and owing to their positions and shapes they maintain their full resilience, no matter how many times valve pins may push down them or be withdrawn.

The Ferranti New Type Resistances are decidedly neat and attractive components, rather smaller than any others, I think. Let the makers describe them to you in their own words:

"The element of these Resistances consists of a tube of refractory material on which is deposited at a high temperature a high-resistance condensing material." Metal-end caps and wires are fitted in the manufacturers' type, which sells at 6d. each,



The "New Type" resistances are supplied in constructors' models in a holder with slotted terminals. The value is clearly indicated.

whilst the constructors' type, which has slotted terminals, sells at 1s. each.

The sizes are: 300 ohms, 500 ohms, 750 ohms,

1,000 ohms, 2,000 ohms, 3,000 ohms, 4,000 ohms, 5,000 ohms, 6,000 ohms, 8,000 ohms, 10,000 ohms, 15,000 ohms, 20,000 ohms, 25,000 ohms, 30,000 ohms, 40,000 ohms, 50,000 ohms, 60,000 ohms, 75,000 ohms, 100,000 ohms, 250,000 ohms, and there will be available shortly sizes up to 2 megohms.

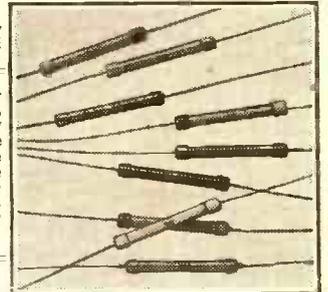
"The accuracy of the Resistances is guaranteed to be within plus or minus 5 per cent, and the average change in value at rated load from the value at no load is minus 3 per cent. Temperature coefficient, minus .04 per cent. Working temperature is limited by the perishing of the protective covering, and is approximately 80°C.

## Background Noises Non-existent.

"The Resistances have been tested in atmospheres of various humidities, and the effect has been found to be less than 10 per cent.

"A test for background noise shows that it is non-existent when these Resistances are used in amplifiers and similar positions.

"The self-capacity and



The new resistances, measuring only 5 ins. with the wire ends, are available in the standard colour code as manufacturers' models.

the self-inductance are negligible, and the Resistances retain their normal values when operated over a long period of time at their full rated load. This is a very important point, as many of the moulded type of resistances commonly available change as much as 100 per cent if operated at full load for even comparatively short periods.

"When supplied with wires, the overall length of the element and wires is 5 inches. This type is supplied marked in the standard colour code, whereas those in holders have a transfer indicating the value."

I have no hesitation at all in endorsing these remarks. The Ferranti New Type Resistances are, in my opinion, dependable and efficient components.

WHAT tremendous progress has been made of late in the design of commercial receivers! I expect that most of you will have noticed it, too, but it seems to me that, if the present rate of progress is maintained, the time is not far distant when receivers will operate—robot fashion!—at a word of command from the listener. Perhaps that sounds a little ambitious; yet is it, I wonder?

Consider the trend of development in the light of a tuning innovation which has just been introduced by H.M.V. With practically all existing sets tuning is an operation that has to be carried out very largely "by ear," so to speak. The introduction of scales calibrated in both wavelength and station names no doubt afforded great help in this respect, but, even so, for dead-accurate tuning it is still not possible to rely on visual methods alone.

## "Fluid-Light" Tuning.

But perhaps I should say it was not possible, for with the new H.M.V. system of "Fluid-Light" tuning it is the simplest thing in the world to tune in a station with the volume control at zero! In other words, with the ingenious "Fluid-Light" device tuning can be carried out entirely visually.

Frankly, I regard this as a most important development, for I have only to consider

it in relation to my own domestic experiences. "Mrs. Link Between," after a lengthy "apprenticeship" in the art of set manipulation, can operate most sets as deftly as any woman I've seen, "although I sez it as shouldn't." But (and I'm hoping that she will miss this paragraph!) she sometimes shows a distinct tendency to

linger on the sidebands, and I get quite alarmed at the sudden appearance of "hiss" in my set.

The fact of the matter is that it requires a trained ear speedily to detect when a set is dead in tune—especially the modern super-selective ones—and unless the set is dead in tune, then inevitably

the reproduction must suffer.

## How the Scheme Works.

There can be no possible doubt about it with the new scheme for which H.M.V. is responsible. On the front of a set which they have just produced is a small glass tube about an inch long, the appearance of which reminds one of a thermometer in miniature. Inside the glass tube is a green column of light which varies in height as the tuning knob is revolved.

When tuning in a station it is simply necessary to watch the column of light, for it is at its maximum height when the transmission is being received dead accurately.

(Continued on page 204.)



Jottings of Interest to Buyers.

By G. T. KELSEY.

# Destroying Man-Made Static

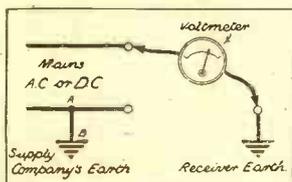
# INDOOR INTERFERENCE



This week our contributor, Mr. BERNARD BARNARD, deals with the cause and elimination of interference such as might be generated by electrical apparatus or faulty mains wiring actually under the listener's own roof.

IT is generally realised that the most effective way of curing interference is to discover the source of the trouble and to prevent the radiation of the unwanted energy at that point.

This is, in the case of *outside* interference, seldom possible, and I have already attempted to dissuade enthusiastic "interference hunters" from tackling owners of offending apparatus and have suggested



### MAINS EARTHS

The efficiency of a mains earth can easily be checked with the aid of a voltmeter, as shown.

that they should leave this rather thankless task to the proper Post Office officials.

But I want to differentiate between *outside* interference and what may be rightly termed local or *inside* interference. The latter term covers all forms of cracklings, buzzings and hootings which may be generated under the listener's own roof.

The listener who finds he is suffering from interference should first of all take stock of the electrical apparatus which he himself is using.

Obviously, only that apparatus which is in continuous use need be considered, and the possibility of interfering domestic plant can be speedily dispensed with by the simple operation of shutting the apparatus down and noticing whether this has any effect on the noises received in the loudspeaker.

### Those Intermittent Noises.

It may be as well to mention here that interference which is generated by running machinery or other plant in the course of normal operation is usually identifiable by steady "tempo" or rhythm in the reproduced sound.

"Inside" interference usually takes the form of intermittent buzzes or crashes which bear no time relation to one another, but occur at irregular intervals or set up a continuous "barrage" of noise suggesting the tearing of infinite calicoes.

With such noises emanating from his loudspeaker the amateur may well suspect his own house-lighting installation before going any deeper into the subject.

Nor need he be deterred by the possible fact that the installation is comparatively new. I have known brand-new wiring to display serious faults due to carelessly made joints or other "human-factor" ailments.

If the receiver under consideration is mains operated the first point for investigation is the power or lighting point from which it draws its "juice."

Very often the fitting here may be faulty and sparking, or intermittent contact may occur. Serious noise, of course, results from any such state of affairs.

The next most likely point to look for trouble is the house fuse box; a badly fitting fuse or loose fuse wire will also produce the undesired interference. Therefore check all fuses to see that the wire is secure and that the contacts are clean and well fitting in the fuse holders.

After this has been satisfactorily covered you should endeavour to discover where the wiring conduit is earthed.

You will probably find all the various conduit ends are linked together by lengths of bare wire near to the meter, and that these go to earth via the incoming water main or some other near-by point.

### A Most Important Point.

Check all these earthing connections to make sure that they are clean and good electrically. If you see any conduit ends which are not linked up in this manner make the necessary connection yourself.

Readers who read my earlier article in which I dealt with the propagation of interference will appreciate the necessity of the conduit being properly earthed. So long as the lighting wires are

necessary to cover closely the entire lighting installation in search of likely faults.

All fittings should be suspect, and even the lamps themselves should be tested by substitution.

Quite often it is found that a lamp has been in use which has a faulty connection in its base that has given rise to splutterings and cracklings in the loud-speaker.

### The Voltmeter Test.

If you have at your disposal a voltmeter which will measure the supply mains voltage you can check the actual mains earth in the following manner.

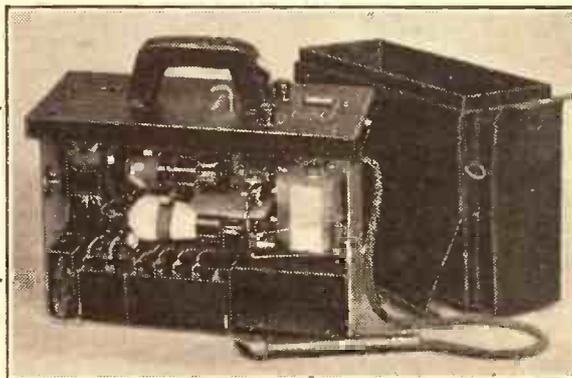
One side of the voltmeter is connected to your radio earth (be sure it is a good one) and the other side to one main. Since one main is always earthed, you will get no reading if this happens to be the earthed one. Connecting the voltmeter to the other should give the full-mains voltage steadily.

If the reading is low or irregular it indicates that the supply company's earthing arrangements are at fault, and they should be asked to rectify the trouble.

Merely a low reading is not likely to cause interference, although it will, in most

### A PORTABLE DETECTOR

A portable "man-made static" detector which is being marketed by Siemens in Germany. It was first introduced in this form at the Leipzig Spring Fair.



properly encased in earthed piping, the chances of the interference currents spreading by induction is greatly minimised.

If, however, the piping is not earthed, or—worse still—intermittently earthed, it will become itself a conductor and "carrier" of the interference energy.

If a battery-operated receiver is used the possibility of a house-lighting fault can be disregarded if the interference continues after the supply main switch has been cut off.

With a mains receiver, of course, this conclusive test is not possible, and it is

cases, cause hum, but a fluctuating reading is a sure cause of crackle.

If none of the foregoing tests gives positive results it is advisable to get a competent electrician to test out your house wiring with a "megger" in order to locate any possible insulation breakdowns. This is a course which should be taken at fairly frequent intervals in any case, as insulation breakdowns may cause current leakage, soaring light bills and danger of serious shock.

# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped addressed, envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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

## QUESTIONS AND ANSWERS

### CAN LOUDSPEAKERS BE USED IN THE BELFRY INSTEAD OF CHURCH BELLS?

Writing from 19, The Avenue, Moor Ends, Doncaster, Mr. Wm. Watson raises the above interesting question in a letter which says: "I am just enjoying your A.C. 'Airsprite,' a really fine set. After this handshake from a genuine 'P.W.' old-timer, let me get down to brass tacks, or, more to the point, church bells.

"I am interested in the building of a new church here—an absolutely new mining village.

"And a peal of bells is out of the question, both from a financial viewpoint—northern mining districts are notoriously poor—and the danger of subsidence through mining operations.

"I want you to tell me if it would be practicable to install in the belfry a battery of reproducers of the public-address type, to give a recorded peal of bells after the style of the B.B.C. interval signal.

"It would be interesting to know if any such scheme is in operation anywhere."

Theoretically, a battery of public-address loudspeakers should be quite capable of undertaking this class of work.

The number of loudspeakers, power required, etc., having been decided upon, a special amplifier of the public-address type would be needed, together with appropriate mains-power supply.

The conditions for such "broadcasting," being entirely different from those governing home-radio reproduction, call for specialised design; but there are a number of firms engaged in this class of public-address work, including Baker's Selhurst Radio; City Accumulator Co.; Edison Swan Electric Co., Ltd.; Epoch Radio Manufacturing Co., Ltd.; Ferranti, Ltd.; General Electric Co., Ltd.; Igranic Electric Co., Ltd.; Eric J. Lever (Trix), Ltd.; Claude Lyons, Ltd.; Marconiphone Co., Ltd.; Pleassey Co., Ltd.

As the scheme has been suggested in other districts it is probable that valuable information on practical points could be obtained from authorities where such schemes have been tried. But, in any case, the firms supplying the necessary apparatus would provide expert assistance in the technical problems of public-address work under such conditions.

The cost, of course, would depend upon the scope of the service, area to be covered, etc. For example, a 3-stage power amplifier of the "50-watt" type, developing about 16 watts undistorted-output power, might cost, with valves, £30 or so, and the outfits with more powerful outputs would be proportionally greater in cost.

### H.T. ECONOMISER CONNECTIONS.

"I was interested in the article on 'High-Frequency Class B' in 'P.W.' for April 14th, 1934. Is the arrangement of the H.T. Economiser circuits the usual one where a metal rectifier is employed?" asks K.S. (Eton).

No; the normal arrangement of a Westector H.T. Economiser is as follows: The end of the grid-decoupling resistance remote from the grid leak is

connected to the positive terminal of the Westector, not to the negative terminal as shown in the diagrams. In the case of Fig. 2, the negative of the Westector should be connected to a negative grid-bias lead, positive grid bias being connected in the usual way to L.T.—

### HUM CURED BY LEAVING OFF THE EARTH LEAD.

C. H. (Salford).—"It is a D.C. three, and when putting the set back after the spring cleaning was finished in the dining-room it was switched on accidentally without the earth wire being connected at all. And for one whole evening it went like this before the disconnected wire was noticed.

## STATION IDENTIFICATION

### WILNO, POLAND.

If your set is capable of receiving this station, it will be found right at the top of the dial, on 559.7 metres. This is immediately above the Budapest dial reading.

The Italian station, Bolzano, shares Wilno's wavelength, but this is not such a drawback to reception as the "swamping" by Budapest, since it is not generally possible to get Wilno whilst Budapest is working.

The announcements are generally made by a lady, but Wilno often relays other Polish programmes. Interval signal, cuckoo. Distance from London, 1,070 miles.

"The strange thing is that it worked even better than usual, my wife remarking, before she knew of the loose wire, that the spring clean had done the set good. We all agreed that it was very clear and quite as loud as before.

"After the earth wire was noticed and put back (the following night) I was surprised to find that the strength was no better than before, and the faint buzz which we had been free of the preceding evening came back again. So I took off the earth wire again, contrary to the directions supplied with the set, and ran it without one again. It was perfect.

"Are we doing any harm this way? I cannot think we are, as the change is really quite surprising to us who are familiar with the set, and even a stranger to it would notice

the improvement without any earth wire connected. But I thought I ought to make sure there was no harm."

No harm at all. The mains themselves are earthed, and in this instance the set is better earthed without the external wire than with it.

This is rather unusual, but it does happen occasionally, and in such circumstances the normal earth connection can be dispensed with and the set used, as you have it now, without a separate earth wire.

### TRYING THREE L.F. STAGES REDUCES THE VOLUME.

S. W. (Bickerstall).—"Just because I know it is the wrong thing to do, I hooked up three L.F. stages of amplification after the detector, expecting to get terrific volume with distortion. It was distorted all right, but there was a whistle, and the power was nothing like so great as when only two L.F.'s were being used.

"I am sure all connections, etc., were O.K., the first L.F. being resistance-capacity coupled and the second transformer. Why should the addition of another transformer-coupled stage actually reduce the volume?"

By attempting to use three stages you were asking for L.F. instability, and you got it! No doubt the "amplifier" was oscillating, and in this condition its amplification would go "all to pot." A reduction in the volume obtained is quite common in such circumstances.

### HOW MANY VOLTS ON THE SCREENED GRID?

G. A. E. (Portsmouth).—"The maximum H. T. battery tapping is 150 volts, and this is led to the pentode's plate and screening grid.

"In the case of the plate lead there is only the primary of the output choke between the + of battery and P. of valve holder. So most of the 150 volts can be assumed to be on the plate. But in the case of the screening-grid lead there is a 5,000-ohms resistance in series.

"How much does this resistance drop the voltage from 150?"

The number of volts dropped in the resistance can be calculated by multiplying the resistance (ohms) by the current flowing through it (amps.). You do not give the current, so this will have to be known before the voltage drop can be calculated.

The easiest way to find it is to insert a milli-ammeter in series with the resistance in question when the set is working normally. (The extra resistance of the instrument is so low that it can be ignored.)

Suppose, for example, it proves to be 3 milliamps. Expressed in amps., this is .003, so we have only to multiply .003 by 5,000 to find the voltage dropped. It works out in this example as 15 volts.

Thus the voltage on the screening grid would be 150 - 15 = 135 volts.

### DETECTOR'S MILLIAMMETER READING INCREASES INSTEAD OF DECREASES.

T. B. B. (St. Helens).—"In accordance with the suggestion of a neighbour I tried to see the effect of tuning by putting my milli-ammeter in series with the H.T. +1 lead, which supplies the detector.

"The result has been surprising in more senses than one. As the tuning dial is altered to 'pass through' the various stations, each is represented by a more or less distinct kick, as was hoped for.

"For a powerful station there is a big needle swing, and I find it a very pronounced aid to correct tuning, especially for a station that spreads across two or three degrees of the dial.

"But why is it that in my set the needle shows an increase in the current flowing, as the tuning is accurately set, but in my neighbour's set the reading goes down instead of up? Have I reversed something?"

No. It is because your set uses an anode-bend type of detector, whereas his detector is of the grid-leak-and-condenser type.

In the former class the anode current is relatively small when no station is being received, but it increases when the set is properly tuned in.

In the type of receiver having "leaky-grid" rectification the effect is the opposite one, viz. a decrease in the anode current when a programme is being correctly tuned in. Your neighbour has this kind of detector, and you have the former kind.

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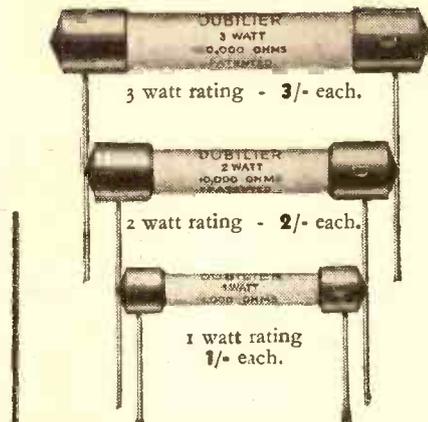
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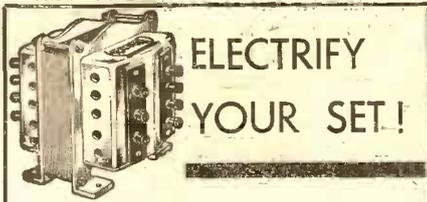
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## THE LISTENER'S NOTEBOOK

Comment and criticism on recent B.B.C. programmes.

CHRISTOPHER STONE'S recent recital suggested that we must not overwork our popular entertainers, or items will become languid and languid. Secondly, that after an all too brief respite, the song to be inflicted on us by an *ad nauseam* repetition is "Wagon Wheels," pronounced in the best circles *Wa-ha-gon We-heels*.

It is pathetic that singers with attractive voices should sing this sort of song as they do. And, that a new song among the latest recordings—"The Dark Town Strutters' Ball"—was on sale in U.S.A. at a 10-cent store in 1917.

I know this to be a fact, for I bought a copy then; and I still possess it, I bought it for the picture on the cover.

I for one am sorry that the Kentucky Minstrels' short season is over. Their performances have been five of the brightest spots of the season. As in variety, their patter comedians are worth their weight in gold and are the mainstay of the production.

I liked the shows because they always went with a swing. No tedious waiting once the curtain was up, and no flagging. Sometimes there was overlapping, but I don't call this a fault, as some people might.

While husbands have been discussing the Budget Mrs. Webb provided an adequate counter-topic for wives by her discussion on bacon. Never have I known women to be so wholeheartedly in agreement as they are on this question.

I agree entirely with the expression of opinion of many housewives, anent this discussion, that the Government's representative was hard put to it to make anything of an argument. I hope the Government will learn the obvious lesson Mrs. Webb had to teach them.

Wasn't it unusual to hear some billiard interval scores in the first News Bulletin the other evening? Until I heard these their omission had never occurred to me. It was certainly strange to hear them.

Mr. V. Bodker's talk was a poor substitute for one of Vernon Bartlett's, and it will take a good one now to interest us in "The Week Abroad." One felt throughout Mr. Bodker's talk (which was very badly read, incidentally) that he was carefully minding his p's and q's in regard to what he was saying. He was thoroughly unconvincing.

## THE LINK BETWEEN

(Continued from page 200.)

The instrument in which this remarkable development is incorporated is one of several advanced designs that were demonstrated to me recently by H.M.V. and which, I understand, are to be available almost immediately. In early issues of "P.W." I shall be dealing with these new sets in greater detail. Meanwhile, I will conclude by saying that, in the course of my visit to H.M.V., I witnessed some of the greatest commercial-set developments that have taken place for a long time. When one thinks of the fame and prestige of this enterprising concern I suppose it is only what one would expect, any way.

### Marconiphone's Contribution.

While on the question of activity in the commercial set-making world, I should be lacking in my duty, I feel, if I failed to call attention to the efforts of Marconiphone. With commendable enterprise they, too, have been getting down very seriously to the problems confronting the modern listener, and as a result they have just announced the early release of several new models.

In my opinion, they are all outstanding in their respective classes, but the one for which I have fallen somewhat akin to a ton of bricks is a new six-valve mains transportable with fully automatic volume control. The whole design is ingenious, but without a doubt the *pièce de résistance* is the visual-tuning indicator incorporated.

The tuning pointer consists of two arrows of light projected upon the wavelength scale, and as a station is tuned in these arrows lengthen. The position of resonance, or, if you like, dead-accurate tune, is indicated when the arrows are longest on any particular station. They will not lengthen to quite the same extent on every station, for the length of the arrows depends upon the strength of the transmission being received.

All the same, that's a minor point which does not detract one iota from the usefulness of the scheme. The main thing is that there is a *visual* indication when the set is correctly tuned in, and that, in my view, is a very valuable asset. You will be hearing some more about these Marconiphone sets in subsequent issues, but just before I leave the subject I want to mention three important price reductions in the existing Marconiphone range.

The model "201" radiogram is forthwith

It was unfortunate, too, that once again there was a technical hitch, outside the B.B.C.'s control, to mar the talk.

The talk suffered much in comparison with Labour's representative's "Afterthoughts on the Budget" that preceded it. This was a well-thought-out talk, and its quiet persuasiveness made a great appeal. In fact, all of the talks in the short series of Budget talks helped to make Budget week 1934 on the air a memorable one.

I enjoyed Leonard Gowings and the Wireless Military Band, especially the former, as he and the likes of him do counteract the strong influences of the Les Allens and the Bing Crosby's.

But even Leonard Gowings couldn't sing his straight songs without embellishing them with a number of what I might call "fussifications." Can you recall his rendering of "The Last Rose of Summer"? If you can you'll see what I mean.

I took part in a heated discussion following an alleged "gross" mispronunciation of a word by an announcer. It was a horticultural word of four syllables, and, on this occasion, the name of a horse. My friends were staggered that any man could commit the crime of putting the stress on the third syllable.

I protested on the ground that we aren't all gardeners, and that in any case there was wisdom in stressing the penultimate syllable, for that is the English rule. Incorrectly, the horticulturalist stresses the second.

I know a man, a student of dialects, who scours the programmes each week for examples of dialect. He tells me, and I agree, that there's rich variety of dialects to be heard just now through the microphone.

Saturday evening, for instance, invariably provides some pretty good Cockney in the "In Town Tonight" series, not to mention Capt. Bone's delightful Scotch at 9.20.

Amateur actors should not despise the help that wireless gives in this direction. A mastery of dialect would render a number of plays less impossible than they are because of their dialect parts. The Children's Hours are often fruitful sources of dialect. There's a Cornishman sometimes whom I am very fond of hearing.

I think it is correct to say that, while every other evening programme begins at 6 p.m., Friday's begins at 5.40 with Commander Stephen King-Hall's summary of the week's news.

This summary is nominally intended for the children, but Commander King-Hall makes such a splendid thing of it that thousands of adults wouldn't miss it for worlds. C. B.

reduced from 50 guineas to 42 guineas, the model "290" radiogram from 42 to 35 guineas, and the model "276" receiver from 22 guineas to 17 guineas. I don't mind admitting that, in the case of all these sets, I thought they were cheap at the old prices.

### Taken for a Ride!

Believe it or not, in this peaceful metropolis far removed from the terrors of gang warfare, I've just been "taken for a ride," and I haven't been "bumped off." At least, in a manner of speaking, I suppose I have.

The "ride" consisted of a jaunt round the City in one of those "scrummy" Talbots, the sort of dream car you see in the showrooms of Messrs. Pass & Joyce. But this was a real super-car, even for Talbots, for it had fitted in it one of the very latest Philco "Transitone" car-radio installations. And did I enjoy myself—or did I enjoy myself?

It will be obvious to those of you who have followed my notes that up to now I've had a very open mind concerning the future of car radio. But now I have very definitely been "bumped off," and I am all for it.

To confine myself to facts, the one I was able to hear under practical conditions was the new 16-guinea model, and the results were most convincing. There was not the slightest trace of interference from the engine, and the number of stations that could be tuned in in the midst of London and in broad daylight was amazing. The quality of reproduction, too, impressed me very much.

One thing is certain: There can no longer be any objection to car radio on the score of inefficiency, and with the greatest objection removed it seems to me that there is likely to be a great increase in popularity.

### The Truth about "Metaplex."

It would appear from my correspondence that certain readers have experienced difficulty in obtaining supplies of the famous Peto-Scott Metaplex baseboards. As a result of inquiries which I have made, it may be taken for granted that there is no hold-up of any description in supplies, and if your dealer tells you that he cannot obtain them—well, I'm sorry to have to say it, but he is wrong in point of fact.

If you should encounter any further difficulties in this respect, just you tell the dealer that you happen to know that the Peto-Scott company have arranged with the British Radio Gramophone Co., Ltd., to act as wholesale distributors of Metaplex for the British Isles, and that adequate supplies are always available on demand.

## SELECTIVITY AND QUALITY

The need for selectivity and good quality in modern radio reception has resulted in the design of special diode valves giving straight-line rectification and exercising extremely low damping on the tuned circuits.

WITH the rapid advance on the transmission side of radio in the use of high-power stations it has been necessary for receiver design to be considerably modified from what it was a few years ago.

No longer is it sufficient for a set to be moderately sensitive in order that it may be satisfactory in use; it must also be selective and be capable of giving good-quality reproduction.

And so we have come to the era of superheterodyne-type receivers with automatic volume (or sensitivity) control, and with all sorts of devices for the provision of easy operation and as lifelike reproduction as possible.

### Essential Requirements.

Television, too, demands, as an essential, a good-quality output from the receiver used if the pictures are to be easily recognisable.

And so designers have been hard at work evolving valves that will allow sets to be built to meet the strict requirements of the present day.

Selectivity and good quality of reproduction do not easily go hand in hand, especially when sensitivity is also considered essential. The latter dictates that we use a fair amount of H.F. amplification, and the need for selectivity also points to several H.F. valves. Good quality, however, is not so concerned with the H.F. as with the detector and low-frequency sections of the set.

And of these two the detector is of very great importance, for it can make or mar not only the quality but also the selectivity of the set.

A detector that introduces a lot of damping into its tuned-grid circuit will militate very greatly against the obtaining of a high degree of selectivity, while a rectifying system that cannot deal with large inputs of high frequency, but easily overloads, will ruin both sensitivity and quality.

### Detector Overloading.

The sensitivity will be spoiled because it will be impossible to obtain really good volume before distortion, due to detector overloading commences, and the quality will suffer because of the facility with which this valve overloads.

The ordinary leaky-grid detector is not a successful device where powerful inputs are to be dealt with, and the anode-bend type is also faulty in that it requires readjustment for varying H.F. voltage inputs. The power-grid type of rectification (really leaky grid with high H.T. on the valve) is successful where quality is concerned; but as it passes considerable grid current it exerts a high degree of damping on the tuned circuit, and so is not good for selectivity. Incidentally, the very

requiring of high H.T. makes the system unsatisfactory in most set designs.

What's to do about it? The valve designers have provided a way out by bringing out special diode rectifiers that require little or no H.T., that will take a very large H.F. input without overloading, and will not exert any damping worth considering on the tuned circuit. In other words, a pretty complete solution to the problem that we have briefly put before you.

You have probably become fairly used to the double-diode triodes and such valves which provide diode rectification with a certain amount of L.F. amplification; but since their appearance further designs of diodes have been produced, and we now have valves giving diode rectification of a very high degree of quality and requiring only 100 volts H.T.

### Designed for D.C. or A.C.

These valves have been produced for use in all-mains sets of either D.C. or A.C. variety, and are so designed that they will operate in either type of set equally well. In fact, they are of the universal type.

As they have no triode section inside the bulbs the valves are extremely small, and can be introduced into a set almost without altering the space required at all. Straight-line rectification is obtained from them, and the damping exerted on the tuned circuit is so slight that it can be neglected. So we get in one valve our selectivity and good-quality essentials.

The Tungram diode valves are the latest we have received of this type, and cover two types. One valve is of the single-diode variety, giving half-wave rectification and taking 4 volts on its heater. It can be used either in parallel connection in an ordinary 4-volt A.C. mains set or else series-heater connection in a high-voltage A.C. or D.C. receiver when it takes its place in series with other valves of the 18 amp. current type. It gives a maximum diode current of 4 milliamp, and is known as the D.418.

### A New Double Diode.

The second Tungram valve to make its appearance is a double diode designed for series-heater connection in universal sets. It takes 18 amp. and drops 8 volts across its heater. The diode current is 8 milliamp in this case, and being of the double type the valve can be used either for full-wave rectification or else for half-wave rectification and automatic volume control.

This valve is designated the D.D.818. Note how very sensible the nomenclature of each valve is, showing at a glance the heater voltage and current and whether the valve is a single or double diode.

Both these valves are fitted with standard European 3- or 4-pin bases and top caps, the latter in each case being connected to one of the diodes. The dimension of the valves is extremely small, the D.418, for instance, having a bulb of only 3/4-inch diameter and a total length of 2 1/4 in.

At the moment of writing the valves are not available on the market, though we have tested samples and found them perfectly satisfactory. But we understand that they will be released in a few weeks' time—probably very shortly after this issue of POPULAR WIRELESS appears on the bookstalls. We shall hear a lot about the new small diodes in the near future.

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# B.B.C. ADVISE

## AERIAL OVERHAUL AT LEAST ONCE A YEAR

## USING KERR CELLS

### Practical points for Television experimenters.

IT should be noted that the Kerr cell contains a volatile liquid which cannot be sealed up completely. A certain amount of evaporation must therefore be expected, and this means that, in the course of time, the cell will require to be refilled, which is usually a job for the makers. In order that the cell may last as long as possible without such attention a little care is required. The main point is to keep the cell as cool as possible, and this involves placing the complete televiewer well away from the fire if it is kept in the living-room. More important still, care should be taken to shield the cell as much as possible from the heat of the projection lamp, and for this purpose a screen made of sheet tin may be used with advantage. It should be placed close up to the lamp and be provided with a hole only just large enough to allow the passage of the comparatively narrow beam of light required for the operation of the cell. **G. P. K.**

## A VARIATION IN L.F. COUPLING

### An easily-tried suggestion.

WHERE a parallel-fed transformer is used there may be a tendency to accentuate any inherent instability or hum. This arises from the fact that the coupling resistance and capacity and the primary of the parallel-fed transformer constitute a path across the H.T. source. Any A.C. voltage, therefore, set up across the resistance of the H.T. source from the output valve will be fed back into the primary of the transformer and amplified, and again fed back in a reaction-chain effect. A modified form of resistance feed, however, gets round this difficulty very

### AVOIDING INSTABILITY

By connecting a parallel-fed transformer in this manner, voltage variations across the H.T. source will not cause instability.

effectively, and the components are connected as shown in the sketch. The various values will remain the same, and there should be no loss of amplification. It is not possible, however, to use alternative ratios as formerly. **H.C.**

## TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

### Suppressing Electrical Interference.

I HAVE mentioned in these Notes more than once the question of interference, especially in mains sets owing to switching on and off of electric lights and to neighbouring electrical machinery and so on. There are a number of firms who have recently put on the market "suppressors" and other devices for cutting out this type of interference. Some of these devices are more efficient than others, but I think it may be said that with all of them a great deal depends on actual conditions in any particular case. The makers are perfectly frank about this, and tell you that you should try the device in this, that, or the other way, and give you a good deal of advice as to how to tackle your particular problem. One of the firms who have given great attention to this question is the well-known firm of Belling & Lee, Limited, and they have recently issued a new booklet entitled "Disturbance Suppression," which contains the results of a full investigation into this important subject by their Research Department under the direction of Mr. E. M. Lee.

### 20,000 Cases a Year.

It appears that the research engineers of the Post Office investigate cases at the rate of as many as 20,000 a year, and they state that 80 to 90 per cent of interference is in the form of high-frequency disturbance and is "mains carried." Once it gets on to the lighting wires of a house it is re-radiated and subsequently picked up by the aerial-and-earth system of any radio receiver in the house, whether the latter be mains driven, battery driven or even a crystal set. This is the type of interference which is recognised as clicks, crackle, buzzing, roaring or sizzling. It is caused by electric motors, lifts, vacuum cleaners, electric signs, tramways, electric railways, television motors, battery chargers, switches, electric bells and all manner of electric devices, particularly those in which any sparking occurs.

### A "Wired-Wireless" Effect.

Disturbance is always worse when listening to distant stations, especially with a powerful receiver. These electrical disturbances can only travel a few yards through space, but they can travel considerable distances if "guided" by any wire which happens to be running between

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

the source of the disturbance and the neighbourhood of your receiver. Usually the disturbance is carried by the electric mains, but in some cases it may even be "directed" by tramways or telephone wires. Once the disturbance has entered your house it will be conveyed all over the electric-wiring system, the latter becoming, in fact, a transmitting aerial radiating the high-frequency disturbance into the region around the house wiring.

### Post Office Assistance.

I have not the space to go into this matter fully, but I should mention that, by arrangement with the B.B.C., the Post Office authorities offer their services free of charge to holders of radio-receiving licences. If any advice or assistance is required you should obtain a questionnaire form from your post office.

The Post Office engineers aim at giving all listeners reception of their nearest National and Regional B.B.C. programmes reasonably free from interference, this

and connected to it by means of a rim of chamois leather or similar material. If however, you are mounting up the speaker unit for yourself directly on to the baffle-board you may not find it convenient to attach the edge of the cone to the board.

In such a case a simple dodge is to glue a ring of nice thick felt around the edge of the hole in the baffleboard (at the back of the board, of course), and then mount the speaker so that the edge of the cone diaphragm itself presses gently against this ring of felt. This will obviate any looseness or rattle in the cone diaphragm, and will at the same time sufficiently "seal" the edges of the cone to the edge of the holder, whilst leaving the diaphragm a certain amount of "play" so as not to damp its movements appreciably.

Sometimes an arrangement of this kind is easier to manipulate than sticking the parts together. Incidentally, it is also much easier to disassemble if occasion arises.

### Getting Power by Radio.

Many people think the day will come when power will be transmitted by the ether for lighting homes, and perhaps even furnishing motive power for trams and motor-cars, which will pick up the energy by means of short aerials similar to those used for radio reception to-day.

This is a very intriguing picture, but remember that the total amount of power thrown out into the ether by broadcast stations to-day is exceedingly small—at any rate, compared to what would be required for the purpose of driving machinery.

You may be surprised to know that the total power sent out by all the broadcasting stations in the world put together is only about equal to that required for half a dozen railway locomotives. It is estimated that there are between 1,500 and 2,000 broadcasting stations in the world, using a total of less than 7,500,000 watts,

or 10,000 horse-power.

### Some Interesting Examples.

Some time ago a well-known American professor worked out the amount of energy which was actually received by an average radio receiving aerial, and he found this to be considerably less than the energy used by a fly in walking up a wall! The average 500-watt broadcasting station broadcasts less energy than is needed to heat a domestic electric iron or toaster and, of course, far less than is used in an ordinary electric radiator in the home. An electric iron or electric toaster is usually rated at about 600 watts, whilst an electric radiator will consume 750 watts in each element.

### Transmitting a Beam.

You see from all this that so far we have only gone a little way towards transmitting power by the ether, and before we could use the ether for the transmission of really large amounts of power, such as would be

(Continued on next page.)

## PROOF OF POPULARITY



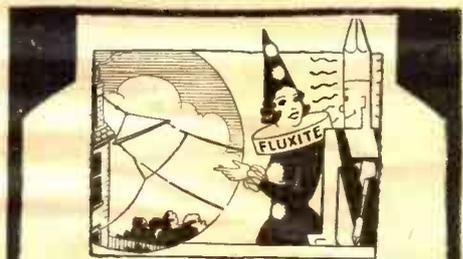
Convincing proof of the popularity of the new Telsen Radiogram, which is reviewed elsewhere in this issue, is afforded by this glimpse of a consignment of these receivers ready for dispatch at the Telsen works.

interference to be suppressed until it is no louder than the needle scratch on a record. Listeners requiring greater immunity from this may have to install additional and more elaborate suppression devices.

Those of you who are troubled with interference of this kind (and there seems to be an enormous number of people who are) cannot do better than to get a copy of the little booklet mentioned above, which will tell you in great detail all about the methods for suppressing interference in almost every conceivable kind of case. It can be obtained, price 3d. post free, from Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex, and you should say you saw it mentioned in these Notes in POPULAR WIRELESS.

### A Cone-Speaker Hint.

A reader mentions in a letter a little hint which I think may be useful to some of you. It relates to the fixing up of a cone loudspeaker against a baffleboard. In a commercial cone speaker the cone is generally mounted up on to a circle of plywood



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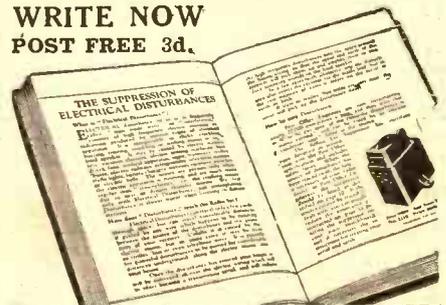


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## TECHNICAL NOTES

(Continued from previous page.)

required for working machinery, we would have to make great developments in our present apparatus.

One very important point is the question of sending the power in a beam instead of allowing it to go out in all directions, literally "broadcast," as we do at present. It is obvious that if the power were directed in beam fashion, a much larger percentage of it would reach a particular position than when allowed to spread out in all directions.

### Obtaining Secrecy.

Talking about broadcast transmission, I dare say you know that for some purposes, such as for long-distance commercial transmissions, and also for police work, it is important to be able to make the transmissions secret. If the criminal were able to hear police orders by means of an ordinary set, it would rather take the edge off the radio as a police fighting tool.

There are several ways in which radio communication can be made secret. The simplest is to send out radio messages in code, but this is rather clumsy, and the necessary decoding renders the method slow.

### A Successful Method.

A quicker method, which has been in process of development for several years, turns the transmission into gibberish, a special arrangement of the receiving set being used for the purpose of recomposing the gibberish, as it were, and rendering it intelligible again. This type of transmission is sometimes called "scrambled" or "garbled," and I dare say many of you heard a sample of it during a special broadcast last Christmas from Rugby.

### The Question of Studio Audiences.

What do you think about the studio applause to radio items? Ever since broadcasting started people have had different views about this. Many people get really irritated with the continual applause and think that the radio items would be much better if the applause were entirely suppressed. Other listeners, again, feel that the applause renders the whole thing more natural and enables them to visualise better what is taking place.

There is another important aspect of this applause question which may not occur to you at first, and that is the effect of the applause upon the performer. A stage artiste finds it very dead and, in fact, disconcerting to do his act before a microphone to an imaginary audience, without any applause to tell him whether his show is "going over." Radio artistes will tell you that they find it much better to give their show before a visible audience, even if the audience is only a small one, and to get their applause as they go along instead of waiting a day or two afterwards until the fan mail comes in.

### The Effect on the Listener.

However, the listener is mainly concerned with the effect upon himself. Personally, I should say right away that

although the applause is sometimes irritating—particularly when it prevents you from hearing the next joke—nevertheless it makes the whole thing much more natural, and if you think of the occasions when you have heard individual artistes "doing their stuff" without an audience you will feel—with them—that it is apt to fall very flat.

### A Few Opinions.

Some opinions on this question were recently obtained from listeners and are rather interesting. One said that, on hearing the studio audience applaud, she herself felt "like a child sent to bed during a party of grown-ups." You know how a youngster likes lying awake in bed in the early evening listening to the older people having a good time downstairs!

Another said that it was "like being cheated," as performers "play up to" those who can see as well as hear what is going on. Another said it was "as if the man at home didn't matter at all as long as the people 'on the inside' got all the funny lines and promptly drowned them for the outsiders."

This is all very well, but, as I say, if you compare a broadcast when the applause is included to one from which the studio audience is entirely excluded, you will agree that the former is much better, in spite of any little annoyances it may cause.

### Loudspeaker Efficiency.

Everyone knows that the efficiency of a loudspeaker is normally very small—I don't mean the quality of the reproduction, but the efficiency in the energy sense: that is, the ratio of sound-output energy to electrical-input energy. In telephone earpieces it used to be estimated years ago that the efficiency was never more than 1 to 2 per cent, so that 100 watts of electrical energy put into the telephone earpiece would only produce 1 to 2 watts of sound energy.

But more recently loudspeakers have been much improved, and an efficiency of 5 per cent is not uncommon. In some of the special loudspeakers used in the cinema theatres it is claimed that an efficiency up to as much as 15 per cent is achieved, although I think this is rather hard to believe.

Incidentally, the sound efficiency of the horn type of speaker is often greater than that of the cone type, probably owing to the fact that in the latter type the sound energy is radiated and dissipated in all directions.

## READERS' INTERESTING EXPERIENCES

### "WONDERFUL RESULTS."

The Editor POPULAR WIRELESS.

Sir,—I feel I ought to write and let you know the wonderful results of two of your sets that I have made up, the sets in question being the "Airsprite" and the "Short-Wave Adaptor." The results of these are marvellous. The "Airsprite" is the last word in medium-wave receivers and the "Short-Wave Adaptor" for same is uncanny.

With regard to the short waves, I have not set up twiddling dials and I have not tuned in after 12.30 a.m., but, at the time of writing, have received practically all U.S. stations at London strength.

I used everything as suggested in the building of these sets, and would not part with them for any model on the market.

Many thanks to you, and I consider myself lucky to be a reader of "P.W.," otherwise I might have missed endless pleasure. On March 19th, from 11 o'clock until 12 midnight, I had to bring the reaction almost to zero on American stations.

Good wishes,

Sincerely yours,

FRANK B. PRIOR.

47, Stafford Road, Croydon.

### A HUMMING FILAMENT.

The Editor, POPULAR WIRELESS.

Dear Sir,—A few days ago a friend of mine asked me to have a look at his set, which was a well-known make of two-valve all-mains receiver. The trouble was that after dark a loud and unpleasant hum came from the set, but during the daytime reception was clear and O.K.

On examining the set I found the trouble was not there. After taking the aerial off the hum died down a little, and on removing the earth lead it stopped altogether. (The earth and lead were in perfect order.) So I put it down to outside interference. I first,

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however made sure that the A. and E. leads were clear of all mains wires. After hunting round for about half an hour I found nothing so I examined all the house switches; they were O.K. and all the lamps fitted perfectly.

I was about to admit defeat when I noticed the light flick once or twice, and when I took a closer look at the lamp I saw that the filament was slightly vibrating and also faintly humming. I removed this lamp and replaced it with a new one—the trouble was all over and the hum cured.

This may be of interest to your readers who may have an untraceable hum in their sets.

Thanking you for the interesting reading and hints one finds in POPULAR WIRELESS.

Yours faithfully,

FRANK HEEDS.

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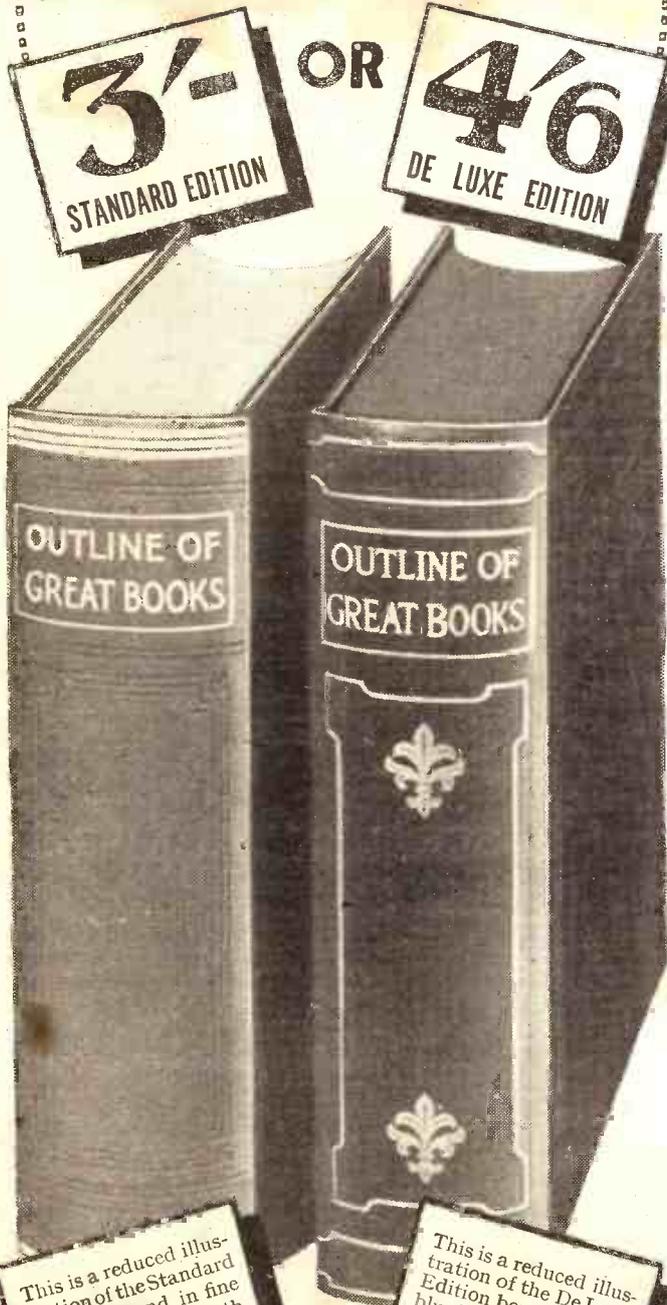
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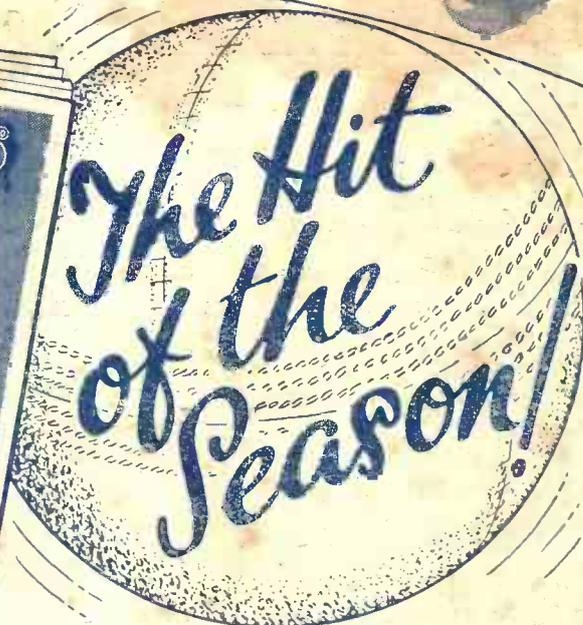
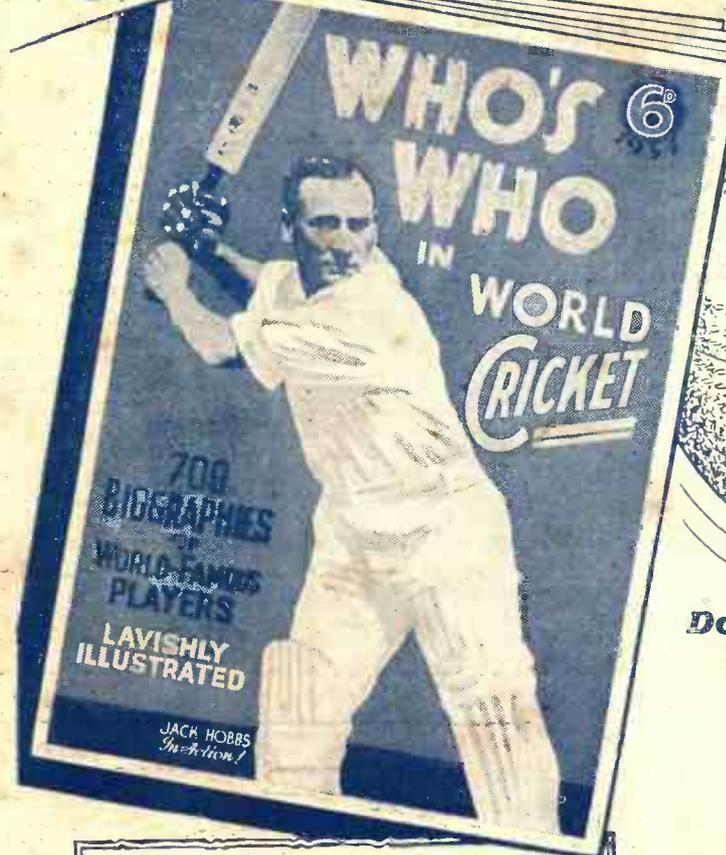
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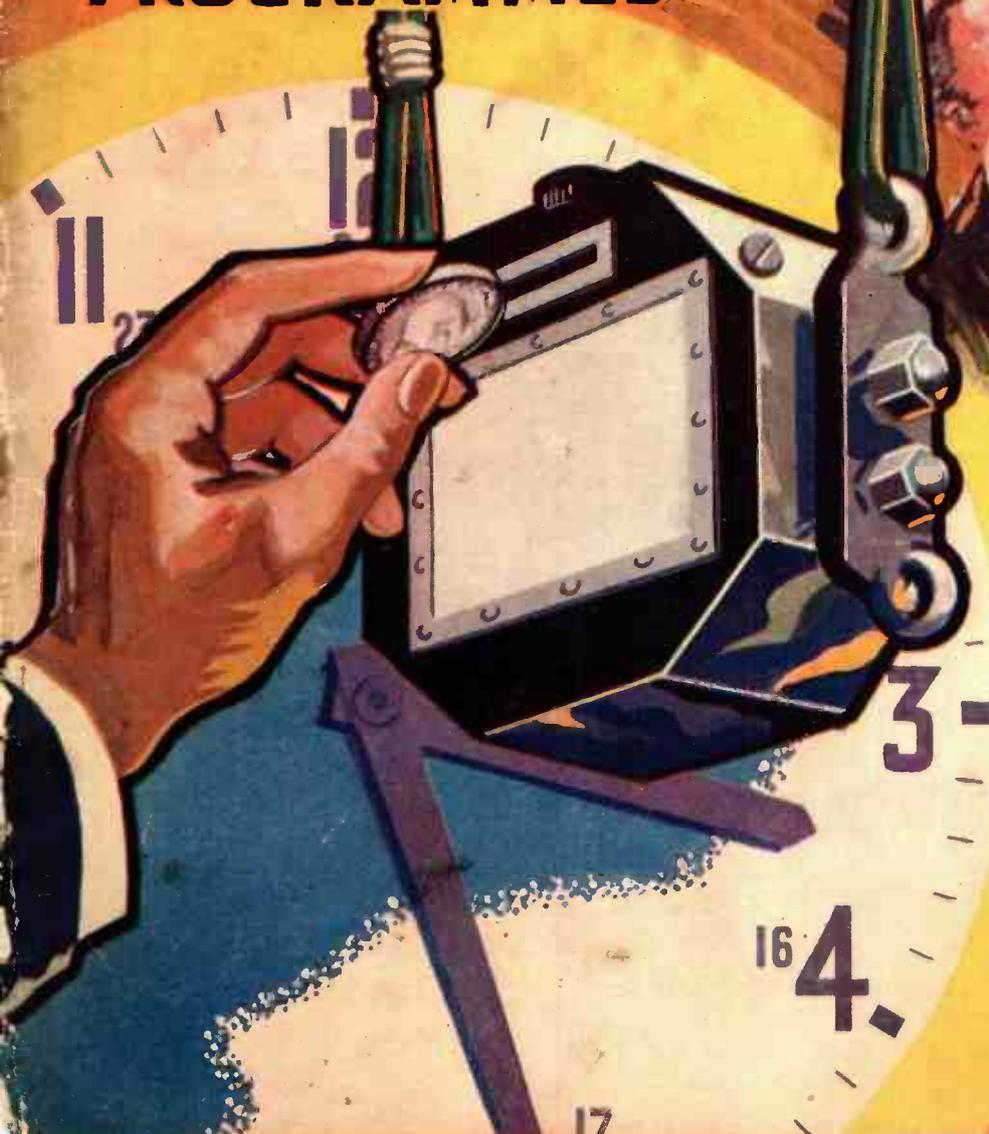
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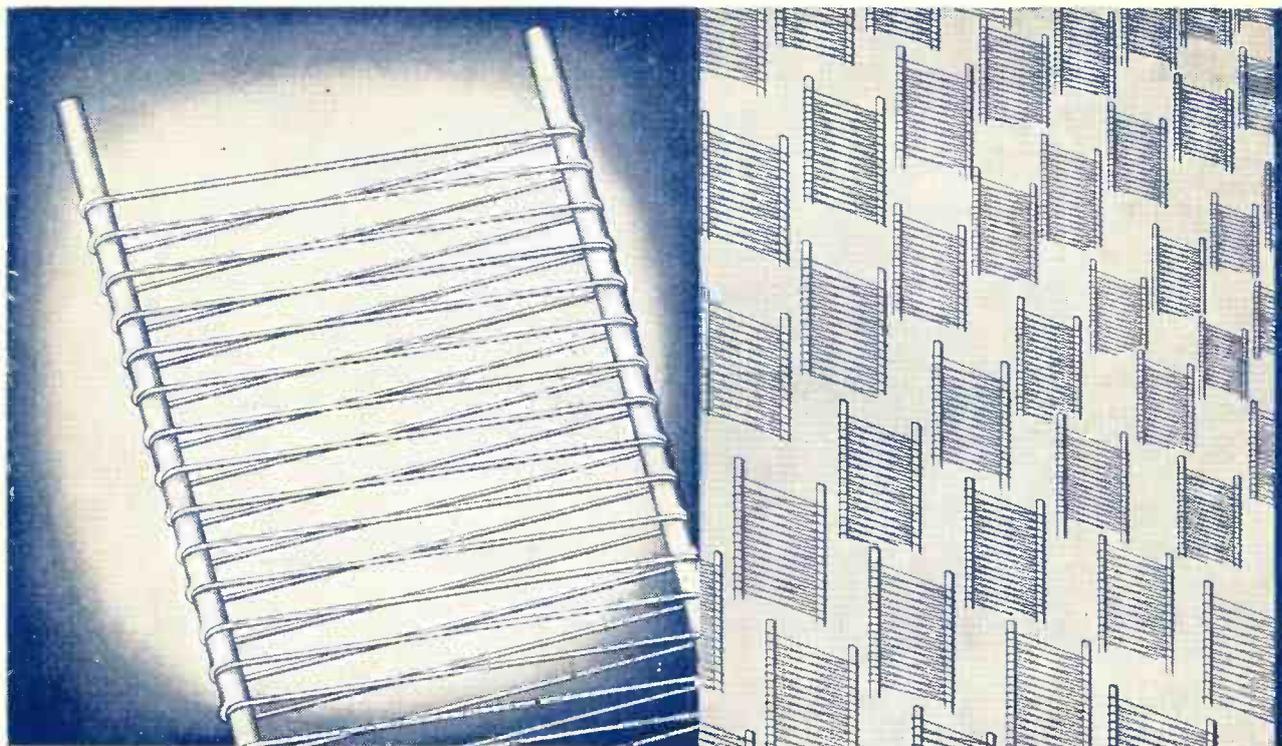
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# POPULAR WIRELESS

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

Scientific Adviser: SIR OLIVER LODGE, F.R.S.  
 Technical Editor: G. V. DOWDING, Associate I.E.E.  
 Assistant Editor: P. ROBERT BIRD.

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 N. F. EDWARDS.

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THE FIRST "L.T.B."  
 D.C. TO A.C.  
 FIGURES TALK  
 WORLD'S FAIR

## RADIO NOTES & NEWS

THAT 1-VALVER  
 U.S.A. WISECRACKS  
 RADIO AEROBATICS  
 "PEN PALS"

### Where is the Good Will?

AN appreciable volume of disappointment and comment has been caused amongst foreign amateurs because they cannot get reception verifications from the B.B.C. On occasions such as international reception contests this failure to be able to produce evidence must be extremely annoying.

I am told that the B.B.C. "sees no point" in verifying reception.

This work of courtesy may not be germane to their chief function of providing programmes; but as they claim to be promoters of international good will I think that they ought to reconsider this matter.

### An Interesting Centenary.

APRIL 22ND was the centenary of the birth of Gaston Planté, who invented the indispensable accumulator, a practical model of which he produced in 1860. Paris will be the scene of three days' celebrations of this centenary in June, when, at a ceremony at the Sorbonne, his work will be honoured.

It is hoped that a Planté medal will be instituted, to be awarded periodically to scientists who help to investigate or improve the accumulator.

### "Marconi Day."

THE Marchese Marconi was sixty years old on April 25th. In honour of the great inventor an international conference of companies which operate marine wireless services, representing fifty countries, recently decided to celebrate that date as "Marconi Day" in future.

I need not inform you about what Marconi has done for the world; the world thankfully recognises that. But I may record here that to-day, thirty-four years after the first company (a British company) was formed with the object of applying wireless to marine work, some 16,000 vessels are equipped with wireless.

### When the Supply Changes.

ALTHOUGH there are plenty of precedents of both kinds for the action of electricity-supply companies with regard to radio receivers on occasions when the supply is changed to A.C., no ruling has been

made on the subject by competent authorities.

It is, therefore, interesting to note that, during the Committee stage of the Electricity (Supply) Bill, a new clause was inserted. This clause specified radio instruments among the apparatus which must, if necessary, be altered, adjusted or replaced by the supply authority when the nature of the supply is changed.

Let us hope that this survives the passage of the Act.

### ON OTHER PAGES THIS WEEK

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YOUR GREAT OPPORTUNITY	211
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"The Gang" Invades the B.B.C.	228
Working on Five Metres - -	231

### A Big Field Day.

THE annual Direction-Finding Competition, organised by the Golders Green and Hendon Radio Scientific Society, will be held on May 27th in the neighbourhood of St. Albans-Rickmansworth—King's Langley.

Valuable prizes will be offered and the

### A FLYING START



A consignment of Cossor receivers being loaded into an Imperial Airways liner at Croydon to fill a rush order from the Continent.

contest is open to any "P.W." reader. Details of the scheme can be got from Mr. J. Hillier, 8, Denehurst Gardens, Hendon.

### Two Great Names Linked.

THERE died recently in Boston, Mass., at the age of 83, Joseph Warren Homer. He was a kind man and did so much work on behalf of the deaf that a tablet has been erected as a memorial to him. He was formerly an associate of Alexander Graham Bell, and named Mr. Bell's then new invention the "telephone."

### A Competitor Writes to Ariel.

DOUBTLESS having imbibed from these Notes the secret of gentle japing, B. R. S. (Glasgow), commenting on the wonderful set which was said to have worked on 1½ volts and received like a real set, says that he had a set which ran for a few hours on volts = 0—and ran into the reconstruction department. Not so bad!

He adds: "Re organ. I suggest that the necessary amount for alterations should be handed to Henry Hall, as he can do without bass but not without guineas." Not so good!

### Radio on a Grand Scale.

SOME surprising facts emerge from a radio survey of America made by the Columbia Broadcasting Co. and a trade journal. In January, 1934, there was radio in 17,950,000 homes. Altogether 3,806,000 sets were sold during 1933, of which 63.1 per cent went to homes already equipped with radio. Of car sets 724,000 were sold as against 143,000 in 1932. Finally, 55,600,000 valves were sold for £11,300,000.

The type of set with the largest increase of sales as compared with 1932 was the car receiver.

### Henry's New Pianist.

BERT READ is Henry Hall's new pianist. Thus, at the age of 24, he has "arrived," and this is the road he took—not a royal road, but certainly a triumphant one.

Played at a night club as a school-boy; at sixteen was playing with Jack Payne's band at the Hotel (Continued on next page.)

# DEEP THINKING FROM THE STATES

Cecil; then joined Ambrose's Orchestra. He was spotted by Henry Hall at the B.B.C.'s anniversary party in 1932, where he "happened" to take a turn at the piano—and there he was and is!

## Rapid Reactions.

**W. H. M. (Catford, S.E.).**—Thanks for your poem. I think you would do well at some manual occupation!  
**H. D. (Glasgow).**—Glad your radio club has cut its teeth so nicely. Copy of newspaper not received. **L. R. G. (Oxford).**—Sorry I cannot deal with chemical questions unless they have bearing on radio, but happy to know we have two tastes in common.  
**C. F. (Hove).**—Yes, I have met Marconi, and success has not "spoiled" him; rarely do great men suffer in that way.  
**K. G. T. (Ryde).**—Yes, I think that one may say that there are no limits to the possible developments of ether-wave study or any other branch of physics.

## The World's Fair, 1934.

**RADIO** will play an enormous part in the Chicago World's Fair this year, and about 200 stations will broadcast its programmes, using 30 "pick-up" stations in the grounds. Amateur radio will have a place of increased importance. Three short-wave transmitters will be erected and will use the call-signal **W9USA** for Morse and **W9USB** for telephony. Contests for amateurs—both visitors to the Fair and those who listen to the stations—are planned, and some of them, we are promised, will be unique.

## The One-Valver Again.

**J. T. (Roche)** and his one-valver are receiving quite a lot of limelight. **Mr. J. Barnacle, 76b, Limekiln Lane, Liverpool,** has asked us to give him in "P.W." the details and working sketches of this set.

We regret that this is not feasible, but we are giving him this paragraph, as he is a bed-ridden cripple, so that herein we can ask **J. T. (Roche)** whether he can help a fellow-reader. As **J. B.** does not feel much at ease amongst theoretical diagrams he would like wiring sketches and the names of the components.

Let us hope that **J. T.** is a Scout.

## From Sublime to Commercial.

**WHEN** we read that the twenty-one-years-old **W. B. Huston,** the first winner of the Edison Scholarship, is now at work in the Edison laboratories, under the guidance of **Theodore Edison,** we may think that he is a lucky lad, and dream for him a future in which he blesses the world with marvellous inventions.

But we descend to the ground with speed on learning that he is devoting most of his time to the perfection of a device which is designed "to make sales talk on retail-store counters," replacing the tickets and placards now in use. More words of mine would mar the thought of it!



## Hilversum Popular in North Staffs.

**WHEN** Stoke City played the Swallows, a famous Dutch team, at Amsterdam recently, Hilversum gave the result in English, and, as the result was 2-1 in Stoke's favour, Hilversum's stock soared in the Five Towns.

I got this tit-bit from the "Sentinel" of Hanley, and the sight of that name brought a flood of happy memories of poor **Arnold Bennett's** immortal (I declare!) books, "The Card," "Clayhanger" and "Old Wives' Tales." How often the

## ON THE AIR NEXT WEEK—1

**HEDDLE NASH** (*National Programme, May 14th*) has a repertoire of twenty-four operas and sings in English, French, Italian and German. He started broadcasting in 1927, after a triumph with the British National Opera Company, and achieved fame at Covent Garden during the International season of 1929. Many theatre-goers will remember his playing opposite the late **Anny Ahlers** in "The Dubarry." In his spare time **Heddle Nash** swims, plays tennis and indulges in home carpentry.

"Sentinel" received a free advertisement in those works!

By the way, some of **Bennett's** incidents should make excellent material for B.B.C. sketches or plays.

## "Wise Cracks" from America.

**RADIO** announcers use two-syllable words only when they name the diseases you may get if you don't use the stuff they are selling."

**Lloyd George** is the "one Englishman who has voice, delivery and mike technique." (My italics.)

The University of Minnesota, after research, has found that persons who like to listen to radio programmes are no less intelligent than those who prefer other kinds of entertainment! Sample of deep thinking.



## ON THE AIR NEXT WEEK—2

**RUDY STARITA** (*National Programme, May 19th*) was intended by his father for the law, but his youthful experiments with xylophone and cornet led him to believe that music would take him to the top of the tree. In 1925 **Jack Hylton** asked him to come over from America to take charge of the Piccadilly Hotel band, and he later played at the Kit-Cat and the Ambassadors Club. Once broadcast the xylophone on his hands and knees, as the stand for the instrument had slipped to the studio floor. His hobbies are tennis and gardening.

## Progress: Indeed!

**TO** rehash an old and now rather inappropriate joke, I may say that when the Southern Railway becomes entirely up to date there is hope for this old country.

In co-operation with **Spartan Air Lines, Ltd.,** they have arranged a daily air service between London and the Isle of Wight, and

the aeroplanes are to be fitted with wireless apparatus similar to that which is used on Imperial Airways liners—an equipment, I may add, that has been adopted by the aviation services of nearly thirty countries.

## Our Transatlantic Cousins.

**ALTHOUGH** they allow their jailbirds to possess and enjoy radio sets, typewriters, pot plants, private secretaries, bath salts, cocktail cabinets and many other delightful things which honest folk outside lack, our American cousins are relentlessly harsh in some things.

For example, if **Spike Murphy** desires to lean his head against his prison's wall and sob over his idiocy in forgetting to wear gloves, he does so at the risk of setting off an alarm signal operated by a ray which his body would intercept.

A nasty "electric eye" will detect on the persons of visitors any little contraband gifts such as knives and pistols intended for the prisoners.



## Radio in Aerobatics.

**SIR ALAN COBHAM** has brought his air circus up to date for his summer tour by equipping it with Marconi wireless gear.

