

# CONTENTS

Vol. XIX. No. 77.

MODERN WIRELESS.

MAY, 1933.

	Page		Page
Editorial	337	Trouble Tracking	438
Mark Hambourg on "My Thoughts"	388	My Broadcasting Diary	439
About Broadcasting	390	At Your Service	441
Work-Bench Wrinkles	391	On the Short Waves	443
Revolutionary Radio	394	The Columbia Radiograph Four	446
Questions Answered	395	On the Test Bench	447
The "Ferro" Three	402	Sorting out the New Valves	449
Round the Turntable	421	In Passing	451
The "Dio-Q"	428	Spotlights on the Programmes	453
Loudspeaker Law	429	High Power Amplifiers	455
Broadcasting H.Q.'s Link with Britain	431	A Visit to the Television Studio	457
Faults I Have Found	433	Choosing Records	460
Macnamara—The Golden Voice	434	All About Band-Pass	461
The Voice from the Skies	435	Morse in Practice	464
Special Section:		Set-Testing with a Milliammeter	465
<b>HOW TO OBTAIN BETTER RADIO</b>		Radio Notes and News of the Month	468

**SPECIAL SECTION, "THE WORLD'S PROGRAMMES," PAGES 403-420**

(See page 403 for Contents).

*As some of the arrangements and specialties described in this Journal may be the subject of Letters Patent the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.*

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## FERRANTI TRANSFORMERS for Class "B" Amplification



No better Transformers are available at any price.

FERRANTI LTD.,  
HOLLINWOOD,  
LANCASHIRE

London: Bush House, Aldwych, W.C.2.

Success with Class "B" Amplification depends on the careful choice of the right transformers.

For the utmost economy in High Tension consumption it is essential to use Transformers of the first grade, with high inductance primaries.

Only under these conditions can the High Tension current of the driver valve be reduced to a small value, thus ensuring that the total H.T. consumption of the set is not materially increased.

**Push-Pull Transformer. Type AF15c.** Ratio 1/1. Primary Inductance. 62/17 henrys. 0/20 m/A. Secondary Resistance 80 ohms each half. Price **26/6**

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All Prices include Push-Pull Licence

# THE NEW "3 IN 1" INSTRUMENT



**1 SUPERHET RADIO (7 VALVES)**

**2 ELECTRICALLY-REPRODUCING GRAMPHONE**

**3 IMPROVED AUTOMATIC RECORD-CHANGE**

THIS complete "3 in 1" home entertainer gives you:

**Firstly**, seven-valve radio employing a superheterodyne circuit and variable mu valves, with the extended range, complete freedom from overlap and "background," and that extraordinarily high degree of selectivity this means.

**Secondly**, an electrical gramophone, as simple to turn on as electric light, and which reproduces your own records electrically.

**Thirdly**, the latest improved type of automatic mechanism to play eight records without any attention, or to repeat one record indefinitely.

Reproduction on both radio and gramophone is through an electromagnetic moving coil speaker giving a tone absolutely "true-to-life." There is nothing experimental about this model. Its thorough reliability has been proved over a period of many months before introduction.

The cabinet work is particularly noteworthy. It definitely acknowledges that radio is a new thing, and must be treated newly. In basic principles the design recognises the soundness of past craftsmanship, but new thought is apparent in the clean



ALL IN ONE SIMPLE INSTRUMENT... AND ALL FOR **55 GNS.**

lines, the contrasting of exquisite grainings, and the absence of dust-catching mouldings. And because sound is influenced by cabinet design, this Autoradiogram has combined much thought, scientific skill and art in achieving "true-to-life" tone quality—for after all, the sole object of the instrument is to please the ears.

This is but a brief description of "His Master's Voice" newest radio-gramophone. You will find below a more detailed specification. But to

appreciate this model fully, you must see, examine, and hear it for yourself at any "His Master's Voice" dealers.

**SPECIFICATION.** "His Master's Voice" Superhet Autoradiogram Seven, Model 524: Circuit. Seven-valve superheterodyne; all mains. Three band-pass circuits employed. Variable mu valves. Tuning by specially compensated 4-gang condenser. Brilliance control to adjust tone. Three control knobs only: tuning, volume and master switch. Calibrated wavelength scale, illuminated and giving the names of principal stations opposite their wavelengths. Automatic record-change mechanism, giving continuous record programme of half-an-hour or more, with eight, ten or twelve-inch records. No pre-setting necessary. Push button rejects any record at will. For A.C. or D.C.

# "HIS MASTER'S VOICE" "TRUE-TO-LIFE" RADIO AND RADIO-GRAMPHONES

The Gramophone Co., Ltd., London, W.1

(Price does not apply in I.F.S.)



# Modern Wireless

Vol. XIX. No. 77

BRITAIN'S LEADING RADIO MAGAZINE

MAY, 1933

*The Latest Addition to the "Diodions"—The "Ferro" Three—Cheering Figures from the Radio Trade—The Coming of Television.*

**F**OLLOWING on the popular "Diodion" designs which have appeared in MODERN WIRELESS in the last few months, we have pleasure in presenting to our readers this month the "Dio-Q"—an unusually interesting development in receiver technique.

This design features the Diode Rectifier in conjunction with Quiescent Push-Pull. The latter ensures very economical maintenance, H.T. running costs being reduced to a minimum. Furthermore, the absence of reaction and the fact that no output valve matching is required are noteworthy features.

The "Dio-Q" makes an ideal household set, for on test we found that it was very easily operated, with adequate selectivity for the reception of plenty of alternative programmes.

### *A Band-Pass Ferrocart Receiver*

**A**NOTHER unusually interesting set is described in this month's MODERN WIRELESS—the "Ferro" Three. As its name indicates, the set makes use of the recently introduced Ferrocart coils, in the form of a band-pass unit. The variable- $\mu$  control of input and ganged tuning are well able to cope with modern ether conditions, while the complete stability and simple screening in this receiver will recommend it to even the inexperienced set-builder.

### *Good News of Radio Industry*

**O**UR contemporary, "The Wireless and Gramophone Trader," records the pleasant news that a new record in the year's trading in the radio industry was set up in 1932. The turnover was £36,627,425, of which £4,000,000 represented imported goods. The total for 1931 was £29,000,000.

Although radio prices dropped still lower during 1932, figures show that many more people purchased better-grade sets, with the consequent result that the year's trading, though showing only an increase of 170,000 in net sales of sets, brought in £7,000,000 additional cash.

Congratulations to the radio industry!

### *The Future of Television*

**M**R. SAM GOLDWYN, one of the most prominent figures in the Hollywood film industry, recently caused a bit of a flutter in this country by stating that television will be on tap for every home within eighteen months.

"Perhaps it's a bold statement to make," said Mr. Goldwyn; "but I have made it, and stand by it."

### *Off the Deep End*

**N**ow listen to Mr. Carlton L. Dyer, head of the Philco Radio and Television Corporation of Great Britain: "Mr. Samuel Goldwyn has gone completely off the deep end. Mr. Goldwyn side-steps the great problems of provision of money for building television transmitters, the uncertainties of the new aerial channel allotments, and the further engineering developments necessary to ensure that sight can be transmitted without distortion over the same distance as sound.

"I estimate that when good television receivers for household use are put on the market, their price will start at between £350 and £500 each," continued Mr. Dyer. "Television will come—that is certain. But not before its many problems are solved."

### *The Lucerne Conference*

**T**HERE is a good chance that the Prague plan will be radically revised at Lucerne in May, and that before the year is over a reduction in interference will have been achieved. The revised plan will probably allow for an increased separation in frequency from 9 to 11 kilocycles, although this will mean a reduction in available channels.

The Chief Engineer of the B.B.C., Mr. Noel Ashbridge, has every hope that an agreement between some 30 countries will be reached at Lucerne in May, and he recently gave this "tip" when interviewed: "Anyone purchasing a new receiver should see that it covers the whole band allocated to broadcasting"—that is (with one or two gaps)—from 200 to 2,000 metres.





# MARK HAMBOURG on

**T**HERE is no musician in the world to-day who is more typically musical than Mark Hambourg. You could not possibly mistake him for any other than a musician, and a pianist at that. Short, dark, hair above the average length, and a certain Beethoven sternness—these are the characteristics which mark him as a man of unusual interest.

Mark Hambourg's fame is world-wide. He has toured America, Canada, Australia and the Continent not once but several times. He has been acclaimed by the severest of foreign critics as a musician of undoubted greatness, a pianist of power and personality.

### Of Fearless Opinions

And he is an Englishman; his home is London. In these circumstances, it seems strange that the B.B.C. has never utilised his services for broadcasting.

It was because I knew that Mr. Hambourg was a man of precise and fearless opinions that I sought his ideas on broadcasting in general and the B.B.C. in particular. Musicians, as a rule, are not com-

municative, but after one or two preliminary hitches, I met him in the foyer of that most famous of artistic clubs, the Savage.

Incidentally, I might say that during the whole length of our talk I did not put more than two or three questions to Mr. Hambourg.

*Mr. Mark Hambourg, whose fame and experience as a classical pianist is world-wide, has never before revealed his opinion of broadcasting; but in this exclusive interview he gives his somewhat controversial point of view for the first time.*

He has the ideal subject's way of knowing just what he wants to say, and how to say it.

"As I see it," he told me, "there are certain directions in which the possibilities of broadcasting have not been fully explored. To-day the wireless set is an object of common domestic use. It is in service on express trains, and the day may not be far distant when every private car, every taxi, perhaps even every omnibus, has a wireless set installed as a standard fitting. The demand for

wireless entertainment is certainly very great.

"It has been freely asserted that wireless broadcasting has become by now an essential part of the life of the masses. It may be true, but I am not altogether convinced of it:

### The Game of Listening

"Few things in life are perpetual. Professor Teramini, the Russian scientist, has actually produced music from the air by electrically charging his fingers. One cannot say in what way this experiment may open up the future, but it is possible that it marks the beginning of a new era in scientific development.

"As for the British Broadcasting Corporation—well, like any body which is established for public service, it comes in for a great deal of adverse criticism. Indeed, criticism seems in some way to be an essential part of the game of listening. I cannot pretend my views are representative of the average British listener, but it does seem there is little substantial ground for dissatisfaction with the services of the B.B.C.

### Demand for Bad Music

"For my part, I listen very little. If more of the best music were broadcast, I should certainly be a more frequent listener. But, then, the business of the B.B.C. is not to satisfy the tastes of myself, but the tastes of the masses.

"I believe it does this excellently. Those who do not care for a symphony concert have only to twiddle the knob of their set to hear the voice of their favourite red-nosed comedian. That seems to be the height of public service.

"More bad music is broadcast than good; that is because the



### THE MICROPHONE

has no terrors for Mark Hambourg, for although he has not yet broadcast, he has made many gramophone records, and is here seen playing for a Beethoven sound film.



# "MY THOUGHTS ABOUT BROADCASTING"

mass demand is for bad music. If public taste were to improve, I have no doubt that the broadcast programmes would contain a higher percentage of good music than they do at present.

### *Service—Not Education*

"I have heard it said that the efforts of the B.B.C. have tended to a wider and deeper appreciation of good music by the public. 'Musically educate' is a phrase in vogue. I very much doubt if the musical education of the public has progressed appreciably since the advent of broadcasting. The demand for good music as opposed to bad does not appear to increase proportionately. Besides, service and not education sums up the national broadcasting policy.

"But, in spite of all that, British broadcasting programmes suffer nothing in comparison with those of other countries. At their best, they are very good. For instance, the B.B.C. Symphony Orchestra is a splendid combination; as good, I think, as any similar combination in the world.

"Listeners would do well to remember what a truly powerful instrument a broadcasting station is, and how simply it can be turned to misuse. In Russia, broadcasting seems to be not so much a medium for entertainment as a means of propagating political ideas.

### *Hiring of Studios*

"Loudspeakers blare all the day, and sometimes half the night, putting forth again and again the ideals of the Soviet Union. Nothing of that nature has, as yet, crept into the microphone matter of the B.B.C.

"It is doubtful, too, if the American idea of permitting the wireless studios to be hired for set periods by commercial advertisers would be acceptable to British listeners, though this

(Continued on page 469)

IN AN  
EXCLUSIVE  
INTERVIEW  
with an  
"M.W."  
SPECIAL  
CORRESPONDENT.



In the circle is Mark Hambourg himself, and below a "music-from-the-air" electrical instrument of the kind to which he refers.



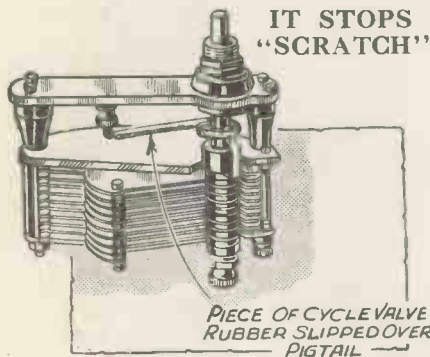
The B.B.C. Symphony Orchestra which Mr. Hambourg considers is as good as any similar combination in the world, is shown below.



### Noisy Condensers

To ensure freedom from noises on short waves great care has to be taken to ensure that a perfect electrical contact exists between the moving vanes of the tuning condenser and the external circuit, this is usually accomplished by the addition of a "pigtail."

In practice it is often found that although the end plate of the condenser is also connected to the



moving vanes and to the "pigtail," a scraping sound is heard when the condenser is rotated, and the "pigtail" touches the end plate.

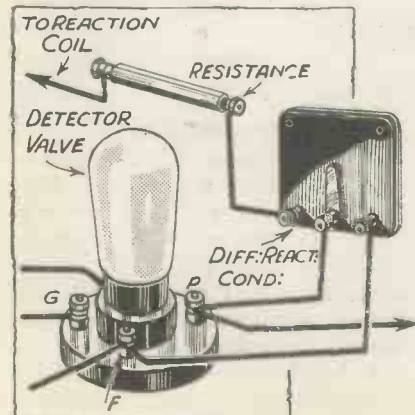
To remove this irritating sound it is suggested that one end of the "pigtail" is removed, a piece of cycle valve rubber being slipped over the "pigtail" which is then replaced.

### Remedying Erratic Reaction

Difficulty is sometimes due to the detector valve oscillating at a frequency different from that to which the receiver is tuned.

This trouble causes the reaction control to have little effect on the sensitivity of the set, although making the detector valve oscillate.

### USE A RESISTANCE



Connected as shown, it stops any unwanted tendency to oscillation.

# WORK-BENCH WRINKLES

Some practical suggestions that will make an immediate appeal to the handy-man.

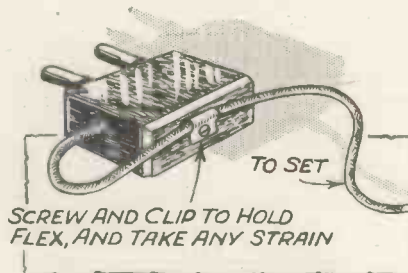
The cause of this fault is sometimes difficult to locate, but a remedy can be effected by connecting a resistance of between 50 and 200 ohms in series with the reaction circuit.

If differential reaction is used the resistance should be inserted between the reaction coil and the differential condenser. If a plain reaction condenser is in the set it may be inserted in the same way or between the detector anode and the reaction condenser.

### Mains Plug Tip

Very often the flex lead to a mains plug gets strained accidentally and bad contact is caused by the fact that any such "pull" is taken up by the connections to the plug's metal contacts.

A simple modification is shown in the SIMPLE—AND SAFE



sketch, where a wood screw and ordinary insulating fastener hold the flex securely on the plug, allowing the actual connecting-piece to be slack where it passes inside the plug.

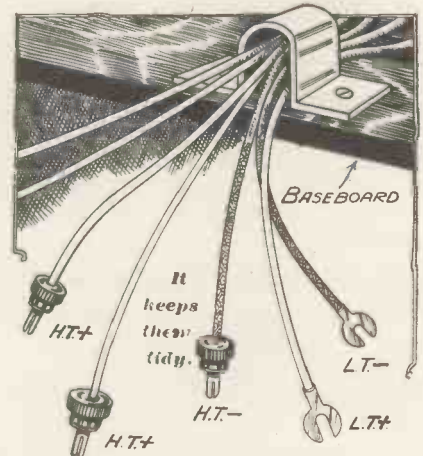
If an accidental pull is given by someone tripping over the flex, or any similar mischance, the lead holds firmly, and no strain at all is imposed on the actual internal connections.

### A Battery Cord Clip

A battery cord with connections direct to the various components—instead of a terminal strip—is certainly a trouble-saving device.

If you use your own flex leads as an improvised battery cord, it is as well to gather the leads together neatly at the back of the baseboard before running them to batteries, etc.

If you do not possess a proper clip for this purpose, the slot end of a brass bolt and socket (you can buy one for a penny or two at Woolworths) can be screwed to the baseboard and the leads passed through it. The size of the slot should be such that it just takes the bunched leads comfortably.



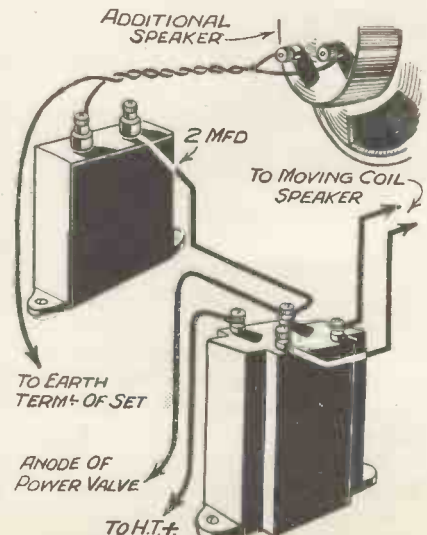
### Operating an Extra Speaker

Many sets which normally operate a moving-coil speaker are equipped with an output transformer instead of an output filter.

This transformer may either be in the set or attached to the speaker chassis.

Sometimes it may be desirable to run an extra cone type loudspeaker also from the set—for example, in another room.

This speaker can be connected as shown in the sketch, and the arrangement should give satisfactory results.



The primary of the transformer acts as the L.F. choke for the additional output circuit.



# REVOLUTIONARY RADIO

**AUTOMATIC TONE  
BALANCE - Q.P.P. -  
THE COLD VALVE-**

**M**ANY of you will no doubt remember that battle of words which was waged in "M.W." a year or two ago on the subject of constructor versus manufacturer. The manufacturer's case was argued by a well-known executive of the radio industry, while I championed the cause of the home constructor.

## The Constructor Scores

And I felt that my task was a very easy one. Among the many points I advanced I suggested that the constructor always scored in "up-to-dateness." Whereas, I said, the manufacturer had to spend months in preparing his "new season" models, the man who "rolls his own" can at once, and with little or no delay, take advantage of every new development in reception technique as soon as it makes its appearance.

We have had ample proof of this contention during the past two or three months. Q.P.P., Ferrocarts coils, the Westector, Automatic Tone Balance and Class B amplification have all been placed in the hands of constructors smoking hot from the laboratory, as it were.

Indeed, I have heard it said that there have been too many of these new things, and that their very number has tended to curb the enthusiasm of constructors. And I can quite well sympathise with those who have held their hands for fear that we are in the middle of a period of "a revolution every week."

## No Cause for Alarm

However, there is no cause for alarm. The fact is, a number of developments of an inevitable character have coincided—that is all. Radio is not in the melting-pot. Let us examine these novelties one by one; find out exactly what they are and purport to do, and what effect, if any, they are likely to have on the future of radio.

Q.P.P. and Class B amplification go together. They both come to us from America. At least, they do in so far as their modern applications of the



BY  
**G.V. DOWDING, ASSOCIATE I.E.E.**

principles involved are concerned. We can afford to ignore historical origins.

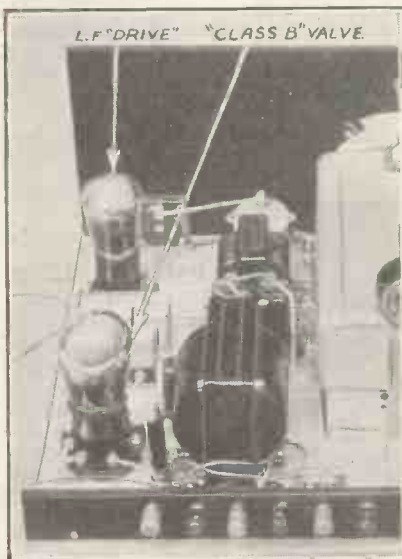
For some years circuit technique has been much more standardised in America than it has been in this country. And low-frequency amplifying arrangements have been grouped

*"... Radio is not in the melting-pot. Let us examine these novelties one by one; find out exactly what they are and purport to do, and what effect, if any, they are likely to have on the future of radio."*

into three classes. Class A comprises straightforward amplifiers, resistance- and transformer-coupled.

In Class B we find quiescent push-pull and the "one-valve" application

## ECONOMY AMPLIFICATION



The Class B method utilises a low impedance valve—called the "driver"—in the first L.F. stage and a special "double" valve in the output. This stage operates on the grid current portion of the valve's characteristic.

**FERROCART COILS-  
"CLASS B"  
AMPLIFICATION**

of this which we style Class B in this country. Class C is concerned with special high-power amplifiers.

Quiescent push-pull, or "push-push," as it is sometimes termed, is based on the original push-pull scheme. Two valves are connected just as in ordinary push-pull except that they are given high grid biases. They are each biased to as great an extent as is an anode-bend detector valve, so that very little anode current flows when they are not working.

## Depends on Strength

Negative impulses have little effect, but as each in turn receives a positive impulse, so anode current corresponding with the strength of the impulse flows. In short, the H.T. current flow depends upon the strength of the energy fed on to the grids of the two valves.

The valves may take only about 2 milliamperes of H.T. when they are quiescent, although on loud passages of music the current may rise to as much as 30 milliamperes or more.

Obviously, the method is a most economical one, for, whereas in an ordinary power valve circuit a more or less high average H.T. current flows all the time the set is switched on, in Q.P.P. the H.T. flow directly depends upon the strength of the programme which is being received.

And a calculation shows that when programme intervals and soft passages of music are taken into account, the average H.T. consumption over an evening is surprisingly low for a given power of output. Seven milliamperes is the kind of figure for an output of the order of 1½ watts!

## Pentodes Usual

But this economy of H.T. must not lead the constructor to think that a small H.T. battery can always be relied upon. It must not be forgotten that there are high maximums (if low averages) in Q.P.P. Also, the H.T. battery must maintain its voltage or serious distortion may occur.

It has been usual to employ pentodes for Q.P.P., although ordinary triodes can be used. A special high-ratio input transformer is needed and

a special output choke (or transformer) is necessary. Thus Q.P.P. costs a couple of pounds or so to install. But it enables you to obtain "mains set" results with a battery set with but a modest overall expenditure of H.T.

By the way, it would seem that both the trade and the public are determined to pronounce quiescent with a short "I" as in quit. I believe the proper pronunciation is "kwy-escient." However, words have always been the slave of men, and always will be despite the efforts of the B.B.C.!

**Easier and Cheaper**

In my opinion Q.P.P. has been something in the nature of a precursor for Class B amplification. Class B is cheaper, and in some ways, easier to use than Q.P.P. It demands a special valve, but this costs less than two pentodes.

The Class B valve is really two valves in one (two separate valves could be used, of course). You can think of it as two Q.P.P. valves built into the single glass envelope.

But instead of considerable grid bias being needed, the "curve" of each of the valves (both of which are in one bulb, remember!) is such that the bend occurs at zero grid volts.

**On the Positive Side**

Therefore, you operate on the positive side of the line all the time.

Which means that considerable grid current flows—as much as 10 milliamperes or more. This necessitates the introduction of special input arrangements. You cannot feed into a Class B circuit straight from an ordinary detector as in Q.P.P.

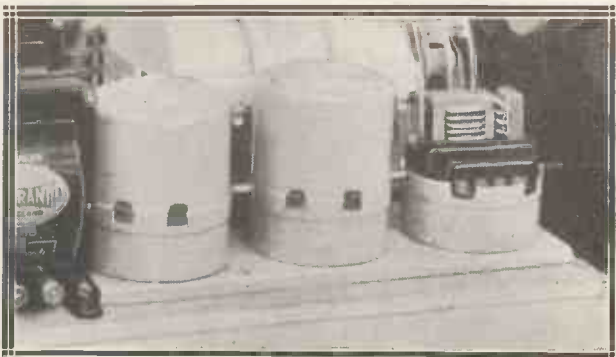
A "driver" valve is required, and this resembles an initial stage of L.F. amplification, and the valve has to be of the small power type because Class

B demands a power and not merely a voltage input.

Also there must be a step-down transformer linking these two stages,

**COMPACT AND EFFICIENT**

Ferrocart coils are the latest development in tuning technique. They are small as to their physical dimensions, and their low losses enable a very high degree of selectivity to be achieved.



and this transformer has to be able to handle the large grid current in its

**THE "COLD VALVE"**



The Westector—to which the arrow points—is a small edition of the Westinghouse metal mains rectifier. In size it is comparable with a grid leak.

secondary winding without interference with its characteristics.

I do not think there is any doubt at all but that Class B has come to stay. Whether its adoption will be universal remains to be seen. Personally, I am

of the opinion that battery sets will tend to group themselves in two classes, the one having a small power or pentode valve output and being definitely limited as to its power output, and the other possessing Class B and the punch of a mains set. Perhaps in time we shall term these Class A and Class B, and so follow the United States in a definite standardisation of circuits.

**Different Proposition**

Anyway, I have the feeling that there will always be a place for the Class A type, restricted in power though it may be. True, you wouldn't have to spend much more in the way of H.T. to obtain Class B results, but the initial expense of this will doubtless stand in the way of its general adoption, particularly as it is so very obvious that a quite respectable percentage of quite respectable listeners are quite satisfied with outputs of the order of a mere couple of hundred milliwatts.

Ferrocart coils are rather different propositions. These are straightforward developments of tuning technique. They are extremely small coils, for they employ cores of patent iron dust type and so develop their required inductances without requiring more than a fraction of the wire normally used.

**High Selectivity**

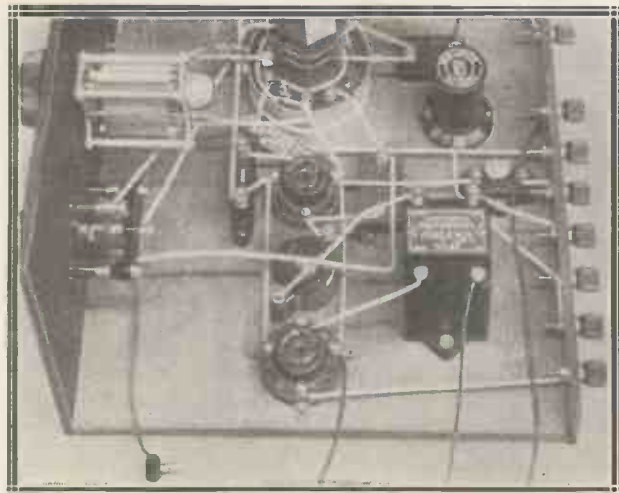
Their losses are low and so they enable high selectivity to be achieved.

In my view their small sizes are by no means their greatest attraction. I cannot see that a few cubic inches one way or another matters much in a radio set except, perhaps, in a portable.

And there are some who have said that we do not want low-loss coils these days, and that when they are

**AUTOMATIC COMPENSATION**

When reaction is applied to a circuit the tuning is sharpened and sensitivity increased. But these advantages are offset by the decreased high-note response which is part and parcel of the ordinary reaction scheme. A.T.B. is an effective method of overcoming this, the operation of the reaction control automatically introducing the required amount of compensation.





## Radio's Latest Developments Reviewed

used it is more often than not desirable to apply some damping. I do not concur with this. I can extend a hearty welcome to any coil which will compensate for some of the screening losses which occur in the majority of sets. And these losses are generally greatest in the screen of the coil itself. To be able to have screening and comparative efficiency seems to me to be an attractive proposition.

### The "Cold Valve"

Now what about the "cold valve"? By the way, I expect Westinghouse, who are always restrained in their claims, are pretty fed-up with the exaggerations which have been circulated about their Westector. It is certainly a "cold valve" in the sense that it can replace a diode detector valve in many circuits, but it can only rectify and cannot amplify, or be employed instead of a three-electrode valve in a reaction circuit.

### In Superhets

Nevertheless, it has many uses. It can be employed with great success as the second detector in a superhet, and there are numerous methods whereby it can take the place of a valve in automatic volume control arrangements.

It is in effect a very small edition of the famous metal rectifier which Westinghouse have been manufacturing for the past few years, and which is used so widely in mains sets and units.