He has got a ground station in a motor van, a short-wave set in a "Lyncock" and a medium-wave set in an autogiro. The "Lyncock," which is used for aerobatics, will be able to inform the spectators about its performance, the pilot speaking by the radio, which will be fed to loudspeakers placed about the ground.

## "Pen Pals."

**FROM** time to time I introduce you to fellows abroad who are anxious to correspond with radio amateurs here, and I believe that many of you have formed valuable friendships by mail. One instance of the value—a material instance, it is true—of a "pen pal" is brought to my notice by **J. T. S. (Leicester),** who has sent for inspection an attractive and informative leaflet about **W. L. W.'s** new aerial and transmitter, which he claims to have received a fortnight before the facts were in print over here.

## Tests of Radiovota.

**SOME** time last month U.S.A. station **WOR** was to have undertaken a test of **Dr. N. M. Hopkins' invention, "Radiovota,"** for enabling listeners to signify their views on any given programme item. At a signal from the broadcasting station the listeners taking part in the test were to switch on a 40-watts lamp, and the extra "load" experienced by the power station was to be divided by 40 to give the number of sets voting, which number, multiplied by 5 (estimated average number of persons per family), would give the number of people voting. I think that we shall all watch this new refinement of broadcasting with great interest. **ARIEL.**

# YOUR GREAT OPPORTUNITY

The system of purchasing commercial receivers over an extended period is rapidly gaining ground, for the simple reason that it has everything in favour of it and nothing against it. "P.W." recognises the obvious advantages of this modern "pay-as-you-listen" idea, and is anxious in the interests of its many readers to reduce the formalities to a minimum. By the timely inclusion of this specially illustrated survey of the outstanding sets of the season, the way is open for readers to conclude all the necessary arrangements for the hire purchase of any of these fine sets entirely through the post.

## THE WORLD'S BEST SETS FOR A FEW SHILLINGS A WEEK

IT is the considered opinion of "P.W." that the time has come when the system of purchasing commercial receivers over an extended period must be regarded, not as a makeshift designed to assist those in straitened circumstances, but as a sound and essentially practical commercial business proposition.

We make no secret of the fact that hitherto we have held a perfectly open mind, verging, if anything, against rather than for the proposition, for the very simple reason that it would have been futile to commend the practice of buying over an extended period if, at the end of that time or even before, there was the possibility of the set being substantially reduced in price or, worse still, of its being rendered obsolete by the arrival of some new wonder.

### Creating Confidence

To-day those objections can no longer be said to apply. While it is impossible for any of us to see very far into the future, the law of economics and the rising tide of industrial prosperity make it abundantly clear that not for some long time to come can prices be appreciably lower than they are now without the quality of the article suffering. That fact alone creates the degree of confidence so very necessary for the successful operation of an extended-payment plan.

But there is also the aspect of future improvements to be considered before the hire-purchase system can become universally popular. In our considered opinion, that, again, is an objection which can no longer be said to apply.

### An Artistic Analogy

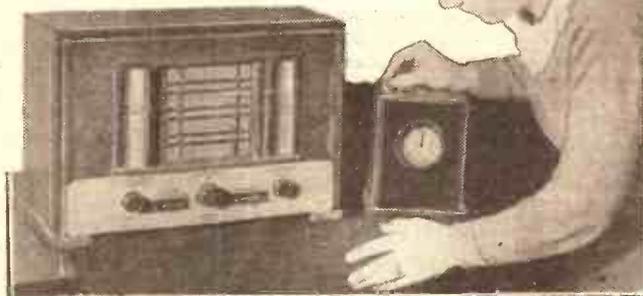
A good artist will tell you that a picture is never finished, and that he could go on putting a little touch here and a little touch there almost to the end of his days. But for practical reasons he has to stop at that stage which gives not only the

effect that he is after, but satisfaction to his clients.

That stage has now been reached in the technique of broadcast-receiver design, and that, in our submission, is the logical jumping-off place for a wholesale campaign in favour of extended credit. It is, after all, only a means to an end, and it does open up the way for many of us to become a little more ambitious in our tastes than if we had to pay cash down.

Consider it another way. To get to the upstairs floor we have to make use of the stairs. If the stairs were not there, then most of us would have to be content to stay on the ground floor.

### HOW THEY DO IT IN GERMANY



Here is a German set intended for hire purchase, but with which the "hirer" has to put a coin into a slot to obtain results! The dealer then calls round periodically to empty "the meter." It would be hard luck if you ran out of small change in the middle of a good programme!

Similarly, if easy stages were not available for climbing up to some of the more ambitious designs, then they would definitely be above our heads, and we should have to be content with remaining, so to speak, on the ground floor.

Viewed from every angle, then, and especially in the light of modern conditions, the credit system of buying has everything in favour of it and nothing against it. It enables the manufacturer very considerably to broaden the scope of appeal of some of his more expensive

instruments, and, from the listener's point of view, it brings first-class modern radio virtually within the reach of all.

Even so, the average Englishman is a very self-conscious individual, and because, in certain quarters, the system of hire purchase has been looked down upon, there exists in his mind an idea that he will be subjecting himself to an indignity if he has to go into a shop to inquire about extended credit.

The world to-day is run on credit, and obviously such an idea is quite without justification. But, unfortunately, this same Englishman, rather like the elephant, never forgets.

### Through the Post

That is where "P.W." steps into the breach, for by the inclusion of this specially illustrated survey of the most outstanding sets of the season, and by the making of special arrangements with the manufacturers concerned, the reader is enabled to choose any one of the sets and to complete all the necessary arrangements entirely through the post.

At the end of each review is published a coupon addressed to the manufacturer concerned. All you have to do is to fill in your name and address and post it in an unsealed envelope (a ½d. stamp is sufficient) to the address given.

The manufacturer will advise you of the name and address of his local dealer from whom you can obtain the set on hire purchase, and if you then drop a line to the local dealer in question he will see that the necessary agreement forms are sent on to you.

By this means the whole transaction can be completed without your having to go near the local dealer's shop.

"P.W." has paved the way—the rest is up to you entirely.

A few shillings a week buys the most ambitious of all types of sets :

**THE NEW H.M.V.  
"SUPERHET FIVE-FOUR-TWO  
AUTORADIOGRAM"**

THE LATEST TRIUMPHANT SUCCESS OF A  
WORLD-FAMOUS ORGANISATION



**TERMS:**  
£2 10s. Deposit  
and 22 Payments  
of £1 7s. 6d.

**J**UDGING by the latest production of the H.M.V. Company, it would appear that the age of miracles is not past—at least, that is the not-so-fantastic impression that we have gained from the recent activities of this world-famous firm.

It does not require a great deal of thought to arrive at what must surely be the one ultimate radio ambition in the life of every listener—that is, so far as known inventions are concerned. For the moment the future, and the tremendous possibilities that it holds in store, we must be content to leave out of it.

**What is Your Radio Ambition ?**

But with complete freedom of choice and a reckless disregard for the financial side of it, there is little doubt, we feel, that a good ninety per cent of listeners would find complete contentment with a really first-class automatic record-changing radiogramophone.

On that point, then, it may be taken that we are all agreed. But—and up to the present this is where the snag has arisen—not all of us have had the good fortune, if good fortune it is, to be born with golden spoons in our mouths, and to whatever heights our theoretical ambitions may have arisen, they have had to be suppressed by the practical limitations of our pockets. That, as we have observed before, has been the state of affairs up to the present. Why should it now be any different ?

The answer—thanks to H.M.V., and amazing though it may seem—is that anybody can now become the possessor of one of these most comprehensive of all radio instruments for an expenditure of little more than six shillings a week !

**Did Not Seem Possible !**

We may as well be honest and admit that we are amazed at the extraordinarily good value for money that is represented by this new 27-guinea H.M.V. Superhet Autoradiogram. At 27 guineas, and reckoned by existing standards, it just did not seem possible.

But it is possible. And not only is it possible : it is here in practical commercial form.

With that same foresight which has characterised the activities of this go-ahead concern right from the start, a specially extended hire-purchase scheme has been put into operation in connection with this instrument, with the result that it can be yours for an initial payment of only £2 10s., followed by 22 monthly payments of £1 7s. 6d. What an opportunity ! And what a set !



Magnificent cabinet work is an outstanding feature of all H.M.V. productions, and the firm's reputation is well maintained in the design of this new model.

But no words of ours, we feel, can possibly impart in full measure the "goldenness" of this opportunity. Let us, therefore, attempt to convey in greater detail some of the outstanding features of this 1934 wonder set, and leave you to judge for yourself.

The H.M.V. "Superhet Five-Four-Two Autoradiogram"—to give it its full name—is a five-valve (including rectifier) super-heterodyne A.C. radiogramophone, with new-type automatic record changer. The changer itself—which is the fifth type that has been placed in production by H.M.V. during the past few years—is the simplest of all the models that have been made. It

will play up to eight 10-inch or 12-inch records in sequence, switching itself off after the last one ; it will play all the records in sequence, repeating the last one indefinitely ; it will repeat a single record indefinitely, or, if you like, the automatic mechanism may be switched out of action.

**Points of Distinction.**

An ingenious mercury switch, which is operated automatically by the pick-up, throws the motor into operation and ensures absolutely silent operation. With regard to the pick-up, for convenience when changing the needle the head may be turned into an upright position.

The general design of the radio section follows very closely that of the famous H.M.V. "Superhet Five-Forty." Outstanding features may be summarised as : (1) Duplex-action whistle suppressor, ensuring particularly clear reception ; (2) absence of the not uncommon superhet "image" effect, owing to the special patented circuit incorporated ; (3) the attainment of wide balance of reproduction (i.e. true "top," as distinct from second harmonic "top" ) ; and (4) the instrument can be operated in any room, if necessary, without the use of external aerial or earth.

**Calibration and Controls.**

Beauty of appearance has been preserved by mounting all the controls, with the exception of the gramophone volume control and record-rejecting button, in a convenient position underneath the lid of the instrument. Considered from the domestic point of view, the controls are very simple, and include a single-knob ball-bearing main-tuning control, a graduated radio volume control and a very useful tone control. The dial, which is illuminated and very easily readable, is calibrated in wavelengths.

It is interesting to note that "P.W." had the privilege of being present at the very first demonstration of this new H.M.V. production, and to say that it came through its tests with flying colours would be to put it mildly. There seemed to be no limit to the number of stations that could be received, and it is true to say that the quality of reproduction was indeed "His Master's Voice."

To "His Master's Voice,"  
The Gramophone Company, Ltd.,  
98-108, Clerkenwell Road,  
London, E.C.1.

Please send me, without obligation, the name and address of my local "His Master's Voice" dealer from whom I can obtain the "Superhet Five-Four-Two Autoradiogram" on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
ADDRESS.....

IT is true to say of radio portability that it is one of those joys that has to be experienced to be really appreciated. But it must be portable radio and not, alas! as is so often the case, portable "coco: phony."

In these days of high-quality reproduction it is rather important to stress that fact, for, due to the unsatisfactory and inefficient reputations of some of the earlier so-called portables, there is in the minds of many an idea that radio portability, even at its best, is little more than a makeshift with a novelty appeal.

First, then, it must be our endeavour to straighten out any wrong ideas in this respect by saying, without reference to any particular make or type, that the modern completely self-contained receiver can be, and, in fact is, comparable in every respect with any other type of well-designed installation.

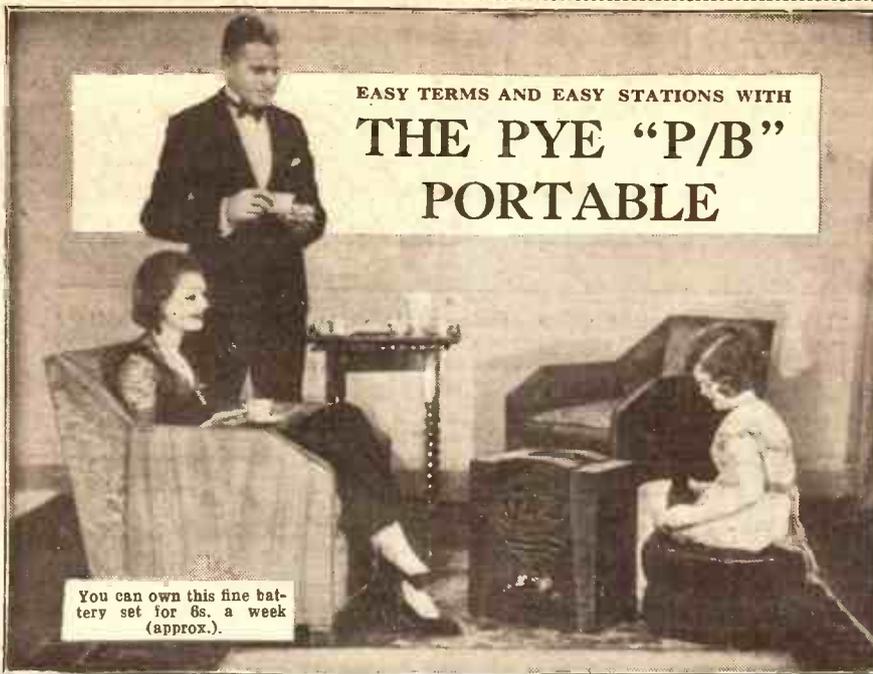
**A Brilliant Example.**

That little myth disposed of—we hope once and for all—we are now at liberty to narrow down and, moreover, to qualify our remarks by reference to one specific example—an example which, in our considered opinion, is a credit not only to the makers, but to the radio industry as a whole. We refer to the famous "P/B" model produced by Pye.

The Pye "P/B" portable is an outstandingly brilliant example of scientific endeavour. Faced with a problem beset with infinitely more difficulties than are likely to be encountered in the design of practically any orthodox type of receiver, Pye's determined to place radio portability on a sound footing. To what extent their efforts have succeeded in the years that have ensued may be gauged by the phenomenal growth of the company and the almost universal popularity of their products.

**The Test of Time.**

"Portables come and portables go, but the Pye 'P/B' goes on for ever!" might well be the slogan of this enterprising concern, for the famous "P/B" has stood the acid test of time. It is not a new set—a five-minute wonder that is likely to be ushered into obscurity by the arrival of a "Super-Infra Contrahet with ashtray tuning control knobs." It is one of the pillars upon which the firm's most sought after of all attributes—the power to give lasting satisfaction—is supported, and it is a safe conjecture that in years to come the "P/B" will still hold the premier position in the world of portable



EASY TERMS AND EASY STATIONS WITH  
**THE PYE "P/B"**  
PORTABLE

You can own this fine battery set for 6s. a week (approx.).

radio as it does to-day—as, indeed, it has done since it was first introduced.

That being the case, the advantages of selecting a receiver of this type for purchase over an extended period will be obvious, for you can enter into the agreement with the reassuring knowledge that the set will still be up to date when you have finished paying for it.

great advantage from the point of view of domestic use, and when once you have had the experience of a portable—perhaps we ought to say of a Pye portable—you will appreciate to the full the significance of our remarks.

**A Very Wide Appeal.**

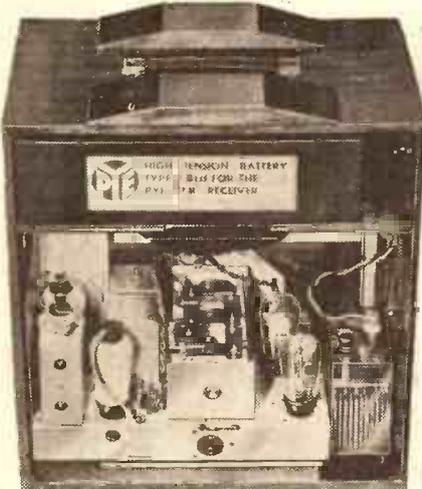
The Pye "P/B" is a battery portable, and on those grounds alone it should make a very wide appeal, for there must surely be few battery sets to touch it from the point of view of quality of reproduction. It has a twin brother in the "P/AC," which is designed to meet the requirements of those who are on A.C. mains.

Considered technically, the "P/B" is a commendable example of the tremendous progress that has been made in modern receiver technique. Basically, the circuit is that of a highly efficient six-valve super-heterodyne with all the latest refinements. Despite the fact that it is a battery set it is capable of providing, through the permanent-magnet moving-coil speaker incorporated, an undistorted output up to 1.4 watts.

**Characteristic Details.**

Then, too, there are all those little touches which are characteristic of Pye attention to detail: the provision of automatic volume control, single-dial tuning, separate tuning dials for each wave-range, with illumination for the one that is in use (depending upon the position of the wavechange switch), the inclusion of connections for a pick-up and even, should you so desire them, for an external speaker and aerial. But, in all but remote districts, the latter is hardly likely to be necessary, for the range of alternative programmes provided by the "P/B" as it stands is sufficiently wide to satisfy even the most fastidious user. There is a whole gamut of stations waiting for you when you turn the single-dial control of the "P/B." Without a doubt it's a very remarkable instrument.

**DO YOU OWN ONE?**



The interior of Pye's most famous battery portable, the "P/B." This fine set can be yours for a first payment of £1 7s. 6d., followed by 12 monthly payments of £1 4s. 6d.

You may now be saying to yourself that the description sounds very fine, but that an instrument of this type, by virtue of

To Pye Radio, Ltd.,  
Africa House, Kingsway,  
London, W.C.1.

Kindly send me, without obligation, the name and address of my local Pye dealer from whom I can obtain the "P/B" Portable on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
ADDRESS.....

**ALTHOUGH** there has been very considerable activity in all spheres of commercial-set design during the last few months, there is little doubt that the most revolutionary advances have been made in the models intended for battery operation.

Up to comparatively recently progress in the development of battery models has been very much slower than has been the case with all-electric designs, principally on account of the limitations that have had to be observed in connection with H.T. consumption. For any battery design to succeed it is essential that it should be economical in operation, and for years that fundamental consideration has precluded the development of battery designs to compare in performance with those of the mains variety.

#### Using the Latest Valves.

Nowadays—and thanks to the enterprise of our valve manufacturers—the position is completely changed, and with the advent of the new dual- and triple-purpose valves the last remaining obstacles have been completely removed. No longer is it true to say that the performance of battery sets in general is below that of instruments intended for mains operation, for very definite evidence to the contrary is provided by the new Columbia "Superhet Battery Grand," at 15 guineas.

Columbia—well to the fore as usual—have been quick to appreciate the tremendous possibilities that have been opened up by the revolutionary changes in battery-valve technique, and they have obviously lost no time in making the very most of them.

In their new "Superhet Battery Grand," despite the fact that from the point of view of physical appearance it has only five valves, the circuit equivalent is really that of an eight-valve receiver in which one of the eight combines the function of oscillator and first detector valves.

#### Consider the Figures.

Those facts are impressive enough, but infinitely greater weight is given to them by a consideration of the probable upkeep expenses of such an efficient combination. When we say, for instance, that the total H.T. current consumption of this set is not appreciably greater than that of any ordinary three-valver of 1932-1933 vintage, and that, with its undistorted output of 1½ watts, it compares favourably with many existing mains designs, it will be appreciated that Columbia have indeed leapt ahead.

Deposit £1.11.6 followed by 12 monthly payments of £1.5.6.

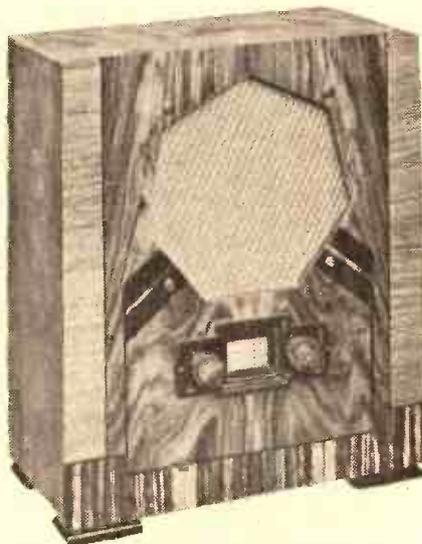


Thanks to the recent valve developments, here is an amazing battery receiver in which five valves are made to do the work of nine! As a result, practically every station in Europe can be received at loudspeaker strength.

## THE NEW COLUMBIA "SUPERHET BATTERY GRAND"

WITHOUT A DOUBT, IT IS ONE OF THE MOST ADVANCED BATTERY DESIGNS YET PRODUCED.

Consider the figures for yourself. Measurements taken in the "P.W." labs. brought to light the astounding fact that this set, quiescent and off tune, consumed a total anode current of only 8 milliamperes. Even under working conditions the peak current on local stations was not appreciably higher than 15 milliamperes. and in these circumstances the maker's claim of a very



Simplicity of control is an outstanding feature of this fine Columbia Battery Superhet.

economical average on both local and distant stations seems reasonable enough. Translated into practical terms, that means to say that a good, average-sized H.T. battery used in conjunction with this set will last as long as it would with practically any existing type of three- or four-valver.

The whole secret of these extraordinarily low-current consumption figures is due to the use in the output stage of one of the new dual push-pull pentode valves. These two valves, which are contained in one envelope, are capable of giving

a maximum undistorted output of 1½ watts with an extremely small average anode current consumption.

But that is not the only outstanding feature of the design. By the inclusion in the superhet circuit employed of one of the latest battery double-diode-triode valves it has been possible to provide for the automatic control of volume.

The set has been designed for use with an external aerial and earth; but to give you some idea of the amazing performance of which it is capable it is here

appropriate to mention that, when tested in the West Country with only an average-sized aerial, there was not a station worth calling a station in the whole of Europe that could not be received at loudspeaker strength! Sensitivity and selectivity are up to a standard hitherto associated only with all-electric designs, and the more ambitious types of all-electric sets at that.

#### For Adequate Control.

In keeping with modern requirements, the controls of this outstanding set have been kept down to a very minimum. There is a master tuning control which moves the illuminated wavelength scales past indicator pointer, a local-distant switch for use when working very near to the local stations, a volume control which is effective not only on radio but on records, should you desire to use a pick-up with the set, and finally a four-position control switch giving medium waves, long waves, gramophone and "off."

The speaker is of the permanent-magnet moving-coil variety, and sockets are provided at the back of the instrument for the connection of an external speaker for cases where it is desired to have radio (or records, of course) in more than one room.

#### Distinctive Finish.

Of the cabinet work one can only say that it is absolutely in keeping with the excellence of the design generally.

Finally, it is interesting to note that the price of the instrument includes batteries and valves. Our own honest opinion, formed as a result of our tests, is that the set would be remarkably cheap even without them.

To The Columbia Graphophone Co. Ltd.,  
98-108, Clerkenwell Road,  
London, E.C.

Please send me, without obligation, the name and address of my local Columbia dealer from whom I can obtain the "Superhet Battery Grand" on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
ADDRESS.....

TOURING EUROPE FOR 4s. 6d. A WEEK WITH

# THE EKCO MODEL R.G.84

THE LATEST MAGNIFICENT ADDITION TO AN

# RADIOGRAM

ALREADY FAMOUS RANGE

**P**ERHAPS the most confidence-promoting introduction that we can make to this new Ekco radiogram is to say that it is a recognised fact among discriminating purchasers that when Ekco do a thing they always do it well.

A long sequence of successful achievements has served to place the products of this famous organisation in a class which is second to none, but—and this is the secret of their popularity—they have been careful to avoid the pitfall into which so many firms fall of allowing prestige to be a justification for higher prices.

### Intensive Research.

To achieve fame is one thing, but to maintain it in the face of severe competition is quite another story. Ekco's have long realised that there is nothing to be gained by entering into a price "war" by the inevitable introduction of inferior articles, and it is to their foresight in this respect that their present enviable position in the commercial-set world may be attributed.

The keenness of Ekco prices to-day is due to one thing, and to one thing only. Years of intensive research into both technical and manufacturing aspects of mass set production have enabled them to eliminate wastage and consequential heavy overhead expenses, and as a result of their accumulated experience they are in the happy position of being able to produce the quality article at the quantity price.

On the score of past Ekco productions there can be no possible doubt concerning the quality aspect, and in talking of quality we use the word in its broadest sense. From the points of view of performance, appearance, ease of operation, and reliability, Ekco sets have undoubtedly built up a reputation that is second to none.

### Previous Efforts Surpassed.

It is refreshing, then, to find that in the design of this latest instrument the Ekco traditions have been fully maintained; in fact, in many respects there is evidence that they have surpassed their previous efforts.

There are many aspects of the design about which we want to tell you, but, in order that you shall not harbour the feeling that you are reading a lot of highly interesting facts concerning a set which is beyond your means financially, may we ask you a direct question? How much money do you spend each week on little tit-bits that you might well do without? Would five shillings, do you think, be a very modest estimate?

Good enough! The instrument which we are about to describe can be yours for a weekly expenditure of something less



Elsie and Doris Waters, the well-known microphone personalities, spend their leisure hours with an EKCO Model R.G.84 Radiogram.

reproduction from every worthwhile station in Europe with about as much effort on your part as is required to turn a door handle! The programmes literally "tumble" in, and yet each and every one is completely separated from the rest. It is true that in our tests we came across one or two stations that were—shall we say for want of a better expression?—"locked together"; but it is rather too much to hope that any set will straighten out a fault which is due entirely to the failure of certain stations to adhere rigidly to their allotted wavelengths. But, apart from this, if you resolved to listen to a different station every night it would take you at least a couple of months to go through the number of programmes that are available on this set!

If the scope of appeal of the instrument finished there, there are few who would have cause to complain at the five-shillings-a-week expenditure. But it doesn't. In addition to having at your finger-tips every worth-while station in Europe, you have unlimited scope for arranging programmes of your own through the medium of gramophone records.

With this outstanding instrument the reproduction of records, like that of radio programmes, leaves absolutely nothing to be desired.

### A Seven-Stage Super.

To revert to the question of ease of operation, all programmes are selected by a single control which moves a shadow pointer to the name of the station desired. In an instant you can pick out by name any one of dozens of different stations, and, as a result of the incorporation of an ingenious interchangeable station-names scale, you need not entertain any fears concerning the possibility of still further readjustments in the European ether.

The Ekco Model R.G.84 is a seven-stage superheterodyne with all the latest refinements. It is available for A.C. or D.C. mains operation, and with electricity at 2d. per unit it can be run for 1,000 hours for 10s. on A.C. mains or 8s. 4d. on D.C.

The cabinet, like the set which is housed in it, is truly a superb piece of work. It is beautifully finished in two-toned inlaid walnut, and the general standard of workmanship is consistent with that of a much more expensive instrument.

than five shillings. That point disposed of you can now consider the claims of this quality radiogram with, virtually, a complete disregard for the financial obstacle. After all, what is five shillings a week considered in the light of the entertainment value that you get in return?

Consider it for yourself. Here is an instrument that will give you real quality



Beauty of appearance in the R.G.84 cabinet is ensured by the use of two-toned inlaid walnut. An initial payment of £2 and 24 monthly payments of £1 are the hire-purchase terms for the A.C. Model.

To E. K. Cole Ltd.,  
Ekco Works, Southend-on-Sea, Essex.  
Kindly send me, without obligation, the name and address of my local Ekco dealer from whom I can obtain the Model R.G.84 on Hire Purchase, as described in "Popular Wireless."  
MY NAME.....  
ADDRESS.....

Correct tonal balance—the secret of flawless reproduction—is the outstanding feature of

## THE NEW TELSEN MODEL 1240 RADIOGRAM

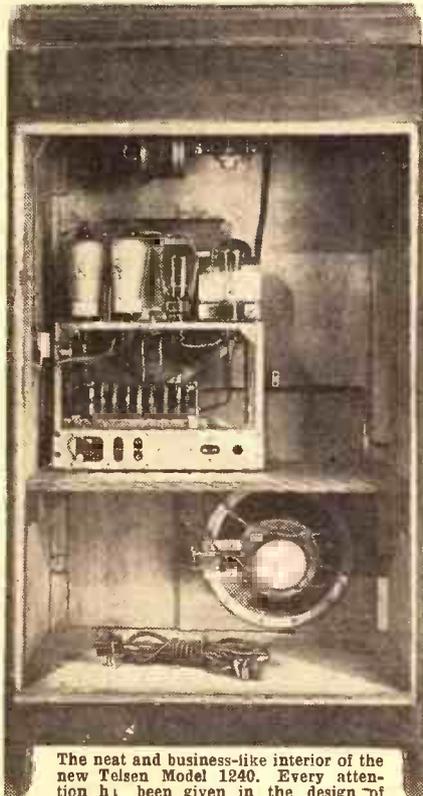
AT THE ASTONISHINGLY LOW PRICE OF 18 GUINEAS, IT IS THE OPPORTUNITY FOR WHICH THOUSANDS OF PEOPLE HAVE BEEN WAITING FOR YEARS!

IF it were possible for a census to be taken with a view to determining the sources from which listeners derive the majority of their broadcast entertainment, there is little doubt that the figures would be heavily in favour of the local stations.

It's a point that you can easily check up for yourself by consideration of your own case. How many times in the course of a week do you sit down with intent to listen to a programme emanating from overseas? Sundays, perhaps—yes; but even then it's doubtful whether you would be drawing from the European ether if our home stations could offer the same sort of light entertainment.

### The First Consideration.

These thoughts are brought forward, not with intent to decry the merits of distant reception, but in order that you shall view the considerations governing the choice of a set in the correct proportions. To be harnessed to your local station would indeed be an awful tragedy, and there certainly are occasions when to reach out is a "grand and glorious feeling,"



The neat and business-like interior of the new Telsen Model 1240. Every attention has been given in the design of the cabinet to the elimination of "box resonance."

but, in general, you, the same as everybody else, if the truth were only known, spend by far the greatest proportion of your listening hours at home with the local stations.

Is it not a fact, then, that if this is the case, the very first consideration governing the choice of a broadcast receiver should be that of quality of reproduction? Is not the fascination to be derived from searching round for distant stations a sort of transitional period between the non-listener and the listener stage? Broadly speaking, we maintain that it is, and although we have no time for a set that will not receive distant stations when occasion demands, i.e. when the Joneses come in for the evening, we believe that, after the "settling-down" period, it is quality of reproduction that counts every time.

That brings us straight to the question of what is quality of reproduction, and, more to the point, it enables us to approach the present review with a definite object in mind.

### Treble and Bass Balance.

Faithful reproduction, in the light of modern understanding, may be said to be the attainment of correct tonal balance. It isn't sufficient for a set to reproduce all frequencies from 50 to, say, 8,000 cycles unless the *balance* between the bass and treble frequencies has been given due consideration in the design.

The happy medium—the medium which ensures results worth listening to for the sake of listening, and which virtually brings the studio to your own domestic environment—is the outstanding feature of the new "Telsen Model 1240 Radiogram." The quality of reproduction given by this remarkable instrument is the first thing that strikes you.

It is true to say of most modern reputable sets that reproduction is good. But how good is good? It is difficult, of course, to lay down any hard-and-fast rule; but with the obvious necessity for us to approach a review of this description with both hypercritical ears and eyes, we are content to let you draw your own conclusions from our verdict that the "Model 1240" is not only good: it is distinctly above the average.

### An Outstanding Receiver.

But the quality of reproduction given by this latest Telsen effort is not the only commendable point about the design. The instrument under test provides conclusive proof that, from every point of view, it is indeed another feather in the Telsen cap.



The handsome appearance of the new Telsen Radiogram is conveyed by this special "P.W." photograph.

"Yes," you may say, "it's all very well to be eulogistic, but look at the price." Well, *look* at it, let it soak in well and truly, and then ask yourself from what other source you can obtain an instrument corresponding in every respect with this one at the price of 18 guineas!

The "Telsen Model 1240," viewed from every aspect, may be said to be right in the forefront of modern receiver practice. The circuit, which is designed for operation on A.C. mains, consists of a screened-grid high-frequency pentode amplifier, an S.G. pentode detector and a super-power pentode output stage—a combination so efficient in operation that we were able with ease to receive rather more than thirty stations with only the mains aerial in use and with no earth connection.

### Simple To Handle.

The controls are almost ridiculously simple to handle, and they consist of a dual volume control which is effective on both radio and gramophone, a master tuning control which actuates a knife-edge pointer over an easily readable scale calibrated in wavelength and a control which, for practical purposes, may be referred to as a signal booster.

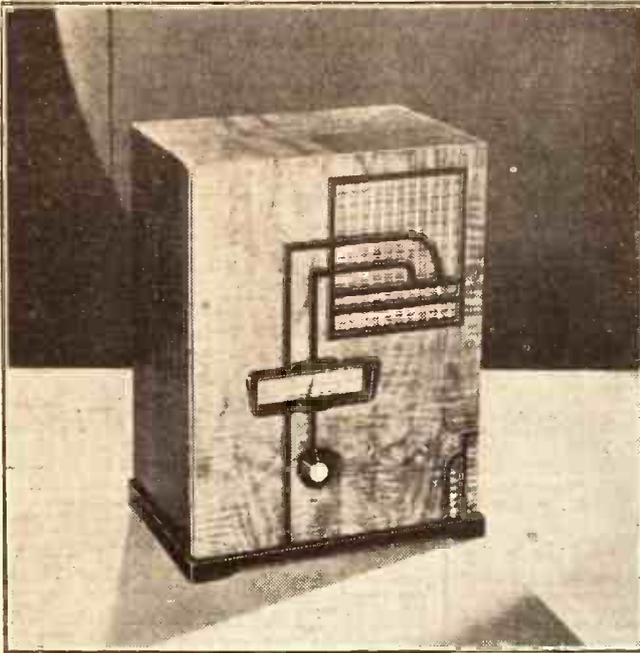
Altogether, the set—and we must not forget to include in that general description the exceedingly handsome cabinet in which it is housed—is an exceptionally attractive proposition.

To Telsen Electric, Ltd.,  
Aston, Birmingham.

Kindly send me, without obligation, the name and address of my local Telsen dealer from whom I can obtain the Telsen Model 1240 Radiogram on Hire Purchase, as described in "Popular Wireless."

MY NAME.....

ADDRESS.....



The Regentone Five-Stage Battery Superhet incorporates an ingenious colour-coded full-vision scale marked with the new station names.

**M**R. R. H. NUNN, the enterprising Managing Director of Regentone, Limited, is one of the industry's greatest exponents of the hire-purchase system. We mention that fact because it has a direct bearing on the products of this well-known organisation.

Hire purchase means payment for an article over a period of months, maybe even years, and *unreliability* is the shortest cut to dissatisfaction. In fact, *unreliability* may lead to non-payment of instalments.

**Attention to Detail.**

That the present firm's percentage of defaulters is so ridiculously small, bearing in mind the tremendous demand for their products, is surely unimpeachable testimony to the reliability factor of any set bearing the name of Regentone.

That is the whole secret of the firm's phenomenal growth. There's nothing of the five-minute wonder touch about anything that is produced by Regentone, for the policy underlying all their activities is the production of instruments that will give, above all else, lasting satisfaction. To achieve that commendable ideal, it follows automatically that their products must be designed with scrupulous attention to detail in *every* respect.

**H.T. Current Economy.**

Selectivity, sensitivity, quality of reproduction, ease of operation, beauty of appearance, economy—all are features which combine to ensure that highly desirable attribute of lasting satisfaction, features which occupy continually the time and efforts of a brilliant combination of research engineers.

Battery users in particular have ample cause to be thankful for the existence of Regentone, for, as we shall prove in the following review, their needs have received the closest consideration in the range of

The "reliability factor" is a vitally important consideration with any set that is to be purchased over an extended period. Lasting satisfaction is the keynote of all Regentone designs, and especially of

**THE REGENTONE FIVE-STAGE BATTERY SUPERHET**

an-exceptionally fine battery superhet that takes a total anode current of only 6 milliamps.

instruments produced by this enterprising concern.

In a sense, the design of a set for battery operation is infinitely more difficult than that of a mains instrument, for everything hinges upon the all-important question of battery consumption. Anybody could design a battery set to equal in performance that of a mains

instrument by disregarding the question of total H.T. consumption, but would lasting satisfaction be given by any set requiring a new H.T. battery every fortnight?

Regentone, in the design of their battery models, have tackled, and tackled success-



For those requiring a battery set slightly less ambitious than the Five-Stage Superhet, this Regentone "Band-pass Three" is an ideal investment.

fully, a problem that is literally bristling with difficulties. They have had to produce an instrument which, in performance, is comparable with a mains set, but which takes, perhaps, as little as one-tenth of the current required by the all-electric design.

To what extent they have succeeded may be gauged from the fact that their five-stage battery superheterodyne—to take an outstanding example—requires only 6 milliampères of current. And it is a four-valve five-stage superhet with

almost every possible modern refinement and with a performance which challenges comparison with any equivalent mains instrument!

The superhet circuit of this remarkable design includes no less than *seven tuned circuits!* It is provided with band-pass input and band-pass intermediates, and the use of a double-diode triode valve in the second detector position has enabled delayed automatic volume control to be incorporated.

**Important Technical Points.**

Tuning is carried out by a single knob which actuates a knife-edge pointer over a colour-coded full-vision scale marked with the new station names. There is a preset hand control for volume, and a sound output adequate for all normal domestic requirements is provided by the compensated-tone moving-coil speaker incorporated.

As you may judge for yourself from the photograph accompanying this review, the design of the cabinet of the Regentone Five-Stage Battery Superhet is pleasingly modern.

Reckoned by our existing standards, it is true to say that the performance of this set was exceptionally good, and that, in general, it certainly lived up to the claims that are made for it. How Regentone can manage to produce such a high-grade instrument for the astonishingly low price of 11 guineas is a secret known only to them, but there is little doubt that it constitutes one of the best set bargains of the year.

**Remarkable Value.**

It is extraordinary to think that anyone can possess this set for 12 monthly payments of only £1 1s. 9d., with no initial payment beyond the first instalment.

Remarkable, too, is the fact that, for anyone requiring a battery set perhaps not quite so ambitious as this one, there is in the Regentone range a most excellent "Band-pass Three" which costs only £7 15s. In the case of both of these sets it is important to point out that the prices are *inclusive of batteries!*

To Regentone, Ltd.,  
Regentone Works, Worton Road,  
Isleworth, Middx.

PLEASE SEND ME, WITHOUT OBLIGATION:

\* (a) The name and address of my local Regentone dealer from whom I can obtain the Five-Stage Battery Superhet on Hire Purchase, as described in POPULAR WIRELESS.

\* (b) The name and address of my local Regentone dealer from whom I can obtain the "Band-pass Three" on Hire Purchase, together with a descriptive folder.

\*(Please strike out words not applicable.)

MY NAME.....

ADDRESS.....

AUTOMATIC VOLUME CONTROL AND AUTOMATIC TONE  
COMPENSATION ARE OUTSTANDING FEATURES OF

## THE K.B. 666 A.C. SUPERHETERODYNE

WHICH IS ALSO DESIGNED FOR THE K.B. REJECTOSTATIC  
SYSTEM AND SELLS COMPLETE AT 16 GUINEAS

UNTIL comparatively recently, the most neglected aspect of commercial-receiver design has undoubtedly been that of the cabinet. Nor does one have to search very far for the probable reason.

We are of opinion that manufacturers in general have so concerned themselves with the perfecting of their designs technically that the question of artistic cabinets in which to house them has been given insufficient attention; in fact, it is probable that it has sometimes been left to the technical designer of the set to suggest a suitable cabinet.

With all due respect, and with very few exceptions, that, of course, is where the trouble has arisen. A technician is a technician and not an artist. Give him all manner of intricate problems



The de-luxe model, distinguished for its striking cabinet design, is available in walnut with chromium-plated metal edges and fittings.

connected with the science of broadcasting and, if he is worthy of his title, you can count on him finding a way out.

But ask him afterwards to assume the rôle of cabinet craftsman, and it's ten to one that his technical masterpiece will find its way into the retailer's shop window in the same old stereotyped cabinet as of old. And then the manufacturer wonders why it will not sell!

### The Technique of Externals.

The fact of the matter is that it is no longer possible to rely on technical merit alone, for the simple reason that the standards generally are so high. Frankly they have to be if the set is to maintain any sort of position in the world's receiver market.

To Kolster Brandes, then, with whose products the present review is concerned, all credit is due not only for realising this fact, but for taking appropriate steps to meet the growing demand. They realise that the balance of favour these days may quite easily be determined by the artistic appearance of the cabinet, and

**TERMS**  
Standard Cabinet: 33s. deposit, 12 monthly payments of 28s.  
De Luxe Cabinet: 38s. deposit and 12 monthly payments of 31s. 6d.  
(The deposit in each case includes Insurance.)

they have turned that psychological aspect to good account by calling in the services of one of the country's leading furniture designers.

With what success you may judge to some extent for yourself from the photographs accompanying this article. But it follows logically that with the combination of K.B. technical skill and the brains of one of the finest furniture artists in the country, K.B. sets to-day are in a class all of their own.

### Employs Three H.F. Pentodes

The one with which we are particularly concerned at the moment is the famous K.B. 666 all-electric superhet, and we have no hesitation in saying outright that it is impossible adversely to criticise the set, no matter from what point of view it is considered. Readers of "P.W." will realise that that is indeed a bold statement, and yet it is one that can be substantiated by consideration of all the outstanding features of the design in the light of modern requirements.

First of all let us consider it from the points of view of sensitivity and selectivity. The superhet circuit of the K.B. Model 666 employs three H.F. pentodes, a double-diode triode and a power-pentode output.

### Sensitivity and Tonal Balance.

The fact that it is a superhet, and that it employs three H.F. pentodes ensures Knife-edge selectivity plus a degree of sensitivity more than adequate for the reception of all the worth-while stations in Europe. Moreover, the inclusion of fully automatic volume control makes them really worth hearing.

Tonal balance is maintained by the incorporation of an automatic tone-compensating device. That, plus the high-grade moving-coil speaker incorporated, takes care of the quality. And as for



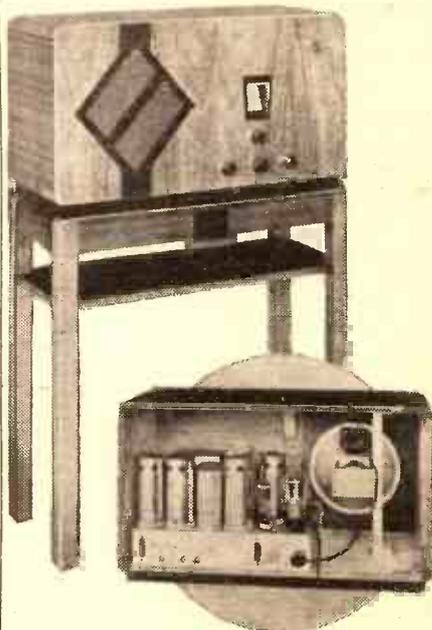
Miss Gertrude Lawrence discusses the merits of the famous K.B. 666 receiver with Mr. Wilding Cole, Chairman of the Radio Manufacturers' Association.

the quantity, we have yet to find a domestic surrounding sufficiently large for comfortable listening when this set is being worked at its maximum undistorted output of approximately three watts!

But that need not worry you unduly, for volume, and similarly, tone, are both adjustable by manual controls.

The K.B. 666, despite its high general standard of performance, is almost ridiculously simple to operate. There is but one main tuning control, and station selection can be carried out by means of the wavelength-calibrated dial which is illuminated when the set is in use.

There is in the design provision for the connection of a gramophone pick-up and external speaker, and it is a feature of the circuit that both the tone and volume controls are effective on gramophone.



The standard model K.B. 666 is here seen mounted on a stand to make it a floor model. This stand is available for either model by adding 5s. to the deposit and 3s. 6d. to each monthly payment. At the foot of the photograph is a view of the interior of the K.B. 666.

To Kolster-Brandes, Ltd.,  
Cray Works,  
Sidecup, Kent.

Kindly send me, without obligation, the name and address of my local K.B. dealer from whom I can obtain the K.B. 666 on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
ADDRESS.....



£2 down, and 22 payments of £1, buy this fine instrument.

The Lucerne Plan and all its implications need hold no terrors for those who choose  
**THE MARCONIPHONE**  
**"LUCERNE SPECIAL" RADIOGRAM**

This outstanding all-electric radio-gramophone represents the culmination of months of intensive research by a firm whose reputation is world-famous

this latest wonder within the reach of all.

For an initial deposit of only £2 you can have this fine instrument delivered to your own home. You then pay £1 a month for a

period of 22 months, and at the end of that time you become the owner of what is undoubtedly one of the most outstanding designs of the year.

But we do not ask you to rely on our recommendations alone. You, better than anybody else, will know what is likely to provide you with complete contentment in the home-entertainment sense, and we shall be quite happy for you to judge the claims of this latest Marconiphone effort on grounds of merit alone and from the information in this respect which follows.

**Well-built and Attractive.**

The actual tuning scale, which is conveniently located on the motor-board, is of the rectangular illuminated wide-vision type, with knife-edge pointer moving over clearly marked wave-lengths. To facilitate the reception of distant stations a printed card, showing the latest station positions on a replica of the scale, is also provided.

The tone control incorporated in the design is effective on both radio and records, but the provision of a separate volume control on the front of the cabinet enables the volume of records to be adjusted without having to open the lid when the pick-up is in action.

The cabinet is built from selected walnut in a well-proportioned modern design, and it is inlaid with

cross-grained walnut and bordered with sycamore.

Of our practical tests of the "286" it is really necessary to say nothing beyond the fact that it worthily lived up to its name. The programmes might almost be originating in the very same room!

**T**HERE are many people who hold the view that for all-round home entertainment there is nothing to beat a really first-class radiogramophone. Candidly, we share that view. We share it because, when it is realised that such a remarkable instrument as the Marconiphone "Lucerne Special" Radiogram can now be obtained for a matter of only a few shillings a week, the long-standing obstacle of financial limitation may be said to be entirely removed.

**A Complete Answer.**

Marconiphone is a famous name. It is famous not only by reason of its association with the greatest name in radio, but because of the long list of successful achievements that it has to its credit. From the very earliest days in radio this world-famous firm has set standards of performance with which the industry as a whole has had no easy task in keeping up.

Each new development in the technique of broadcasting has brought forth from Marconiphone a corresponding improvement in receiver design to keep pace with it; and it is no doubt due in part measure to their efforts in this direction that present standards generally are so high.

With a firm possessing such a brilliant record of achievements from the very earliest days of broadcasting it was only to be expected that they would lose no time in providing a complete answer to the Lucerne Wavelength Plan. That they have succeeded once again in scoring a "hit" is abundantly obvious from our tests of their new "Lucerne Special" Radiogram; but—and this is where the pleasant surprise comes in—the "hit" has been scored in such a way that it makes an instant appeal not only to—shall we say for want of a better expression?—the well-to-do, but to everyone.

**Specially Extended Scheme.**

By the inauguration of a specially-extended hire-purchase scheme covering a period of 22 months, Marconiphone is to be congratulated for having brought

period of 22 months, and at the end of that time you become the owner of what is undoubtedly one of the most outstanding designs of the year.

But we do not ask you to rely on our recommendations alone. You, better than anybody else, will know what is likely to provide you with complete contentment in the home-entertainment sense, and we shall be quite happy for you to judge the claims of this latest Marconiphone effort on grounds of merit alone and from the information in this respect which follows.



A very good idea of the efficient layout of controls is conveyed in this special "P.W." picture of the Model "286" motor-board.

The Marconiphone "Lucerne Special" Radiogram, or, as we intend to refer to it hereafter, the Model "286," is, on the radio side, a five-valve (including rectifier) all-electric superhet., specially designed to put an end to the difficulties created by the inauguration of the Lucerne Plan. The circuit consists of a constant-peak band-pass input preceding a screened-grid combined detector-oscillator and followed by a transformer-coupled variable-mu I.F. amplifier and a power-grid second detector. L.F. coupling is carried out by means of a triple-compensated auto-transformer, which feeds an indirectly-heated power pentode.

The input circuit has been specially

To The Marconiphone Company Ltd.,  
 210-212, Tottenham Court Road,  
 London, W.1.

Please send me, without obligation, the name and address of my local Marconi-man from whom I can obtain the "Lucerne Special" Radiogram on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
 ADDRESS.....

## "A valve-maker's set" is a description which guarantees the efficiency of The Cossor "435" A.C. Mains Receiver

when one remembers that the valve-maker is A. C. Cossor, Ltd.

IN a season when, judging by recent commercial set-making activities, everybody is superhet crazy, it is refreshing to come across a design that is so much off the beaten track as to make one wonder why.

It is probable that the designers had several very sound reasons, but the most telling fact of the lot, from the point of view of the listener, is that the set is made by Cossor. They make the valves—very fine valves, too—and if they are not qualified to know how best to get the very maximum results from them—well, candidly, who is?

Technical considerations of the circuit alone make it abundantly obvious that in the design of their new Model "435" all-electric receiver, Cossor technicians have had in mind the attainment of the maximum possible efficiency from the ever popular combination of three valves. As a result, they have succeeded in producing a design which might truthfully be summarised as a three-valve receiver with almost a five-valve performance.

### Unusual Valve Combination.

The reason for that is not far to seek. This set is one of the very few on the market in which detection is carried out by means of one of the new high-frequency pentodes; but, for that matter, the whole combination of valves is unusual, since each valve is of the multi-grid type. There is a variable- $\mu$  S.G. valve in the H.F. stage, the Cossor M.S./Pen. working as a leaky-grid detector and a Cossor M.P./Pen. in the output position.



This is what the new Cossor "435" receiver will look like when installed in your home. The cabinet is handsomely finished in walnut.

It is a recognised feature of all Cossor receivers that the question of quality of reproduction is given paramount consideration. The new Model "435" is no exception to this rule; in regard to the tonal balance and general crispness of top

notes the performance of this Cossor receiver is deserving of special praise. There is little doubt that the use of a resistance-capacity low-frequency stage is an important contributory factor to the high quality of reproduction.

Despite the fact that this new Cossor set employs only one H.F. stage, selectivity is of a high order. A welcome compromise between sensitivity and selectivity to suit all conditions can be obtained by using the variable- $\mu$  control in conjunction with reaction; but it is important to note in connection with both of these qualities that an "outsize" in aerials is definitely not required. Surprisingly good results can be obtained with this set when using only a small indoor aerial, and the choice of anything up to a dozen or fifteen alternative programmes is easily possible. But when using an outdoor aerial of average dimensions, there seems to be no limit to the number of stations that can be received at excellent loudspeaker strength.

### A Novel Station "Pointer."

A welcome feature of the design is the ease with which the set can be operated.

The controls, which are few in number, consist of a main tuning knob with concentrically mounted trimmer control, a volume control which functions by virtue of its regulation of bias on the variable- $\mu$  screened-grid valve, and a reaction control. The mains on-off switch is actuated by the volume-control knob.

The tuning dial is calibrated in wavelengths, and easy station selection is facilitated by the use of an ingenious "pointer" which consists of an oval spot of light focused on to the

scale. As the main tuning dial is operated, the illuminated "pointer" automatically indicates the appropriate wavelength. Incidentally, the wave ranges covered by this set are from 200 to 540 metres on the medium waveband, and



Testing a new receiver by means of a cathode-ray oscillograph in the Cossor factory at Highbury.

The "435" is obtainable on hire purchase terms for £1 deposit and 10 monthly payments of £1.

from 900 to 2,000 metres on the long waveband.

The design provides for the connection of a gramophone pick-up and, where desired, for external speakers. Considerable foresight is also shown by the designers in providing sockets for the connection of an electric gramophone motor.

In keeping with the excellence of the design in other respects, the walnut-finished cabinet constitutes an excellent piece of furniture. It is modern in design, and measures 13 in. high, 17½ in. wide, and 10 in. deep.

### Plenty of Power.

The maximum undistorted output from the set is in the neighbourhood of 2 watts, and although the mains-energised moving-coil speaker incorporated is capable of handling this output, there are few domestic surroundings in which it will be required to use the set "all out."

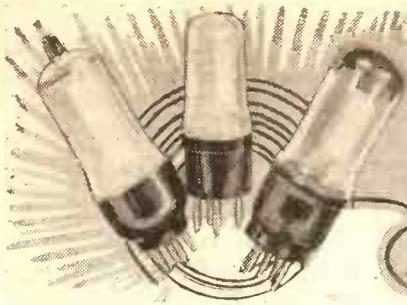
The "435" is intended for operation on A.C. mains of from 200–250 volts, 40–100 cycles.

The mains input connections are adjustable for voltage and a full-wave valve rectifier supplies the H.T. power to the valves.

To A. C. Cossor Ltd.,  
Highbury Grove, London, N.

Kindly send me, without obligation, the name and address of my local Cossor dealer from whom I can obtain the Cossor "435" Receiver on Hire Purchase, as described in "Popular Wireless."

MY NAME.....  
ADDRESS.....



# The NEW CATKIN BATTERY VALVES

**A**BOUT twelve months ago the Marconi and Osram valve companies introduced an innovation in mains valve design that caused a considerable amount of discussion. These "Catkin" valves, as they were called, marked a complete break-away from convention, and immediately became world-famous.

But the "Catkins" were designed for mains operation only, and the construction has not been applied to battery types until recently, when the first three of a new series of battery-operation valves were announced. They are not yet ready for the market—these battery "Catkins" or "K" valves, as they are termed—but they are as novel in their own sphere as the mains "Catkins" were in theirs last year.

### Constructional Features.

Like their big brothers, the battery "Catkins" are smaller than the standard type of valve, and also employ a completely different manner of construction. As a matter of fact, all the essential features of construction that characterised the mains "Catkins" have been incorporated in the "K" class with the exception of the external air-cooled anode.

By the anode itself comprising the external envelope in the mains "Catkins" considerable advantages are offered in the easier dissipation of heat, but where the battery valves are concerned there is no need for such efficient heat dissipation, for the valves do not get hot like the mains indirectly-heated valves and big power types.

So the new "K" valves, as can be seen in the photograph in the heading and the sketch on this page, employ glass envelopes in each instance with the metal anode inside.

### They Are Unusually Small.

The other characteristics of the "Catkin" valve, however—the rigid construction, the saving of space, improved inter-electrode lead insulation, and increased mechanical strength and firm anchoring of the electrodes—are all incorporated in the "K" valves.

The smallness of the valves is the feature that strikes one most when first looking at the three types at present being prepared for public distribution. They are so much smaller than the equivalent standard type of valve, both in height and in diameter, that they at once attract attention.

But though the physical dimensions of the valves are features that are of no mean importance, the electrical characteristics are the vital considerations. And here it is claimed that the valves again score over their larger brothers, for the rigidity with which the electrodes can be mounted, and the method of anchoring in mica spacing pieces, makes it possible to achieve a very

First details of a new range of two-volt battery valves of unique construction. Great rigidity and a high degree of accuracy in characteristic standardisation can be obtained by the new design, models of which will be available in a few weeks.

By K. D. ROGERS.

high degree of standardisation and constancy of characteristics.

### Preventing Microphonic Howls.

Absence of microphonics should also be a strong point in the "K" valves, for here again the rigidity of the electrode mounting should prevent the vibration that so frequently causes noisy operation, especially in detector valves.

The S.G. valve is designed to operate on 120 to 150 volts on the anode and 60 to 75 on the screen. It gives a total H.T. current of about 2.2 to 4.5 milliamps, with 60 volts on the screen, and 120 to 150 volts on the anode; or a total between 4.2 and 5 milliamps, with a screen voltage of 75 and anode voltage of 120 or 150 respectively. The above are at zero bias, or the most sensitive state of the valve.

### Working Voltages and Currents.

The grid bias of the valve is 9 volts, so that a 9-volt battery is ample for controlling the mutual conductance, which varies between 1.5 and .016 m.a./volt, with 150 on the anode and 75 on the screen. The filament current is .15 amp. at 2 volts.

Taking .1 amp at 2 volts on its filament, the H.L.2/K. gives a mutual conductance of 1.5 m.a./volt with an impedance of 18,000 ohms. It takes a maximum anode voltage of 150, and draws 1.8 milliamps at -3 volts grid bias.

The pentode is a very pretty little valve, and is capable of an undistorted A.C. output of about 400 milliwatts in straight circuits, or with another in Q.P.P. of 1,000 milliwatts.

The filament voltage is the same as in the foregoing, and the current is .2 amp. Maximum anode and screen volts are 150 in each case, and the mutual conductance of the valve is 2.5 m.a./volt. The optimum load varies between 20,000 and 25,000 ohms for 150 to 120 volts on the anode, and 150 or 100 volts on the screen respectively.

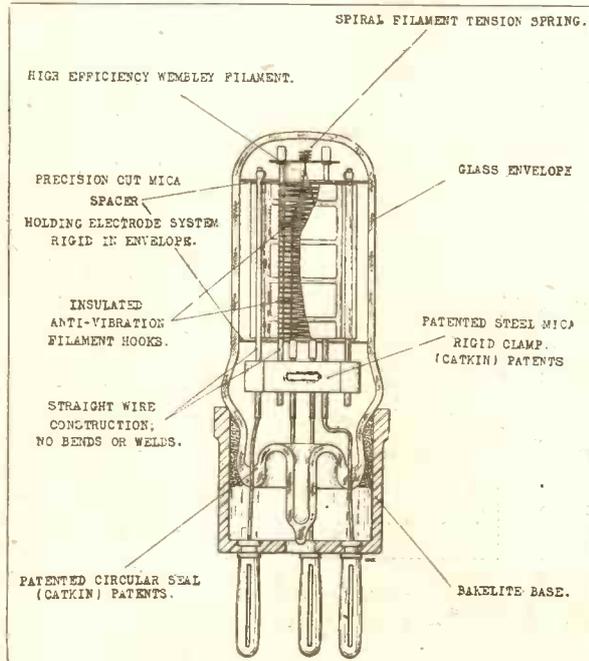
### For Economy Running.

The grid bias at 150 anode voltage is -4.5 for normal purposes, or -6 where "economy" running is desired, and the total H.T. consumption is then 11.5 or 8 milliamps respectively. At 120-volts anode and 100-volts screen setting and -3 on the grid, the total H.T. current is reduced to 5 milliamps, the output power of the valve also being reduced

under these conditions.

At the moment the valves are not available, but they should be on the market before many weeks, and when they do appear should have a very ready sale, either in new sets or as replacements for existing battery valves of similar characteristics.

## EXTREMELY RIGID AND EFFICIENT



The construction of the H.L.2/K., one of the new "K" type of Osram valves, is clearly illustrated in the above diagram. Note the wide separation between the electrode leads in the base of the valve.

When the valves are released, in a few weeks' time, there will be three to start with—a variable- $\mu$  screened-grid valve, the V.S.24/K. (I wonder why the makers did not start with a screened-pentode?); an H.L.2 type, known as the H.L.2/K., and an output pentode to be known as the P.T.2/K.

# THE PROBLEM OF PERFECTION

EXPLAINING HOW MICROPHONE, TRANSMITTING SYSTEM, AND LOUDSPEAKER MUST ALL PLAY A PART.

by

**P. P. ECKERSLEY,**  
M.I.E.E.

**T**HE problems of creating realistic reproduction should be constantly restated. I do not think

there is any short cut to perfection. Perfection will come when it is possible to make a real microphone, a perfect system and a perfect loudspeaker.

The chief limitations of the microphone are twofold—lack of sensitivity for given hiss and lack of overall response.

The limitations of the system are twofold—lack of overall response and the impossibility of getting overall response so long as the transmitting stations are crowded so close together in frequency separation.

## Loudspeaker Limitations

The limitations of the loudspeaker is one-fold—lack of overall response.

The system problems are solvable in many ways. If the nations could stop fighting and co-operate, each could have fewer stations but clearer channels.

If vested interest could be smacked and sent to bed while the community's rights were studied, the "administrations" could re-allocate all the wavelengths so that each service could get its proper technical facility. Then, if people wanted to serve the public, they could set free a large number of wavelengths and use the wire for urban broadcasting.

But this is a technical, not a political article. It concerns, therefore, the purely technical problems of good reproduction.

If any of you want to solve these problems, "all you have to do" is to make an "armature" which, when moved by alternating electrical forces, sends out sound waves in proportion to the intensity of these electrical forces, whatever their frequency, between 10 and 20,000 vibrations a second.

It is probably impossible to make an apparatus to do this given present knowledge and bits and pieces. The nearest solution has been brought about by using not one loudspeaker but several.

## Confusion about "Top"

In general, those who have shown nearly perfect reproduction are those who have had two sets of loudspeakers, one dealing with frequencies 10-5,000 (what one might call the bass and treble frequencies), the other dealing with frequencies 5,000-15,000 (what I always call "top").

There is confusion, incidentally, in nomenclature. What do you mean by "top"? You may say a reproduction lacks "top" when it lacks frequencies

round 5,000. I say it lacks treble in that case.

"Top" is that rare band of frequencies which, when

present, seems to make the sounds come into the room, and which, when absent, gives us the familiar sensation of listening to something concealed half-way down a drainpipe.

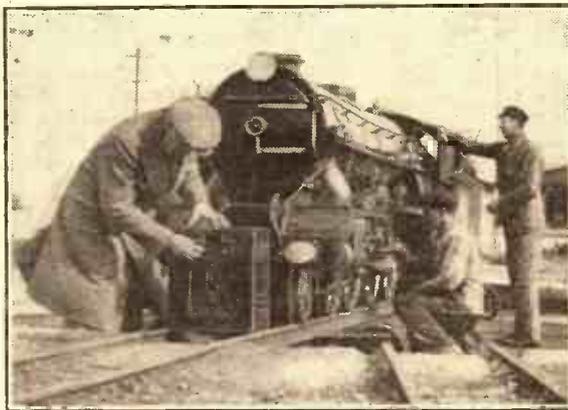
## U.S.A. Station Separation

I have sometimes said that my life's work has been, first, to try to ensure what there is to be heard is worth hearing, however badly reproduced; and, second, to ensure that whatever is heard shall be clearly heard, however trivial its content.

I have hardly attained my ambition. The cheap and shoddy ear-offending noises, coupled with their inanity, are scarcely encouraging.

The other day an American who is studying England made a study of our broadcasting. He summed up what ought

## ON THE RIGHT LINES



Listening to an "His Master's Voice" A.V.C. Portable Grand whilst repairing the Romuey Hythe-Dymchurch light railway engine. The receiver, which is 13 in. wide, just fits across the rails. One of these H.M.V. receivers is frequently used to entertain passengers while on their fourteen-mile journey.

never to have been the controversy—which was better: British or American broadcasting—by saying that one was excellent for one country and the other excellent for the other. That is abundantly true. But be careful not to despise something which you do not like. Other people like it, and other people are sometimes intelligent, too.

Certainly the Americans are very lucky in being able to design sets which give good quality. They have not got anything like so difficult a selectivity problem as we have.

They have a 10-kc. sec.-station separation, to begin with. Then, in every urban district, there are from two to ten

local stations all separated by more than 40 kc./sec. So you get a wonderful choice of programme, and reproduction right up to 9,999 cycles/sec., as it were. And the quality of reproduction is far better than any British set I have heard.

Doubtless we could design sets to be just as good, but the "set up" of our broadcasting and the circumstances of a quarrelsome Europe at our doors prevent it.

## Are We Better Off?

Of course, the American rural listener gets a bad time. There are no long-wave stations to give him service and conditions. But, then, are we much better off?

I listened on the long wave band recently. What a chaos! Time signals, overlap, heterodyne. Paris doubly represented—No! It isn't a highly comforting lookout, and until there is a demand for that good loudspeaker we shan't get it. Of course, there are always the talkies (and wire broadcasting!).

## THE LISTENER'S NOTEBOOK

Comment and criticism on recent B.B.C. programmes.

**T**HOSE of us who are interested in the Studio Variety v. Stage Variety competition had an opportunity of comparing the two when Teddie Williams' team was followed immediately (on another wave) by a relay from the Grand Theatre, Doncaster.

Let it be said immediately that the fielding of Teddie's side was very weak. It was the weakest variety show we have ever had, which was all the more unexpected as it followed so soon after the suspension of the Saturday night performance. This is economy with a vengeance!

I am annoyed to think that Saturday night variety is now no more. For some time past Saturday evening programmes have been of high entertainment value, thanks largely to Eric Maschwitz's determination to put on a variety bill comparable to the pukka variety as staged on the halls.

The secret of those Saturday evening successes was St. George's and the atmosphere there. An audience is a necessity where acting is concerned. An actor has to convince an audience that he means what he says and does. With an invisible audience how can he know how he is faring?

St. George's audiences have proved this over and over again. The same was demonstrated even with Teddie Williams' show. And again, but to a much greater extent, at the Grand Theatre, Doncaster.

Herein lies the difference between these two performances. After making allowances for the weak show at St. George's, the Doncaster performance

was superior because a better and bigger audience kept it so alive.

I know that some listeners complain that artistes tend to ignore the listening audience and play only to the people before them. I expect to hear complaints about Tubby Harold on this score. But, personally, I don't mind this playing to an audience.

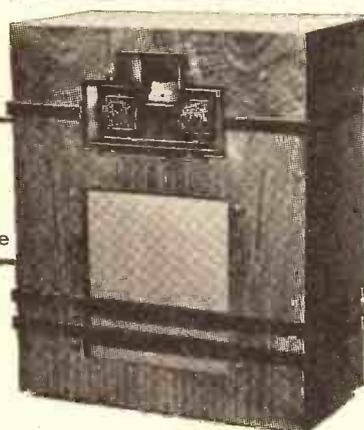
Tubby Harold, for instance, made a far better thing of that song "Gorn!" by singing it to the St. Georgites than he could have done had he been singing to the seaweed and wire-netting content of a studio wall. This was all to our advantage, of course.

For just the same reason Nan Kennedy and  
(Continued on page 242.)