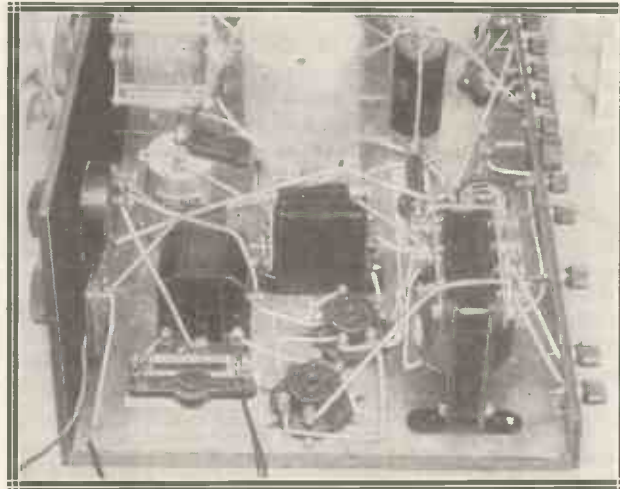
There are two distinct types of the Westectors, the one is a half-wave rectifier and the other a full-wave type. The principle of working of

both is the same and depends upon the "one-way" current-carrying propensities of copper, having a layer of copper oxide on it.

There is a tiny disc of this with a washer of lead in contact with it, though they say that the object of the lead is merely to act as a contact terminal for the oxide. The rectifying action is said to take place between the copper and the oxide on its surface, although I do not think anyone is very dogmatic as to exactly what takes place.

A Westector costs no more than an

### Q.P.P. GIVES "MAINS POWER" OUTPUT



Quiescent push-pull is usually employed in conjunction with two pentodes and provides an effective method of achieving large output power with considerable economy in H.T. current consumption. The current taken from the H.T. battery is proportional to the volume.

ordinary valve, and it requires no L.T. or H.T. and never wears out. Therefore it is bound to be used extensively wherever it can be found a job. There can be no argument about that.

Finally, we come to Automatic Tone Balance. This is one of my ideas, and although it has been praised by

practically all the chief engineers of the radio industry, it is not at all likely that it will be widely used in its present form in commercial sets, for the simple reason that it was launched as the chief feature of a "Popular Wireless" home constructor set!

### How A.T.B. Works

But in that it has been adopted with great success by thousands of constructors, I am quite satisfied. Perhaps various adaptations of A.T.B. will in due course make their appearance, and if that should happen I would be even more pleased, for there can be no argument as to its merits.

I expect most of you know what A.T.B. is. For the sake of the few who may not, I will briefly describe it. A.T.B. works in conjunction with reaction. The use of reaction causes terrible distortion. All high notes from about 400 cycles upwards are reduced more and more in strength as reaction is applied.

### Automatic Compensation

With A.T.B. the mere operation of the reaction control automatically introduces compensation. The effect is astounding. Instead of barely distinguishable mutterings and mumbblings, the distant stations are heard with the clarity of the local.

A.T.B. ought, in my opinion, to be a compulsory fitting on all sets which have to use reaction to tune in stations! The fact that it costs little or nothing and does not increase the number of controls on a set are by no means the least attractive of its many features.

Now is the time for those who possess portable receivers to give them a look over ready for the summer. Even if yours has been in use throughout the winter, a spring-clean will certainly not do it any harm.

The causes of mediocre results with a portable are generally quite small items. Here are some of the things to look for and to check over.

First of all, batteries. The energy picked up by the frame aerial of a portable is very small, so efficient

\*\*\*\*\*  
**POLISHING UP THE PORTABLE**  
*A few seasonable tips.*  
 \*\*\*\*\*

amplification is needed for good results. And unless the battery voltages are up to scratch this cannot be obtained.

If the accumulator is sulphated or the acid appears cloudy, have the cell

washed out and filled with new electrolyte. If it is in a very bad state, a new one is advisable.

The voltage of the H.T. battery should not have dropped to two-thirds of its original value if it is to be retained. If you buy a new H.T. battery, be on the safe side and get a new G.B. battery as well.

Also clean up all battery spade-tags and plugs, and check over the valves for good contact between their pins and the valve sockets.

A. S. C.



# QUESTIONS ANSWERED

## Volume Control

H. T. C. (Hendon).—“ My set is an S.G., det. and L.F., and I find that the Brookmans twins come in far too loudly, in spite of the fact that I rotate my variable-mu control to its minimum volume position. Is there anything I can do to reduce the volume still further ? ”

Yes, you could use a second volume control in the form of a potentiometer across the L.F. transformer secondary winding. This should not be difficult and, in fact, there is no reason why you should not gang the two controls, operating them both from one knob, if you feel so inclined.

The connections for the second control are as follows: Disconnect the lead which at present goes from “ G. ” on the transformer to the grid terminal of the valve.

Join the two ends of the potentiometer winding to “ G. ” and “ G.B. ” respectively, on the transformer.

Connect the centre terminal on the potentiometer (the slider) to the grid terminal of the valve holder.

A suitable resistance for the potentiometer is 0.5 ohm.

## Differential Reaction

P. W. T. (Bath).—“ At the present moment my set is a det. and L.F. with a reaction condenser having one set of fixed and the usual moving vanes. In other words, it is an ordinary small condenser. I find, however, that when I am trying for distant stations, the reaction adjustments upset the tuning to some extent and this makes searching rather difficult, especially if the station is very weak. Would a differential condenser improve matters ? ”

The effect of a differential reaction control on the tuning adjustment is

very small and much less than that of the type of condenser you are using at present.

In the case of the differential, the capacity between the anode of the valve and the “ earth line ” is substantially constant, and consequently there is no change in the capacity across the tuning circuit due to reaction adjustments. This is one of the advantages of differential reaction.

## TECHNICAL QUERIES DEPARTMENT

Are You in Trouble With Your Set ?  
The MODERN WIRELESS Technical Queries Department is in a position to give an unrivaled service. The aim of the department is to furnish really helpful advice in connection with any radio problem, theoretical or practical.

Full details, including the revised scale of charges, can be obtained direct from the Technical Queries Department, MODERN WIRELESS, Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you to ask your questions so that we can deal with them expeditiously and with the minimum of delay. Having this form you will know exactly what information we require to have before us in order to solve your problem.

London Readers, Please Note: Inquiries should not be made in person at Fleetway House or Tallis House.

## Transformer Ratio

A. E. H. (Southsea).—“ I am a beginner, and recently visited my local dealer with the object of buying an L.F. transformer. He offered me the choice of two instruments, one having a ratio of 1:3 and the other 1:5. He advised the former and said that the lower ratio was more suitable for my particular receiver. Judging by the results his advice was sound, but I am rather mystified as to the meaning of ratio.”

The ratio of a transformer represents the number of turns of wire on

the secondary winding as compared with the primary winding. A 1:3 ratio means that for every turn on the primary there are three turns on the secondary.

A perfect 1:3 transformer—i.e. assuming there were no losses—would give a voltage of three across the secondary terminals for every volt applied to the primary.

The high-ratio transformer definitely has its uses, and those employed in Q.P.P. amplifiers may have turns ratios up to 1:10.

But for ordinary “ straight ” amplifiers a medium ratio is usually the best for all-round results.

## Sharper Tuning

S. R. (Enfield).—“ I have a three-valve receiver of the S.G., det. and L.F. type, and although I am able to get good results, I feel that the selectivity could be improved.

“ I do not wish to rebuild the set in order to incorporate band-pass tuning, and I am wondering whether you can help me by suggesting a simple method of sharpening the tuning.”

The first method that we suggest is the insertion of a .0003-mfd. variable or preset condenser in series with the aerial. You will find no difficulty with the connections. The wire joining the aerial terminal to the aerial coil should be removed. The aerial terminal is connected to one side of the selectivity control. The remaining side of this control is then joined to the “ aerial ” terminal on the coil.

Another scheme is to add a further tuning circuit to the receiver in the form of a separate unit.

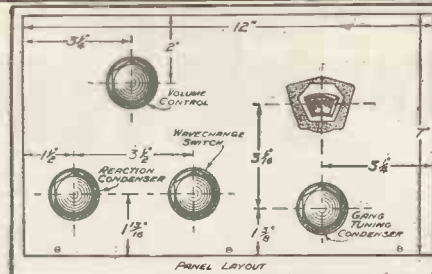
This method, however, whilst increasing the selectivity, necessitates an additional tuning condenser, and for this reason is not always acceptable.



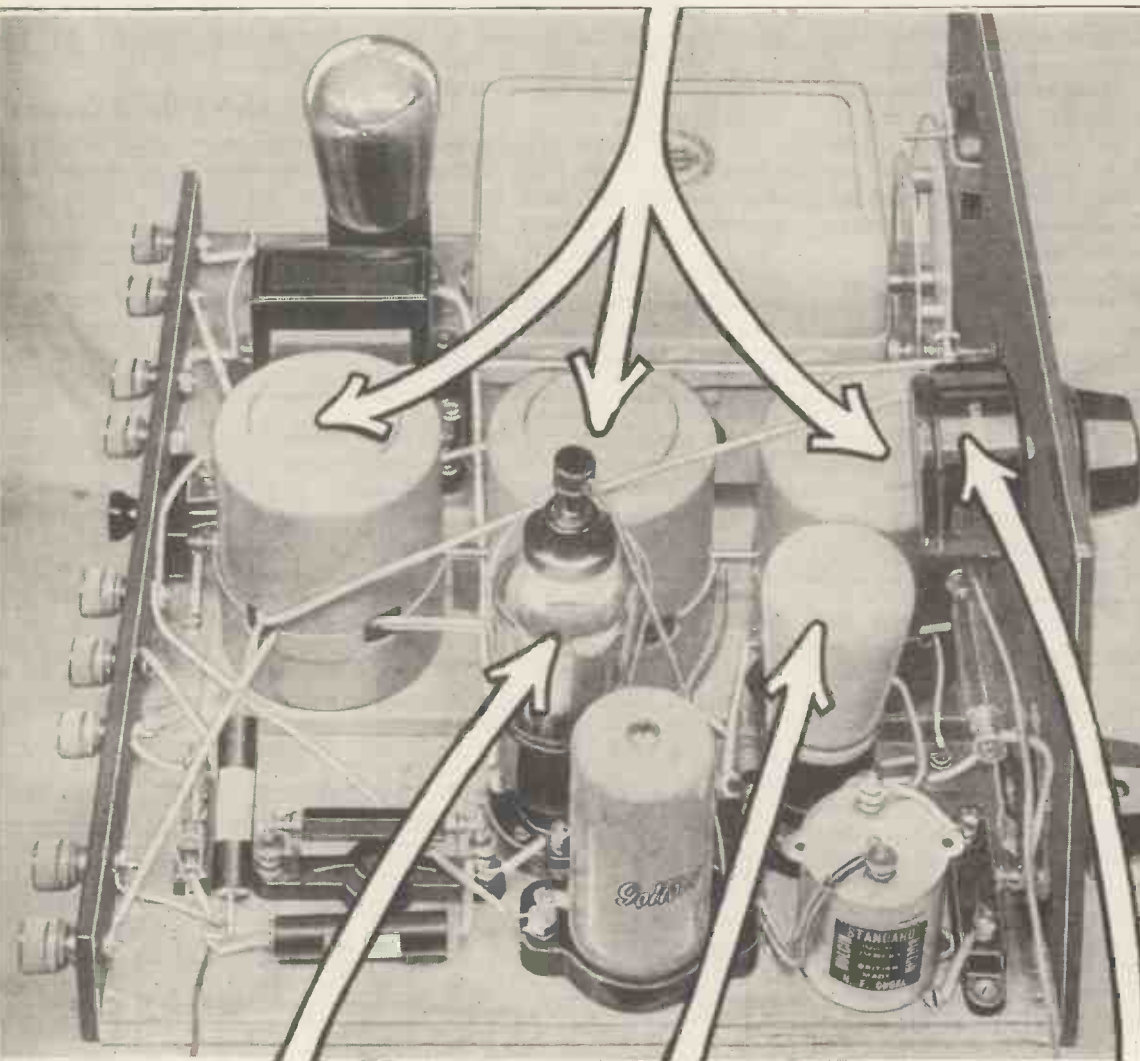


### SPECIALLY MATCHED FERROCART COILS

The three-ganged screened-coil assembly incorporates the latest "iron-card" type of tuning inductances. The two on the left are linked to form a band-pass filter of unusually high efficiency. They are tuned by the two back sections of the triple-gang condenser. The remaining condenser section tunes the third Ferrocart coil, which is in the grid circuit of the detector.



Maximum efficiency was the main consideration in arranging the various controls.



#### THE " VARIABLE-MU "

The variable-mu S.G. valve has dual advantages. In the first place it provides a progressive method of controlling amplification so that speech is heard at natural intensity and music reproduced with satisfactory volume. Secondly, detector overloading is completely eliminated, thus removing a prevalent source of distortion.

#### EFFICIENT SCREENING

The use of a metallised detector valve is a worth-while precaution against instability, and, further, to obviate risk of unwanted interaction a screened lead connects the reaction H.F. choke to the L.F. transformer. The careful employment of screening (note the screened H.F. chokes) is responsible in no small measure for the set's perfect stability.

#### CONTROLLING VOLUME

A 50,000-ohm wire-wound potentiometer is used to vary the bias applied to the grid of the S.G. valve, the bias battery being common to the H.F. and L.F. stages. A three-point L.T. "on-off" switch is employed to break the G.B. circuit when the set is not in use. There is, therefore, no continual drain on the grid battery through the potentiometer windings when the set is not in use.



## Well Able to Cope with Modern Conditions

Ferrocart coils are now being made in this country by Colvern Ltd., and the efficiency is such that with a plain Ferrocart coil the same results as regards stage-gain can be obtained as with one of the old 3½-in. Litz wound coils of a few years ago.

But the Ferrocart coil can be canned without upsetting its efficiency, while the old Litz coil could not be properly screened unless a gasometer were used, making it far too unwieldy for set designs!

### Is It Too Efficient?

So we reach a point where a small canned coil is equal to the large Litz coil that was so efficient. Meanwhile, as we have seen, valves have improved, and now it is not necessary to have such efficiency from the point of view of stage-gain, for we can get all the *amplification* we want with smaller, less efficient coils.

Is the Ferrocart coil too efficient? Is it wasted? Not a bit of it, for with the extra efficiency we can begin to consider selectivity. This, as you know, is the antithesis of sensitivity. No matter what you do in the way of set design, taken stage for stage you have to *decrease* sensitivity (or stage-gain) to *increase* selectivity.

In the simplest cases loose coupling between the input and secondary of a coil is used to provide this much-required sharp tuning, "tapping down" the coil being a favourite method. The amount you can tap down depends on the amount of amplification (or sensitivity) you are willing to lose—in other words, it depends on the efficiency of the coil.

### Selectivity and Sensitivity

Now we return to the new Ferrocart coils. These are highly efficient, too efficient for present-day valves, for if the full amplification that could be obtained with them were attempted, the gain would cause sufficient feedback in the valve's internal capacity to result in instability.

So we have a lot of efficiency to spare, so to speak. This we exchange for selectivity by the well-known method mentioned above—tapping down the coil. The result (in the case of the anode coil) is a coil as efficient as the best of the "ordinaries," plus a very high degree of selectivity.

What about the aerial end? Do we tap down again here? We could

do, but instead a better method has been chosen—band-pass coupling.

By the same process of reasoning we have been discussing, the efficiency of the Ferrocart band-pass unit is equal to the best "ordinary" band-pass unit in selectivity, but with greatly enhanced sensitivity. As a matter of fact, it can be compared in sensitivity with the average single-canned coil unit.

So once more we have gained. The sum total is that we have band-pass advantages with single-coil unit sensitivity plus increased intervalve selectivity with first-class stage-gain. That is the Ferrocart three-coil unit arrangement as used in the set we are about to describe. The practical result is probably the nearest

We have suggested that band-pass tuning is useful where Ferrocart coils are concerned, and that is so much borne out in practice that it has been used in this particular set.

### Band-Pass Tuning

The first two coil units in the three-gang assembly, then, are coupled to form a band-pass unit, inductive coupling only being employed. This is arranged for by the makers in coils themselves.

The band-pass section is followed by the screened-grid valve, which, it will be seen, is of the variable-mu type. This is extremely important, for the need for a pre-detector volume control is very great, due to the high degree of amplification obtained.

### THE COMPONENTS FOR BEST RESULTS

Component	Make used by designer	Alternative makes of suitable specification recommended by the designer
1 Panel, 12 in. x 7 in.	Peto-Scott	Becol, Wearite, Goltone
1 Baseboard, 12 in. x 10 in.	—	—
1 Cabinet to suit above	Camco	Osborn, Gilbert, Lock
1 '0005-mfd. three-gang condenser	J.B. "Nugang" type A	—
1 '0003-mfd. reaction condenser	Graham Farish	Telsen, Utility, Polar
2 '1-mfd. fixed condensers	T.C.C. type Q.F.	Telsen (small type)
1 '0002-mfd. fixed condenser	Dubilier 665	T.C.C. type M., Telsen W.209, Hellesen
1 '0002-mfd. fixed condenser	Dubilier 665	T.C.C. type M.
1 '0001-mfd. fixed condenser	Sovereign	Dubilier 670
1 50,000-ohm wire-wound potentiometer	Igranic	Lewcos
1 1,000-ohm resistance, with horizontal holder	Graham Farish "Ohmite"	—
1 1,000-ohm resistance	Graham Farish "Ohmite"	Dubilier 1 watt
1 2-meg. grid leak, with wire ends	Goltone	Tunewell, Dubilier, Lissen
1 Set of Ferrocart coils	Colvern F.1, F.2, F.3	—
2 Screened H.F. chokes	Goltone and Bulgin H.F.9	Wearite
1 Three-point push-pull switch	Ready Radio	Telsen, Lissen, Bulgin
2 Four-pin valve holders	W.B.	Lotus, Telsen, Lissen, Benjamin
1 Five-pin valve holder	W.B.	Lotus, Telsen, Lissen, Benjamin
1 L.F. transformer	Ferranti A.F.8	R.I., Igranic, Lissen, Telsen
1 Fuse holder	Belling-Lee type 1034	Bulgin, Goltone, Telsen
1 Terminal strip, 12 in. x 1½ in.	Goltone	—
9 Indicating terminals	Belling-Lee	Elex, Clix, Igranic
6 Wander plugs	Clix	Belling-Lee, Goltone
2 Accumulator spades	Elex	Clix, etc.
3 yds. insulating sleeving	Wearite	Goltone
5 yds. 18-gauge tinned copper wire	Goltone	Wearite
1 150-milliamp. fuse	Belling-Lee 1056	Bulgin, etc.
1 Piece of copper foil, .004 gauge, 12 in. x 10 in.	—	—
1 Foot single-screened sleeving	Goltone	Lewcos
1 Anode connector	Belling-Lee	—
2 Knobs for panel matching	Bulgin K.8	—
Flex. screws, etc.	—	—

thing to superhet characteristics ever achieved with single circuits.

The selectivity is truly amazing, while the sensitivity of the set makes you forget you are handling a band-pass arrangement—it is more like a plain "full kick" tuned anode in its "feel."

So much for the actual *type* of coils used in the "Ferro" Three; now let us consider the circuit in which they are employed.

The variable-mu valve gives excellent control, especially if the usual maker's recommendation of 9 volts bias is increased to 16.5 volts when the set is to be used within 20 miles of the nearest station.

### Following the Variable-Mu

Nine volts is adequate for controlling purposes if the set is used some distance away, but when it is desired to cut down the volume very

considerably, as is the case when listening to a near-by transmission, it is essential that greater bias be available.

Following the variable-mu valve is the tuned grid detector circuit (or shunt-fed tuned anode), and it will be seen that the anode-feed from the screened-grid valve is tapped down the Ferrocart coil to provide a selective arrangement.

**Accurate Ganging Essential**

The grid of the detector is also tapped down to reduce the damping of the leaky grid rectifier, which would tend unduly to flatten the tuning of this circuit.

With inductances of this calibre the tuning is pretty sharp, and if the three coils are to be gang-tuned, with a three-stage condenser, every effort must be made to lessen not only stray capacity across the coils, but any other form of damping that might be introduced.

It is essential that the ganging remain absolutely accurate, or not diverge more than a very small amount, over the whole of the tuning range, and every precaution has to be taken to ensure this. If, due to any fault in the circuit design, or the constructional fulfilment of it, the

ganging does go out, the set will be largely useless, or at the least reduced to a condition of mediocrity.

We are stressing this matter of ganging accuracy because it assumes far more important proportions than

operation. This whip threw the ganging out to a sufficient extent to render the set quite second-rate.

It is essential that a good design of variable gang condenser be used, therefore, and, moreover, it is desirable that it be of such design that the required connections between it and the coil unit can be carried out conveniently, and that the trimmers be easily reached and operated.

This latter point is most

important, and must essentially bear very greatly on the layout chosen for the components. That is one reason why the panel appearance of the "Ferro" Three is somewhat unconventional. We have so arranged the parts of this set that the most efficient disposition has blended with the most practical from not only an operating but a *trimming* point of view.

**Need for Rigid Condenser**

The fact remains, however, that in the choice of gang condenser several makes and types had to be discarded because of minor structural faults that allowed minute mechanical whip of the rotor shaft to take place during

important, and must essentially bear very greatly on the layout chosen for the components. That is one reason why the panel appearance of the "Ferro" Three is somewhat unconventional. We have so arranged the parts of this set that the most efficient disposition has blended with the most practical from not only an operating but a *trimming* point of view.

**Efficient Rectification**

It will be seen in the photographs that there is absolutely nothing to get in the way of the three trimming wheels on the side of the gang condenser, which is readily adjusted when the set is tried out "on the bench" before being placed in its cabinet.

But we divert; let us return to the circuit. The leaky grid detector applies reaction to the third Ferrocart coil through an ordinary reaction condenser of .0003-mfd. capacity, while a .0001-mfd. fixed condenser is connected between anode and filament of the rectifier valve.

This, as you know, is essential to provide efficient rectification in the absence of differential reaction, and to bypass the H.F. component in the anode circuit of the rectifier.

**Reaction Circuit**

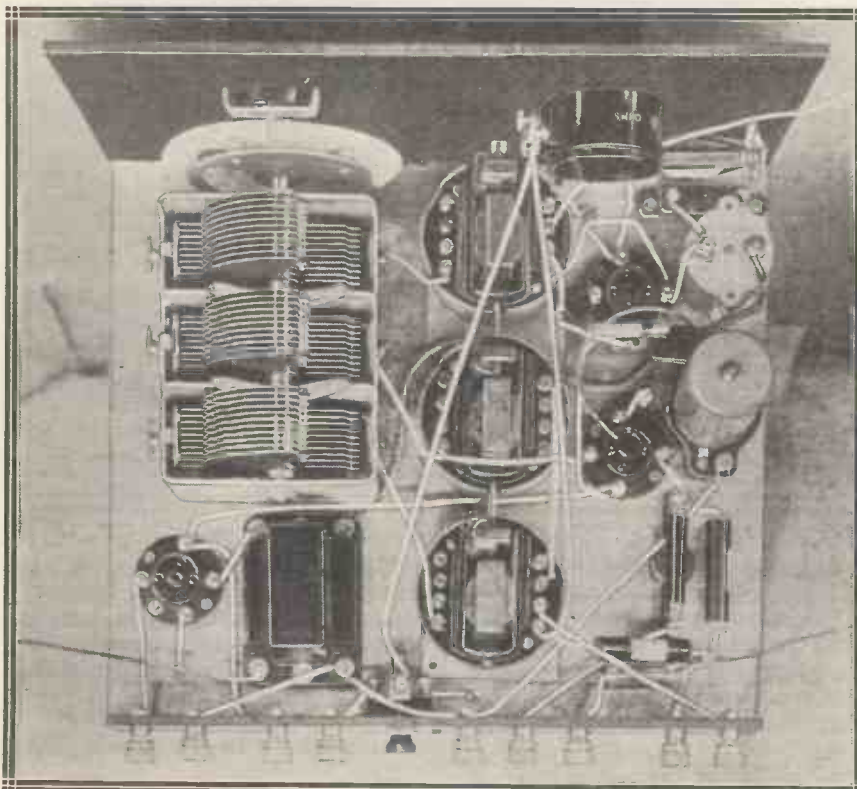
But a particularly interesting component is the 1,000-ohm resistance in series with the reaction coil and the .0003-mfd. reaction condenser. (This, by the way, has its moving vanes at earth potential to prevent any body-capacity effect.)

The resistance is a parasitic oscillation stopper, and is essential with these coils on the long waves. Without the resistance, two reaction points are noticed on the long waves (the medium band is usually not so affected): one when parasitic oscillation

**THE " FERRO " THREE VALVES**

Name	H.F. Stage	Detector	Output	Output (Mains Unit)
Cossor	220V.S.G.	210H.L.	220P.A.	230X.P.
Mullard	P.M.12V.	P.M.1.H.L.	P.M.2A.	P.M.202
Marconi	V.S.2	H.L.2	L.P.2	P.2
Mazda	S.215V.M.	H.L.2	P.220	P.220A.
Osram	V.S.2	H.L.2	L.P.2	P.2
Lissen	S.G.2V.	H.L.2	P.220	P.X.240
Tungsram	—	H.210	P.220	S.P.230
Eta	—	B.Y.1815	B.W.604	B.W.602
Six-Sixty	S.S.215V.S.G	210H.L.	220P.A.	220S.P.
Micromesh	—	H.L.B.1	P.B.1	—
Clarion	—	H.2	P.2	—

**TRIPLE-GANG EFFICIENCY**



To ensure accurate and trouble-free ganging over the entire waverange the leads joining the tuning condenser and coil unit have been kept short and well spaced. At the same time accessibility has not been overlooked.



## Utilises the Latest Coil Development

commences, and the other. "farther on," when the normal long-wave reaction occurs.

The parasitic oscillation is apparently set up at very high frequency, and it so upsets the reception of long-wave stations that they usually completely disappear when the oscillation commences. The net result is that reaction application does not have the desired effect of increasing the strength of reception on the long waves, as almost as soon as the reaction condenser is rotated the parasitic oscillation blankets everything.

### Wiring Simplified

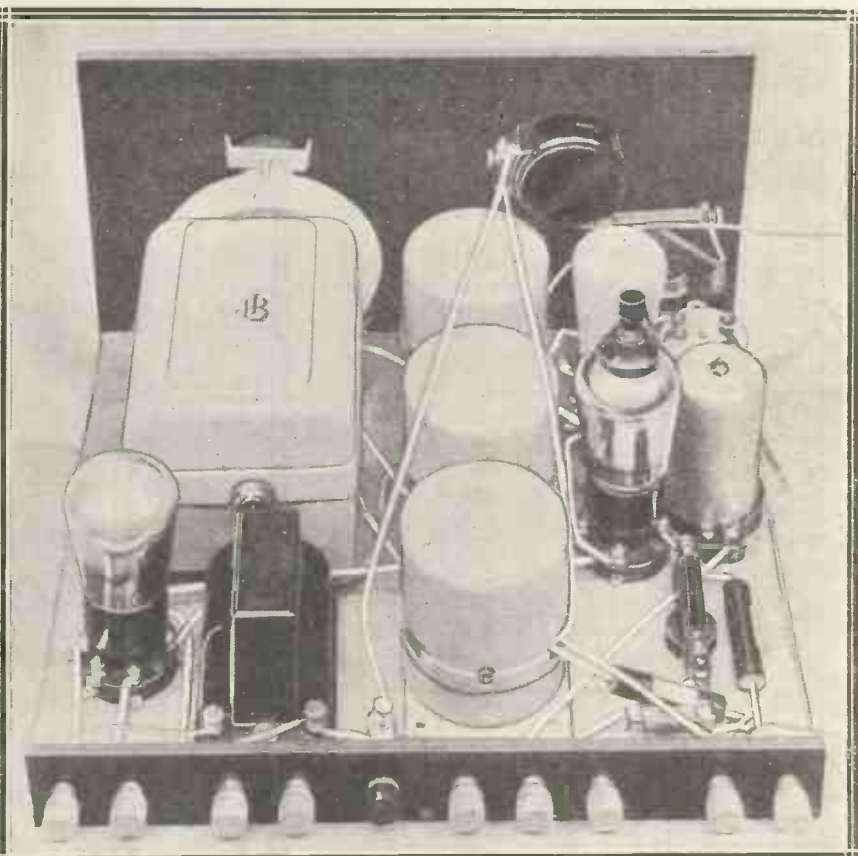
The resistance effectually stops the trouble, however, and enables the full benefits of reaction to be obtained. Note that the lead between the H.T. side of the H.F. reaction choke and the "P" terminal of the L.F. transformer is screened.