# NEW MODELS

WITH FLUID-LIGHT TUNING

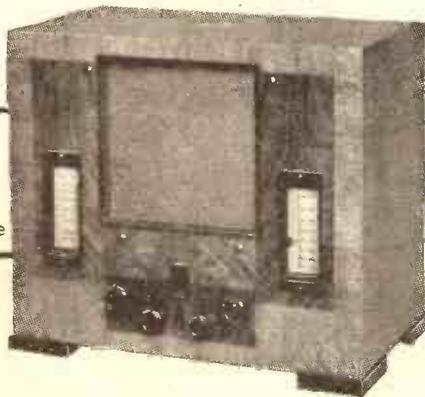


MODEL 463  
**16 GNS**  
or by hire purchase

## All-Electric Superhet PORTABLE FLUID-LIGHT SIX

This is the new "His Master's Voice" Mains Portable. It works off the mains electricity supply. Earth and aerial are self-contained. It is the answer to all who have waited for "mains reception" in a portable set. Its selectivity is so acute that it is fitted with Fluid-light tuning — the sensational new device that ensures accurate tuning always. In this model this device takes the form of two illuminated arrows that gradually approach each other until they show the exact point of perfect reception. So that by sight alone, unassisted by ear, you can tell when this set is tuned, as it were, to concert pitch!

MODEL 463. Mains Portable, with self-contained earth and aerial (six valves including rectifier). Fluid-light tuning incorporated in wavelength scale. Automatic volume control. A.C. only.



MODEL 442  
**15 GNS**  
or by hire purchase

## All-Electric Superhet FLUID-LIGHT FIVE

A new five-valve Superhet table model, with automatic volume control and Fluid-light tuning. This model has what every "His Master's Voice" instrument has, absolute accuracy and truth of tone. It is a delight to look at, a joy to hear, and a pleasure to handle. Its range is extraordinary and every station is kept *distinct*. The Fluid-light tuning device, in this model, is a thin column of light which rises and falls in a slender central window, indicating the exact spot at which perfect tuning is reached.

MODEL 442. Superhet Table Model (five valves including rectifier). Fluid-light tuning in central window. Automatic volume control. A.C. only.

# "HIS MASTER'S VOICE"

Write to-day for special illustrated leaflets to  
The Gramophone Company Ltd., 108K, Clerkenwell Road, London, E.C.1. (Prices do not apply in I.F.S.)

# STATIONS WORTH HEARING

A forecast of the conditions which we may expect on the medium and long wavebands during the summer months, with a reference to American reception.

By R. W. HALLOWS, M.A.

FOR some reason or other a certain amount of trouble in long-distance reception is often experienced at the time when the change-over from Greenwich Mean Time to British Summer Time is made. Last year we put our clocks forward on April 9th, and this year on April 22nd; but though there was a difference of a whole fortnight Nature ran true to form in sending us her usual samples of both fading and atmospheric just before and just after the change. Is it her way of registering a mild protest?

Actually it is, of course, the weather and not the clock that is to blame. We enjoyed something approaching a heat-wave for a week or more before the official inauguration of summer and afterwards we had a cold, wet spell. Whenever barometer and thermometer are abnormally high for the time of year, long-distance reception is apt to be affected and sudden weather changes are not too good for the DX man's prospects.

## Some Dozen Regulars.

However, one can safely say that, though we may have our little troubles on odd evenings until, perhaps, the end of May, there is no question that European stations will be better heard this summer than they have ever been before.

I believe that on a most conservative estimate at least a dozen on the medium waves will continue to be completely reliable providers of entertainment right through the lighter and (we hope!) hotter months. Those which I am rash enough to predict as summer-time standbys are Stuttgart, Florence, Brussels No. 1, Brussels No. 2, Prague, Rome, Stockholm, Munich, Milan, Berlin, Hamburg and Frankfurt.

Those are my dozen "stars"; but there are many others which may be almost as good. I am rather afraid that Budapest, Beromunster and Vienna may not be so good evening after evening as they have been, for all of these three have already shown small but noticeable variations in strength. But Athlone—if it is permissible to count Athlone as a foreigner—will probably continue to be excellent unless fading sets in near the top of the medium waveband. I expect great things, too, of both Lyons PTT and Langenberg.

## A First-Rate Broadcaster.

Paris PTT will not, I am sure, fall below the loudspeaker-volume level, though it may not be so good on some evenings as on others. If Leipzig gets rid of its heterodyne it will undoubtedly be a first-rate summer station. Breslau is sure to be almost, if not quite, as good as any of the dozen stars, and I would certainly have included the Poste Parisien and Hilversum in the list were it not for the fact that both are occasionally heterodyned.

Trieste and Nurnberg may be affected by fading owing to the shortness of their wave-

lengths, but I expect to hear a good deal from both of them during the summer.

And what of the long waves? Here stations are comparatively little affected by conditions of daylight and darkness; fading is almost unknown, and the only obstacle to good reception that we have to fear is the wily atmospheric. As we are now close to a sunspot minimum period I hardly think that atmospheric will prove a nuisance, except at odd times when the weather is inclined to the thundery.

## The Long-Wave Muddle.

Huizen at the time of writing is suffering interference from the new Brasov transmitter, which is working with an output rating of 20 kw. This is eventually to go up to 100 kw. or more. It seems a pity that countries cannot agree to adopt the revised scheme for the long wavelengths, which would have avoided all the trouble which has occurred between 1,000 and 1,875 metres.

The most astonishing instance of "dog-

where it is right on top of Reykjavik and Kharkov.

My summer list for the long waves contains Radio-Paris, Zeesen, Luxembourg and Kalundborg as stars, with Warsaw, Motala and Huisen as possible additions if they can agree to be sensible and to adopt wavelengths on which they will neither cause interference nor suffer from it.

## Surprises are Coming.

On both wavebands we may have some surprises when new high-powered stations come into operation, as a good many are about to do between now and next September. I hardly think that the Madrid long-wave station will get under way during this time, but Brasov may work up to its full power and then a reshuffle at the top of the long waveband will become imperative.

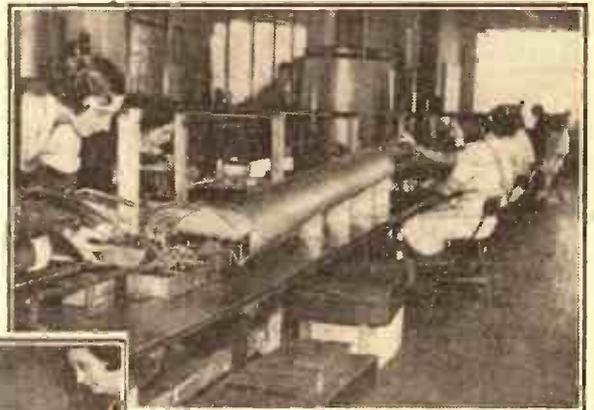
On the medium band quite a number of high-power plants are likely to make their appearance. The two Brussels stations are about to increase their power from 15 to 75 kw. The new Belgrade transmitter is nearing completion and work is going forward on several of the high-powered plants which will replace present PTT stations in France. Amongst the most important are Paris PTT, Toulouse PTT, and Nice PTT.

The power of Beromunster is to be raised from 60 to 100 kw., and increases in the power of Söttens and Monte Ceneri are probable.

## FOR BETTER RECEPTION

A member of the His Master's Voice staff at Hayes has invented a new machine (seen on the right) by means of which newly-made fixed condensers are automatically passed through a wind tunnel and cooled.

Below is a new picture of Vivian Ellis and Frances Day trying out the new H.M.V. 12-guinea receiver during an interval at the recording studios.



As you know, Switzerland is divided into three areas, the German-speaking, the French-speaking and the Italian-speaking. The first of these has been pretty well served by the 60-kw. Beromunster and will be served still better when the power goes up to 100 kw. French Switzerland has at present to rely upon the 25-kw. Söttens and Italian Switzerland on the 15-kw. Monte Ceneri.

In a mountainous country such as Switzerland, where many of the towns and villages lay in deep valleys, high power is necessary in order to secure reasonably good service areas.

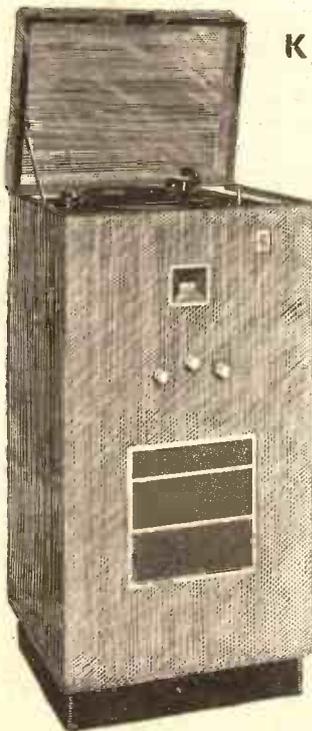
Don't neglect American reception during the summer if you happen to be up and about in the small hours. I have had good reception of American stations lately on several occasions and there is always a great satisfaction for the DX enthusiast in hearing them in what is supposed to be the off season.

in-the-mangerishness" was to be observed during April when Warsaw, the Eiffel Tower and Motala insisted upon working on channels separated by only one kc. from one another. Even in their own service areas interference must have been severe, but for a long time none of them would give way.

Warsaw has now moved to 1,345 metres,

# KB—Pioneers in Radio Hire Purchase

KB were among the first to make it easy for you to buy a good radio receiver. And the KB scheme remains to-day one of the easiest and fairest. When you buy a KB receiver you have the advantage of dealing with the maker of your set and not with a finance company. Ask any KB authorised dealer to tell you all about the KB Hire Purchase Scheme.



**KB365 4-valve A.C. SUPER-HET RADIO-GRAM**  
(including rectifier)

**22 GNS.**

or 43/- deposit (including 3/- insurance) and 12 monthly payments of 38/6.

*Another fine K.B. Receiver.*

**KB 666. 6-valve A.C. SUPER-HET RECEIVER** (including rectifier)  
 DE LUXE-MODEL 18 gns. or 38/- deposit (including 3/- insurance) and 12 monthly payments of 31/6d.  
 STANDARD MODEL 16 gns. or 33/- deposit (including 3/- insurance) and 12 monthly payments of 28/-.  
 Stand for either model—2 gns. extra or add 5/- deposit and 3/6 to each monthly payment.

*Every Modern Refinement:* "REJECTOSTAT" RECEPTION: conquers electrical interference. AUTOMATIC VOLUME CONTROL: cures fading. AUTOMATIC TONE COMPENSATION: corrects tone at all volumes. MANUAL VOLUME AND TONE CONTROLS. \*Registered Trade Mark. Cabinet of De Luxe Model in Walnut and Chromium. Standard Model in Walnut and Macassar Ebony.

Other models from £7. 15. 0 to 28 guineas.

Ask any authorised dealer for a demonstration or write for illustrated catalogue to KOLSTER-BRANDES, LTD., CRAY WORKS, SIDCUP, KENT.

**YOU** remember the theatre at Radiolympia last year, when the B.B.C. variety stars performed and a revue was presented for the crowds that flocked to the great Exhibition?

It was a gigantic success and, of course, will be repeated at this year's Radio Exhibition.

The Scottish Exhibition also wants a similar theatre this time, and so does the Belfast Exhibition. Both look like being lucky.

#### No Change at Manchester.

Manchester will probably carry on as it did last year so far as the B.B.C. side of its Radio Exhibition is concerned.

#### Exit "Central Elephant."

The date of the termination of the National Council for Broadcast Adult Education is July 31st next. Thus comes to an end the famous "Central Elephant," the group of professors and other educators who have been primarily responsible for B.B.C. Talks during the past nine years.

#### Who Will Get the Time?

This august tribunal was set up in the first place in order to secure for the B.B.C. recognition from the highbrow element of the community and a certain respectability—something that would make it "different" from the films.

This certainly was accomplished, but the "Elephant" demanded its full pound of flesh in the form of a series of elaborate and erudite talks. So the time came when the price of respectability and intellectual status became too high.

Now that the "Elephant" is going, there will be a scramble for the time made available next autumn. I back Eric Maschwitz and Val Gielgud to get a good slice of it!

#### No Christian Science.

Ever since Sir John Reith promised Lord Lothian that Christian Science would be introduced into the programmes at the first opportunity there has not unnaturally been a good deal of interest and expectation among Christian Scientists up and down the country.

It was thought that Christian Science might have its say in the "What I Believe" series, along with Spiritualism and other minority views. But Christian Science was not disposed to be lined up in this way, and the proposal has been dropped for the time being.

I suggest that it is not good policy for the B.B.C. to continue to ignore this influential and growing body of opinion.

#### Liaison Meetings.

The B.B.C. has begun a series of liaison meetings—that is, gatherings of staff of different grades from all over the country to be addressed by the Director-General and to enable views to be ventilated.

Two of these meetings have been held, one last autumn and the other last week. My information is that they are inclined to be too formal. Proceedings are cut and dried in advance, and there is very little



Victor Olof, leader of the famous B.B.C. Sextet which bears his name.

## RADIOLYMPIA GOES NORTH

### AND OTHER NEWS ABOUT BROADCASTING

opportunity for impromptu or free discussion.

If I am right, then meetings of this kind serve no useful purpose so far as morale is concerned.

#### Leonard Henry in Shakespeare.

The part of Launcelot Gobbo has been given to Leonard Henry in the Sunday Shakespeare play on May 13th. "The Merchant of Venice" has been chosen, and the production will be in the hands of Cyril Wood, who has recently come up from the West Region for a spell of duty at Broadcasting House. Abraham Sofaer will be Shylock, Gwendolen Evans plays Jessica, and Portia will be Celia Johnson. The performance starts, as usual, at tea-time.

### SELECTED PROGRAMMES—

**NATIONAL:**  
**DRAMA.** "The Merchant of Venice" [Sunday, May 13]. Shakespeare's play produced by Cyril Wood of the West Region.  
**MUSIC.** "London Music Festival" [Wednesday, May 16]. The last concert of the B.B.C. Festival from the Queen's Hall.  
**OPERA.** "Arabella" [Thursday, May 17]. Act 1 of Strauss' opera from the Royal Opera House, Covent Garden.

### Publicity for Empire Programmes.

Desire to get more publicity overseas for the short-wave service has impelled the B.B.C. to depart from one of its most cherished policies—namely,

preservation of the copyright in advance programme information. So far as newspapers and journals abroad are concerned, there is no longer any question of B.B.C. restriction on the publication of programme information.

#### Overseas Papers Favoured.

This may have important repercussions in Great Britain. A large proportion of the short-wave programmes duplicate the home programmes

If overseas journals are to have the freedom of all programme information, they will enjoy an advantage to which British newspapers will not be oblivious.

#### A Midland Novelty.

Midland Regional has "raked up" another old custom as the subject of a holiday broadcast for Whit Monday, May 21st. It is the custom of the rolling of cheeses down Cooper's Hill, near Gloucester, the origin of which goes back far longer than it is possible to trace.

The broadcast will take the form of an eye-witness account to be given by Mr. John Capel, of Leicester, who described the bottle-kicking and hare-pie scrambling custom which the villagers of Hallaton, in Leicestershire, celebrate on Easter Monday.

#### Receivers in Churches.

An enterprising firm of radio manufacturers has loaned twenty-five receiving sets to be used in a corresponding number of churches in connection with the broadcast service from Ripon Cathedral on Whit Sunday. The Bishop of Ripon hopes that the broadcast will be rediffused in most of the churches in the two hundred and twenty parishes which constitute his diocese.

The Bishop (the Rt. Rev. E. A. Burroughs) will preach the sermon and the Cathedral choir will lead the singing.

#### Worcester Broadcasts.

Sir Ivor Atkins, the organist and master of the music, will conduct the Worcester Cathedral Choir, and will also play a solo from Elgar's second organ sonata, in the next of the series of "Choir and Cloister" broadcasts on Thursday, May 17th.

Worcester Cathedral contains the tomb of King John and his will, which the notorious monarch made at Newark, is still preserved to-day among the archives in the Chapter House.

#### Australia's Contribution.

The chief programme on Empire Day, May 24th, will come from Australia, and will be radiated to British listeners through the National transmitters. It will also be re-broadcast to other parts of the Empire either simultaneously or later by electrical recording.

#### "Mediterranean Man."

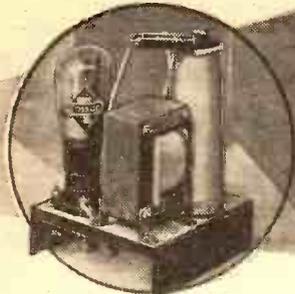
Those who like topicality even in light entertainment should tune in to Ronald Hill's revue, "Mediterranean Man," which Martyn C. Webster is producing in the Birmingham studio on Saturday, May 19th.

Pleasure cruises will soon be in full swing, and the action of this revue takes place during one of these delightful trips, with various incidents which happen in a hotel at Cairo and in the harem of a pasha. It includes, too, an infatuation, an abduction and a surprise ending, not to mention some delightful tunes and music which will be played by Harry Pell's Première Dance Orchestra.

O. H. M.

### —FOR NEXT WEEK

**REGIONS:**  
**MUSIC.** "Brass Band Concert" [Tuesday, May 15, SCOTTISH REGIONAL]. A loud and cheerful programme.  
**FEATURE.** "Ilmington Meets the Microphone" [Tuesday, May 15, MIDLAND REGIONAL]. Life and music from a Warwickshire village.  
**VARIETY.** "Palace Theatre Relay" [Friday, May 18, WEST REGIONAL]. An excerpt relayed from Plymouth's variety theatre.



# The D.C.-B UNIT

**T**HIS unit was specially designed for use with the "Contra-phase" Four receiver, which was described in a recent issue of POPULAR WIRELESS. But while being particularly suitable for this set, it will at the same time prove perfectly satisfactory with practically any other receiver employing Class B amplification.

The purpose of the unit is to provide smooth, unvarying H.T. from D.C. mains for all the valves in a set, including a Class B valve.

Ordinary H.T. units do not usually prove satisfactory for supplying Class B valves, because a Class B valve draws an H.T. current which widely varies in accordance with the volume.

This causes the H.T. voltage to fluctuate, and so good results are not given unless special steps are taken to stabilise the output of the unit.

### The Best Method.

Undoubtedly, the best method of doing this is to use a neon-tube stabiliser. This we have done in the D.C.-B., which, by this means, is able to cope with the varying load imposed upon it by a Class B valve and yet maintain steady voltages across both its output terminals.

With an ordinary uncorrected unit it is not only that the voltage on the plates of the Class B valve vary, but that the anode voltages of the other valves are likely to swing about!

The action of a neon-tube stabiliser is interesting and most positive. It is placed across the circuit of the unit, and the voltage set up between its anode and cathode causes an electrical discharge to occur through the neon gas in the tube.

This current varies with the voltage applied. Now, you will note that its position in the circuit makes it a by-pass for the mains current.

### Regular Pressure Maintained.

If the current drawn from the unit by the set increases, so the voltage across the electrodes of the neon drops and the neon takes less current. As the current drawn by the set drops, so the voltage across the neon rises and it by-passes more current.

In this manner a very satisfactory condition of stability is achieved, and the output of the unit is maintained at a regular pressure, despite the different loads imposed upon it by the Class B valve in the set with which the unit is used.

That the D.C.-B unit is an easy and moderately inexpensive device to build will be quite clear from the photographs and diagrams which accompany this article.

A quite essential item in its construction is, of course, the neon tube, and the one which we have chosen is, we can assure you, a perfectly reliable and efficient one.

The components are mounted on and under a small baseboard of the metallised type having bakelite or ebonite end supports to form a chassis. Two of the resistances and a fixed condenser are fixed on the underside and the rest of the components on the top.

We strongly advise the constructor to

The unit described this week is, as its name implies, designed for use on D.C. mains and in conjunction with receivers utilising Class B amplification. It is fitted with a special neon stabilising device which ensures a perfectly constant high-tension voltage irrespective of the current variations of the Class B stage.

By the "P.W." RESEARCH DEPT.

fit the completed unit with a metal cover firmly screwed in position on the chassis. This cover can be of any metal. Stout aluminium or tin are both suitable. You will note we say "stout." Obviously, thin foil would be too fragile a material for the job.

The neon tube fits into an ordinary four-pin valve holder.

Use robust wire for the wiring—either a well-insulated type or a bare tinned copper supplemented by "spaghetti." Some of

the leads pass through the baseboard, and you will see that these are clearly numbered. Our diagram of the under-baseboard wiring gives you that view of it which you would actually see in the instrument itself when it is inverted, and is not an "X-ray" diagram showing the wiring and components as they would be seen if you looked down on the unit through a glass baseboard.

There is one resistance, marked "X" in the diagrams, the value of which depends upon the voltage of the mains with which the unit is used.

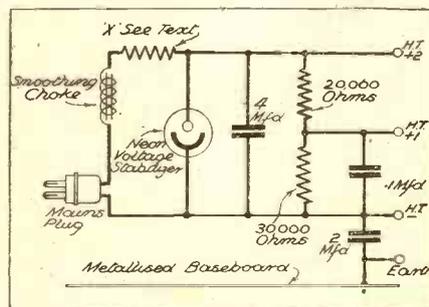
It is, in fact, the adjustment that enables the unit to be set so that the neon tube will provide perfect stabilisation.

The value of the resistance should be such that the current flowing through the neon tube when the unit is connected to the mains, but *not* to the set, is something between five and ten milliamperes higher than the greatest current that the set will demand when the volume is greatest.

### Not a Critical Value.

It is not a particularly critical value. Five hundred ohms for mains of 200 volts will be perfectly O.K. About one thousand ohms for 220 and two thousand for 250 will generally serve, while if everyone

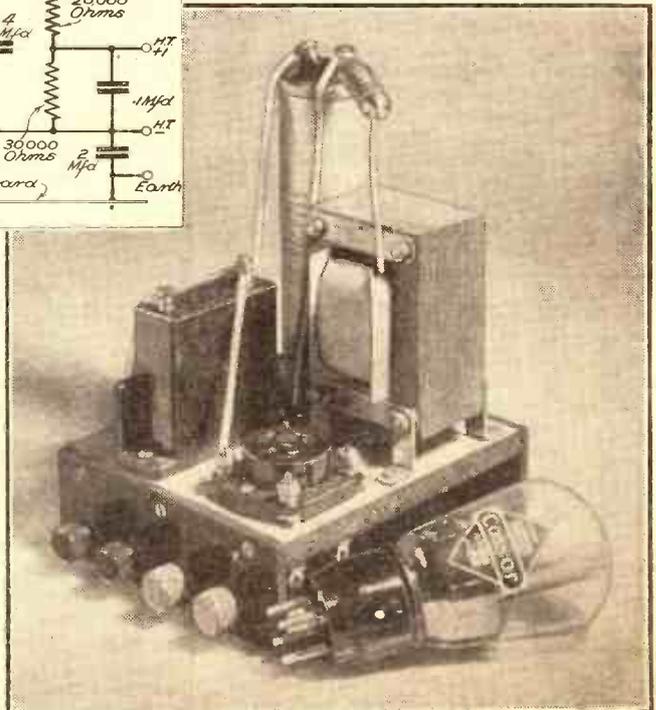
(Continued on next page.)



### CONSTANT VOLTAGE

As is explained in the text, the value of the resistance marked X in the theoretical circuit (above) depends upon the voltage of the supply. Generally speaking, 1,000 ohms is suitable for voltages of from 200-250.

On the right is shown the completed unit, together with the neon stabiliser which enables a constant voltage to be obtained.





Hughie Green rehearses The "Gang" in front of the microphone

## THE "GANG" INVADES THE B.B.C.

HUGHIE GREEN, FOURTEEN-YEAR-OLD RADIO, FILM, STAGE AND GRAMOPHONE STAR, GIVES HIS VIEWS ON BROADCASTING IN AN EXCLUSIVE INTERVIEW WITH PATRICK CAMPBELL.

"FOR goodness' sake take some notes of what I say. The last man who wrote about me made me seem like the world's prize prig."

And that is the last thing Hughie Green is. When I went to see him last week he was interviewing two admiring young ladies who had come to beg for his autograph. "Well, this is the first time *that's* happened to me," he said, and began to discuss all the things that any boy of his age would discuss.

Last week Hughie produced and played lead in a revue of his own devising at the Fortune Theatre, Drury Lane. Last Saturday he brought his "gang" to Broadcasting House for a radio programme. Next week he is probably starting work in the film which John Watt is writing for B.I.P. In his spare time he makes gramophone records. He can do all this—but he won't talk about himself.

"Let me tell you all about the gang," he said.

### Who's Who in the "Gang."

"There's eight of us altogether, including myself. First there's Audrey Samson. She's thirteen and a half and plays the piano beautifully as well as sings. Audrey has written three songs for us. One of them has been published.

Then Leslie Wilson. He's the same age. He came to an audition that I was holding.

she's just like Jessie Matthews. The same fringe and everything. She sings and dances and has any amount of personality.

"And then there's Bobbie, Joyce and Joan, who harmonise—very well, too."

### How it All Started.

I asked him how he first came to start his company.

"Well, in 1931 I thought it would be fun to run a show, so I borrowed five shillings from my father and took the local church hall for a night. We had an audience of 88 and made £4 for the hospital.

"In 1932 we had a bigger hall and made a profit of £6 12s. 2d. with an audience of 250. Then we took the Rudolph Steiner Hall near Regent's Park, and had a big success, £25 profit. And a B.B.C. official saw the show and asked us to perform in 'In Town Tonight.'"

"Weren't you in 'Emil and the Detectives'?" I asked.

"Oh yes. That was great fun. Rushing from studio to studio all over Broadcasting House. Lance Sieveking is a great producer. I should think he would be a fine actor, too."

I ventured a remark about films.

"I believe the gang will be seen in two films soon. One of them is a show called 'Radio Pirates,' which Ian Campbell is pro-

ducing. And then in June we hope to be in John Watt's film."

"And now will you tell me what you think of the B.B.C.?" I asked him.

"Well, everyone is awfully nice to me. I often go up to Broadcasting House and meet all kinds of artistes, and they show me how the effects work. The other day I wanted to know how they did a train, and they showed me a man running a roller skate over a wash tub!"

"And the programmes?" I persisted.

"If I had anything to do with the B.B.C., which I haven't," he said, "I should first of all do away with all the intervals between items and programmes. If you add all these wasted seconds and minutes together, you'd have time for several extra turns."

### Longer Variety Programmes.

"And then I should have longer variety programmes. Say two hours, broken up by the News, like the Symphony Concerts. Variety artistes are always having their turns cut short because there isn't enough time.

"And all those quartets and quintets with groups of songs in the middle—they'd have to go. Do you like listening to a man singing German songs with an English accent after you've heard Tauber?"

"And is it true that you have been asked to join the B.B.C.?" I ventured.

"I wouldn't say that," said Hughie as he hurried off to rehearsal.

But whether that last remark was a disclaimer or a warning against premature publication only the future and Sir John Reith can tell!

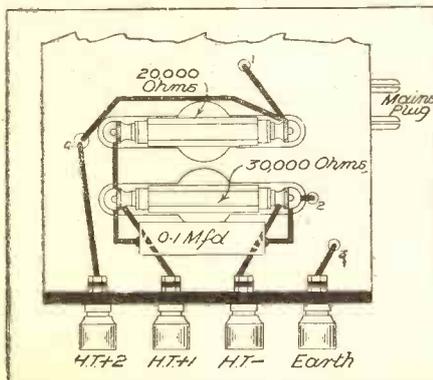
## THE D.C.-B UNIT

(Continued from previous page.)

having anything between 200 and 250-volt mains used 1,000 ohms for that resistance we are pretty certain they would have nothing to complain about in the operation of the unit.

By the way, it is interesting to note that the neon tube contributes no little smoothing to the circuit, and so users will find the "D.C.-B" just as silent in use as units

### BELOW THE CHASSIS



The baseboard rests upon two 1½-in. deep ebonite strips, which provide clearance for the three components and wiring on the underside of the chassis.

having apparently much more complicated smoothing.

As with all D.C. apparatus, it is necessary to join the unit to the mains in the one particular way. That is, the power plug must be inserted the right way round or the unit cannot work.

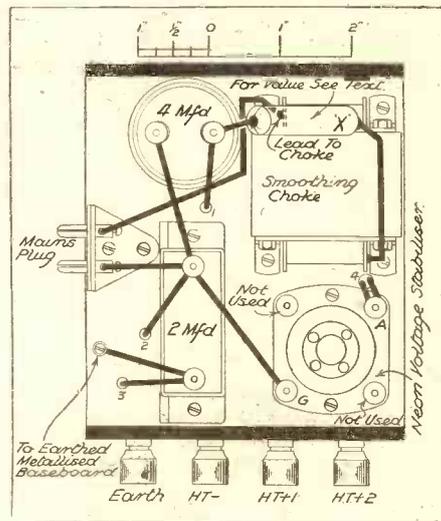
The earth terminal takes the place of the

### RECOMMENDED COMPONENTS

- 1 Bulgin L.F. choke, type LF.21.S.
- 1 Dubilier 4-mfd. fixed condenser, type 9202 9200.
- 1 Telsen 2-mfd. fixed condenser, or T.C.C., Dubilier, Ferranti, Graham Farish.
- 1 T.C.C. 1-mfd. fixed condenser, type 250, or Dubilier.
- 1 Benjamin 4-pin valve holder, "Vibrolder" type, or W.B. Telsen, Lissen.
- 1 Graham Farish 30,000-ohm 1½-watt type Ohmite resistance in horizontal holder.
- 1 Graham Farish 20,000-ohm 1½-watt type Ohmite resistance in horizontal holder.
- 1 Varley Electronic resistance (value, see text) 1-watt type with wire ends, or with terminals, Dubilier, Graham Farish, Bulgin, Erie.
- 1 Belling-Lee mains plug, or Bulgin, Goltone.
- 1 Peto-Scott Metaplex baseboard, 5 ins. × 4½ ins.
- 4 Bulgin indicating terminals, or Belling-Lee, Clix, Ealex.
- 2 Peto-Scott terminal strips, 4½ ins. × 1½ ins., or Permcol, Goltone, Becol.
- 1 yd. 18-gauge tinned copper wire, 1 yd. insulating sleeving, flex, screws, etc. (Peto-Scott).
- 1 Cossor Neon stabiliser, type S.130.

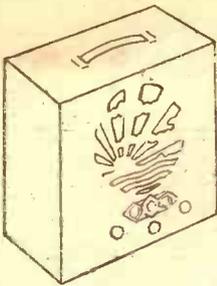
earth terminal on the set. There must be no direct earth connection to a set when a D.C. mains unit is used. This is very important, for if the positive main were earthed (as is often the case) a direct earth to the set would mean the blowing of the mains fuse.

## THE MAIN WIRING



This diagram shows the layout and wiring for the top side of the chassis. The holes where wires pass through the baseboard are numbered 1, 2, 3 and 4, to correspond with those in the sketch of the underside of the chassis.

Many find that when a D.C. unit is used the earth connection can be dispensed with, as the set finds an earth via the mains. On the other hand, it is advisable that the unit *should* have an earth, and if a metal casing is used (we strongly urge this) it should be connected to the earth terminal on the unit.



**PYE  
"STRAIGHT"  
BATTERY  
PORTABLE  
MODEL "O/B2."**

"Straight" portable for battery operation. Needs no external aerial or earth connections. Built into fine-grained oak cabinet. Fitted with strap handle for carrying. Price 10 GNS. (or 20/- down and 12 monthly payments of 17/6).



The Pye Six-valve Portable Superhet

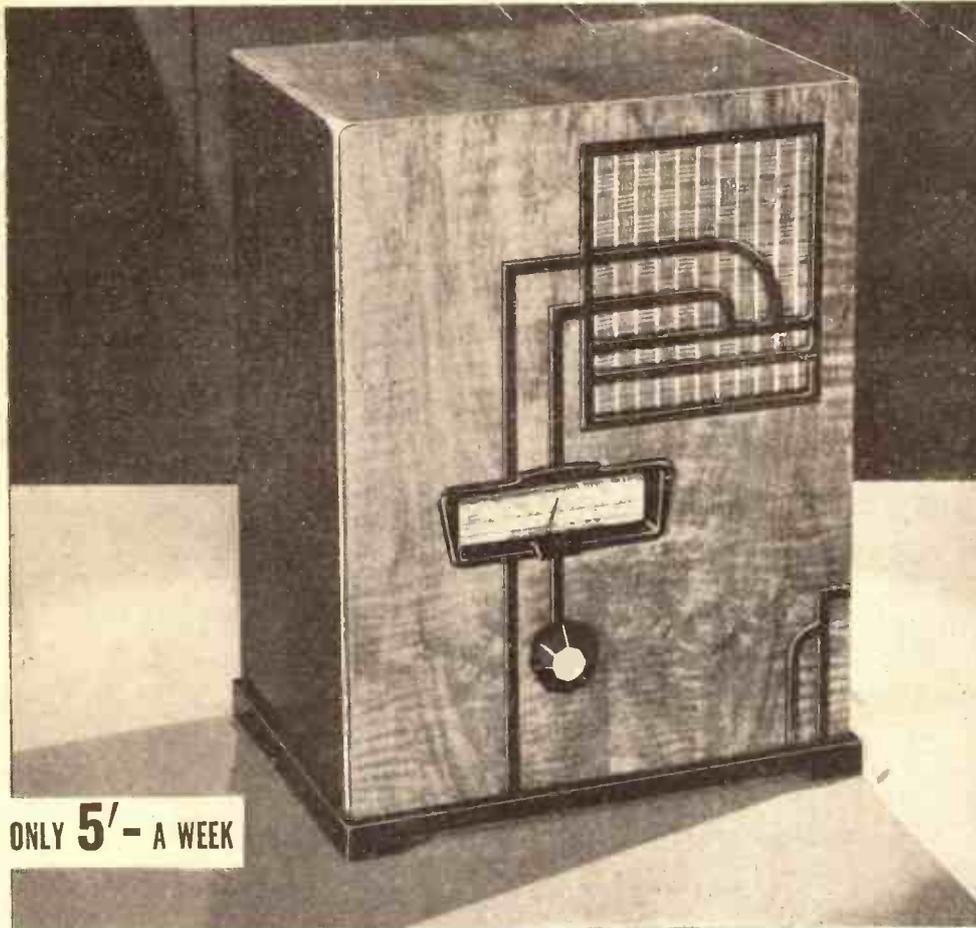
## NO OUTSIDE AERIAL-NO EARTH-IT'S SELF-CONTAINED!

Don't be tied to "one-room" radio—get a Pye Portable and have a radio in every room whenever you will. Radio in the lounge, radio in the dining room, radio in the kitchen and the nursery. Pye Portables are completely self-contained—the models illustrated above need no aerial or earth wires of any kind. There are all-electric models too, which need only a plug to the mains. Learn more about these Pye Portables. Send off the coupon to-day!

PYE MODEL "P/B" .6 VALVE BATTERY PORTABLE SUPERHET (OR 27/6 DOWN AND 12 MONTHLY PAYMENTS OF 24/6)	<b>14</b> GNS.
PYE MODEL "P/AC" PORTABLE SUPERHET FOR A.C. MAINS (OR 31/6 DOWN AND 12 MONTHLY PAYMENTS OF 26/-)	<b>15</b> GNS.
PYE MODEL "O/B2" "STRAIGHT" BATTERY PORTABLE (OR 20/- DOWN AND 12 MONTHLY PAYMENTS OF 17/6)	<b>10</b> GNS.



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ONLY 5' - A WEEK

**PRECISION  
QUALITY  
VALUE**

# REGENTONE

Designed and built by engineers from first-grade parts, passed through exacting tests. The "REGENTONE" Five-stage Battery Superheterodyne with "A.V.C.," a specification which, at the price of 11 guineas, challenges comparison.

**SENSITIVITY.** Equal to that of the usually more powerful mains receiver, but with an entire absence of the usual background noise.

**SELECTIVITY.** "Knife edge," provided by a Superheterodyne circuit of balanced design, Band-passed and with 7 tuned circuits.

**VOLUME.** Adequate, infinitely adjustable.

**-tone.** Moving-coil reproduction gives round tonal rendering and true response to both bass and treble passages.

**ECONOMY.** The brilliant performance of this receiver is maintained upon the extraordinarily small current of only 6 milliamps, ensuring long life for the incorporated High Tension Battery.

**INSTANTANEOUS TUNING.** Colour coded full vision scale marked with new station names makes station selection a matter of utter simplicity. Walnut cabinet of high-grade finish, solid construction.

And this magnificent Regentone receiver will be delivered to your home for the first of 12 monthly payments of 21/9; and the Regentone Band-Pass Three, illustrated on right, costs only £7.19.6, or 12 monthly payments of 15/6. Precision in manufacture, quality in materials, value in cost go to make Regentone the lowest priced luxury sets that money can buy.



ONLY 3'6 A WEEK

Regentone Ltd., Regentone Works, Worton Road, Isleworth, Middlesex.

# ON THE SHORT-WAVES

## OUR SPECIAL SECTION for SHORT-WAVE ENTHUSIASTS

CONDUCTED by W.L.S.

SHORT-WAVE enthusiasts of "P.W." are divided into two camps over this 5-metre business. My post for the last fortnight reveals two practically equal piles of letters. The gist of one is, "Why all this bother about 5 metres? It doesn't interest us!" while the other has as its theme, "More, more, more about 5 metres!"

Well, here is more about 5 metres. But I must warn all 5-metre enthusiasts to make the best of it, because it may be the last they hear about this wave before our tests start. I much prefer doing a thing to talking about it, and we're nearly ready.

For the benefit of readers who want to make the acquaintance of 5-metre work for the first time I had better explain what it's all about. These ultra-short waves—call them "quasi-optical" or

Although a little unconventional in appearance, this is the usual circuit employed for five-metre reception. Contrary to the belief of many, a super-regenerative type of circuit is not necessary, but merely convenient for portable work.

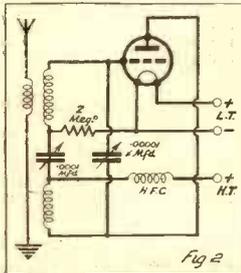


Fig 2

whatever you like—are a species all on their own.

They rely entirely on the direct ray, as far as we know at present, for no trace of a reflected ray has been discovered. The probability is that the sky wave goes straight through the ionised layer or, more probably still, becomes completely absorbed therein.

Our direct ray will, from the look of things, reach to about 1.3 times the optical range from the particular locality at which it is started. From the top of Leith Hill, for instance, one can (or could, atmosphere permitting) see about 80 miles. One might reasonably expect a 5-metre range of 105 miles or thereabouts.

### Our Crystal Palace Tests

Our Crystal Palace tests last year showed up freak results; we were heard at a distance of nearly 200 miles, the optical range being less than 70. This year, by way of a change, we want to try some more straightforward tests, without any particular desire to cover fabulous distances.

### WORKING ON FIVE METRES

**Peculiarities of this fascinating wave-band—The type of receiver to use—Getting ready for our tests.**

Obviously we can never rely on 5 metres to give us 100 per cent communication over 200 miles. My argument, therefore, is that our time is better spent in making it really reliable over shorter distances.

I have a small 15-watt transmitter all ready to be dumped on the back seat of a small car and taken wherever one wishes to go. A midget receiver, naturally, will accompany it.

We are hoping to spend several Sundays "on the air," alternately trying it out on hill-tops and in towns. I have a long list of regular readers of "P.W." who have signified their willingness to help.

So much for what we're going to do. Now for *your* part. The first step is naturally to build a receiver. There is not much

### THE TYPE OF COIL

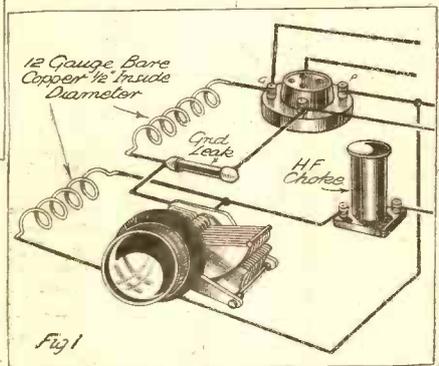


Fig 1  
If the coils are wound on an ordinary pencil they will spring out to the right diameter when removed.

point in giving a full description of one, because, frankly, we haven't succeeded in improving on the one described in "P.W." last year.

Any ordinary short-waver can be made to work on 5 metres. The sketch given above shows the kind of coils required. I wind mine, with No. 12 bare copper, round a thick blue pencil. When they spring off they are just the right diameter.

Fig. 2 shows the usual circuit employed. It may look a bit queer, but it is quite a conventional short-wave circuit except for two points. First, the grid leak and

condenser have been ousted from their usual position, the grid leak having been inserted, instead, at the bottom end of the coil.

Secondly, the tuning condenser, which is very small, goes right across the *whole* coil, both grid and reaction sections. If you regard a short-waver using the conventional Schnell-Reinartz circuit as having only one coil, which happens to be broken in half for the insertion of the H.T., you will have no difficulty in understanding the circuit shown, which is of the Colpitts breed.

It works extremely well, and there is never the slightest difficulty in getting it to go first shot.

### When Using a "Super"

The super-regenerative part of a 5-metre circuit bothers some people, for no particular reason, since it is absurdly easy to manage. There is no need to use a "super" if you build your detector extremely well and are skilled at handling rather delicate controls. The chief advantage of the "super," for portable work, is that it broadens out the tuning and makes things easier to hold.

Fig. 3 shows an easy way of winding a pair of quenching coils for the purpose. You will find the full circuit on page 328 of "P.W." for May 20th, 1933, and although my 1934 receiver has been "hotted up" on the constructional side, the circuit remains unaltered.

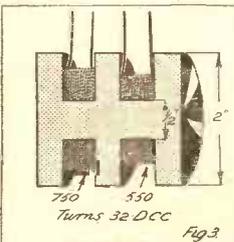


Fig 3

For those who prefer a super-regenerative scheme, here are details for winding a pair of quench coils. It is quite a good idea to arrange them on a single former with two slots, instead of on two independent formers.

If you don't want to wind a special coil like the Fig. 3 affair for your "super" stage, use a couple of large-size plug-ins.

The sizes aren't too critical. I have departed from last year's turn numbers considerably and the set works just as well.

I will give further hints from time to time, probably in "Answers to Correspondents," and you will soon be hearing the dates of the first tests. Meanwhile, G 5 A W, at Streatham, is transmitting from 22.45 every Monday night, and other amateurs will probably be heard then.

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

## WHAT READERS ARE SAYING

"D. B." (Leicester) reports hearing a station just below Jely (42.92 metres) announcing in French and English as "H B . . ." testing. From the call-sign he might be a Swiss amateur, unless this means the arrival of a new Swiss broadcast station.

"F. S. N." (Ulverston), while promising support for 5-metre tests, comes forward with an excellent scheme. He suggests that a register should be formed of those readers who would undertake to lend a helping hand to any short-wave novices in their own districts. If such kind readers would care to volunteer for this sort of job I will gladly keep a list of them.

"F. S. N." also calls my attention to an ingenious hand-spreading arrangement used in America. I have already come across it, and will have something to say on the subject later on.

### Learning Morse.

"G. K." (Edmonton) wants to know whether there is a short cut towards the learning of the Morse code. I'm afraid, "G. K.," that most short cuts turn out to be longer in the end. My advice to you is to find a friend who is keen enough to learn the alphabet with you and give you some slow buzzer practice.

Take it in three steps: (a) *Learn* the characters first—that is essential; (b) get used to the *sound* of them on a buzzer;

(c) tune in a station sending fairly slowly—there are plenty of them nowadays—and take down just a letter here and there, if that's all you can manage. You will soon find it growing on you, and you will be copying 15 w.p.m. in a couple of months.

"V. I. E." (Liverpool) writes to me from a new address. Will "R. C. W." and the other Liverpoolians who wanted to get in touch with him please communicate with Mr. V. Ingram-Ellesmere, 55, Kenyon Road, Wavertree, Liverpool?

"J. W." (Glasgow), in an interesting letter, laughingly mentions his habit of indulging in portable stunts, on which he uses a 4-v. tapping on a grid-bias battery instead of an accumulator for L.T. It's all right while it lasts! It's a much better

what a hope! I'm afraid it is very improbable that our signals will cross the border.

"J. M. D." (Chingford) is a real old-timer who knows, personally, several of the New Zealand and South African "hams." He is hankering over a transmitting licence, and wants to know whether R.S.G.B. membership is essential for this end to be achieved. I can promise him that he would find it very useful, but membership of societies, in this free country, is, and always will be, a purely voluntary matter!

### "H.A.C.3" in Plymouth.

"F. W." (Plymouth) would like to get into touch with anyone in that district using the "H. A. C. Three-Valver." Will such a person please make himself known to Mr. F. Ward, 37, Embankment Road, Plymouth?

Also "F. W." wants to know if, and how, a frame aerial can be used for short-wave work. Search me, "F. W.!" I don't know. There's not much point in trying, seeing how well one can get on with a small indoor aerial.

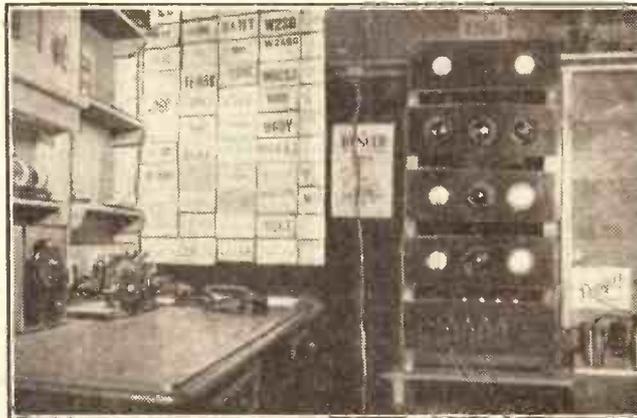
### Sydney on Sundays.

"H. J. B." (Manchester) wants to know why "Short-Wave News" doesn't appear every week. The reason, "H. J. B.," is simple: there isn't always enough news to go round. You will usually find it in alternate issues. Thanks for your notes on conditions in Manchester. They are practically the same in London.

"J. B. M." (Glasgow) reports that VK 2ME (the Sydney, Australia, station on 31.28 metres) still endangers his headphones with monotonous regularity on Sunday mornings.

W. L. S.

## A NEW YORK AMATEUR STATION



This neatly arranged transmitting station is W 8 D W J, operated by Mr. H. F. Graves, and situated at Brantingham, in the American State of New York.

plan, economically, to change to 2-volt valves and use one of the tiny portable accumulators that are available nowadays.

"J. W." will be a useful "D X listening post" for our London 5-metre tests; but

THE B.B.C. is being taken as a subject for records more and more by the various gramophone companies. Witness the "boom" in "In Town To-night" (the Knightsbridge movement of Eric Coates' *London Suite*), the recording of various numbers from *Big Business*, and the boosting of many of the B.B.C. stars on different discs. Quite natural, of course, and it is rapidly growing, no doubt to the delight of thousands of listener-gramophone fans.

The latest B.B.C. type of record is Austen Croom-Johnson's "Soft Lights and Sweet Music," a popular feature of the recent B.B.C. programmes. With Elizabeth Welch he has made an extremely pleasing disc of a selection of well-known tunes under that title, providing in "canned" form a perfect replica of one of his broadcasts. (H.M.V. B8144.)

Another "radio" record is the skit on *In Town To-night* by Max Kester, made just before he left

H.M.V. to go back to the B.B.C. Called "In Town All Night," this 10-inch record is a perfect piece of buffoonery, and is exceptionally clever in conception as well as in execution. Detail has been most carefully followed, so that a remarkably true replica of an imaginary broadcast of that famous Saturday evening feature is achieved, even to the rustling of the speaker's notes as he pauses and turns over a page. (B8145.)

Among the recent records which come from films there are four songs sung by Gracie Fields from her new picture, *Love, Life and Laughter*. On B8140 there is the name song which, in the picture, she sings in a children's ward of a hospital. There was great competition amongst the child artistes in London, when the film was being made, to be chosen as the ones to sing with the great star.

On the other side of the record is "Chérie," whilst the spirited "Riding on the Clouds" is coupled with "I'm a Failure" on H.M.V. B8141. No praise is required other than to remark that these are true Gracie records.

A broadcasting artiste who is now in the star class—Hugh Morton—has made his first record for H.M.V. of two popular numbers, "Over on the

## ROUND the RECORDS



Selections and recommendations from the latest gramophone lists

"Sunny Side" and "Masquerading in the Name of Love" (B8143). The rise in popularity of this popular baritone has been one of the romances of broadcasting.

For seven years he appeared in musical comedies, revues, films and cabaret, but he had never sung. He had to leave the stage for eighteen months owing to an attack of typhoid, and at a party which was given to celebrate his return to health all the guests had to form an impromptu cabaret. He was told to sing, and his friends were amazed at the quality of his voice.

They suggested he ought to go for an audition at the B.B.C., but he regarded the matter as a joke, and said: "I bet you a pound they would not have me." This was taken on, and he had to visit Savoy Hill, and no one was more surprised than himself when, the morning after, he received a contract to sing in a broadcast musical comedy.

Since that date he has been heard on the air at least twice a month, and this record gives every indication that he will become a star of the recording firmament.

Jack Hulbert's records always have an individuality of their own, and the comic patter which he usually improvises in the studio during the session adds much to its attractiveness. When he made "My Dancing Lady" and "Miss What's Her Name," which are recorded on H.M.V. B8147, he

had just been inoculated for malaria, as he was sailing for Egypt to make another film.

He caused much amusement in the studio when he explained he was wearing a light blue piece of ribbon round his arm instead of the conventional red, as it was near boatrace time and he must show his support for his old "Varsity." This record is one of the best he has made, and I can thoroughly recommend it.

Two of the most expensive popular songs that have ever been written—the composers were paid £2,000 per song for the film rights—have been recorded as foxtrots by the well-known American band, Eddie Duchin and his Orchestra, on H.M.V. B6474. These are "Build a Little House" and "No More Love," from the new Eddie Cantor film, *Roman Scandals*.

I prefer these two numbers as pure vocal items, but that is a personal matter, of course. Ruth

Etting, who stars in the film, has made an exceptionally good recording of them on Brunswick 01674.

Talking about Brunswick, I am glad to know Ambrose and Roy Fox

his Orchestra will be on the air again. There is no doubt that they have been sadly missed, and we have had to thank Brunswick for providing our only opportunity of hearing the famous band other than that of going to the Embassy Club.

The latest Ambrose recordings are "Gay Vienna" and "No More Heartaches, No More Tears," 01730; "Wagon Wheels" with "Boulevard of Broken Dreams" on 01721; and "Gee, Oh Gosh, I'm Grateful" with "Because it's Love" on 01729.

"Gee, Oh Gosh, I'm Grateful" is also in the Decca list by Roy Fox and his Band, and forms a delightful alternative to the record mentioned above.

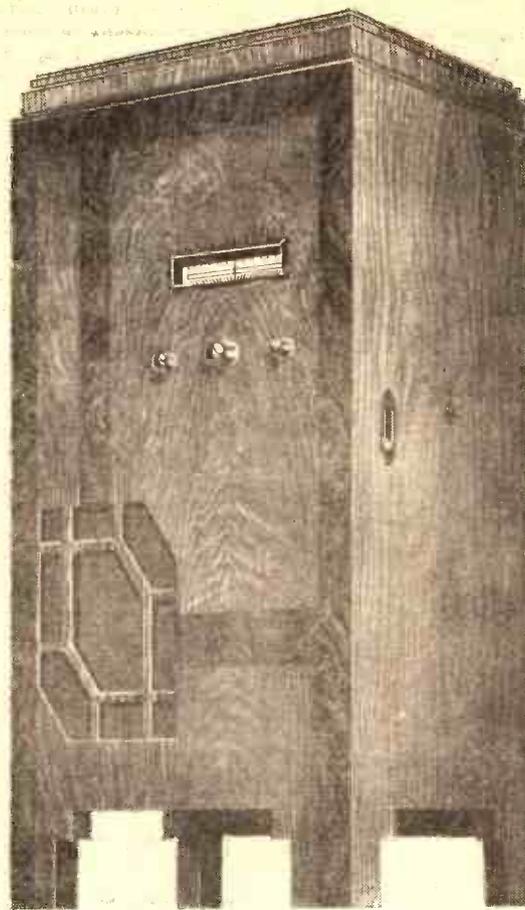
Yodelling is an art possessed by a few (did you say "Thank goodness"?), and to have the opportunity of listening to a real star among yodellers is an unusual experience. But such an opportunity occurs with a Regal-Zonophone record, which presents Andreany, the great Swiss yodeller, in "Valley of Echoes" and "Yodelling Mountaineer" (MR1248).

K. D. R.

## AMBROSE AND ROY FOX

## JACK HULBERT'S NEW HITS

You get  
**BOTH**  
 Perfect Radio  
 Reception  
 AND  
 Superb  
 Gramophone  
 reproduction  
 IN THE NEW



# TELSEN

MODEL 1240

## ALL-ELECTRIC RADIO GRAMOPHONE

The New Telsen 'Model 1240' is a Radio-Gramophone of particularly outstanding merit. A quality production in every detail, it not only incorporates a unique Band-Pass circuit, but it also embodies all those detail refinements which you expect to find only in the most expensive Radio-Gramophones. Yet the price of this luxury instrument is only 18 guineas. Here is value indeed, but even more remarkable than its value is its performance—its ultra

selectivity, its range, and above all, its TONE. It gets you all the stations you want, *one at a time*, with a fidelity of reproduction which banishes all thought of mechanism between performer and listener. It makes both radio and records really live. No 'mush'—no 'background'. Nothing added—nothing missing. Simply the full beauty of the original rendering. You must hear this remarkable Radio-Gramophone.

**18** *Gns*

OR £1 PER MONTH FOR 20 MONTHS  
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★  
 4-valve band-pass tuned circuit for ultra-selectivity

★  
 Latest type energised moving coil speaker

★  
 All-electric gramophone motor and pick-up

★  
 Full-vision illuminated scale calibrated in actual wavelengths

★  
 Magnificent inlaid figured-walnut cabinet in dual tones

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the easiest of easy terms!

THE MARCONI LUCERNE SPECIAL Radiogram is a luxury instrument from every aspect but that of cost. Powerful, fine-toned, and highly selective, yet built by Marconi-men to be within the means of everyone. You *must* hear this outstanding set for yourself, try the extraordinary efficiency of its superhet circuit and admire the beauty of its cabinet work.

Ask your dealer now for a demonstration of the Marconi Lucerne Special Radiogram—you will be under no obligation whatsoever. For A.C. Mains.

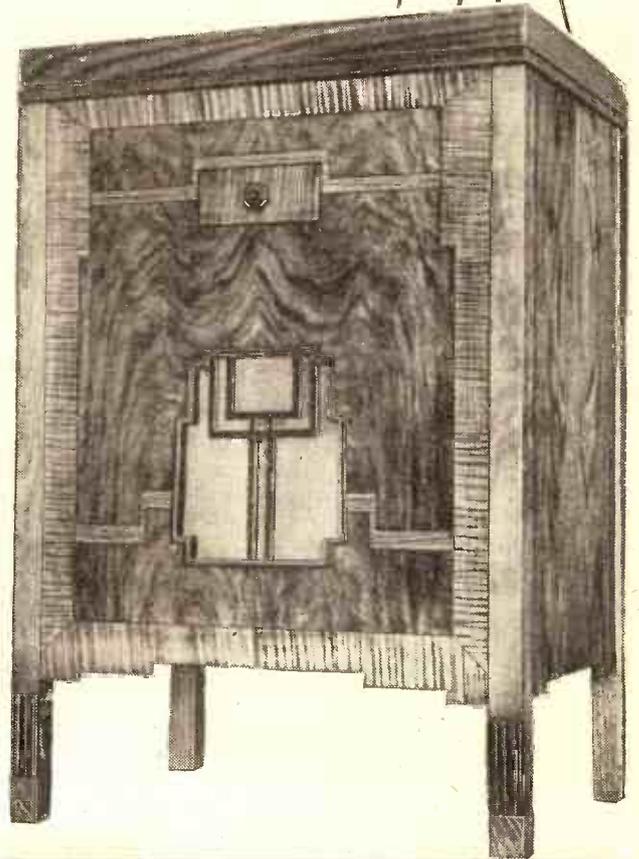
## 20 GNS

FOR D.C. MAINS 21 GNS

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EASY EXTENDED  
TERMS OVER 22  
OR 12 MONTHS



The world-famous trade mark of  
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5-VALVE  
SUPER-HET  
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DESIGNED  
FOR LUCERNE  
WAVELENGTHS

REALLY  
EXCEPTIONAL  
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AND VOLUME

ECONOMICAL  
TO PURCHASE  
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# TELEVISION By G.P. Kendall, B.Sc.

## 6-METRE POSSIBILITIES

THE daily Press, I saw, got hold of the 6-metre story, and appeared to think that in quite a short time the whole country would be covered with such transmissions, and, in fact, that completely perfected television for all was just round the corner.

We all know just how much to allow for over-enthusiasm when reading such effusions, but it is a fact, all the same, that the waves around 6 metres are receiving serious consideration in many quarters.

### The Present Test Transmissions.

There is actually a test transmission being made with some regularity from the Crystal Palace, using a considerable amount of power, on such a wave, and there may be others ere long.

Now, such transmissions as these are hardly intended to interest the home constructor. Indeed, I should not be surprised if some of their sponsors made efforts to discourage him from trying to receive them at all. The feeling of these people, no doubt, is that it is a difficult job to receive "ultra-short" transmissions in such a way as to show the full quality of which they are capable, and it is feared that the amateur will be seeing (and telling his friends about) imperfect results which will tend to discredit the transmissions themselves.

I suppose the attitude is understandable enough, but, from what I know of the home constructor, he is not likely to pay much attention to it! After all, he knows that, even if he doesn't at first succeed in getting the full results which the transmission is capable of giving, what he does get should be streets ahead of anything he can obtain from the 30-line transmissions on the broadcast waves, and that should be enough to start most of us looking into ways and means.

### Use a Vertical Aerial.

That is just the subject I want to discuss this week, for, although I have previously gone into questions of the probable results to be achieved on the ultra-short waves and the prospects generally, I have not yet given much practical information as to the details likely to be important in producing a successful receiver for the job.

I shall have to be very brief, for there is much ground to be covered, and I will start with a few notes on the aerial question.

Some notes on the fascinating "ultra-short" waves now being used for television, with practical hints and suggestions for producing a suitable receiver for this wave-band.

It has been my experience that large aerials are a definite nuisance on ultra-short waves; the ideal in most cases seems to be a comparatively short, vertical wire placed in as well-exposed a position as possible. Try ten or fifteen feet of wire thus arranged if you can, but don't worry if you cannot get it accurately vertical.

As regards circuits, I would suggest that something after the Hartley style will be found the easiest to get going at first. This, of course, applies only at relatively short

Good results can be obtained from one made as follows: on a piece of  $\frac{1}{4}$ -in. diameter ebonite rod or tube wind on No. 36, or preferably 38, double-silk-covered wire in a single layer until it occupies a length of  $\frac{3}{8}$  in. on the former.

The actual layout of the tuning and reaction circuits is vital. It must at all costs follow exactly the electrical run of the circuit. Thus, if the connections of the tuning condenser are to the ends of the coil, as in the circuit I am assuming, then there is only one place to put the condenser, and that is as close beside the coil as it can be squeezed, though, of course, it must be kept out of the actual field.

### Careful Layout is Important.

Lay out the receiver exactly like a well-drawn circuit diagram, keeping every lead carrying H.F. as short as you possibly can, and you will probably produce a set which will work straight off.

It will probably be best to mount the detector valve holder up on a pillar of some sort, in order to bring its terminals as close as possible to those of the tuning and reaction condensers, grid condenser, etc. The coil and H.F. choke will presumably be "hung" to appropriate terminals on the condensers and valve holder by means of their wiring.

Decapping the detector valve is sometimes recommended for ultra-short work, but since the modern valve will oscillate down to about 2 metres without much difficulty, even with the cap on, it seems rather a waste of time on 6 metres. It is a trick which is going out of fashion.

On the L.F. side it seems that we must make up our minds to use resistance coupling if we want to do anything like justice to 180-line scanning.

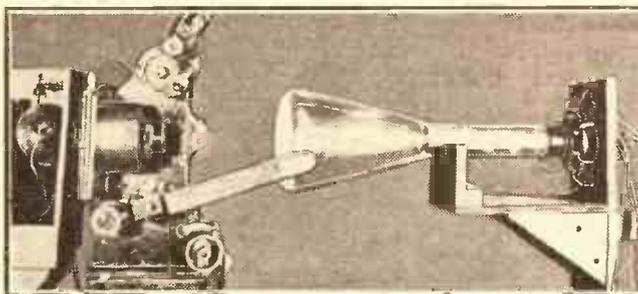
### Later Improvements are Possible.

Probably, if we were setting out to get the utmost perfection, we should do something to counteract the normal tendency of such coupling to fall off in efficiency at the very highest frequencies, but I am thinking now rather of the problem of making a start and getting some sort of results as a basis for future experiment.

From this point of view, carefully designed resistance coupling will serve, and will indeed give very excellent results. Later, correcting devices can be added.

(Continued on page 240.)

### FOR HIGH-DEFINITION SCANNING



High definition is more practicable on the very short wavelengths, and for this class of work the ubiquitous cathode-ray tube is specially suitable. The tube shown above is one used in a new Cossor scanning system that was described in the March, 10th, 1934, number of "Popular Wireless."

distances. At longer ranges it is probable that some form of superhet will be needed for proper results.

For early trials in the local areas a receiver consisting of a detector and low-frequency side will be quite worth trying if it is arranged with due regard for the special requirements of the case. The detector will require the usual bare wire coil of one turn or thereabouts, with one end to grid through a grid condenser and the other to plate through a reaction condenser, and an earth tapping on a clip.

Tuning and reaction condensers will probably need to be equipped with real extension handles, and should themselves be of the double-spaced type and small capacity. (About .00005 for tuning, a little larger for reaction.)

The H.F. choke in the detector anode circuit will require to be of special type.

# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## GOLSTONE "STATOFORMERS"

AS the use of the mains, both for purely domestic and workshop and for radio purposes, widens (I believe there will be nearly twice as much current consumed this year than there was in 1933), so the problem of electrical interference seems to become increasingly acute.

Many are of the opinion that legislation should at once be invoked in order to deal with it effectively; but there are great difficulties to overcome, not the least being our national dislike of any further encroachments on our freedom.

Somewhere—I really do not know exactly where—a commission is sitting; a commission designed to investigate the whole matter. But, as far as I can make out, it just sits, and I do not think that it has yet even hatched out an interim report.

I am afraid I have given up hope that it will contribute anything useful to our generation.

In the meantime, purely private enterprise continues to tackle the problem courageously. The latest development in this direction is the "Golstone" Aerial and Receiver Statoformer system, due to Messrs. Ward and Goldstone, Ltd., Pendleton, Manchester, who have already done much in the creation of interference-eliminating gear.

The system comprises three essentials—an Aerial Statoformer, a Receiver Statoformer and a screened down-lead.

These Statoformers are, in effect, H.F. transformers, and the object of the Aerial Statoformer is to step down the voltage of the received energy. It can then successfully be handled by a completely effective screened down-lead without loss, and this screened down-lead prevents the ingress of any electrical interference.

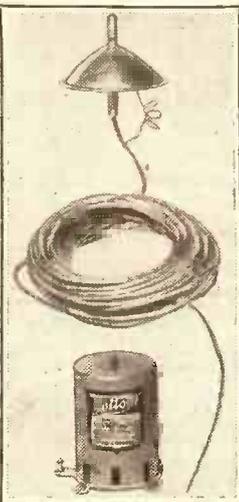
The Statoformer at the receiver then steps up the voltage to its original intensity. But, in addition, both Statoformers are tuned impedance-matching devices, and as the electrical connecting link between them—i.e. the screened down-lead—feeds off from and into tappings on them, any out-of-tune energy tends to be cancelled out.

It is a very interesting system, and one can have no doubts as to its effectiveness after testing it. There is no appreciable effect on the strength of the radio signals passed through it, and over parts of the waveband there is actually a slight increase; the "through-air" electrical interference is very well subdued.

How "Golstone" have tackled the problem of interference—the "Statoformer."

Of course, that interference which arrives via the mains needs other treatment, but this, too, can be eliminated by means of apparatus suitable for the purpose.

The "Golstone" Statoformer system is far from being costly. The Aerial Statoformer costs 4s. 6d.; the Receiver Statoformer, 5s.; and a 50-foot length of screened down-lead, 4s. 3d. And that is not much to pay for an effective method of dealing with that interference bugbear.



## CLIX CHASSIS- MOUNTING STRIPS

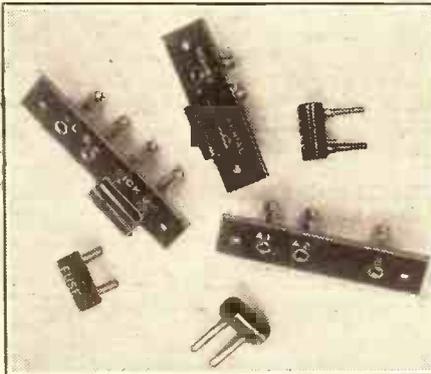
THE "Clix" brochure published by Lectro Linx, Ltd., 79a, Rochester Row, London, S.W.1, is called "A Matter of Connection". Now, very excellent as that may be, I feel that it deserves the definite article.

I'd like to see it as "The Matter of Connection," or even with an adjective added, as well, such as "The Vital Matter of Connection."

Because it is a vital matter. By far the majority of faults in wireless outfits occur through broken or faulty connections, either inside the set itself or between the set and its external accessories.

And just as a fault of this nature, which should not occur because it is due to badly designed apparatus, can be extremely annoying, so, on the other side of the picture, is there immense satisfaction to be obtained from a device which makes easily and without effort a solid, secure connection which you instinctively feel simply cannot go wrong electrically or mechanically.

I get this latter with the "Clix" Chassis-Mounting Strips. The little plugs push home into their appropriate sockets easily and deeply. There is something like half an inch of them sliding smoothly into big-area contact with the resilient sockets.