This is to ensure that, although this lead must perforce be a long one, it does not pick up any radio-frequency impulses and so convey them to the L.F. section of the receiver. In practice the lead runs from the choke between the S.G. valve and the detector, between two sections of the coil gang unit, and so to the L.F. transformer (see wiring diagram). Unscreened, this lead would "run the gauntlet" of quite a lot of H.F. energy, possibly with disastrous results to the operation of the receiver.

The whole of the baseboard is covered with copper foil, to which a number of earth returns are made. This greatly simplifies the wiring of the receiver and makes for general efficiency. The moving-vane connection of the variable condenser is made to earth by virtue of the fact that the frame of the condenser is screwed to the baseboard, the "screws" being tapped bolts which are run through the baseboard from underneath and into the three threaded holes in the bottom of the condenser.

### Bias and H.T. Voltages

The wiring will not take long, and soon after the completion of the lay-out the set will be ready for its first test. The batteries required are given in the accessory list, and H.T. and G.B. should be connected up as follows: If you are within 20 miles of a local, G.B. - 2 should have



The high magnification per stage renders very effective screening necessary, but this is obtained without trouble to the constructor by means of self-screening units.

16.5 volts negative. If you are farther away, give it the full voltage of the G.B. battery, which can then be chosen to suit the demands of the power valve chosen; thus, it may be only 9 volts.

The H.T. plugs should have full voltage (120-150 volts) for H.T. + 2, and about 75-80 volts for H.T. + 1.

### Ready for Trial

The valves are given in detail on page 398, the variable- $\mu$  valve going in  $V_1$ , detector in  $V_2$ , and the output valve in  $V_3$ .

Then with the aerial and earth and loudspeaker connected we are ready for the first try-out. This should be done with the set outside the cabinet, so that the trimmers on the gang condenser can be operated.

The method of trimming is important, so it should be carefully followed and patiently carried out, but first of all it is necessary to rotate all three trimming wheels in an anti-clockwise direction for about three turns. (Assuming they are screwed right up to start with.)

Switch on the set and tune-in to some powerful medium-wave station (your local will do), preferably below 30 degrees on the dial. Reduce the variable- $\mu$  control until you can just hear the station, and then

### ACCESSORIES WE RECOMMEND

**LOUDSPEAKERS.**—Marconiphone, Celestion, B.T.H., Blue Spot, G.E.C., R. & A., Epoch, Clarke's Atlas, Igranite, Baker's Selhurst, Ferranti, Lanchester, Ormond, H.M.V., W.B.

**H.T. BATTERY.**—120-volt Super Capacity, Ediswan, Ever Ready, Siemens, "Silver Knight," Pertrix, Marconiphone, Drydex, Lissen, Magnet, Oldham.

**G.B. BATTERY.**—16-volt. Ever Ready, or see above.

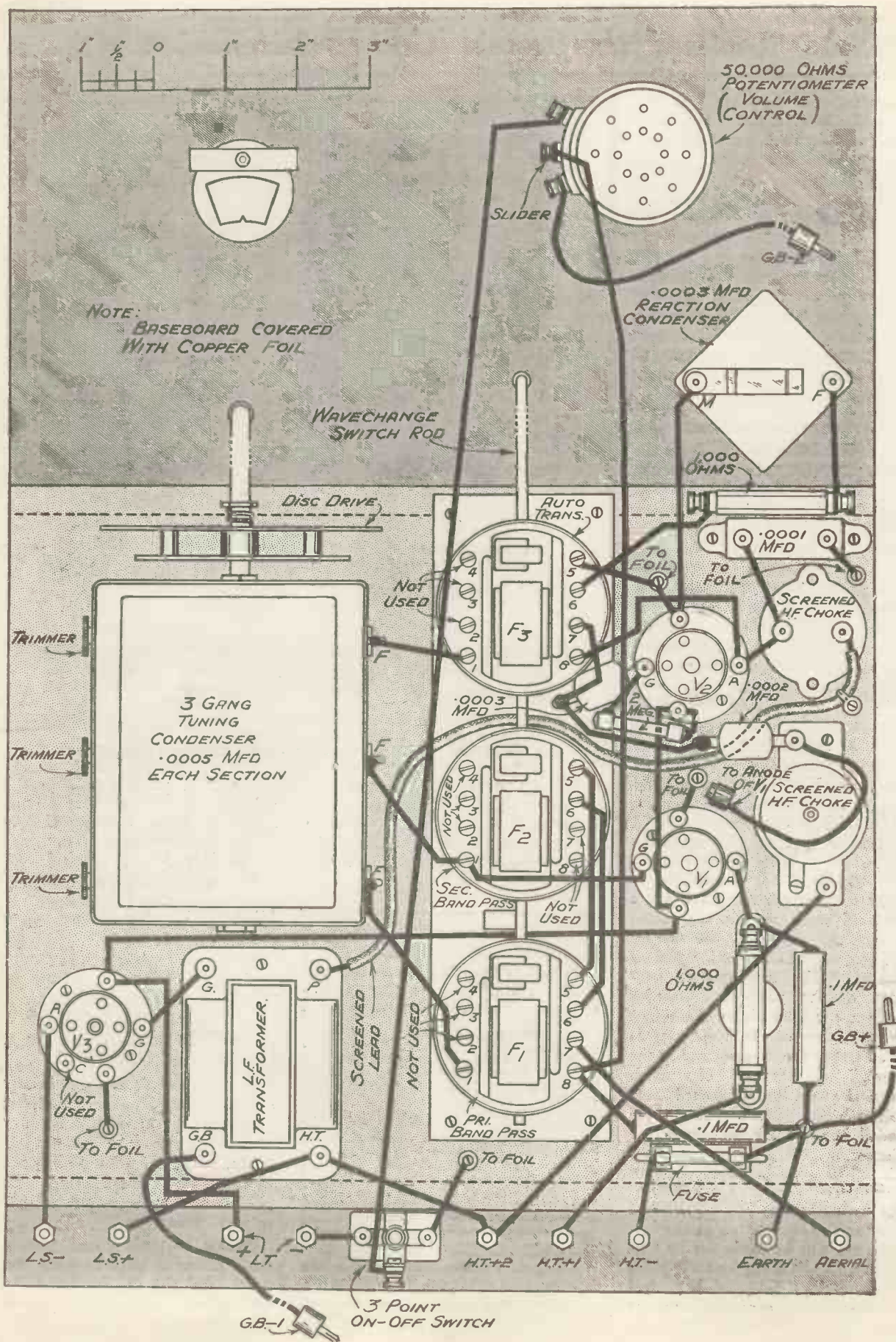
**L.T. BATTERY.**—Exide, Ediswan, G.E.C., Oldham, Pertrix, "Block," Lissen.

**AERIAL AND EARTH EQUIPMENT.**—Electron "Superial," Goltone "Akrite," Graham Farish "Filt" earthing device.

**MAIN UNIT.**—This should have two positive tappings with outputs to suit valves chosen. Clarke's Atlas, Ferranti, Ekco, Regentone, R.I., Heayberd, Tunewell, Formo.

The power valve should have the bias recommended by the makers for the particular valve, according to the H.T. voltage applied, and this bias goes to G.B. - 1.







## "Increased Intervalve Selectivity with First-Class Stage-Gain"

rotate the trimmer nearest the panel till the station is at its loudest.

This setting will be quite sharp. Next reduce the variable- $\mu$  again until the station is just audible and find the loudest point on the middle trimmer. Repeat the process with the third trimmer.

### Trimming Procedure

Now "increase" the variable- $\mu$  control and tune-in a distant station near the bottom of the medium-wave range. "Reduce" the variable- $\mu$  again, bringing up the strength of the station with reaction. Still further "reduce" the variable- $\mu$  volume control until you need to be on the verge of reaction to hear the station.

Now re-trim the trimmer nearest the panel, noting that probably the set will oscillate at one point. That point is the point of tune, and the trimmer should be left there and reaction re-adjusted to "just-off-oscillation" again. The station will now be louder.

Next do the same with the middle trimmer, again slacking off reaction

if oscillation is obtained. Finally repeat the performance with the rearmost trimmer. It is important to remember that the thing to aim at is the obtaining of accurate trimming with all trimmers at their farthest possible "out" positions. We do not want to add any more capacity than we can help.

After this the set is ready for use. It will approach the verge of oscillation at "full" variable- $\mu$  control on the medium waves, showing that the maximum amplification possible with the valve is being obtained, but it should not reach that point on the long waves.

### Remarkable Performance

The amplification obtained with the "Ferro" Three is remarkable, and if you have a chance to compare it with any other three-valver, it will surprise you as regards its combination of sensitivity and selectivity. The range of reception is extremely good, and the powers of station selection unusually high.

On test in London it was most

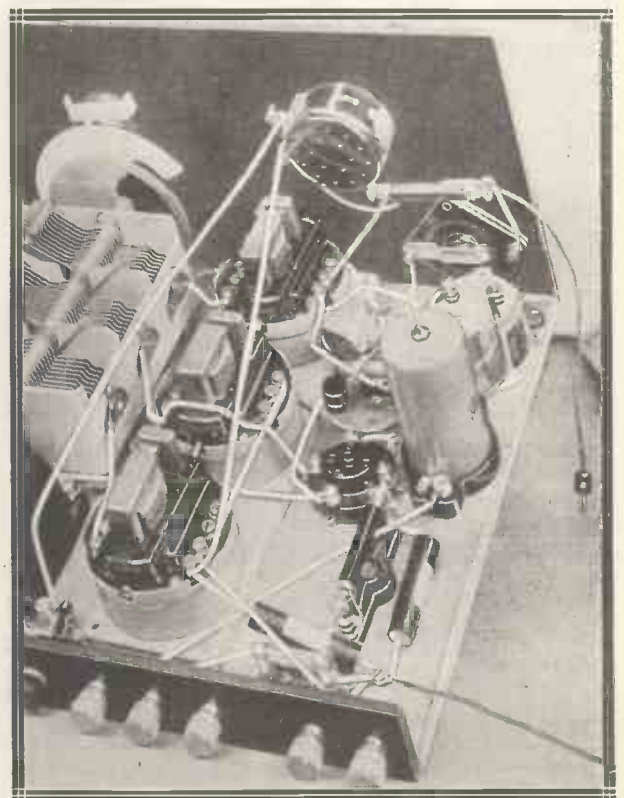
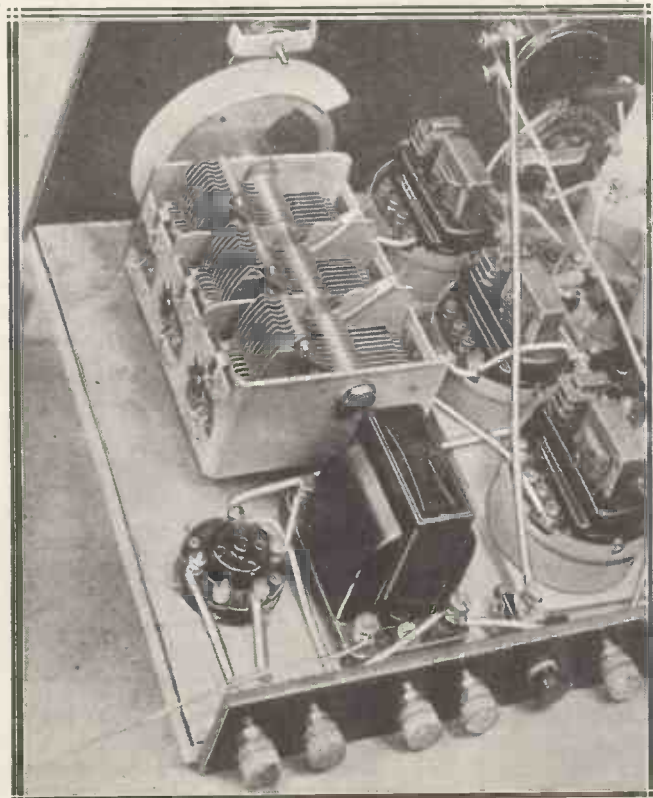
uncanny at first to note the large gap between the London and Midland Regional stations, more especially as the latter came in at a strength comparable with a local transmission. This gap is not normally present on such small sets unless the selectivity is so increased at the expense of sensitivity that the Midland station is useless for loudspeaker reception unless reaction is heartily applied.

### Easy to Tune

With the "Ferro" Three no reaction is required for full loading of an L.P.2 output valve on either the Midland or the North Regional stations, when the set is operated at Tallis House. In other words, good loudspeaker strength is possible (in the evening especially) from a wide range of stations without any recourse being necessary to reaction.

Tuning is easy, in spite of the sharp selectivity, because of the single dial control, while the sensitivity has yet to be beaten in our experience by any three-valve battery receiver.

## Coils and Condenser Screened—Complete Stability—Low Loss



These two views show the all-important Ferrocart three-coil band-pass unit from different angles. Note how the very small dimensions of the coils enable them to be widely spaced from the screens (removed for the purpose of illustration), and how the single compact unit simplifies layout and wiring.



# ROUND the TURNTABLE

*A Silent Thermal Delay Switch—Automatic Record Changing—A “Lifelike” Loudspeaker.*  
By **TONE ARM.**

THOSE attracted by the “A.C. Diodion,” described recently in MODERN WIRELESS, may be interested to learn that the technical staff have made a minor alteration that has been worth while.

The thermal delay switch in the power pack has been changed with a view to trying the Ediswan D.L.S./1, a vacuum switch which will carry a most astounding wattage—200 milliamperes at 2,000 volts!

### Like a Valve

The switch (costing 7s. 6d.) is in the form of a small valve, with four-pin base, and the connections are exactly the same as with the type used in the set. The time for making contact is 30 seconds, and the action is completely noiseless, save for the faint “plonk” as H.T. is supplied to the already hot output valve. No arcing at the switch can possibly take place.

Other valves of the set, being indirectly heated, are not quite hot, and so, while the possibility of high-voltage peaking in the power pack is obviated, there is no noisy announcement that the set is “on.”

The D.L.S./1 is certainly the quietest thermal delay switch I have ever come across, and I am so enthusiastic about it and the “Diodion” that I am building a copy of the set for myself—with the Ediswan switch.

### A Real Boon

But being intimately connected with the playing of gramophone records, I am going to fit one of the latest Garrard Automatic Record Changers—a real boon to the enthusiastic record listener.

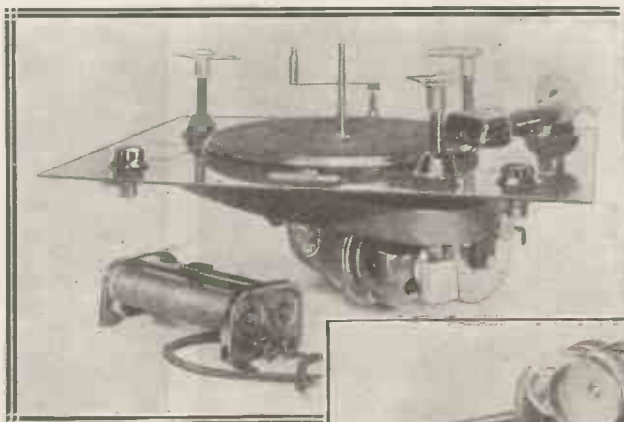
I have had one of these on trial for some time now, and am very pleased

with its operation. The quality provided by the pick-up is first class, while the sensitivity is sufficient with two stages of L.F. provided a good speaker (preferably with energised field) is used.

In action the Garrard changer is most uncanny, for the steady unflinching sequence of movement is really robot in style. There has been no sign of failure at any stage of the proceedings, and either 10-in. or 12-in. discs (unmixed) can be dealt with, the capacity of the machine being eight.

The illustration shows the universal

### A RECORD-CHANGING ROBOT



Two views of the Garrard Automatic Record Changer, showing the mechanism and the adjustable, series mains resistance. The magazine of records is supported on the three pillars.

type, which is made for either D.C. or A.C. mains, but a synchronous A.C. model is also available for A.C. mains users.

The power consumption is small, working out theoretically at an

average of 16-20 watts, while mechanical quietness is a very noteworthy feature. I am looking forward to the time when I get mine going, for I am tired of getting up every three or four minutes to change records.

### Sturdily Built

And talking about radiogramophones, let me commend to your earnest attention the Magnavox speakers—especially the D.C.142 type, which has a mains-energised pot and a most satisfying output.

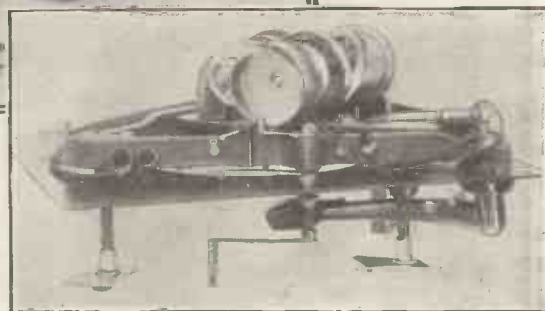
Sturdily built, the speaker is one of the best that I have tried for a long time. It “gets it off its chest” in a gratifying manner, and the design of cone and coil, plus the strong restoring force of the magnetic field, result in a brilliance that is most reassuring. Transients get a much better deal in this speaker than they do in most, and the realism obtained is worthy of the highest commendation.

### Handles Six Watts

Several Magnavox models are made, of course, but I have only experience of the type mentioned above—and of that model I can truly say it is very good.

The speaker will handle up to about six watts without any trace of distress, and the sensitivity is such that it makes very good use of the A.C. power delivered to it.

Resonance seems to be commendably absent and the overall response is extremely good. The cone is fairly free



so that the bass end of the musical scale is cleanly represented, while the sturdy method of ensuring correct and permanent coil centring is a notable feature. The result is a very strong mechanical design.



# The WORLD'S PROGRAMMES

## HOW WHEN AND WHERE TO HEAR THOSE FOREIGNERS

LA MARSEILLAISE  
Written and composed by Claude Joseph Rouget de Lisle 1792.  
Cantata.  
All for male voices by

GOD SAVE THE KING  
Attributed to Henry Carey 1746

Austrian Hymn  
(Joseph Haydn) 1781 - 1809

The Belgian National Song

The Polish Hymn  
Allegretto (J. 1780)

THE STAR-SPANGLED BANNER  
National Song of the United States  
With spirit  
Art. by J. B. L.

SÖNNER AF NORGE  
Den Norske Nationalhænge  
Norge National

THE MAPLE LEAF FOR EVER  
Words and Music

Dutch National Hymn  
Maecsson (J. 166.)



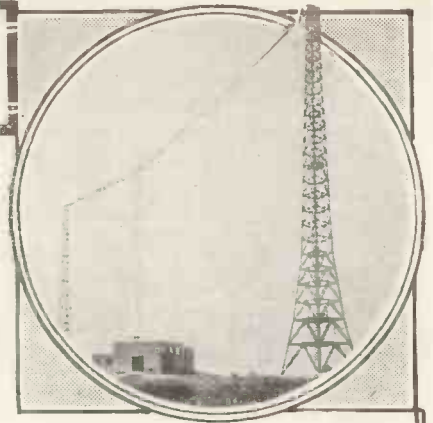
GERMAN LISTENERS' LOSS. Alfred Braun, one of the founders of German broadcasting and a popular Continental announcer, has retired and will no longer be heard "over the air."

### CONTENTS OF THIS SPECIAL SUPPLEMENT

- Dialling Above 1,000 Metres.
- From Newcastle to Budapest.
- At the Leipzig Fair.
- "Radio Algiers."
- Short Waves in Chile.
- Keeping a Log.
- Across the Tasman Sea.
- The Freemasonry of the Ether.
- "München" on the Air.
- On Foreign Aerials.
- The Month in Europe.
- Programmes on the Continent.
- Capetown Calling the Empire.
- Summer Searching.
- Distant Stations and How to Hear Them.

There is probably nothing in long-distance listening more pleasing than the reliability of long-wave stations. Here's the latest news about the higher waveband.

## DIALLING ABOVE 1,000 METRES



It is not often we have to complain of heterodyne trouble on long wavelengths, but the past few weeks have certainly not been free from this annoyance. At one time Kalundborg was being badly "sat on" in daylight hours by the new Radio-Luxemburg tests, whilst at the other end of the dial Huizen was marred by a whistle. Yet, on the whole, long waves have been very satisfactory.

### DODGING EIFFEL TOWER

Warsaw, on 1,411 metres, is a station that you will find it does not pay to neglect for long, and although there is generally the difficulty of dodging Eiffel Tower's would-be accompaniment, it is always on the cards that the big Polish station will provide good entertainment after dark. On the simpler sets it is too much to expect daylight fare from Warsaw now that summer is here.

Another station that has definitely disappeared from my aerial until darkness falls is Motala, on 1,354.4 metres. The term

"definitely disappeared" perhaps needs some qualification, because it is not meant to imply that there is no trace of Motala; all that it means is that his strength is not such as to place him among the alternatives available during daylight.

Late in the evening he is often all that could be desired.

Several correspondents have expressed curiosity about the language employed by Radio-Luxemburg. As a matter of fact, the language clue is not much to go by so far as this particular station is concerned, because the intention is to announce in several different languages, including English, French, and German.

For the test transmissions French is generally used. The call is, however, a fairly easy one to recognise whether given by the man or woman announcer. It is "Ici Radio Luxemburg Experimentale."

### IRREGULAR HOURS

Another experimental long-wave transmission is that from Vienna. It seems liable to vary both in strength and dial position, but at the moment of writing is supposed

to be on 1,237 metres; and if not exactly there, is certainly very close to it. Irregular hours appear to be one reason why this station is not better known to the British listener.

Now that the long-debated question of the site for the new B.B.C. long-waver, to replace Daventry 5 X X, has been decided, preparations are going forward at Wychbold, near Droitwich, for the British super station. It is an open secret that the B.B.C. engineers are going to set a very high standard of quality, and in this connection the situation created by the arrival of Radio-Luxemburg is of special interest.

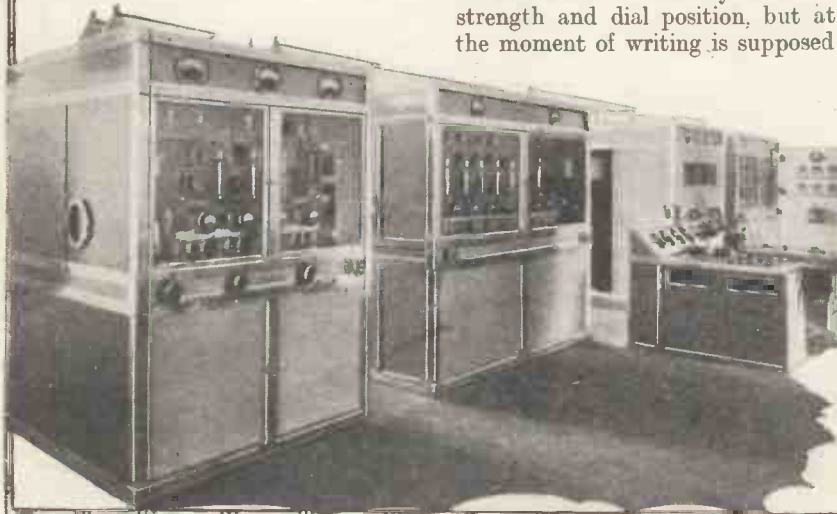
### RATHER TOO CLOSE

There is, at present, no question of Luxemburg interfering with British broadcasting programmes as such; but, on the other hand, the long-wave stations were admittedly rather too close together before the situation was complicated by Luxemburg's arrival, and if other small countries should follow this example, all the broadcasting wavelengths will be adversely affected.

It will be of the greatest interest to see what the forthcoming Lucerne conference will do about the Luxemburg invasion.

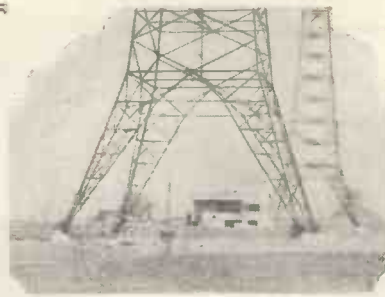
Regular listeners to Königs Wusterhausen will probably have noted that the big German, on 1,635 metres, is now using a new interval signal. Instead of the monotonous tick-tocks we now have musical chimes, playing an old German air.

Incidentally, Königs Wusterhausen will in future initiate its own National programmes, and not act merely as a long-wave relay of Berlin.





So crowded are the channels between 210 and 550 metres that prevailing conditions in the ether may make all the difference between successful reception and a silent station.



"The World's Programmes," by giving you the most up-to-date reports on current listening conditions, will make it easier to decide whether your receiver or the state of the ether is to blame.

## FROM NEWCASTLE TO BUDAPEST

THE modern tendency towards the use of increased power for broadcasting stations has been greatly deplored by many technicians, but there is no doubt that the practice has its advantages. And these have been very apparent during the last few weeks, when the British listener who is interested in foreign programmes has found himself presented with a very wide variety of alternatives from the Continent.

The high-powered Germans have been particularly good, including Heilsberg, on 276.5 metres, which is a wavelength not very well suited to long-distance results.

Breslau, on 325-metres, even with Poste-Parisien on the wavelength immediately above, has provided powerful and clearly receivable programmes; while Mülacker (360.5 metres), Langenberg (473 metres) and Munich (533 metres) have all exemplified the benefits of high power.

In the case of Leipzig, on 389.6 metres, we have a station rated at 120 kilowatts, which is double the power of the other German Regionals

named. Its wavelength is next above that of Toulouse, and it is separated from Midland Regional only by Bucharest, but nevertheless it succeeds in scoring full marks for reliability in this country.

Although the full 120 kilowatts are not always used, it is undoubtedly by virtue of its high power that Leipzig is such a favourite.

At the lower end of the dial

yet its power is only two kilowatts!

Moreover, it is known that the German administration does not wink at a very liberal interpretation of power rating (which is the reason why some other "low-power" stations reach British listeners so well), so it is probable that the two kilowatts of Nürnberg are really two kilowatts by B.B.C. reckoning, which makes the station's reliable performance all the more meritorious.

Budapest No. 1, on 550.5 metres, has been another notable station during the past few weeks. Its situation near the top of the dial makes this an easily recognisable transmission, and set-owners who habitually keep an eye on Budapest have been well rewarded recently.

Those who can tune to the "in-between" wavelengths may be glad to note that the new Budapest's programmes are going out on 840 metres.

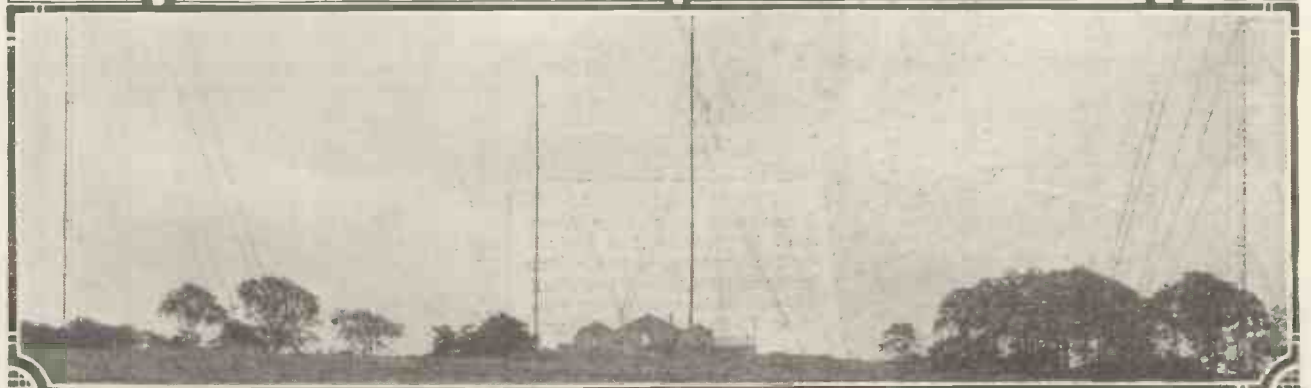
Brussels No. 1, working on 509 metres, is another always worth tuning for in the London area.

D. X.

### YOUR FRIEND ABROAD

Why not send him "Modern Wireless" every month to keep him in touch with all the latest radio news and developments? Post his name and address with 17s. to the Subscription Department, Amalgamated Press Ltd., The Fleetway House, Farringdon Street, E.C.4, and "M.W." will be sent every month for a year.

Nürnberg, on 238.9 metres, relaying the Munich programmes, has been in excellent fettle. This station is surely one of Europe's curiosities as regards carrying power, for at all times of the year it is liable to put over a very strong transmission to the southern and eastern parts of England, whilst all over the country it is a well-known "possible." And



# AT THE LEIPZIG FAIR



This interesting receiver shows the trend of modern cabinet design since the radio receiver has become a piece of furniture rather than a mere piece of apparatus.

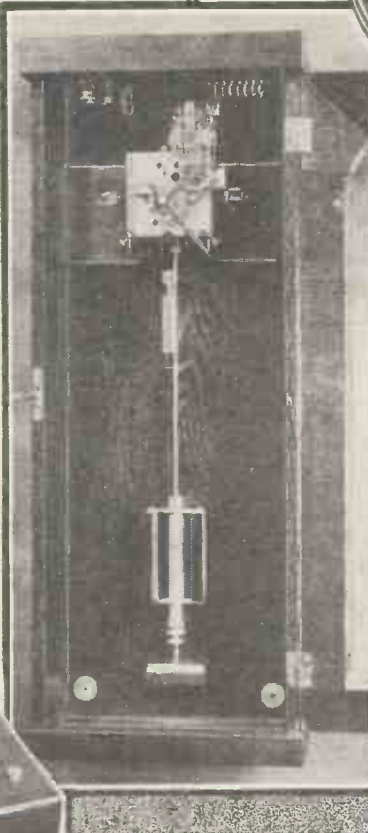


The Philips' pick-up (above) has a useful vertical lift which increases the ease with which the needle can be inserted.

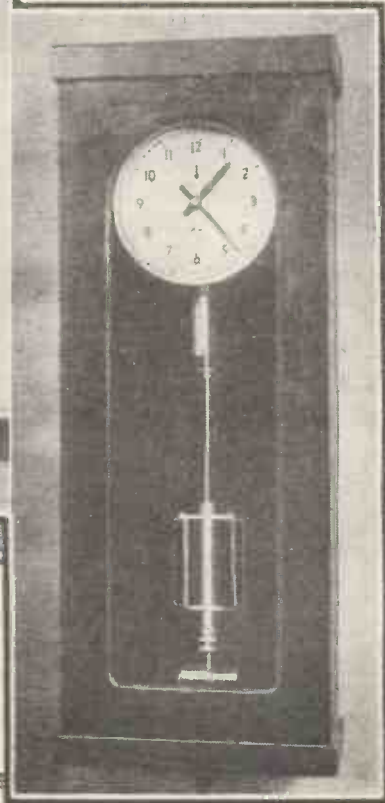


The World's Fair at Leipzig in 1933 produced a number of interesting exhibits, some of the most interesting from a radio and electrical point of view being shown in these photographs.

Many radiogram enthusiasts, for instance, will be astonished at the receiver shown above which incorporates a gramophone turntable built at a slope. As many of us have learnt that the ideal gramophone turntable should be dead level, this new departure in technique will be watched with no little interest.



The master clock seen above and to the right is typical of the electrically controlled apparatus which is installed to-day in broadcasting studios. To the left is a Siemens' wavemeter.





**ALGIERS** is about a thousand miles from London. That is far enough to make it fascinating to Londoners, but infernally hot, and pretty ghastly to the olfactory nerves of residents!

When I was a temporary resident in Algiers itself a few months back, I helped to pass one sweltering evening by visiting the wireless station, official permission being granted by the French broadcasting engineers.

**Vital Importance**

I must say at the outset that Algiers, which is quite a strong signal in London (it is a 13-kilowatt, please remember), is of vital importance to us out here. Programme quality is, of course, limited by small funds, but it is, nevertheless, a very welcome addition to the few evening amusements, and is popular with Europeans and natives alike. As it is one of the few African stations that can be heard fairly easily in England, I feel sure that a description will be of interest.

The wireless station is a white building, one-storeyed, as are most buildings in these parts. It is comparatively new, and is therefore futuristic. It replaces the older wireless station building, and really we are very proud of it.

There is a wide drive up to the entrance, and the name "Radio-Alger" greets you above the door. On a small stone tablet is a reminder that the station belongs to the Gouvernement General de l'Algerie.

The aerial wires go out on both sides of the building, and proclaim, even to the new residents, that this is the broadcasting station of the city.

In the office of the station engineer I was introduced to a man who took me round. He was a Frenchman and well understood the broadcasting gear, which is of French manufacture.



*Algiers! What fancies the name conjures up for the romantic reader. Shimmering sands, swarthy Sheikhs, sweltering sunshine, and all the rest.*

*Algiers isn't quite like that—its broadcasting station is really quite a modern affair—but there are still a few romantic touches left.*

*So come with us to the coast of North Africa and let's pay a visit of exploration to Radio-Alger.*

transmitter hall and there were the rectifier valves which provide the H.T. It comes from an A.C. supply, of course.

There are three banks of valves, but no special provision for a quick change-over in the event of a burn-out. The three-phase A.C. supply is rectified, smoothed and handed on to the main transmitting valves in the other wing of the building.

**Porcelain Supports**

Radio-Alger has water-cooled valves. They are mounted on porcelain supports on a big cylindrical tower-like affair.

This stands in the centre of the floor, and the rubber tubes carrying

carried out with copper tubing. There are also the pipes which carry the water to the pipe coils and thence to the valves.

But in spite of this array of highly dangerous bare metal parts, the operator at Radio-Alger does not go in constant danger of his life! The tuning condensers and the air-spaced variometer coils have the handles taken out to control wheels like the steering wheel of a car.

At the back of all this H.F. gear are the huge air-spaced condensers, and also the smoothing condensers of the rectifier. Thirteen kilowatts is a fairly high power, but the size of the equipment at the station does not leave the impression that huge power is being handled.

test of quality. The transmitting gear was rather fascinating to watch, especially the central valve tower with its bubbling, humming water-cooled valves.

The station is tested nearly every morning, so there was no need for any anxiety when the engineer switched on for the start of the evening programme.

And now a word about the studios, announcers and programme arrangements. They have both a man and a woman announcer, though I haven't heard the woman announcer often during the last few weeks. The normal announcer can speak both French and Arabic, but native speakers often come to the microphone.

**"Ici Alger"**

The Arabic announcements are of little use to the European population, and of no use at all to you who want to identify Radio-Alger. The usual French call is "Ici le poste de radiodiffusion du Gouvernement General des P.T.T. d'Alger." The interval is just "Ici Alger," which is pronounced "Al-jay."

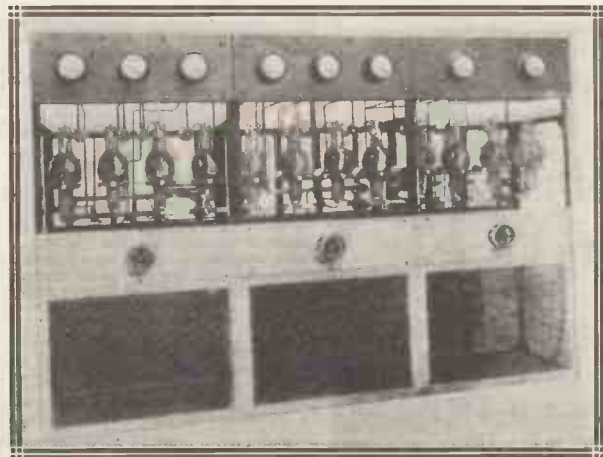
I had a long talk with a programme man at the studio. Naturally, he wants better programmes and longer broadcasting hours, but I have already mentioned the stumbling block.

The usual evening programme runs for three hours, starting at about 7 p.m. Sometimes exchange quotations or shipping forecasts are given, but we don't need this news very much and the usual procedure is to start with a short session of dance music.

The main part of the programme is European, but about twice a week there are concerts of Eastern music. Gramophone records from a well-worn file are, unfortunately, the mainstays of the dance music sessions, but occasionally there are

**TESTED EVERY MORNING**

Every day all the apparatus is given a thorough test by the station engineers. A necessary proceeding, since quick change-over arrangements are not provided for. Special attention is given to the three banks of rectifying valves seen below.



He explained that it was built by the Compagnie Francaise de Radiophonie, and so it is rather like Radio-Paris. I dare say a Parisian who had seen his native broadcaster would think that he was back home again on visiting Radio-Alger, but to me it all seemed very strange.

**A Strange Sight**

I have had enough experience of Algeria to know that it is not quite the land of sheikhs pictured in lurid novels, and Algiers itself is more a place of smells than of sheikhs; but it was strange to see such an ultra-modern thing as a 13-kilowatt broadcaster in a suburban district of the city.

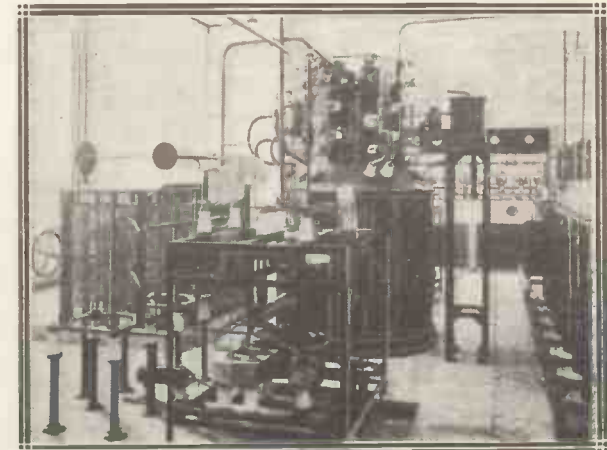
We went into one wing of the

the cooling water trail off to huge spools in the centre of the valve tower. This tower leaves all the high-voltage points exposed, and I was very careful where I walked when I accepted an invitation to see the H.F. side of the transmitter.

Everything can be seen, for the coils and tuning and smoothing condensers are mounted on porcelain supports on the floor. I can hardly credit that this is like Radio-Paris.

There is a little valve rack at the side of the main valve tower. It carries a solitary water-cooled valve in the master-oscillator circuit. Even the high-voltage condensers are kept away from the rack on porcelain supports.

All the wiring is visible; very visible, in fact, for most of it is



**A REALLY NOVEL ARRANGEMENT**

A tower in the centre of the transmitter hall carries all the transmitting valves for Radio-Alger, together with the water-cooling apparatus. It is unusual to find all the H.T. points exposed! To the left of the picture can be seen the tuning condensers and coils with their controls.

Even when Radio-Alger is working there is no evidence of 13 kilowatts going out into the ether. Just before I was due to leave for a chat with a studio official they started up for the 7 o'clock programme of dance music.

**Fascinating Gear**

The rectifiers were switched on, the water pumps started, and within four minutes an aerial ammeter showed that Radio-Alger was pushing out a 13-kw. carrier.

Through a pilot loudspeaker I heard an announcer give out details of the dance band items, but as this speaker was working on a side-tone receiver, and not on one of the speech amplifiers, it was not a fair

some good broadcasts from the actual local dance centres.

**No Ripple**

A carbon microphone of not too modern style is hung on a cable above the orchestra. All the amplifiers used for the outside broadcasts are operated from the electric light mains, but there is no ripple in the transmission.

Before leaving the station I was told that the valve tower can easily be added to, and in the event of the Gouvernement granting permission for more than 13 kilowatts it would not take more than a few hours to fit new water-cooled "bottles" and shake the ether with higher power in French and Arabic!



# SHORT WAVES IN CHILE

Some radio experiences of an exile from home.

**M**AKING a short-waver in Chile nowadays is rather like attempting the feats which were performed on the medium waves in 1920. Short-wave chokes? None in stock, so we set to work with bits of glass tube and sealing-wax. Fixed condensers? The little chaps are there all right, but those big ones—phew, what a price!

We make shift with those paper affairs which one extracts with great difficulty from old Ford coils. The fact that their capacity is a bit indefinite, and that they not infrequently short-circuit, adds to the fun.

### Our Box of Tricks

Short-wave coils? Four pounds per set, so we spend hours bringing out tapping-points from home-made affairs and soldering them on to old valve-legs. Who is to say that we do not get more pleasure out of our box of tricks, when we really have overcome all our difficulties, than the man who buys a forty-seven-and-sixpenny set of parts at home and assembles them in an hour or so with the aid of only a screwdriver?

In due time we graduate, via that path which all would-be short-wavers must tread, into something approaching S.W. experts. The family refuses to permit the expenditure of any more cash on "that wireless rubbish—why, the whole house is full of it!" and demands in the same breath a short-wave receiver that (a) shall not be in a continual state of disintegration and reincarnation, and (b) can be switched on and tuned-in in the rightful owner's absence.

### We Are Not So Critical

To ensure the latter feature—that is to say, foolproof yet regular performance—calls, let it be stated, for some nicety in the case of a short-waver.

With a well-constructed set, built chiefly by the aid of many hints and tips extracted from the pages of "Modern Wireless," we are able to switch on our receiver on arriving home of an evening, just as one does in London. Despite the well-known vagaries of short-wave reception, the principal features of which are fading, distance distortion, and variability of signal strength, there is usually some form of entertainment sufficiently audible to be left on, as we are not so critical here. Now what exactly can we find on our tuning dials?

England, of course, is our first thought, and ever since the new Daventry Short-Waver has been working we have been sure of some daily reception.

It may come as a surprise to some of the home folk, who often seem to have the mistaken idea that life abroad is a kind of perpetual holiday on the Lido, to learn that we seldom, if ever, reach our respective loved-ones before 8 p.m.

As the Canadian Zone broadcasts—which we receive best here—take place between 7 and 9 p.m. (local time), the week-end is our only opportunity for uninterrupted listening to the Old Country.

### Famous Sunday Policy

Apparently the B.B.C.'s famous Sunday policy extends to the Empire, for on that day we have to

look for light entertainment to other parts of the world.

On Saturdays, however, the family is sternly silenced while father tunes in.

On Sundays France is the star turn, and is audible from 3 p.m. onwards. By audible is meant moderate loud-speaking—ear-phones never being employed even for the short waves out here nowadays. The trouble about Pentose, however, is not his audibility, but his volubility. Oh, how that announcer talks!

### Counting on Evening Programmes

Germany (Zeesen on around 30 metres) is received at about the same strength as England, their excellent programmes giving pleasure till about 6 p.m. Italy

### Makes His Pictures Rattle

These are the famous KDKA at Pittsburg, Pennsylvania, and WGY at Schenectady, New York, and of the two the latter (or, rather, its affiliated short-wave station of W2XAD on around 30 metres) is without question the better received in this corner of the world. My "Interaxial" can make the pictures rattle with a vengeance if the abundant energy from WGY is not soothed with quite a fair percentage of a 500,000-ohm resistance.

Not seldom, however, do we get rather tired of super-snappy announcers, dialogues that miss their point due to the anxiety of the individuals concerned to say so much in the shortest possible time, and discourses on those "toasted" cigarettes which are so kind to one's throat.

It is then that we hope that the present Empire system may be developed into a 24-hour service, on several wavelengths simultaneously, on the metal strip process.

### Showing the World

Then, indeed, England will show the world that even though she may sometimes lag behind her neighbours from the point of view of time, she can in the long run "produce the goods," and we feel certain that British programmes can compete with any in the world. That positive results will be forthcoming as a return for the capital invested in the new station is not easy of proof by

## THE ADVANTAGES OF KEEPING A LOG

By R. C. FROST.

**E**VERY amateur who takes his hobby seriously knows that a detailed and accurate log of his work is absolutely essential if he hopes to collect any valuable data or to make a lasting contribution to the science of radio. The form this log shall take is often something of a problem.

At first some kind of notebook is generally used, but the man who has been at the game for long usually feels that this has become inadequate, owing to the large amount of matter accumulated. He feels the need of some means of filing and classifying the log, so that he can refer to any particular item without having to wade through pages of notes to find it.

In such cases the following arrangement is easily the best I have yet struck, and will be found equally as practical for the beginner as for the advanced amateur.

### Convenient for Reference

Briefly, the idea consists in using a set of ordinary record cards, as used in card index systems, in place of the more usual log-book. These may be kept in a long, narrow box on a table at the side of the receiver, in a position convenient for reference.

I have found 6 in. by 4 in. the best size of card to use, but larger or smaller sizes are also available and all are quite cheap. Index cards can be used to divide the log into sections as required.

The actual method of filling in the cards depends entirely on the requirements of the user. I am giving two examples to show the idea, but readers will be able to modify these to suit their own conditions.

Probably the simplest way is to allot one card to each day's work.

Notes on weather conditions, receiver used, etc., may be recorded in the title space above the first line, while details of stations logged during the day fill up the lines below.

### Valuable Information

Of course, two or more cards may be used, where necessary for each day, and index cards inserted to divide the log into months and years will greatly help when referring back to any particular date.

A more useful and detailed log is where each station has a card to itself. In this case, the less common stations may be logged each time they are heard, while those which can be heard on almost any night may be recorded, say, once a week.

In this way a most useful and interesting watch can be kept on the effect different times of day, weather, phases of the moon, etc., have on any particular station, and a great deal of valuable information is sure to be acquired.

The above methods will not be found ideal in every case. They are only given as examples, and many other ways of filling in the cards are possible.

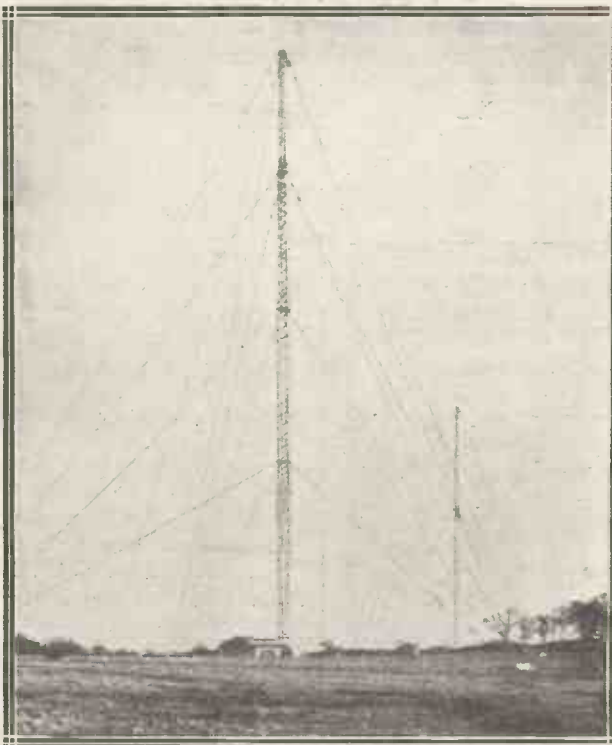
For instance, the experimentally inclined can devote one card to each experiment carried out, and to the results noticed. In fact, a log such as this, kept in conjunction with one similar to one of the above two examples, will be found an ideal way of recording the work carried out at a station.

### For the Transmitter

Similarly, amateur transmitters could allot a card to each station worked, using index cards to divide the log up into the various countries.

Abbreviations should be used wherever possible.

## FOR FREE STATE LISTENERS



The aerial system of the Athlone transmitter, which has been working since February on a wavelength of 413 metres and with a power of 60 kilowatts.

is not so good. Holland used to be very reliable, but has not transmitted for some time now.

Turning now to the States, here we are on a better basis as to time factor, and can count on programmes during the evening hours. An official list of American short-wave transmitters looks formidable, but for programme value and steady reception there are only two stations worth consideration as far as Chile is concerned.

figures; but that there will be such return—indirectly, perhaps, but in full measure—is surely obvious to all who realise the enormous importance of our export trade and the inestimable value of indirect advertising in assisting that trade.

It seems a pity, now that the Empire Station at Daventry is an actuality, for the hours of service to be restricted.

C. M.





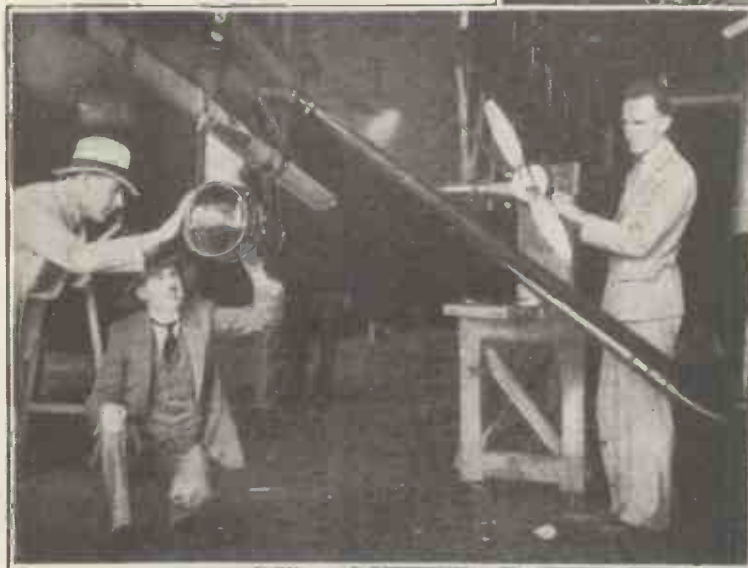
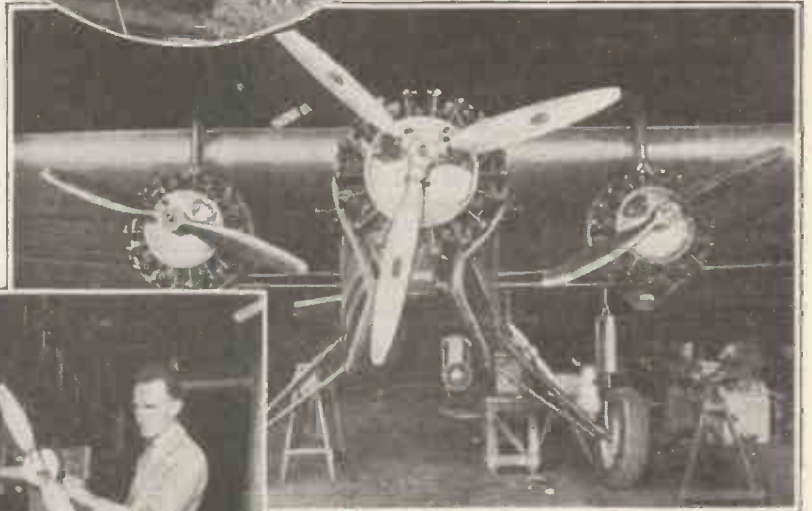
**FINAL OVERHAULS**

"The Southern Cross" is the first long-distance machine to be fitted with wireless apparatus for both reception and transmission. The photographs above and in the circle show the compact nature of the apparatus, to which Mr. Stannage, the wireless operator, is putting the final touches. The apparatus was designed by Philips in collaboration with a London aircraft firm.



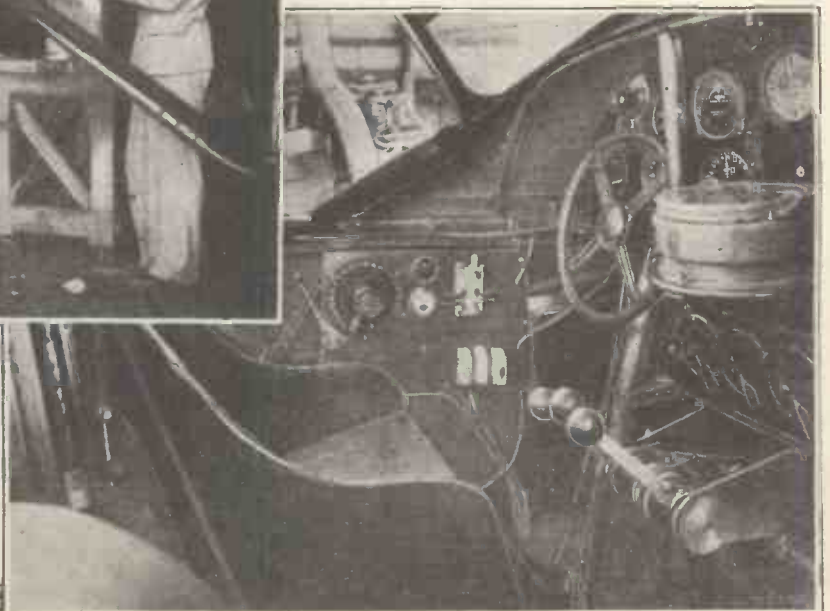
# ACROSS THE TASMAN SEA

with Sir Charles Kingsford Smith, who has recently added to the successful flights he has achieved with "The Southern Cross" a "hop" from Australia to New Zealand.



**THE EYE OF "THE SOUTHERN CROSS"**

A 60,000 candle-power landing light was fixed to the machine, the current being taken from a wind-driven generator. On the right is a "close-up" of the cockpit showing the controls and, to the left of the pilot's seat, the electrical controls.



# THE FREEMASONRY OF THE ETHER

**T**HERE'S a man I meet on the train every morning as I come to work. With typically English reserve we used to sit at opposite ends of the carriage, he with his paper and I with mine. A week or two ago I happened to be reading a wireless paper when my companion put down his paper and began to talk.

We discussed many things—affairs in Germany, the American crisis, the latest revolution in South America—and I was struck with the knowledge he displayed of every country I mentioned.

"I have a friend in Portugal . . ." he said; or "There's a man I know in Australia . . ."; or again, "I had a letter from Hamburg yesterday . . ."

He didn't look the kind of man who would have the opportunity of world travel, and so I broached the subject as tactfully as I could.

"You must have seen a lot of the world in your time," I said.

He laughed.

"Never been farther than Boulogne on a Sunday trip. You see, I happen to be a short-wave enthusiast."

\* \* \*

It makes one wonder, sometimes, where it will all end. These fellow enthusiasts all over the world—maybe it all starts with a reception report and then it becomes a regular correspondence and letters written in bad English or worse Spanish cross seas and oceans to knit further a friendship between two people who will probably never come within a thousand miles of one another.

The question of nationality never enters into the matter, divergence of tastes counts for nothing. Sufficient that the common



The firm friendships which have grown up between amateur radio enthusiasts of every country in the world are doing fine work in promoting international goodwill.

interest of radio provides the opportunity for obtaining new lines of thought, a new outlook.

It's a fine thing, this freemasonry of the air. It provides such immense opportunity for getting to understand the other fellow's point of view



"WHAT A STRANGE IDEA!" says this Swedish railwayman when his English colleague has explained some of the more interesting facts of British railways during a radio debate. In the heading above a German and an English bricklayer exchange views.

without having it rammed down one's throat by history books, lecturers or newspapers.

In England, the B.B.C. has not been slow to see the value of it. Those recent talks between British and foreign waiters and railwaymen and so on—they have surprised listeners even more than they have the actual participants.

Those of you who have listened regularly to foreign programmes from one or two stations and have afterwards had the good fortune to travel to the very towns from which these programmes have come must have had the same feeling, a feeling of friendship for someone you know but have never met.

\* \* \*

I wonder just how many people have learned to speak French or Spanish or Italian through the patient efforts of E. M. Stephan, Maria de Laguna and D. Pettoello? And how many have found, as a result, that the Frenchman and the Spaniard and the Italian are not just so many "peculiar foreigners," but individuals with thoughts and tastes as distinct and as sensible as our own?

Our statesmen may talk at Geneva; the prime ministers of many countries may indulge in pacts and ententes to their hearts' content. But I venture to believe that the conferences of the Union Internationale Radiophonique are every bit as important as the sessions of the Disarmament Conference.

While the individual members of the countries of the world can enjoy the camaraderie which their mutual interest in radio brings, can tread on common ground through the medium of radio, the peace of the world is secure.

P. C.





# "MÜNCHEN" ON THE AIR

The 60-kilowatt MUNICH transmitter has recently arrived to swell the ranks of Germany's regional transmitters. We invite you this month to join "The World's Programmes" tour of Munich, conducted By OUR CORRESPONDENT IN GERMANY.

**H**AVE you heard the new Munich yet?

I ask this before describing the station, as the Bavarian authorities want to get as many reports as possible from England. I found them extremely interested in British reception of their new station.

### A DIFFERENT STATION

Munich has every reason to be proud of its new station which has come on the air almost simultaneously with Leipzig and Frankfurt, and which in many respects is even better than its rivals.

Somehow Munich strikes me as being even more different, technically, from B.B.C. stations than is any other German station.

Perhaps that is just because the power is 60 kilowatts, and because the rather special high-power apparatus in the way of water-cooling under pressure and remote control for the transmitter is very different from anything which you can see in England or France.

Just three weeks after the new station opened I was able to visit München and go out to the transmitter building a mile or so from the city.

### WHOLLY SELF-CONTAINED

The Bavarian Department has taken over a new plot of ground for Munich, and has put up a large white building, strikingly futurist and by no means an eyesore.

It is a big building because not only does it house all the transmitter gear (it is quite self-contained, in-

cluding the rotary generators for power supply), but it has one wing for the station staff and for the research laboratory.

I was introduced and shown over the building.

The machine-room is on the left, while in the main wing is the hall, much smaller, of course, than the generator house.

The aerial is to the left of the building, parallel with the main road which leads up to the Munich site. A more desolate spot in the neighbourhood of Munich you could not possibly imagine.

### INSULATED MASTS

"The result," said one of the engineers to me, "is that there is a considerable local ground signal, for there are no trees or high buildings to break up the 'direct ray.' The only station you can get near the Munich transmitter is—Munich!"