The variety of purposes for which Clix strips are made must ensure for them a place in almost every modern set that demands the maximum efficiency.

TO be in the fashion, how else can I start off this week other than by a reference to the splendid set-buyers' section which appears elsewhere in this issue? If you pause for a moment to think about it, you will realise that this is the first occasion in the history of technical journalism that any journal has provided its readers with such excellent facilities for obtaining receivers on hire purchase.

The hire-purchase system is rapidly gaining ground in this country because there are such obvious advantages to commend the practice. But until such times as it becomes a universally recognised practice there will always be those who are inclined to regard the purchase of an instrument by easy terms as a sort of stigma. It isn't that they object to the idea in principle so much as to the so-called "indignity" of going into a shop for the purpose of fixing up the necessary agreement.

With that obstacle removed there is little doubt that a great number of people would take advantage of the facilities so generously offered by the manufacturers. Well, "P.W." in the presentation of this special set-buyers' section, has removed the obstacle, and now the rest is up to you.

Having determined, through the medium of the coupon printed at the foot of every page, the name and address of the local dealer who handles the particular instrument in which you are interested, the whole of the rest of the business can be done through the post.

I am confident that it requires no urge from me for you to take advantage of this great opportunity. All I can say is that, in my considered opinion, it is too much to hope that prices will ever be appreciably lower than they are now—at least, not for a very long time to come—and that this is a chance which should certainly not be missed.

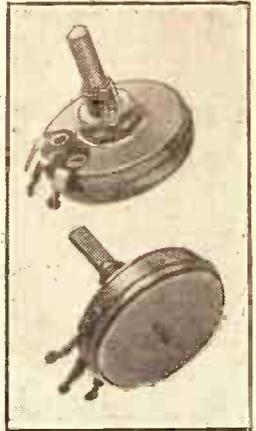
## THE LINK BETWEEN

Notes of interest to buyers by  
G. T. KELSEY.

These strips also look tidy, and the constructor will appreciate the small but effective terminal screws on the sockets.

The price is another attractive feature. The two-socket type of strip engraved "Mains Aerial, In, Out," costs only 6d., while the shorting plug for use with it retails at 3d.

There is no appearance of quality having been sacrificed to price in the new Ferranti volume controls seen here.



The three-socket type is engraved "A1, A2, E," and it lists at 7d. There is also a four-socket type carrying this engraving, "L.S., Pick-up," and that one costs 8d.

## A NEW FERRANTI POTENTIO- METER

I HAVE already referred in general terms to the new range of inexpensive components which are now being manufactured by Messrs. Ferranti, of Hollinwood, Lancs.

In the case of the condensers, I pointed out that set by this firm in past productions was fully maintained, and that the saving was obtained in the assembly and finish of the components.

But this hardly applies to the new Ferranti potentiometer, except in that it is not fitted with terminals, but has soldering tags. Beyond that the component bears no indication of economy whatever, but is a polished, neat article in all outward appearances.

A careful study of it, however, reveals that, due to skilful, careful design, it is a comparatively simple factory-assembly job lending itself admirably to mass production in a well-equipped factory.

And it may well be that its very simplicity of conception plays no small part in its entirely satisfactory operation.

There is a complete absence of superfluous mechanical parts, and there is not one shred of material in it which does not pull its full weight.

The action is beautifully smooth, and there is not the slightest harshness or undue looseness at any single point in the rotation of the spindle.

It is of the direct-contact type. That is to say, the moving contact runs round the resistance element and makes direct electrical connection to it. Nevertheless, my samples (and I have tested several thoroughly) maintain a perfect quietness, and there is every indication that this desirable effect will continue indefinitely.

Moreover, I have had a glance through the special section before writing these notes, and it seems to me that the editorial folk have succeeded in including practically all the worth-while sets of the present day. Take my tip and strike while the iron is hot!

## H.M.V. and Columbia Price Reductions.

Here's some welcome news of price reductions which take effect forthwith: The famous H.M.V. "Superhet Concert Seven" is reduced from 22 guineas to 17 guineas, and their Model 524 radiogram, the price of which, up to now, has been 48 guineas, is to retail henceforth at 44 guineas.

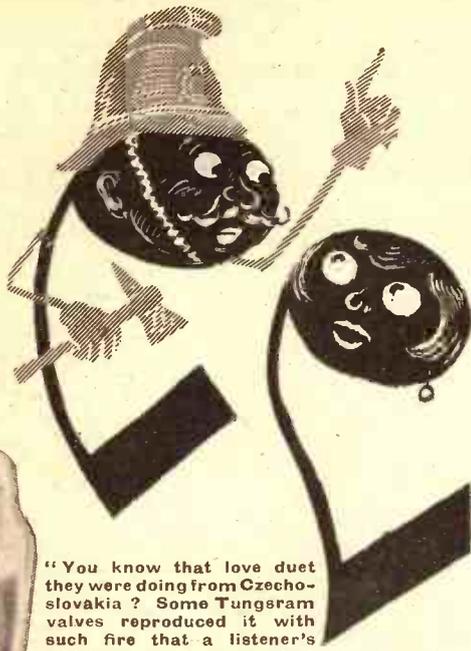
Columbia's, too, have made a price reduction in the "C.Q.A. Battery Radiograph." The new price is 17 guineas, a reduction of 3 guineas.

## A T.M.C. Development.

News of an important development comes from the Telephone Manufacturing Company, Ltd., the makers of the famous "T.M.C. Hydra" range of condensers, telephonic equipment, "Temco" A.C. mains electric clocks, etc.

They have just formed a new company, to be known as "T.M.C. Harwell Sales, Ltd.," to take over Harwell, Ltd., of the Sessions House, Clerkenwell Green, London, E.C.1., and the new company is to act as trade distributors for all T.M.C. radio products.

Commodious premises in Central London are to be taken for the new sales company, which, supported by the extensive resources of the Telephone Manufacturing Company, Ltd., and with the excellent connection of Harwell, Ltd., will occupy an important position in the electrical and radio industries.



"You know that love duet they were doing from Czechoslovakia? Some Tungram valves reproduced it with such fire that a listener's whiskers have been scorched in Wigan!"

# TUNGSRAM

from 5/6  
**VALVES**

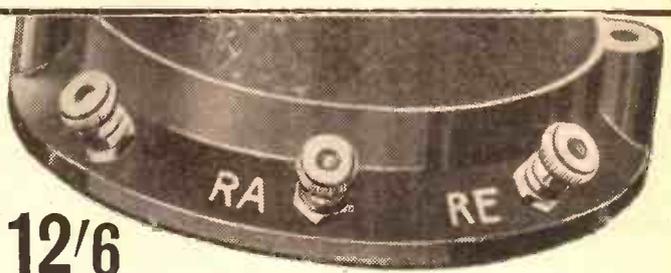
Tungram Electric Lamp Works (Gt. Brit.) Ltd.,  
72, Oxford St., W.1.  
TAS/Tu.47.



## MICRION IRON CORE COILS

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# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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

## QUESTIONS AND ANSWERS

### INTERFERENCE APPARENTLY DUE TO SHARING OF EARTH LEAD.

Many inquiries have been received recently from readers who are getting interference from adjacent sets via common earth connections, or via earth leads which are necessarily very close to neighbouring ones.

The trouble is particularly noticeable when the two sets are in the same house. A typical instance of this is that reported by Mr. James Boyd, of Walpole House, Stanley Mount, Ramsey, I.O.M. In a letter to the Editor he says:

"If two wireless receivers of different types are connected to a common 'earth,' in this case the main water-pipe to the house, should

the reception of either set be affected when both sets are working?

"I have two wireless sets—A, a three-valve set, and B an 'S.T.500.' The earths of these are connected to the water main where it enters the house.

"This main is a lead pipe  $\frac{3}{4}$ -in. external diameter, and will therefore be about  $\frac{1}{2}$ -in. bore. Each earth lead is soldered to the pipe; the distance between the connections is 9 in.

#### Only One Set Affected.

"I find that when both sets are working B gives very poor volume compared to that given when it is on alone. In fact, if the earth connection from B be removed no further diminution of volume is noticed when both sets are on together.

When B is working alone the volume is all that is desired. On the other hand, it does

not appear to make any difference to A whether B is working or not.

"I might add it is not convenient to bury an earth plate, as the house is surrounded by a paved courtyard.

"The earth leads are each 7/22 wire, and the leads are 15 feet and 8 feet from B and A respectively."

Other readers get very similar effects when their neighbour's set is switched on, even when the latter is being worked as it should be, without a trace of oscillation.

(In most cases the more powerful set appears to overwhelm the smaller outfit, but sometimes the reverse effect takes place.)

### Good Separation is Desirable.

Unfortunately, this type of mutual interference, due to the use of a common earth or an adjacent earthing point, is very difficult to cure. There is no easy way out of the difficulty, and sometimes there appears to be no way out at all.

In general, it can be said that the earths, like the aerials, should be separated as far as possible. But separation sometimes makes no appreciable difference, and there are many cases where one man uses a water-pipe earth, his neighbour a buried plate, and the interference is bad unless one of them disconnects from earth altogether.

Sometimes it helps to put a condenser in the earth lead. Either a large or a small capacity may prove beneficial, and sometimes the mere shifting of the "selectivity" condenser in the aerial circuit to a point between the earth terminal and earth will prove advantageous.

In one case reported to us a considerable improvement took place when a choke was inserted in the earth lead, so experimenters who have chokes on hand may care to try this.

A likelier remedy is to use a counterpoise earth for one of the sets. This can take the

(Continued on next page.)

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

form of an insulated wire, about as long as the aerial in most cases, but running under the aerial (for instance, along the fence) instead of being high up in the air.

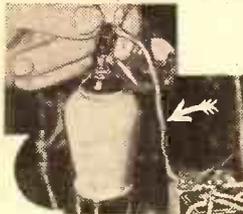
It must be carefully insulated from earth, just as the aerial is—in fact, it can be regarded as a second aerial, except that it is connected to the earth terminal of the set, and it is placed near to the ground instead of being as far above it as possible.

Failing an outdoor counterpoise along a fence or on short supports, the indoor type may be tried. A long coil of flex is suitable for this, the wire being disposed under the floorboards, in a cellar or any similar situation which may appear to be suitable.

But we would emphasise that there appears to be no certain cure for this class of interference, which varies greatly in different circumstances, and so calls for experiments on the spot.

### "CURING A PERSISTENT WHISTLE."

May we thank the many kindly correspondents who sent in details of experiences



### FOR BETTER RADIO

All sets should receive a periodical overhaul,

when special attention should be paid to the flexible leads.

Battery and switch leads, plug-connectors, etc., should be carefully examined. And the small flex leads inside the set—such as that to the anode of an S.G. valve—should receive special attention.

Do not forget that the metal strands are liable to fracture where strained or bent, the rubber covering often showing no signs of damage.

concerning the fault reported by a Mitcham reader some weeks ago?

We have space for only a couple of these, reported in letters to the Editor. The first is from Mr. Wm. Agate, 10, Mayo Road, Willesden, London, N.W.10, who says:

"In 'P.W.', week ending April 28th, I observe there is a question in your 'Radiatorial Questions and Answers' from S. V. C. (Mitcham) under the heading, 'Curing a Persistent Whistle.'

"About two years ago I had a German transformer (of 3:1 or 5:1; I am not quite sure which), but the peculiar part about it was that in a three-valve set, Det. and 2 L.F., two trans.-coupled, I had exactly the same trouble.

"I tried the remedies that you mentioned at the time; also I tried earthing the metal casing and core, but this failed to stop it.

"I then tried the transformer in a Det. and 1 L.F. set, where it gave a wonderful performance. I tried the transformer in conjunction with an R.C. coupled stage, where it worked perfectly.

"Thinking, perhaps, it had been the fault of the other transformer, I tried it as I had it at first, Det., 2 L.F. The whistle immediately

returned. I tried six or eight other transformers with the German one, with still the same results.

"I took the German one out and replaced it with another, still keeping the original second transformer. Results: O.K.

"Conclusion: The German one would not work in conjunction with another transformer, but gave very good results in a two-valve circuit or with an R.C. coupling unit in Det., 2 L.F.

"I should suggest that if S. V. C., as is presumed, is using two transformers, he gets a third transformer, which he may have by or be able to borrow, and replaces each of the others in turn; or tries R.C. coupling one stage, if he has components suitable. Or a third suggestion would be: try the set after reversing the positions of the transformers, i.e. making the second stage one the first and the first the second."

### Feed-back from L.S. Leads.

The second letter is a brief one, but it tellingly emphasises a point that we have often stressed—feed-back from L.S. leads. It is from Mr. Wm. Griffiths, who writes from 39, Upton Road, Yardley, Birmingham. He says:

"Referring to S. V. C.'s (Mitcham) letter, I have had the same trouble with my 'Straight Three.'

"The set is in the same cabinet as the loudspeaker, and the speaker leads were close to the valves.

"This caused a whistle, the same as S. V. C.'s. If you will pass this tip on—*move the leads farther away*—perhaps he will cure his trouble.

"(You may be interested to know that on Sunday, July 16th last, I heard General Balbo broadcast from Pittsburg on 48'86 metres at 3 a.m. The announcer's name was Bill Hayes, of the N.B.C. The same morning I heard Boundbrook on 16'87 metres, and a station which announced itself as K O K U, 39-18 metres. I am aged fifteen.)"

### THE CAUSE OF FLATTER TUNING.

J. M. (Oxford).—"I have been experimenting with a super-quality three-valve receiver, the 2-v. amplifier portion being separate, to allow me to work on distortionless detection; and I notice that if I get the value of the grid leak really low, less than a quarter of a megohm, the tuning gets noticeably flatter. Is this usual?"

Yes, it is likely to occur, owing to the greater damping placed across the tuned circuit.

### SOME PUSH-PULL POINTS.

In a letter from 81, Henry Road, West Bridgford, Nottingham, Mr. W. R. Crosskill raises some points about ordinary push-pull working that may prove of interest to others, so we are commenting below on the numbered questions. Mr. Crosskill says:

"I have been for some time wishful to see a 'push-pull' scheme outlined in 'P.W.', and I noted the explanation given on page 132 of April 21st, 1934.

"I feel sure that I am voicing the wishes of others in asking for a good, seriously planned scheme of push-pull amplification of the ordinary kind. Not Class B or quiescent push-pull, but one suitable to people who have eliminators, or other H.T. units, where a saving of H.T. is not of much consequence.

"The following queries arise:

"(1) Is the input-tapped transformer usually a 1 to 3 step-up?

"(2) What steps can be taken to ensure that the two valves will keep in correct match with each other? That is, cannot the grid bias be fed via some variable resistance which will vary the H.T. to each valve, as required by any difference of the two valves with each other?"

(Continued on next page.)

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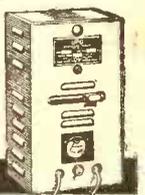
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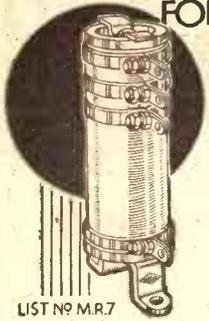
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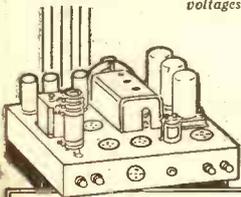


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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

"(3) What should be the correct ratio of the output transformer? Is this a 1 to 3? Or is it a 1—1 for best results?"

"(4) Is a constructor who is thinking of introducing push-pull called upon to buy two ordinary power valves, or must he purchase super-power valves? If the latter is needed, will it not be beyond the power of many eliminators, or other units, to stand up to the heavy drain?"

"A theoretical circuit, as shown on page 132 of April 21st, does not carry a constructor very far. There are so many queries, beyond the simple scheme outlined, that will need to be made clear before any reader will feel that he is ready to embark on push-pull, and I feel sure that a really practical article covering the whole scheme would be valued by many readers of your excellent paper."

(1) Yes; about 1 : 3 or 1 : 3½ is the usual ratio.  
(2) We are not quite sure what is meant by the first part of this question relating to the steps that can be taken to ensure that the two valves will keep in correct match with each other.

To form a pair for a push-pull stage, the two valves should be of identical characteristics. That is to

### STATION IDENTIFICATION

#### ZAGREB.

The wavelength used by Zagreb is 276.2 metres, which is just below that of Bordeaux P.T.T. It is thus half-way between the Scottish National and Belfast dial-readings.

Being a low-powered station it is seldom received in this country, especially as it now shares its wavelength with the Swedish station, Falun. (Falun, by the way, has been getting over well of late.) The distance of Zagreb (from London) is some 830 miles.

The call is "Radio Zagreb" and in addition to Serbo-Croatian, both the French and German languages are used. Interval signal, metronome.

say, they should be of the same make and type, and preferably not only true to type, but "matched" within close limits, in order to reduce as far as possible any little electrical discrepancies which might appear in valves intended to be exactly alike.

Correct characteristics are a matter of manufacture—exact "placing" of the electrodes, degree of vacuum, etc.—so two properly matched valves will always keep in correct match if grid bias, H.T., etc., are applied as they should be in push-pull working.

Furthermore, if the valves are not of similar characteristics, there is no wangle with grid bias, H.T. or other adjustment that could render them matched for push-pull operation.

(3) For push-pull operation the considerations governing the output transformer ratio are not fundamentally different from those obtaining when a single output valve is used.

There is this important difference: that the impedance of the two valves in push-pull is double that of one valve. But the same rule for coupling the load applies.

The rule is that the effective impedance of the loudspeaker which forms the load should be made high compared with the impedance of the valves driving it.

In practice, this condition can be fulfilled for particular valve-and-loudspeaker combinations by using an output transformer of ratio suitable to the requirements of the given case. It is possible to work out theoretically what this ratio should be, but hardly practicable for most set-builders, and fortunately unnecessary.

The makers of the valves, or of the output transformer, or of the loudspeaker will all be equipped with the necessary information which will be supplied on request to them; and such "service" information is better than the set builder could work out for himself, because it embodies practical experience of the various parts under working conditions.

(Remember that the makers are just as anxious as you are that the right valves, transformer and loudspeaker should be used with their apparatus.)

It will be seen that a 1 : 1 ratio would be suitable only if the loudspeaker's impedance were several times greater than that of one of the valves.

(4) The push-pull principle is applicable to either power or super-power valves, according to the output power required.

In the latter case, especially, the high-tension supply must be considered carefully.

The requirements for any given output stage can be stated precisely by the valve manufacturers, and they will say what the output of the "eliminator" should be, or even recommend a particular type of mains unit that they have found satisfactory in practice.

### WHY IS IT CALLED THE DRIVER VALVE?

"CLASS B" (Sheringham).—"Why is it that when a small power valve is used in front of a Class B valve it is called the 'driver'?"

"If, for some reason, it were used before an ordinary or pentode output, not Class B, would it still be a driver? What does it drive?"

There is no need to use a power valve before an ordinary triode or output pentode, because, unlike Class B valves, they do not have current as well as voltage supplied to them by the preceding valve.

Electrical power always implies voltage and current. And although the grids of ordinary types of output valves require to be fed with voltages, no grid current must flow. Therefore the preceding valve need not be a power valve.

With Class B output it is different. In the Class B grid circuits there is a considerable current flow, which incidentally is the reason for using special low-resistance-secondary (Class B) transformers.

Therefore the preceding valve must be a power valve. It not only supplies voltages to the grid circuit, but it also drives a current through it.

It is true that some Class B valves are so economical in their grid-current requirements that they can be fed from the "general-purpose" type of valve, but this is merely a matter of degree, and when used thus such a valve is really acting as a small power valve.

### BACK NUMBERS OF "P.W."

Readers who are unable to obtain locally back numbers which are still in print should apply to the publishers, The Amalgamated Press Ltd., Back Number Dept., Bear Alley, Farringdon St., London, E.C.4. The price is 4d. per copy, including postage.

### 6-METRE POSSIBILITIES

(Continued from page 235.)

I have recently explained the main points which must be watched in order to preserve the elusive upper frequencies which represent the detail and definition of the picture, so I need not go into that again.

Instead, I must mention a point about the output circuit which is apt to be overlooked, even by people who ought to know better. This concerns the fact that an output filter can be a bit of a snare in the case of the ultra-high (actually super-audible) frequencies involved in high-definition television.

Unless the choke used is specially designed for the job, its self-capacity is likely to be high enough to cause an appreciable loss of the precious high frequencies which we have gone to so much trouble to obtain.

Here I must stop. I'm afraid I have only skimmed over the surface of the subject, but I hope I shall at least have provided a starting point for those who have already had a little experience of ultra-short wave work. For those to whom it is a new field I hope to provide some more detailed practical information in the future.

## BRINGING UP THE BASS

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

ONE of the most-often-asked questions—at least, by the less expert of those who have attended Infra-Sonic demonstrations—is “Why is it that the introduction of an artificially generated fixed frequency of a ‘lower-than-audibility’ nature seems considerably to improve the rendition of the whole range of the bass notes, and, perhaps, even high ones as well?”

That might seem something of a puzzle at first. But actually, if this effect were not in fact achieved, the main purpose of my scheme would have been unfulfilled. Infra-Sonics would have been, in my mind, almost a failure.

### “Masses of Sound.”

To understand exactly what happens one has to think in terms of masses of sound in much the same way as one visualises quantities of water. (A comparatively small quantity of water flows through a tiny brook as compared with that which flows between the banks of the Thames.)

A quiet passage of music causes very much less vibration in the air than a very loud passage.

Now, by far the greater part of the air disturbance caused by an orchestra is due to the low notes. When many of these are almost lost in radio or talkie processes (as is inevitable), it is obvious that the mass of air vibration experienced by the listener or audience will be less for a given degree of loudness.

The same apparent volume as the original can only be achieved by an inordinate amplification which brings up the middle and high frequencies and makes the result screechy and superficial.

Tone correction helps to balance things up to a certain extent, but it cannot go beyond a certain point, for it is obviously useless trying to exaggerate frequencies which simply are not there!

### Adding to the Harmonics.

But harmonics of even the very low notes can get through, though they leave their fundamentals behind them. It's like trying to post one of those huge bottles of coloured fluid you see in the windows of chemists' shops.

The whole thing can't be sent through the letter post, but you could remove the colouring matter and send that alone easily enough.

And if, instead of water, the recipient added to this colouring matter some other fluid of a colourless nature and poured the whole into a large glass bottle, you would have a perfect imitation of the original thing.

That crudely explains what happens in Infra-Sonics. Tonal colouring consists of harmonics, and these are very weak regarded in terms of masses of air vibration. But all the mass that is needed is supplied locally by the Infra-Sonic apparatus, and so the ear thinks it is hearing the whole thing in its perfect, pristine condition.

The radio or the talkie gear has supplied the silk covering of the cushion, and Infra-Sonics provides the stuffing!



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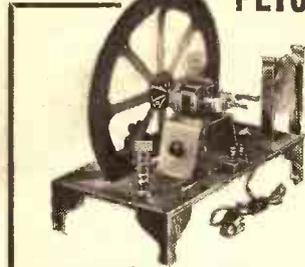
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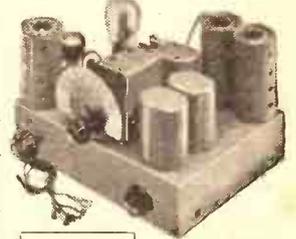
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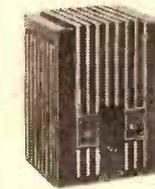
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WHAT others are saying about Mr. G. V. Dowding's amazing invention: "Men who served in the war laughed nervously in a room in London yesterday when they listened to a 'life-size' reproduction of a bombardment. Those who knew the meaning of a tropical hurricane hunched their shoulders as the wind whistled.

"The occasion was the testing of a new invention, Infra-Sonic Frequency, which is expected to have an important effect upon the acoustics of the talkies."—"Daily Sketch."

"In a demonstration yesterday he certainly produced a most marvellous thunderstorm, quite alarming in its realism."—"Daily Telegraph."

## THE LISTENER'S NOTEBOOK

(Continued from page 222.)

Lune and Shaw scored big successes at Doncaster. Lune and Shaw are absolutely dependent on an audience for the success of their turn. The more it warms up the more they do. It reached red-heat point the other night, and Lune and Shaw responded accordingly.

So much for variety, but may I just add that if we are to be deprived of the Saturday evening bill, Eric Maschwitz must see that his Wednesday show never falls again as low as it did the other night? I felt really sorry for Teddie Williams, who did his difficult job well.

Gerald Heard is always interesting, and the listener needn't necessarily be scientifically minded to follow him. He had a lot of interesting things to say in his recent talk on the Conference Telephone.

Cut-out or circuit-seizing valves may sound terribly technical to the uninterested, but actually his explanations of these and similar things are so simple and direct that anyone can grasp the idea immediately. So give Mr. Heard a trial, you non-scientists.

May I give the clarinet of the Scottish Studio Orchestra a pat on the back for his beautiful playing recently in one of Suppé's attractive Overtures? It was superb playing! I would like to hear more clarinet solos broadcast. The clarinet is an infinitely better instrument than a "sax," yet saxophone solos are given in plenty.

Mae West's present fame on the films finds an echo over the air. Several artistes are "doing her," and her "Come up and see me some time" is rapidly becoming nothing to laugh at.

Are you one who thinks there is a dearth of humour on the wireless? The King's English, by Professor Lloyd James, doesn't sound a very promising field for humour-hunters. But, believe me, it is. When Professor Lloyd James maltreats or murders King's English it is one of the funniest performances I know.

He paid a tribute to the English of Sir Walford Davies, Commander King-Hall, Miss Power

and Mr. Hibberd (the chief announcer) the other afternoon, and a well-merited tribute, too, say I.

I would like to add two more names to these. Neither is famous in broadcasting circles, but both were in the programmes recently. I refer to Mr. "Plum" Warner, who spoke on the Australian cricketers, and Mr. Percy Philip, who spoke from Paris in "The Week Abroad" series.

I am anxious to say a word on the latter series, in view of the opinion I expressed about it last week. The good talk I referred to then made an immediate appearance, and came from Mr. Percy Philip. This gentleman has much of the style of Mr. Vernon Bartlett, and his talk from Paris gave the series the pick-me-up it needed.

It is a pity we have to wait so long for the next of the Old Music-Hall programmes. I could do with one of these every week. I know they require some preparation. I was particularly interested in the "Empire" programme, because I had peeped in at one of the rehearsals at Broadcasting House.

I can still see Mr. Stanford Robinson leisurely wielding his baton, the Male Chorus of varying shapes and sizes just bursting themselves and Denis O'Neil complacently looking on. I'm not certain whether the latter is growing a beard.

Anyhow, these stalwarts can put on a good show. How they make one year for the good old days when songs were songs and words meant something!

C.B.

## A TELEVISION SURPRISE

The Postmaster-General appoints a committee to investigate the possibility of a programme service.

ALTHOUGH first news of such a move was given in POPULAR WIRELESS last week, the announcement that Sir Kingsley Wood, the Postmaster-General, was actually appointing a committee to consider the conditions under which a public television service could be operated has come as a surprise.

Government departments are not wont to move with such speed and decision, although the Postmaster-General has already allied himself in more than one way with progress. B.B.C. and Post Office officials will serve on the committee with television experts.

Ever since POPULAR WIRELESS cleared up the position regarding television and announced details of the various systems of high-definition transmissions which were competing for public recognition with the Baird 30-line system, the B.B.C. has been trying to avoid the responsibility of making its own choice of any particular form of television for future use.

The new committee will have to decide whether television is sufficiently advanced to justify a public service and, if so, whether such a service should be in the hands of the B.B.C., the Post Office or private enterprise.

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# TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

## How Many Sets?

YOU would think that everybody had a wireless set by now, but actually "saturation point" (as the manufacturers call it) is still a long way off. In other words, there are still lots and lots of people who do not possess a wireless set of their own. I don't know how the figures for gramophones compare with those for wireless sets, but I should imagine that more people have gramophones than radios. I don't suppose you have ever met anybody yet who did not possess a gramophone in the house, although you do sometimes come across people who admit that they haven't got a wireless.

## AN INVISIBLE GUARDIAN



Smash-and-grab thieves are going to have a thin time in future with the new G.E.C. device—here shown in operation. A steel shutter automatically covers the window display directly the glass is broken. The scheme is based on the principle of the photo-electric cell.

## Radio Abroad.

Some recently compiled figures stated that during the past year there had been an addition of about 20,000,000 to the ranks of wireless listeners. The total number of radio receivers in use throughout the world is estimated at 40,000,000, which, on the basis of 4 to 5 listeners per set, works out for the listening public throughout the world at not far short of 200,000,000.

Many people think that the United States has the greatest number of sets per thousand of the population, but in point of fact Denmark heads the list with 140 sets per thousand, whilst the United States comes in at only about 130 sets per thousand. Great Britain is quite a little way down the list with about 115 sets per thousand of the population.

## Short-Wave Development.

One of the most important developments in radio transmission and reception in the near future will, I think, be in connection with very short-wave work—on what are sometimes called "micro-waves." There are many advantages about these short waves, and by using this type of transmission we can get round a lot of difficulties which bother us on the medium and long waves. For one thing, the range of transmission on a wavelength of a few inches does not travel much beyond about 20 to 25 miles. At first sight you might think this was a drawback, but it can be turned to useful account, because a relay station can serve the town or area surrounding it over the above-mentioned range and will not cause interference outside that radius.

As you know, we are getting farther and farther into difficulties with the heterodyning and other interference caused by some of the giant European stations.

For this reason alone, apart from others, it is quite on the cards that very short waves will play a much greater part in broadcasting before long.

## Overcoming High-Power Interference.

On this arrangement, instead of a comparatively few long-wave and medium-wave stations, we should have numerous short-wave stations, each covering a relatively small area; these would not interfere with one another, because of their short range.

This short-wave working also offers many advantages for the purposes of television, since a greater number of channels could be used, which would make for much greater facility in working and detail in reproduction.

Unfortunately, British manufacturers do not seem to have paid the attention to short-wave receivers which they deserve, and a good deal of business in this type of receiver goes to the American product. No doubt things will be changed before long, and personally I think that short-wave receivers will soon become as big a market as medium-wave receivers are at present.

## Volume-Control Connections.

The other day I was examining a home-made set in which the volume control appeared to be without any effect at all. The set was resistance-capacity coupled and the quality of reproduction was not too good, certainly not as good as one would have expected from this type of circuit.

From the fact that the volume control appeared to have little or no effect, it seemed that it might be disconnected, but the explanation of this and the poor reproduction turned out to be that the volume control was connected the wrong way round. Instead of the slider being connected to the grid of the next valve, it was connected to the negative terminal of the grid bias, the grid of the valve being, therefore,

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

connected straight through the resistance element of the volume control. You can easily see why it didn't work.

This is a point you want to watch, because the three terminals of some types of volume-control unit are necessarily placed very close together, and it isn't always easy to see at a glance how each terminal is connected. Before fitting the component you should take care to identify the terminals, more particularly the one which is connected to the slider. It is a matter of indifference which way round the other two are connected, since they simply join up the two ends of the resistance element.

### Pianoforte Reproduction.

We have often heard of the idea of screwing a loudspeaker unit to the sounding-board or even to the back of the wooden case of a piano, the latter acting instead of a diaphragm or trumpet. I see that a new kind of piano is now being made, in which the process is, as it were, reversed. Instead of the piano relying for sound amplification upon its own sounding board, it is fitted with a series of small microphones, one microphone to every five notes of the piano, and the electrical output from these microphones is passed to a multi-valve amplifier fitted within the instrument, the resulting output being reproduced from a loudspeaker. The reproduction, of course, is very similar to the best type of pianoforte reproduction you get over the wireless, but the system lends itself to the production of many unusual effects.

One interesting feature is that the "soft" pedal, instead of acting as in an ordinary piano, operates a volume control and the volume of sound can be made not only quieter but also louder. I do not know to what extent a piano of this kind is likely to "take on" with the public, but it is certainly interesting from the technical point of view.

### Loudspeaker Extension Leads.

Often you find that you want to use your loudspeaker at some distance from the set and you will find that if you merely use extended leads, without some form of output circuit, you are apt to get losses and distortion. If the loudspeaker has its own input transformer incorporated with it, as is very general practice with loudspeakers nowadays, it doesn't help matters very much, because wherever the loudspeaker

goes, the transformer, like Mary's lamb, is sure to follow.

### Choke-Filter Output Advisable.

If it is convenient to separate the input transformer from the loudspeaker, keeping the input transformer adjacent to the set and extending the output leads from the transformer to the now distant loudspeaker, the results will be much better. It is not, however, always possible to pull the transformer and loudspeaker apart like this, and in such a case it is better to treat them as a single unit and then to use an ordinary choke-filter output at the receiver end, running extension leads from the output of this to the input of the loudspeaker transformer.

For this purpose you will generally find a choke of about 30 henries with a condenser of 2- or 4-microfarads capacity to be suitable,

## NEXT WEEK

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at any rate with ordinary power valves. It is important that the choke, of whatever form, should have a low D.C. resistance.

### Detector Bypass Condensers.

When you are using an H.F. bypass condenser in a detector stage it is usual to employ one with a capacity of about .0001 microfarad, one terminal of the condenser being connected to the anode of the valve and the other to H.T. negative. You will notice that when used in this way the full H.T. voltage on the detector is applied across the condenser and it goes without saying that the condenser must be tested to a much higher voltage than this.

Sometimes you may not be certain that a condenser which you have handy is capable of standing up to the voltage, and if you are in any doubt about it you can get round the difficulty by connecting a small fixed condenser across the primary of the transformer in the detector anode

circuit. In this position it will not have to stand the whole of the high-tension voltage and you will often find it acts quite well as a bypass.

### Power Valve Grid Bias.

Power valves in these days often take a somewhat lower grid voltage than they used to do formerly and many people do not allow for this when substituting a modern small power valve for one which has been giving service for perhaps three or four years. About that time ago power valves were generally rated for a grid bias voltage of 9 to 12 volts with, say, 120 to 150 volts H.T., whereas there are now plenty of small power valves which require only about 4½ to 6 or 7½-volts grid bias.

If you leave your grid bias at the old high value when using a valve which requires only a smaller bias voltage, you will almost certainly get distortion; in fact, if you experience any trouble of this kind when fitting in a new small power valve, this question of bias voltage is one of the first things to look for.

### Study the Data Sheet.

Of course, if you are using a valve of the super-power type this argument does not apply. In any case, the proper thing to do with this, as with all other valves, is to study carefully and follow out the rating instructions given on the carton or on the leaflet enclosed with the valve.

A lot of people don't do this but just trust to their own judgment. It only takes a few moments to study the specification sheet and it is only fair, not only to yourself, but to the manufacturers of the valve, that you should do so.

## THE AVOMINOR

### An Important Announcement

The Automatic Coil Winder and Electrical Equipment Co., Ltd., have asked us to inform those readers entering for the competition announced on page 242 of this issue of POPULAR WIRELESS that there is a printer's error on the free entry form and folder which they will receive.

The last range of readings with the AvoMinor is given in the folder as 0 - 3 megohms. It should, of course, be 0 - 3 megohms, and readers should bear this in mind when making their tests for the competition.

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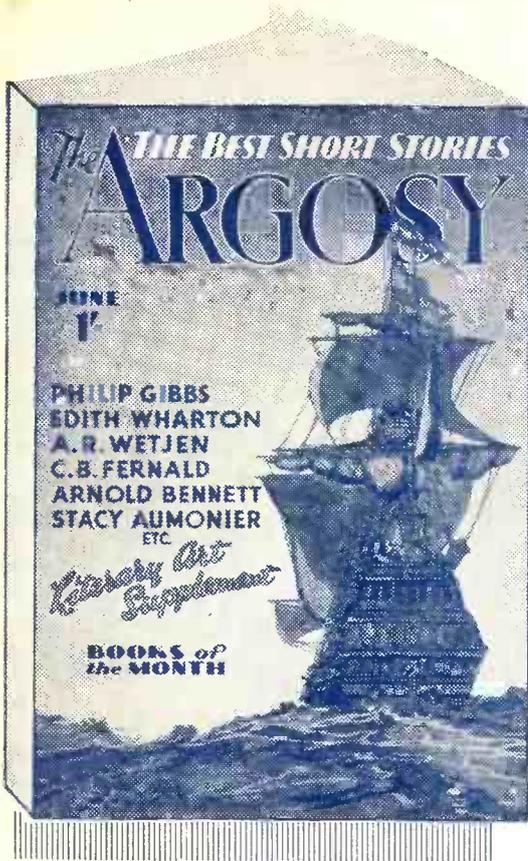
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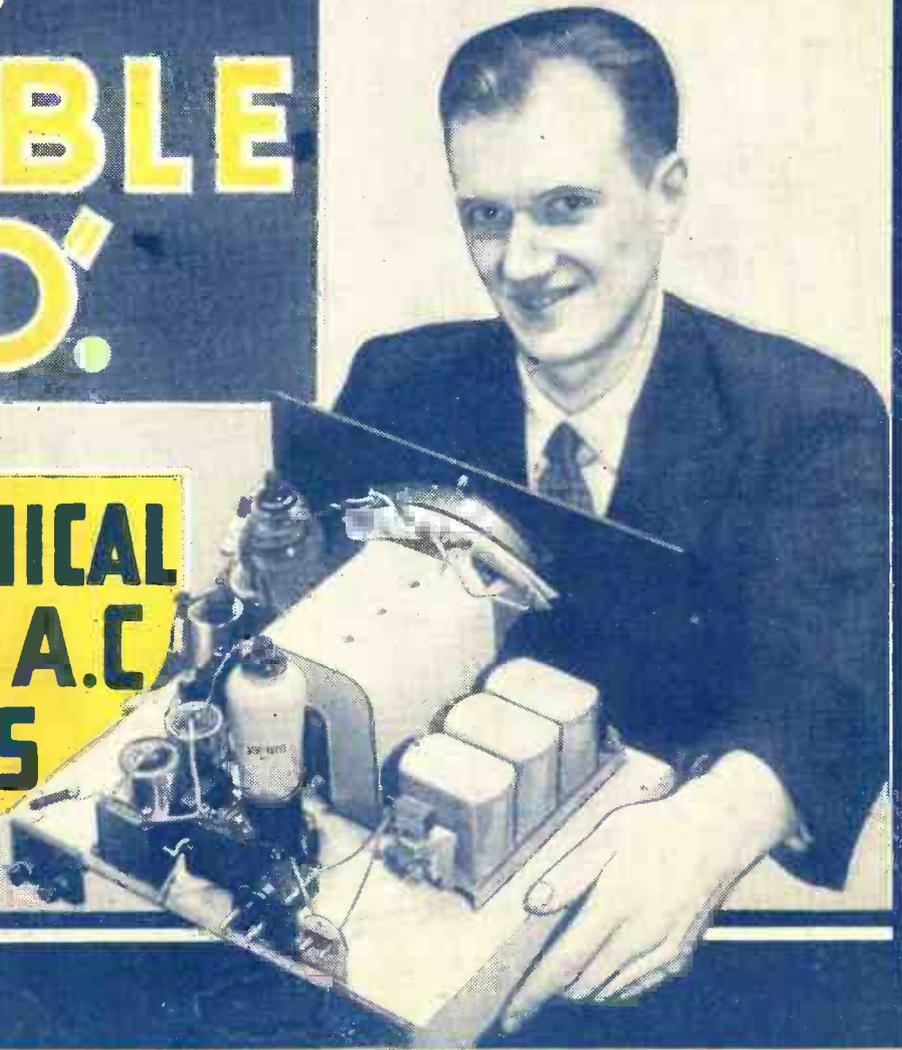
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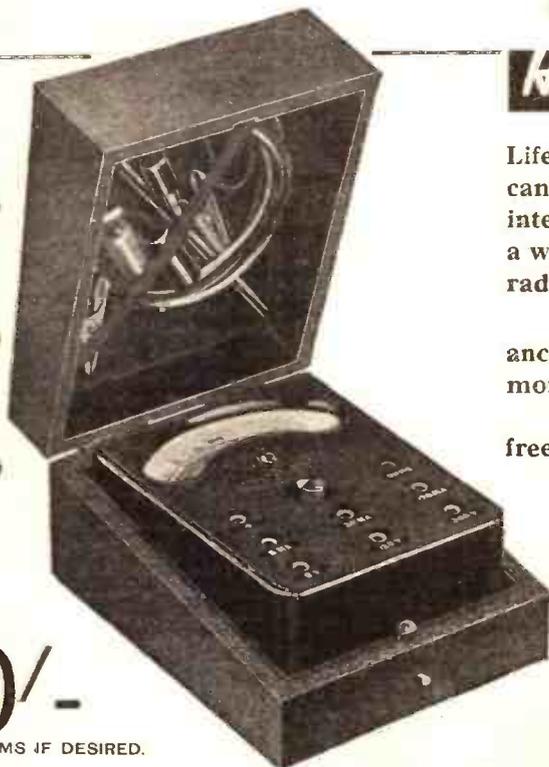
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# POPULAR WIRELESS

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

Scientific Adviser: SIR OLIVER LODGE, F.R.S.  
 Technical Editor: G. V. DOWDING, Associate I.E.E.  
 Assistant Editor: P. ROBERT BIRD.

Managing Editor:  
 N. F. EDWARDS.

Chief Radio Consultant: P. P. ECKERSLEY  
 Assistant Editor: A. JOHNSON-RANDALL.  
 Chief of Research: K. D. ROGERS.

**"SOUND AND NOISE"  
 THOSE FRACTIONS  
 A FARADAY FIND  
 HUMMING WIRES**

Radiolympia, 1934.

PLANS for this year's Radiolympian triumph are going forward steadily, and there can be no doubt that it is going to be more attractive than ever.

So popular were last year's performances in the theatre that the seating is to be enlarged to take 2,500 people. The lighting arrangements, decorative and illuminative, will be an orgy of ingenuity, art and watts.

And—bless me soul!—the colour scheme! Ultramarine, black, silver and orange. The chameleon's nightmare! Nevertheless, an effective combination for show purposes.

**An Opportunity for Londoners.**

WE have to thank the British Radio Institution for a cordial invitation to "P.W." readers to attend, free of charge, a lecture on "Sound and Noise" which Professor A. M. Low, D.Sc., is to deliver at King's College, Strand, W.C.2, at 7 p.m. on May 24th, before its members and members of the International Faculty of Sciences.

If invitation cards are preferred they may be got from the Secretary of the Association, 36, Gordon Square, W.C.1.

Anything which Dr. Low says is bound to be vital, provocative of thought and exceedingly interesting.

**"Ole Man Railroad."**

THE modern version of the "Showboat" must be the H.M.V. Show Train which is now puffing through some of the 3,000 miles which it is to cover during its three months' tour of this country.

This train has been equipped as a show-demonstration room for radio, gramophone and allied products, and is a miracle of contrivance and beauty.

The best of luck to it—though I am not sure it is wholly deserved! Why? Well, they picked on a nice little *Scottish* girl to christen the train by breaking a valve full of champagne over it. Will she ever live it down?

**I Suppose I Must Explain.**

IN telling you about the wonders of wireless wires a few weeks ago I referred to a diameter of "two one-thousandths of an inch" and to a thickness

## RADIO NOTES & NEWS

**ICELAND'S RADIO  
 A GOOD IDEA  
 REDIFFUSION  
 MORE HOWLERS**

of "two ten-thousandths of an inch," but my very friendly C. S. P. (of Shortlands) points out that I could cancel those fractions down to one "five-hundredth" and "one five-thousandth" respectively.

Verily he speaketh sooth; but what journalist worth his ink would go out of his way to knock the sensation out of his figures by a schoolboyish adherence to the refinements of arithmetical practice?

Then C. S. P. seems to object to my distinction between "radio" and "scientific work." I regard radio as an art.

**Radio Interference.**

THE I.E.E.'s Committee on Radio Interference (from which we hope so much) state that they find it desirable to establish practical methods and instruments for appraising the interference and the apparatus causing it.

Hence it has been found essential to agree to some standard point of reference

which will represent substantial immunity for a well-designed set, and, on the other hand, is demonstrated as being of practical application to electrical appliances which emit interference and to radio sets which are subject to such interference.

This is so thrilling that I will continue.

**Slow but Sure.**

THE Committee are studying methods and devices which are within the power of the listener to apply, and their effectiveness for ameliorating the effects of interference, and methods and devices for suppressing the emission of interference from electrical apparatus.

Any suggestions based on the assumption that there remain no technical problems must, the Committee fear, be regarded for the moment as premature.

Wouldn't it have been quicker to ask the Germans how they have eliminated such a lot of interference already? However, no doubt when we do begin we shall make a good job of it.

**A Scarce Book.**

R. E. (London, N.1) writes to say that he has recently bought an 1845 copy of Faraday's "Researches in Electricity" (three vols.), and that the price is fifty shillings. I am not sure whether his letter is merely the proud gloating of a bibliophile or an offer to sell me the books. The idea of Ariel being willing to pay the equivalent of a month's pocket-money for something which he cannot eat ought to be worked up into a comedy by the B.B.C. However, whatever be the truth, I am grateful to R. E. for writing.

**Telegraph-Wire Hum.**

STILL the battle of theories rages! The warrior who now flings himself into the hurly-burly is H. G. W. T. (Chiswick), a musician, and, as is natural, he tries to explain the mysterious hum from his knowledge of musical instruments. Arguing from the fact that a tap on the sounding box of a violin will cause the strings to hum, he declares that the telegraph wires act as the strings, the poles as the "bridges" and the earth as the

(Continued on next page.)

**WHAT SHALL WE HAVE NEXT?**



This young lady is extremely proud of her new Marconiphone Model 286 radiogram.

# HALF THE DUTCH LISTENERS USE NO AERIALS

sounding box. Well worth our consideration indeed, and I am glad to have found an anti-wind theorist at last. Well, gentlemen, any comments, please?

### This is Too Awful!

THIS bit of news from Toronto will be a wounding blow to those of you who, like myself, have enjoyed cinema pictures and stories of those hefty fellows, the Royal Mounties of Canada.



They are to engage in a house-to-house hunt for radio "pirates"—thus has their glory been dulled and their glamour snuffed out by Radio Inspector Samuel Ellis, a good man and able public servant.

Well, times change! For the Arctic wastes and the final struggle before they "get their man," these strong, silent cops now substitute the side streets and "Is your mother in, little man?"

This would have hastened Stevenson's end!

### More "Depressions" Coming.

ICELAND'S broadcasting station, though medium-powered, has been well reported from places as distant as North Africa and America, and this has evidently encouraged the authorities there to make Iceland heard everywhere. Marconi's have been ordered to construct for them a single installation which will operate (a) overseas telephony, (b) telegraphic meteorological services to seven countries and (c) short-wave broadcasting. It is expected that (c) will be heard in all parts of Europe and America.

### Those Studio Audiences.

AMERICAN radio comedians are still arguing about the pros and cons of studio audiences, and still failing to reach a unanimous conclusion. Groucho Marx said that one reason why he objects

## ON THE AIR NEXT WEEK—1

JOHN RORKE [London Regional, Tuesday, May 22]

First appeared before the microphone in 1924 and has forgotten how many times he has been in the studio since. Started taking part in television programmes in 1929 and last year was held up at 12.30 midnight by detectives who suspected the suitcase of costumes and music he was carrying. Born in Sloane Square, London, of a family who had been connected with the stage for two hundred years. Has tried every form of entertainment except opera and "talkies."

to audiences is that he has to provide tickets for his relatives. "It's bad enough to have relatives without seeing them in front of you every night." Jimmy Durante, also an anti-audience man, argued that when a radio comedian has an audience he "does things," which things the audience laugh at and the radio listeners miss. I am not in favour of audiences; are you?

### Another Library Note.

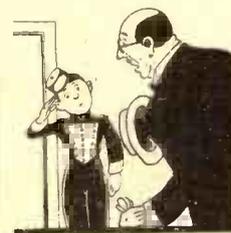
PRICE one shilling. Published by H.M. Stationery Office. "Valve Oscillators of Stable Frequency: A Critical Survey

of Present Knowledge." Produced by the Dept. of Scientific and Industrial Research. (Radio Research Special Report, No. 13.)

The first part amounts to a practical textbook, and includes discussions of the Dow method of "electron coupling" and a method of applying the principle of the governor, as used in engines, to wireless transmitters. A handy little booklet for the club shelf.

### It's the Same Over There.

THE visit of Sir John Reith to the New York "Radio City" is already bearing fruit—in New York. A prominent broadcaster who was paying his first visit to Radio City was unable to find the studio he wanted, and, knowing that he dared not ask his way point-blank of any passing official, asked a page boy to direct him to the Information Desk.



Very politely the boy saluted and replied: "Sorry, sir. It's against the rules to answer questions. You'll have to ask the Information Desk!"

### A Good Idea.

I HAVE been glancing through a bright little magazine which is the official organ of E A Q, the short-wave station (30-43 metres) of "Transradio Española," in Madrid. It includes "talks," humorous articles, photographs and technical matter, and a course in Spanish written in English.

This language business is still the barrier between many radio friends, and I congratulate E A Q in recognising this in such a practical manner. It's to be hoped that other radio papers will follow E A Q's lead.

### The Strange Effect of "P.W."

SINCE I published that paragraph about accumulator acid, gold, platinum, etc., I have experienced an unusual nervousness amongst the local radio shops in the matter of accumulator acid.

I tried the blighters out on purpose. One chap asked me why I wanted acid when it was supplied with the battery. I said, For analysis. Whereat he went purplish and declined the order. I suspect that he wants to keep all the gold himself, supplying only H<sub>2</sub>SO<sub>4</sub> to his dupes.

Well, I demand H<sub>2</sub>SO<sub>4</sub> containing gold and platinum—or I'll show up the whole racket.

### Radio Rediffusion.

I HAVE been reading a proof of P. P. Eckersley's paper on "audio-frequency wire broadcasting," and now see more clearly than ever that this form of listening is likely to become more and more widely

adopted amongst certain sections of the public and in certain places. In Holland fifty per cent of the people have their radio laid on to the house by a wire connection.

### Unconscious Humour.

HERE is one of those little "finds" which bring a ray of ultra-violet into my squalid den. An article about the broadcast from Byrd's Expedition, which was the outstanding item of April, after pointing out that it included the

## ON THE AIR NEXT WEEK—2

LANCE SIEVEKING [National, Friday, May 25]

Author and producer of the new radio play "Wings of the Morning." Known in reference books as Major Lancelot de Giberne Sieveking, D.S.C. Joined the army in 1914, commissioned in the navy in 1915, before being transferred to the R.N.A.S. Joined the B.B.C. in 1926 and has written and produced well over fifty original programmes. Counterbalances his inclination towards "highbrowism" by bringing a barrel-organ into the studio for many of his productions. Is not yet forty.

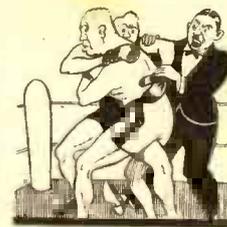
singing of "The British Grenadiers" and our National Anthem, added: "No reference to Grape-Nuts was included. . . . Isn't that delicious?"

Now that you have enjoyed the fun, I must in fairness say that the remarkable broadcast in question was "sponsored" by the American Grape-Nuts Company, and its relay to this country arranged by their English house with the B.B.C.'s help.

### Welcome "Howlers."

LET us turn to the bright side of school life and savour a few welcome "howlers" (1933 vintage).

"An accumulator is a battery which relies for its power on the generating station. The longer it stays there the more ampere hours you get."



"Close coupling is what the referee stops in fights, and is the same in radio, but less of it weakens the signals."

"That wireless is in its infancy is proved because if Queen Elizabeth had it she would have stopped Admiral Drake from burning King fillips wiskers but she never."

### Beromunster Changes.

THE power of Beromunster is to be increased from 60 to 100 kws., and several other alterations will at the same time be effected, chief amongst them being the incorporation of the "floating-carrier" system which automatically controls the carrier-wave.

The power increase will be carried out by replacing the present power amplifier by a new stage containing two of the largest water-cooled valves of their type (Marconi CAT.14) in existence.

These changes will probably be made in the autumn, and the station will be closed down then for about three weeks or thereabouts. **ARIEL.**

# TELEVISION from FILMS

by G.P. Kendall, B.Sc.

Apart from reproducing actual happenings at the time they occur, television has great possibilities as a means of bringing "talkies" into the home. And here our popular contributor reviews some of the problems and progress in this interesting field.

ONE of the rosiest dreams of the television experimenter has always been the distribution by radio of "talkies." It is a dream which may be a good deal harder to realise than many of the enthusiasts perhaps understand for purely commercial reasons, but there is no denying that the technical side of the problem is of fascinating interest.

Fundamentally, there is no radical difference between this and the normal problem of "sight-and-sound" broadcasting of the kind with which we are now becoming familiar, but in matters of detail there are special modifications involved which introduce great difficulties.

### A Recent Demonstration.

I propose this week to give some general account of certain of the methods employed, and in the course of this survey we shall discover the nature of the difficulties, which in themselves represent one of the most interesting aspects of the question from the experimenter's point of view.

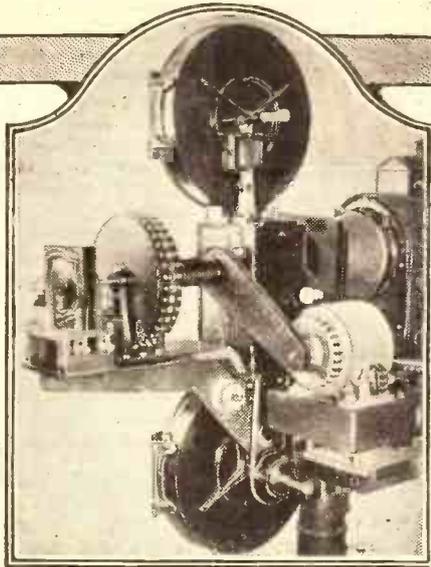
Before I begin upon technical matters, however, I think perhaps it may be helpful to give the reader some idea of the actual results which can be obtained in film transmission by existing methods. Personally, I always like to know just what basis of practical achievement exists in any subject of this type before I start to study it, and I imagine this liking will be shared by "P.W." readers, who are likewise practical people.

It happened that I recently saw a demonstration of film transmission on the high-definition system now being worked from the Crystal Palace, and since this probably represents the present high-water mark of achievement it will serve to give an indication of the results which can be hoped for at this time.

### Easy Comparison.

By good luck the test consisted of some sequences from a film which I had seen in a good modern picture theatre only a short time before, and so I had the chance to make a real comparison.

This sketch explains various parts used in the transmitter of the "His Master's Voice" Five-Channel television system, which is illustrated pictorially in our heading photograph. The lens-drum system of scanning employed is of special interest.



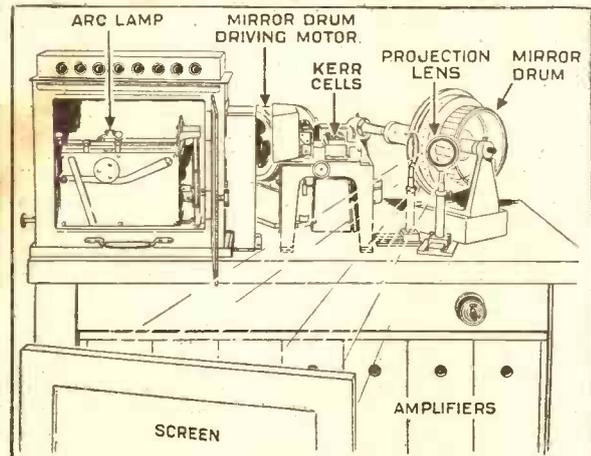
I came to the definite conclusion that while the results were at all times perceptibly inferior to those obtained under theatre-projection conditions, even on a screen of similar limited size, nevertheless they had real entertainment value.

### Certainly Worth Watching.

Flicker was almost completely absent, and definition was good enough to demonstrate that the film in question was notable for brilliant photography. There was no difficulty in following every detail of the action, and facial expressions were sufficiently clear.

The main failing, it seemed to me, was that the clear pearly greys which represent skin tints in cinematography were often somewhat muddy, a defect which proved rather irritating in close-ups. High lights generally were affected in a similar fashion.

This is the receiving layout used in a Five-Channel television system developed by "His Master's Voice." It will be noted that the general principle is of a type already described by Mr. Kendall in this series of articles.



Sound, of course, was good, and appeared to be fully up to the usual picture-theatre standard. The net result was something which would certainly be worth watching under home conditions if the subject matter were of real interest.

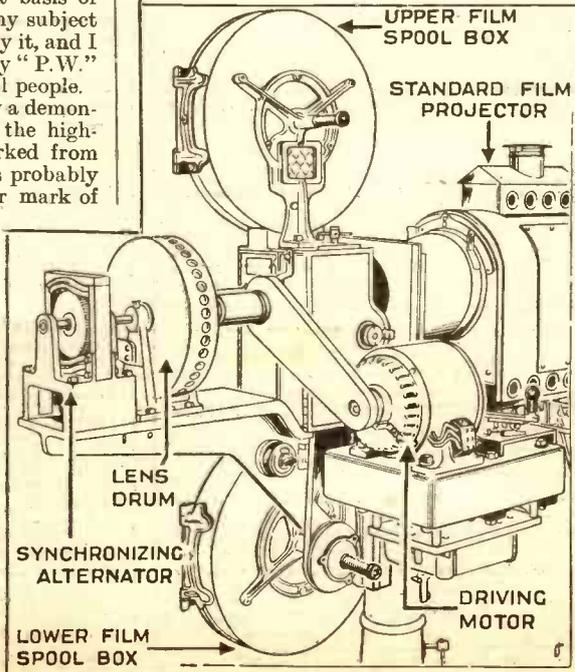
Now let us see how it is done. The basic difference, of course, between the television of a film and an actual scene is that in the case of the scene we have to deal with large dimensions, so that the usual scanning disc or "flying-spot" methods are relatively easy to apply, whereas with the film we have to work with a succession of tiny pictures whose size introduces a very awkward problem.

### Very Close Scanning.

In the present sound film each individual picture is only about .7 of an inch high and .83 wide, and it may be imagined that to scan such a tiny area with the necessary perfect accuracy is no easy task.

When it is remembered that the picture which I saw was scanned in no less than 180 lines the extreme delicacy of the operation will be realised. This actually means that each equivalent scanning line can be only .0046 of an inch wide! Of course, the actual size of the scanning spot or its equivalent may not be so small as this, but some sort of optical dodgery must be resorted to in order to produce the effect of such a fineness of line in the picture.

(Continued on page 266.)



**ERIC MASCHWITZ** has just returned from Lancashire. He has come back to Broadcasting House discouraged. One hundred and twenty aspiring radio stars came along to his auditions, and of these only two were suitable. "There is really no talent in the country today," he sighs.

But from other quarters come signs that this opinion of the Director of Variety is not endorsed.

A recent article in the "Era" is headed "The B.B.C. Want the Best Turns—We Have Them!" The writer takes the only common-sense view about the position of radio and the music-hall. "My advice to vaudeville managements, therefore, is that they should not oppose their artistes working for the B.B.C., but should be happy to be able to have the greatest advertising medium at their disposal for the purpose of making their artistes famous."

#### Well-Known Names.

Clapham and Dwyer, Flotsam and Jetsam, John Tilley—all these names will be found near the top of any list of purely radio stars. And yet in each case microphone fame came to these men only after they had started to make names for themselves on the music-hall.

It may be a good idea for the B.B.C. to



Howard Jacobs, with his Café Anglais band, proves the immense popularity of dance orchestras.

## "THERE'S NO TALENT," COMPLAINS ERIC MASCHWITZ, B.B.C. DIRECTOR OF LIGHT ENTERTAINMENT.

brief period of training for the microphone before they attempt to entertain.

#### The B.B.C. "Discoveries."

From time to time the B.B.C. has announced loudly and hopefully that it intends to make its own "stars." From time to time various young ladies have appeared in special programmes, have been given leading parts in one or two shows, and have then been allowed to disappear into a merciful oblivion. Can you think of one radio artiste who has been "discovered" by a B.B.C. department as an "unknown" and who has achieved any real measure of success?

It is not easy to make a radio "star." Nevertheless, we see that at least two new training schools for embryo microphone artistes have recently sprung up. One has secured Mrs. Borrett as director of studies.

Whether they will succeed where Eric Maschwitz has failed remains to be seen.

give auditions to more or less talented amateurs. It certainly discounts the suggestion that new names are not being sought. But real talent is more likely to come from the suburban and provincial music-hall stages; because here artistes have served a hard apprenticeship and are not taken from factory and farm, from mill and office, to undergo a

## THE SUMMER SEASON

### ADVANCE NEWS OF THE REGIONAL PLANS FOR LIGHTER PROGRAMMES

WITH the obvious advantages of Mr. Willett's great idea of putting forward the clock between April and September, the listening habits of the people are necessarily quite different in the summer from what they are in the winter.

They still want their radio entertainment, but under circumstances which permit of little acceptance of anything that can be termed serious, heavy or highbrow. The ability to concentrate disappears with the passing of our habits to imitate the Eskimo cooped up in his igloo. Brighter weather makes us brighter people, and brighter people want brighter programmes, more commensurate with the inconsequentialities of life as we live it during the summer.

Unfortunately, the Regional officials of the B.B.C. seem to be more conversant with this state of affairs than are their opposite numbers on the programme-building staff at Broadcasting House. On the other hand, it is quite likely that the London officials hold to the opinion that the various Regions are better able to fix up summer broadcasts from their own health resorts and that it is easier to include a representative selection of these in the National and London Regional programmes.

#### The Boom of the Sea.

The North is always good with holiday entertainment, and Blackpool is an excellent stand-by to open the season in Whit-week.

Accordingly, on Friday, May 25th, listeners will enjoy a special Blackpool Night Entertainment. With the noise of the sea as a background, they will be able to pay a visit to the pleasure beach, hear a variety show at the Palace Theatre, dance music by Will Hurst's band from the Palace Ballroom, shows by the Arcadian Follies from the South Pier and Tom Vernon's Royal Follies from the Central Pier, and last, but not least, laugh with the crowds at the clowns performing at the Tower Circus.

For some years summer broadcasts from Manxland have been a delightful feature of North Regional programmes, and at this early stage we need do no more than give a brief outline of the arrangements made up to the end of July. Here they are: June 1st—Running commentary on the Mannin Moor race for high-power cars; June 11th—Eye-witness account of the Junior T.T. race; June 13th—Ditto on the Light-weight T.T. race; June 15th—Ditto on the Senior T.T. race; July 5th—The Tynwald Ceremony (pronulgation of the Manx laws) relayed from Tynwald Hill.

In addition there will be numerous relays of orchestral concerts and concert-party entertainments from other resorts—New Brighton, St. Annes-on-Sea, Morecambe, Bridlington, Scarborough and Whitby, to mention but a few. All will help to contribute just the sort of broadcast fare that listeners enjoy from their loudspeakers in the garden, on the river, by the seashore and in country places, and even more so from their car radio sets while actually travelling.

The Midland Region promises to do better than ever before with summer "O.B.'s." Cheltenham, Leamington and Droitwich Spas will each contribute their quotas of light, cheery entertainments, and quite a bunch can also be anticipated from bracing Skegness—a welcome addition to the list.

#### Up Over the Border.

Devonshire and Cornwall are coming more into the scheme of things than ever before in West Regional summer arrangements. Quite apart from music and concert parties, Cornwall in particular has many quaint and historic customs which will make excellent material for broadcasts. Several of these are being roped in for the enjoyment of listeners. Barry Island and other playground spots of Wales, as well as more dignified Bath, will not be forgotten.

Away up over the Border the hard-headed Scot also has his leisure moments and his health resorts, because not all Scots are attracted by the romantic scenery of the Highlands and the Isles.

Aberdeen is a favourite spot, and most holiday-makers to the Granite City go to the Beach Pavilion, where Harry Gordon and his company of entertainers are a great attraction.

Five relays have been arranged from the Beach Pavilion this summer, and the first is to take place early in June. There will also be a number of relays from the Barnfields Pavilion, Largs, and from the Pavilion, Portobello. The Winter Gardens, Rothesay, is also on the list of outside broadcasts, and these places will alternate with broadcasts of variety, some of which will come from well-known theatres in Glasgow, Edinburgh and Perth.

Northern Ireland has many interesting outside broadcasts during June, July, August and September, and in addition to the regular relays from Portrush and other places, the usual sporting commentaries will be given.

In this latter connection there is a possibility of a description of a special hundred-mile road race on a new circuit in Ulster. This takes place in June.

O. H. M.

## From All Sides

—notes about broadcasting and other radio topics.

#### LASSIES FRA' T' NORTH.

Lancashire produced Gracie Fields. And so Eric Maschwitz has recently held a three-day audition at the North Regional Headquarters to find new talent for the B.B.C.

As a result, the Director of Variety may give a contract to an unknown Sheffield mill-girl.

#### A STERN CRITIC.

Probably the severest critic of the B.B.C. is the Tottenham man who was fined for working a radio receiver without a licence.

"The only time I ever listen-in is when the time signal is being broadcast," he said.

#### NOT THE RECEIVER.

A good deal of copy was made by the newspapers recently out of the case of the baby who was electrocuted by a mains plug.

"Baby Killed by Wireless Plug!" "Child Electrocuted by Wireless Set!" were the lines on which the headlines ran.

Actually, of course, the wireless set had nothing whatever to do with it. The child was killed by a "live" mains plug which was not connected to any apparatus. The disaster might just as logically have been blamed upon an electric iron or an electric fire. But wireless is SUCH good copy!

#### A RADIO SCHOOL.

The Snainton (Yorkshire) village school bell-ringers are featured in the North Regional programmes.

This school has been "radio-minded" since the early wireless days owing to the enthusiasm of Mr. Frain, the schoolmaster. I remember listening to a radio programme in this school in 1926; and concerts were regularly used in those days as part of the school curriculum.