Both masts are, I should say, a

trifle under 300 feet high, and are Eiffel Tower shaped. A peculiar thing is that the base of each "Eiffel Tower" is not buried in the ground, but rests on four blocks of stone. The idea, of course, is to insulate the whole mast to cut down shadow effect.

### THE LOCKED ROOM

A staggered staircase which needs one of a cooler head than mine to climb to the top leads to the aerial winch affair on each mast, while there is a little platform at the top. These masts are particularly difficult for a novice to climb as the first part is not truly vertical, but leans over at a sickening angle for the first fifty feet up, parallel with the base part of the mast!

Exactly between the two masts is the transformer house. In here, they told me, is a single insulated panel, carrying a tuning circuit wound of copper tube. I was not able to see inside. The hut is kept locked.

### EXTERNAL DETAILS

The primary is connected to the two feeder lines which run back underneath the aerial to the Munich transmitter, while the secondary has one side connected to earth, to a plug passing through the concrete



IN THE MODERN STYLE is Munich's transmitter house seen in this photograph which was taken from the tuning hut at the end of the aerial feeder line. Special quarters for engineers and research technicians are provided.

## THE SPEECHES THAT WERE NEVER HEARD!

floor, and the other end goes out through a porcelain insulator and a tensioning device to the aerial down-lead.

The lead-in, of two cables in parallel, is carried on twelve posts like telegraph poles about fifteen feet high.

So much for the outside of Munich. As there is no external water tower as at Frankfurt, there was nothing much else to see outside, and we went back to the machine-room.

### THE MACHINE-ROOM

At Munich the *Maschinenraum* is more interesting than the transmitter itself.

From the little gallery which runs along one end, and which is backed by a glass wall and swing doors leading into the upper part of the transmitter, you get a bird's-eye view of the rectifiers, water-cooling gear and rotary converters which supply Munich's power.

There are two large A.C.-to-D.C. converters, two smaller sets with

out of sight unless you go down the metal stairs to the machine-room floor) are the relay panels connecting up with the master control desk. They are let into the wall.

### A POWER FAILURE

There is space enough and to spare in the machine-room, so that if Munich even becomes a dual-wavelength transmitter like Brookmans Park, it will only take a few weeks to install the additional generators.

A futurist note is struck by the Munich control-room, which has the latest type of Lorenz relays as installed in Leipzig.

When I went in, the control engineer was in touch by the house telephone with the amplifier-room. Ten glowing indicator lamps were on each side of him and showed that each section of the transmitter was working properly.

Seven emergency lights to the left would indicate at once any fault that might crop up.

opening ceremony at the end of last year," said an engineer. "There were hectic scenes in the control-room here ten minutes after the opening ceremony had started in the Bavarian Department of the Ministry of Posts.

Nothing was wrong with the transmitter itself, but of course we hadn't banked on a power failure, and all the generators were checked over to make sure that it wasn't absolutely a local fault.

### GOOD RELAY SERVICE

"The galling part was that the ceremony was carried on without the famous people knowing that there was a hitch. And by the time the power had come on again, the ceremony was over. But still, Munich was not quite 'dead.' We have our relays."

Munich, indeed, is very fortunate in its relay stations, which are of comparatively high power and which have good wavelengths. There is a land-line apparatus at München for dealing with the S.B. cables taking the programme to Augsburg, Kaiserslautern, and Nürnberg; while at the touch of a switch the local studios can be used or the station can take its programmes from the Berlin group.

I was told that nearly all the early-morning transmissions come from the Munich studios; while it is generally in the evening that they S.B. with, say, Witzleben. The Berlin lines available for München (the German name for what we call Munich) have been tested by the German Post Office, and are every bit as good as our own simultaneous broadcast system.

### CORRECTED LAND-LINES

The line amplifiers at München are fitted with valve boosters to compensate for any cable defects, and with the silent "faders" which they use to change over from local studios to Berlin studios, it is impossible to tell whether the programmes are local or from Berlin.

I feel bound to add that the staff at München consists of all qualified men, and when the new "lab." is furnished they hope to get down to a few knotty problems such as transmitter aerial design and frequency control—just to pass away the time!



THERE'S NOTHING TO CRAMP THE STYLE of the control engineer in Munich's modern transmitter building. Everything is well spaced out and yet ready to hand when needed. The possibility of having to duplicate the apparatus for a twin-transmitter was not overlooked by the architect.

two sets as a stand-by, and two little converters for the grid-bias voltages. Each of these machines is mounted on a chassis supported on springs from the concrete bases.

As you look down the hall from the balcony, the bigger generators are immediately below; while down on the left are the large Krauss' tanks, heavily lagged.

On the right are the safety panels carrying the fuses and switch gear for the high-voltage machines; while down underneath the balcony (and

The water-cooled valves working, as I have said, under pressure for cooling are mounted on the new-type stands fitted with safety valves for the cooling water, and each of which carries five meters, showing the water temperatures and rate of flow and the grid and anode steady and peak voltages. The tuning circuits for the water-cooled valves are enclosed in cabinets with safety doors.

"It was unfortunate that a power breakdown happened during the



# ON FOREIGN AERIALS

Last-minute news flashes gathered from the principal broadcasting stations in every corner of the globe.



**BRUSSELS.** Belgium is to have its radio services centralised in a Broadcasting House, the plans for which have been the subject of a competition for architects. It is expected that construction will be well under way before the end of the year.

**THE MIDLAND REGIONAL.** Listeners in the Birmingham area are hoping for a great improvement in quality when the new "5 G B" comes into operation next year.

Their present station was erected in 1927, as an experiment to determine the lines of development of the Regional scheme.

It is therefore fitting that the modifications and improvements resulting from the B.B.C.'s experience with the scheme should finally be embodied in a new Midland Regional station.

**NEW YORK.** President Roosevelt's radio speeches have been so successful that he is expected to continue them at about fortnightly intervals.

**DROITWICH.** Work on the new 5 X X station at Droitwich is now proceeding. The power to be employed will be 100 kilowatts, instead of the 30 kilowatts of the present long-wave Daventry station. It is expected that the earliest date for the new long-waver to come into action is about this time next year.

**NOGINSK, U.S.S.R.** The recently completed station at Noginsk, 40 miles from Moscow, is claimed to be the most powerful broadcaster in the world, being rated at 500 kilowatts.

**ARENDAAL, NORWAY.** When the new Stavanger station is erected, the old half-kilowatt transmitter will be re-erected at Arendal as a relay station.

**RADIO AGEN, FRANCE.** This long-silent station is now on the air again regularly, for two programmes of one hour's duration daily, commencing at 12.30 p.m. and 7.30 p.m.

**JUAN LES PINS, NICE, FRANCE.** The plans for the new station have now been finally passed.

**CARDIFF.** Although listeners within about three miles of the present Cardiff station's aerial may find the service from the West Regional station is not quite so powerful, the majority of Cardiff listeners will get a stronger service from Watchet, owing to its much greater power.

**MILAN, ITALY.** Experiments with a second service for the Milan area are being carried out, the 331.5 metre main transmitter being supported by an alternative, working on the (common) wavelength of 453.2 metres.

**KESTON.** The tuning-fork which acts as the frequency standard of the B.B.C.'s receiving station at Keston is made of Elinvar steel.

**THE WEST REGIONAL.** The B.B.C. expects the new station to take over the full service of programmes about the beginning of June.

**BOLZANO, ITALY.** Although this station has a power rating of only 1 kilowatt, it has recently been getting over at great strength on 368.1 metres. The interval signal is the song of the nightingale.

**THE WEST NATIONAL.** Public tests of the new West National station, on 261.6 metres, will not be carried out until listeners are getting a full and satisfactory service from the West Regional station (309.9 metres).

**BARI, ITALY.** The unmodulated aerial energy of the Bari transmitter is 20 kilowatts. The station uses a quarter-wave T-type aerial, suspended between two 80-metre earthed self-supporting steel towers.

**IVANOVO VOSNESENS.** This is the name of a new Soviet station, which has been testing, apparently on high power, on a wavelength of 483 metres.

**"ATLANTA."** Successful tests carried out by the Air Ministry and Imperial Airways, Ltd., have led to the decision to equip the first four "Atlanta" type aircraft on the Cairo-Capetown route with Marconi apparatus capable of telephony and telegraphy on medium and short wavelengths.

**MILWAUKEE.** Highly interesting directive experiments have recently been carried out with the aerial system of the W F L A station.

It has been found possible to distribute the evening programme differently from the day programme, by means of a switch governing an aerial reflector system.

**RADIO-TOULOUSE.** The famous French station was almost completely destroyed last month by fire. It is doubtful, at the time of writing, whether it will be rebuilt on the same site.

**THE LUCERNE CONFERENCE.** In view of the important wavelength conference to take place in May at Lucerne, some of the European stations have been testing outside working hours on different wavelengths. This explains many unknown transmissions picked up in the small hours.

**W K J, ROCKY POINT, NEW JERSEY.** The special German talk from W K J, given the second Friday of every month on 20.7 metres, is relayed to Berlin listeners, so the apparent reception of W K J direct on these dates may prove to be reception from Germany instead.



THEY WANTED REALISM—and they certainly got it in this radio play—"What Does Your Heart want in Hollywood?"—broadcast recently from the Hamburg studios.

# THE MONTH IN EUROPE

Some of the best items of last month picked at random to illustrate the great entertainment value in foreign listening.

## HILVERSUM (Holland)

Until the end of June the programmes from the Hilversum studio will be transmitted on the Hilversum aerial, so listeners will know where they stand!

Outstanding programmes of the past month included a performance in Dutch of the third act of Galsworthy's play "Justice"; and a little known operetta by Suppé—"Ten Maids and No Man."



## TURIN (Italy)

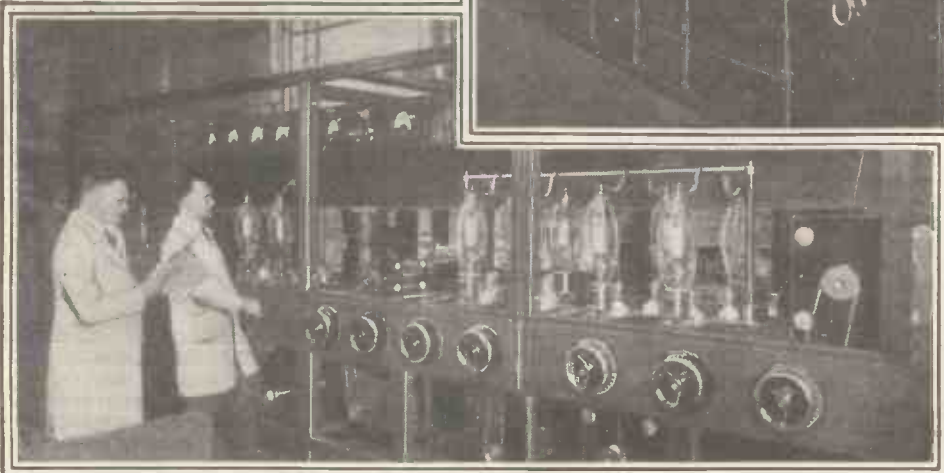
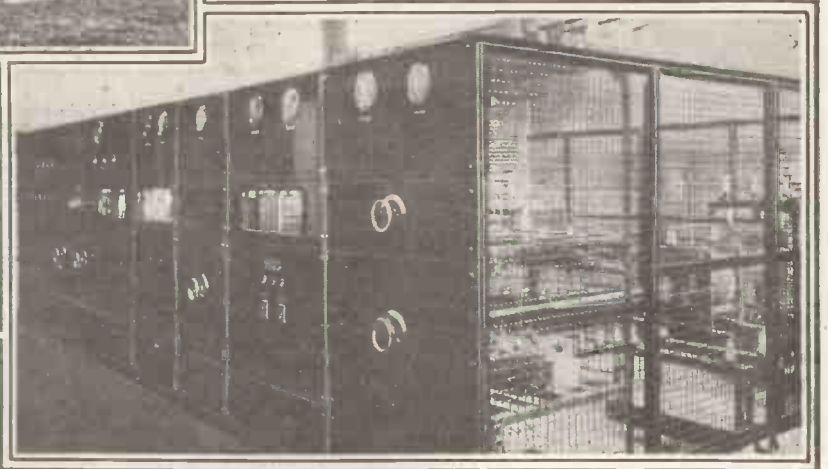
The best of the light entertainment from this enterprising Italian station was a bright show called "The Duchess of Hollywood." The gentleman in the picture is Professor Granata, announcer at Turin.

## CHRISTIANSAND (Norway)

Relaying the Oslo programme on 235.5 metres, this station (above) gave prominence to the British composer, Sydney Baynes.

## TRIER (Germany)

A selection of dances from well-known grand and light operas was one of the best items which this station (right) relayed from Hamburg.



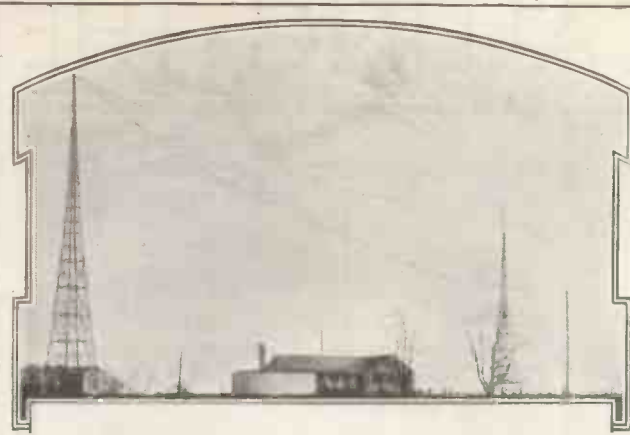
## MORAVSKA-OSTRAVA (Czechoslovakia)

This Central European station obviously believes in giving its listeners full value for money. During April a full performance of the opera Tannhäuser was broadcast, the three acts lasting from 6 to 9.45 p.m., with brief intervals for news and book reviews!



# PROGRAMMES ON THE CONTINENT

Outstanding Continental programmes of the past month reviewed in brief.



**T**HE programmes during the past month—or at any rate those which I have heard—have not been particularly outstanding. All the same, there is always enough and to spare of light entertainment for the man with a moderately good set who chooses his programmes with care.

English composers—I always listen carefully for their works—have not been so popular as in some months, but Ketelbey continues to be a firm favourite. Jones' "Geisha" also remains in favour.

On the more serious side, it was interesting to listen to the different performances of "Parsifal," which was almost universally performed between Palm Sunday and Good Friday. I heard extracts from Budapest, Stockholm, and Vienna, and give the highest marks to the Austrian version.

German programmes are still rather vague as a result of political unrest, the resignation of broadcasting officials and the banning of certain composers—Toscanini in particular. The new arrangement whereby a "National Hour" is simultaneously broadcast by all German stations (usually between 7 and 8 o'clock in the evening) is now in full swing, and seems to be fulfilling its object of providing representative national propaganda, in the way of music and drama, to the whole of Germany.

## AUSTRIA

The dispute about the regular broadcasting of the Austrian National anthem (you will remember that the tune is the same as Germany's anthem—and nobody knows the words!) has been settled by an order from the Government requesting the playing of the anthem every day.

Vienna provided an excellent per-

formance of "The Gondoliers," which gained much by the excellent playing of the orchestra.

## FRANCE

The relay from a Paris music-hall of the revue "Oh! Papa!" gave a fine example of the light shows which abound on the Continent. Listeners knowing no French must have delighted in the bright music.

A French adaptation of Somerset Maughan's play "Rain" was another good item, and one which was quite



**THE DOCKS OF HAMBURG** formed the subject for a recent broadcast from Germany. Above, the harbour master is explaining, from a map, the formation of the harbour; this was followed by a running commentary from a launch in the docks themselves.



manner of the film "Atlantic," which many of you may have seen.

## GERMANY

Listeners to Langenberg will have enjoyed those light orchestral programmes which Herr Eysoldt gives at regular intervals. Full of lively marches, lilting waltzes, and some modern dance music, there is no little resemblance to the concerts of our own Joseph Muscant.

Many of the German stations also gave a report on the Easter Hockey Tournament at Folkestone!

## IRISH FREE STATE

The sponsored programmes which started from Athlone a few days ago have added yet another name to the list of non-British stations to which British listeners tune. There has already been some confusion over announcements in the Irish language.

easy for the not too skilled French scholar to follow.

## BELGIUM

"The Land of Smiles," given from Brussels, is but one example of the large variety of light entertainment which foreign stations provide. But I was more interested in a radio play founded on the Titanic disaster. This was quite well done after the

## ITALY

I heard part of a performance of "Katja the Dancer" from Palermo.

Foreign stations make a regular habit of putting on musical shows which have been successes in England—which is pleasant for English listeners!

COSMOPOLITE.

# CAPETOWN CALLING THE EMPIRE!

South Africa was responsible for opening up a new chapter in radio history when Capetown addressed the British Commonwealth of Nations from the top of Table Mountain. The proceedings were relayed in England by the B.B.C. The Earl of Clarendon, Governor-General of South Africa, inaugurated the broadcast, which Mr. Caprara, Director of Broadcasting, carried out from the rock on the verge of the "great, grey rampart" brooding over the Mother City.



**BROADCASTING FROM A MOUNTAIN TOP**

In the two photographs above the broadcast is in full swing with Mr. Caprara telling the Empire of some of the beauties of the Peninsula. Note the portable receiver which was used for listening to the rest of the programme. This included the speech which Lord Clarendon made from the study of his home in Capetown. He is seen in the circle in the middle of making his speech which was heard in almost every corner of the world.



It is hoped that the Capetown broadcast may lead to further Empire programmes reciprocal to the Daventry transmissions. In this way the Empire will be linked still more closely together.







An article of topical and practical interest which provides several sound suggestions for

# SUMMER SEARCHING

**H**'M! Vienna's not so good to-night. A little more reaction perhaps. Ah, that's better—but wait a minute. Why all that mush and crackling?

Summer's coming! You couldn't have a more certain herald. And the long-distance listener begins to resign himself to the poorer conditions he has learnt to expect.

## UP AND DOING

But must he take it like that—lying down? Certainly not!

This is just the time for the DX enthusiast to be up and doing. Proving his prowess as a long-distance expert. Proving his set has got that something others haven't got.

Let's see just what the differences are between summer and winter radio conditions. And what can be done to overcome them.

First of all, a fundamental consideration. Longer hours of daylight.

Reception on broadcast waves is always better after dark. Also, most distance listening takes place in the evening when work is done.

## GREATER SENSITIVITY

During the winter it is dark before one's evening leisure commences. But in the summer we can seldom wait for it to get dark. Even then reception does not seem as easy as in the winter—possibly because of greater ionisation of the atmosphere during daylight.

So we need greater sensitivity.

There are three ways of attaining this. You can ginger up the set, improve the aerial or add another valve.

The ginging-up process is really a good "spring-clean." Start by removing all the dust from your receiver.

Then go over all the connections to make sure they are tight; clean up battery plugs and spade-tags; test

H.T. and G.B. battery voltages (unless the set is run from the mains), and replace any old valves of which you have become suspicious. Finally, check over all adjustments such as trimmers on gang condensers, series aerial condensers, and so on.

## CLEAN THOSE INSULATORS

Now for the second suggestion. "Improve the aerial." Easier said than done, you'll think. Agreed, but you do not necessarily have to alter its height or length to improve it.

What about cleaning those insula-



## RADIO ON THE ROAD—

tors, or fixing that lead-in well clear of the gutter? Maybe the far end of the aerial is rather near the trees supporting it. Shortening the aerial wire a little, and lengthening by an equal amount the wire or halyard

## —AND IN THE COUNTRY

The fine weather brings many enthusiasts out into the country with "hook-up" sets and portable aeriels. The smaller picture above shows a radio receiver installed in a car, which provides entertainment on a Sunday afternoon's outing.



supporting the insulators would overcome this.

Joints are undesirable in an aerial wire. If there are any in yours, it

would be worth while renewing the aerial wire with one continuous piece of wire.

If you can increase the height of your aerial, so much the better. But don't make it too high if you are near a powerful station. You might upset the set's selectivity.

Adding another valve will make the most noticeable difference to sensitivity. But in some cases there will be difficulties in the way.

## ADDING A VALVE

Commercially-made receivers are generally too inaccessible for such additions. And sets with an H.F. stage may be made unstable by another H.F. valve. (Usually the added valve should be an H.F. amplifier.)

The extra stage best takes the form of an H.F. unit. The grid circuit of an S.G. valve is tuned by a coil and condenser in the usual way. The anode is coupled to the set's aerial terminal by means of an H.F. choke and fixed condenser.

## THE NEXT ITEM

The aerial lead-in is removed from its normal terminal and taken to an aerial terminal on the unit. With the unit added, there is, of course, an extra tuning control to adjust.

Having considered the fundamental

difference between summer and winter reception—conditions—what is the next item? It's atmospherics. Sometimes called static. And,

## FRAME AERIALS ARE SOMETIMES HELPFUL!

occasionally, natural interference. Unfortunately, little can be done about it. Experts have been trying to discover a static eliminator ever since radio came out of the shell. And the first successful one is going to make a big fortune for its inventor!

Static is picked-up more or less just like radio waves. That's the trouble. Cut out the static and you cut out the station.

### IS IT ATMOSPHERICS?

You all know the familiar "click, click, spurtle, CLICK!" of the atmospheric. Usually accompanied by a background of sizzling.

But don't take it for granted that all such noises are atmospheric. They may have their origin in the set itself.

It's surprising the number of set troubles which get put down to atmospheric during summer months. So when those sizzles and bangs come along, make the following test.

Remove the aerial lead. If the noises stop, you can put them down with certainty as external to the set.

Suppose they are just as bad. Then remove the earth lead. If they stop now, your earth lead is probably going on strike.

But should they still be present, your set is suspect. Perhaps the H.T. battery is running down, or there is a faulty connection. One of the valves may even be causing the trouble.

### PROGRAMME VERSUS NOISE

At the moment we are concerned only with the ether noise caused by the summer warming up of the atmosphere.

"What's to do about it—?"

Well, remember this. It's not so much the strength of the atmospheric which counts, as their loud-

ness in relation to the loudness of the station being received.

Compare distant reception with local reception on a night when atmospheric are bad. They don't worry one nearly so much on the local programmes.

### DIRECTIONAL RECEPTION

The reason is that less amplification is employed. Amplification that may take the simple form of reaction.

The trouble is that beyond a certain point, amplification often appears to increase the strength of atmospheric more than it increases the volume of the wanted station. In such cases the aerial becomes particularly important. And the points already described in connection with it should receive attention.

Frame aerials are sometimes

bands at the same time. It may even vary at different parts of one band.

The final difference that we will consider between summer and winter conditions is the weather. However pessimistic you may be, you have to admit temperatures are higher in summer, and that rainfall is less. Even if the latter were not strictly true, the effect of the rainfall would be less, because evaporation is quicker due to the higher temperatures.

### REMEMBER THE EARTH

And so you must keep an eye on your earth if it is a buried one. In the winter the surrounding mould may always be damp, but in summer it may become so dry as to be non-conductive.

There are two ways out. Bury the earth deeper, or in a damper spot, and water the earth in summer. A piece of buried pipe, clear of the earth at the top, is a good means of getting the water down to the earth plate.

There is another point on which the question of temperature must be considered. The life of the H.T. battery.

Sun shining on a dry battery will make it too dry, and it will soon need replacing. Choose a place

where the sun cannot reach the battery and the temperature is fairly even.

### PORTABLE EXPERIMENTS

Those who are keen on long-distance reception from an experimental point of view, will find it worth while "to have a shot" with the portable when out in the country.

An aerial can be added by twisting a piece of flex round the outside of the set. One end goes to a short aerial slung up to a tree and the other to a piece of wire laid on the ground.

A. S. C.



DON'T BE MISLED into thinking you can take the receiver out in the garden and work it with any old makeshift aerial. In summer-time your aerial and—even more particularly—your earth need very careful nursing if results are to be at all satisfactory.

helpful in reducing atmospheric. Although the latter have no particular wavelength as a rule, they have a definite place of origin. The directional properties of the frame aid reception from directions approximately at right angles to that from which the interference is coming. This feature of frame aerial reception often proves of great value.

Should you find atmospheric make conditions on medium waves hopeless for searching around for distant stations, try the long waves. And vice versa.

Static is seldom as bad on both





# DISTANT STATIONS AND

## HOW TO HEAR THEM

**T**HE dull "boom" of Big Ben striking midnight heralds the commencement of a new day, and, for the long-distance enthusiast, the beginning of real DX réception, for at midnight most of the European stations close down, whilst far away across the Atlantic American listeners are beginning to settle down to enjoy the evening's programmes.

### AFTER MIDNIGHT

For a few moments after Big Ben has said "Good-night," the anthems of many countries are audible and a multitude of announcers wish listeners "Good-night" and "pleasant dreams" in a variety of different "tongues." Comparative silence now reigns; Europe has closed down and it is time we joined our American friends in listening to their stations. Impatiently we swing the dial, or dials, eager to pick up a "Yank."

### WHAT'S TO BE HEARD?

What stations are we likely to hear during these midnight excursions? Well, of course, it depends upon the receiver employed. If it employs a minimum of valves—one—we should not expect too much. WCAU, Philadelphia; WTIC, Hartford, WBZ-WBZA, Springfield - Boston; WABC, New York; and WIOD, Miami, are pretty certain to be received, but the log may end there.

### STAR OF THE MOMENT

If you add an L.F. amplifier, or if you possess, as is extremely probable, a receiver incorporating several valves, you may confidently expect a much larger "bag"; and to hear fifty American stations during a night's "sitting" is by no means unusual.

At the present time WTIC at Hartford, Connecticut, is the "star" station, having ousted WCAU (the "star" of a few months ago) in that position.

### CHOOSING PROGRAMMES

If you are interested in humorous turns (and surely we all are!), you should pay a visit to one of the National Broadcasting Company's Blue Network stations. WJZ, K-Y W, WBZ, WBZA, KDKA, WIOD, and many other stations relay this network, and you are pretty certain to find one of them coming in at reasonable strength.

Then you may prefer to hear some of America's popular dance bands. If so, tune in to a station taking the Columbia Broadcasting System net-

"trip" whilst conditions are favourable.

By the time you read these notes, we shall be well into the season of long days and short nights. The effect of this upon short-wave réception is to lengthen considerably the hours during which we hear stations below 30 metres.

### SUMMER CONDITIONS

The 20- and 19-metre stations, which, during the winter, fade out between 5 and 6 p.m., will now be lasting nearly until midnight, well up to their maximum strength. When we get really near the longest day of the year it will be possible to hear 20-metre stations up till 2 a.m.

Another big change that takes place in May is the way in which distant stations come in early in the mornings. For the last four years the 20-metre amateur band has been full of signals from the West Coast Americans—stations in California, Washington, Oregon and British Columbia. These stations—the "W" 6's and 7's, and the "VE" 5's—are rarely heard at any other time of the year, and then it is generally in the late afternoon.

I don't know that they are of very great interest to the man who doesn't read Morse, although there will certainly be a few telephony

stations amongst them.

### RECEIVING AUSTRALIA

We shall probably find that Sydney, on his 31-metre wave, is much better in the mornings than in the afternoons, during May, June and July. Watch for him at almost any time between 6 and 9 a.m., and you should find him at good strength,



A PORTABLE MICROPHONE UNIT used extensively in Germany for "on the spot" addresses during the recent general election campaign.

work. Guy Lombard and his Royal Canadians, and many other bands, well known at home through the medium of gramophone records, broadcast regularly over this network.

Whatever your taste, you are sure to have it catered for by one or another American station, and I certainly suggest you make the

## NOTES AND NEWS FOR THE DX MAN

provided that conditions are not absolutely bad.

It is strange that the shorter waves—those below 30 metres, at any rate—always used to be called "summer waves" or "daylight waves." As a matter of fact, there is considerable truth in the suggestion that they come over best when either the receiving or the transmitting end is in daylight.

### LIGHT AND SHADE

For instance, the West Coast of the U.S.A. is enjoying its early morning sunshine when it is 3 p.m. over here, and we never hear their signals then. The times when we hear them best are roughly 5.30 p.m. here (just getting dusk, or quite dark during the winter), and 6-9 a.m. here (when it is 9 p.m. to midnight out there).

Think of the times at which almost any really DX stations come in best, and you will agree that only one end is in darkness.

It is most instructive to try to work out the lines separating darkness from daylight over the face of the globe at different seasons. Reception from almost any part of the world is supremely good when the path of the signals runs more or less parallel with that line. If the signals have to cross the line of light and shade at right-angles, they are rarely heard at all.

### WHEN TO LISTEN

Some simple experiments with a globe and a spotlight held at a distance are very instructive in this way.

For the benefit of those who like something definite to go for, I suggest that it should be fairly easy to find the following stations during the next few months. The suggested "best times" are added in brackets.

49-Metre Group.—W 4 X B, Miami; W 1 X A L, Boston; W 8 X A L, Cincinnati; W 3 X A U, Philadelphia; W 8 X K, Pittsburg (all between 11 p.m. and 3 a.m.); V Q 7 L O, Nairobi; Z T J, Johannesburg (6 p.m. to 9 p.m.); Z L 2 Z X, Wellington, New Zealand (2 to 6 p.m.).

### "BEST TIMES"

31-Metre Group.—P R B A, Rio de Janeiro; W 2 X A F, Schenectady; W 1 X A Z, Springfield; W 3 X A U, Philadelphia (all between 9.30 p.m. and 2 a.m.); V K 2 M E, Sydney (5-7.30 p.m. and 6-8 a.m.).

19-Metre Group.—W 8 X K, Pittsburg; W 2 X A D, Schenectady; W 2 X E, New Jersey (4 or 5 p.m. till midnight or after); J 1 A A, Tokio (10 a.m. till noon).

### FIRST-HAND EXPERIENCE

I have not quoted European stations, and it is impossible for me to give a list of "best times" for Colonial and foreign readers to look for the Europeans, since the compiling of a list of this sort is only done satisfactorily from first-hand experience.

In general, during May the best



EVEN AMERICAN ANNOUNCERS have their moments of higher thought. Here is the famous Ted Husing, who is never parted from his microphone, giving a little light entertainment to two of his fellow radio stars. Have you heard him from one of the American short-wave stations?

hours to use the set will be between 6 and 9 a.m., and between 7 p.m. and midnight.

Fortunately these times occur during the leisure hours of most of us.

Whenever a friend tells me that a set which I know to be a good one is not proving so sensitive or so selective as it ought to be and asks me if I can suggest any reason for this, the very first thing that I

suspect is the earth connection. Comparatively few people realise how important the earth is, though it is no exaggeration to say that with many modern sets it is of far greater moment than the aerial. For various reasons it is not always possible to have a first-rate aerial, but it is seldom that a really good earth cannot be contrived if a little trouble is taken over it. Such an earth used in conjunction with even a poorish aerial is likely to give far better results than are obtainable from the best of aerials in combination with an indifferent earth. If, therefore, you are not satisfied with your results you will do well to tackle your earth connection, no matter how good you may think that it is.

### EASILY SATISFIED

Many people, who will spend hours in rigging up an aerial, are very easily satisfied when it comes to the earth connection. An earth tube is driven in, without any examination of the soil; a plate of some kind is buried a little beneath the surface, or connection is made to the nearest water-pipe—and sometimes even to a gas-pipe. And that is just that! But just as all that glitters is not gold, so every alleged earth connection is not a real earth. Time and again I have found the performances of sets ruined by earth tubes or earth plates that were sunk no deeper than an upper layer of light gravelly soil.

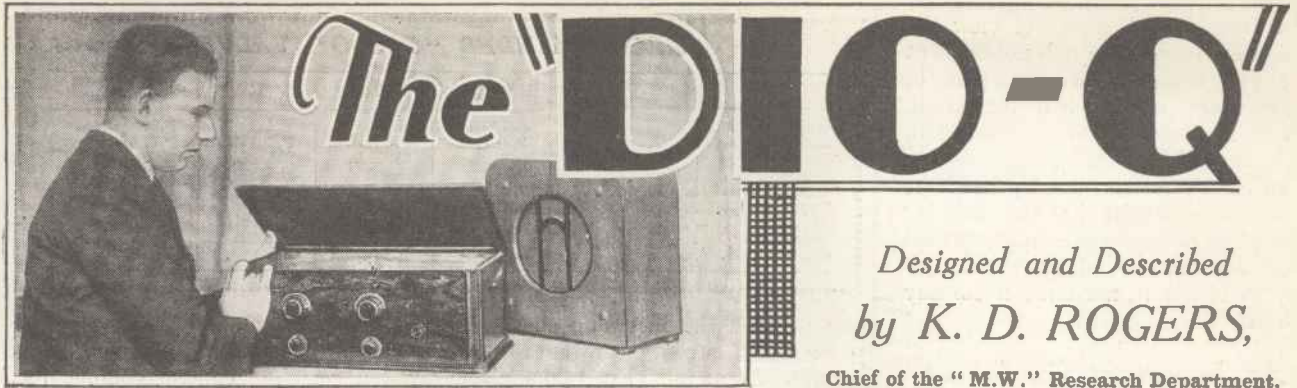
### GETTING DOWN TO IT

When you are making an outdoor earth connection your slogan, if you want to be able to have the best of long-distance results, should be: Get down to the clay or to the heavy subsoil, at any rate. It may have to go in a foot or so deeper, it may mean only a few inches; but it is worth while over and over again. Waterpipe earths can be deceptive, and the use of gaspipes, besides being forbidden by many authorities, is bad practice. Give your set a chance by providing it with an earth that really is an earth.

This is not to say, of course, that the provision of a good earth relieves one of the necessity of erecting a satisfactory aerial.

Every endeavour should always be made to get the best aerial circumstances will allow. When that's done see that the earth is equally efficient.





Designed and Described  
by K. D. ROGERS,

Chief of the "M.W." Research Department.

THIS is the fifth of the popular "Diodion" receivers described in MODERN WIRELESS during the last six months or so. Everyone has had as a basis the "Kirkifier" method of diode rectification, using a leaky grid diode as detector.

Detector distortion is thereby obviated to a much greater extent than is possible with ordinary methods of rectification; while, due to low charging, selectivity is enhanced.

**Reducing H. T. Consumption**

Some would criticise battery-operated diode receivers on the ground that they necessitate an extra valve when compared with normal sets, and this, being of the L.F. type, will cause H.T. consumption to be greater.

Such increase is very small, however, but it cannot in itself be avoided, and its effect on the life of the H.T. battery is negligible. What really does count is the consumption of the output stage, and this is a factor which is inevitably present in all sets.

It can be reduced greatly, though, by one or two methods of valve coupling, the recently popularised

quiescent push-pull system being one well worth considering.

**Great Simplicity**

We have employed this method of output in the "Dio-Q" with triode valves instead of the more usual pentodes. This gives extreme economy of high-tension consumption, with the

The latest development in the "M.W." "DIODION" SERIES, featuring:  
**TRIODE Q.P.P.**  
and  
**DIODE RECTIFICATION**  
★ ★ ★  
Very Economical H.T. Consumption—  
No Output Valve Matching—No Reaction

greatest possible simplicity of operation and minimum adjustment.

The chief snag in the use of pentodes in quiescent push-pull is the fact that theoretically they should be watched as regards their anode current when in the quiescent state.

**Matched Valves Obtainable**

This necessitates the careful adjustment of screen voltage with a milliammeter in the anode circuit, though in practice this is not always

done. With triode valves this is not required. The valves can be obtained matched from the makers without any extra charge, and all that has to be done is to bias them with the voltage that gives best results, and leave it at that.

The quiescent anode current of a couple of triodes, like the L.P.2, is only a matter of a couple of milliamps., and thus the whole set takes under 8 milliamps. The average current taken during operation is about 10 milliamps., which is remarkably low when the sensitivity and output power are considered.

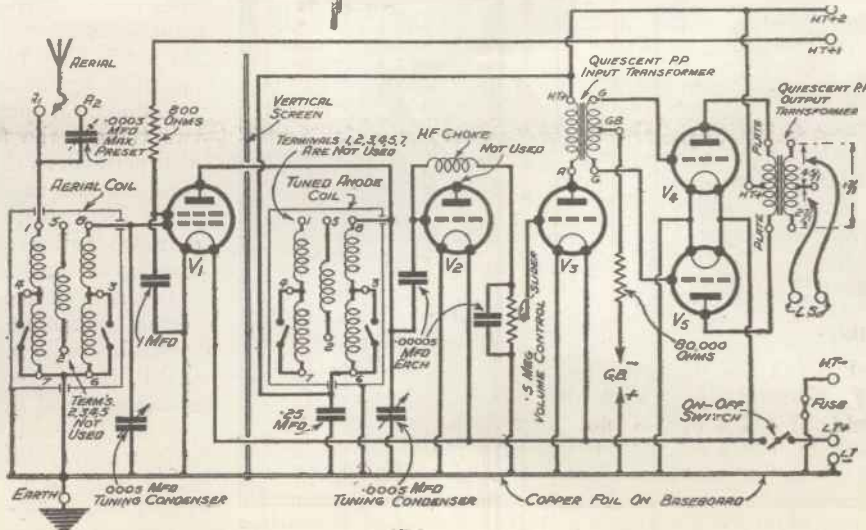
**Selectivity Adjustment**

The circuit of the "Dio-Q" is for the most part quite ordinary. Two aerial taps provide for adjustment in selectivity that makes the set suitable for any type of outdoor aerial and earth system; while the canned coils, plus the vertical screen between S.G. and rectifier stages, ensure stability.

Plain tuned-anode coupling is employed between the S.G. and the diode, as in the first "Diodion" published some time ago. A .25-mfd. fixed condenser is placed between the "earth" end of the coil and "real" earth, so

**DISTORTION-LESS DETECTION**

is one of the features of this absolutely up-to-date set, which adds another triumph to the long line of successes scored by the "M.W." "Diodions."



**QUIESCENT PUSH-PULL**

is the new form of amplification embodied in the "Dio-Q." It effects a great economy in H.T., and enables "mains" results to be obtained from batteries.

that from an H.F. point of view the coil is effectively at earth potential at that end, though from a D.C. point of view there is complete insulation. Thus, no short-circuit or leakage of H.T. can take place.

In circuits of this description it is, of course, essential that the blocking condenser be employed, and we would urge constructors of the "Dio-Q" not to forget it, nor omit it for any reason.

### An Important Condenser

Cases are on record where the necessity of such a condenser was not realised by constructors, with a burnt-out coil and ruined H.T. battery as a result of its omission.

The L.F. valve, which is of the H.L. variety, is biased by the incoming broadcast energy, and it therefore acts as a limiter of the voltage that can be applied to the push-pull circuit. Actually in effect the limiting action (due to the fact that over-biasing

Make	H.F. Stage	Det.	L.F.	Output (pairs of valves)
Mazda	S.G.215	H.L.2	H.L.2	P.220
Mullard	P.M.12A.	P.M.1H.L.	P.M.1H.L.	P.M.2A
Cossor	220S.G.	210H.L.	210H.L.	220P.A.
Osram	S.22	H.L.2	H.L.2	L.P.2
Marcconi	S.22	H.L.2	H.L.2	L.P.2
Tungsram	S.210	H.210	H.210	P.220
Eta	B.Y.6	B.Y.1815	B.Y.1815	B.W.604
Micromesh	—	H.L.B.1	H.L.B.1	P.B.1
Clarion	S.G.2	H.2	H.2	P.2.

occurs when the incoming energy is particularly strong) prevents that horrible distortion that takes place with overloading of valves.

### Distortion Stops Set

Instead of producing distorted results, the set "packs up" and practically nothing is heard. The remedy is to "reduce" the volume control, when, on the strength being properly adjusted, the reception is resumed at its normal quality.

It may be thought that a better method of controlling volume would

be by a variable-mu S.G. valve, or some form of aerial control. This would certainly control volume, but it would not be so good on strong "signals" from the point of view of quality. With diode rectification it is best to keep the input into the diode as high as possible. It will not *overload*, but "*underloading*" means loss of quality.

### High Quality Level

Thus, we prefer to give the diode all we can, *all* the time, and where necessary cut down the strength on the output side. By this means we keep the quality at as high a level as possible, even though the volume is adjusted at will from the full power of the set down to a mere whisper. This could not have been done without loss of quality by means of a pre-rectifier control.

Following the L.F. stage are the two push-pull triodes, with the special input and output transformers.

As a household set the "Dio-Q" is ideal, for it is selective enough to enable plenty of stations to be received clear of interference; while it is without the complication of re-action—a great boon when in the hands of the somewhat uninitiated.

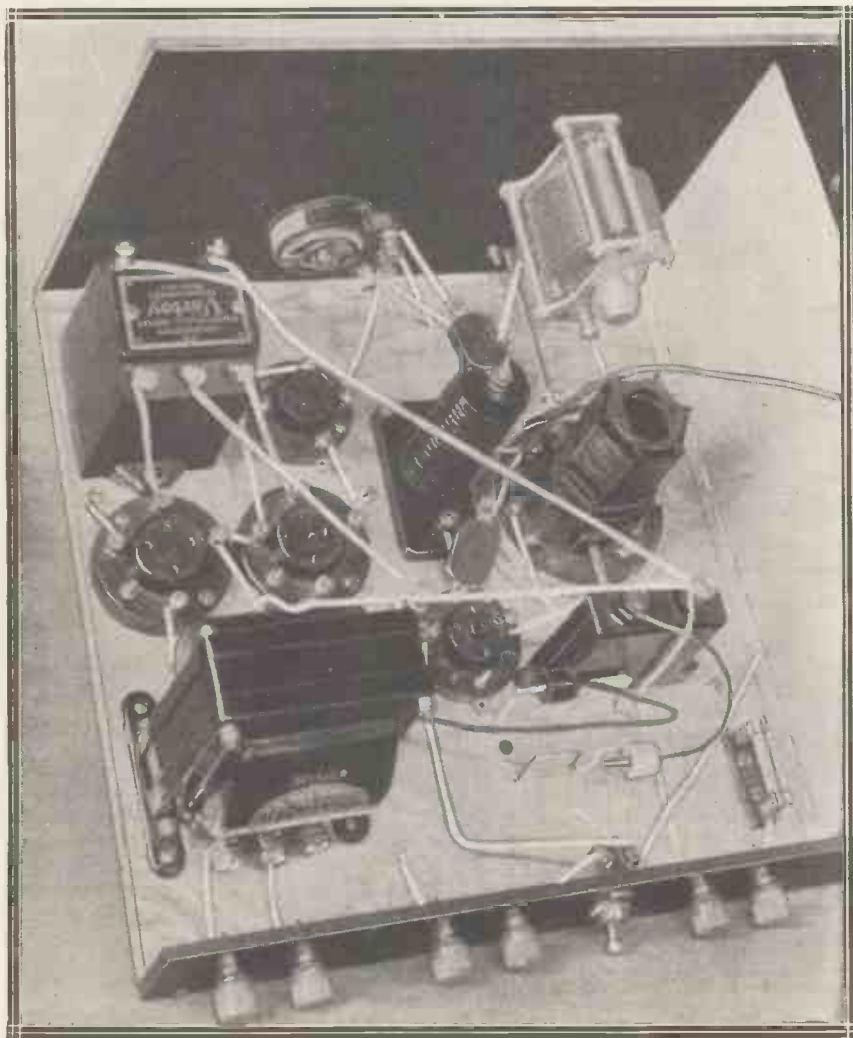
### Preventing H.T. Waste

The calibration of the two tuning dials can be carried out by the constructor member of the household, and the set is then ready for economical operation by the others of the family.

Economical operation is assured by two things: the fact that Q.P.P. is incorporated, so that the H.T. current consumption is proportional (and never great at that) to the volume of reproduction, and the automatic biasing of the L.F. valve.

It has been mentioned that only a certain maximum volume can be received—sufficient fully to load the Q.P.P. stage—and this fact prevents undue waste of H.T. because it is not possible to run the set with the output valves badly overloaded and using more H.T. than is necessary. The self-stopping action of the L.F. valve is a real boon in that respect.

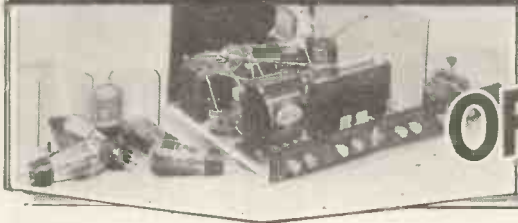
### USES ORDINARY VALVES OR PENTODES



The output valve holders are of the five-pin type, so pentodes can easily be used instead of triodes if the constructor prefers.



# COMPONENTS AND CONSTRUCTION



## OF THE "DIO-Q"

CONSIDERING it from a modern standpoint, the construction of the "Dio-Q" is rather unconventional. It combines screened coils and Q.P.P., with a vertical screen between S.G. and detector stages.

### High Amplification

This vertical screen may seem somewhat unnecessary when the canned coils are remembered, but a circuit of the diode type needs very careful screening owing to the low damping of the tuned circuits, and consequent high amplification provided by the screened-grid stage.

The use of screened wire is to be deprecated, because added capacity is a thing that one wishes to keep down to as low limits as possible. Therefore, the easiest way to provide adequate shielding between grid and anode S.G. circuits is to use canned coils and a screen.

This can be quite a simple affair, for there is no need to run the screened-grid valve through it. The valve can stand vertically close to the screen, with a short anode lead running through the metal to the anode circuit on the other side.

The preset condenser (.0003 mfd. max.) is useful to provide a selectivity setting that will be of use on local and most distant stations, while the  $A_1$  aerial tap, which cuts out the preset, can be used when the very last ounce of sensitivity is required from the set, when interference is not present, and when some of the more distant long-wavers are to be received.

### The Diode Choke

The quality of the H.F. choke in the diode circuit is of paramount importance, for this component must be good if it is to act efficiently. An inefficient, high self-capacitative or low-inductive choke means loss in the rectifying circuit, and consequent poor results.

The choke can easily be tested by tuning in to the local station and pulling out the diode valve. Theoretically, you should hear nothing. Practically, due to slight capacity

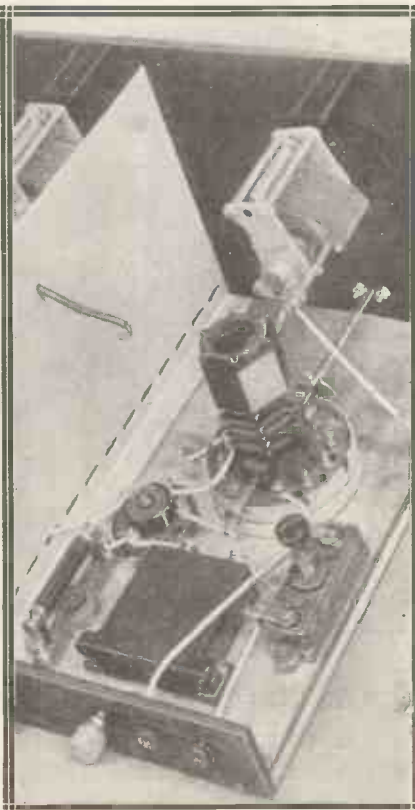
feeds, you will probably hear the local programme faintly.

The first L.F. valve is then acting as the rectifier, due to the passing on to its grid of H.F. impulses, through stray wiring capacities, and the non-perfection of the H.F. choke.

If the choke is inefficient, the reception with the diode removed will probably be quite loud. If so, you will need a better choke, especially if a further similar test on a more distant transmission results in a similar exhibition of H.F. leakage.

The small fixed condensers (.00005 mfd.) used in series with the diode "anode" (actually its physical grid), and across the .5-megohm potentiometer, must be of small capacity to prevent damping of the diode circuit, for these condensers are in parallel

### SIMPLE SCREENING



The use of modern screened coil units simplifies matters for the constructor by rendering it necessary to employ only a plain-type vertical screen.

with the anode-cathode (grid-filament) capacity of the valve itself.

The first condenser (if of large capacity) would seriously damp the tuned circuit and upset the rectifying powers of the valve, while loss of high notes would be a serious factor in the set's characteristics were the second condenser to be too large.

### Easy Wiring

As the baseboard is covered with copper foil, the wiring of the "Dio-Q" is remarkably easy; but it should be remarked here that all grid and anode leads should be run at least half an inch above the foil, if reasonably low wiring capacity is to be obtained.

The coils are the usual well-known Telsen screened coils, but a word is necessary concerning the way they are used.

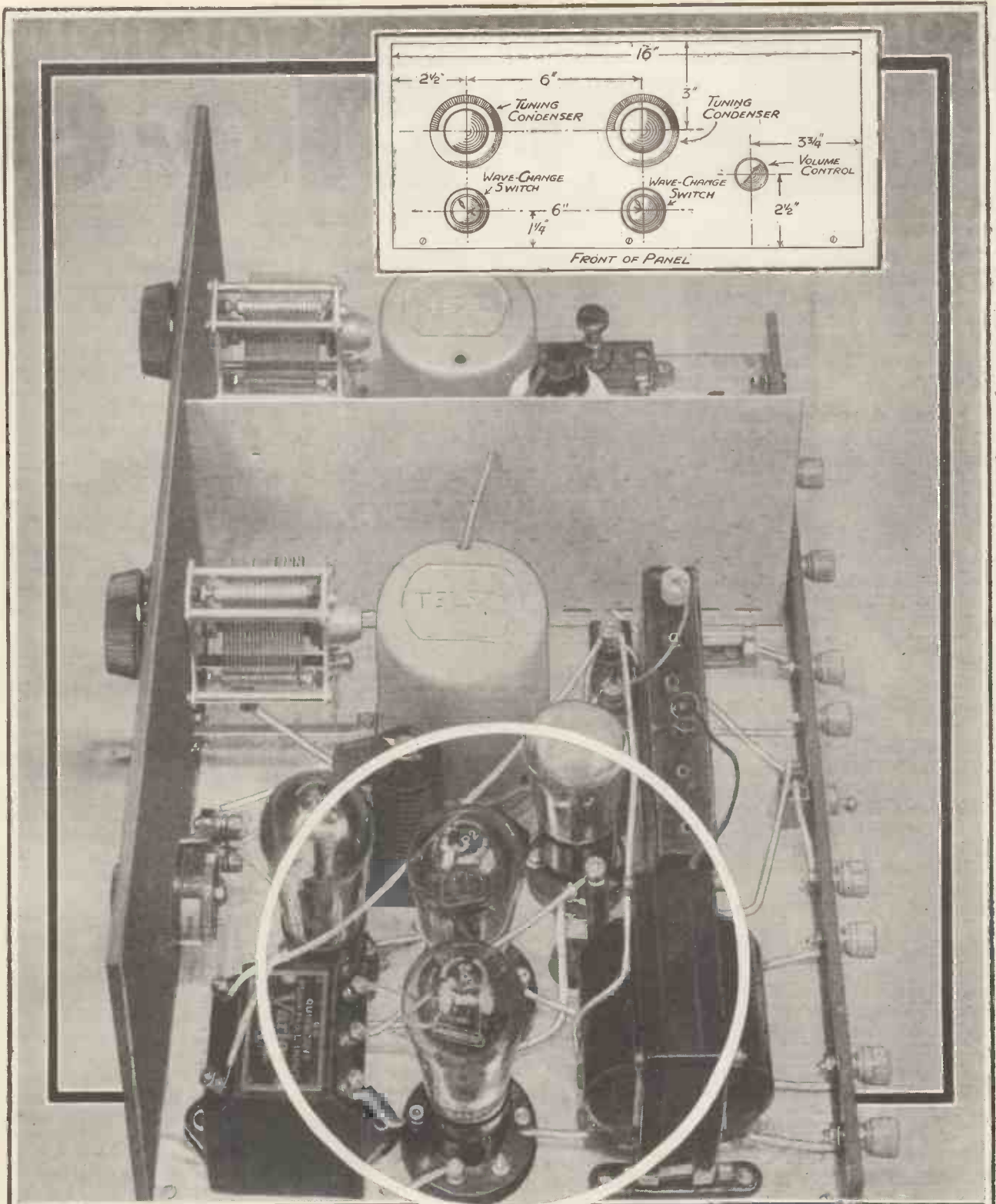
In order to simplify the construction, to obviate the need for cutting the vertical screen (other than by drilling a hole in it for the anode lead of the S.G. valve), the coupling link scheme provided, if required, by Telsen for ganging the switching of their coils was not used.

Instead, two separate coils and two separate wavechange controls were employed; *but*—and this is important—the rods required are not the standard lengths supplied with every single coil. They are of the lengths supplied by Telsen with their double-gang chassis unit. So on ordering the coils, be sure you get with them *two* 7-in. rods, and not the usual lengths supplied with the coils.

### A Necessary Precaution

It will not be out of place here to reiterate the oft-repeated warning to all set constructors who use a metal-covered baseboard. The use of such foil is a real boon to the constructor if he takes one very simple but necessary precaution. Without this precaution the metal covering may well be disastrous.

We refer, of course, to the need for obviating any possibility of



**QUIESCENT PUSH-PULL USING TRIODE VALVES**

Two small power valves are connected in the Q.P.P. output stage and form an economical and effective method of achieving good loudspeaker volume with the minimum expenditure of H.T. current. An important feature is that the valves can be obtained from the makers ready matched at no extra charge.



# Foil on Baseboard Greatly Simplifies Wiring

short-circuit occurring between any unearthened connection and the foil. In the majority of components an unintentional connection to the foil by a "live" portion of the component is impossible, but there are cases where it is not impossible for such a thing to occur.

Notable among these are the holders for Graham Farish "Ohmites." This is an excellently-made holder, save for one feature—the screw-heads of the two terminal bolts are prone to be very nearly flush with (we have even known them "proud" of) the moulded casing.

As these screws are underneath, they run a very great danger of touching the metal foil, especially if the latter is at all wrinkled or uneven.

Should it be desired to change from triode to pentode output, all that is necessary is alteration of the output transformer ratio, and the connection of H.T. + leads to the two cathode terminals on the valve holders.

## Choice of Components

We are assuming five-pin pentodes will be used in such a case, but should the four-pin and side terminal type be employed, the extra H.T. leads would go to the side terminals, and the cathode sockets of the valve holders would be left unconnected.

The "Dio-Q," as already explained, was primarily designed for triode output, with a view to keeping the H.T. current down and simplifying the necessary adjustments.

differ considerably as to ratio and terminal marking, it is best to write to the makers of the particular model you fancy, if it is decided not to keep to the specified type.

Some of these chokes are marked with lettering, and some have numbered terminals, so that it is too much to go into the various connections of each one here. Also, as one or two firms make models of different ratios, it is essential when getting in touch with the manufacturer to state not only the valves you are going to use, but to give details of the loudspeaker as well.

It will be seen from examination of the wiring diagram how very materially the presence of the foil covering the baseboard helps construction.

It enables wiring to be reduced in

## THE PARTS EMPLOYED IN THIS LATEST "DIODION" SUCCESS

Component	Make Used by the Designer	Alternative Makes of Suitable Specification recommended by the Designer	Component	Make Used by the Designer	Alternative Makes of Suitable Specification recommended by the Designer
1 Panel, 16 in. x 7 in.	Becol	Wearite, Peto-Scott, Goltone	1 Q.P.P. input transformer	Varley	Lissen, Sound Sales, R.I., Multitone
1 Baseboard, 16 in. x 10 in.	—	—	1 Q.P.P. output transformer or choke	Ferranti O.P.M. 13(c)	Sound Sales, Varley, R.I., Multitone, Lissen
1 Cabinet to suit above	Osborn	Camco, Lock, Gilbert	1 Fuse holder	Belling-Lee type 1034	Telsen, Bulgin, Goltone
2 '0005-mfd. tuning condensers	Polar No. 2.S.M.	Utility, J.B., Ormond	1 Terminal strip, 16 in. x 1½ in.	Goltone	—
1 '0003-mfd. max. preset condenser	Goltone type J	Telsen, Ready Radio, Colvern, Sovereign	8 Indicating terminals	Belling-Lee type R	Bulgin, Goltone, Eelex, Clix, Igranic
1 1-mfd. fixed condenser	T.C.C. type 50	Dubilier, Telsen, Igranic	2 Indicating sockets	Clix parallel type	Clix, Belling-Lee, Goltone
1 25-mfd. fixed condenser	T.C.C. type 50	Dubilier, etc.	0 Wander plugs	Eelex	Eelex, Clix, Goltone
2 '0005-mfd. fixed condensers	Dubilier 685	T.C.C.	2 Accumulator spade-tags	Belling-Lee	Goltone
1 5-meg. volume control	Igranic Megostat	Sovereign, Leweos, Graham Farish, Lissen	3 Yds. insulating sleeving	Goltone	Wearite
1 80,000-ohm fixed resistance with horizontal holder	Graham Farish "Ohmite"	—	5 Yds. 18-gauge tinned copper wire	Goltone	Goltone, Telsen, Bulgin
1 800-ohm ditto	Graham Farish "Ohmite"	—	1 Fuse	Belling-Lee, 150 ma., type 1056	—
2 Screened coils	Telsen W.216	—	1 Piece .004-in. copper foil, 16 in. x 10 in.	—	—
2 7-in. coil spindles	Telsen (see text)	—	1 Vertical valve screen, 10 in. x 6 in.	Magnum	—
1 H.F. choke	Leweos Snaper	Igranic, Radiophone	1 Battery clip	Bulgin No. 2	—
1 Two-point Q.M.B. switch	Bulgin S.80	Lotus, Benjamin, Telsen	1 Anode connector	Belling-Lee	—
3 Four-pin valve holders	W.B. (small)	Lotus, etc.	Flex, screws, etc.	—	—
2 Five-pin valve holders	W.B. (small)	—			

Should the screwheads touch, it is ten to one the H.T. battery will be short-circuited!