#### AMBROSE'S REPRIEVE.

The statement that Henry Hall was to succeed Ambrose in the Saturday night dance-music programmes was a little premature.

Actually Henry and Ambrose are to take alternate Saturdays so that listeners shall not become weary of too many "guest nights."

#### OH, WOMAN!

Women, who were chiefly instrumental, through their criticisms, in securing the termination of Mrs. Borrett's experimental contract as announcer, are now demanding, through one of their organisations, more women announcers.

"We get so bored by men's voices," they say.

#### WELCOME, THIEVES!

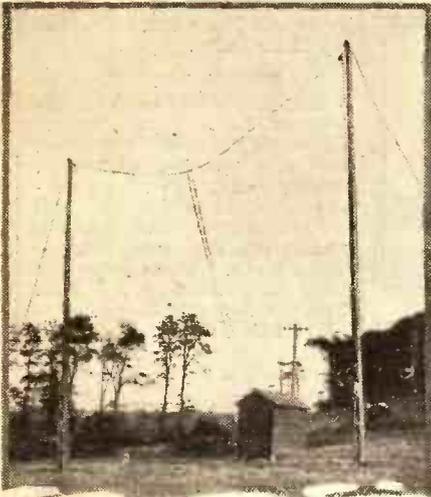
A firm of radio dealers in South West London has prepared a warm welcome for any thieves who attempt another robbery on their premises.

"Do not tamper with windows or locks," reads a notice in the window. "Fitted burglar alarm—6,000 volts." What a shock!

#### WIRED WIRELESS.

The important clause which, if added to the Electricity (Supply) Bill, would allow radio programmes to be supplied to subscribers via the mains was defeated in Committee only a day after P. P. Eckersley, "P.W.'s" Chief Radio Consultant, had read a paper on that very subject to the Institution of Electrical Engineers.

R. B.



# Phoning on Five Metres

## DETAILS OF A REGULAR COMMERCIAL SERVICE

**T**HE radio-section engineers of the Post Office have been carrying out secret tests with an ultra-short-wave transmitter capable of working between 3 and 10 metres.

They had in mind the possibility of using such a short-wave link in the event of phone wires being blown down; but the experiment was so successful that the traffic branch of the Post Office asked the short-wave engineers to fit up an ultra-short-wave outfit carrying phone messages across from Cardiff to Weston-super-Mare.

### Two Little Wooden Huts.

The Post Office ultra-short-waver generally works between 5 and 7.5 metres, and is connected up with the ordinary inland telephone network.

On the Weston-super-Mare side of the circuit the transmitter is at Hutton, which is about three miles from the Weston exchange. On the Cardiff side the equipment is at Lavernock, about five miles from the Cardiff exchange. The telephone wires are carried on ordinary poles (which also support the 240-volts A.C. power-supply cables for the transmitter) and four 50-ft. poles, and two little wooden huts are the only signs of the presence of a radio outfit.

The transmitter and the receiver huts are of the ordinary wooden construction, as used to house the batteries in the terminal point of a Post Office phone system. They are spaced about 100 yards apart to minimise cross-talk, and each transmitter and receiver has its own pair of masts carrying the 5-metre aerial.

### Output Valves in Push-Pull.

The transmitter works from the 240-volts A.C. mains supply, and V.T.24 type valves are used both for oscillating and modulating. The 5-metre oscillator is carried at the top of a metal framework; the mains-rectifying equipment is in the centre and the speech amplifier below.

The oscillator is arranged with the output valves in push-pull, and there are two terminal connectors close to the valve sockets, to which the feeder lines to the short aerial are connected.

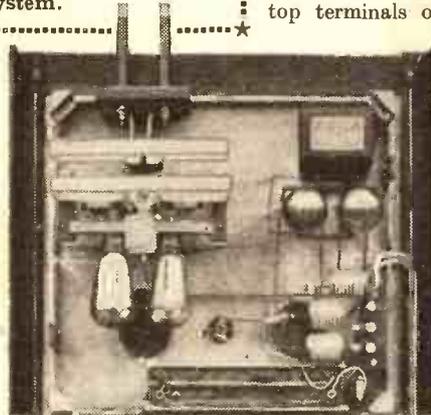
The superhet part of the circuit for reception is carried at the top of the

receiver rack, while at the bottom is a special 3,000-cycle low-pass filter.

The aerials used at both ends consist of about 8-ft. of copper rod. The actual length is chosen according to the wavelength in use. The rod is slung up horizontally on cables between the two poles, and the usual parallel type of feeder wires

(braced to prevent the spacing varying in rough weather) are carried from the top terminals on

The ultra-short waves have passed out of the realm of experiment and are now used for communication between a number of places. Here are details of a short-wave transmitter used by the G.P.O. on the ordinary telephone system.



racks to the suspended copper rods.

It would be possible to fit up a beam reflector, but the engineers found that, as the total transmission distance between the stations is only 15 miles, there was no need to concentrate the beam with a reflector. As a matter of fact, the transmission is quite secret, although the beam is not concentrated.

The short-wave aerials are highly directional, the maximum radiation being at right angles to the length of the copper rods. The speech, moreover, can be "scrambled" (as is done with the transatlantic telephony) so that eavesdroppers cannot pick up anything worth while.

### No Need to Tinker.

The superhet stages and the transmitter oscillator controls are provided with vernier dials, and an accurate log is kept of the adjustment needed. The engineers have found, once the transmitters and receivers have been properly tuned, that there is no need to tinker with the 5-metre gear.

Actually the transmitter at Hutton and the corresponding receiver at Lavernock

have been in operation for just over 900 hours without needing any adjustment or attention.

The transmitter is extremely simple so far as controls are concerned. Two of the push-pull valves are arranged on their sides and two others upside down, again in order to get short leads from the valve sockets to the tuning circuits and feeder leads.

### Only One Tuning Control.

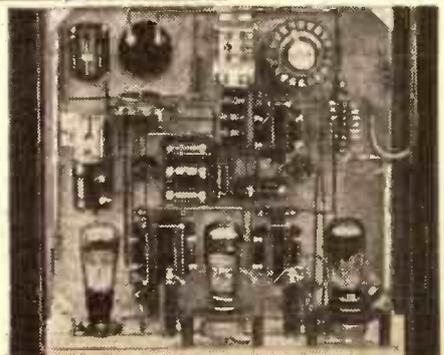
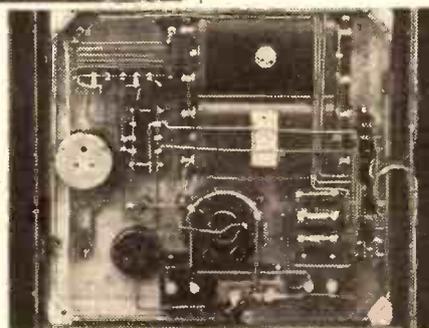
The mains-rectifying apparatus is fitted with special smoothing for 5-metre operation, but otherwise looks like any good-quality high-tension unit. The speech amplifier below has all the valves (three stages) mounted in the normal position.

A potentiometer with stud contacts is controlled from the front of the panel, while there is a volume-indicator meter in one anode circuit. There is only one tuning control on the front of the transmitter panel.

For many months telephone subscribers have made use of the Cardiff-Weston-super-Mare radio link without realising that the ordinary landline circuit is not still in regular use.

For communication across such stretches of water as this, wavelengths in the neighbourhood of five metres have been proved ideal. One hundred per cent reliability may be achieved on these waves

when the distances are short and no obstacles intervene, and the power required is remarkably small compared with what would be needed on longer wavelengths. So it is quite likely that five metres will be used extensively in the future for similar purposes.



The transmitter is constructed in three sections, mounted above one another in a tall cabinet. The top photo shows the oscillator, the middle one the power pack, while below is the modulator.

OUR SPECIAL PAGE FOR BEGINNERS.

## REMOTE CONTROL AND S.G. VALVES

ARE AMONG THE USEFUL RADIO ITEMS  
LUCIDLY EXPLAINED THIS WEEK

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

### REMOTE CONTROL.

The simplest form of remote control is the operation at a distance of an on-off switch of a radio set. This is sometimes very convenient, especially when a loudspeaker is being used in a different room from the one in which the set is installed.

Various relays enabling on-off remote control easily to be arranged are on the market. More complicated are those remote controls with which the set can actually be tuned as well from any distant point in the house.

It seems to us strange that the simpler compromise which we advanced some few years ago has not proved popular. This was that the remote control of tuning should be limited to a change-over from one station to another and back again to the first one as desired.

Most listeners confine the major part of their listening to the alternative programmes provided by the B.B.C. And it would seem to us invaluable (and all that the majority need) to have a remote control for switching the set on and off and for changing from the one B.B.C. programme to the other.

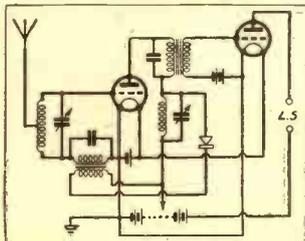
The on-off switching demands only a simple relay action. The station change-over could be effected by a straightforward switch-over of predetermined tuning capacities.

### REFLEX CIRCUIT.

This type of arrangement once enjoyed considerable popularity, and while it is not entirely outside the bounds of possibility that it will be subject to revival, this does not at present seem very likely.

Reflexing, or dual amplification, as it was sometimes called,

### DUAL AMPLIFICATION



This diagram shows the two valves and crystal detector of a typical reflex circuit. The first valve works both as an H.F. and as an L.F. amplifier.

is the use of a valve both as an H.F. and an L.F. amplifier simultaneously. A typical reflex had two valves and a crystal detector.

After the first valve had amplified the incoming energy at high frequency it was passed on to the crystal detector for detection. From the output of the crystal-detecting circuit the energy was then fed back by means of an L.F. transformer to the first valve for amplification, this time at low frequency. The second valve operated merely as an additional L.F. amplifier.

### RELUCTANCE.

The magnetic equivalent to resistance. It is, in fact, the resistance to the passage of magnetic flux by a substance on the application of a magnetising force.

It is the opposite to permeability, which is a measure of the magnetic conductivity of a substance. Therefore any substance, such as nickel-iron, which has a high permeability has low reluctance.

### RESISTANCE.

The practical unit is the ohm. Resistance is the opposition offered by a substance or circuit to electrical current. It can be compared to friction. It is easy and requires little force to push an object along a smooth, oiled surface. But if the surface is not smooth more force is needed, and power is wasted in heat because of the friction.

Where there is resistance in an electrical circuit, so there will be power wasted in heat.

The resistance of a thin wire of, say, copper will be greater than that of a thick copper wire. Also the longer a wire of a certain metal and gauge the greater its resistance.

### RESONANCE.

This is a condition which exists when the capacity and inductance in a circuit give that circuit a natural frequency equal to the frequency of the applied energy. Resonance in a loudspeaker is a tendency for the diaphragm to vibrate more readily at certain frequencies.

### R.M.S. VALUE.

The effective value of an alternating current or voltage. Alternating current rises and falls between zero and a maximum. A proportion of the maximum equalling the amount of direct current necessary to produce the same heating effect is taken as the effective or virtual value.

This works out at  $\sqrt{2}$  times the maximum.

### SCANNING.

A television process. By means of a scanning disc (a metal disc containing spiral holes), or in one or other of the various other methods which have been developed, the picture to be televised is taken point by point in a series of strips and the lightness or darkness of the sequence of points translated into electrical impulses.

### SCREENED-GRID VALVES.

When a three-electrode valve is used as an H.F. amplifier the capacity existing between the anode and the grid causes a coupling between the anode and the grid circuits. Through this coupling link H.F. energy is fed back, and the undesired reaction that results causes instability if any attempt is made to achieve useful amplification.

The first method introduced to overcome this was known as "neutralising." Later the screened-grid valve was developed. The "S.G." valve has an additional grid placed between the control grid and the anode. This extra grid is taken direct to the H.T. battery, and is, therefore, virtually at earth potential.

By thus negating the anode-grid capacity a high performance plus stability is possible.

In addition, the screened grid, which is given a positive H.T. voltage, reduces the space charge—the cloud of electrons that collects between the filament and the anode, and which tends to limit the anode-current flow—and thus the efficiency of the valve as an amplifier is considerably improved.

The anode of an S.G. valve

is connected to a terminal at the top of the valve.

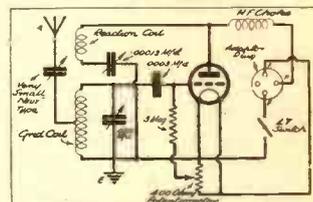
### SHORT WAVES.

The official definition is "waves between 10 and 50 metres." Presumably, lower waves than that are "ultra-short," and, indeed, that is the term generally employed to describe them.

Short-wave communication is carried out exclusively on the indirect ray. These leave the earth and are reflected back from the Appleton Layer.

Great distances can be covered using low powers, but considerable fading is experienced owing

### S.W. ADAPTOR



A detector stage with suitable short-wave coils that can be plugged into the detector valve holder of an existing set. The set then becomes a complete short-wave receiver.

to variations in the reflecting layer.

Nevertheless, the results are sufficiently good for the short waves to attract a considerable following, and it must be added that the Empire short-wave service operated by the B.B.C. has achieved no little success.

Short-wave apparatus differs little in fundamentals from that used for normal wavebands; but, owing to the extremely high frequencies of the currents employed, care has to be exercised to prevent undue losses occurring. Efficient components, carefully planned layout and short wiring are essential.

Reaction plays an all-important part in such an instrument, and it needs to be smooth and under perfect control. Tuning adjustments are necessarily rather critical, and some skill and patience are required to resolve a programme from the first squeal that heralds its presence.

Any ordinary radio receiver can be made suitable for the reception of short-wave programmes by means of a short-wave adaptor. This comprises a complete short-wave tuning circuit and detector valve with reaction. (Alternatively, there are superheterodyne types of adaptors in which two or more valves may be used.)

The detector valve of the normal set is removed from its holder, and in its place a plug joined to the short-wave adaptor is inserted. In most cases the same valve can be used as detector in the adaptor.

The H.F. section of the set, if there is one, and its detector circuit are then out of action, and only its low-frequency amplifying stage or stages are used.

# Destroying Man-made Static

# The Best Aerial



The aerial-earth system is the way by which most extraneous noises reach a receiver. Steps which can be taken to keep them out are described in this article, which is the fourth of a special series on the subject of interference.

the tube and the wire as low as possible so that the signal currents are not lost en route. The outer tube is, of course, earthed.

There is one other aerial modification which may be found useful in very severe cases of interference. This is the loop aerial, and it is often found to be very effective when the interference is being picked up by direct radiation or shock excitation.

The sensitivity of such an arrangement is necessarily limited, but it is the only satisfactory aerial arrangement in cases where the horizontal portion of an ordinary aerial is picking up severe interference.

For reasons that will now be obvious an indoor aerial is definitely unsuitable under conditions of interference; but where it is impossible to use any other form of antenna an ordinary frame aerial or a loop aerial round one complete room wall may be found to be a satisfactory compromise.

### An Important Consideration.

And now let us turn to the earth. The general importance of a good earth connection has been rather forgotten since the all-mains receiver came into popular vogue, for these sets get quite a passable earth connection via the mains, and consequently the sensitivity is scarcely affected even when no direct earth is used at all.

But where interference is being experienced a first-class earth connection is often indispensable.

Water-pipes, gas-pipes and radiators are usually worse than hopeless, since they circulate well within the interference area, and unless they should happen to get to earth by a resistance-free path they will be acting as carriers of the interference.

The only completely "safe" earth is a connection taken to ground some yards away from the house by means of a heavy-gauge wire which joins the earth plate or tube by means of a faultless soldered connection.

It is a wise precaution to sink the earth tube some distance from the house, so as to avoid the possibility of the receiver being "grounded" close to the point where either

the water main rises or the gas-pipes are buried; such proximity may cause trouble in the form of induced interference energy.

The motto of every amateur who undertakes interference investigation must be "every little helps." It is very doubtful whether any one of the foregoing points will be found to be the cause of all the trouble, but attention to every detail will have a cumulative beneficial effect, and the grand total will be most encouraging.

BY far the major portion of interference energy finds its way either directly or indirectly into the receiver via the aerial or—to be more precise—its lead-in.

The reason for this is clear when we remember that the interference oscillations have set up an "infectious" area around all the house wiring, and since the down lead from the aerial is almost sure to come in close proximity with part of this wiring on its way to the receiver, it follows that interference currents will be induced in it.

The obvious moral is to keep the down lead as short and as direct as possible and to avoid any unnecessary length of wire indoors where the interference field will be strongest.

### An Easily Made Error.

To carry the lead-in around a picture rail is to invite trouble if there is interference about, and no amount of care and time expended on other portions of the installation will overcome the unfortunate results of this simple error.

A little consideration will show that, since the greatest amount of interference is picked up by the down lead or introduced into the receiver from indoor sources, the height and efficiency of the aerial itself can be increased without producing a proportional increase in interference pick-up.

To put this in another way, we may say that we can make our signals louder, by increasing the efficiency of the aerial—much faster than the strength of the interference will increase; we shall, in fact, obtain the desired increase of the signal interference ratio.

### Beware of It!

Therefore every advantage is to be obtained by improving your aerial. Make it higher, if possible, and avoid all unnecessary screening; make sure that the insulation at both ends is as good as possible.

If you have any joins in the wire between the remote end and the aerial terminal on the set, solder them up well or, better still, dispense with them altogether.

Of all things beware of the cheap and inefficient aerial earthing device or lightning arrester, and, if it is age-worn and

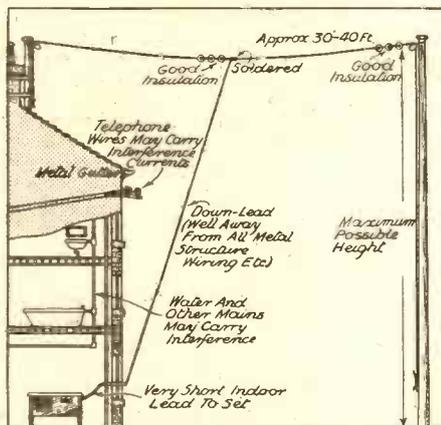
By  
**BERNARD BARNARD**

corroded, discard it rather than try to repair it.

All these points, little ones in themselves, will help you to increase your signal strength at the expense of the interference.

And now we come to the very important item—the aerial down lead. Since every metal structure in or around the house is liable to be carrying interference currents, it is of the utmost importance that the down lead be kept away from such conductors as telephone wires, metal gutters or electric wiring of any sort.

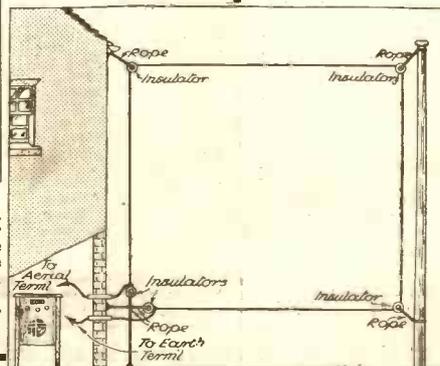
It must be kept as far from the walls of the house as is practicable, and, in most cases, it will be found possible to attain this by bringing the lead down diagonally



The arrangement of a large single-loop outdoor aerial on the lines of the one in the diagram to the right is often beneficial in reducing interference pick-up when this is particularly bad.

### HOW TO ERECT YOUR AERIAL

The more important points which require watching when fixing an aerial, are set out in the diagram to the left.



to the window at which it is to enter the house.

At this point it will be interesting to mention the very successful "screened down lead" which has comparatively recently been marketed.

The wire is, of course, an ordinary conductor which is supported inside a metallic tube; it is insulated from the tube and kept as far as possible from its surfaces by suitable supports throughout its length. This is done to keep the capacity between

THE refusal of the B.B.C. to broadcast a German Male Voice Choir (Sangerbund Rheydt), offered for a date towards the end of May, is believed to mark a new policy at Broadcasting House, where, in future, British artistes and musical combinations are to receive much more definite preference and priority than in the past.

It is high time that this step was taken.

Talks Plans.

The Adult Education talks for next autumn and winter will be the first series to be handled entirely by the staff of the B.B.C., the Advisory Council dissolving in July.

In economics there will be a series on "Poverty and Plenty: Some Possible Solutions." Education will have a series on "The Child, the Parent and the School," and in philosophy "The Christian Ethic in Modern Life" will be the chief subject.

"The Meaning of Modern Art" is a series that will be of a particularly challenging nature.

More B.B.C. Troubles.

Provost Murray of Dingwall is again in motion against the B.B.C. This time his complaint is that the B.B.C. is taking too long to build and complete the new North of Scotland transmitter. There are threats of a new mobilisation of angry Highlanders.

My own view is that the B.B.C., if open to criticism at all about its Highland policy, is guilty of devoting resources to a comparatively thinly populated part of the country which other parts might claim with greater conviction and justice.

So perhaps the less the Highlanders criticise the carrying out of the project the better for them.

Unrest in the West.

But the trouble in the West of England is much more real. There, Devon and Cornwall are now fully aroused and determined to be no longer regarded as satellites of Wales in the broadcasting firmament.

The B.B.C. will have to rig up some kind of transmitter to placate opinion in that part of the country.

Telling the World.

The B.B.C. has launched a big publicity campaign throughout the Empire and in foreign countries. This plan to "tell the world" has its origin in the necessity of doing something to justify the big expenditure on the short-wave Empire services.

"THE WITCHING HOUR"

The following official announcement will help considerably those readers who are finding it difficult to understand the new system of time-keeping sponsored by the B.B.C.:

"When a programme finishes at midnight the time will be announced as 24.00. When a programme begins at midnight it will be announced as 00.00."

This should please Professor Einstein!

I hear the publicity is being well handled and well supported with pictures and illustrations. Opinion in the Dominions and elsewhere abroad is being impressed, and as a result British prestige benefits in all directions.

The Parliamentary Inquiry.

From "inside" authoritative information I can prophesy with confidence that the



Leonard Henry, radio comedian, practising the "Rumba" before acting as judge in a dancing competition.

THE B.B.C.

"BUYS BRITISH"

NEWS FROM THE "BIG HOUSE"

Parliamentary inquiry into the B.B.C. will not take the form of a Select Committee. The Government, on the recommendation of the P.M.G. and with the concurrence of the B.B.C., has decided to appoint a Committee similar to that presided over by Lord Crawford and Balcarres in 1925.

Report Next Summer.

This will be constituted on a non-party non-special-interest basis, with a neutral chairman. The composition of the Committee will be announced towards the end of this year.

The Committee will begin its work next spring and report in the summer, the consequent legislation being taken before the end of 1935.

The King's Birthday.

The King's birthday will be celebrated on Monday, June 4th, with the customary broadcast of the ceremony of Trooping the Colour, relayed from the Horse Guards, Whitehall.

There is no need to go into elaborate details of the ceremony, which will be

carried out on traditional lines, but listeners will be able to follow it very closely from the commentary which is to be supplied by Major J. B. S. Bourne-May, late Coldstream Guards.

Greta Keller Returns.

Greta Keller had fifty broadcasts from London to her credit before she went to America (a very long time ago, so it seems)

THE UNEMPLOYED

The Saturday evening talks on "Time To Spare" by unemployed men and women will be heard in future at 9.20 p.m. instead of 7.5 as in the past.

Future speakers are to include a London seaman, an engineer from Lincoln, a woman cotton operative from Lancashire and a member of the middle-class unemployed.

to take part in a revue in New York. At that time her reputation had been built entirely on her work with the B.B.C., and it was not astonishing, when something went wrong with the theatrical show, that she became a radio star on the "other side."

For a long time she appeared with Rudy Vallee in a weekly programme sponsored by a yeast manufacturer. Now she is home and will return to the B.B.C. microphone on Friday, June 1st, in Entertainment Hour. Joe Sargent, her husband, will be in the same programme.

Children's Request Week.

More than fifty thousand individual requests for specific items have been received for the Children's Hour Request Week, which is to take place from June 11th to 16th inclusive. This is the first request week under the new scheme for Children's Hour programmes which became operative as from January last, and which provides that twice a year, in winter and summer, request-week programmes are to be given.

The scheme is worked on the ballot principle. The actual number of cards sent in was 8,265, and they came from all parts of the country, from children of all ages from four years upwards.

The Voting.

The order of voting for the first seven most popular items was as follows:

The Zoo Man, 5,885; Toytown Dialogues, 5,524; "The Waterways of England" (dramatic plays by L. du Garde Peach), 4,205; Frederick Chester (West Country songs and stories), 2,423; the Staff Family Party, 2,312; Ronald Gourley, 1,547; "Mostly Mary," 1,400.

The Zoo Man is a series introduced as recently as last January, the talks being given by Mr. David Seth-Smith, a curator at the Zoological Gardens, London. "Mostly Mary" is a story for younger listeners which is specially placed in the first part of the Children's Hour programmes.

Gipsy Smith to Broadcast.

Empire listeners, as well as all those who can tune in direct to B.B.C. Regional transmitters, will have an opportunity on Sunday, June 3rd, of hearing Gipsy Smith, the world-famous evangelist, in a relay from Wesley's Chapel, City Road, London.

# ON THE SHORT-WAVES

## OUR SPECIAL SECTION for SHORT-WAVE ENTHUSIASTS CONDUCTED by W.L.S.

"WHEN is a set out of date?" No, this isn't a riddle, but an honest question that puzzles not a few of us. The only satisfactory answer that I can think of is: "When it no longer does the job it was intended for."

### Watch the Coils and Condensers.

How many of my readers have sets that come under that description? And what do they propose to do about it? One can either scrap the whole thing and build a new receiver, using some of the old parts for the sake of economy, or one can compromise by carrying out what the Americans call a "rehash" on the old set. The really fortunate ones can throw the whole thing away with an air of nonchalance and order the components for a new set from the nearest dealer.

These latter don't need any help from

me, so I propose to give a few hints to those about to indulge in a "rehash." The components in the average short-wave receiver that are most likely to need replacing are the variable condensers and the coils.

If your condensers are of a fairly good type, and not too decrepit, turn up page 140 in the April 21st issue of "P.W." There is a solution for one of the troubles in out-of-date short-wavers — tuning condensers that are far too large.

If, on the other hand, they are of a doubtful breed—particularly that type which embodies masses of dielectric material to support the plates—scrap them. And when you buy new ones it will be well worth your while to purchase the best that your pocket will run to. "Economy" on such components as variable condensers is usually false economy.

### Some Further Improvements.

Regarding your coils—if they have seen several years' service, including a fair

## MODERNISING YOUR SET

No set will last for ever, but there are many ways in which a receiver can be brought up-to-date, and the more easily accomplished of them are described on this page.

amount of "heaving" out of their holders, they will probably be wanting a pension. You can make a set to replace them, or you can buy a set at quite a reasonable figure.

This article isn't written with the express intention of trying to make you spend some money. No set, however, will last for more than a certain number of years without becoming more trouble than it's worth. I would sooner have no set at all than an old, decrepit affair that makes listening more pain

it is beginning to look "under the weather."

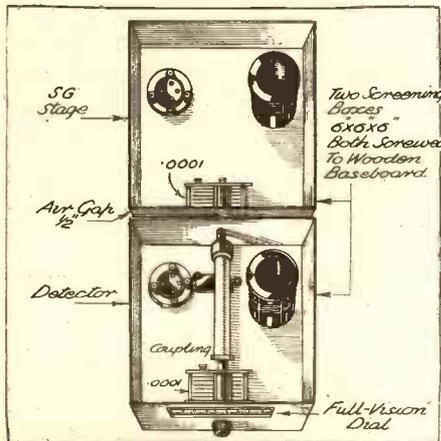
So much for the first stage of the modernising operations. It now remains to be seen whether your old circuit, freshened up and repainted, so to speak, will be its old self once more. If it doesn't come up to scratch, think hard about a new circuit, or perhaps a new arrangement of the old one.

### To Simplify the Handling.

As an example, if you use an H.F. stage, look at the two diagrams on this page. Perhaps you are worried by the fact that you have two tuning controls to keep in step. Why not try to gang them? It is quite straightforward if you take the trouble to screen the H.F. stage from the detector.

I am rather putting the cart before the horse, because I hope to deal next week with the addition of an H.F. stage to an existing receiver. This little sermon, however, applies rather to those who already possess one.

Fig. 1 is, in my opinion, one of the nicest layouts one can have for the purpose. Many of us have the old type of 6-in. cube screening box about the place. Two of these, mounted "back to back" on a wooden baseboard, with a small air-gap in between, provide very good screening.



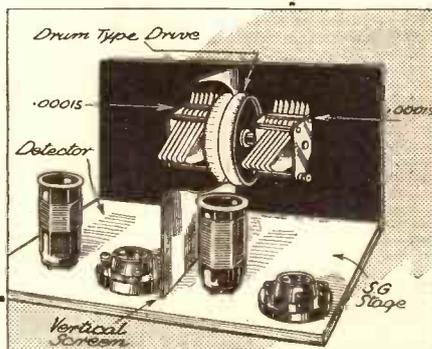
The tuning can, alternatively, be ganged as shown to the right. Here, a double-drum-drive condenser is employed, the spindles being connected and a screen passed between the drums.

## GANGED SHORT-WAVE TUNING

than pleasure. Now take another look round that baseboard. What do the valve holders look like? If they started life in the pre-bakelite era, and look as though they've been left out in the rain, it's time they were put on the list, too.

But, quite apart from the substitution of new components, you can do a lot with a soft paintbrush. Clean out the dust from underneath the wiring and from the components themselves.

Replace those straggly, untidy battery leads. Replace some of the main wiring if



tuning condensers is a simple matter. Since we now have to have only one dial on the front panel, one of the modern "full-vision" type may be used. Reaction control may be arranged at the side.

Fig. 2 shows an easy way of ganging with the standard "bread-board" layout. A double-drum-type condenser is used and a vertical screen is arranged between the two sections, which are, of course, mounted on either side of the drum assembly, and permanently linked.

### Mounting an S.G. Valve.

If one uses a metallised S.G. valve it is hardly necessary to mount it horizontally through the screen, and the ganging of the two small

ON THE SHORT WAVES—(Cont. from previous page.)

## WHAT READERS ARE SAYING

I AM afraid my post-basket is being rather encumbered by letters from readers who ramble on for several pages without making it at all clear what they are writing about! One or two of them have completely got me guessing. Please make your letters concise, clear and (if possible) legible. I have to read hundreds per week, and it's hard work!

### Best Time Below 30 Metres.

"H. K. M." (Brightlingsea) has built the "Short-Wave One," and finds life fairly good, except for the fact that he can't do much below 30 metres. I think this is accounted for by the fact that he says that he only listens between 10 p.m. and midnight. Try daylight at weekends, "H. K. M." Sorry about your previous letter—it didn't reach me.

Quite a number of people have written with reference to the query by "A. H." (Leeds) concerning W I X A E. They all suggest that it must be the familiar "I X A Zee"—but "A. H." said not. (That letter "Zee" is more nuisance than it's worth. Why can't they fall into line with our "Zed"?)

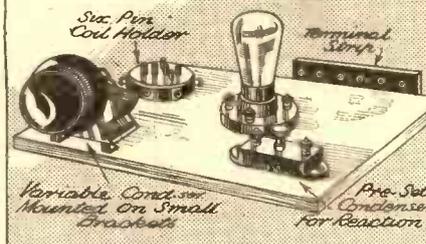
"S. C. I." (Acton) remarks that W 3 X A L on his 49-metre wave is extraordinarily loud of late. The Amateur Call-Book, "S. C. I.," may be obtained from R. S. G. B., 53, Victoria St., S.W.1. It is

a biggish volume and now costs 5s. 6d. Incidentally, it gives the address of G 2 J L, about whom you inquire, as Newport, Mon.—not London, as you thought.

"K. C." (Bristol) reports a very loud station on 49 metres announcing in what he thinks is a Scandinavian language. It is just below Boundbrook on 49.18. What does anyone know about that?

Will "P. P." (Westcliff) and others who have written on the same subject please

### FOR TRYING OUT CIRCUITS



A reader suggests that a plain baseboard with terminal strip, tuning condenser and a few other components permanently attached is ideal for experimenting with different detector circuits.

note that I have now tried out the "Pen-Det." with several different H.F. pentodes as detectors, and it is absolutely satisfactory. I had a particular reason for using an L.F. pentode as detector, but the other type appears to work perfectly.

"J. H." (Weymouth) asks me for a method of "de-scrambling" Rugby so

that he may enjoy the semi-private telephone conversations. Nothing doing, "J. H."! I should get into dreadful trouble, even if I knew, which I certainly don't!

### Who is Campeche?

"C. H.," a Spanish reader of "P.W.," reports hearing a station announcing himself as Campeche on 53 metres. He announces in Spanish, but "C. H." says: "The speaker is not a Spaniard, because I know the Mexican accent—the same that you know that the Yankee is different from the English." Is this Campeche a Mexican station? Reports, please.

"J. B. M." (Glasgow) is getting a little beyond me lately. First he sends me an old school tie and then announces that I am Hon. Editor of a journal that he proposes to start up! I'm afraid my wits aren't up to this; doubtless I shall decipher it all in good time.

### Unusual Absence of Background.

"L. C. M." (Plumstead) sends along a nice little log, together with a hint for readers that grid leaks and other small components may be mounted "all in among the wiring," simply by soldering little loops of tinned copper to their ends.

"I. S." (Glasgow) sends in a most interesting list of stations, including C O C (Havana, Cuba) on 49.92 metres. He is the first to report this station. He remarks, too, that beginners often think there is nothing doing on the 19-metre band because of the absence of background and interference compared with 49 metres—a tip worth remembering.

## WITH THE AMATEURS

A few notes on experimental transmitting stations.

I HAVE had several requests from readers for an occasional paragraph or so about the doings of the amateur transmitter. I could fill the whole of "P.W." on the subject, but I will try to condense it into an occasional portion of this page.

Just at present I believe I am right in saying that there are more amateur transmitters working in the 40-metre band than anywhere else. Listen any Sunday morning between 41.1 and 42.9 metres, and you will probably agree.

There is usually some interesting telephony to listen to, although the band is very badly hashed up by the primitive efforts at speech turned out by French unlicensed stations.

### On Telephony, Too.

The 80-metre band has become a regular Sunday-morning rendezvous for British amateurs on telephony, and there is very little interference up there. It is an excellent band for the job, on account of the much shorter skip-distance.

20-metre work mostly comes in the category of "D X." During the afternoons and evenings, between 20.8 and 21.4 metres.

readers who can copy Morse will be sure of hearing stations from all over the world.

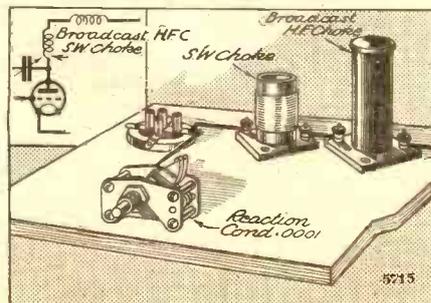
Those interested in telephony only have quite a lot to listen for as well, since the 20-metre phone has become very popular in the U.S.A. Some of the American amateurs use very high power, and their telephony signals are comparable with those from broadcast stations.

### Work on the "Ultra-Shorts."

I suppose the local work carried out on the 160-metre amateur band hardly comes under the heading of "short waves" nowadays. In any case, it speaks for itself.

In addition to these four bands, we have, of course, the ultra-short—"10" and "5." Quite a lot has been written lately about the latter band, but it is not very interesting unless you live fairly close to someone who is active on that wavelength.

### UNIVERSAL CHOKING



Sets which are used for both short waves and broadcast waves should have two chokes in series, unless the "broadcast" choke is specially designed to cover the short waves as well as medium and long.



HERE are some new stations (or old stations on changed wavelengths) to listen for. Most of them have been logged by readers already. Drummondville, V E 9 D N, is a new Canadian on 49.96 metres. Medellin, Colombia, using the call-sign H J-4 A B E, may be heard on 50.42 metres, and Cali, H J-5 A B D, is on 46.3 metres.

San Domingo (Dominican Republic), call-sign H I X, is another newcomer on 50.4 metres.

### From the Antarctic.

The Byrd Expedition in Little America, Antarctica, using the call-sign K F Z, works on eight different wavelengths, and may be heard—if you are lucky enough to strike the right time—in the region of 31.57, 25.36 or 19.64 metres. These are all within the limits of the normal short-wave broadcast bands.

The other wavelengths are round about 45, 34, 23, 17 and 14 metres.

Failing direct reception, keep a look-out for Buenos Aires on 28.98 metres, relaying programmes from K F Z. W. L. S.

# HOW TO MAKE A DUAL-RANGE COIL

NO reason need be given for explaining how to make a dual-range coil. The facts that it is really efficient, not difficult to make and is constructed from an inexpensive kit of parts provide ample recommendation for it.

There is no reason why a modern, compact, dual-range coil should not be made by the home constructor. It is not, as is so often suggested, a complicated and difficult-to-make component.

The complete kit of parts for the coil to be described is obtainable from Messrs. Peto-Scott, and comprises the following:

### Complete Kit of Parts.

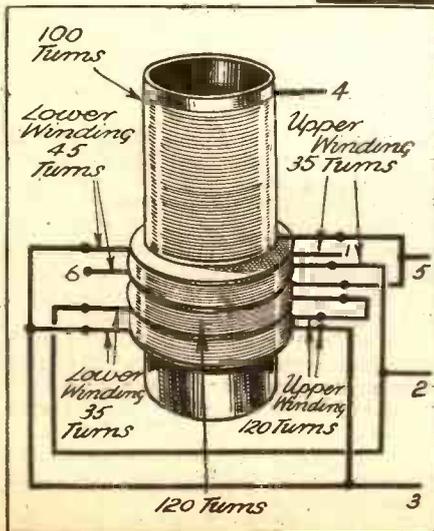
One coil of 34-gauge insulated wire, with which all the winding is carried out.

A metal screening can and a metal ring on which it fits. The coil former itself, and four rings of insulating material which just slide tightly on to the former to make the slots for taking hank windings.

A metal angle piece to hold the former to the ebonite coil base, and the necessary nuts and bolts.

Commence by drilling two holes as near one end of the former as possible to take the bolts for the angle piece. The latter is then secured in place.

Now arrange the four rings in place,  $\frac{1}{4}$  in. apart, with the bottom one up against the heads of the bolts holding the angle piece. Drill a small hole between the top two rings, thread the end of the wire through it from the outside for about 6 in. and wind on 45 turns tightly. Cut the wire about 8 in.



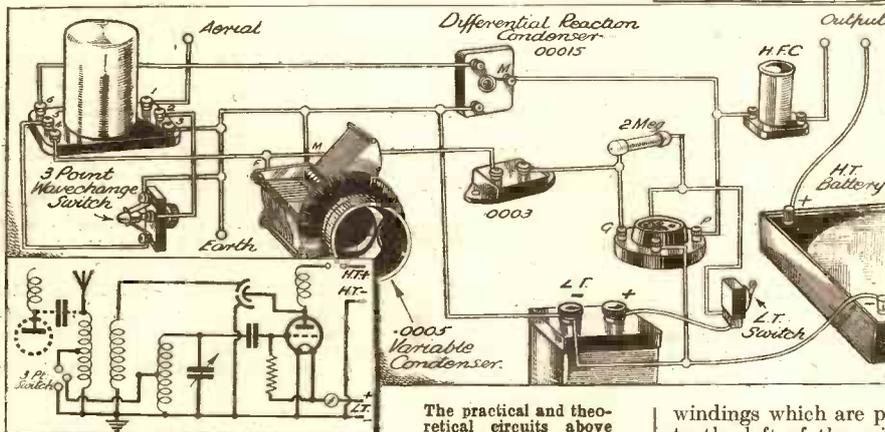
The modern, compact, dual-range coil has for a long time been a complicated component outside the scope of home construction. But here is an efficient design which anyone can tackle, described in complete detail.

By A. S. CLARK.

from the last turn, take it over a slight nick in the second-from-the-top ring and then through a hole between the two centre rings. The other windings (see sketch) are made and the ends taken through holes in a similar way, and the ends labelled carefully with small pieces of paper.

A layer of paper is placed between the upper and lower windings in the two outside slots, and all windings should be wound on tightly to ensure getting the right number of turns in. Also it is most important to

### A SUITABLE CIRCUIT TO USE



The practical and theoretical circuits above show how the coil is used. The dotted connections in the theoretical sketch indicate the method of using after an S.G. valve.

To the left are seen the connections to the windings, while the small sketch above the circuit shows how the coil former is held in place.

keep all windings in the same direction.

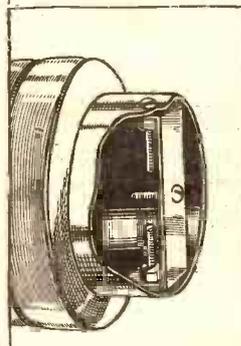
When the windings in the slots are completed, start the single-layer winding as near the top of the former as possible and wind it in the same direction as the other sections. Keep the turns very close, or you will not get all of them in in the available space. But this will not matter much, for the last ten or so turns can be wound on top of one another in hank form without harm.

### Connections to Terminals.

Having completed the winding of the various sections of the coil, the next job is to make the connections to the terminals. The metal ring over which the screen fits is fixed into place with two of the nuts and bolts, the nuts being uppermost.

At first the different wire ends should be threaded through the oval slots in the metal ring and attached loosely to their respective terminals. The latter fit in the six holes (three at either end of the coil base), and one oval slot will be found adjacent to each terminal.

The positions of the terminals from 1 to 6 are marked in the pictorial circuit diagram, and the connections are given in the diagram at the bottom left-hand corner of this page.



To ensure that there shall be no mistakes I will go over the connections verbally.

### The Windings.

First of all, it should be noted that the connections to the hank-wound sections are shown in pairs. Each pair represents the beginning and end of one winding, the upper connection in the diagram being the beginning of the section and the lower one the end of that particular section.

In the case of the two outer slots, each of which, as you know, carries two windings or sections, the lower

windings which are put on first are shown to the left of the coil former. Let's start with the top of the coil.

The beginning of the single-layer winding, which is the medium-wave tuned coil, goes to terminal 4. The end of it goes to terminal 5, which is one of the "switch" terminals.

### In the Slots.

The beginning of the winding in the middle slot, which is one half of the long-wave secondary, also goes to terminal 5.

The upper winding in the top slot is the medium-wave aerial coil, and it will be seen that its beginning is the only wire going to terminal 1. The end of this winding goes to terminal 2, which goes to one of the switch contacts. Terminal 2 is also joined to the beginning of the long-wave aerial coil, the lower winding in the bottom slot.

The end of the middle-slot winding goes to the beginning of the upper winding in the bottom slot. This winding forms the second half of the long-wave secondary.

(Continued on page 266.)



The Radio Society of East Africa this week takes our Chief Radio Consultant to task for a paragraph in the February 17th issue of POPULAR WIRELESS. P. P. Eckersley, in reply, explains the difference between real quality on short waves and satisfactory entertainment for the Empire.

THE Radio Society of East Africa write as follows:

April 11th, 1934.

"The Editor, POPULAR WIRELESS, London.

"Dear Sir,—An article appearing by Mr. P. P. Eckersley on page 1020 of the issue of February 17th last of POPULAR WIRELESS has found considerable disfavour with the majority of the members of this Society, also many other listeners in this area.

"The paragraph to which particular exception is taken is that reading:

"Now people down-under and up-over and East of Suez and all that are beginning to complain about the Empire Service. They complain on two counts: first that the programmes are not very interesting when they can hear them, and secondly that they seldom hear them satisfactorily enough really to understand why they dislike them so."

"It is very evident that Mr. Eckersley and some of his informants have not carefully listened to the Empire Transmissions Nos. 3 and 4 (possibly they are still beginners in short-wave reception), and we consider it only fair to the B.B.C. and its hard-working engineers to say that, although there are occasions when conditions are not in our favour, yet we can receive 85 per cent to 90 per cent of its programmes with pleasurable interest.

"If Mr. Eckersley could be induced to practise short-wave reception at distances between 4,000 and 8,000 miles, perhaps he would be rather more lenient in his criticisms of an institution of which he was at one time an employee."

I want to apologise at once if I have given the impression that I am pleased that the Empire Service is not a success. The only thing that can account for the tone of the East African letter must be that I have given this impression.

That "Sea-Shore" Effect.

We should all be delighted that the people of East Africa enjoy such good reception and are so pleased with the programmes. My paragraph was inspired by news from Australia, New Zealand and Canada. I must admit I had no news from East Africa when I penned the offending paragraph. Moreover, one is more likely to hear complaints than praise.

I have, as a matter of fact, often listened to short waves because I enjoy listening to American programmes. But my enthusiasm has always cooled off in the end. The sea-shore effect, the changing nasal to booming tone, the frequent inability to

get anything at all are deterrents to the pleasure of listening.

And do let us forget this nonsense about "skill" in receiving short waves. No one can receive what is missing in the transmission. It is true that by the expenditure of large sums of money you can get much better reception by using several aerials spaced apart by tens, twenties and thirties of metres. But this requires money to do it and skill to find out that it should be done.

It is a Glorious Hobby.

As I grow older I find it more and more difficult to endure the noise of an imperfect transmission. Contrary to the accepted dictum that you can soon get used to background noise, and that you come to forget it, I find myself more and more conscious of its persistence. It irritates me. That's why I am not an enthusiast for short-wave reception.

### "ROLL AWAY, CLOUDS"



Paul Robeson listening to the new "His Master's Voice" Superhet A.V.C. Portable Grand receiver which he has just sent to his son at school. Robeson is a very keen radio enthusiast.

On the other hand, there cannot be much to do living in the wilds apart from one's work, if one is not fond of books or contemplation. We get so accustomed to our cinemas, concerts, lectures and ever-changing sights of big cities. We cannot conceive what wireless means to the lonely listener.

It is for him a glorious hobby, it brings a reminder of "home" and is a subject for endless experiment. I cannot think why Empire listeners do complain so much about

the service. Perhaps it's different in places where civilisation is more developed.

\* \* \*

I was asked the other day whether I considered the superheterodyne better than the straight set. I replied cautiously. I have lately been building a superheterodyne set. I have put ten valves into it. (Two for auxiliary purposes.)

I have attempted to get the "perfect" solution, and I have found out an interesting fact. I have found out how easy it is to get too much "hiss" if you embrace a wide-frequency band. I knew in general that "hiss" had frequencies 4,000-6,000 cycles/sec., but I didn't realise how enormously it increases if you reproduce these frequencies.

The superheterodyne is probably a hissier person than a straight set. On the other hand, it's easier to design filters and equalisers to get full reproduction up to, say, 7,000 with a super than with a straight if one wants constant performance on all wavelengths.

\* \* \*

I understand that the Union are discussing the principles of single sideband transmission. You may have seen that I proposed that this should be done in my articles of some weeks back. If such a principle were introduced, we should have to use the superheterodyning receiver to get the most out of it. Then the super would have to get rid of its hiss.

Clearing the Ether.

It could be done, I think. Lots of people who own supers will tell you that they don't get hiss. Your reply is, "I know, but then do you get reproduction up to 7,000 or 8,000 cycles per second frequency?" and if they say "Yes," ask them if they've ever heard sideband jamming from other stations!

You will get bored with me if I say it again, but it all comes to the same thing: there are too many broadcasting stations. Either there should be fewer of higher power, or power should be reduced with the present number, or there should be more and better wavelengths allotted to broadcasting stations (and then there should still be fewer stations, but higher power).

I sometimes wonder if this dissatisfaction with the present is not useless: that people are perfectly happy with the "boomsh" of the modern set, if people want those fine nuances of quality.

However, I don't think we should have got even thus far if some people hadn't been discontented.

# The "Double P. D."



Using a new type of valve, this remarkable mains receiver is unusually economical, and is capable of providing an output power of over 3,000 milliwatts.

Designed and described by the "P.W." Research Department.

**T**HIS week we publish the description of a particularly interesting mains-receiver design which has a special appeal to the man who wants good-quality reception of his local station with reasonably powerful reproduction and sufficient sensitivity to enable him to pick up a fair number of foreigners at good strength, without a lot of wangling of controls and coaxing of reaction.

Most three-valvers nowadays will enable these things to be accomplished, with the possible exception of the last—they mostly need reaction in order to achieve sensitivity on distant transmissions—but here is a two-valve set that exactly fills the bill.

Obviously, it will be said, there must be something out of the ordinary in the design and components of a receiver that will at once be powerful and sensitive, needing no reaction and yet having only two valves.

Quite right. The set is completely out of the ordinary, for it uses one of the latest types of multiple valves, the double-diode pentode that has been produced by Mazda and which is quite different from any other valve on the market.

### A Fine Combination.

In front of this valve is an H.F. pentode, and from this combination we get the title of the set, the "Double P.D.," or the double-pentode diode. But let us go further into the matter of the new valve before we discuss the actual circuit and construction of the receiver.

The ordinary double-diode triodes, tetrodes or pentodes are valves that have been known on the market for some little time now—since last year—and the workings of these valves are all aimed at one objective—the provision of diode rectification and a following stage of low-frequency amplification to overcome the insensitivity of the diode without the need for another valve.

### Three Watts From the Detector.

They do their tasks very well indeed and have been deservedly popular. But to get loudspeaker reproduction from receivers containing these valves it is necessary to use an output valve following the double diode, while for sensitivity a preceding H.F. amplifier is required, making in all a three-valve set.

The valve we have chosen for the receiver under description is of such a design that

no further amplifying stage is required after the detector, for this latter is capable of giving an output power of some 3 or more watts undistorted A.C. How does it do it?

It will be remembered that some little time ago—last year—a valve known as the A.C.2/Pen. was put on the market by Mazda. This valve was what might be called an ordinary pentode output valve, except that it had remarkable characteristics.

The average mains pentode valve needs something like 9 or more volts grid input before it will deliver a power of 2 watts or so, but the A.C.2/Pen. had such a steep slope that it needed but 2.8 to 3 volts grid input before it was giving its full output power of some 3.4 watts.

The immediate result of the appearance of this valve was, of course, that sets designed with no L.F. stages after the detector other than the power stage, became increasingly popular, and these receivers also became more compact than was possible before, while still giving ample volume.

As a matter of fact, the sensitivity of the valve enabled remarkable powers to be obtained from distant stations besides the local transmissions, and three-valve receivers using the A.C.2/Pen. gave all that was desired in this respect.

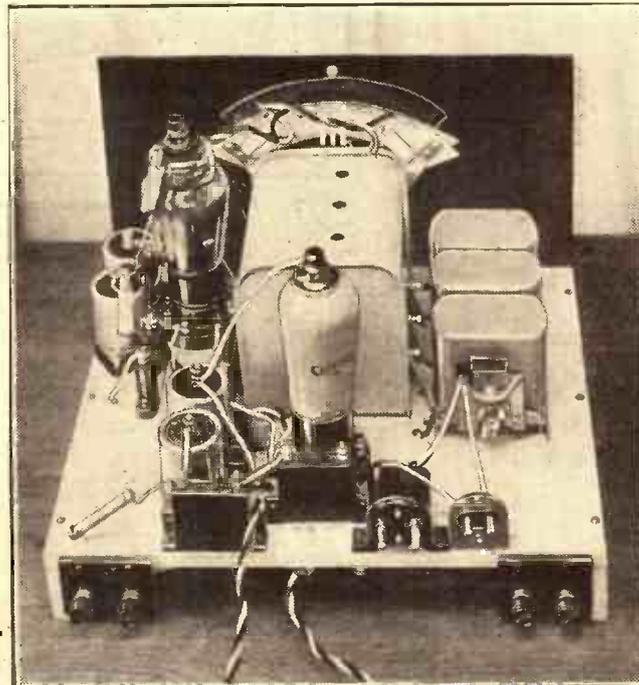
### Uses a New Valve.

Now the makers of the valve have gone a step farther, and have incorporated the A.C.2/Pen. with a double-diode rectifier in the same bulb, resulting in a detector and output stage of a particularly useful character.

The diode part of the valve can be used for half-wave or full-wave rectification, or half-wave rectification and automatic volume control, while the

(Continued on next page.)

## TWO PENTODES AND A DIODE



An H.F. pentode is followed by a double-diode-pentode valve in this interesting receiver. The second valve acts both as rectifier and output valve, and gives up to 3,000 milliwatts with extreme purity of reproduction.

### YOU WILL REQUIRE

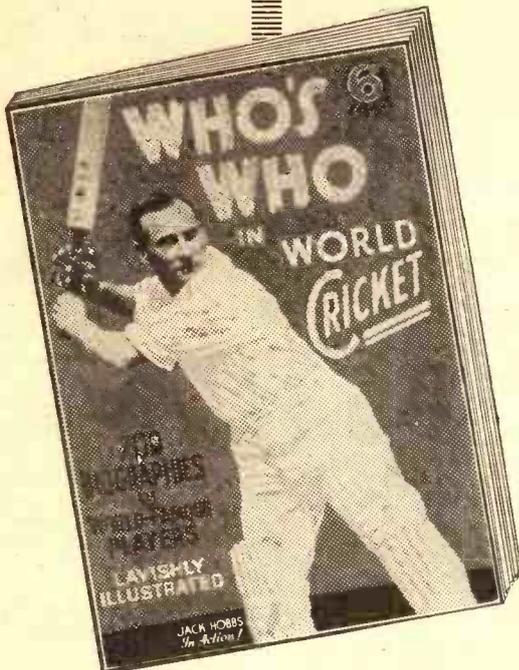
- 1 Polar Star Minor .0005-mfd. 3-gang tuning condenser.
- 1 Polar Arcuate S.M. drive for above (marked in degrees).
- 2 W.B. 7-pin valve holders.
- 1 Colvern G1, G2, G3 3-gang iron-core coil assembly.
- 1 T.M.C.-Hydra type 25 2-mfd. fixed condensers.
- 3 Telsen type W.231 1-mfd. fixed condensers.
- 1 T.C.C. type 501 50-mfd. electrolytic condenser.
- 1 Dubilier 670 .01-mfd. fixed condenser.
- 1 Telsen .0005-mfd. fixed condenser.
- 1 Telsen .0001-mfd. fixed condenser.
- 2 Erie 1-watt .5-meg. grid leaks.
- 1 Erie 1-watt 100,000-ohm resistance.

### THESE COMPONENTS

- 1 Ferranti synthetic (new type) 25,000-ohm resistance.
- 1 Ferranti synthetic (new type) 20,000-ohm resistance.
- 2 Erie 1-watt 5,000-ohm resistances.
- 1 Graham Farish 1½-watt "Ohmite" 150-ohm resistance in horizontal holder.
- 1 Graham Farish 1½-watt "Ohmite" 50-ohm resistance in horizontal holder.

- 1 Bulgin V.C.29 5,000-ohm potentiometer.
- 2 Telsen type W.340 screened binocular H.F. chokes.
- 1 Belling & Lee mains plug.
- 1 Bulgin type F.15 combined mains plug and fuses.
- 4 Clix small type indicating terminals.
- 2 Peto-Scott terminal strips, 2 in. × 1½ in.
- 1 Peto-Scott panel, 12 in. × 8 in.
- 1 Peto-Scott double Metaplex chassis, 12 in. × 10 in., with 1½ in. runners.
- 1 B.R.G. coil "Quikon" connecting wire.
- Screws, flex, etc.





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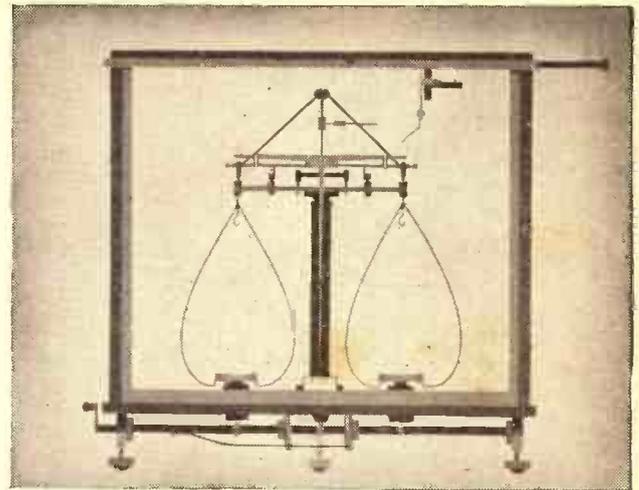
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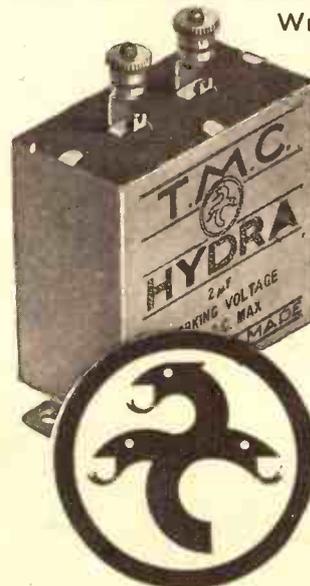


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Made by TELEPHONE MANUFACTURING Co. Ltd.

## THE "DOUBLE P.D."

(Continued from page 258.)

For two of these, black-flex leads are supplied attached to the coils, and are taken to the earthed chassis, the aerial lead is red and the other three are given yellow leads, being connected to the three terminals of the fixed vanes on the gang condenser. There are, therefore, no tricky coil terminals to be wired up; everything is just about as simple as could be.

A word should be said about connections to the baseboard and also about resistance mounting. The former should be made by means of round-headed screws and washers, clamping the loops at the ends of the wires firmly on the metal surface of the board.

### Preventing Short Circuits.

Where resistances are of the moulded type in horizontal holders, paper should be placed between the holders and the baseboard to preclude any possibility of short circuits between the chassis and the terminal heads underneath the resistance

error in the positions of the two holes for these components will very likely result in a spoiled panel. It is thus extremely important that the dimensions on the panel diagram be adhered to and that the panel be properly mounted on the chassis.

### Assuring Accuracy.

The best plan, of course, is to fix the panel in position on the chassis and then to offer the variable condenser and the coil unit to the panel, marking the points on the ebonite where the holes have to be made and correlating these with the dimensions given on the drilling diagram.

This checking is even more important if by any chance it should be decided to use an ordinary baseboard and metal foil instead of the special Metaplex recommended in the list of components, or if a home-made chassis is constructed of sheet Metaplex and the thickness of the baseboard is not the same as that in the complete chassis supplied by the makers, or if the side pieces are cut a little too narrow or too wide.

With the chassis cut to the correct size the panel-drilling dimensions should be as follows: The wavechange switch and on-off switch, which are both operated by the knob on the coil unit, should be  $2\frac{1}{4}$  inches up from the bottom of the panel and  $2\frac{1}{4}$  inches in from the left-hand edge, looking at it from the front.

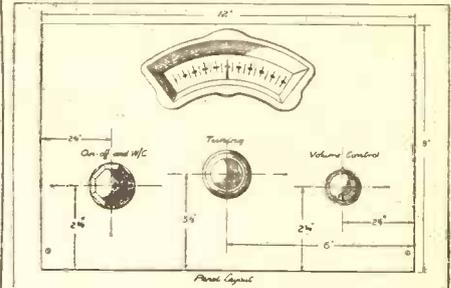
### The Disc Drive.

The variable condenser control knob operating the disc drive should come  $3\frac{1}{2}$  inches up from the bottom of the panel and in the centre, measuring laterally. The volume control can be fitted with a certain amount of latitude, because it does not have to be fixed to the chassis, but symmetry necessitates its knob position harmonising with

the other two, and so we place it  $2\frac{1}{4}$  inches up and  $2\frac{1}{4}$  inches in from the right.

Only two screws are required to fix the panel to the chassis, and these are placed so that they come in the centre of the two side pieces of the chassis, the holes being started by means of a drill to prevent

## A NEAT PANEL



Very few controls are necessary, as is shown in this diagram of the panel layout and drilling.

splitting of the plywood of which the side pieces are made.

By the way, we wonder how many constructors trouble to soap the screws they insert into the wooden baseboards

## ACCESSORIES

**LOUDSPEAKERS.**—Rola, W.B., Celestion, Blue Spot, R. & A., Marconiphone, Ferranti, H.M.V., Atlas, Ormond, Amplion.

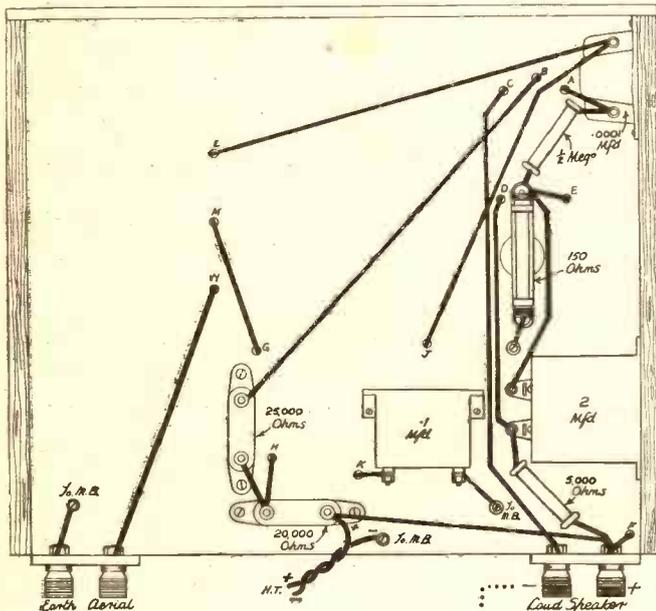
**POWER PACK.**—(See text.)

**AERIAL AND EARTH EQUIPMENT.**—Electron "Superial," Goltone "Akrite," Radiophone "Receptru" down-lead, Bulgin lightning switch, Graham Farish "Filt" earthing device.

and chassis of their sets. Such a simple step often makes the work very much easier.

Especially is this tip valuable where fairly hard wood has been employed, either ordinary soap, or better still, soft soap being used. This prevents all forcing of the screw.

With the construction completed there is little to be done to get the receiver going. The trimming has to be carried out, the various leads to power pack and speaker connected, aerial and earth joined up, and the set is ready. But we shall have more to say about it next week.



holders. A disc of paper under each valve holder, too, is a good idea, as it will prevent the valve pins touching the chassis if the valve is pushed too far home in the sockets.

Note how the Erie resistances are linked to the condenser feeding the grid of the double-diode pentode. The connection to the top terminal of that valve is actually made to the wire end of one of these resistances.

### Hints on Drilling.

Before we leave the construction of this unusually compact and efficient receiver it may be as well to point out that in drilling the panel great care must be exercised that the holes are made in the correct positions.

This is particularly important in view of the fact that the panel comes down to the foot of the chassis, while the coil unit and the variable condenser are fixed on the baseboard as well as the panel.

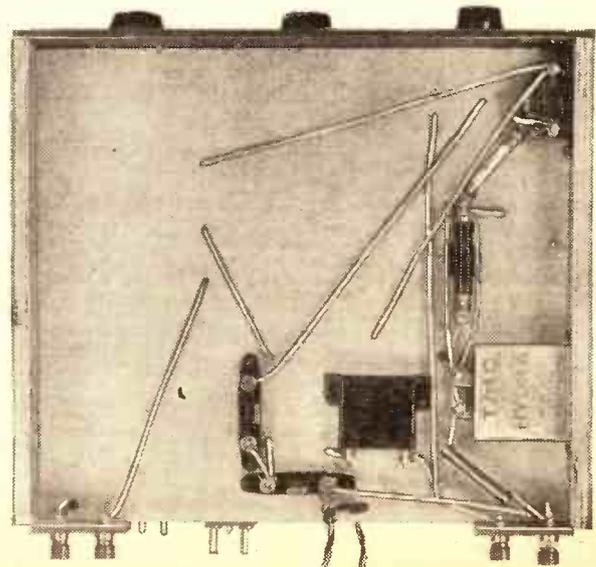
It can be seen, therefore, that the slightest

## UNDER THE CHASSIS

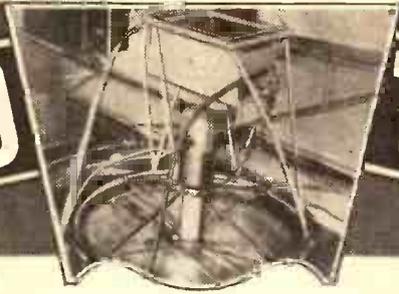
All the holes in the wooden chassis in the above diagram are lettered so that no mistake shall be made in following the wiring as it passes from one side of the baseboard to the other.

This wiring diagram of the under-chassis connections should be consulted, together with the photograph on the right when the receiver is being constructed.

As is our custom, all connections made to the metal baseboard are marked "M.B." and they are secured by means of round-headed screws and washers clamping the loops of wire against the metal surface of the chassis.



# SOME RADIO



# "OFFSHOOTS"

**M**OST of the old "magical" flavour of wireless seems to have passed away—to keep company with those almost forgotten days when one struggled manfully with catswhisker, crystal and coils, complete in a cigar-box.

But even now—in the midst of superhets, double-diode triodes and all the modern paraphernalia—one is occasionally moved

The application of what we may call radio science is not devoted solely to the provision of entertaining programmes for the stay-at-home listener. The field is much wider than that; and in this brief but comprehensive survey there are set forth some of the ways in which "radio" can be used in the everyday application of medicine or travel.

By **SEXTON O'CONNOR.**

to wonder at the ingenuity of some of the latest applications of what we may call radio science.

### The Valve's Many Uses.

The valve, for instance, though it was born and bred to the wireless art, is incessantly finding fresh fields to conquer. It can be made to see, hear, feel—and even smell—so much better than our own senses that it is steadily replacing them.

As a low-frequency amplifier it will "hear" sounds far below the threshold of the human ear. In medicine, for instance, the beating of the human heart and the quaint noises made in breathing are magnified up to such a pitch that even the faintest symptoms of incipient disease speak in a voice of thunder to the practised ear of the physician.

When harnessed to a photo-electric cell or a thermo-coupler it "sees" light and heat rays far too feeble to affect the human eye. It affords us the means whereby we can magnify the tiny output from the ordinary light- or heat-sensitive device into a current sufficiently powerful to operate a relay directly.

We can measure in this way the light from a star so far distant that the ray takes over a thousand years in its passage. And

it must be borne in mind that light travels over eleven million miles a minute!

Similarly, the natural heat from a person's face can be "registered" at a distance of over a thousand yards.

There are a multitude of applications for this kind of thing at a lower level of sensitivity. For instance, counting and grading articles according to their size or quality before packeting them; comparing the colour and texture of all sorts of material; automatically regulating and controlling the colour and heating of workshops and other buildings; and a thousand and one other industrial purposes.

### Detecting Poison Gas.

The Thyratron, or grid-glow tube, is able to "feel" the slightest movement by capacity action. A nearby object shifts slightly and so upsets a critical control bias on the grid of the valve. The valve reacts by "spilling over" and operating an indicating instrument.

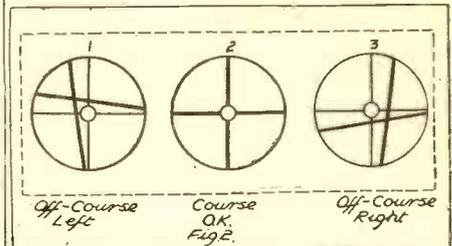
The response is so delicate that it will measure how much a dinner-table "bends" when a shilling is placed on it!

The presence of poison gas in a mine—or in trench warfare—changes the normal transparency of the surrounding air. The change, though very small indeed, is sufficient to upset the balance of a photo-electric valve "bridge," which thus "smells" it out and promptly gives visible or audible warning of its presence.

is directed down through the surface of the earth, and hidden deposits of minerals or metals, or even of oil and water, are indicated by their action in absorbing or diverting the reflected waves.

A similar method of "prospecting"—applied this time to the upper limits of the atmosphere—allows us to measure the height of the Heaviside Layer. Incidentally,

### VISUAL INDICATION



An impression of the indicator by which the radio-controlled pilot knows whether he is on his course or whether he is wandering to the left or to the right.

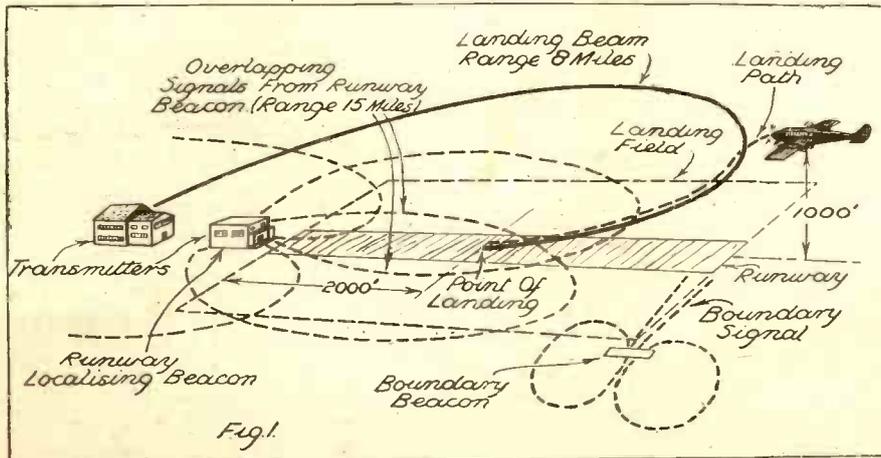
it has also proved the existence of two separate layers—one more than double the height of the other.

### "Sound" Signalling.

The detection of a distant body by its action on a reflected wave is also a feature of supersonic "sound" signalling. Such waves are frequently used at sea to indicate the proximity of rocks, icebergs and other dangers to navigation. Trawlers, too, can be fitted with similar devices to record the presence of a shoal of fish, so that the crew may let down their nets at the most favourable time.

Perhaps the most valuable "offshoot" is to be found in the application of wireless to aerial navigation—more particularly in the ingenious methods now being used for assisting an aviator to land his machine even in the densest fog, when visible signals are quite useless.

### RADIO GUIDES THE AIRMAN HOME



A pictorial diagram which shows how aeroplanes are automatically guided by radio signals modulated by different notes, so that a landing can be made dead on course even in the densest fog.

From another angle we can find various interesting examples of the use of radiated wireless energy for purposes quite distinct from that of ordinary signalling.

For instance, a stream of wireless waves

The landing equipment is generally combined with directed "beams" of wireless waves which keep the aviator on his proper course from start to destination. Any

(Continued on page 265.)

# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## THE NEW "B.A.T." SWITCHES

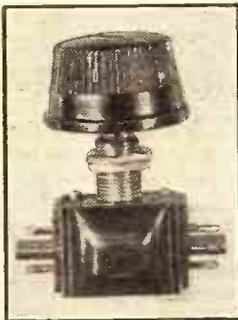
THE question of panel appearance was not one that used to trouble the home constructor much. But to-day it has assumed some considerable importance in view of the development of the commercial set.

With ready-made "So-and-So" Supers and "This or That" Radiograms filling shop windows and widely advertising that radio can be as handsome to look at as it is pleasant to listen to, 1934 constructor ideas perpetrated on 1934 panels are likely to give their owners inferiority complexes!

But it is not always particularly easy to preserve symmetry and neatness of panel controls, because the knobs of different makes of components tend to vary quite a deal.

Nevertheless, by careful choice one can preserve a very fair standard, though often the switches are rather difficult. For example, one of those tiny knobs on a push-pull type of switch or an ordinary toggle knob simply will not match with, say, the knob of a reaction condenser, and there are few hopes of obtaining a satisfactory balance on many occasions.

In such instances the "B.A.T." Side-Action "Q.M.B." Switches provide perfect solutions to the problems, for they have knobs similar in



"Half-way" positions are impossible with the "B.A.T." on-off switch seen here.

appearance to the normal potentiometer or reaction condenser.

Their knobs rotate, too, so that there is a standardisation of the movement of the controls, and that is no small advantage.

These "B.A.T." switches are, of course, manufactured by Claude Lyons, Ltd., 40, Buckingham Gate, London, S.W.1, who, by the way, publish one of the most attractively informative radio catalogues that are available to the public.

There are four types of these "B.A.T." Side-Action Switches, and they are as follows: No. 161, Single-Pole "On-Off," price 1s. 9d.; No. 163, Single-Pole Double-Throw "2-way," price 2s. 6d.; No. 2161, Double-Pole "On-Off," price 3s. 6d.; No. 2163, Double-Pole Double-Throw, price 4s.

It is not advised that this particular line of "B.A.T." switches should be applied to H.F. work, such as, for example, wave-changing, but for all battery and mains switching or for the majority of L.F. purposes they are as good as anything I have examined.

The movement is quite perfect. There is a definite, efficient switch-over, and half-way positions are impossible. For easiness, combined with positive switching, these "B.A.T.'s" are, in my opinion, 100 per cent—more than which it is unnecessary to say.

## "W.B." UNIVERSAL VALVEHOLDER

THE new Universal valves differ quite a bit from normal types in their physical constructions. The control grid is taken from the top of the bulb instead of being included in the bunching at the bottom.

This is a technical improvement which may sometimes prove of great importance. All too often efficiency has to be lowered in attempts to obtain stability, and, as you will all know, if there is one thing that needs to be electrically separated from various of the components and other parts of the set, that is the grid and its associated circuit.

The base connections to the Mullard Universal valves are made by means of side contacts instead

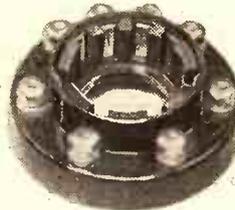
of by pins. Therefore an entirely new type of valveholder becomes necessary.

The first one to be brought to my notice is due to Messrs. Whiteley Electrical Radio Co., Ltd., Radio Works, Mansfield, Notts, who are as famous for their W.B. loudspeakers as they are for valveholder manufacture.

Of course, this new W.B. valveholder does not include the usual sockets, but a number of contacts are arranged in niches around the inner side of the cut-away centre.

It is impossible to insert the valve incorrectly. It will go in only when it is placed the right way round. But this is by no means a difficult opera-

The new side contact Universal valves need a new type of valveholder. Here is the model which Whiteley Electrical are now making.



tion. As a matter of fact, I am inclined to think that it is quite

a bit easier than placing an ordinary nine-pin valve.

The holder takes the valve with wonderful smoothness and holds it rigidly and with perfect electrical contact at each point. Only first-class design and construction would ensure this precision effectiveness, and both are to be found in this W.B. valveholder.

## "GOLSTONE" LIGHTNING ARRESTER

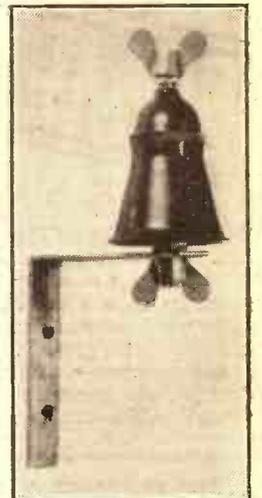
ONCE again the season of thunderstorms is upon us, and once again the thoughts of many listeners will no doubt turn to the question of lightning and the radio set—perhaps anxiously.

But let me reassure all those who have fears. The

risk of lightning causing serious damage through a radio installation is a very small risk.

Some four and a half million aerials poke themselves into the sky in this country alone. In the whole world there must be at least forty or fifty millions. And I'll wager that only a small proportion take precautions against lightning striking them.

Yet I cannot recall to mind one single fatality directly due to the radio aerial attracting lightning. Yes, I know what you are going to say (some of you): there have been cases of wireless sets being burnt out.



Prevention is much better than cure—which is why so many listeners have one of these lightning arresters permanently between aerial and earth.

Very rare—so rare that they are always photographically recorded by the Press. And even so it is open to argument as to whether the presence of the wireless aerial did not result in the lightning doing far less damage than if it hadn't been there at all. I consider it quite probable that in at least some instances the radio-set damage was slight as compared with what might have happened.

Nevertheless, a burnt-out radio set is a loss we would all avoid were it possible. Rare though such an occurrence may be, it does happen. But it is possible to fit an inexpensive safeguard—a device which will by-pass the energy developed by the lightning and, if the device is properly installed, render the radio aerial something of a lightning conductor to protect your chimney pots.

This device is known as a Lightning Arrester, and consists of a small gap, to one side of which goes the aerial and to the other a direct earth connection. The lightning energy jumps this small gap in preference to overcoming the great resistance to current of high frequency which is offered by the devious path through coils, etc., in the set itself.

Messrs. Ward and Goldstone make a good Lightning Arrester: one of the best I have come across. I like it because it is so substantially constructed. It is obviously able to resist the sternest weather conditions, for, of course, to be effective a lightning arrester needs to be installed outside the house.

The "Golstone" Lightning Arrester is made of stout galvanised metal and has a strong bakelite cowl. In the words of its manufacturers, it is "practically indestructible," and can be fitted and forgotten—and the last word then also applies to that lightning risk.

SUMMER radio—and some are portables! That's fortunate, for as I write these notes the sun is streaming in through the windows and I am reminded of all the joys of possessing a set that you can take about with you.

I am glad that the idea of radio portability has not fizzled out. Indeed, but for the perseverance and enterprise of some of our manufacturers it might have done, for some of those earlier types of portables were hideous things, and when an idea starts off badly it takes a long while to overcome the unsavoury reputation thus created.

But any ideas of portables generally being unsatisfactory belong very definitely to an era that is past. Modern portables are equal in every respect to instruments designed for ordinary purposes, and they differ only in the respect that they possess the added attraction of portability.

### Choose a Good Make.

Of course, with portables, as with any other types of sets, a lot depends upon the make that you choose. That is really the reason why I have raised the matter in my notes, for I feel that guidance in this respect is particularly



Jottings of Interest to Buyers.

By G. T. KELSEY.

appropriate at this time of year.

With this type of set, more, perhaps, than with those intended for use with an aerial, it is essential to confine your choice to the leading makes. For instance, from my own experiences I can confidently assure you that you will not go very far wrong if you bear in mind the names of H.M.V., Pye, Marconi and McMichael. They all produce models which fall in with my ideas of what a modern portable should be, and I have selected these names particularly because of price considerations.

If any of you would care for further details of the portables available in any or all of these ranges, I shall be pleased to make the necessary arrangements for descriptive literature to be forwarded.

Just send in a postcard in the usual way, write the word "Portables" in the top left-hand corner and then give a list of the makes in which you are interested.

### Cabinet Bargains.

I feel rather tempted to start off this paragraph somewhat in the manner of "Talkie Trailers." You know the sort of thing—

(Continued on page 265.)

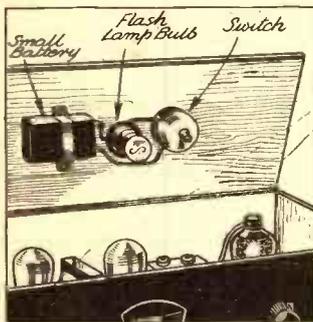
# A PAGE of Recommended WRINKLES

## A USEFUL GADGET.

IF something trivial breaks down in the set it is easy to tighten a screw or make an adjustment if the light is good and the parts can be seen. The usual method is to use a flash-lamp in one hand and a screwdriver in the other. If the flash-lamp is run down or not handy the set is usually uncoupled, and much trouble is necessary, perhaps, to tighten a single screw.

If a flash-lamp bulb is mounted on the underside of the lid, with a small battery and switch, much trouble will be saved, as in this way the lamp can be fixed by setting the lid at the required angle.

The alternative is to leave the small circuit open and arrange to switch over to the I.T. when required; but many will prefer to use the separate circuit when the light can be switched on at any time without interfering with the connections or taking juice from the set battery. The lid can be made to fix in any position by using thumbscrew and brass strip attached to the lid and cabinet.

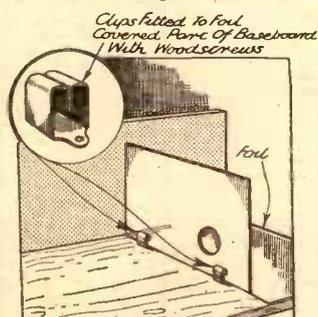


A lamp in the lid of an American-type cabinet helps you to carry out repairs when the light is not good.

## MAKING SCREENS REMOVABLE.

AT certain periods it is found one has to do some necessary adjustment inside the set, and an awkward obstruction is the screen. This can be easily removed in a moment if the following wrinkle is carried out:

The two clips (see sketch) are fitted to the foil-covered part of baseboard where screen is positioned. These



Clips made from the contacts of an old single- or double-throw change-over switch will allow a screen to be removed when necessary.

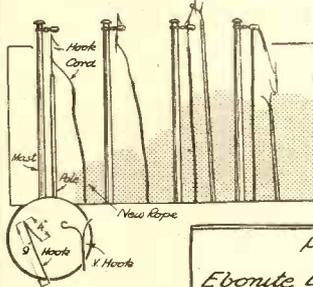
clips I obtained from an old earthing single-throw change-over switch. The screen, having no turned edge for fastening to baseboard, is simply pushed into the clips.

The screen is easily removed, when required, by simply pulling out of the clips. A good connection is made by using this device.

## REPLACING BROKEN AERIAL ROPES.

OFTEN, when an aerial comes down, due to the supporting rope breaking, it is concluded that the only way of getting it aloft again is by the laborious method of taking down the pole and running a new rope through the pulley.

In the case of the average pole of up



to 30 ft. in height, this is not always necessary. The job can usually be done with a long pole (a long fishing-rod has been used successfully) in conjunction with a short piece of cord and two pieces of steel wire of about 16 gauge, bent as shown.

The procedure is easier in practice than it looks in words.

Drill a 1/4-in. hole about 3 in. deep in the top of the pole, and insert the long hook. To the centre of the hook is lashed the piece of cord, which may be 2 or 3 ft. long, while the new rope is lashed to the other end of the cord. Then push the hook right through the pulley and draw away the pole, which will leave the hook in the pulley.

Next push the hook right through the pulley by means of the V piece

lashed to the top of the pole; then engage the hook on the V piece with the other hook and pull the rope down, being careful to get the rope in the pulley groove, which is easily done by keeping a slight strain on the free end and manipulating the pole.

## ENSURING SECURE FIXING

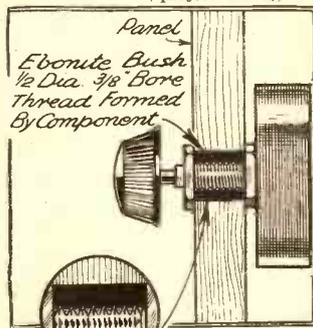
WITH wood panels now in vogue, trouble arises with the controls working loose. My hint to overcome such ensures a tight control at all times.

As each control has a screwed collar, usually 3/8 in. in diameter, instead of drilling to this size, increase to, say, 1/2 in. diameter. Take a piece of scrap ebonite, the thickness of wood panel, and drill a 3/8-in. hole; then saw and file out to 1/2 in. diameter. This is just a nice knocking fit into the wood panel. The slight contraction of the ebonite bush enables the control to screw into position, and the nut then answers as both a fastening and locking device. The sketch will make this clear.

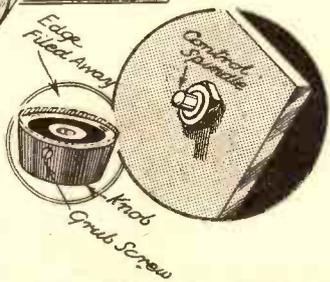
## SHORT CONTROL SPINDLES.

IN some instances, where a moderately thick panel is used, it is found that the control spindles do not project through sufficiently to enable the grub screws to obtain a firm hold. It may be only a tantalising sixteenth of an inch short, but in such circumstances the control knobs are of little use.

However, to save the expense of another set of knobs, a good remedy can be effected by filing away part of the underside ebonite, as shown in the diagram. In this



The top diagram illustrates the method of threading the new ropes through the pulley. In the centre you see how controls are kept secure in a wood panel by means of an ebonite bush.



File away part of the underside of an ebonite knob to ensure a fit for the knob in a case of a thick panel.

## ONE GUINEA FOR THE BEST WRINKLE!

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

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

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

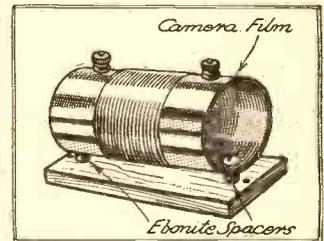
The best Wrinkle in the May 5th number of "P.W." was sent by Mr. G. Cozens, 1a, Limes Walk, South Ealing, London, W.5.

way the thickness can be reduced, and so enable the grub screw to bite.

## A SHORT-WAVE H.F. CHOKE.

WHILE making up a two-valve short-wave set recently I could not obtain any suitable ebonite tubing, and found that ordinary 2 1/2 x 1 1/2 camera film proved to be an excellent substitute. The film winds itself up naturally, and can be formed into a 1-inch-diameter tube by sticking up with seccotine.

The tube can be wound with any wire between 32 and 40, and the ends of the wire connected to two terminals mounted 1/2 inch from each end. The base is of ebonite, 1 1/2 in. wide by 2 1/4 in.



An ordinary camera film is made into a former for a choke by gluing with Seccotine.

long, with a screw hole drilled at opposite corners.

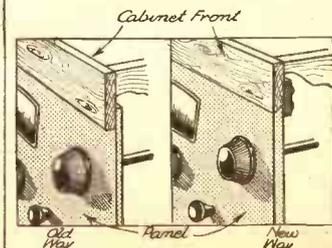
## FITTING PANELS FLUSH.

WHEN building a console cabinet it is usual to arrange the set and panel so that it can be removed bodily from the cabinet for adjustments. To do this, an opening is cut in the cabinet for the panel, as in the left-hand part of the illustration below.

Well, I think this looks rather crude, and in order to make a neater and better-looking job I have suggested and used the method shown.

As can be seen, the opening in the cabinet is made taper, and the corresponding taper put on the sides of the panel, so making a taper joint of it. It can be secured by a small piece of wood at the back, as shown.

The panel need not necessarily be flush with the cabinet, for it can be made to protrude in front of the cabinet. This also looks very neat.



A taper at the top of the panel, with a corresponding taper on the cabinet, permits flush fitting.

# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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

## QUESTIONS AND ANSWERS

### A CURIOUS CASE OF INTERACTION BETWEEN NEIGHBOURING SETS.

We continue to receive correspondence on the subject of common earths, etc., causing interference between adjacent sets. And the following is a good example of the "trickiness" of this type of trouble.

It is reported by Mr. R. F. Gardner, of 71, Greenhill, Woolwich, London, S.E.18, who says: "My set is a 'Cosmic Three,' working from a mains unit, inside aerial and water-pipe earth, and still gives good results.

"My next-door-but-one neighbour has a 'K.B.' all-electric receiver, working from an outside aerial and buried-copper-tube earth. He is about 40 feet away, and certainly has no metallic connection with my water-pipe earth.

"When both sets are receiving any station on the long waves the electric receiver cuts my reception right out, leaving me to enjoy a humming sound!

"Thinking he has been working on the verge of oscillation, I have operated his set myself, and proved that no interference exists when I removed his earth wire. But, on replacing the earth connection, my set fades out, and I can only receive the programme by forcing up reaction. No interference exists on the medium waves!"

As one set is using an indoor and the other an outdoor aerial, it does not seem likely that there is interaction here; and, if there were, one would expect it to be worse on the medium than on the long waves, instead of vice versa.

The earths are certainly not very far apart, but they obviously cannot be separated much more; and as they would both appear to be good ones, the 40-ft. clearance should be an adequate separation (which is farther than many of us can manage to get from our neighbour's earth).

It is not uncommon to find that what is called "modulation hum" is worse on long waves than on the medium, due to the fact that H.F. chokes are less effective at the lower frequencies of the long waveband. So it might be as well to try the old stunt of putting in series a second H.F. choke, if on hand, to back up the present one.

And as a reversal of the primary connections of H.F. transformers is sometimes helpful, this might be tried. In the "Cosmic Three," with dual-range coils of the type numbered 1 to 3, this would mean reversing the leads which go to the No. 1 and 7 terminals.

If the dual-range coil is of the type with terminals marked 1 to 6, a reversal of the connections to the 3 and 4 terminals might be tried.

Theoretically, the foregoing are not very promising suggestions, but, as recently explained, there is no royal road to clearing up this type of interference, and the only thing to do is to experiment on the spot.

### NEW CONNECTIONS FOR SEPARATE GRID-BIAS BATTERY.

C. F. (Derby).—"My last battery had the grid bias combined with the H.T. There were five leads to the battery: +2; 120

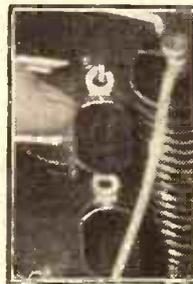
volts; +1, 72 volts; H.T.—; G.B.—1, 4½ volts; and G.B.—2, 9 volts.

"When I use instead a separate battery for obtaining the grid bias, what extra leads shall I need, and shall I have to alter the set in any way?"

There will be no need to alter the set; and the only new lead required will be a short length of flex.

Stand the new G.B. battery close to the H.T. battery, with its + terminal close to the — terminal of the H.T. battery. By means of the new flex lead connect the + terminal of the G.B. to — of the H.T.

All the other leads will then be connected exactly as before.



Components which have no terminals may easily suffer from bad contact.

## FOR BETTER RADIO

The necessity for obtaining good contact is always being emphasised, but it is still necessary to stress the fact that trouble is particularly liable to occur when components which have no terminals are employed.

A fall-off in strength, crackling noises, etc., are commonly due to "twisted-wire" joints at points where soldering or terminals would have been satisfactory. In general, if tags are provided it is better to use small terminals on threaded rod than to rely on wire contact made tight with pliers. Although satisfactory at first, twisted joints are always liable to develop crackles in time.

### WHICH SWITCH IS WHICH?

Owing to the many types and varieties of switches now in common use, it is always worth while to make sure that the right switch has been chosen before it is wired into the set.

Mistakes are easily made, even by dealers, and we have had many cases where constructors have been supplied with unsuitable switches, which nevertheless looked all right, and which even had the right type number on the cartons in which they were packed.

It is especially easy to confuse a switch of the three-point-shorting type with one of the change-over variety.

The action of these two switches is entirely different, but in external appearance, etc., they are often almost identical. So it is always

advisable to test the action before putting the component into position in the set.

This is very easily done. All you need is a few volts from a small dry battery to cause a click in a pair of phones or loudspeaker, or to light a flash-lamp—according to which method of testing you prefer.

(Full details of these methods of testing appear frequently in these columns in reply to questions raised by readers desirous of testing components, tracing faults, etc.)

As an example of the bother which such confusion of switches may cause, the following details of the experiences of a Hanwell reader of "P.W." will be of interest:

He built "The Caledonian Three," which was described in our September 2nd, 1933, issue, the circuit being an S.G. high-frequency stage (variable- $\mu$  valve), followed by leaky-grid detector and power valve.

### It is Very Confusing.

Such a set will always give a good selection of alternative programmes if working properly. But he reported "Signals only just audible; can only hear London National and Regional.

"I have had all parts tested, and they have been found in perfect condition. If I disconnect the 100,000-ohms resistance from the slider of the volume control there is no difference in the performance of set."

As this pointed to the fact that the switch portion of the volume control was of the change-over and not of the requisite three-point-shorting type, he was advised to check this carefully.

But even after a careful check the similarity in appearance, type number, etc., allowed the wrong switch to continue in use, and it was not till an actual continuity test was made that the switch was definitely proved to be the cause of the trouble.

It should have been one of the three-point-shorting variety. The three terminals of this type of switch are all separated in the "open" position and all joined together in the "closed" position.

To test whether these conditions are fulfilled, join one of the test battery's leads to one terminal of the switch, and touch the other test lead on the other switch terminals in turn.

In the "open" position there is no current flow, and, therefore, no click in the phones or loudspeaker (or flash in the lamp if this is used instead).

In the "closed" position, however, all the three terminals are joined together, so there is an indication of current flow when the test lead touches either of the other terminals. This proves that the switch is of the three-point-shorting variety and is working properly.

### Checking the Change-Over.

Now for the case of a three-point change-over switch. How can this be tested?

Its action should be such that one of its terminals is joined first to one of the remaining pair, and then, when the switch is operated, to the other terminal instead.

So, if this type of switch is working properly, its three terminals are never all joined together by the action of the switch, as was the case with the three-point-shorting switch described above.

To test whether a three-point change-over switch is working properly, join one test lead to one of its terminals and touch the other test lead on the remaining terminals in turn.

One of them should show contact; the other should not. But if neither of them shows contact, don't despair—it may be merely that the test leads are not yet connected properly.

Pencil a small figure 1 against the terminal to which you have the "fixed" test lead attached, and then undo that test lead and put it on one of the other terminals instead.

Now take the loose test lead, and once again flick it on the other terminals in turn. One of

(Continued on next page.)

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

them should show contact; the other should not. Any luck this time?

Perhaps you will be lucky, and you will find that you get your click (or glow) in the one case, but not when you touch the other terminal.

(And, by the way, don't operate the switch knob whilst all this is going on, but merely try the effect of testing the terminals with the switch at the same setting all the time.)

### Two "Dead" Terminals.

When you get to the point where one of the remaining switch terminals shows the contact O.K. and the other does not, when flicked with the loose test lead, you can try the effect of operating the switch knob.

You may find that the effect is to change over the "live" and the "dead" contacts. That is to say, you may discover that whereas the terminal near which you pencilled the figure 1 against was formerly "dead" and showed no contact, the action of the switch is to make this the "live" terminal of the pair against which you have been flicking the loose test lead. In fact, you can make the pencilled 1 terminal and the remaining switch terminal either "alive" (showing contact) or "dead" (showing no contact) according to the control knob's operation.

If so, O.K.; the switch is a proper "change-over" and it is working properly.

But instead you may find that, after pencilling the 1 against the first terminal and then changing over the leads as directed above, you get one live and one dead terminal: and then the operation of the switch does not change over these two; instead, all that happens is that the test then shows two "dead" terminals. Unless you put the switch into its former position, when one is "live" and the other "dead" again.

### The Final Test.

All that this means is that you have to change the test leads—that is, undo the "fixed" lead and place this wire on the other "live" terminal (not the one you marked).

Now you should get one "live" and the other "dead" terminal when the test is carried out. And the operation of the switch will effect the change-over, making the "live" one "dead" and vice versa.

This proves that the switch is a true change-over and is working O.K.

It may seem a rather troublesome or tricky test, as described in detail, but it is really very easy when you are handling the leads.

### OVERRUNNING A MAINS UNIT.

D. E. (East Croydon).—"The set is supposed to run at 20 milliamps or a little more. But my mains unit is only supposed to give 15 milliamps. Will it hurt the mains unit if I use it on the 20 milliamps set, or will it hurt the set, or what?"

"I have asked several people what the effect will be if I try it, but they all advise me not to try, though they do not seem to be sure of what the effect would be.

"And I know what the dealer will say if I ask him: 'Buy a 20-milliamps mains unit.' I don't want to do that unless it is necessary."

A 20-milliamps unit is essential, for, although the set may work after a fashion on an insufficient H.T. supply, it cannot possibly give you the satisfaction of which it is capable.

If you try to make your unit give the 20 milliamps, it will do its best to supply them. And, quite apart from any question of damage, there will be two drawbacks—the current you do get will be insufficiently smoothed (in other words, you will get hum), and the voltage will be far below the figures given on the unit.

As you probably know, insufficient voltage is a certain way of asking for distortion.

So your only way to run a 20-milliamps set satisfactorily is to provide it with a 20-milliamps H.T. supply

## SOME RADIO "OFFSHOOTS"

(Continued from page 261.)

deviation from the correct track is immediately indicated by the pointer on the instrument board of the machine.

The terminal arrangement at the aerodrome is shown in the drawing. As he gets near the landing field the pilot first picks up two overlapping beam signals from a "runway localising" transmitter. These carry different notes which "balance" on the automatic indicator so long as the machine keeps strictly on the midway line.

As he passes the boundary of the field the pilot gets a signal from the "boundary-marker" beacon, which warns him that he is coming under the influence of the "landing beam."

The latter consists of a clear-cut "field" of ultra-high-frequency waves, so shaped that, once he gets within its range, the pilot has only to glide down the edge of the beam in order to come to earth at the correct landing point.

From the moment he reaches the boundary of the aerodrome the pilot steers his machine so as to keep the junction of the two indicator needles (see Fig. 2) dead in the centre of the dial, as shown by the middle diagram. So long as he does this he can make a proper landing in the densest fog.

## THE LINK BETWEEN

(Continued from page 262.)

"smashing," "stunning," "amazing," "stupendous" and so forth.

The fact of the matter is that Camco's have got a sale on—at least, not exactly a sale, but something that is the equivalent. They are offering to "P.W." readers the remaining stocks of last year's radio and other cabinets at exceptionally reduced prices. Now is your chance if you want to pick up a really excellent cabinet at rock-bottom price.

London readers are recommended to visit their showroom at 24, Hatton Garden, Holborn Circus; but others not so fortunately placed can still avail themselves of this opportunity by writing to me, through the medium of our postcard service, for a catalogue in which the reduced prices will be marked. (No. 85)

### The Mountain Going To Mahomet.

The "His Master's Voice" National Show Train (see photograph on page 266) has now completed the first stage of its 3,000-mile tour.

This remarkable train is more than 160 feet long, and it is to visit over 60 towns in all parts of the country. The train is virtually a mobile showroom in which over thirty different radio receivers, gramophones and radiogramophones can be seen and heard. The exterior of the train is strikingly finished in chromium, orange and cream, and it has on board its own power station.

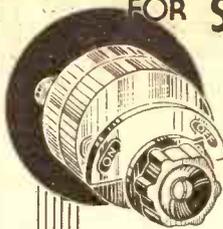
"It becomes," Mr. Louis Sterling, the Managing Director of the Company, told the Prime Minister at the inaugural ceremony, "really a case of the mountain going to Mahomet. With the co-operation of the railways it will enable thousands of people throughout the country to inspect the latest developments in ultra-modern surroundings."

Admittance can be gained by tickets only, which are available from the local H.M.V. dealers.

### OUR POSTCARD SERVICE

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

## BULGIN FOR SWITCHES

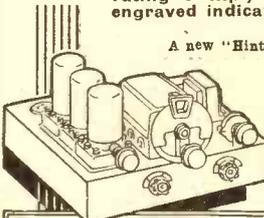


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## THE LISTENER'S NOTEBOOK

Comment and criticism on recent B.B.C. programmes.

I AM getting very tired of the strong American flavour of British dance bands, and particularly weary of some of our vocalists. Every Jack one of them sings in the same way, and much too often as well. There was a time when these vocalists made only a small contribution to a programme; now they are to be heard in every number. Often they are the number itself. Dance music is not progressing like most of the other radio fare. Why? Because dance bands have made themselves such slaves to the American pattern.

Why doesn't some leader have courage enough to cut himself right away from this American bondage? Café Collette should supply all the encouragement he needs. What an opportunity for someone to start an all-British band which would play all-British music expressive of the British character!

Who was the genius to write that number, "Mamma don't want no peas an' rice an' coconut oil"? If that's the best they can do for us, after all these years of dance music, it's high time we had a change. Did you ever hear such words? Come, come, you dance-band leaders! We listeners haven't sunk to such a low level of intellect that we must have such rubbish foisted on us.

An evening's broadcasting that gave me much enjoyment was that, consisting of "Bands Across the Sea (No. 1)." News followed by Mr. Crossman on German Labour Camps; Prince George's speech from Grosvenor House; "The Gesture," by E. M. Delafield; and, lastly, James Agate's talk on the theatre. All within the space of two hours. Not that every item was first class.

I thought, for instance, that Jay Laurier was good material just wasted in the first item. Give him something funny to say, and you bet he'll say it all right. If Bert and Biddy were introduced to help Don Sesta's band, then all I can say is that they were unnecessary. This band can quite well stand on its own legs.

"The Gesture" was a simple, straightforward play with nothing very exciting about it. A babel of noise almost blotted out the first five minutes of the dialogue, and it was always likely to break-out afresh. Yet, on the whole, it was easy listening and pleasant withal, although it brought back memories of our own bad crossings.

Mr. Crossman on German Labour Camps was most interesting. I am very fond of these short talks coming at the end of the news. They are invariably good, and they have the added recommendation of being brief. James Agate was the turn of the evening. He was tremendously informative and tremendously amusing. I don't remember him ever being in quite the same humorous vein. He even amused himself. It was obvious that his own suggestion of the two tubs labelled respectively "Ladies" and "Gentlemen" tickled him hugely. And it did me, too.

I listened to "Fidelio" with a certain amount of pleasure. The language difficulty does affect our enjoyment of these operas, of course. We are often in the dark as to what is happening. This isn't a hint that we should have an English version of the opera where possible. Not at all. Perhaps "Fidelio" will be best remembered by that incident which might be written up under the title of "Opera and Society and Sir Thomas Beecham."

As was only to be expected, June made a distinguished broadcast in *Charlotte's Hour*. Her articulation was excellent. Her voice has quality. A combination not very common. I am afraid, though I thought the other ladies in the cast weren't much inferior to her in this respect, but one of them sang with a gusto that was hardly necessary. One noticed that Uncle André relied to a large extent on one author for his tunes. I was a bit surprised at this, as these tunes weren't of outstanding merit. André himself as a composer is in a class by himself. He is the essence of amiability.

That series of Midland Regional talks called "Choir and Cloister" is worth noting. I listened to "Lincoln." The narrator, Walter Pitchford, knows his subject inside-out; nor does he smack of the

guide-book. He speaks with an intimacy and sincerity that reveal a true love of his subject. Lovers of our cathedrals will need no inducement to listen to the series *in toto*, but to others I can recommend that they give the next talk a trial. They may be pleasantly surprised.

"The Private Life of Don Juan" in the making, relayed from Elstree, was interesting enough, although it was just a magnified version of what we've already had in the "In Town To-night" series. Mr. John Watt worked very hard and kept his questionnaire going splendidly. His interview with Mr. Douglas Fairbanks was the best bit of the show. The latter spoke with the greatest optimism about the future of British films.

Mr. John Evans told, at times with vehemence, his all-too-true story of the pitiable plight of the unemployed. These talks will bring home to many listeners facts of which they were hitherto ignorant, and it is to be hoped that they will also help to bring to the unemployed a happy issue out of all their afflictions.

C. B.

## HAVE YOU SEEN IT?



The H.M.V. Special Radio and Gramophone train—seen here at Paddington—is now on its tour through Britain. The inauguration ceremony was attended by the Prime Minister, who watched with great interest the "christening" of the train by a seven-year-old Scots girl as she broke a "valve" of champagne on the symbolic record shown in the photograph.

## TELEVISION FROM FILMS

(Continued from page 247.)

At first glance it might appear impossible to use one of the normal disc methods of scanning in this case, but it is actually done with the aid of a special system of lenses.

Here, for example, is a verbal outline of a simple method which has actually been used for film transmission with an ordinary receiving-type disc. Behind the film a powerful light is placed, and after passing through the film the beam reaches a system of lenses which projects an image of each picture on to the surface of the scanning disc.

### The "Flying Spot" Again.

The process so far is very much like the normal procedure in projecting a film, with the difference that the picture is thrown on to the scanning disc instead of a screen. Behind the disc there is a further lens system which collects the light coming through the holes in the disc and directs it into a photo-electric cell as usual.

Another method practically reverses the arrangement I have just described. The source of light is placed behind the scanning disc, and the "flying spot" which results on the farther side is focused down by a series of lenses until it only just covers the tiny area of the film picture, or "frame," as it is called.

## HOW TO MAKE A DUAL-RANGE COIL

(Continued from page 255.)

The end of this second half of the long-wave secondary is taken to terminal 3, to which two other wires are joined. These are: the end of the lower winding in the bottom slot, i.e. the long-wave aerial coil; and the beginning of the reaction winding.

The latter is the lower winding of the top slot, and the end of it goes to terminal 6. Those are the complete connections, and all that remains now is to finish off the coil.

The former is first fixed to the base by a nut and bolt, the bolt passing up through the ebonite base and through the hole in the metal angle piece attached to the bottom of the former. The "run" of this bolt is illustrated in the small sketch. To get the nut on to it, it may prove necessary to slacken off somewhat the bolts which hold the angle piece to the former.

### Finishing It Off.

A thick washer, or two or three thin ones, must be placed between the ebonite and the angle piece to lift the former a little, to ensure the heads of the bolts which secure the angle piece do not foul the aluminium ring, and to give clearance between the bottom slot-ring and the nuts which hold the aluminium ring in place.

The final job is to slip short pieces of systoflex over the wires going to the terminals, after which the wires can be replaced under the terminal nuts and the latter tightened up.

The coil is now ready for fitting into a circuit, as indicated in the centre diagram on page 255. In a circuit employing an H.F. stage, two coils will be needed, the reaction winding (terminal 6) not being connected in the case of the aerial coil.

In this case the photo-electric cell is placed behind the film and operates on the variation in the amount of light getting through as the scanning spot travels over the picture and encounters areas of varying density. Although this system is not so easy to adjust accurately, it has certain definite optical advantages, chiefly in the matter of requiring a much less powerful light, and it seems to be considered the most practical method yet devised.

Now, I'm afraid I am treating the whole subject very briefly, but the fact is that it is a very large one, and I can only hope to give a general outline at this stage. However, I have worded my descriptions with some care, and I am satisfied that the essential information is there, although it is presented in such concentrated form that it may be necessary to read it through once or twice.

Another important system of film transmission is that known as the variable-speed method, but this has already been described in "P.W.," so I will content myself by reminding the reader that it functions with the aid of a scanning spot which travels at a speed that varies in accordance with the brightness of the particular detail of the picture which is being transmitted. When it crosses a bright area it travels slowly and speeds up in covering a dark part. This, of course, is essentially a task for the cathode-ray tube.

# TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

## Tunable Hum.

WHAT is called "modulated hum," or "tunable hum," causes quite a deal of trouble these days, and often enough people who suffer from it do not recognise what it is and assume it is an ordinary mains hum, which perhaps cannot be cured. A typical case is when you tune-in a powerful local station and get a very loud hum on that station only, the set behaving itself quite well over the rest of the dial.

It is caused by the hum from the mains part of the set being modulated by the strong local signal. Generally you can get over the difficulty quite simply by the use of a pair of condensers of, say, 1 microfarad each, joined together in series, the centre-point being connected to earth, whilst the two outside terminals are connected to the two anodes of the rectifying valve. A pair of condensers used in this way is sometimes called a "buffer-condenser," and three-terminal condensers specially for the purpose are obtainable on the market.

## Connecting Transformers in Series.

I have been asked several times whether it is possible to connect two L.F. transformers in series in order to get a greater step-up ratio. By connecting them in "series" people mean, of course, connecting the two primaries in series and the two secondaries in series, treating the combined primaries as one primary and combined secondaries as one secondary.

At first sight it would seem obvious that the total output voltage would be equal to the sum of the output voltages of the two secondaries taken separately. But if you think about it for a moment you will see that it amounts to nothing of the sort, because—assuming for simplicity that the two transformers are identical—you have twice the number of turns in the combined primary and twice the number of turns in the combined secondary, so that the ratio of the combined primary to the combined secondary is exactly the same as the original ratio. Another way of looking at it is that the voltage available for applying to the primary is spread over the two primaries in series, and therefore each only gets half the original voltage.

## Improving the Response Curve.

Although this arrangement is of no use for the purpose of increasing the step-up ratio, it nevertheless may be useful in improving the response curve of the whole outfit. In fact, it has actually been found that using two transformers in series in this way sometimes gives a very much

flatter and more uniform response curve, more free from resonance points than either of the transformers singly.

For this reason it is well worth trying, if you happen to have an additional transformer doing nothing, and I have known, in my own experience, a great improvement in the quality of output to be obtained, especially in the lower register, by this dodge, although, as I say, the doubling of the voltage is a delusion.

## What Ratio Should Be Used ?

Another problem which often troubles people, especially beginners in radio, is the question of the ratio for a low-frequency transformer. I assume everybody knows that theoretically the output voltage bears the same ratio to the input voltage as the number of turns in the secondary bears to the number of turns in the primary (incidentally, in practice the ratio of voltages often falls very far short of the ratio of turns, as this depends a great deal on the efficiency of the design of the transformer and the quality of materials and so on).

However, when using what we may term a general-purpose valve, with an amplification factor of 20 or more, you will usually find that a step-up ratio for the low-frequency transformer of about 3 to 1 gives sufficient amplification. If you go much more than this in these particular conditions you may run into instability in the set.

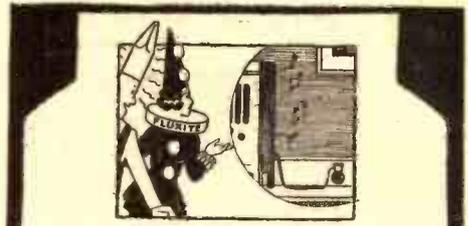
## Avoiding Valve Overloading.

If you have a valve which is not so sensitive, especially when you use a single low-frequency stage, it may be permissible to go to a higher ratio, say as much as 6 to 1.

The important point to keep in mind always is the question of overloading the following valve, and if you are to avoid distortion you must take care that the signal voltage, which is applied to the grid of the succeeding valve, does not exceed a certain value, depending upon the valve itself; this value is sometimes called the "acceptance" of the valve. A useful rule to remember is that the input grid voltage, or rather the maximum peak voltage of the same, should not be more than about half the specified grid bias of the valve.

Obviously, if you push into the valve a greater signal input than the valve can accept, you will be sure to produce overloading and consequent distortion. This question of overloading should be borne particularly in mind when you use more than one stage of L.F. amplification.

(Continued on next page.)



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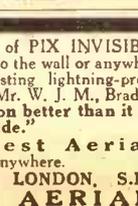
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## TECHNICAL NOTES

(Continued from previous page.)

### "Straight" Set or Superhet?

I was asked the other day by an experimenter whether he should build a superhet receiver, or a "straight" set using two screen-grid H.F. amplifiers. I should explain that he has had a good deal of experience in set building and is perfectly well qualified to operate either type of receiver, his interest being mainly in the building and operation rather than simplicity of control. The superhet can, of course, be arranged with single-knob control, but that in itself did not specially interest my friend.

After considering the matter carefully, I came to the conclusion that he would get more fun out of building and operating the two screen-grid set (following with det. and 2 low-frequency amplifiers) than with the five-valve superhet which he was contemplating as an alternative, particularly as the range of the two should be pretty well the same.

I do not know what you may think about this choice: I expect some of you will be disappointed that I did not recommend the superheterodyne. On the other hand, there is plenty of scope for skill both in the construction and the operation of a straight set with two S.G.'s on the H.F. side.

### The Changing Atom.

Most of us have been brought up with definite beliefs about the structure of the atom. These, it is true, have been slightly varied from time to time, but, generally speaking, we have become quite accustomed to the idea that the atom has a central positive nucleus which is surrounded by a number of flying electrons, each in its own particular orbit, like a sort of miniature solar system.

According to some research work just recently published; however, it is said that the theories on which this view of the atom is based have left out important factors. The Rutherford atom, as it is sometimes called, is supposed to have the mass mainly concentrated in the nucleus. This new atom—by which I mean this new theoretical atom—has a light nucleus with heavy masses surrounding it.

### Many Things Unexplained.

It is claimed that this new theory as to the structure may account for many things which the previous theories did not explain. I dare say you know that there are plenty of things which are not explained by existing theories of the structure of the atom, just as there are plenty of things which are not explained by scientific theories on most subjects. I say this not in any critical way, but merely as a statement of fact. Indeed, it would be extremely unusual to get a theory which precisely and in every detail fitted the observed facts of any physical phenomenon.

### A Bag of Mystery.

With regard to what we may call the "old" atom, it has been said that "the whole mass is relegated to a little central bag of mystery as inaccessible to common

methods of investigation as the centre of a hot star, of which almost anything may be averred, and frequently is, without its seeming to matter very much whether it is right or wrong."

Amongst the claims which are made for the new theory are that it explains what causes atoms to unite with one another, to emit X-rays, to disintegrate, to conduct electricity (or to be a non-conductor, as the case may be) and to have metallic, magnetic and other properties.

Those of you who are interested in this latest work may read more about it in a new book called "The Atom" by Dr. J. Tutin.

### The Popularity of Superhets.

I made some observations in these Notes the other day about the increasing popularity of the superhet. I pointed out that since the superhet was first introduced some years ago reception conditions had changed very greatly in such a way as to bring more and more into prominence the peculiar advantages of the superheterodyne receiver. On top of this the superhet of to-day is a very different proposition from that of seven or eight years ago. It is much simpler to operate and is altogether a more practical proposition.

## NEXT WEEK

### HOW TO BUILD

### THE MIDGET PORTABLE

AN IDEAL SUMMER RADIO COMPANION.

There are many reasons for the increasing popularity of the superhet, and one of them lies in the fact that it has such great selectivity and distance-getting qualities. In view of the increasing congestion of the ether this question becomes more and more important.

### A "Radio Pen."

A new radio invention has just been publicly demonstrated in America, known as the "radio pen," a device for transmitting and receiving writing, printing or drawings by radio. This has been invented by Mr. J. V. L. Hogan, the well-known American radio engineer, and in the demonstration images were sent out and reproduced in facsimile by a recorder five miles away. It turned out comic pictures, a bridge problem, an outline drawing for children to paint, and then, in accompaniment to a sound broadcast, it was used to illustrate a child's story and to send a radio map for a spoken description of a motor-car tour.

The device gets its name from an electrically operated pen, controlled by the incoming signals, which is impressed upon a sheet of paper so as to make the image. The apparatus is housed in a metal cabinet about the size of a typewriter case and incorporates a motor which serves to move the pen across the paper and to turn up the paper line by line. It can be used as an attachment to an existing radio receiver.

**JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E., the most popular and successful designer of home-constructed receivers in the world, writes a long instalment of his Armchair Notes, as well as giving you the benefit of his unique radio experience in a page of replies to readers' questions in the June issue of**

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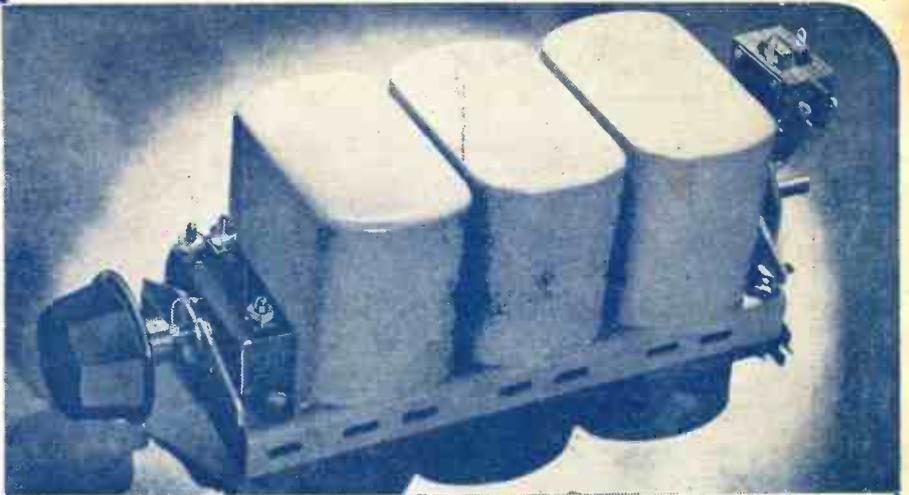
**Instructions for building a modern A.C. Radiogram—some new ideas on Television—topical hints and tips for obtaining better radio—news about broadcasting and broadcasters—a special article on the early days of B.B.C. programmes—reception conditions and notes—all these are outstanding contributions to the June issue of**

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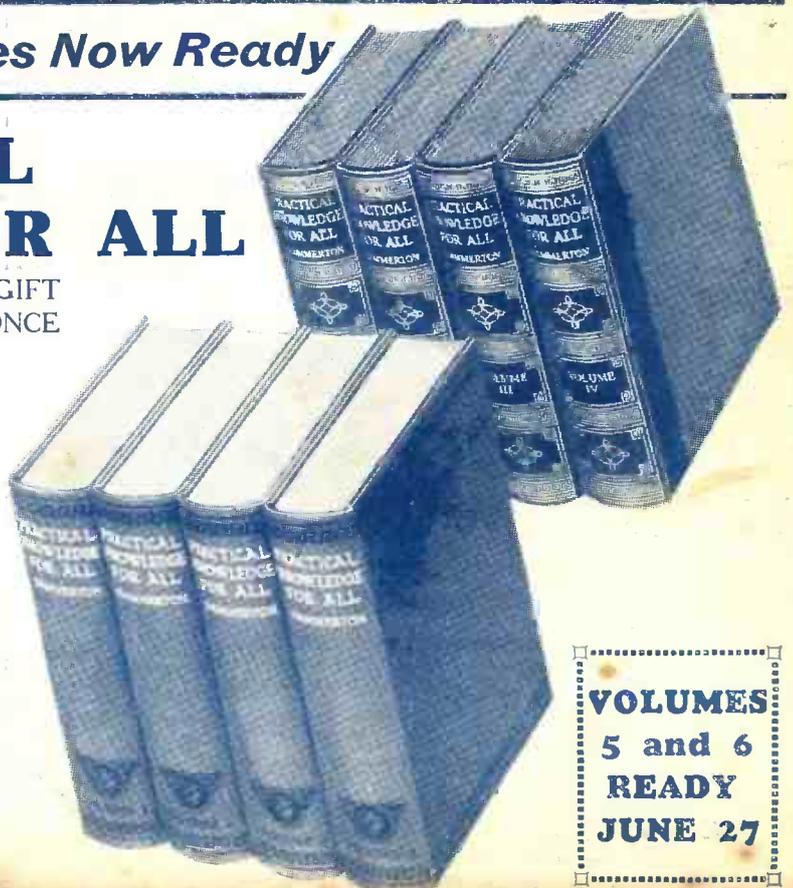
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# "FAKING" SOUND REPRODUCTION (SEE PAGE 280)

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# Popular Wireless

SILENCING YOUR MAINS

THE B.B.C.'S HIGHLAND STATION

HOW TO IMPROVE SHORT-WAVE RECEIVERS

No. 625.  
Vol. XXV.  
May 26th, 1934.

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*You can Build*

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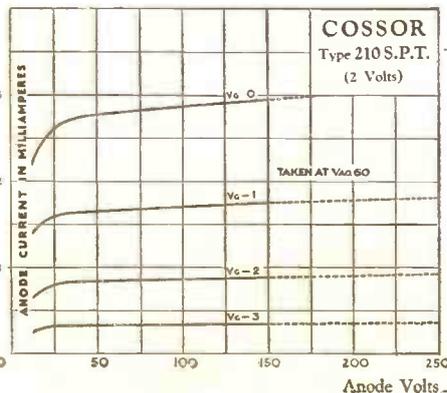
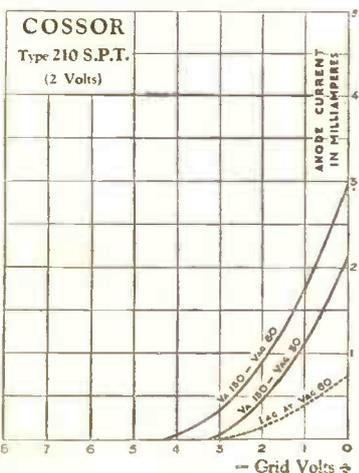
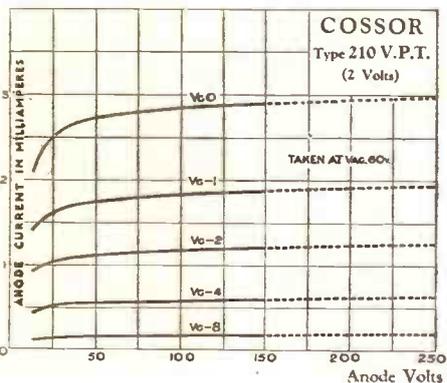
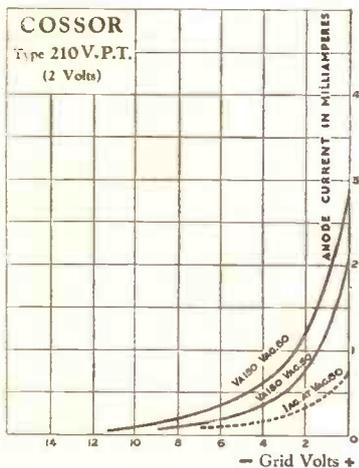


KINGS OF THE AIR

# TWO NEW

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# POPULAR WIRELESS

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FINDING WORK  
MORE RED TAPE  
DE-BUNKING  
RADIO VOTING

## RADIO NOTES & NEWS

PUNJAB'S PROBLEM  
CLEAR WHISTLES  
MUSICAL MILKING  
TELEVISION NEWS

### Why Not Try It?

A YEAR or so ago I suggested in these Notes that the B.B.C. should assist the unemployed by broadcasting news of vacant situations. Nothing of the kind has been done, and I suppose that, even if it were considered, a large number of very fine reasons against the experiment would be unearthed. I can see plenty of practical difficulties myself.

Meantime, it has been tried in Hungary, and during 1933 work was found for 7,000 people by means of a radio labour exchange.

### Chilly "Customs."

IN the same hour that I read about the Turkish Customs demanding duty upon the wreath which the recent pilgrimage party took to Anzac, I came upon a report of Prof. J. S. McLennan's lecture to the I.E.E. on the subject of "Electrical Phenomena at Extremely Low Temperatures."

Now, for the low temperatures required, use is made of liquid helium, and some of that would have been very useful at this lecture; but having been discouraged on previous occasions by *customs duty and red tape*, the Professor had not brought any from Leiden, where these classic experiments were born.

### The Champion De-bunker.

BROWSING idly amongst some North-country papers, what should my eyes meet but the effusion of the King of De-bunkers. How he wallowed in his bath of bunk! Henry Hall's band is the worst on the wireless! The variety "compèring" is "supposed-to-be-clever tripe." Chris Stone—well, "surely anyone can put a record on a gramophone." Thus he.

I now turn to the result of a vote on light entertainment recorded by over one million listeners. First place, Gracie Fields; second, Henry Hall; third, Chris Stone.

### America's Applause Meter.

THE device to which I referred a fortnight ago for enabling listeners to vote by lighting electric lamps was, I thought, intended to be used for ascertaining whether a given programme

item was deemed worthy of applause. I find, however, that the U.S.A. radio people are more interested in learning how many listeners a certain station has at a certain time. They live by selling "ether time." There is a conflict of opinion in America

### ON OTHER PAGES THIS WEEK

- .... "The surest way of dispensing with hand-capacity effects on short waves is to add a screened-grid stage of H.F." Page 277
- .... "Why is it that the quality of the headphone is so pleasing?" Page 280
- .... "An ordinary house-fly alights upon a steel bar, a quarter of an inch square. What happens?" Page 286

about the utility of the radio voter, arising from the belief held by some people there that radio "circulation" is not susceptible to exact measurement. Quite so! But the volume of "applause" for one artiste, compared with that registered for another, would be useful to the B.B.C.

### WILL HE BROADCAST?



Mr. Richard Austin, the 31-year-old musical director of the London Coliseum, is to succeed Sir Dan Godfrey at Bournemouth. The commencing salary will be in the neighbourhood of £1,000 a year. It is likely that the broadcasts of the Bournemouth Orchestra will continue under Mr. Austin's direction.

### Are Punjabis Bored by Radio?

THE Punjab Government is considering plans for experimental broadcasting in rural districts, using an ex-B.B.C. transmitter. The object of the experiment is said to be to find out whether a satisfactory programme can be broadcast which will interest the listeners after the novelty has worn off. How like home! Why, that is precisely what we wish the B.B.C. to do. I hope that the Punjab and the B.B.C. will pool their findings.

### The Nameless Club?

SINCE last October monthly meetings of "hams" living in the Shortlands, Beckenham and Bromley districts have been popular, and I hope that before long we shall see a great Kentish radio club in full swing.

The repeated invitations of one of the live wires of Shortlands to pay him a visit, and my repeated excuses, make me feel a little ungracious; but the veil is not mine to lift. And why am I so often credited with residence in that snug suburbia? Are there not handsome and accomplished journalists everywhere?

### A "Strong" Choir.

THE Kilsyth Male Voice Choir, whose fine work has won for it premier awards at most of the Scottish musical festivals, consists largely of men employed in coal mining and stone quarrying. (How do they keep their whistles clear?)

That they are a stout-hearted set of fellows is proved by the fact that during the general strike of 1926 they tramped eleven miles to compete at the Glasgow Festival, won first place in the open section and tramped back the same night.

### Inquiry for Glasgow.

WOULD any member of a wireless club within reasonable proximity to the Pollokshields district of Glasgow kindly get into touch with Mr. J. McDougall, 8, Leven Street, Pollokshields, Glasgow, who is anxious to hear about any such body?

The Shettleston club is too far from his home. Perhaps here may be an opportunity

(Continued on next page.)

# THE RADIO SET IN THE MILKING SHED

for Mr. McDougall or another to found a new club in his own district.

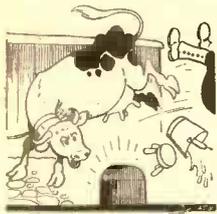
## More P.R.S. Royalty News.

THE Performing Right Society has proposed a new and lower scale of royalties for residential hotels and boarding houses, covering the entertainment of guests by music, and radio apparatus is included. For sets or gramophones, excluding radiograms, the yearly royalty is a guinea for a maximum of 15 bedrooms, with a guinea extra for each additional 15 bedrooms.

For radiograms or sets plus gramophones, the fee is £1 11s. 6d. for 15 bedrooms, with £1 11s. 6d. for each additional 15 bedrooms. Who would have thought that the composer of "I travel the road" would compute his earnings at so much per bedroom!

## Musical Milking.

A GLOUCESTERSHIRE farmer, having visited a very up-to-date agricultural show, made his ancestors roll over in their graves by installing a radio set in his milking shed, in the faint hope that the delivery per cow would be facilitated and, possibly, augmented.



The experiment was a dismal failure. The cows kicked, plunged, sulked, snorted and did everything that

bad, bad cows usually do.

A friend of mine who heard of this took a walk to the farm and asked permission to see the thing tried out again—and got the same results. But he found the reason. The milkers were unconsciously trying to beat time to the music with their hands!

## The "Latest" about Television.

THIS week's dictum is that of Mr. C. A. Wall, of the National Broadcasting Co. (U.S.A.), who declares that, although television transmission is all set and ready, the receiving apparatus is still too expensive for mass distribution.

Television seems to be like the Promised Land, but I hope the regulation forty years in the wilderness will be considerably reduced for us. If it is not, my great-grandchildren will have to describe the screen scenes to me—if any. I mean if there is any me worth bothering about.

## Yet Another Society.

A TELEVISION society has been formed for Cheshire and South-West Lancashire, and all those interested can get particulars from the Secretary, c/o Messrs. Jensen and Base, 223, Seaview Road, Wallasey.

It is hoped to carry out television transmission as well as reception, and intending members would help the organisers by stating their present activities in television and what type of apparatus they have. A meeting place will be arranged at an address most suitable to the majority of members. Good scanning to the new venture!

## Stand Up and Blow.

EVER restless, the Americans have now turned their fevered minds to the task of improving radio orchestras, with the result that the musical director of the N.B.C. has discovered that when an orchestra plays standing there is "a marked tonal difference."

One can well believe it. I notice that the pianists, cellists and harpists are exempted from the vertical position, and therefore I beg to suggest that the conductor should kneel.

Let them try also the effect of a recumbent三角list and a saxophonist suspended in mid-air like the pantomime fairy.



## ON THE AIR NEXT WEEK

### GRETA KELLER

[National programme, June 1]

Some years ago this Viennese singer journeyed to America, with a reputation built entirely by the B.B.C. She went to New York to appear in a revue. Something went wrong with the revue, so, instead, she became a star of radio, appearing with Rudy Vallée. She has broadcast on more than fifty occasions in London.

## Condensed Communications.

E. B. (Oslo).—Welcome letter too late for use. Thanks. Glad you got required copy of "P.W." J. N. (Cheam).—Darn it! I seem to have aroused a hornets' nest of chemists, bless 'em! Try the "Analyst." F. S. (Rochdale).—Another poet. Hum! Try clay modelling. G. P. R. (Wrexham).—There are no reasons why we cannot communicate with other inhabited planets except that we cannot do so. Which seems to be fairly conclusive, eh?

## The First Wireless Comedian.

THE recent death of John Henry was a shock for listeners who remember his great popularity of only a few years ago. Contrary to rumour, there was no break between him and the B.B.C. They were, in fact, considering another engagement when his death was announced.

## The Plumber Up to Date.

RADIO devices are more and more being called upon to help us wrestle our way through this vale of tears and smiles, though I believe they cannot cure love-sickness or acute feminine verbosity.



Officials have recently hunted a leak in the water mains of an Ohio town which was said to be losing a million gallons a day, and they used a microphone amplifier for the job.

When the gurgling of the leak was at last heard they could hardly believe their ears,

because the maps showed that the mains did not run there. However, radio cannot lie. So they dug.

Fifteen feet down they found an old, forgotten spur of the mains.

## The Veteran's Lament.

A. J. G., of London, N.20, in a letter which is full of kind words for "P.W.," pipes a lament for the good old days when the construction of a receiver was like a feat of conjuring and the actual reception of signals unbelievably thrilling. Nowadays, he wails, sets can be made and worked in one evening by anyone. In a nutshell, he wants "P.W." to give old-timers like himself "something hard to bite on."

Sighing heavily, I have to remind him that scarred old warriors are in a tiny minority; the present radio generation must be served, as he well knows. Yet I think that, with his experience and his knowledge of the fundamentals of wireless, he should have no difficulty in helping himself to find problems worthy of his skill. Ultra-short waves, television—is there nothing now to be done, my friend?

## "To What Base Uses . . ."

IT is said that the devil can quote the Scriptures when it suits him, and I am reminded of this by the use to which a radio set was put by three bold bandits of Marseilles.

Entering the flat of M. Matta, an antiquary, they demanded to be told where he kept his valuables. M. Matta, thinking that the inquiry was prompted by other than anti-quarian interest, lifted up his voice and yelled for succour. Whereupon the bandits switched on the wireless set and, under cover of its blare, smote M. Matta and masked his outcries, process continuing until M. Matta became a "yes-man."

And the next, please.

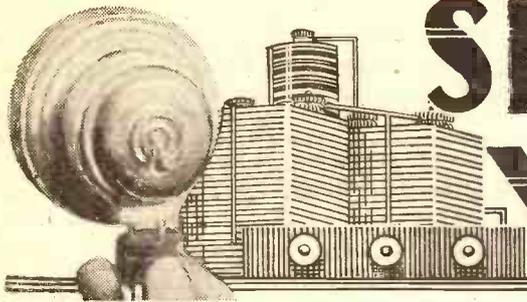
## Strictly Private.

MY old pen pal, F. W. (Plymouth), asks me where I intend to spend my holidays this year. Answer: Half of them at home; the rest at Bournemouth. He is pining to get me well and truly be-misted on his native moors, I know. F. W. then goes into a trance and sees all "P.W." sets rise up before him, and the one which lingers as the others fade is that old "Magic Four"! My, what a set that was and/or is!

Ah, and I must not forget to mention that he aspires to establish a Chapter of the International Short-Wave Club in Plymouth. Come, dogs of Devon! Exeter has a Chapter of six. Shall Plymouth lag behind?

Any interested short-wave fans should write to Mr. F. Ward, 37, Embankment Road, Plymouth.

ARIEL.



# SILENCING YOUR MAINS

**C**ONTINUING our search for a complete cure of interference, we must now return our attention to the supply mains themselves and see what steps can be taken to render these innocuous as far as interference is concerned.