The prevention is easy. Simply a small strip of card (postcard is excellent for the purpose) placed under the holder. A similar piece of card could with advantage be placed under the valve holders, in case the valve pins are pushed so far home that contact is made with the foil.

## Alternative Valves

And talking about valve holders, it should be explained that as the same components are required for either triode or pentode quiescent push-pull, we have allowed scope in the "Dio-Q" for either by the inclusion of five-pin valve holders in the output stage.

As the input transformers for quiescent push-pull are "much of a muchness," whatever the make, though there are one or two outstanding types, any of those listed in the "alternatives" column of our component list are equally suitable.

The wiring to the various alternatives may have to be slightly modified, but in the main it will be as shown in the wiring diagram.

When it comes to the output side matters are different. We have chosen a Ferranti output transformer, and this gives truly excellent results. It may be desired, however, to use a Q.P.P. choke (there are no other makes of "plain" Q.P.P. transformers), in which case the connections would need altering.

As the various makes of such chokes

length, and in many cases eliminates wires altogether. For instance, the negative L.T. connection to the five-pin valve holders is made via the foil; while the return leads from numerous points to L.T.— and to earth are eliminated by short connections down to the foil.

## Little Soldering

There is no need to solder these, or other connections, except those to the .00005-mfd. condensers (not even those to the "on-off" switch if one with small screw terminals is obtained), for foil contacts are best made by means of looping the wire round ordinary steel or brass screws, and then, with a washer over the wire loop in each case, screwing them down hard on to the foil.



The fixing of the Telsen coil units is thoroughly explained in the leaflet given away with each coil, and the directions should be followed closely. It is of the utmost importance that these coils be properly mounted, for inefficient coil connections will spell disaster to results.

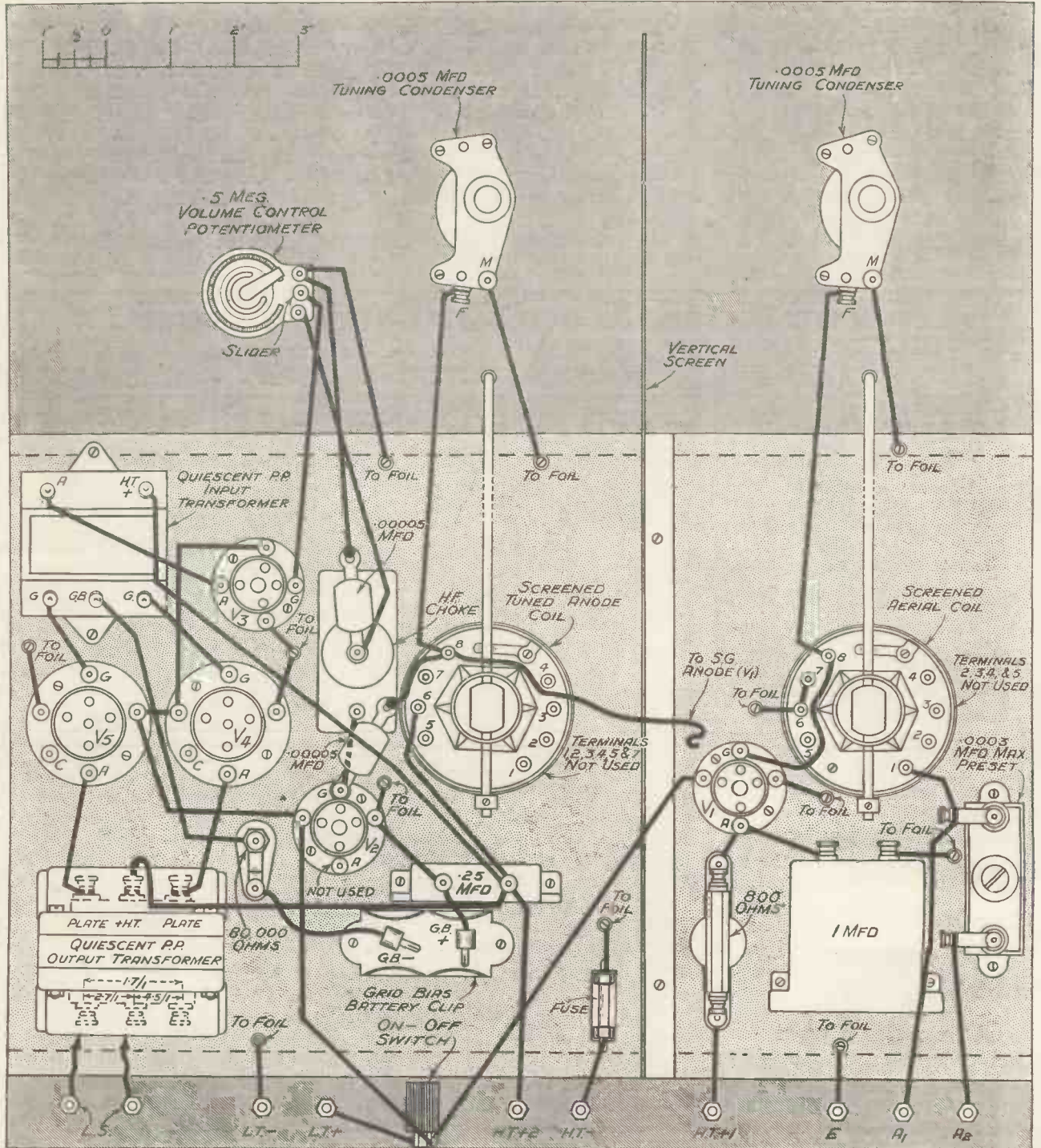
The collar at the end of each spindle and the spindle-checking "butterfly" which prevents the wave-

change shaft from overstepping the switch positions are essential to good operation. The butterfly has not been shown in the diagram.

### Spindle Earthing

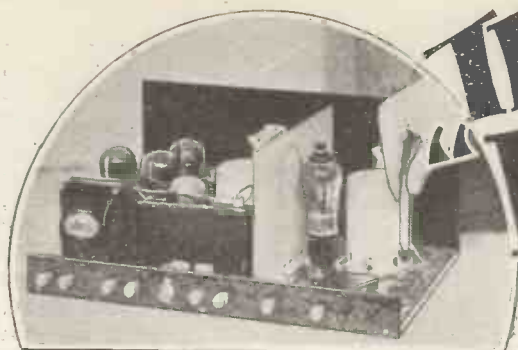
There is one other important piece of coil assembly—the positioning of the spring which makes contact with the spindle and with the screw-hole (near

terminal "4") on the base of each can. This spring earths (via the can base) the wavechange spindle, and should be so placed that the spindle passes over the spring, keeping it under tension. If the spindle is allowed to pass underneath, the contact between it and the spring will be unreliable, and may give rise to noisy reception or, in some cases, to instability.



The reason that the output transformer terminals are shown dotted is that in the particular model employed (Ferranti) the terminals come below the "bulge" of the case and thus are not visible from directly above. Note that the wiring is simplified in many instances by connections to the earthed foil on the baseboard.





# The "DIO-Q" in ACTION

**T**HE operation of the "Dio-Q" is particularly easy, both from the point of view of making the initial adjustments and the actual tuning-in of programmes.

There being separate tuning controls, there is no need for circuit ganging and trimming, the two tuning dials are rotated together, slowly, and after the relative settings for one station have been found, they are kept in step as the waveband is explored.

## The Aerial Taps

There is no reaction, and the volume control is the plain L.F. variety, operating on the grid circuit of the first low-frequency valve.

The aerial taps should be used freely, the  $A_1$  tap being employed when extreme selectivity is of no consequence, and the  $A_2$  when things want sharpening up a bit.

The setting of the preset condenser in series with  $A_2$  should be done with the set receiving the most difficult station from the point of view of selectivity that is ordinarily required.

For instance, should it be found difficult to separate the two locals, Daventry and Radio Paris, or any other two programmes, the set should be tuned to the most-interfered-with

though occasional variation may be necessary if conditions become particularly bad at any time.

The output valves we recommend are the small power types, such as the L.P.2, P.M.2A., P.220, and so on. These can be obtained matched.

## HOW TO ADJUST AND OPERATE FOR BEST RESULTS

Regarding the output transformer, it is necessary to try the various ratio tappings with the various ratios available on the loudspeaker until the combination that gives the best quality results is obtained.

The H.T. voltages should be H.T. +1, 75-80; H.T. +2, 120-150. No bias is needed except for the output stage, and here from 4.5-7.5 volts will usually be enough for 120-150 volts H.T. The bias should be varied until the highest voltage consistent with good quality and sensitivity is found.

Finally, a word to the experimentally-minded. "Class B" is a form of push-pull (or, better, push-push) amplification that is worth trying, though special valves are required to do it normally. The circuit is very similar to that used for Q.P.P., but an interesting mixture of Q.P.P. and "Class B" can be obtained with ordinary valves. You can try it on the "Dio-Q" if you get a "Class B" input (or "driver") transformer.

## "Class B" Connections

It connects up like the input Q.P.P. type, but the centre terminal goes to the bias *direct* instead of through the 80,000-ohm resistance. Bias is applied as before, but instead of two L.P.2's in the last stage, we prefer two H.L.2's or similar types, and an L.P.2 as the 1st L.F. to act as "driver" valve.

In this latter case the lead from the volume control to L.T.— should be broken and 1.5 volts negative bias applied. For the H.L.2 outputs about 3 volts bias will be needed. The rest of the set is as before.

## "DIO-Q" ACCESSORIES

**LOUDSPEAKER.**—B.T.H., Amplion, Celestion, E. & A., Rola, Epoch, Blue Spot, Magnavox, Marconiphone, H.M.V., Ferranti, Igranic (the first eight makes can be obtained with Q.P.P. transformers incorporated if desired).

**H.T. BATTERY.**—120 volts, or special Q.P.P. type. Ediswan, Drydex, Pertrix, Lissen, Siemens, Ever Ready, Magnet, Oldham, "Silver Knight."

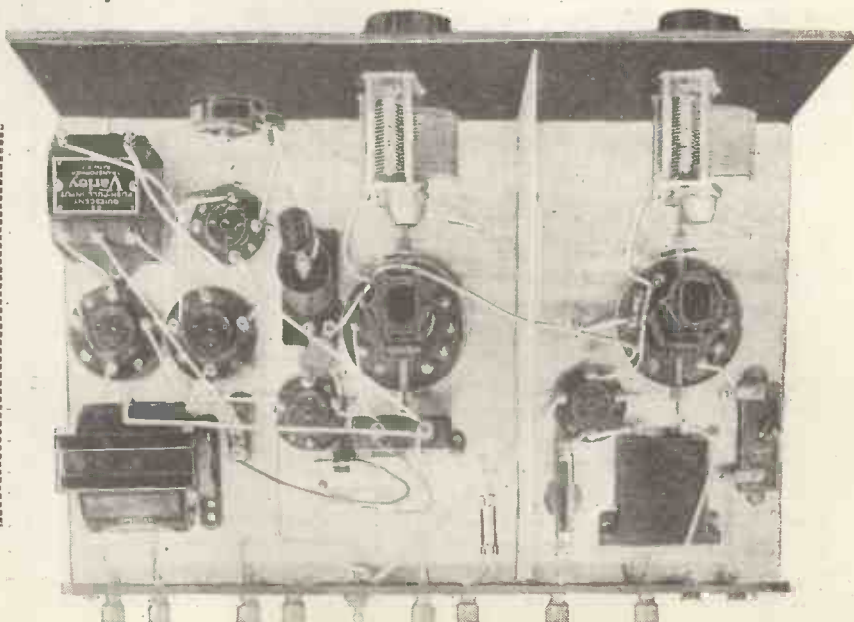
**L.T. BATTERY.**—G.E.C., Exide, Pertrix, Ediswan, Oldham, Lissen, "Block."

**G.B. BATTERY.**—To suit output valves chosen. Ever Ready, Siemens, Ediswan, Magnet, Pertrix, Lissen, Drydex.

**AERIAL AND EARTH EQUIPMENT.**—Electron "Superial," Goltone "Akrite," Graham Farish "Filt" earthing device.

station and the preset condenser set so that the required selectivity is obtained.

After this it should be left set,



Completely wired and ready for the final check.

# LOUDSPEAKER LAW

*Some details of a far-reaching decision involving the delicate question of copyright.*

*FROM A LEGAL CORRESPONDENT.*

**A** CONSIDERABLE body of law has already grown up around the use of the loudspeaker for broadcast reception. Up to the present it is mainly based on the well-established principle that no one citizen is entitled to trespass unduly upon the peace and quietness of another.

For instance, in most towns local regulations have been passed to prevent the excessive use of loudspeakers for publicity purposes.

## *A Common-Law Remedy*

In business there is a natural tendency to take full advantage of every new method of advertisement that comes along, and so in some cases a trader used to keep his loudspeaker braying forth at all hours of the day—and even long into the night, until the neighbours rose up in wrath and appealed to the law for protection. By-laws were thereupon passed to prevent this form of abuse.

In the same way the private citizen has a common-law remedy against any neighbour who is selfish enough to turn his loudspeaker into a public nuisance. Of course, the neighbour has his own rights, too. He is entitled to enjoy the broadcast programmes in his own home without let or hindrance so long as he keeps within moderate bounds. It is only when he intrudes unreasonably on his neighbour's peace and quietness that he can be brought to book.

## *Drawing a Distinction*

Quite recently another interesting development in loudspeaker law has taken place—this time involving the delicate question of copyright. The result is that it is now necessary to draw a distinction between the reception of a broadcast programme in one's own home and the reproduction of the same programme in a café, hotel, restaurant, or other premises to which the general public has access.

Copyright is the protection given by law to the "intellectual property" which any artist, author or composer has in his own original work. The

inventor is protected by Letters Patent, and the artist by the law of Copyright.

A moment's reflection will make it clear that this is only fair. Original work of all kinds should be protected, because it is obviously a form of personal property. But since it is of an intangible nature, and cannot be locked up in a safe, as one can lock up jewellery, money, and other material possessions, it has to be safeguarded by the legal process known as Copyright.

Accordingly, when the composer of a

## IN THE HOME.



Beniamino Gigli, said to be the world's finest tenor, listening to his latest records on the new H.M.V. Auto Radiogram Seven.

play or piece of music or a song finds that his work is being "pirated"—i.e. reproduced without permission—the law allows him to recover damages from the guilty party by an action for infringement.

## *Up Against the Problem*

Now the public in general naturally expects the B.B.C. to maintain reasonably high standard of interest in their programmes. Whether in fact the B.B.C. always do so is another matter, but at all events they do not always confine themselves to old-fashioned songs and music.

But directly they include any

modern works, they come up against the problem of copyright. In other words the B.B.C., like anybody else, must get formal permission from the author or composer, and must pay him certain fees by way of royalty.

Since the number of musical composers, song-writers, dramatic authors, and the like is legion, it would be very troublesome, or at least inconvenient, to have to deal with each of these individually. In practice, therefore, most owners of copyright works join an association called the Performing Right Society, who look after their interests for them.

## *Limited Agreement*

This helps to simplify matters, and the B.B.C. have in fact made agreements from time to time with the P.R.S. to broadcast certain selected items and to pay a stipulated fee for doing so. But difficulties have recently arisen over the interpretation of the term "public" reproduction. The P.R.S. maintain that the licence given to the B.B.C. under the existing agreement is a limited one, which only covers reproduction in the listener's own home. The actual clause reads as follows:

"The licence covers the audition or reception of copyright musical works, by means of broadcasting, for domestic and private use only."

In other words, so long as the wireless programmes are confined to the family circle—and this, of course, includes invited visitors—no question of infringement of copyright can arise.

But the Performing Right Society object very strongly to the reproduction of the same programme when it is used as a means of entertainment by the proprietor of a café, restaurant or dance-hall.

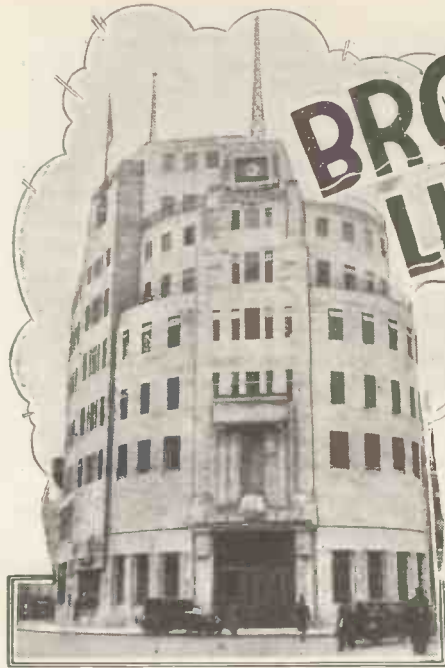
## *Infringement of Rights*

In his judgment in the High Court Mr. Justice Maugham agreed with this contention of the Performing Right Society. He held that the Copyright Act was passed with a single object—namely, for the protection of authors of all kinds—literary, dramatic, and musical—and that the reproduction of broadcast items in the circumstances stated was a definite infringement of their rights.

The case may, of course, go to Appeal, but as the law now stands it is clear that the ordinary B.B.C. licence does not permit the public reproduction of copyright performances under circumstances which result in either a direct or indirect profit to the owner of a wireless set.



# BROADCASTING H.Q.'s LINK WITH BRITAIN



*The big switchboard at Broadcasting House from which run all the landlines to Britain's transmitters is one of the vital nerve centres of broadcasting. Our Special Correspondent explains how the headquarters of broadcasting is constantly in touch not only with Brookmans Park, but with every transmitting and reception point in the Kingdom.*

**A**Ll kinds of good things come into Broadcasting House by landline! The Post Office cables hired by the B.B.C., running out to every main studio and through repeater stations to the relays, all converge on Broadcasting House.

It is the starting point of landlines going to Daventry and Scotland in the North, and to the new Western Regional station in the West. There are other cables which come in from outside broadcasting places—restaurants and so on—where microphones are a fixture.

## Vital Nerve Centre

There are cables to the Tatsfield testing station where the B.B.C.'s own superhets relay America, and there are local 'phone wires to the Post Office transatlantic switchboards close by St. Paul's Cathedral.

The big switchboard at which all the main lines terminate is one of the most vital nerve centres of broadcasting, and when you stand in front of this board and see the engineers working the controls on the landlines, say, carrying the National programme up to Scotland, and when you see the "O.B." men busy on the incoming lines carrying a test relay from America, you realise that here broadcasting is a living force more clearly than you do even when you are in the studios.

## Making Measurements

In the lines-testing room at Broadcasting House is a rack of five tall panels. It is a tidy affair when compared with the work-bench equip-

ment, testing gear and battery chargers at the side of it.

Part of the amplifier rack is built out as a small desk on which the lines' engineer can make measurements while he tests the cables, and surrounding this is a galaxy of volume controls, amplifier switches, line-testing plugs and the black dials of the familiar programme meters, which show the strength of the signals on the lines.

## Link to Brookmans Park

It is all a little puzzling until an engineer explains the technical details, and I was fortunate enough the other day to be shown the inner working of the line room.

For safety's sake, all the Post Office cables are taken to fuses on the distribution frame in the control-room. There is a special heavy cable, each wire of which weighs 40 lb. per mile, and this is used for linking up Broadcasting House with Brookmans Park (to which there are four cables) to Daventry, Leeds, the Empire Broadcaster, and so on. This is covered with a continuous layer of metallised paper, in order to prevent any cross-talk or landline interference.

## Labelled Landlines

There are smaller landlines coming up to the five grey panels from restaurants, concert halls, churches and other places from which regular outside broadcasts are made.

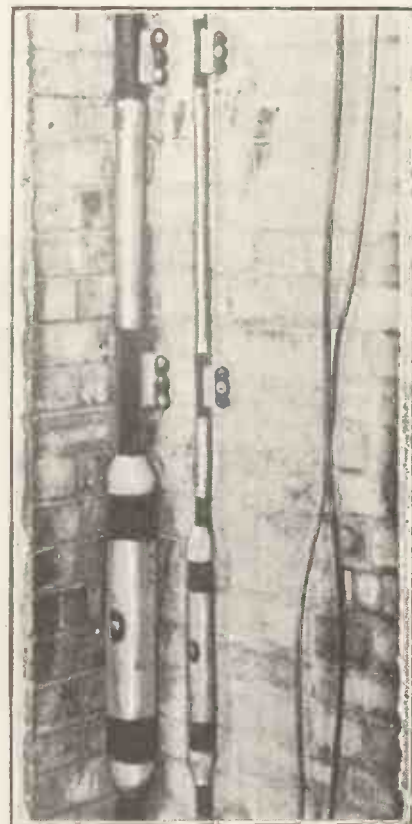
Each landline is labelled, and a code number corresponds with a reference to the whole landline equipment kept on a series of giant blueprints in the sanctums of the engineering department.

On first being introduced to the landline panel you cannot help feel-

ing that the B.B.C. is a kind of octopus with a multitude of legs stretching out not only to the chief outside broadcast places of amusement in London, but to all the stations of the B.B.C. chain!

There are something like 300 plugs and jacks on the landline board and a set of spare cords, so that within a

## 400 PAIRS OF WIRES



The two main "lead-out" cables from Broadcasting House to contain 400 pairs of wires in addition to the associated telephone cables which run in the smaller of the two "lead-out" conduits seen here.

few minutes the engineers can disconnect any landline from its amplifier in the control-room and test it out with a constant tone source.

**Constant Output**

Suppose that the National programme line to the Empire transmitter is reported faulty. An engineer in the North 'phones through on one of the special B.B.C. speech lines to London, and within a few seconds (but not usually during programme time) the programme cable is disconnected from the three-valve amplifier at the London end and the cable is connected up to the testing apparatus.

A valve oscillator is switched on and an engineer slowly turns the dials to pick out any note in the frequency

tion on any note within the frequency range.

The delicate tester which is used to show up the weaknesses of the landlines is a thermo-couple reading on a sensitive milliammeter. It takes a few minutes to get all this accurate testing apparatus at concert pitch, and then it is only the matter of a few seconds to find out the weak spot of any line.

**Checking Insulation**

The amplifier for the thermo-couple, which is generally used at the far end of the landline, is calibrated, and so the engineers do not have to make calculations in order to find out which frequencies the line carries best.

If one of the stations 'phones

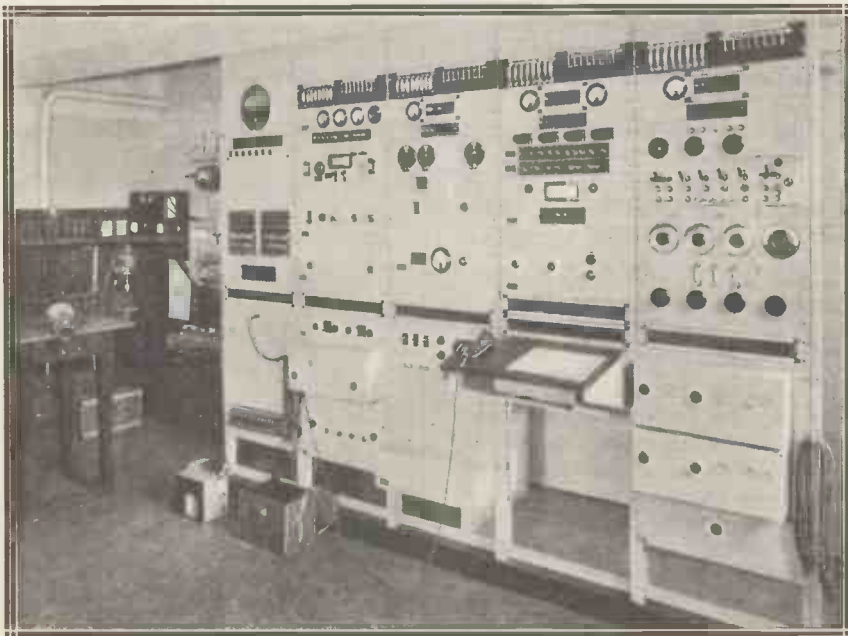
direct, over long distances, from the studio to the transmitters, but they go through amplifiers in order to keep volume up and to prevent feed-back.

**Avoiding Cross-Talk**

There are trap valves, too, so that if the volume is insufficient on the London-Leeds circuit, the gain of that amplifier can be increased without upsetting the volume of the programme on, say, the London-Daventry line. As the landline amplifiers have 10-watt power valves in the output stage, the volume carried is considerable, and if the landline testers at London do not do their work well there may be interference and cross-talk.

The testers wear 'phones for a rough oral guide of the landline quality, but all the checking and frequency tests are done with the calibrated controls. One of the ordinary programme meters, with its associate five-valve pentode-output amplifier, can be switched on to any of the programme lines to show the volume.

**"EVERY LINE IS TESTED EVERY DAY"**



The line-testing room at Broadcasting House where every one of the lines to and from Langham Place is checked daily by B.B.C. engineers in conjunction with the Post Office. A spare is always available immediately during any broadcast.

range from 30 to 10,000 cycles. It is just the sort of oscillator you need to test your loudspeaker. It is far better than "howling tone" records, for it gives a constant output at all frequencies.

**A Matter of Seconds**

The tone source can be worked at one end of the programme cable and a delicate tester switched on at the other end, or the whine of the oscillator note can be sent up on one set of cables and checked on the return group. The oscillator is of the same kind which the engineers use for echo testing in the studios and when they want to find the reverbera-

tion through to report landline crackle, then a direct current tester is switched on in order to check up the insulation of the lines and the resistance of the conductors. This D.C. testing apparatus can not only be used on landlines, but on any of the control-room apparatus. It was developed, it need hardly be said, at Clapham, where all the B.B.C. research is done.

The overall frequency of all the "music circuits," as, for example, between London and Leeds, or London and Gloucester, is regularly tested.

The landline engineers at the monitoring board in London can get reports on any of the amplifiers on the trunk lines. Landlines do not run

**Post Office Co-operation**

Landlines are expensive. The B.B.C.'s bill for the hire and maintenance of trunk lines all over the country runs into hundreds of pounds for a single programme distribution. The B.B.C. testers at Broadcasting House work in conjunction with the Post Office engineers to see that every programme line is O.K. and that a spare is always available.

If the B.B.C. reports a serious fault, then the Post Office switches on a similar line-testing panel at the London Trunk Exchange and sends out local engineers to make repairs.

\*\*\*\*\*  
**THE NEW MIDLAND REGIONAL**  
*When it will start and the power it will use.*  
 \*\*\*\*\*

Both the Midland Regional (5 G B) and Daventry National (5 X X) were experimental stations erected by the B.B.C. with the intention of replacement. The new stations are to be built at Droitwich.

\* \* \*  
 March, 1934, is the date round about which it is officially expected that the Droitwich station will be ready to take over.  
 \* \* \*

Every precaution was taken by the B.B.C. before selecting the new site to ensure that local conditions were favourable in every way.



# FAULTS I HAVE FOUND

by a  
**SERVICE ENGINEER**



**M**ANUFACTURERS have long had cause to grouse about the many non-standard supplies that are still operating in various parts of the country; voltage variations are not so important, but frequency differences often present a much more serious difficulty.

It is obviously not economical to produce a special model of each type of receiver for

each type of supply, and, as a rule, three models have to suffice—i.e. 100/110 volts A.C. and 200/250 A.C. at 50 cycles, and one direct current

model capable of adjustment for use over a range of 200–250 volts D.C.

This does not adequately cover the mains frequencies of 25, 33½ and 100 cycles per second, and therefore modifications have to be made to existing models in order to ensure correct operation on the non-standard supplies.

It usually falls to the service engineer to discover and make the necessary alterations to the circuit and components.

## A Convincing Demonstration

In this field I have come up against some of the most obstinate snags of my experience, and many of them still remain unsolved.

The complaint is almost always the same—hum and still more hum.

Bournemouth is a bad spot for this type of trouble, and my last visit there took me to the radio department of a big store; the manager had just taken delivery of ten A.C. radiograms which, he had been assured, would function quite satisfactorily on the 100-cycle supply.

I found him in a condition which can only be likened to that produced by a severe attack of D.T.'s, and in order to convince me that his wrath was justified, he switched on all ten sets *at once*.

## Frequency Troubles

The noise was terrible, and the floor itself seemed to vibrate; the demon-

eventually all of the sets had to be returned to the factory for new mains transformers, which would deal with the 100-cycle supply.