Here we have to deal with two distinct problems, both of which are bound up in the fact that the interference energy is being carried by the supply wires.

The first problem is to find some way of preventing this energy either from entering the house altogether, or, if we allow it to enter, to prevent it from "infecting" other conductors in the immediate neighbourhood.

Our second problem is that, if we accept the energy into the house wiring, we must so modify our H.T. smoothing apparatus (this concerns mains and eliminator users only, of course) so that the interference currents do not get into the receiver circuits.

Often the amount of H.F. that gets into the house wiring can be considerably reduced by fitting large H.F. chokes in the supply mains close to the electric meter; but a drawback to the fitting of these chokes is that the job is not one which the average amateur is likely to care to undertake except under expert supervision.

### A Straight Tip.

The wire of which they are composed must be of sufficiently heavy gauge to carry the full lighting and power load of the house, and they are consequently fairly bulky and difficult things to handle and mount.

In view of these difficulties and the problematic advantage to be gained by installing these large-scale chokes, I strongly advise amateurs to leave this job as a last resort, and then only to have the job done by a fully competent electrician.

It is, however, the only way out for the all-battery user who finds that his interference is cured when the supply mains switch is open; obviously, his trouble is due to H.F. currents in the lighting wires, and if the careful earthing of conduit and the aerial precautions indicated in previous articles fail to produce the desired improvement, he must fall back on this means of keeping the interference out of his house.

Let us now turn to problem two. We have accepted the interference currents into the house wiring, and they will be present at the point from which we draw power for the receiver.

### For A.C. and D.C.

We must devise some filter arrangement that will prevent this H.F. energy getting past the smoothing gear while offering no appreciable resistance to the mains "juice" itself.

Obviously, the details of such a device must vary according to the nature of the electric supply, but fortunately the two are identical in requirement.

For both alternating and direct-current supplies we shall require H.F. chokes which will carry the current taken by the receiver; this is not excessive—usually not more than 1 ampere for all-mains sets—so that these chokes need not be unusually bulky.

### Use Good Condensers.

These chokes will effectively block the path to the unwanted interference currents, and we shall now need a capacity path to carry them away to earth. The filter circuit is shown in the diagram. This circuit is

A.C. work as well—have a working voltage of not less than 250 volts, so that there is no danger of them breaking down and short-circuiting the mains. The condenser C1 may be as large as 2-mfd., whilst C2 and C3 should not exceed .1 mfd. each.

And now some details of the H.F. chokes. The size and winding details of these are far from critical, and, with the exception of the wire gauge, considerable liberties may be taken in order to use up existing material. Twenty-gauge enamelled wire should be used and a 2½-inch diameter Paxolin or cardboard former will be found quite suitable.

The greatest possible care must be taken in regard to insulation, since the full mains voltage will be present at all points in the filter circuit, but, apart from this, the amateur can go ahead without any particular instruction.

It may be desirable to mount the filter inside the receiver cabinet.

If the chokes are very close to the receiver wiring, induction may again rear its ugly head and allow a certain amount of interference to get to the set.

Undoubtedly the best place for the filter is in a separate box—which need be only quite small—away down beside the electric-power point. About 100 turns will be sufficient for each choke, and these should be wound in the straightforward solenoid fashion.

### Coupling May Be Advisable.

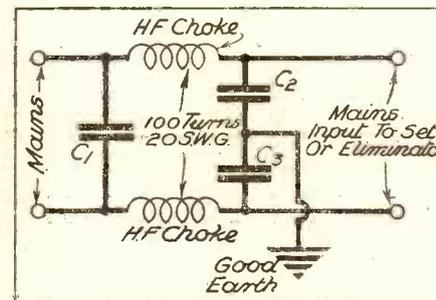
The earthing point between the two condensers C2 and C3 should be taken, if possible, to an earth separate from that to which the receiver is "grounded"; this is not always essential, but it may often be found that it is better to leave this point disconnected rather than to take it to a common earth with the set.

A certain amount of coupling between the two H.F. chokes is sometimes found to be an advantage, and they should then be mounted quite close together, but, of course, not so close that there is any danger of their touching.

By **BERNARD BARNARD**  
Our series of practical articles on "Destroying Man-Made Static" is carried still farther this week by a consideration of the supply mains themselves and of the steps which can be taken to render them innocuous.

suitable for both A.C. and D.C. The condensers must, of course—and this goes for

### "CHOKING OFF" INTERFERENCE



By means of this choke and condenser unit, connected, as shown, between the mains and the receiver power input, interference entering through supply mains (both A.C. and D.C.) can be lessened considerably, if not cured altogether. The connections and the winding details for the choke are given in the text as well as in this diagram.

## LISTENERS' LETTERS

### Our Book Offer—A Memory Aid.

The Editor, POPULAR WIRELESS.

Dear Sir,—May I take this opportunity of expressing my appreciation of your excellent Presentation Book offer?

My volumes arrived by return post, and even a slight examination of them revealed what a wealth of information is contained between their splendidly bound covers, the sections on Astronomy and Engineering being particularly well done.

Thanking you for the chance of obtaining these fine books at such small cost, and wishing continued success to "P.W."

Yours faithfully,  
J. C. WOODVILLE, Stud.I.E.E.  
Tan-y-bryn, Whittinton, Salop.

The Editor, POPULAR WIRELESS.

Dear Sir,—From time to time there has been published a formula for easily remembering and using Ohm's Law as below:

Current (amps.)  $\times$  Resistance (ohms) or  $\frac{V}{C \times R}$   
where you place your finger on the unknown quantity, the remaining factors giving you the answer to the problem.

But sometimes watts come into the calculations, and where these are concerned the following will give the necessary information:

Watts being volts  $\times$  amps., or  $V \times C$  the new formula becomes:

$\frac{\text{Voltage} \times \text{Current (amps.)}}{\text{Watts}}$  or  $\frac{V \times C}{W}$   
The two formulae can be used in conjunction with one another for all possible calculations.

Yours faithfully,  
A. L. MARTIN  
76, Seymour Road, Stapleton Road, Bristol 5.

THE B.B.C. is not easing off in its endeavour to get the public to use the twenty-four-hour system of time notation. But the trouble is that the public is not at all impressed and will not be cajoled.

My information is that the B.B.C. will carry on with the experiment much on the present lines for at least two months more.

#### Mr. Aylesworth's Visit.

Mr. Merlin H. Aylesworth, President of the N.B.C., contemplates returning Sir John Reith's visit.

When he comes to London he is likely to take a special interest in British television developments, which are supposed to be somewhat in advance of American methods.

#### "Derby Day."

Alfred Reynolds will conduct the Theatre Orchestra for the broadcast of "Derby Day," the comic opera in three acts which is to be broadcast for National and Regional listeners on Wednesday and Friday, June 6th and 8th respectively. Alfred Reynolds wrote the music for the opera, the book of which is by A. P. Herbert, for production by Sir Nigel Playfair at the Lyric, Hammer-smith, on February 24th, 1932.

Gordon McConnel, the B.B.C. producer, has made an adaptation of the original production, and it is hoped that Vivienne Chatterton, Philip Wade, Roy Russell and Bruce Anderson will take part in this revival. Stuart Robertson is also in the cast.

#### "Men Like Machines."

Martyn C. Webster will produce a new play for Midland Regional listeners, en-

#### MUSIC AND VARIETY.

**ARABELLA.**—Act. 3 of Strauss' opera relayed from Covent Garden (*National, Tuesday, May 29th*).

**PICTURE PEOPLE.**—A programme taken from the sound-track of recent film successes (*London Regional, Tuesday, May 29th*).

**RIDGEWAY PARADE.**—The return of Philip Ridgeway and several old favourites after a triumphant provincial tour (*National, Wednesday, May 30th*).

titled "Men Like Machines," by Edith M. Bulman, on June 1st.

The chief characters are a bullying manager, played by Stuart Vinden; an over-worked clerk, played by Denis Folwell, of Leicester; and a typist, played by Cecily Gay.

#### Welsh Variety.

The West Regional programme staff is still plugging away with the idea that Welsh variety programmes will one day be as good as those from English studios. A new artist has been engaged for the next show on Friday, June 1st—Malan Prytherch—who will sing some original songs at the piano, a type of entertainment rarely heard in Wales.

#### Strange Instruments.

The latest gossip of Pentrecwmcoryn (which it is hoped may become the Welsh equivalent of Hogsnoton) will be told by Gunstone Jones on the same evening, and "The Three Comrades," who have been heard in previous Welsh variety entertainments, will play popular tunes on strange instruments.



STARS AT HOME.—Mr. Hugh E. Wright, radio comedian, photographed at his Hampstead home.

## THAT 24-HOUR CLOCK!

### AND OTHER INTERESTING NEWS AND VIEWS ABOUT BROADCASTING

Another artist in the same "bill" is Haydn James, whose skill as a mouth organist is well known throughout South Wales, and particularly Pembrokeshire.

#### Novelist for Scottish Children.

Mr. Compton Mackenzie, the famous novelist, has chosen a story from his work and his favourite Scottish songs for broadcast in the Scottish Regional Children's Hour on May 28th.

It is hoped that this programme will be the first of an important series to which other well-known Scottish writers will contribute.

#### Northern Air Service.

The new air service between the North of England and the Continent, for which the Air Ministry has granted permission to the Royal Dutch Air Lines to run overland

## LISTEN TO THESE!

to Liverpool by way of Hull, will be inaugurated on Thursday, May 31st, with the arrival at Hedon airport of the first machine from Amsterdam.

The occasion will be the subject of a relay for North Regional listeners of a running commentary on the civic proceedings and the broadcasting of incidental noises—the roar of the plane engines and the cheers of onlookers.

#### In Wireless Touch.

The journey between Amsterdam and Hull is scheduled to occupy rather less than two hours, and throughout its flight each machine will be directed by wireless from the control point at Barton airport, Manchester.

#### Twenty-one Years of It.

Cranwell Royal Air Force College Band, conducted by A. E. Sims, gives its second Midland broadcast from the

Birmingham studio on May 27th.

Harold Mills, who gives violin solos during the interval, is conductor of Birmingham Repertory Theatre Orchestra. Except for war-time service he has been actively associated with the music at the Repertory since it was opened twenty-one years ago.

#### Isle of Man Race.

Major Vernon Brook, the well-known authority on motor racing, and Mr. Victor Smythe, who is responsible for all North Regional "outside" broadcasts, are to be the commentators on the first of this season's Isle of Man motor contests, the "race of the big cars," on Friday, June 1st.

Major Brook will describe the race at the Villa Marina grandstand (the starting point) and Mr. Smythe will be stationed at the Governor's Bridge.

#### Well Worth Hearing.

The race is over two hundred miles, and though the course has been considerably altered since last year, there are still enough hair-pin bends and other difficulties for the drivers to negotiate to make the race well worth watching and the commentary well worth hearing.

#### The Deepest Voice.

Who owns the deepest voice in Scotland? It would seem that Halbert Tatlock has strong claims to this distinction. He will be heard in "Bitter Brevities" on May 29th.

These "Bitter Brevities" are mainly of Mr. Tatlock's own composition, but may include some translations from the French.

Listeners who do not care for the macabre broadcast in sepulchral tones should listen to the alternative programme that evening.

#### Television Committee.

The names of those who will serve on the Television Committee have now been made public. Lord Selsdon will be chairman, with Sir John Cadman as vice-chairman; Mr. Noel Ashbridge and Sir Charles Carpendale represent the B.B.C.; Colonel Angwin, Mr. Phillips and Mr. J. Varley Roberts come from The G.P.O., while Mr. O. F. Brown, of the Department of Scientific and

#### TALKS AND PLAYS.

**A TEDIOUS BRIEF SCENE.**—A bucolic interlude for broadcasting adapted from "A Midsummer Night's Dream" (*West Regional, Thursday, May 31st*).

**MANNIN MOAR.**—A running commentary of this famous motor-car race in the Isle of Man (*North Regional, Friday, June 1st*).

**MEN LIKE MACHINES.**—A new play for the microphone by Edith Bulman (*Midland Regional, Friday, June 1st*).

Industrial Research, makes up the eight members.

#### The "Fantastic Battle."

Revivals of popular radio plays during the summer are to include the "Fantastic Battle," which is by Leslie Baily, the author of the renowned "Scrapbook" programmes. The "Fantastic Battle" will be heard early in July, and it is probable that the Dramatic Director himself will be responsible for the production on this occasion.

O. H. M.

# MORE ABOUT

# THE 'DOUBLE P.D.'



The success of a receiver does not rest merely on its design and its construction by the set builder; the "final touches" play quite a big part in the results that are obtained. In these the matter of trimming the variable condensers is of importance, and the process should be carried out with special care by the constructor.

This process and other details, such as the mains power-pack design and connections, are dealt with in the following article.

LAST week we discussed the main essentials of the circuit and construction of this unusual two-valve mains set—how it works and its general advantages. Now we must finish the story by dealing with such items as trimming and the power-pack connections.

But before we go on we want to make one point in the construction quite clear—a point that may be missed in the wiring diagram. We described how the grid terminal of the double-diode pentode is connected direct to the wire end of one of the resistances fixed in that little bunch of resistances and condenser on the H.F. choke near the V2 valve holder.

If you look at the wiring diagram carefully, however, you will see that under the fixed condenser is a hole in the baseboard marked "E," and through this passes a lead from the cathode terminal of V2. A simple connection, but one that could quite easily be missed or made wrongly if the diagram were not sufficiently carefully studied.

### The Mains Unit.

With the set completed, place the H.F. pentode in V1 and the double-diode pentode in V2. Connect up aerial and earth and loudspeaker, using the pentode tap on the transformer of any loudspeaker you may choose.

Taking the Eckersley "National Three" mains unit as a typical example of a suitable

P.D.," we connect the two leads from the heater terminals of the valve holders to the terminals marked L.T. on the unit and the H.T. to those marked H.T.+2 and H.T.—. The H.T.+1 and the G.B. terminals on the power pack are not used.

### Some Component Details.

Those who have not a copy of POPULAR WIRELESS for January 27th of this year can get one from the Back Number Department, Bear Alley, Farringdon Street, London, E.C.4, or they may decide to build a power pack off their own bat specially for this receiver.

Such a unit requires, firstly, the mains transformer of the 250-0-250 type to give 60 milliamps, and a rectifier filament

current of 1 amp. and a current of 3 amps. for the heaters of the valves in the receiver. A U.10 type of rectifier is employed.

The next requirement is a smoothing choke of good quality and a couple of 4-mfd. condensers for smoothing and reservoir purposes. A valve holder and the necessary odd terminals, mains plugs, etc., complete the unit.

The trimming of the condenser on the set is a task that has to be done carefully, for on accurate trimming depends the sensitivity of the receiver. First screw down the trimmers till they are quite tight, then undo them about two turns. Next tune in as weak a station as can be found on the lower end of the medium waveband.

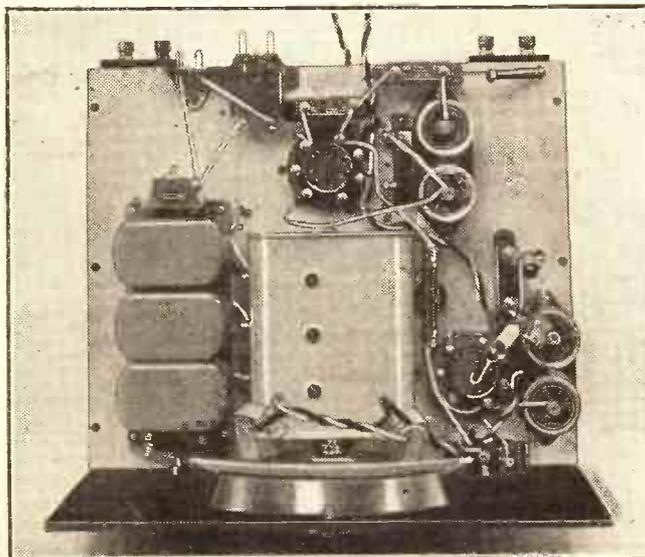
Adjust the middle trimmer for loudest results, and then try the one nearest the panel. This will be the sharpest of the three. If the station becomes loud, tune in another weaker one (not one that is fading, however, as this is most misleading when trimming is in progress) and retrim these two sections of the condenser.

### Keep the Capacity Low.

Finally, adjust the trimmer of the aerial section—that nearest the back of the set. Probably this will be fairly flat, but it must be adjusted carefully for all that. Remember throughout this operation that it is usually best to try to achieve a trimming setting with the lowest possible amount of trimming capacity—that is, with the trimmers not screwed down any farther than is necessary to achieve the object.

(Continued on page 289.)

## ABOVE THE BASEBOARD



A bird's-eye view of the "Double P.D.," clearly showing the three trimmers in the gang condenser. A piece of wood sharpened like a screwdriver is the best instrument for varying the settings of the condensers.

## THE PARTS REQUIRED—

- 1 Polar Star Minor .0005-mfd. 3-gang tuning condenser.
- 1 Polar Arcuate S.M. drive for above (marked in degrees).
- 2 W.B. 7-pin valve holders.
- 1 Colvern G1, G2, G3 3-gang iron-core coil assembly.
- 1 T.M.C.-Hydra type 25 2-mfd. fixed condenser.
- 3 Telsen type W.231 1-mfd. fixed condensers.
- 1 T.C.C. type 501 50-mfd. electrolytic condenser.
- 1 Dubilier 670 .01-mfd. fixed condenser.
- 1 Telsen .0005-mfd. fixed condenser.
- 1 Telsen .0001-mfd. fixed condenser.
- 2 Erie 1-watt .5-meg. grid leaks.
- 1 Erie 1-watt 100,000-ohm resistance.
- 1 Ferranti synthetic (new type) 25,000-ohm resistance.
- 1 Ferranti synthetic (new type) 20,000-ohm resistance.
- 2 Erie 1-watt 5,000-ohm resistances.

- 1 Graham Farish 1½-watt "Ohmite" 150-ohm resistance in horizontal holder.
- 1 Graham Farish 1½-watt "Ohmite" 50-ohm resistance in horizontal holder.
- 1 Bulgin V.C.29 5,000-ohm potentiometer.
- 2 Telsen type W.340 screened binocular H.F. chokes.
- 1 Belling & Lee mains plug.
- 1 Bulgin type F.15 combined mains plug and fuses.
- 4 Clix small type indicating terminals.
- 2 Peto-Scott terminal strips, 2 in. × 1½ in.
- 1 Peto-Scott panel, 12 in. × 8 in.

## —FOR THE CONSTRUCTION

- 1 Peto-Scott double Metaplex chassis, 12 in. × 10 in. with 1½ in. runners.
- 1 B.R.G. coil "Quikon" connecting wire.
- Screws, flex, etc.

### VALVES

- H.F. PENTODE. (V1)—Marconi or Osram—V.M.P.4.
- D.D. PEN. (V2)—Mazda AC 2 Pen.D.D.

### ACCESSORIES

- LOUDSPEAKERS.—Rola, W.B., Celestion, Blue Spot, R. & A., Marconiphone, Ferranti, H.M.V., Atlas, Ormond, Amplion.
- POWER PACK.—(See text.)
- AERIAL AND EARTH EQUIPMENT.—Electron "Superial," Goltone "Akrite," Radiophone "Receptru" down-lead, Bulgin lightning switch, Graham Farish "Fit" earthing device.

**SCREENING.**

The magnetic and electric separation of components or sections of a set. The simplest type of screening consists of a vertical metal partition placed so that the coils and other components in adjacent stages do not tend to indulge in undesired coupling effects. But partition screening is tending to give way to the individual screening of coils, etc.

Unless carefully applied, screening can result in considerable losses, particularly where tuning coils are concerned. The introduction of iron-cored coils has enabled screening to be carried out with relatively greater efficiency, for the iron-cored coils are small, and so their "cans" can be comparatively large without the whole component assuming undue dimensions.

When screening is applied to a coil not designed for it the inductance of the coil may be altered so that the coil no longer covers the desired waveband.

An iron screen will tend to increase the inductance if the losses in eddy currents are not large, but a screen of any other metal will tend to reduce the inductance.

Screening, or shielding, as it is often termed in the following connection, is not easily applied to low-frequency apparatus. Often the thin metal that is quite successful in an H.F. capacity is insufficient to accomplish any noticeable effect in the shielding of, for example, mains chokes and transformers.

Stout iron sheeting is required.

Generally speaking, all screens, whether of the partition variety or cans or casings on components, should be earthed.

Frequently it is necessary to resort to screened wiring in H.F. amplifiers in order to achieve stability. Where instability in an H.F. amplifier fails to be cured on the application of the usual expedients, such leads as the lead from the screened-grid terminal of the S.G. valve, control-grid leads, etc., should be screened with the flexible metal tubing sold for the purpose. Or, alternatively, screened wire all ready to use can be purchased.

OUR PAGE FOR ENTHUSIASTIC BEGINNERS.

**THE IMPORTANCE OF SCREENING**

FORMS THE MAIN SUBJECT OF THIS WEEK'S PAGE OF LUCID EXPLANATIONS OF FREQUENTLY USED RADIO TERMS

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

ence to PRIMARY will explain both SECONDARY CIRCUIT and SECONDARY WINDING.

**SELECTIVITY.**

The power to select a desired station while, at the same time, giving no ingress to any other station. The selectivity of a set primarily depends upon its tuning circuits, and, loosely, the more tuning circuits it possesses the greater will be its selectivity. Selectivity increases, with single or two-circuit-tuned sets, are seldom possible without a consequent reduction of sensitivity.

**SELENIUM CELL.**

A device for transforming light variations into current fluctuations. Selenium is a substance somewhat similar to sulphur. While it is kept in the dark it has a fairly high electrical resistance; but when light shines upon it its resistance drops very considerably, the actual extent of the effect depending upon the intensity of the light applied to the cell.

capacity." The larger the winding and the closer the proximity of the turns, obviously the greater will be the self-capacity. It is in order to reduce this as much as possible that the turns of wire on, for example, an H.F. choke are divided into sections.

Self-capacity is present in other pieces of apparatus. For instance, capacity exists between the electrodes of a valve.

Self-capacity in a coil gives it a natural frequency

words, it is a *short circuit*), and the current may rise to such an extent that it actually melts the wire.

A short circuit of a dry H.T. battery does not melt a connecting lead of normal thickness, because the current is limited by the internal resistance of the battery. However, the battery itself may be badly damaged by such treatment.

**SHUNT.**

A resistance for connecting across a meter in order to vary its range of measurement. The shunt diverts a proportion of the current. By means of shunts of various resistances one meter can be made to carry out a wide range of different measurements.

A simple method of using a shunt can be given by way of an example of the method.

A milliammeter is designed to read from 0-5 milliamperes, and it is desired to measure currents up to 10 milliamperes. In order to do

that it will be easy to see that half the current must be diverted from the meter. That is to say, when there are six, seven or eight milliamperes or any other current up to ten milliamperes flowing, only half must flow through the meter.

If it is known that the meter receives exactly half the current, then it is simple to calculate the actual current flowing merely by multiplying the meter reading by two.

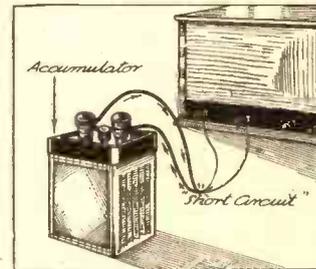
In order to halve the current a resistance must be joined across the terminals of the meter which is identically the same resistance as that of the meter itself.

A voltmeter works by current measurement. It may help you to think of it as a milliammeter having a very high resistance. The movement of its needle is caused by the current, and obviously the amount of current which will flow through it depends upon (1) its resistance, which is fixed, and (2) the voltage across its terminals.

From this it follows that a voltmeter can be made to give higher readings by placing resistance in series with it. In any case, it is not desirable to shunt resistance across a voltmeter, because it is generally advisable to keep its effective resistance up and to avoid reducing it.

Shunts are used with ammeters in high-power electrical engineering with the object of passing all the current except a small amount which goes through the measuring instrument.

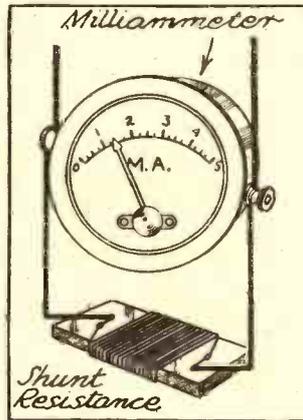
**LOW RESISTANCE**



The diagram above shows how the touching of two wires whose insulation is faulty causes a short circuit and sets up a path of very low resistance for the accumulator current.

On the left is illustrated the method of connecting a shunt resistance across a meter (in this case, a milliammeter) in order to give a different range of readings with the same instrument.

**VARYING RANGE**



**SELF-CAPACITY.**

Any two objects which conduct electricity and which are insulated from each other will constitute a condenser. The adjacent turns of wire on a coil will be at different potentials, and these are separated by the insulating material on the wire and must, therefore, form a small condenser. The total capacity built up from these small condensers in a coil is known as the "distributed capacity" or "self-

which is a product of this capacity and its inductance.

**SERIES.**

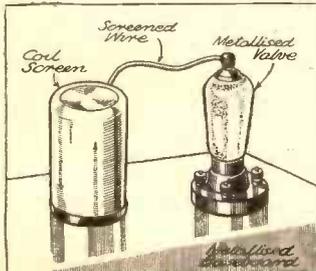
When two pieces of apparatus are connected together so that the same current must pass through each in turn they are said to be joined in series. Battery cells in series are connected so that their unlike poles are together—positive to negative and negative to positive.

**SHORT CIRCUIT.**

The introduction of a path of very low resistance. This may result in the current rising to a very high value and causing damage.

A typical short circuit is when the two leads of an accumulator accidentally touch. The path for the current is then of extremely low resistance (in other

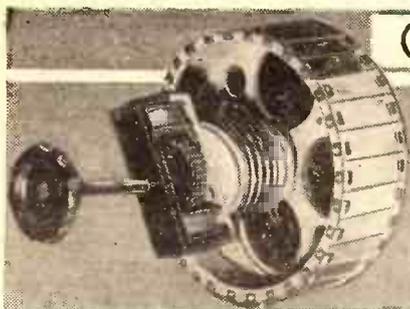
**WELL SHIELDED**



Four commonly used methods of screening—the coil "can," screened wire between coil and valve, valve metallising and metallised baseboard. In this diagram all the screening is confined to the H.F. stage. Screening at the L.F. end of the set is often not so successful.

**SECONDARY BATTERY.**

A term applied to the accumulator. Full details of this accessory have been given on a previous occasion, while refer-



G. P. Kendall, B. Sc., on Television

# LINING - UP THE MIRRORS

**T**HE best advice which can be given to the user of an assembled mirror drum or mirror screw is *not* to make any adjustment of the individual mirror settings unless he is quite certain that it is necessary.

Even if it is decided that the mirrors are out of line, it must be remembered that re-aligning them is definitely a delicate job which calls for care and patience. Unless the owner is prepared to spend time and trouble upon it he would be wiser to send the drum or screw to the makers for resetting.

### The Usual Indications.

The need does not often arise, of course, but there is always a chance that the situation may occur after some considerable time of service. I feel it is only fair to make these points quite clear before I proceed, because I am going to give actual instructions for carrying out the job, and I do not want to encourage anyone to tackle it without due warning.

It may be helpful to explain here how one may decide whether the adjustment is becoming necessary: the almost invariable sign is to be found in the appearance of one or more dark streaks running down the picture, sometimes with extra bright lines alongside.

The method of resetting which I am going to describe is a more or less standard one, but I shall give some practical hints as to the best ways of carrying it out which I think will be found to make a great difference to the otherwise possible difficulty of the task.

The method consists, briefly, in placing a sheet of white paper on the back of the viewing screen and observing the track of the light spot thereon when the drum or screw is turned slowly by hand. The setting of each mirror is then adjusted until the spot follows precisely the right track at each sweep.

All of which looks simple enough on paper, but it is apt to be far otherwise in practice unless one sets about the operation with certain precautions. The first point to be observed is that the sheet of paper *must* have a really dull surface: any trace of glaze will cause trouble.

### It Should Be Secure.

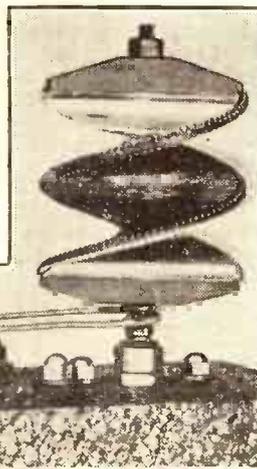
Secondly, the paper must be fastened securely in place. Lacking any other method, it can be fixed with a few spots of Secotinc, which can be washed off when the job is finished. This is important, for if the paper shifts during the operations one has no choice but to start over again.

Next, there is the question of getting a spot of sufficient brightness for easy

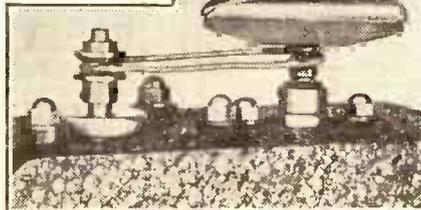
observation. If the apparatus includes a light valve such as the Kerr cell this must either be removed altogether, so as to give the light beam a clear path, or else persuaded to "open" sufficiently to let a fair amount of light get through.

Removal is usually advised, but is not always necessary. In many cases it is simpler to disconnect the leads running to the valve and apply to it instead a steady pressure of about 50 volts from a battery. This causes the valve to "open" sufficiently to let a fair amount of light through. The result is not so bright as that obtained by removing the valve altogether, but it may be good enough to serve, so it is worth trying.

Streaky reproduction, and the appearance of black lines, are caused by maladjustment of the scanning mirrors of a television receiver. In this practical article our popular contributor tells the owner of a mirror drum how he can re-align the mirrors for even and effective scansion.



A typical mirror-screw arrangement, partly dismantled, showing the belt drive and motor housing.



It helps, also, to do the work in as dim a light as may be found adequate to enable one to see what one is doing. It may even be worth while to fix up some sort of shade over the sheet of paper to darken it a little.

### Checking the Size of the Spot.

So much for preliminaries. Now to make a start on the adjustments themselves, the first step being to turn the screw or drum slowly by hand until the mirror is found which sends the spot down the screen at the extreme edge of the picture area.

Now check the adjustment of the various lenses in the optical system, making sure that the light spot is of the correct size. This will normally be done according to the instructions from which the gear was set up in the first place; but it may be useful to remember that the usual size of the picture area is 3 in. by 7 in., and in this case the correct size of the spot for 30-line scanning is a diameter of one-tenth of an inch.

This point being duly checked, mark the exact path of the spot down the sheet

of paper by drawing a pencil line to mark the outline of the streak which it makes. Now turn the drum to bring round the next mirror, which should send the spot down your sheet of paper exactly beside the line you have drawn.

### No Overlapping Must Occur.

There should be no space between, nor should there be any overlapping, and if this condition is not present the mirror setting should be varied until the desired effect is obtained. By the way, mind you get the right mirror when you start this step; the wrong one, i.e. the one on the opposite side of the mirror with which you began, will send the spot down the farther side of the picture area.

When you are satisfied with the setting of the second mirror, again draw a pencil line to mark the path of the spot and proceed to the third mirror. Once more see that it runs down the paper exactly beside the line you have just drawn, checking its path precisely as before, and then you can go on to number four, and so on until all have been tested and reset where necessary.

The work will take some time if it is done with the care and accuracy which it really needs; but so long as you are methodical and do not hurry you should be able to make a good job of it.

When you have finished, the sheet of paper should be covered with parallel pencil lines one-tenth of an inch apart, the spaces between representing the successive paths of the light spot as it sweeps down the picture. You can make a final check by turning the screw or drum back to the starting point, and then turning it slowly forward and watching the spot run down each pencilled track, keeping a sharp look-out for any signs of overlapping or other inaccuracy.

### Another Method of Setting.

An alternative method sometimes advised is to draw the complete set of lines before starting to trace the paths of the spot, and then adjust the mirrors until it follows each track correctly, but I have found this method less satisfactory in practice than it appears in theory.

The great difficulty is first to be sure that your particular outfit gives a picture exactly three inches wide, so that the one-tenth-inch spacing between the lines is correct, and then to draw the lines with sufficient accuracy. For these reasons I am suggesting the better-known scheme which I have described in detail in this article.



VAL GIELGUD—  
DRAMA  
DIRECTOR OF  
THE B.B.C.

## RADIO DRAMA— OR THE DRAMA OF RADIO?

ELEVEN YEARS OF  
OUTSIDE BROADCASTS

How many of you have ever seen a photograph of that most modest of all B.B.C. men, Gerald Cock? How many have even heard of Mr. Wood or of any other of the men whose job it is to take the microphone up and down the country in the green vans of the B.B.C.?

### In Search of Sensation.

In the early days of broadcasting new thrills were not hard to find. The novelty of radio was of itself sufficient to instil drama into almost any outside relay. The broadcasting of the nightingale, now an annual commonplace, was then considered little short of a miracle. What studio performance of "A Midsummer Night's Dream" could ever hope to recapture one half of the beauty and atmosphere of a relay from the heart of a Berkshire wood?

And so the microphone was sent to capture more of the dramatic. It went up in an aeroplane; it went with a diver to the bottom of the Thames, where it found, you will remember, nothing but empty bottles. It went to more than ten thousand places—horse races, football matches, exhibitions, opera houses. It caught and faithfully passed on the voices of kings and princes, of crossing sweepers and convicts.

For more than eleven years the drama has never deserted the O.B. department. It is harder, perhaps, to find new material for that voracious microphone.

WHAT was the most dramatic broadcast that you ever heard? Was it a Sunday afternoon performance of Shakespeare? Some thrilling stage play brought to the microphone?

Or was it, rather, some "unstaged" performance by people who were not professional entertainers? The roar of aeroplane engines in an international race? The sound of a vast crowd singing the National Anthem as His Majesty the King attended some sporting event? The silence of Armistice Day at the Cenotaph?

### Those Artificial Thrills.

Can artificial drama, the drama of the studio, ever hope to rival the natural thrills, the spontaneous emotions of an outside broadcast? I doubt it.

And yet we hear a great deal about the various departments of manufactured drama at Broadcasting House, and equally little about the men whose job it is to seek out and put over convincingly the all-important subjects of outside broadcasts.

Val Gielgud, Eric Maschwitz, Lance Sieveking: their names and photographs are well known to thousands of listeners throughout Britain and the Empire.

## The Station in the Highlands

—and news from Ireland.

WORK on the new B.B.C. transmitter for the North of Scotland is likely to start quite soon, after many months of doubt and delay.

At last a site has been chosen at Burghead which, although not in the centre of the district to be served, has been shown by the B.B.C.'s travelling van to be ideal for the purpose.

Ideal, that is, so far as local conditions will allow; for the B.B.C. engineers are not too hopeful as to the results. "Until recently," says the official statement, "it seemed that the results obtainable would not justify the building of a station."

And although a large proportion of the population in the North of Scotland will get an adequate service, a very much smaller proportion of the area will be served.

We can foresee Scottish fireworks in the not-far-distant future.

### Where Are the Plans?

Listeners in Northern Ireland, who were promised their transmitter—a high-powered affair of 50 or more kilowatts—some time ago are also getting restive.

Although a site has been chosen at Lisburn, near Belfast, no start has been made with the building.

In fact, we understand that the plans have not yet been completed.

### And Droitwich, Too.

Noel Ashbridge's announcement that the three English medium-wave National transmitters will not close down until about three months after Droitwich starts working is a welcome one.

The difficulties of long-wave reception are going to take some getting used to, and it will be essential to have a stand-by National programme on the medium waves.

But Mr. Cock has never once proved unequal to the task.

The life of an O.B. man is no bed of roses. Anything may happen, and yet nothing must be allowed to happen.

### The Man in Green.

There are none of the conveniences of a studio. The microphone must be suspended precariously in the most impossible places. Instant decisions must be made as circumstances alter with alarming suddenness. On rainy days they may have to hide their apparatus in a hen house. In the theatre a knockabout act threatens the microphone in the footlights. You probably heard of the mysterious "man in green" at the last Aldershot Tattoo. He was an O.B. engineer whose job it was to keep the microphone within range of the manoeuvring troops.

When you listen in ten days' or so to a perfect commentary on the Derby, when you hear the relays from Wimbledon, from Tidworth, from the Isle of Man, remember Mr. Cock and his men, who for eleven years have put the real drama into broadcasting. P. C.

## THE LISTENER'S NOTEBOOK

### CANDID COMMENT ON SOME RECENT RADIO PROGRAMMES

THE B.B.C. has a curious way of dispensing opera: Act 3 first; Acts 1 and 2 to follow later.

There may be method in this madness, only I fail to detect it. It must appear that the reverse manner of "Die Walkure" was not an accident, since "Turandot" is to begin with Act 2, followed by Act 1 five days later. Perhaps we shall be enlightened.

The immense sums of money paid annually by the B.B.C. on these relays surely entitles listeners to something better than this odd back-to-front manner of production.

I was enthusiastic over Leslie Baily's microphone medley that he called "Scrapbook for 1914." The author modestly refuses to call it history, and thereby robs it of a lot of its value.

Scrapbooks are usually interesting. "Scrapbook for 1914" was no exception to the rule. Scrapbooks can also be collections of odds and ends. "Scrapbook for 1914" was no such thing.

No medley containing such a substantial and impressive thing as the Countess of Oxford and Asquith's reminiscences of those fateful hours immediately preceding our declaration of war on Germany should be relegated to a scrapbook. I thought that this fragment of Leslie Baily's scrapbook gave the whole thing a unique value.

The Countess was there herself to give these reminiscences. She is no stranger to the studio. We all know her marvellously clear delivery.

I remember her once being before the "mike" to champion the cause of blood-sports, and I wasn't too impressed on that occasion. But this time she rose to great heights. She was the good wine of the feast, but, unfortunately for the feast, she wasn't reserved till the last.

This wasn't the author's fault, however, as he had to follow a chronological order of events. The fact remains that "Scrapbook for 1914" did tend to diminish in interest towards the

(Continued on page 289.)

# ON THE SHORT-WAVES

## OUR SPECIAL SECTION for SHORT-WAVE ENTHUSIASTS CONDUCTED by W.L.S.

I WONDER how many radio societies there are in existence that have not at some time or other run a discussion called "Do we need H.F.?", "Is H.F. Worth While?" or something similar. This dear old hardy perennial simply can't be kept under. It's dead—but it won't lie down!

Don't think I'm opening the ball under another name! I want to deal purely with the short-wave aspect of H.F. amplification, which is absolutely and entirely different from any other aspect of the problem.

On short waves we come up against a queer effect—that of an H.F. stage, often useless from the point of view of amplification, yet earning its keep by the countless little advantages that come of it. When I say "often useless" I don't imply that it *need* be useless; but it usually is.

We don't really *want* amplification, after all. We have, I will assume, a fairly sensitive detector which brings in good signals, together with a beautiful selection of mushy noises from trams, cars, mains, commercial stations and what not. An H.F. stage is going to amplify the whole lot, and if that's going to be its only function we may as well dispense with it right away.

But regard an H.F. stage as something else, which I will call, for want of a better name, an "aerial decoupler." If your aerial is tightly coupled to your detector, just consider what may happen. First of all, if the aerial swings about, the tuning of your detector-grid circuit is going to alter.

### A Cure for Hand Capacity.

If the aerial happens to have been cut to an unfortunate length you are going to be worried out of your life with hand-capacity effects that are apparently incurable. Likewise, if someone suddenly lets off (metaphorically) a "big bang" in the vicinity of the aerial, your detector grid is going to become beautifully positive for a split second, causing you to think that the interference is much more severe than it really is.

Interpose a screened-grid valve between your detector and the aerial, and none of these undesirable effects will worry you, because you will have decoupled the detector from their source.

Probably some of my readers will think I am telling fairy-tales when I say that the surest way of dispensing with hand-capacity effects on short waves is to add a screened-grid stage of H.F. Nevertheless, it's a fact. Ask anyone who has tried it.

Similarly, a powerful signal from a nearby amateur transmitter, some distance from the wave on which you are listening, will no longer buffet your detector about as it did before.

The sketch shows an untuned S.G. stage reduced to its simplest terms. Across the grid and filament of the valve is a special choke consisting of 40 turns of No. 36 D.C.C. on a 1-in. former. In the anode circuit is an ordinary commercial S.W. choke, and the anode is coupled through to

condenser marked "see text." There are a few words to be said about that. Take away your special 40-turn choke, insert a short-wave coil of appropriate size, connect the '0001 across it and you have a *tuned* H.F. stage ready made.

### Easy to Rig Up.

It is best to start off with the untuned arrangement, since it is so much easier to handle. As a matter of fact, it usually does the job well enough, and there is no need to go to the bother of an extra control.

The screen, of course, of the S.G. valve will require the usual operating voltage, in accordance with the maker's recommendations. It is not critical, and something between 60 and 80 volts, if the plate voltage is 120, will be required.

Should you decide to try an S.G. unit of this type, I strongly recommend you to leave your present set absolutely alone and to rig up the new unit "bread-board fashion," as shown in my diagram. Most

of the parts will probably be found in the junk-box, and if you don't like it—well, take it away!

What you *should* find is a slight gain in signal strength, complete absence of any hand-capacity effects that may have been present before, absence of threshold howl and a much more smooth and pleasant reaction control.

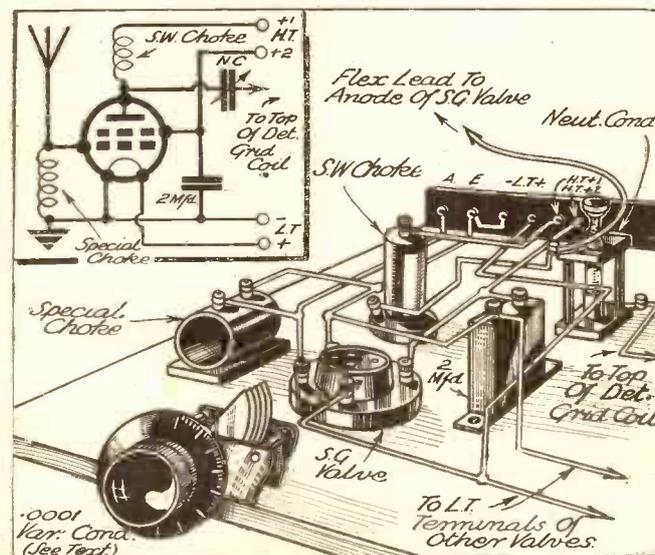
### Try a '0001.

If you decide to try tuning the H.F. stage you will probably find that you have to insert a '0001 preset condenser in the lead from the aerial to the grid of the first valve; otherwise your tuning will probably be extremely flat—which, however, is sometimes an advantage.

If anyone happens to be "sitting on the fence" by the time he reads these last few words I should like him to take my word for it that it is worth trying. In any case, we all call ourselves experimenters, so anything new is worth trying.

## H.F. STAGES HOW TO IMPROVE YOUR S.W. RECEIVER

### EXTRA CONTROLS ARE NOT NEEDED



The practical connections and the circuit of an untuned S.G. stage for short-wave work are given in this diagram and are fully explained in the article.

your existing detector-grid coil by means of a neutralising condenser.

I have not shown the detector circuit in the diagram, because it doesn't matter two hoots what it is so long as it works pretty well already. Note the '0001 variable

ON THE SHORT WAVES—(Cont. from previous page)



ABBREVIATED answers must be the order of the day; the post-basket is overflowing. J. C. M. (Biddenden) suggests that those who have not yet heard Sydney should set their dials to W I X A Z the previous night and just give them an upward touch when they listen for him in the morning. Sunday morning is, of course, the time, although he may sometimes be heard on Sunday afternoons and evenings.

D. C. S. (Whetstone) has made a single-valve 5-metre receiver which won't! Sorry, D. C. S., but I can't place the trouble from your details. You must have "left a nought out somewhere." Re your other query: it is an R.A.F. aerodrome station.

J. C. (Mr. J. Case, The Croft, Reydon, Southwold, Suffolk) wants to get into touch with any other short-wave enthusiasts in his district.

Can any reader forward a copy of "P.W." for November 7th, 1931, containing the "S.G. Four," to Mr. T. E. Lowe, 28, Allenby Road, Cadishead, M/C.? That particular issue is out of print, but Mr. Lowe will gladly pay a reasonable price for one.

R. S. L. mentions an effect that I have often meant to deal with. He uses a .0003 reaction condenser in a straight circuit, and finds that, after passing a

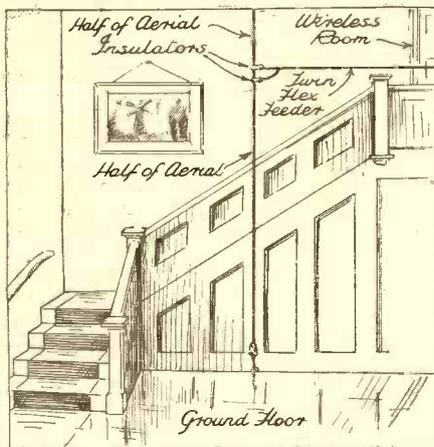
certain point, the set, already oscillating, goes out of oscillation again.

Quite a common thing, R. S. L.; you shouldn't use such a big condenser! It tunes the reaction coil (in series with other components) to a wavelength that produces what is virtually a "dead spot." Nothing to worry about.

By way of showing that quite an effective indoor aerial is possible, a reader has rigged up a fearsome affair that wanders "all over the house." He finds it effective in appearance only; its efficiency is somewhat low. My sketch on this page shows a possible way out, suggested by the said reader, who, unfortunately, can't use it himself owing to lack of space.

Even if there's no room for the "doublet," one half might be quite efficient.

AN INDOOR "DOUBLET"



This sketch illustrates a reader's suggestion for finding room to erect a really efficient S.W. aerial indoors.



READERS report the following items of interest during the past fortnight or so: Jeloy, LCL, on 42.92 metres, has disappeared! W 2 X E has suddenly turned up on 25.36 metres with a very good transmission. This station is at Wayne, N.J.

The Venezuelan station, Y V 5 B M O (whom I suspect of being ex-Y V 2 A M), has been logged in the 49-metre band by several people.

The following news items are really useful, as they contain details of definite schedules "straight from the station's aerial." I am indebted for them to W. G. M., of Southampton:

H C J B, Ecuador, on 73 metres—daily, except Mondays, 00.30—02.45 B.S.T.

V E 9 B J, 49.26 metres—daily, 00.10—02.30 B.S.T.

C O C, Havana, Cuba, 49.92 metres—daily, 22.00—23.00 B.S.T.

V K 2 M E, Sydney, Australia, 31.28 metres—Sundays, 07.00—09.00, 11.00—15.00 and 15.00—17.00 B.S.T.

This last item settles the queries of those who write to know whether they stand a chance of hearing Sydney without going through the ordeal of rising early on a Sunday morning! W. L. S.

I SAID last time that we had all missed Ambrose and his band on the air. Possibly by now you will have heard him again, for his differences with the B.B.C. have, I believe, been patched up. But whether or not you have heard him again on radio, you will be pleased to listen to his latest Brunswick record, *Hand in Hand and Somebody Wants To Go To Sleep*. Both these are from the film "The Three Sisters," and show Ambrose at his usual best. (01758.)

As I have started with dance numbers, I may as well continue with another. My next tip is Guy Lombardo (I am particularly keen on this combination) on Brunswick 01743. *Little Dutch Mill* and *You Oughta Be In Pictures* are the numbers chosen, and once more we are treated to the typical Lombardo style and neatness. It is a good record.

Many of the dance tunes this month, as far as I have yet heard them recorded, I am afraid are rather unimaginative in orchestration. Even Ray Noble seems to be having a rest in his version of *One Morning In May*, and especially so in *You Have Taken My Heart*, which is not nearly as attractive, in my opinion, as it should be. I have heard it done much more appealingly.

Henry Hall's numbers from "Three Sisters" are also dull and not too tuneful. But I must not despair, for I have many others yet to play—but I hope they buck up a bit.

Stories about well-known gramophone artists are usually interesting, so here is one about the popular American trio, the Boswell Sisters. They record for Brunswick, and have lately made *I Hate Myself* and *You Oughta Be In Pictures* (01751). But the tale of how they got into the singing act is one that has much in common with other vocalists—their friends more or less forced them into it.

Martha (the eldest) was a professional pianist, Connie was in the same orchestra playing the cello, while Vet, the baby of the trio, fiddled the violin. And they did very well. But friends had heard them extemporising vocally and urged them to enter this form of entertainment. For a long time they held out, but at last they consented and determinedly fought their way to fame in the new sphere.

You've heard Marion Harris on the radio, I expect, during the various visits she has made to the British microphone. Well, you can now hear her at her very best on Decca, for whom the Cabaret Queen (as she is

# ROUND the RECORDS

Selections and recommendations from the latest gramophone lists.

called) recorded in the early hours of the morning at the studios in Chelsea. The titles of her numbers are *One Morning In May* and *Oh-oo-ooh, Honey* (What you do to me), introducing "Ooh, that Kiss." The disc is F3954, and is one to add to your light vocal records.

One of the most tuneful waltzes recently published is *You Have Taken My Heart*, and it has been broadcast many times by various dance bands. The first vocal record of the number I have heard, however, is that of Reilly and Ccmfort on Decca F3946. You should hear it, for it is really (no pun intended) a most enjoyable recording.

An unusual disc is that made by H.M. Grenadier Guards on Decca K723, called *Eton Memories*. The famous "Boating Song" of course, comes in, as does "The Vale" and a number of other tunes more or less well known by the "outside" world. A vocal quartet assists the band.

Many will welcome another "new-method" orchestral recording by Sir Hamilton Harty, whose record of Balakirev's "Russia," for the Columbia History of Music, actually introduced this big recording advance. This time we have works which will interest a much wider public, Schubert's *Marche Militaire* and Sibelius' *Valse Triste*, and they are such as may be said to create a new orchestral standard.

The *Marche Militaire* is derived from a set of pianoforte duets composed by Schubert. With perhaps one exception this is the most popular of all Schubert's compositions. The orchestral arrangement gives the march a pulsating and invigorating lilt, and emphasises the pulsation of the composition. The contrast with the serious mood of

*Valse Triste* on the reverse side adds to both items a refreshing piquancy.

The *Valse Triste*, of course, is an excerpt from the incidental music written by Sibelius to accompany a drama called "Kuolema," written by Arvid Jarnevelt (a brother-in-law of Sibelius). The music illustrates an episode that needs little explanation.

A woman at the point of death is roused by the sound of music, which becomes louder when some ghostly characters enter the room. They beckon the woman to follow them in a dance. In her exhausted condition she cannot maintain the speed at which the waltz is taken, and rests momentarily.

Urged on by the seductive music, she continues, and the culmination is reached when the door opens—an apparition of Death appears. The ghostly figures hasten away, and the music declines to a whisper. The performance of the London Phil-

harmonic Orchestra, conducted by Sir Hamilton Harty, is fully worthy of their great tradition. (DX571.)

Radio was well represented at the recent Command Performance, when Henry Hall and Doris and Elsie Waters were among those who were honoured.

These latter inimitable artists have just made a record of one of their well-known "wives of famous people" series—this time it is *Old Sam's Wife*, while on the reverse side is one of their Gert and Daisy episodes. This will be a popular record among radio listeners. (Col. DX577.)

It is uncommon to hear a Stanley Holloway record that is not of the Sam type, but such is his latest, showing the former Co-optimist in the rôle of a stage comedian. He has made a record of his latest Drury Lane success, "Three Sisters," and the items, *Hand In Hand* and *Keep Smiling* (a mock sentimental song), portray the famous artist in quite a new light. Many will be surprised at his fine voice, which one would not suspect he had from hearing only the Lancashire dialect records.

One disc that will sell like the proverbial hot cake is the *London Suite* by Eric Coates, on which is recorded *Knightsbridge*, the famous march taken by the B.C.C. as the theme for "In Town To-night." It is a twelve-inch record, and with it goes another on which the same composer's *Westminster* and *Covent Garden* are recorded. The companion to *Knightsbridge* is Hadyn Wood's *Forgotten Melody*, a striking contrast to the martial briskness of Coates' world-famous piece. (H.M.V. C2655-6.) K. D. R.

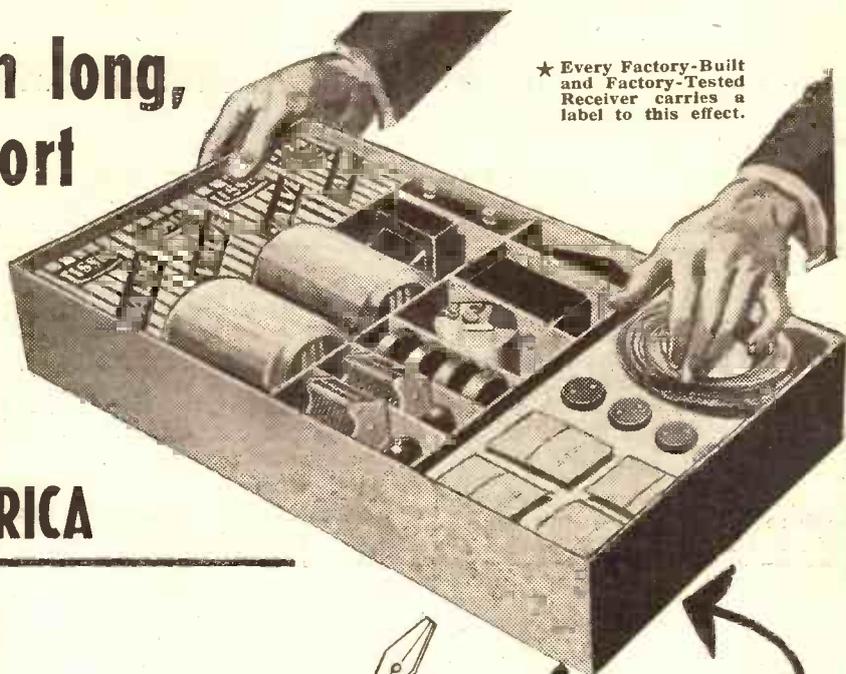
A GOOD RECORD

ETON MEMORIES

OLD SAM'S WIFE

# With the **LISSEN** "SKYSCRAPER" 4

you get radio on long,  
medium and short  
wave stations  
from ENGLAND,  
EUROPE, AMERICA,  
AUSTRALIA, and AFRICA



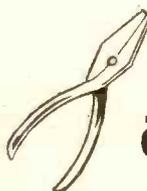
★ Every Factory-Built and Factory-Tested Receiver carries a label to this effect.

*All you need is*

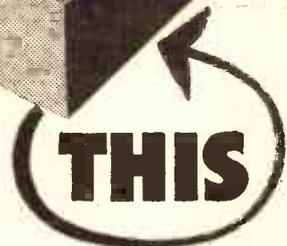
**A SCREWDRIVER**



**A PAIR OF PLIERS**



and **THIS**



Read what these enthusiastic 'Skyscraper' owners say:

**From SOUTH AMERICA:**  
"Kit used on voyage to Buenos Aires with 60 ft. aerial. On the long and medium bands, home and European stations received at good strength. ALL EMPIRE PROGRAMMES CONSISTENTLY RECEIVED AT GOOD STRENGTH. Also received SYDNEY and MELBOURNE."

**From SOUTH AFRICA:**  
"London comes through quite clearly. The best battery set we have heard."

**From INDIA:**  
"Assembled 'Skyscraper' Four in two evenings. Set worked marvellously. Wonderfully clear. Here in Bombay, am receiving London programme on 49.6 metres as loudly and clearly as ever I heard it on an ordinary Receiver in England."

**From NORWAY:**  
"Set working splendidly. Over 60 stations with inside aerial."

*Or you can now buy it completely factory assembled and factory tested at exactly the same price.★*

You can assemble these 'Skyscraper' Kit sets in a couple of evenings, and get full-power, moving-coil reception on all wavelengths. Besides the fun of building your own set you have the satisfaction of knowing before you start that the results will be everything you expect—because every component part of the 'Skyscraper' kit has been subjected to vigorous tests under actual working conditions.

For just a few hours fascinating work, the vast range, mighty power and real economy that have made 'Skyscraper' radio famous throughout the world, will be yours—to enjoy day after day. Act now. Post the coupon for full instruction chart **FREE**.

**HOW LITTLE IT COSTS** Chassis Kit, complete with 4 valves . . . **£5.12.6**

With Walnut Cabinet and Moving-coil Speaker . . . . . **£8.2.6**

**USE LISSEN BATTERIES—LISSEN VALVES  
LISSEN ACCUMULATORS FOR YOUR SET**

**POST COUPON FOR FREE CHART NOW!**  
To Lissen Ltd., Worpole Road, Isleworth, Middlesex.  
Please send me a FREE copy of colour-printed All-Wave All-World Skyscraper Chart.  
Name \_\_\_\_\_ Address \_\_\_\_\_

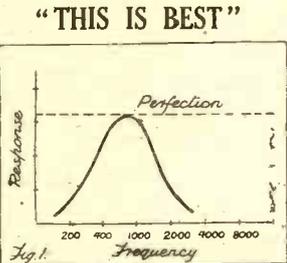


I THINK I prefer headphones to most loudspeakers. Of course, people say headphones are inconvenient. But they are more than convenient for people who don't use them—a loudspeaker too often invades all privacy and quiet. If one wants to listen, and another does not, the headphones solve the difficulty.

Then I find that the quality of a headphone is so intimate and unoffending that I disregard its technical imperfections. Someone seems to be particularly interested in entertaining me when I have the headphones on; everybody seems intent on hawling out nonsense when a loudspeaker starts its blurb.

**"Almost Impossible to Expect."**

Why is it that the quality of the headphone is so pleasing? We have got to recognise at once that it does not give us true quality in the sense of reproducing all the sounds equally. In fact, if you look at Fig. 1 you will see a sketch which indicates the sort of characteristic you are liable to get with headphones in particular and moving-iron reproducers in general.

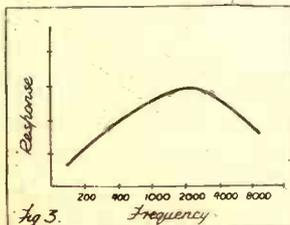


The dotted line indicates perfect response. The thick line is the response curve of good ear-phones, moving-iron speakers and the best mechanical gramophone.

Now there is a theory, quite unproven as yet, that if you cannot give true reproduction you must make a good fake. I have heard true reproduction, and it is really lovely, provided the original has also that rare quality.

True reproduction comes about when all the frequencies in audible sound are reproduced with the relative magnitude in which they

**"CRISP QUALITY"**



In this curve the bass response is lacking and the high notes fall off rapidly after about 2,000 cycles.

existed in the original. It is almost impossible to expect machines of reasonable price to get near this ideal. The tragedy of wireless is that the transmission authorities do not allow

us to get as near to it as I believe we might.

On the other hand, let us say a certain band of theorists get a good fake because we can never get perfection. These are the people who might be allowed to talk about the "art" of reproduction—because, of course, art presupposes distortion.

The painter conveys light shining into one's eyes without shining light into one's eyes: he conveys the feeling of three-dimensional space in a two-dimensional

**"FAKING" SOUND REPRODUCTION**

A discussion on the relative merits of headphones and loudspeakers in the search for adequate quality. By P. P. ECKERSLEY, M.I.E.E.

medium. Sculpture may not concern itself by reproducing busts of exactly the same size as the original; it could be even more daring and give one the impression of an emotion rather than a reality.

So in sound reproduction, lacking the ability to give truth, let us convey something which is pleasant to the ear and at least reminds the hearer of the original.

This is a question for the intelligence—not for the technician, who can only think in technical terms.

Some of us think that we get the best fake by having a reproduction curve rather like that shown in Fig. 1. In Fig. 2, Fig. 3 and Fig. 4 I show curves which have self-explanatory headings. Fig. 2 shows what the moving coil and the superheterodyne have done to ruin quality.

**The Balanced Spectrum.**

The noise which issues from Fig. 2 is to me, at any rate, the most offensive of all noises—that characterless thump with a fringe of sibilants which is sold at ten to fifteen guineas a time. In Fig. 3 there is something of what we used to get when stations were widely separated—valves too feeble and loudspeakers too poor to allow bass reproduction, but when, upon the other hand, people were interested in crisp quality: the quality which—perish that awful word!—was not "mellow."

In Fig. 4 I include the sort of quality given by special large-cone speakers: a warmth to please the bass fiends and yet a top which still remembered some of the happy days of Fig. 3.

But my point—because I am one of the theorists who still believe in the "fake" of moving iron—is that of all the compromises Fig. 1 shows the best. It is, by

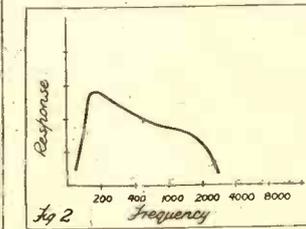
and large, the quality given by good ear-phones, by good moving-iron loudspeakers of the ordinary type and by the best of mechanical gramophones.

It has to be observed, talking of loudspeakers, that the moving-iron "fake," or let us be more polite and call it "balanced-spectrum quality," is obviously superior when the auditorium has considerable reverberation. On the other hand, in small living-rooms full of (padded) furniture the moving coil, properly fed, is better, because it supplies that richness which the ear craves for in an overdamped room.

**Enter Infra-Sonics.**

And now the ever-ingenious Mr. Dowding of POPULAR WIRELESS has invented something quite new and ingenious and amusing. It's another fake, but maybe it's a very important kind of a fake and may combine the good qualities of moving coil with moving iron.

**"OFFENSIVE NOISE"**



The characterless thump that is found in many receivers which accentuate bass is shown in this curve.

Because, maybe, Mr. Dowding has hit on something which wants hitting on harder than it's yet been hit. If they bang a drum, or slam a door, or even clap their hands, the result-

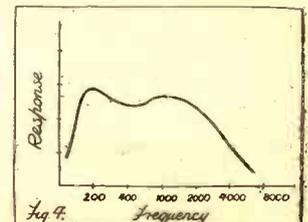
ing reproduction leaves much to the imagination and does a lot for irritation. (No wonder the B.B.C. fade out the applause!)

Each of these "sounds," if you like, has a common quality. They are "transients." They are unlike steady notes because they begin with an almost steady atmospheric pressure increase and then fade away.

They can be shown to be made up of lots and lots of frequencies. And some of these frequencies are very low frequencies—almost below audibility.

And that's where Mr. Dowding comes in. I reserve a special chapter for Mr. Dowding's Infra-Sonics, and say "continued in our next."

**"WARMTH—AND TOP"**



An attempt at compromise between emphasis of bass and the "top" of Fig. 3.



# The MIDGET PORTABLE

A light, compact and efficient two-valve portable that can be used anywhere. Moreover, it need not be opened in order to be operated—the case can be kept shut after the phones have been withdrawn and plugged into the panel.

Designed and Described by the "P.W." Research Dept.

THIS is undoubtedly one of the most attractive instruments we have produced. It is not one of those rough little medleys of components crammed inefficiently into a small case and designed for use with an extemporised, extended aerial, but is neat and absolutely "all-in" in design.

There is a small frame aerial tucked away in the case, so that when the headphones

are removed and plugged in you can at once receive programmes wherever you may be—at home, in a train or out in the wide, open spaces.

Two valves are used in a perfectly straightforward circuit, but such is the effectiveness of the design that the results really are quite amazing.

In the heart of London, surrounded by high buildings, during the broad light of day when the stations are weakest, the London National and Regional programmes are receivable without reaction. A slight adjustment of the reaction control and the volume is sufficient to operate a loudspeaker.

The Midland Regional comes in with full programme value on headphones, and the long-wave station at Daventry is also full and robust.

With careful handling of the controls the Northern Regional is quite audible.

Several Alternative Stations. Tested in the country in the evening, several foreign stations could be picked up with good strength once the knack of operating the set had been acquired—and that does not take long.

Now, some of you may be wondering whether the results are freakish in character. Perhaps it is thought that the little set is so "nearly on edge" that it is more

by luck than good judgment that our original model worked so well, and that any attempt at its duplication might be accompanied by instability or just no results.

There is no danger of that. The design could safely go into mass production. In accordance with our general procedure with such original designs, we built another "Midget," using different components. We also varied the dimensions here and there, packing the parts in savagely.

But the results were just the same, and this we anticipated. Rock-like stability, abounding sensitivity.

### Anyone Can Build It.

Anyone can build the little set with an assurance of satisfaction—that is, so long as he does not anticipate being able to tune in dozens of stations! Mind you, we are not suggesting that this is impossible, but such achievements must be regarded as the exception rather than the rule.

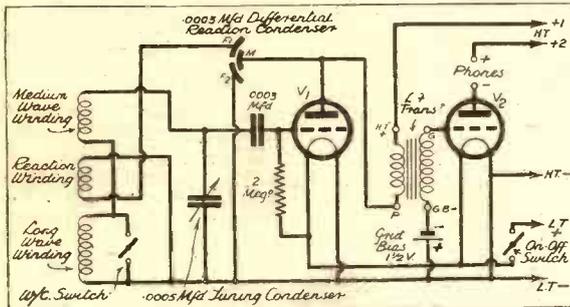
Practically the whole of the set can be made at home. All that you have to buy are the few components and the materials which we list.

There is no coil. The frame aerial acts as the tuning coil.

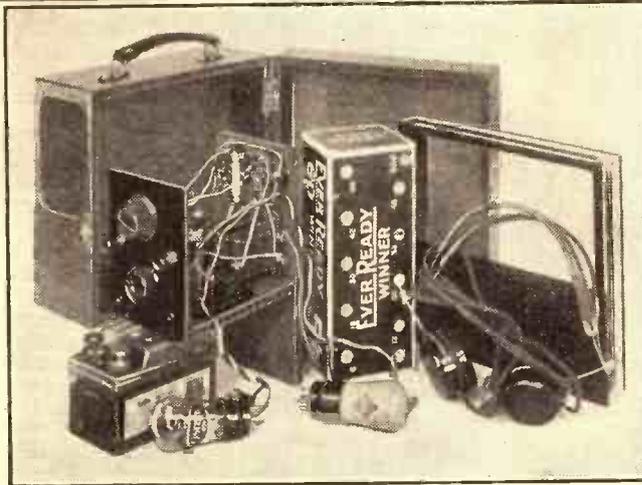
Now, it should be noted that there are no wide margins of space allowed. Compactness is one of the main features of this set.

(Continued on next page.)

### A THOROUGHLY TESTED CIRCUIT



There is nothing freakish about the circuit—the design of the set is based on well-tryed and reliable radio practice, ensuring complete reliability and ease of operation.



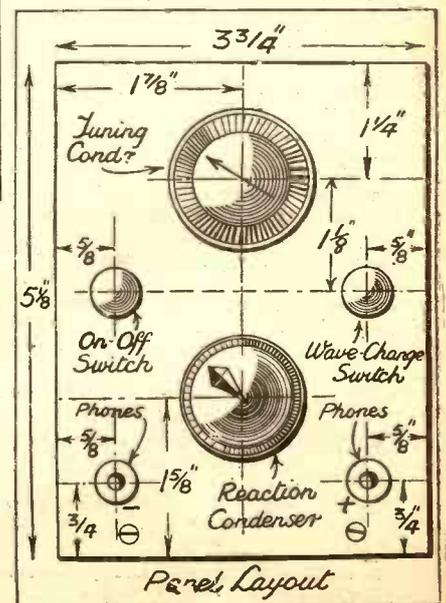
All the parts shown above pack neatly away, as can be seen in the illustration in the heading, while the position of the panel (the layout of which is seen on the right) allows the set to be worked with the case closed—a very important point when neatness and compactness are considered.

minute dimensions, but that it can actually provide alternatives—!

Our aim was to fashion the lightest, most inexpensive all-in receiver capable of providing at least one British programme practically anywhere in the country. That this "Midget" can do more than that is so much pure gain over the original specification.

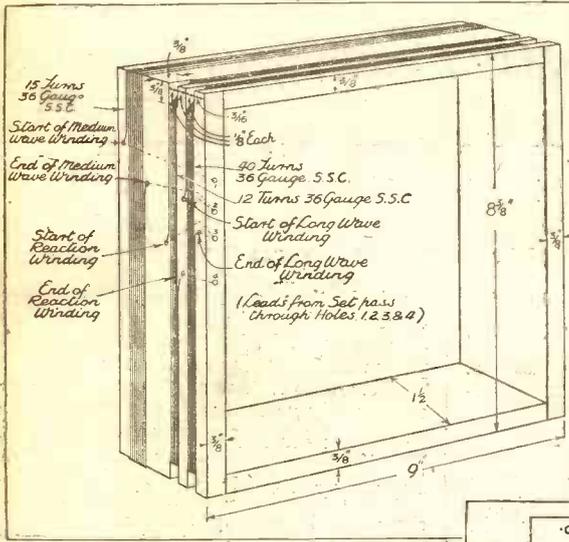
Now, some of you may be wondering whether the results are freakish in character. Perhaps it is thought that the little set is so "nearly on edge" that it is more

### SIMPLE TO CONTROL



# THE MIDGET PORTABLE

(Continued from previous page.)



Constructing the frame aerial is a straightforward job if the above diagram is followed carefully. The ends of the windings are taken through holes to the inside of the frame, and there joined to the flex leads from the set which come through slanting holes starting in the edge of one of the sides.

Therefore it is very necessary to use exactly the parts we have specified if you want to adhere to our dimensions.

It is true that there appears to be little difference between the sizes of many of the makes of, for example, L.F. transformers, but we can assure you that quarters of an inch mean much in such a construction as this one.

There is also this to remember: While the set can develop a quite respectable power for its size (don't forget its "pick-up" is confined to a small frame aerial of

## SOME SUITABLE VALVES

Make.	Detector.	Output.
Cossor . . . . .	210H.F.	210L.F.
Mullard . . . . .	P.M.1H.L.	P.M.2D.X.
Mazda . . . . .	H.L.2	L.2
Osram . . . . .	H.L.2	L.21
Marconi . . . . .	H.L.2	L.21
Hivac . . . . .	H.210	L.210
Tungram . . . . .	H.R.210	P.D.220
Dario . . . . .	T.B.282	T.B.172

the area of a medium-sized biscuit tin) there is not a bushel of decibels to waste in inefficient components!

The main part of the constructional work involved in the building of this set is in the making of the case and its aerial frame and chassis. Not a great carpentering skill is needed: merely the ability to use a saw moderately well.

We propose to give the necessary instructions in detail next week. The mounting of the components and the wiring are very

In the wiring diagram to the right the flex leads which go to the frame aerial are numbered similarly to the holes in the aerial frame through which they pass. The panel and two sections of the baseboard are shown flattened out into one plane.

easy, and all that you will need to know about these can be gathered from the diagrams.

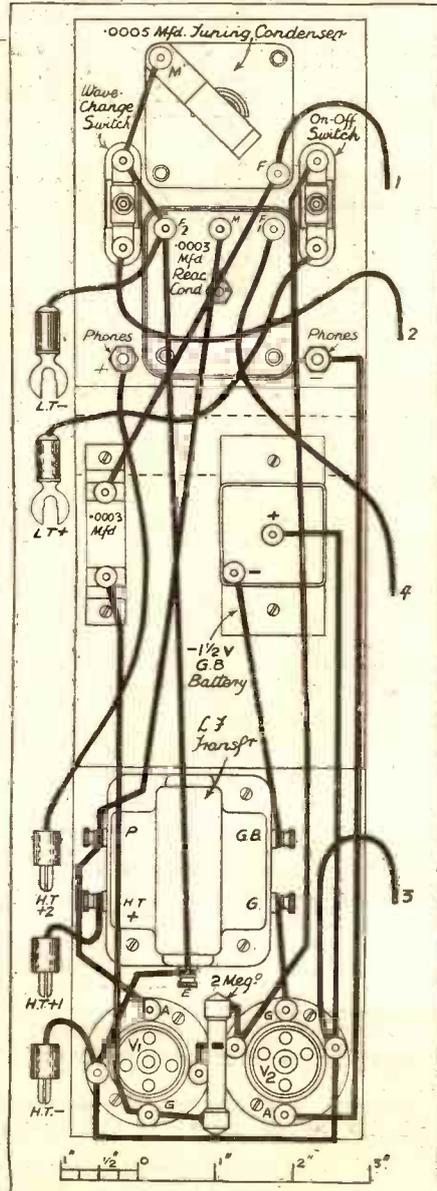
The headphones require to be fitted with plugs to fit the sockets on the panel, and it should be noted that it is usual to plug in the phones the right way round. Though the magnets are of cobalt steel it is common sense so to connect the phones that the H.T. current assists magnetism rather than opposes it.

### Small H.T. Battery.

A 1 1/2-volt grid-bias battery is wanted, and this is accommodated on the baseboard. It supplies grid bias for the L.F. valve.

A 60-volt H.T. battery suffices, the full voltage going to the L.F. valve and about thirty-six to the detector; but you can experiment with this in order to ascertain the best voltage for smooth reaction

### SEEN IN PLAN



and greatest sensitivity with your particular detector valve. It is not a critical adjustment.

### Extraordinarily Economical.

An unspillable accumulator is used, and if you purchase any other make or type than the one listed herewith, remember that the accommodation for it is a fixed dimension!

And now a few words about battery consumption. You will discover that this little set is extraordinarily light on both H.T. and L.T. After a long period of use you will wonder when the batteries are going to run down, for they will seem almost everlasting if you have memories of the consumptions of the average loudspeaker portable.

And you must be careful that that does not lead you to neglect the accumulator cell. This ought to be tested at least once

## RECOMMENDED ACCESSORIES

- BATTERIES.**—Ever Ready "Winner," 60-volt H.T. Exide 2-volt accumulator, type P.O. 2. Siemens 1 1/2-volt grid bias, type G.T.
- HEADPHONES.**—1 pair B.T.H. high resistance.

a week and charged at regular monthly intervals.

Also, if the little set is to stand idle for any length of time, the batteries should be removed. Not that it does them any harm to be left in position; but when they are tucked away out of sight they are apt to be forgotten.

The "Midget" portable is quite easy to tune. As we have said, the smoothness of reaction depends to some extent on the H.T. applied to the detector valve.

If the reaction tends to be fierce and "hard" the detector H.T. can be dropped to as low as 30 volts with the average detector valve without any really noticeable loss of power.

### A Useful Direction Finder.

Don't forget the directional qualities of the instrument. To obtain the greatest volume it needs to be placed so that it is in line with the direction of the desired station. Tourists will note that the set, therefore, constitutes a rough direction finder.

However, to obtain the sharpest bearings it is generally better to work on the minimum strength of a station, and that obtains when the set is at right angles to the direction of it.

The controls must be turned slowly and carefully, or you will miss some of the programmes that are well within the capabilities of the little receiver.

## BUILD WITH THESE COMPONENTS

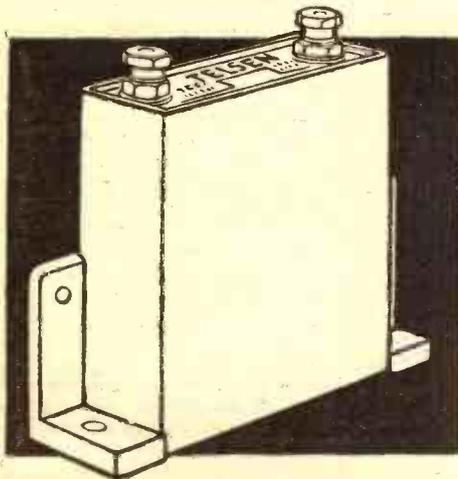
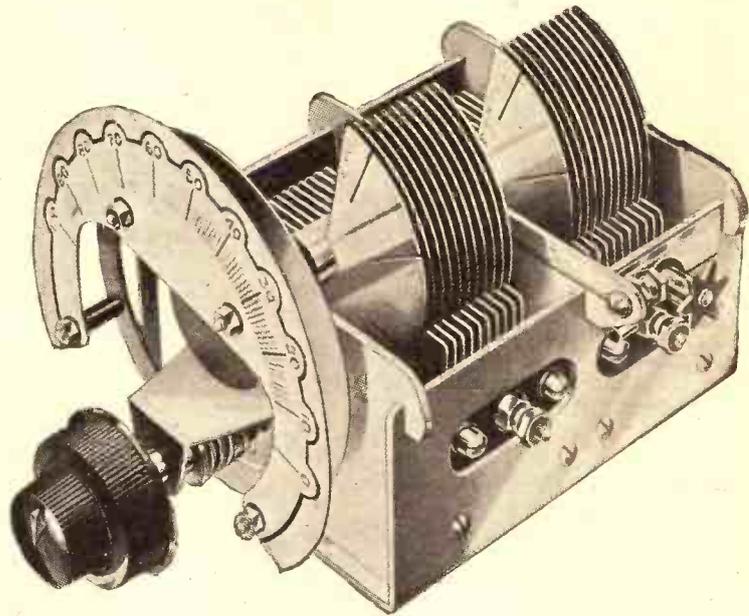
- 1 Graham Farish .0005-mfd. mid-log-line solid dielectric tuning condenser.
- 1 Telsen .0003-mfd. differential reaction condenser, type W.351.
- 2 Telsen push-pull two-point switches, type W.107.
- 2 Clix plugs and sockets.
- 1 Telsen "Ace" 1:5 L.F. transformer.
- 1 Dubilier .0003-mfd. fixed condenser, type 620.
- 1 Dubilier 2-megohm grid leak, 1-watt type.
- 2 W.B. small type 4-pin valve holders.
- 1 Peto-Scott ebonite panel, 5 1/2 in. x 3 1/2 in. x 1/8 in.
- 1 Peto-Scott baseboard, 5 in. x 3 1/2 in. x 3/8 in.
- 1 Peto-Scott baseboard, 8 1/2 in. x 3 1/2 in. x 3/8 in.
- 1 coil of B.R.G. "Quikon" connecting wire.
- 1 oz. Peto-Scott 36-S.W.G. S.S.C. wire
- 2 Clix accumulator spades
- 3 Clix wander-plugs
- Wood, covering, fasteners, hinges and handles for case, screws, flex, etc.

# TELSEN

provide the

## PERFECT *Condenser* FOR EVERY PURPOSE

**B**UILT to the highest mechanical standards, and rigorously tested at every stage of manufacture, each Telsen Condenser is the finest of its type it is possible to produce, combining lasting efficiency with exceptional value.



### TELSEN PAPER CONDENSERS

Self-sealing, non-inductive and hermetically sealed. Give the highest insulation with complete freedom from breakdown. 500 volt test.

Capacity	.01 mfd.	1/6
"	.04 "	1/9
"	.1 "	1/9
"	.25 "	2/-
"	.5 "	2/3
"	1 "	2/3
"	2 "	3/-

### TELSEN GANGED CONDENSERS

For use where accurate and simultaneous tuning of two or three circuits is obtained by the rotation of one dial. A pressed-steel frame of great rigidity eliminates distortion, the rotor and stator vanes being let into one-piece, high-pressure die castings to ensure accurate spacing. All sections are very carefully matched by means of split end vanes, and trimmers are provided. Complete with knob, pilot light escutcheon and two alternative tuning scales.

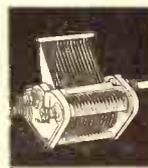
Single Unit, Price **8/6**  
Twin Ganged - - **16/6** Triple Ganged - - **22/6**



### TELSEN TUNING CONDENSERS

Very rigid construction, with high-grade dielectric, ensuring permanently accurate spacing with minimum losses. Exceptionally compact. Complete with knob.

Capacity	Price
.0003 mfd.	2/6
.0005 "	2/6



### TELSEN VARIABLE CONDENSERS

The frame is braced by three solid pillars, the vanes clamped at three points, making distortion impossible. Generous bearings prevent backlash or end-play.

Capacity	Price
.00025 mfd.	2/6
.00335 "	3/6
.0005 "	3/6



### TELSEN REACTION CONDENSERS

Incorporate several valuable improvements, the whole unit being enclosed in a strong dustproof bakelite case. Supplied complete with knob.

Capacity	Price
.0003 mfd.	2/6
.00015 "	2/6
.0001 "	2/6
.00075 "	2/6
.0005 "	2/6



### TELSEN DIFFERENTIAL CONDENSERS

Similar in design and construction to the reaction condensers. Supplied complete with knob.

Capacity	Price
.0003 mfd.	2/6
.00015 "	2/6
.0001 "	2/6



### TELSEN AERIAL SERIES CONDENSER

With switch. Built on similar lines to the reaction condensers, providing an ideal selectivity and volume control. Supplied complete with knob.

Max. Cap.	Price
.0003 mfd.	2/6

**TELSEN FOR EVERYTHING IN RADIO**

Announcement of THE TELSEN ELECTRIC COMPANY LIMITED, ASTON, BIRMINGHAM

# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## THE BLUE SPOT "STAR"

DEVELOPMENTS in loudspeaker design appear to group themselves into two distinct classes. In the one are purely technical developments and in the other what I think can be termed developments of application. That is, improvements in the adaptability of the device to the one or more purposes and conditions.

Any fairly good step forward in either class is usually deemed sufficient justification for the introduction of a new model. Very rarely indeed are improvements in both classes coincident.

But this is certainly the case with the Blue Spot "Star," recently introduced by The British Blue Spot Company, Ltd., of Blue Spot House, Rosoman Street, Rosebery Avenue, London, E.C.1.

This "Star" is indeed a *star*, and constitutes one of the most important radio innovations of the year.

The Blue Spot "Star" looks different from any of its predecessors, and it is distinctive and novel in its design.

Instead of the usual obvious magnetic system, an entirely new arrangement is employed. Special magnet material is enclosed within four chromium-plated tubes, and these lend a quite attractively modernistic appearance to the loudspeaker.

The chassis frame is die-cast in one piece, and is thus very rigid and entirely free from audible resonance and from the possibility of loose parts creating chattering.

Special steps have been taken to exclude dust and to provide protection for the diaphragm and the speech coil. The suspension is particularly good.

## Matched with Any Output.

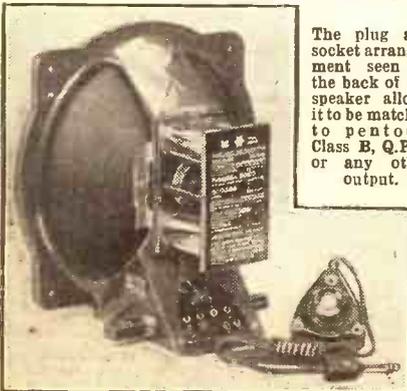
So much for the technical considerations of the design pure and simple, and I can say right away that they are extremely effective in practice, for the response of the speaker is excellent.

By means of a simple-to-handle plug and socket scheme it is possible to match this Blue Spot "Star" loudspeaker with any output including Pentode, Class B and Push-Pull, either direct from a plate circuit of an output valve or valves or from an existing output transformer.

Also it can be used as an extension speaker in combination with any other, and, because of the flexibility of its matching arrangements, without in any way upsetting the tonal balance of the other speaker. I fail to see why, in many cases, it should not actually improve it.

Well, all this you might think would be enough to justify a fairly high price as speakers go these days, though, as a matter of fact, the chassis model costs only 70s., but there is yet a further development of note.

There is a plug which can be used as an on-off switch or which can be removed for the insertion of a volume-control plug. The volume control is sold separately at ten shillings, complete with a lengthy flex. It is a remote control, and so can be placed



The plug and socket arrangement seen at the back of the speaker allows it to be matched to pentode, Class B, Q.P.P. or any other output.

on the arm of your chair, so that the volume can be adjusted exactly to your liking without getting up and without reference to the actual set.

It should be noted that this volume controlling can be done without affecting the volume on any other loudspeaker which might be used with the same receiver.

I consider that the instrument is definitely an achievement, and while we naturally expect great things from Blue Spot, they have on this occasion quite excelled even themselves.

## A FINE WAVETRAP

Whatever the Lucerne Wavelength Plan may or may not have done, there is one thing certain, and that is that it cannot have affected to any appreciable extent the average non-selective set.

And, judged by modern standards of reception technique, of which the 1934 superheterodyne is an excellent expression, there must be millions of sets which fall within that category.

The separation of stations on many of these can only be achieved by sacrificing power and a number of the programmes which would otherwise be available.

No doubt quite a large proportion of listeners find that they cannot pick and choose even between the London Regional, Midland Regional and other such stations because of the spread of their local stations.

Perhaps they go so far as to contemplate the purchase or construction of entirely new sets merely so that they can add another B.B.C. alternative or



Both the top and the bottom of the Wearite wavel trap are shown in this "reflection photograph."

two, for it must be admitted that those Midland and Northern Regionals, for example, seem to be able to devise some very attractive programmes on occasions.

But such a drastic step is quite unnecessary. A powerful, interfering station can be successfully subdued without cutting down the sensitivity of the set by brutal aerial shortening or series-capacity measures.

All that is needed is an efficient wavel trap. Placed in series with the aerial, this will enable any one station, however powerful, to be so reduced in strength that it no longer interferes.

It is an indisputable fact that the Brookman's Rejector wavel trap principle is the most efficient of all, and great credit is due to Mr. G. P. Kendall for its invention.

## Perfectly Satisfactory in Every Way.

Quite recently we described the construction of a wavel trap embodying a modern version of this now-famous principle, and it proved very popular.

But we received quite a number of letters from readers asking if the trap could be purchased ready made. That is not surprising, despite the simplicity of the construction, for a great number of present-day listeners appear to be prepared to pay a little more for such apparatus rather than make it.

However, at the time we had to say that there was no manufactured equivalent available. But this has now been rectified by Messrs. Wright and Wearie, of

740, High Road, Tottenham, London, N.17. They have made a wavel trap which is the exact equivalent of our design, and it is, therefore, perfectly satisfactory in every way, and has the added advantage of a factory finish.

All those who are still troubled by the spreading of powerful stations now have the best remedy ready to hand. Let me remind you, in conclusion, that such a wavel trap as this not only does not reduce the power of your set, but in cases actually increases it; further, it improves the general selectivity of the set, to some extent, while eliminating any one interfering station.

## NEW BELLING-LEE KIT

How often we find ourselves held up completely on a servicing job just because of one small item such as a plug or fuse which we haven't got!

I use the word "servicing" in its broad sense, and not in its professional application only. All of us radio folk, designers and constructors alike, find it necessary from time to time to undertake overhauls and repairs.

Sometimes they are our own sets that have to be seen to, and sometimes we are asked to do the professional man out of a commission!

But, quite apart from repair work, the "Belling-Lee" Spares Kit produced by Messrs. Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex, is invaluable to the experimenter and constructor.



Plugs, sockets, fuses, pilot lamps—all these are included in this useful "service kit" which every constructor will want to possess.

It is contained in an attractively printed tin box no larger than a flat box of fifty cigarettes, and includes the following items: 12 "Bowspring" Wander Plugs, 2 Banana Plugs, 1 four-volt Pilot Lamp, 1 six-volt Pilot Lamp, 2 Spade Terminals, 1 "Wanderfuse," 2 "Scrufuses," 10 Cartridge Fuses, 1 "Twintap" Plug.

These are all arranged in an orderly form, so that exactly the item needed is at once to hand.

While many others will find this outfit of immense value, it is, of course, to the service man that it will undoubtedly have the greatest appeal.

The price of the kit is 10s. 6d., and it might be mentioned that that does not quite equal the total list price of the individual items which it includes.

## THE LINK BETWEEN

Notes of interest to buyers

By G. T. KELSEY.

COINCIDENT with the release of still another recreated record of the voice of the late Enrico Caruso, an amusing story is told concerning an experience which befell the great tenor when he was spending a holiday in one of the more rural parts of America.

One day he called in at the local post office to see if there were any letters waiting for him, but to his consternation he was told by the clerk that, although there were some letters, it would be necessary to provide proof of identity before they could be handed over.

Enrico, attired only in a shirt and flannel trousers, confessed that he had not his note case with him, but said: "Surely you can recognise me from my photographs." But the clerk remained obdurate. "No," he said, "other men may resemble Caruso in appearance, and if you want to prove it to me—well, there is only one Caruso in voice."

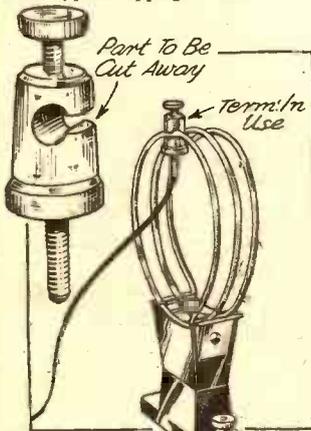
Much amused, the great tenor asked the clerk what song he would like him to sing, and, clad only in shirt and trousers, Caruso

(Continued on page 290.)

# A PAGE of Recommended WRINKLES

## TAPPING S.W. COILS.

WHEN tapping short-wave coils of the 16- or 18-gauge self-supporting type, a crocodile clip is often used. This, however, tends to be knocked loose. For this reason I have devised a new type of tapping.

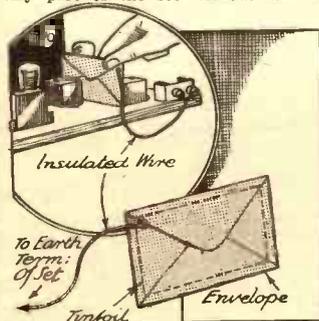


A method of tapping short-wave coils which is efficient and instantly applicable.

A terminal of the telephone type is taken, and the part of it as shown in the diagram is cut away with a hacksaw. When a permanent tapping is desired the terminal is slipped on to the wire and the screw is tightened.

## TO FIND THE BEST POSITION.

WHEN a set is unstable it is often suspected that additional screening will cure the trouble. But where? If a sheet of tinfoil, with a length of insulated wire attached to one corner (by twisting the two together), is placed flat in an envelope, with the wire protruding from one corner, the envelope may be pushed and bent into any part of the set without fear of



The screen may be moved about without fear of shorts.

short circuiting; and if the other end of the wire is attached to the earth terminal of the set, an effective screen is produced.

When the correct position of the required additional screen is found, a proper one may then be made out of sheet metal and substituted for the envelope.

## ONE GUINEA FOR THE BEST WRINKLE!

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

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

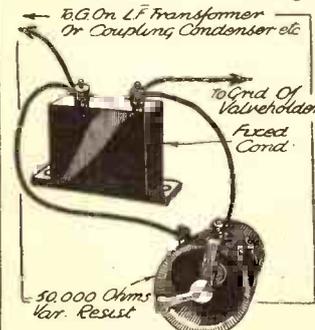
Will readers please note that the Editor cannot, in any circumstances, guarantee to return rejected Wrinkles, and that payment for published hints is not made until ten days after they appear?

The best Wrinkle in the issue dated May 19th was sent by Mr. W. H. Grayling, 8, Milton Rd., Cambridge, to whom a guinea is being awarded.

## A SIMPLE TONE CONTROL.

IN some cases it is found desirable to increase the high-note response of a receiver or amplifier. This can be easily effected by connecting a fixed condenser in series with the grid lead of one of the L.F. valves.

A variable resistance should be connected in parallel with this fixed condenser. Varying the setting of the variable resistance will alter the degree



With these two components you can adjust the high-note response of your set.

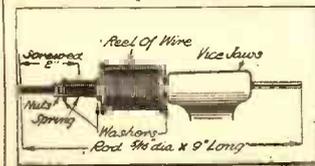
of tone correction. .005 mfd. is usually a suitable value for the condenser, and a 50,000-ohms resistance will give adequate control.

## TENSIONING WIRE FOR HAND COIL-WINDING.

WHEN making coils for home-made sets I have found trouble owing to the difficulty of getting the right amount of tension on the wire to prevent overrunning.

In order to overcome this I adopted the arrangement shown in sketch enclosed, which has proved very satisfactory in use. The rod is simply clamped into the jaws of a vice.

All that is needed is a piece of round metal rod, about 9 in. long x 1/8 in. diameter or thereabouts, to suit the size of hole in the reel of wire to be wound. One end of the rod is screwed for about 2 in. in length and is provided with a nut, a spring and three washers about 3/8 in. diameter.



The tension can be adjusted to suit all reels and purposes.

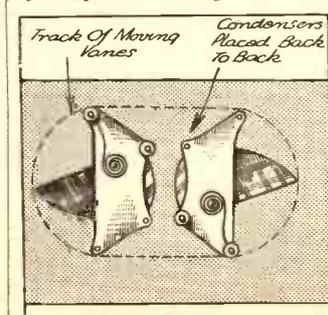
Varying lengths of reels can be provided for by simply pushing the rod farther into the jaws of the vice. The spring can be partly compressed when placing the rod in the vice and fine adjustment made by means of the nut.

The wire is wound by turning the former with the left hand against the tension, and with the right hand the wire can be kept close up to that already wound. Counting the number of turns is not necessary if a trial run for, say, 1/2 in. is made and the number counted. Thus, for a 50-turn coil—say 10 turns for 1/2 in.—the coil will be 1 1/2 in. long.

## FITTING VARIABLE CONDENSERS.

IT is sometimes found necessary to connect two variable condensers in a very confined amount of panel space, as, for example, on the aerial side of the screen where there is only a limited space.

In this case it is necessary to know exactly the very smallest area the condensers will occupy so that they may be used to their fullest advantage. To do this, place the condensers down, back to back (as sketch), on a piece of paper. Find, by plotting points at the tips of the moving vanes, the farthest distance, across the condensers, from tip to tip of the moving vanes. Plot



Arranging the condensers to take up a minimum of space.

also the points at the other extremities. By connecting these lines, as in sketch, and placing the paper against the panel, the most convenient arrangement may be found.

## A CORNER CABINET SPEAKER.

A PLAIN 18-in.-square baffle across the corner of the room, for considerations of space, proved unsuitable both from the point of view of appearance and performance.

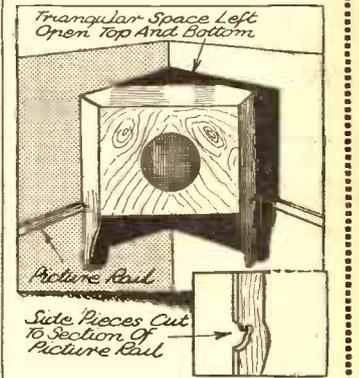
The baffle was then reduced approximately to 12 in. square, and two of the strips sawn off the sides were utilised

for side supports, as shown on the sketch, and cut out as shown exactly to fit over the picture-rail moulding.

The side pieces are at right angles to the wall, and the angle between the sides and the baffle requires careful cutting; but plastic wood is a great help in disguising doubtful joints!

The top and bottom boards of the cabinet are 5 in. wide and cut at the ends from both sides to an angle of 45°, thus fitting the cabinet at the front and resting snugly against the wall at the back. This leaves a triangular opening, top and bottom, at the back between the speaker and the corner.

If the portions to fit the picture rail are accurately cut, the cabinet stands on the rail quite firmly without fixing, screws, the shape necessitating its being correctly placed across the



No nails or hooks have to be driven into the wall to accommodate this speaker.

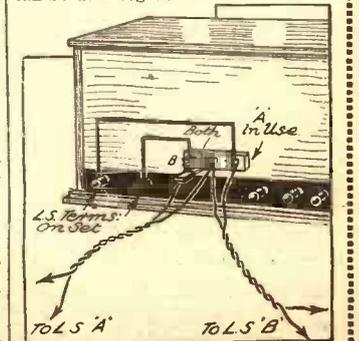
corner; and it cannot fall forward owing to the shape of the side pieces carried below the picture rail.

## SPEAKER SWITCHING.

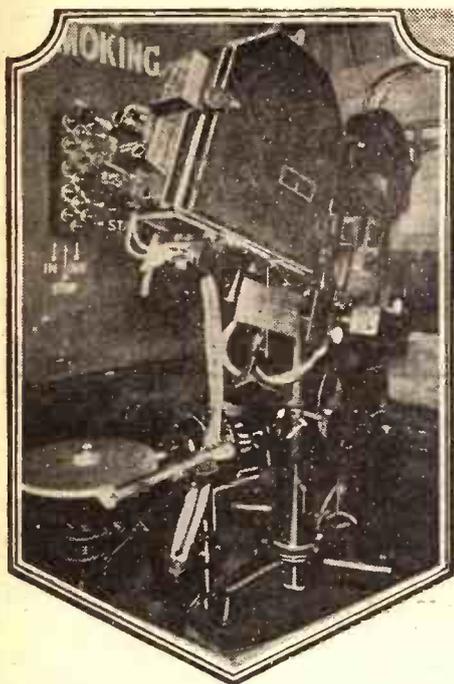
WHERE two loudspeakers are used in series, each in a different room, some arrangement is usually required for switching one or the other off. The simplest form of switching for this purpose is by means of a single-pole double-throw switch.

In one direction one of the speakers is in use and the second shorted, while in the reverse position, of course, the second speaker is used, the previous one being shorted.

In the "up" position both speakers can be used together.



Either or both of two speakers can be instantly switched into circuit.



# WIRELESS CASTS ITS SHELL

We are apt to forget that the science of radio is responsible for many valuable developments besides wireless communication. In this comprehensive article, little-known branches of the subject are described

By EDWARD LUPTON, D.Sc., Ph.D.

**T**HERE was a day, many years ago, when wireless was merely "wireless." The science at that time was merely one of communication: that is, the transmission of intelligible signals from one point to another without intervening wires. Things stood thus, more or less, until the advent of the valve or vacuum tube. The first really successful wireless telephone soon followed this.

We all know, of course, that broadcasting itself is only the propagation without wires of signals to be received at the other end. But wireless does not stop here, although the public at large is not aware of the fact that the science of wireless is used for hundreds of different purposes, apart from broadcasting and telegraphy.

The following few remarks may be of interest to those who have not given close attention to the tremendous growth, in every direction, to which wireless has actually attained.

#### Broadcasting Foreshadowed.

For instance, as far back as 1908, when wireless was just getting into its stride, the Dynamophone was invented. The Dynamophone was an apparatus whereby it was possible, with the human voice, to start an electric motor or any other electrical appliance from a distance.

Every time words were spoken into a microphone a transmitter would be energized, sending out impulses; whereupon the motor at the receiving side would start and run as long as the words were spoken into the distant transmitter.

While it was at that time but a toy, the apparatus foreshadowed broadcasting, because this was before the days of the wireless telephone, and the human voice actually did create effects at the receiving end.

#### Automatic Lightning Recorder.

At a not much later date the Ceraunograph was evolved. This was an automatic lightning recorder, and was constructed from the then existing wireless apparatus.

It recorded, on a paper tape, lightning discharges at a great distance. A similar device, employing the same principle, is in use to-day by a New York power company to record the approach of thunderstorms many hours before they actually arrive in the city. Both of these devices were invented, of course, before the day of the valve.

The marvellous valve makes possible not only the wireless telephone and broadcasting, but also many other important developments. It is really only from the time of the advent of the valve that wireless has left its home sphere and invaded other and older sciences, causing and creating many revolutions in them.

#### Long-Distance Telephony.

For instance, up to the time of the perfection of the valve it was not possible to talk by wire over very great distances. The telephonic repeater coils, loading coils and others, as well as the very heavy lines

necessary for long-distance communication, made this feat impractical.

The valve changed the situation altogether, and to-day it is used in long-distance telephony to an extent which the public very little appreciates. That is only one case where wireless principles are applied to line telephony and make possible the bridging of great distances, impossible to cover otherwise.

#### The Weight of a House Fly.

An ordinary house fly alights upon a steel bar, a quarter of an inch square. What happens? Perhaps offhand you will say, "Nothing." Nevertheless, the weight of the fly depresses the steel bar to an extent which, impossible as it sounds, can be measured to-day. The instrument, in fact, measures the movement of the incredibly short distance of three billionths of an inch and is called the Ultra-Micrometer.

It is capable of measuring distances 15,000 times shorter than have hitherto been detectable with microscopes of the highest magnifying power. Again, wireless instruments and the valve are called in to achieve the result just cited, because the heavy steel bar upon which the fly alights is but part of a condenser; and the change in the capacity of the condenser, although the fly weighs practically nothing, is sufficient to be accurately measured.

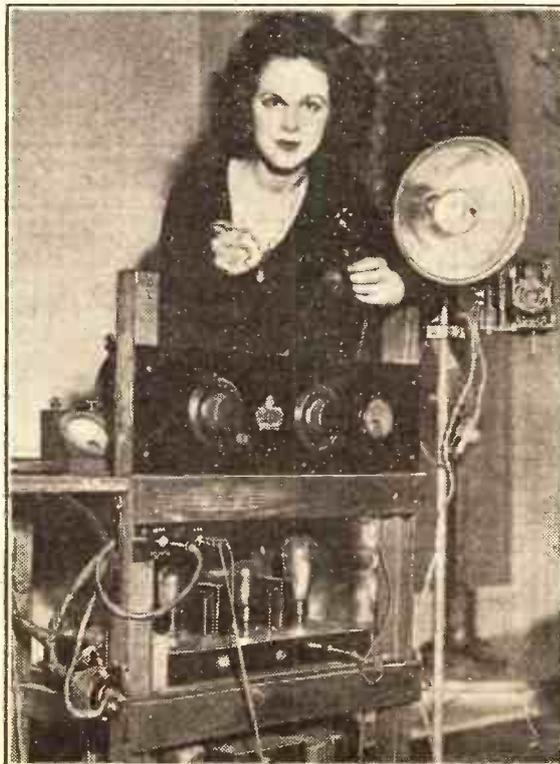
#### Modern Recording.

The "talkies" would not be a success if the valve and wireless principles were not used in some of the stages. The same statement is true of the modern gramophone, where both the recording and reproducing are done by means of wireless instruments.

Most readers are probably familiar with the method of trapping burglars by making

(Continued on page 289.)

## BURGLARS, BEWARE!



One of the latest developments made possible by the wireless valve is the burglar alarm illustrated here. This instrument (shown in its experimental form) sends out a radio-alarm signal to the police, and at the same time takes a photograph of the intruder by means of the camera shown on the right.

# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.  
The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### THE LICENCE QUESTION AND THE PORTABLE SET.

T. T. (Chesterfield).—"How do I stand about the licence for a portable set if I make up a small one in addition to my ordinary set? I'm going camping in Cornwall and Devon—just two of us, and plenty of room for a small set in case we get a lot of wet evenings."

"But, being recently married, I am about 'stony,' and if my expenses on the holiday set will have to include 10s. for another licence fee I shall have to cut down on the portable or else try and take the home set on holiday, with the risk of regretting it."

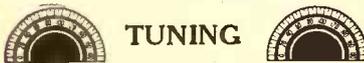
"What is the position when leaving home with a wireless set?"

It is a condition of the ordinary licence that the licensee, or members of his household, may use more than one receiving set at the licensed address without obtaining an additional licence. So your ordinary licence covers both the original set and the portable at home.

Moreover, if you look at the back of your licence you will find that one of the conditions under which it is issued is the following:

"This licence will be deemed to permit the occasional use by the licensee or a member of his household residing with him at the address of the station of one portable wireless receiving set (1) away from the address of the station (e.g. in the open air) or (2)

### ABOUT YOUR CONTROLS



Ideally, tuning should be adjustable by one knob and independent of all other controls. In practice, for economical and other reasons, it frequently requires simultaneous adjustments to two condensers; and it is often affected by the selectivity adjustment, and to some small extent by reaction.

Accurate tuning is specially important in a band-pass type of set, because, if a station is a little off-tune, the quality may be badly affected. The best aid to correct tuning is a low-reading milliammeter (usually 1-5 m/a scale) inserted in the detector's H.T. + lead, where it will give a visual indication of exact tuning.

When searching for distant stations tuning can be adjusted in conjunction with reaction, if available, to obtain maximum sensitivity and range.

Details of the correct methods to apply will appear in these columns in future notes "About Your Controls."

at another fixed address at which the licensee is temporarily resident; but the Postmaster-General reserves the right to withdraw such permission and to require the licensee to take out a second licence if he is of opinion that such use is not occasional or such residence is not temporary. The portable set shall be used in all other respects in accordance with the terms of this licence; a person using his set away from the licensed address shall carry this licence with him."

### WHAT DOES EACH COMPONENT DO?

A question that frequently arises in correspondence is that given above—"What does each component do?"

To answer it fully would necessitate much more space than is available, for even in the simplest set each component is kept extremely busy in the electrical sense. But the following description and the photograph will give some idea of the action of the various parts:

Placing the L.T. switch in the "on" position enables electrons from the L.T. battery to flow through (and thus heat) the filament of the valve.

Some electrons are detached from the heated filament and are attracted to the anode across the vacuum inside the valve; so switching on L.T. starts this H.T. current as well. (It flows to the H.T. battery + via the H.F. choke and phones.)

The sounds heard from the phones are due to low-frequency variations of this (H.T.) current, the variations being caused by voltage variations of low frequency on the grid of the valve.

To understand how these are applied, consider the H.F. currents which are flowing in the aerial-earth circuit due to the action of the distant station. They pass through the set via the A and E terminals, crossing the preset condenser and flowing through the aerial portion of the coil unit.

### Sharpening the Tuning.

The object of the preset condenser is merely to alter the aerial circuit's capacity (and thus "sharpen tuning"), so this condenser can be omitted without affecting the fundamental action of the circuit. But the aerial coil is essential, because the magnetic field around it (due to the currents flowing through the winding) links the aerial winding with the adjacent grid coil.

The action takes place across the small space separating the two windings.

Across this grid coil H.F. voltages are thus

created by the aerial coil's magnetic field. And corresponding H.F. currents then tend to flow in the grid (centre) coil, and so to the tuning condenser, which is connected across it.

This condenser-and-coil combination forms an H.F. circuit, having a natural frequency of its own. When adjusted to the same frequency as a transmitting station, the circuit responds vigorously to it, but other currents, from stations working at different high frequencies, affect it to a comparatively small degree.

We can thus, by tuning, select one (the desired) station's effects and reproduce them in the adjacent coil-and-condenser circuit. The effects consist of high-frequency currents, which are varying in amplitude from moment to moment at low frequencies.

### Electrical Counterparts of the Sounds.

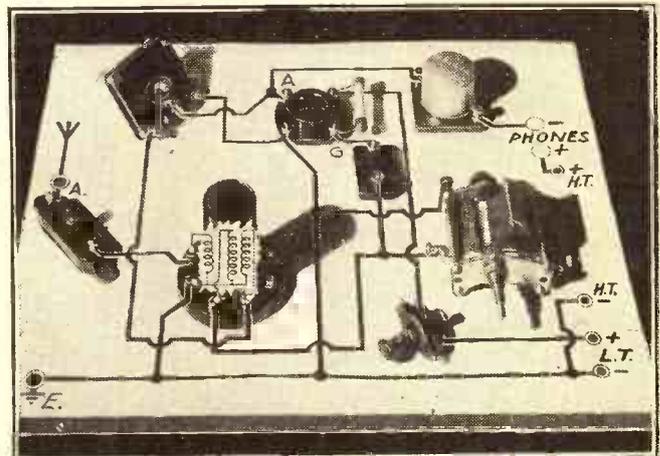
These amplitude variations, caused by the speech or music at the distant transmitting studio, are the electrical counterparts of the sounds there. And they are, therefore, as varied and as complex as the sounds themselves.

Whatever the sound frequencies—due to piano, harp, voice, drum or any combination of these or other "instruments" in the studio—the corresponding electrical frequencies are to be found in the receiver's tuned circuit as amplitude variations.

How are they detected and made audible? We already have a current flowing through the phones, but it is a steady, unvarying current, which needs to be altered in amplitude at the sound frequencies in order to produce the required sounds from the telephones.

This can be done, as stated, by virtue of the fact that the amplitude of the plate current of the detector valve is controlled by its grid voltage.

### A RELIABLE ONE-VALVE ARRANGEMENT



The black lines show how the various terminals should be wired to form a one-valver, with leaky-grid detection and reaction. In practice there would probably be a wavechange switch associated with the coil unit, but this has been omitted to simplify the illustration.

The tuned circuit—coil and condenser—is connected between the valve's filament and grid. (The connection is made directly in the case of the filament end, and via the grid condenser to the grid.)

Voltages developed in the tuned circuit are thus impressed across grid and filament, and H.F. voltages appear in the plate circuit. Barred by the H.F. choke, they cause H.F. current to flow in the reaction circuit.

This consists of the differential reaction condenser and the reaction coil winding.

The reaction condenser enables more or less of the H.F. current to be passed through the reaction coil, where it is magnetically linked with the original current in the tuned circuit.

(Continued on next page.)

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

Thus the degree of feed-back is easily controlled, and the original tuned H.F. impulses can be strengthened to any desired degree within the limits of the system.

When H.F. voltages—whether due to the distant station alone or strengthened by reaction—are thus applied to a valve, the grid attracts to itself some of the electrons from the filament. They form a small current, flowing externally from grid to filament via the grid leak. (The grid condenser is an insulator to such currents.)

When current flows through a resistance such as this there is always a voltage difference across the resistance. As the current varies in average amplitude, L.F. voltage variations appear across the ends of the resistance.

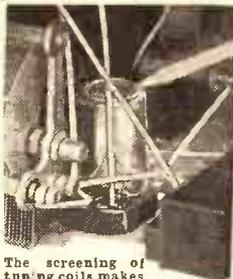
Thus the effect of the grid-leak-and-condenser combination is continually to vary the grid voltage in accordance with the low frequencies of the sounds heard in the distant studio. And as the grid voltages affect the plate current, the corresponding current variations appear in the valve's anode circuit.

Being at low frequencies, these variations in current are not impeded by the high-frequency choke. They therefore pass through it to the pphones, which thus operate to produce sounds corresponding to the original ones.

### EASILY MADE MISTAKES THAT ARE HARD TO FIND.

Recent correspondence from readers who have been in trouble with their sets discloses the curious fact that in a great proportion of cases it is the simpler faults that are now proving the harder to find.

The complicated circuits of multi-electrode valves do, of course, present difficult problems,



The screening of tuning coils makes possible very compact components and set designs.

### FOR BETTER RADIO

Prior to the general use of high-magnification valves, screening was of a very incomplete character or absent altogether; but

when the valve improved, it became imperative to prevent unwanted feed-back between different stages of the set.

Coils, condensers, transformers, chokes and valves themselves are all commonly screened, the latter by means of a metallic coating on the bulb, joined to one of the "filament" legs.

The coils, etc., usually have a metal cylindrical screen, and this may give trouble unless properly earthed. If it makes contact with a screen holder the contact must be firm, or crackling and instability may result. The fact that a metallised valve's coating is "earthed" implies that care must be taken not to allow battery-leads, etc., to touch it accidentally.

but the really elusive fault is often due to something which is "too obvious" to be seen.

One Hornsey reader put the matter in a nutshell when he wrote:

"At last I have solved the mystery. It was

a 'silly-ass' fault, and I think these are the hardest to find. I am almost ashamed to confess that, after all the trouble I have put you to, there was really nothing wrong with the set at all except the fact that I had reversed the G.B. leads!

"Honestly, I can't imagine how I missed it, especially as the possibility was mentioned in your first letter, and I can only suppose that I was so much on the look-out for the out-of-the-way fault that I could not see the obvious one staring me in the face."

Here is another case, reported by Mr. R. C. Thomas, of 132, Queen's Road, Halifax, in a letter to the Editor; and it will be noted that Mr. Thomas found a comparatively tricky fault without too much trouble. But he was thinking of calling in the aid of a coal-hammer!

### Wrong Grid-circuit Connections.

This is what he says:

"I have read with interest the discovery of queer faults in set building published from time to time in 'Radiatorial.' The following may be of some interest to other readers:

"I have just completed a small portable of the Det., 2 L.F. variety which, when completed and switched on, simply refused to utter a sound.

"First the valves were tested: all well. Next a run-through with a flash-lamp bulb disclosed a connection to earth.

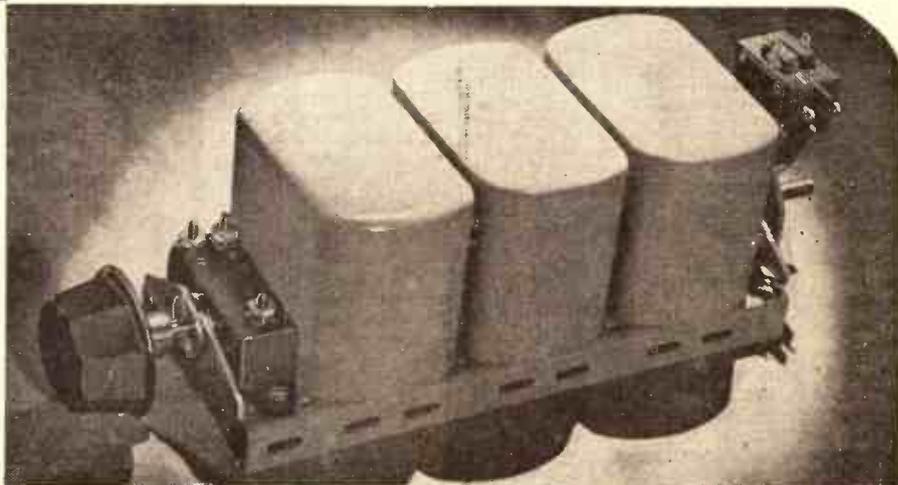
"Having rectified this, thinking everything was O.K., I again switched on and received very faint, distorted signals.

"By this time I was considering operations with a coal-hammer, and then I saw it—right under my nose, fairly standing up and yelling at me!

"The grid condenser and leak were connected wrong way round. The end of the condenser, which should have gone to the end of the grid coil, was taken to L.T. +, and the bottom of the grid leak to the coil—the other terminal unconnected."

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THE fourth edition of "Television To-day and To-morrow," by Sydney A. Moseley and H. T. Barton Chapple, Wh. Sch., B.Sc. (Hons.), containing a foreword by John L. Baird, has just been published at 7s. 6d. net by Sir Isaac Pitman & Sons, Ltd.

While this book deals almost exclusively with the Baird systems, that does not imply as great a limitation as might be thought, for in their applications these systems undoubtedly cover or are allied closely to much of the general television progress and development that have taken place to date.

There is a considerable amount of interesting historical matter, and the early attempts of the Baird Co. to get their system on the air, which ended in an amicable collaboration with the B.B.C., are dealt with in some detail.

The theory of television is adequately encompassed, and there is a wealth of practical information concerning the subject, the clear and simple text being backed up by numerous diagrams and photographs.

It is certainly a volume which television experimenters will find both readable and helpful.

**THE LISTENER'S NOTEBOOK**  
(Continued from page 276.)

end. Perhaps 65 minutes was a little too long for such a thing.

Or was it because the main theme in the final stages was war?

The best feature of these productions is that they contain the elements of many varieties of entertainment, all skilfully blended.

I would readily award "Scrapbook for 1914" my weekly bouquet, minus no sprigs, were it not for the Royal Command Variety Show.

But, obviously, before this performance everything else paled. The show was outstanding, and the continuous roar of laughter from the Palladium audience was a tonic in itself. Surely no further proof of the value of an audience to these shows is now wanted.

I take it that it was Christopher Stone's special care to help the listener to get the atmosphere. Actually, his help was unnecessary. When he might have helped—as, for instance, in the burlesque at the end of the performance—he wasn't able to get a word in. He wisely refrained from trying, and after the turn confessed he had left it all to our imagination.

I should say that the most popular tune to-day in England is the one that was first brought to universal notice by the "In Town To-night" series. I mean Eric Coates' composition from the "London Suite."

It is a fascinating tune, and one that will not pay the usual penalty tunes pay for their popularity—an early demise. I should say it will be added to the list of tunes that will live for ever.

Was that bus-driver hard on the woman driver, or wasn't he? He must have had lots of experience of her, and he should know.

The Mills Brothers have caused me to modify my views of the American crooner. This will strike you as a rapid conversion on my part, considering my denunciation of him last week. In my defence, however, let me plead that these clever brothers aren't typical of their

crooning compatriots. They sing quietly, harmoniously and do not make nasty noises.

Early evening broadcasts have a seriousness these days that can only suit the specialist listener. Surely one must be in the proper mood for most of the items that are broadcast before the hour of 8 p.m.?

And, talking of hours, I wouldn't call the B.B.C. announcers perfect demonstrators of the 24-hour clock system. Mistakes have been rather frequent. But I sympathise with them. They must find the big numbers of the new times confusing, particularly after the simplicity of the old.

I see no advantages at all in the innovation. It is untrue to say that the 24-hour clock is simple and more practicable. C. B.

**WIRELESS CASTS ITS SHELL**

(Continued from page 286.)

it impossible for them to approach a safe within three feet. By upsetting the fine electrical balance of a system of wireless instruments it is thus possible to give an alarm before the burglar or safe-cracker has even touched the safe itself.

Some six years ago a method was devised whereby all employees emerging from a factory and passing through a certain gate would immediately indicate to an observer whether or not the employee carried an excess of metals on his body. By means of valve amplifiers it is even possible to detect as small a quantity of metal as the gold or silver filling of a person's teeth.

Another development, also of interest, is the use of a condenser in wireless amplification, whereby the small variations in the capacity of the condenser are used to reproduce gramophone music in a manner of which one would scarcely dream.

It may be said with safety that the surface of what remains to be done has as yet not been scratched. There is scarcely an industry to-day that cannot make use of wireless instruments in some phase of its work. When it is realised that by means of wireless instruments it is possible that the heartbeats of a chicken can be magnified so that an audience of thousands of people can hear the sound throughout an auditorium, it should be apparent how wonderful and how universal the uses of wireless apparatus have become.

**MORE ABOUT THE "DOUBLE P.D."**

(Continued from page 273.)

But also remember that to be properly trimmed means that adjustment of any trimmer either way will weaken reception of a distant station. It is not just a matter of bringing the trimmer up to a maximum, but of being able to pass it in either direction and then setting the trimmer on the peak point.

With this task over we can settle down to enjoy the results the "Double P.D." will provide. Tuning is perfectly straightforward and quite sharp. Volume is controlled by the right-hand knob on the panel and wavechange and on-off by the knob on the left.

Remember, in this latter connection, that the mains themselves are plugged into the set, and then the set is plugged into the power pack. That is why the two plugs on the set are provided. The mains do not go direct to the power pack.

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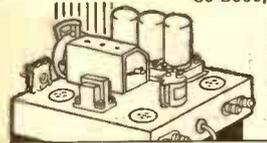


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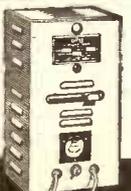
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## THE LINK BETWEEN

(Continued from page 284.)

thrilled the inhabitants of the little American village by singing "Only for You." Of course, the letters were duly handed over, but the anti-climax came when the clerk confessed that he had known Caruso's identity all the time, but that he had bet a friend that he would persuade the world's greatest tenor to sing to him without a fee!

This is a little off the beaten track, perhaps, but it happens to be this very song which is the latest to be recreated by H.M.V.'s remarkable process. It is coupled with "A Vague Resemblance," another Caruso recreation, on H.M.V. record number DA 1,367. It's an ideal record for radiogram work.

### "P.W.'s Personal Corner.

Just before I settle down to my usual task of providing points for purchasers, I want to make a brief reference to two important appointments which have recently been made in the radio world.

I am confident that readers will join me in extending good wishes first to Mr. Frank Gill, O.B.E., who has been elected Chairman of Kolster-Brandes, Ltd., and secondly to Mr. Ernest J. Long on his appointment to the managing directorship of the British Ebonite Co., Ltd.

Both of these gentlemen have had very distinguished careers in the radio industry, and there is little doubt that their brilliance in other directions will have pleasant reactions

### OUR POSTCARD SERVICE

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

in the future activities of the two firms in question. In the typical "P.W." style, we wish them the very best of luck.

### Battery News.

I learn with interest from Siemens Electric Lamps and Supplies, Ltd., that a new "Full O' Power" battery has just been introduced for use with the popular K.B. model 274 "Kobra" receiver. This new battery is 120-volts H.T. and 9-volts G.B. combined, and its dimensions are 7½ in. x 8½ in. x 3 in. The list price is 12s., and when ordering you should quote the reference number 1193.

### Wearite Excel.

I am amazed at the success of the new Wearite Universal coil, although, quite candidly, I think it is very well deserved. It is characteristic of Wearite that when they do a thing they always do it well, and the new Universal coil is certainly no exception.

I think that this time they have excelled themselves, for at the price I know of no coil on the market that can touch it.

It is obvious that the constructing public has realised that too, for the coils are selling in thousands, and I understand that it is very much a case of all hands on deck down at the Wearite factory to keep pace with orders. That's the stuff to give 'em!

I expect that most of you will already have obtained details of this new coil; but in view of the tremendous popularity of the component, I propose to make the literature available through our postcard (No. 86.) service.

## TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

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

### A New Type of Loudspeaker.

SEE that a new kind of loudspeaker is now being put on the market, based on the piezo-electric principle. In case you do not happen to know what the piezo-electric principle is, it depends upon the use of a substance, generally of a crystalline type, which will expand and contract when electrical potentials are applied to electrodes stuck on the sides of it. A large crystal of Rochelle salt is a well-known example of a piezo-electric substance, whilst quartz (cut in a special way) is another very familiar example. In fact, it was with quartz plates that piezo-electricity was first investigated (by Monsieur Curie, if I remember rightly).

### The Effect of Alternating Potentials.

If the potentials applied to the electrodes (pieces of tinfoil stuck to the sides of the substance) are alternating, then the piezo-electric substance will expand and contract in a corresponding fashion; and if a diaphragm is fixed to one end of it, and the other end is fixed to some fairly rigid support, you will get vibrations of the diaphragm corresponding to the variations in the applied potential. Here you have all the elements of a loudspeaker, but the actual amplitude of motion is relatively small.

Recently, however, methods have been found for greatly increasing the amplitude of this movement, so that practical loudspeakers can now be made. Apart from this, the arrangement has the very great advantage that the phenomenon is a molecular one, and therefore the movements of the substance follow the variations in the applied electrical potentials with extreme rapidity and great faithfulness. So to that extent the system is eminently suitable for use in a loudspeaker unit.

### Excellent High-Note Response.

In the new loudspeaker now being put on the market the piezo-electric arrangement is used in conjunction with a moving coil, and it is claimed that the combination gives very perfect reproduction. With the Rothermel-Brush piezo-electric speaker it has been shown that good reproduction is obtained with frequencies up to as much as 8,000 cycles, and even higher than this.

It is quite likely that we shall hear a good deal more of this type of speaker in the near future.

(Continued on next page.)

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PIX

## TECHNICAL NOTES

(Continued from previous page.)

### Some Interesting Battery Tests.

You are always being advised to go in for genuine British-made H.T. batteries and to give the go-by to the cheap foreign article. To show you that this is not merely a question of supporting home industries and all that, and that you really get better service out of a properly made British battery, some very careful tests have lately been made at the National Physical Laboratory, and the results of these are important to all users of battery-operated sets.

In these tests four high-tension batteries of different makes were taken, each with a 60-volt nominal rating, two of the batteries being well-known nationally advertised British brands, whilst the other two were of what we may call "the other kind."

### Finding the Effective Life.

Each of the batteries was discharged over a given number of hours per day until

### HENRY GETS THE BIRD!



Henry Hall and Florence Desmond investigate the new streamlined refrigerator which H.M.V. have recently produced as another addition to their wide range of electrical manufactures. The chicken which Florence Desmond is handing to Henry was placed in the refrigerator and left for a month—before being eaten!

the voltage had fallen to 36 volts. For the purposes of the test we can call the two well-known brands numbers 1 and 2 and others 3 and 4. It was found that in the case of numbers 1 and 2 the effective life came to about 210 hours, whilst with number 3 the figure was about 145 hours, and number 4 about 175 hours.

The deterioration of 1 and 2 was gradual until the end of about 150 hours run, whilst with numbers 3 and 4 the deterioration became fairly rapid after about 60 hours run.

At the end of 150 hours number 3 had ceased to be effective and number 4 had dropped to 39 volts, whilst numbers 1 and 2 registered about 49 volts each.

### Eliminating Interference.

Electrical interference with radio reception is now becoming so widespread that definite measures are being taken by the broadcasting authorities in different countries to see what can be done in the way

of concerted action to deal with it. In this country there are thousands of listeners who wish to install electrical household appliances, such as electric refrigerators, vacuum cleaners and so on, who hesitate to do so because they are afraid that these may cause interference with their radio reception.

A Committee on the electrical interference with broadcasting has been set up by the Institution of Electrical Engineers, and a special meeting of this Committee was recently held, with a representative of the B.B.C. present. I understand that the Committee has come to the conclusion that it is essential to get down to practical methods as soon as possible for checking this interference and for dealing with apparatus which causes it.

### A Standard Limit.

It is suggested that a standard limit of radio interference should be defined and adopted, this standard to be one which would give reasonable immunity for a good set and which, at the same time, would be reasonable also to the manufacturers of electrical appliances of various kinds.

Another Committee is to study the various devices which can be adopted by the listener himself so as to suppress interference from electrical apparatus.

I said something about this in these Notes quite lately, and you may recollect that I have more than once mentioned different devices which are available on the market for this purpose. There is no doubt that the matter is one of increasing importance, and although technically the best way to tackle it is at the offending instrument or machine, whatever it may be, nevertheless personally I believe that the most practical method, at any rate for the time being, is for the listener to try out different devices which he can use on his own set or electric-light wiring system.

### Another New Home Recorder.

I hear news of a fresh development in home recording. You will remember I mentioned in these Notes some time ago a system of home recording in which the record was made on a plastic material, which was afterwards baked for two hours in a special electrically-heated oven. This baking hardens off the material, so that, whilst it is soft for recording, it becomes hard for reproducing.

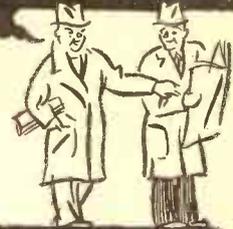
The baking, however, is evidently a nuisance and something you want to avoid. Well, this latest method does avoid it. The record consists of a thin circular aluminium sheet—conventional size—covered with a layer of cellulose varnish. This is no ordinary varnish, but one which has been carefully prepared after long experiment.

### Cutting the Record.

When in its normal state, before recording, it has a soft, cheesy consistency, and it "cuts" under the recording needle very smoothly and cleanly. A particular point to notice is that it requires very little force to drive the record against the needle whilst it is cutting, so that an ordinary gramophone will serve the purpose. This is where most of the previous systems fell down—the ordinary small home gramophone motor was not powerful enough to drive them when "cutting" the record.

(Continued on next page.)

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"NO - I'M BROKE



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## TECHNICAL NOTES

(Continued from previous page.)

After the record is made, the disc is left lying about to dry, and after about 24 hours it will have lost most of the "softener" and will be quite hard enough for playing. It can, of course, be played back immediately it is made, but if possible it is better to wait until the next day.

The makers tell me that, if it is carefully treated in this way in the early stages, it will then play for 200-300 reproductions, which is as much as can usefully be got out of most ordinary commercial records.

### Using the Microphone.

Home recording in the past has generally been rather unsatisfactory and for that reason has never seemed to "catch on." But I have always been convinced that, if something really satisfactory could be produced, the public would buy it.

This latest effort certainly seems very simple and appears to get over most of the difficulties of the previous attempts. The reproduction is very good and it is a very simple matter to "record" from one record to another, or from the broadcast or a microphone.

Ordinary "acoustic" or direct recording (that is; without the aid of electrical

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amplification) is not, of course, so good, but that is only to be expected. Most people nowadays seem to have radiograms and can easily arrange electrical amplification, so there may be a big future for this latest system.

### Tone-Correcting Transformers.

I have often been asked whether a tone-correcting transformer should be used with leaky-grid detection, or whether it can be used just as well with the anode-bend detector.

The popularity of the tone-correcting transformer principle has increased greatly since this type of transformer was first introduced and there is no doubt that, when properly used, it is a good investment.

### The Curve of the Valve.

The anode-bend detector introduces a certain amount of harmonic distortion—since the so-called "straight" part of the curve of a valve is not really straight at all. It is not so long ago that a large percentage of fans looked with contempt on the leaky-grid detector, the anode-bend being considered the last word in refinement.

Things have changed since then, and it has been found, as I say, that the anode-bend produces a certain type of distortion. Moreover, improvements have been made in the leaky-grid type and nowadays this type is capable of giving excellent quality—particularly where the input to the detector is small. If the input is large, power-grid detection may be resorted to.

### Harmonic Distortion.

If a tone-correcting transformer is used, with anode-bend detection, the harmonic distortion is emphasised. With a leaky-grid detector, on the other hand, excellent results can be obtained, especially if, as mentioned, you operate the detector under proper conditions.

This difference between the two detector systems, when using tone-correction, is rather interesting in view of the old controversy as to their relative merits.

### Automatic Volume Adjustments.

I don't know whether you have ever stopped to think how extraordinarily sensitive the ear is. It has many remarkable properties and not the least of these is its faculty of making itself very sensitive to weak sounds and relatively insensitive to loud sounds.

Perhaps I can best explain what I mean by comparing with a microphone and amplifier system. You know that if you have such a system tuned up for great sensitivity, so that it will reproduce very weak sounds at reasonable strength, and then you suddenly put very loud sounds into it, the whole thing is liable to bust itself.

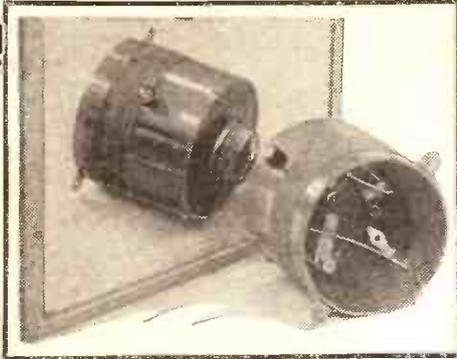
It hasn't the power of accommodating or adjusting its sensitivity to the loudness of the input. The ear, on the other hand, can stand a most amazing range of loudness variation without the slightest trouble, from a watch-tick to a big gun. It has been estimated that it can hear a sound when the amplitude of vibration (at the ear) is only a millionth of a millionth of a centimetre.

### Loudspeaker Defects Covered.

Another very amazing thing about the ear is its capacity for making up defects in the input. Many people speak very carelessly and leave out half the consonant sounds, but the ear, by practice, is able to fill these in and the listener understands perfectly what is said.

The same sort of thing applies to loudspeaker reproduction. Many a loudspeaker fails to reproduce half the sounds—overtones and what not—that were present in the original, but the ear blissfully supplies all these for itself and often enough the listener is quite unaware of the crudeness of the sound he is hearing. It often happens, in fact, that the loudspeaker gets the credit that rightly belongs to the ear of the listener!

See full description in Editorial columns on page 284 of this issue.



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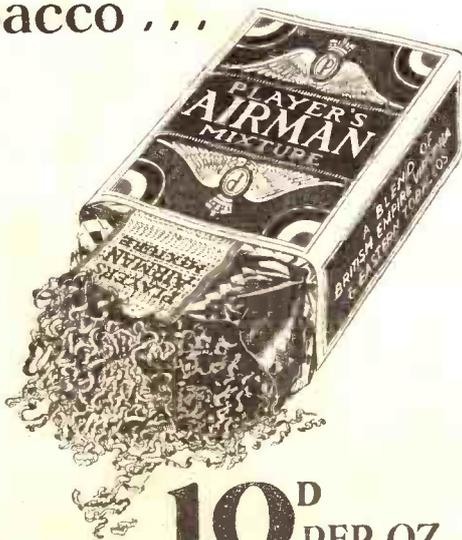
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