Incidentally, several had to be returned a second time for special gramophone motors to be fitted; the 50-cycle motor would not give sufficient power to operate those instruments which incorporated record-changers.

It is a curious thing how some sets refuse to operate satisfactorily without a good earth connection, whilst others seem to give of their best without any

earth at all. If you are the possessor of a receiver of the former class, I expect you have worried a good deal as to whether your earth is really good or not.

## Voltmeter Test

Here is a simple test which is conclusive; all that is needed is the electric supply and a voltmeter capable of measuring it.

As you are probably aware, one main is always earthed, and therefore your meter will measure the supply voltage across earth and the unearthed main. The connections are shown quite clearly in the accompanying diagram.

A high-resistance earth connection will cause a voltage drop, and you will therefore not obtain the full reading on your voltmeter.

For this test a cheap meter is better than a good one, for the lower the resistance of the meter the greater the current passed, and therefore the greater the voltage drop across any resistance that may exist in the earth lead.

## HIS EXPERIENCE AT YOUR SERVICE

*This new series of really practical articles by a radio fault-finding expert will prove of the utmost value to our readers. In the course of his duties our contributor meets the most difficult and unexpected problems, and his solutions and experiences are remarkably enlightening.*

stration was terminated, however, by a speedy and pointed complaint from the adjacent department which dealt in crockery and glassware!

I spent several hours in an endeavour to cure the trouble, but

## WATCH YOUR EARTH!

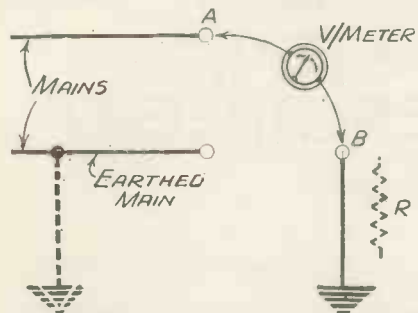


A high resistance earth is often the cause of poor results. If you use a water pipe connection, make sure that the joint is electrically sound.

You should, of course, take the precaution of checking the meter directly across the mains first to ensure that it is reading accurately.

Last month I mentioned that bad-soldered joints often produce fading of signals.

**CHECKING ITS EFFICIENCY**



The efficiency of the earthing system can be tested by connecting a voltmeter between one side of the mains and the set's earth as shown above.

I have discovered another and, at the moment, a more prolific cause of this trouble, which for a long time defied detection.

**Was It the Aerial?**

The same old symptoms and the same old methods of restoring the signal were met with; even the locals faded away to nothing and the set remained dead, until somebody switched on a light in the house or banged the front door, when, as if by a miracle, all was well again.

Being a little impetuous, I resigned myself to what seemed to be the inevitable, and removed the chassis, making a careful examination of every soldered joint, expecting to find at least one "dry" connection.

This time, however, I was disappointed, and no such fault was discovered.

Somewhat discouraged, I returned the receiver to its cabinet, and indulged in a good hard "think."

At last came a "waving of the brain," and I made a few discreet inquiries concerning the aerial; I was rewarded with the information that it had been up "some years" and "did I think that this could be the cause of the trouble?"

I did.

**The Cause of the Trouble**

An examination revealed that the wire and insulators were in a reasonable condition, but one little link in the aerial chain was beyond restoration.

An aerial-earthing device in a porcelain case had been fitted outside the window through which the lead-in

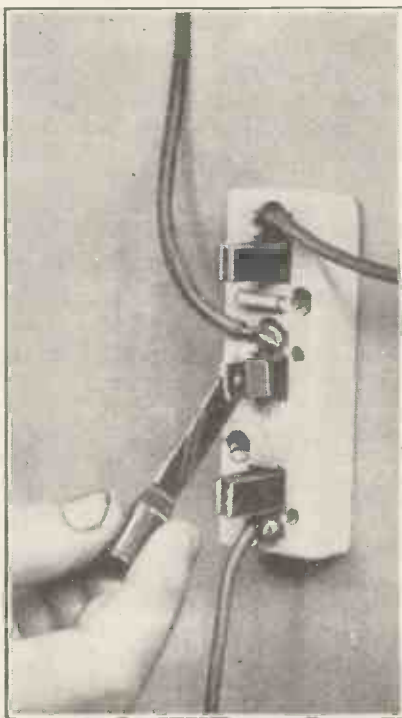
was taken and, being encased, it had, I suppose, been considered everlasting.

**Matching Dial Lamps**

I removed the cover and found the contacts had corroded to such an extent that the aerial was connected to the receiver by nothing more conductive than a heap of copper oxide, whilst the D.C. resistance between the earthed contact and the aerial showed anything between 8 and 250 ohms on my meter.

I connected the aerial straight through to the set and found that the fading trouble had completely disappeared.

**AN IMPORTANT POINT!**



When the earthing switch is mounted outside the house it is advisable to protect it from climatic effects, otherwise corrosion is liable to occur. Unprotected switches should be inspected and, if necessary, cleaned at regular intervals.

A point that still puzzles me, however, is that the foreign reception was only slightly below par when the set was working with the lightning switch in circuit.

Matching up pilot lamps has become the most recent pastime in service departments; and this is not so "batty" as it sounds.

Many 1933 receivers use two 4-volt flash-lamp bulbs in series to illuminate the tuning scale, and this has led to the discovery that the wattage of these diminutive bulbs is far from constant.

The consequence is that with two

in series, fed off a six 6-volt supply, the bulb with the lower wattage lights first, and therefore has a brilliant but somewhat uncertain career.

It is therefore necessary to find two bulbs with similar characteristics before they can be put in harness together. This is done by the simple process of putting them in circuit together at random and picking out those which light up simultaneously when the set is switched on.

**Misleading Symptoms**

Simple faults sometimes produce teasing symptoms. It is never safe to draw very definite conclusions when dealing with wireless sets, and an open mind is a necessity where fault-finding is concerned.

I will give an example of this.

It concerns a five-valve receiver consisting of three S.G. stages, anode-bend detector and power valve output.

The set had not received attention for very nearly two years, and in fact had been in store during a long portion of this period.

On connecting up I found that the local Regional transmitter was alone receivable at good strength, and poor quality, and that the signals from this station cut off with a distinct "click" at about two degrees on the dial off "tune."

The symptoms were obviously those of shorting condenser vanes, but—the fault was a completely run down grid-bias battery!

The actual trouble was probably in the detector stage, but since none of the valves had any bias on the grid, the "cut-out" may have taken place earlier in the circuit.

One theory is that the detector started "detecting" only when signals reached sufficient strength to bias the valve to a point that brought it to the bottom bend of its curve.

**TESTING THE G.B.**



The grid-bias battery is often tucked away in the set and forgotten. Although no current is taken from this battery, it should nevertheless be tested from time to time, and renewed at periods of about nine months.



"MODERN WIRELESS" TESTS.

# MACNAMARA— THE GOLDEN VOICE ELECTRIC RADIO (LATEST VERSION)



It is a safe assumption that the majority of people who buy commercially-made receivers are not technically-minded.

They look upon radio solely as a source of programme entertainment as distinct from the fascination of home-construction, and with such an endless variety of receivers from which to choose, the problem of selecting a suitable model must at times be difficult.

### The Real Problem

But it isn't really a problem of knowing which one to choose so much as knowing exactly what you want to do with it when you get it. If, when you set about it, you can be certain of your requirements, the difficulty of selecting a suitable model to fulfil those demands becomes reasonably straightforward.

Take, for instance, what is perhaps one of the most popular of all modern circuits arrangements, the S.G.-detector-pentode combination. Supposing we were commissioned to purchase such a receiver, upon what considerations should we base our choice?

### Four Main Requirements

Broadly speaking, our requirements would fall under the four headings of selectivity, sensitivity, ease of operation and quality of reproduction. In the case of a battery-operated receiver, the question of economy of operation would also enter into it, but for the moment we are concerned only with the all-electric type of set.

For a set of this type we should expect a measure of selectivity adequate for all normal requirements.

In other words, we should definitely turn down any set that did not cut out the local stations in very few degrees.

### Variable Selectivity Wanted

That brings us face to face with another little problem. Since the set would not have been designed specifically for use in any one particular area, we should look favourably upon the incorporation of a variable selectivity device in order that the set could be adjusted to fulfil our re-

be used successfully by any member of the household. It would have to have the very minimum number of controls for the achievement of completely satisfactory results, and the modern interpretation of that requirement would be just one control for tuning with, possibly, a trimmer device, one for volume, one for wave-change switching, and preferably one for selectivity adjustment.

It is doubtful, also, whether we would entertain any ideas of a receiver that was not calibrated in actual wavelength readings.

### Desire for Realism

Our last requirement—that of quality reproduction—is best summarised by one word—*realism*! Upon that there could be no argument, and any instrument failing to give absolute fidelity of reproduction would very definitely be considered as an "also ran."

With these considerations in mind, our thoughts turn almost automatically to some tests we have recently been conducting in the "M.W."

(Continued on page 471).

### BEHIND THE GOLDEN VOICE



The workmanship and general finish of the Golden Voice Receiver are of an extremely high order.

#### OUTSTANDING FEATURES

**GENERAL DESCRIPTION.**—All-electric receiver, table model, for A.C. mains, 200/250 volts, 50/60 cycles. Consumption 52 watts.

**NUMBER OF VALVES.**—Four, all of the indirectly-heated type. Arrangement is Screened Grid, detector, pentode and rectifier.

**CIRCUIT DETAILS.**—Loose coupled aerial with tuned H.F. transformer intervalve coupling, followed by a parallel-fed L.F. transformer to pentode output valve. Pentode operates a powerful built-in moving-coil speaker of the energised field type.

**CONTROL ARRANGEMENTS.**—Single dial ganged tuning with concentrically-mounted trimmer, selectivity (separator) control, volume control (right) and ganged wavechange switch (lower centre). Mains on-off switch is conveniently placed at the back of instrument.

**SPECIAL FEATURES.**—Ease of operation; undistorted output of 2 watts; excellent quality of reproduction; provision for use of mains aerial and for the connection of both a pick-up and external speaker (or speakers); inclusion of "separator" control and provision for mains hum adjustment.

**PRICE.**—Plain cabinet, 10 gns.; walnut cabinet, 11 gns.

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

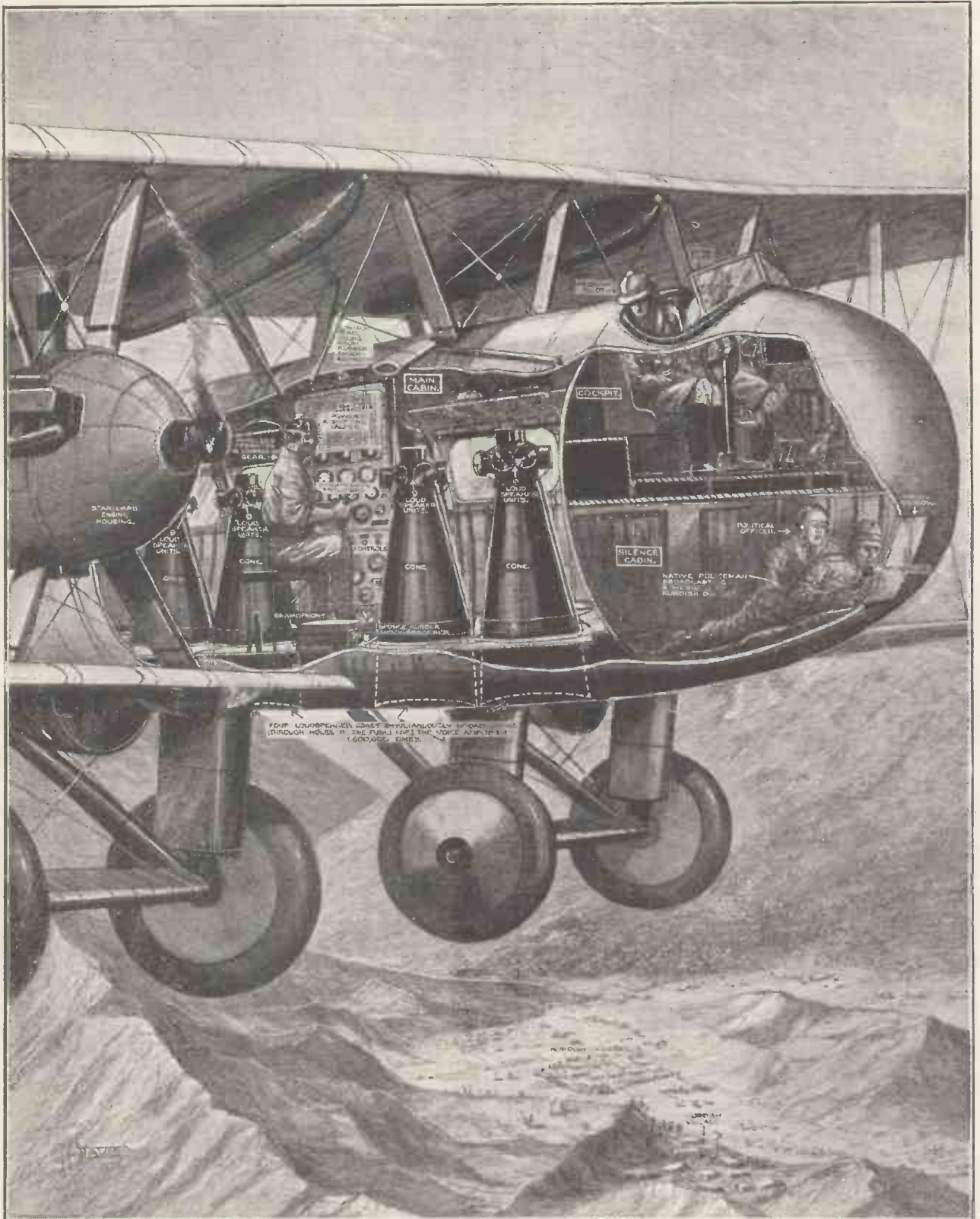
quirements under almost any conditions.

### Reasonable Expectations

With regard to sensitivity, well, we should not regard it as unreasonable to expect a minimum of thirty alternative programmes, and we should expect that total to include the cream of European broadcasting.

Upon the question of operation we should not select a set that could not

# THE VOICE FROM THE SKIES



From this Vickers-Victoria type aeroplane a stentorian voice calls in their own language to the native tribesmen below warning them that if they do not mend their ways their villages will be bombed. The voice is magnified  $1\frac{1}{2}$  million times by the power amplifier near the centre of the picture. This method of warning rebels has been successfully used in Northern Kurdistan, the "announcer" being a native policeman.





# How to Obtain BETTER RADIO

Whether you build your sets or buy them ready-made, you'll always find some query cropping up regarding maintenance, installation, or modification. This special monthly feature solves all such problems for you in an attractive and entertaining manner.

## RADIO REACHES THE DRAWING-ROOM

SOME of you may be inclined to think that this title is some years out of date and that radio has long since become as much entitled to inclusion in a furniture catalogue as a piano.

But this is not really the case. The radio set is still more often than not an intruder failing to harmonise with its surroundings. In the excitement of installing a new set, many listeners are apt to overlook its purely æsthetic aspects, and it is only when the instrument becomes a familiarity that its appearance begins to jar.

The piano can be said to have started life as a drawing-room fitment

## MODERN CABINETS



A group of modern radio cabinets illustrating the æsthetic advance of home wireless.

and its lines changed subtly as fashion in furnishing changed.

Radio began as apparatus pure and unadulterated. The first sets were small pot-pourries of mercantile and services designs, and they were tolerated in parlours and drawing-rooms as curiosities just as are queer souvenirs of foreign travel.

Then, when broadcasting began to grow domesticated in its appeal and receivers to be regarded as familiar objects, tentative attempts to blend them into their surroundings were made.

### "What the Eye Doesn't See—"

They were provided with polished wooden cabinets of more or less artistic appearances. Or, alternatively, various methods of hiding them were tried. And, by the way, constructors who find the cost of cabinets of artistic appeal prohibitive might do well to consider these schemes.

On this page you will find various of them illustrated. Obviously, the particular one adopted depends upon individual circumstances.

It was very hard to make the early radio set a handsome drawing-room fitment because of the necessity of having a loudspeaker horn. The

same difficulty was experienced with the early gramophone. Certainly some success was achieved with modelled wooden horns, but at their best they were obtrusive and, at times, somewhat garish devices.

With the coming of the cone the situation was changed. But it is still no easy matter to choose a set which will fit in with a given style of furnishing.

### A Great Mistake

We have seen dozens of expensive cabinet sets in various homes, and in only one or two cases did they seem to blend artistically into their surroundings.

This, we think, is largely due to a riot of individual experimentation in form, which is clearly an endeavour to render different makes of the same article as widely distinctive as possible.

We believe that this is a great mistake. Practically every other article used in the home adopts a conventional basis of shaping.

## MISLEADING BANDS

A VERY useful method of gauging the efficiency of a set from the point of view of quality is to endeavour to distinguish the different instruments composing a band that is being broadcast.

### Identifying Instruments

Therefore, the constructor will find it well worth while and most interesting to obtain experience in their identification. If he goes to the talkies more or less regularly he will almost certainly see and hear numbers

of the well-known dance bands—at least, that is, if he attends one of the larger cinemas.

Most of the instruments will come to the front at one time or another, and he should pay particular attention to the clarinet (a long, thin instrument studded with keys), the trumpet, the violin, and the double bass (large fiddle).

By memorising the characteristic sounds of these instruments he will then be able to discover how well or how badly they are rendered on his set.

If he finds it difficult to distinguish between the violin and the clarinet, for example, his set may be lacking in "top."

When small dance bands are being broadcast it should be remembered that at one time or another more instruments may be heard than there are players. This is because in practically all dance bands many of the players "double"—i.e. change over from one instrument to another even in the course of the same item. The saxophone players may change to clarinets, for example.

## AN ACCUMULATOR TIP

ALTHOUGH listeners are warned never to "top up" their accumulators with anything else but distilled water, this advice may in the course of time lead to trouble if taken to the extreme.

During charging, a certain amount of the electrolyte will be thrown out of the accumulator cell in the form of spray. But this will cause only a slight loss. It is, however, a loss which will cause dilution of the electrolyte during the years, and this can only be made good by the introduction of new acid solution.

## AMPLIFICATION AND QUALITY

IT would often seem that while one cannot obtain good quality without plenty of volume, plenty of volume means a loss of quality. Obviously, that remark will need a bit of unravelling!

### What Is It?

Well, first of all, what do we mean by "good quality"? Is it a freedom from scratchings, blurrings, and obvious distortion, or is it all that plus an even treatment of the various frequencies in the audio scale?

Think this over for a moment. It deserves close consideration because we are often apt to get rather mixed up over the point.

## THE EARLY DAYS



This veteran compared with any modern radio receiver may look very crude, but someone was proud of it!

We fancy that when the average listener judges the output of a set he first listens for jarrings and discordances, and then, if there are none, for a good thump, thump in the bass and a clear rendition of speech.

As a matter of fact, that is, we consider, a very excellent method to adopt. And if one has a fairly critical ear the set must be pretty good, or it will fall down before those standards.

Now, to get good bass you must have a fair amount of power in the output. You simply cannot develop it without it. Of course, if the loudspeaker has a rampant resonance in the bass a certain quantity of spurious "boom" (we haven't the heart to call it "bass") will be developed, and that may satisfy a few.

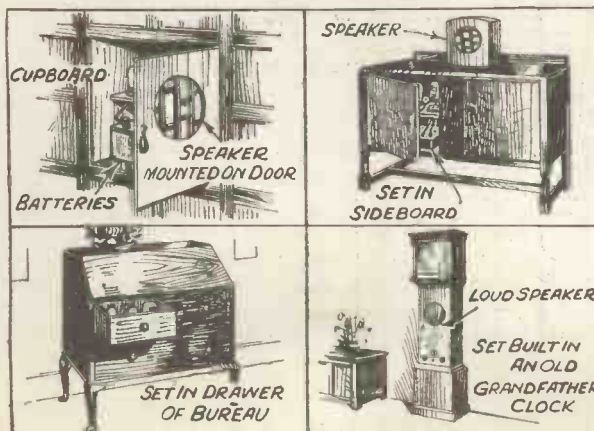
### Undesirable Noises

The trouble is that we cannot always build up power without bringing in its train undesirable extraneous noises in the form of rustling, scratching backgrounds.

Also, with mains sets the more the volume control is turned up the more hum there will often be.

It is, indeed, very difficult to obtain big powers without noisy backgrounds.

## HOW TO HIDE YOUR SET!





# Some Interesting Facts About Condensers

In the case of distant station reception it is sometimes quite impossible. Even with the local station, interference is frequently built up to a greater extent than the legitimate sounds are magnified.

This is why so many are disappointed when they change from a fairly small set to a larger "hyper-super-de-luxe." They exchange small volume, possibly quite pure so far as it goes, with a more or less dead-silent background for a hefty volume standing on a host of rustlings, whisperings, and crackles.

## THOSE VARYING VANES

THE variable condenser has passed through a succession of extremely interesting changes, and a brief description of these will enable the constructor to understand exactly what he gets when he buys one of modern design.

The first variable condenser had semi-circular vanes. Therefore, equal movements of its dial gave equal variations of capacity. There was, in fact, a "straight-line" capacity variation.

When the knob was turned 90 degrees (half-way) there was an overlap of exactly half the area of

to comprehend wavelength, the "straight-line" wavelength variable condenser was brought forward.

This provided equal wavelength change for equal dial movement.

Finally, the log mid-line type appeared, and this is the most popular at the present time. It lies between the "straight-line" frequency and the "straight-line" wavelength.

There have also been other technical changes in variable condensers. Nowadays, very little insulating material is used, whereas at one time the greater part of the frame was built up from ebonite.

But all insulating materials except air cause losses to a greater or lesser degree. So the modern variable condenser designer attempts to reduce the "solid dielectric" to a minimum, unless, of course, he is designing a condenser employing solid dielectric for vane separation when he applies himself to the task of finding a material of as low-loss a character as possible.

### Rigidity

To-day, too, much more attention is paid to rigidity of assembly. Screws are eliminated as far as possible, and the different parts are held together by clamping and rivets.

Rigidity is of paramount importance in ganged condensers, and therefore these are constructed from solid castings and stouter metal framework than the single types.

The one-time practice of building the sets of condenser vanes up on threaded pillars, each vane being separated by a spacing-washer and the whole held together by nuts at the ends of the pillar, has disappeared for ever.

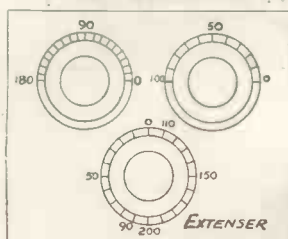
And one of these days the practice of having the vanes all projecting unprotected into space, is going to disappear. We will prophesy that there will be no variable condensers sold in 1943 which are not totally enclosed.

And we hope we are here, still contributing "Better Radio" articles to "M.W." when the time arrives for our prophesy to be proved!

## YOUR DIAL READINGS

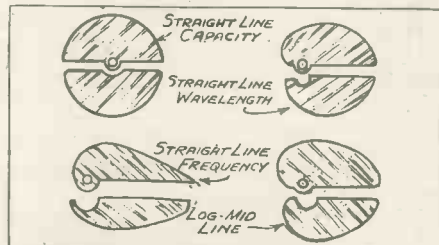
WE presume that no one nowadays credits ordinary dial readings with meanings that they are not intended to convey. It is probably known by all that they are just markings and that, before they can give information, a chart must be prepared in which the readings are shown against wavelengths or frequencies.

### COMMON SCALES



The three methods of marking disc type dials.

## THE FOUR TYPES



Here are the vane shapes of the four kinds of variable condensers.

the vanes, and that meant half the maximum capacity of the condenser was effective.

A quarter turn (45 degrees) gave a quarter of the capacity, and so on.

This was quite all right when there were not many broadcasting stations from which to select. But as they began to multiply it was seen that the "straight-line" capacity method was not all it might be.

A given capacity variation has a much greater effect on wavelength at, say, 250 metres, than it does at, say, 500 metres. Therefore, with the "straight-line" capacity condenser there was a tendency seriously to crowd the stations at the bottom end of the dial, while at the top they would straggle out widely.

### Frequency Scale

To off-set this the "straight-line" frequency variable condenser was introduced. With this equal movements of the dial gave equal frequency variations. One degree might represent, for example, 20 kes., and this change would be constant all the way round the dial. Move the dial 1 degree from any given reading and the tuning of the set would change, say, 20 kes.—that is, if the condenser and other components with which it was associated were able to give such perfect results. However, it must be admitted that something pretty close to perfection had been achieved.

In an attempt to render the dial readings more useful to listeners, few of whom seemed able to cope with frequency, whereas all appeared

But we would be surprised if anyone can venture a reason as to why both 0 to 100 and 0 to 180 scales are still issued. We can't!

It is high time there was a final standardisation and either the one or other eliminated for ever. We are inclined to consider that the 0 to 180 should be retained and the 0 to 100 scrapped.

With the good slow-motion dials that are available and the multiplicity of stations we do not think 0 to 100 provides close enough readings.

## WHEN TIGHTENING SCREWS

NO doubt quite a number of constructors try to tighten the screw terminals of their sets so as to prevent any possibility of looseness occurring. But that is almost an impossibility if lock nuts or some other "locking" method is not adopted.

Temperature changes causing expansion and contraction of metal and the constant mechanical vibration to which all radio sets are subjected while they are working is almost certain to loosen screws in time. Both effects are generally extremely slight, but, nevertheless, they are there.

There is nothing to be gained in tightening a nut or screw more than a certain amount. Indeed, you are likely to strip the thread if you indiscriminately apply force. And the threads of brass screws are particularly easy to strip.

The screws should be tightened up as much as possible with the fingers, and a half turn given to each with the pliers after that.

All the screws (we are, of course, referring to metal screws screwed into metal or similar hard material) and nuts ought to be examined periodically—every few months, say—and any loose ones tightened up.

## AMERICAN v. BRITISH SETS

AMERICAN and British radio set designs have tended to follow two distinct roads of development. Whereas in the States designers have always been most prodigal with valves, in this country it is the practice to use as few valves as possible and to make each valve as efficient as circumstances permit.

The average American set will have as many as eight or nine "tubes," and one having sixteen is not regarded as a freak.

But the British set employing more than four valves is reckoned to be something of a "de-luxe" outfit.

Why should this be? We suppose the reason is to be found in the patent situation in Britain.

The patents are controlled by a strong group, headed by the Marconi Co., and licences are issued on a royalty basis of five shillings per valve.

In these conditions it is obviously impossible to add valves to a circuit with the light-hearted freedom which characterises the work of the American designer!

### "Low-Mag" Method

However, the matter does not end there, because the absence of any enforcement of a restricted number of valves, apart from manufacturing costs, has enabled American designers to develop a technique which has much to be said for it from a technical point of view.

One can style it the "low-mag" method. Instead of striving for high valve

efficiency and high component efficiency at every stage, they deliberately keep their stage magnification moderately low.

Whereas, we will make one or two stages of H.F. amplification try to produce all the required range and selectivity, they will have as many as four or five, and even more, H.F. stages, each one operating with fairly low effectiveness, but the whole giving all that is needed.

Naturally, the superhet principle is very popular in the States, and refinements necessitating extra valves, such as push-pull and automatic volume control, are freely introduced.

There are arguments both for and against the many-valve system. But some of these arguments do not hold as good as they did a few years ago.

### High Efficiency

It used to be said that because British sets worked at high efficiency they were more prone to break down, and that the Americans achieved greater reliability by their scheme of more valves, each "taking it easy."

But, of course, British manufacturers have given ample proof that it is not impossible to combine both efficiency and reliability.

It was also said that the American way enabled sets to be produced with greater facility. This argument advanced the idea that by having greater margins to play with, manufacture and assembly were made much easier.

Apparently it was thought that the Americans added a few valves to compensate for possible losses due to errors and carelessness in manufacture!

## TYPICALLY "U.S."



The Americans use anything up to fifteen or sixteen valves.

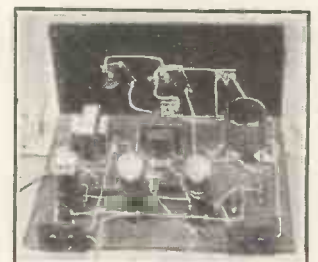
Whether or not there was any basis of truth for such a suggestion, it need only be mentioned in this connection that if we in this country are capable of obtaining efficiency in mass production we should credit our American friends with similar powers.

### Important Point

There is one very important fact which must not be forgotten. The multi-valve idea sprang into prominence very early in the history of American broadcasting, but that was also the period when America was almost incredibly prosperous.

And although their big "radios"

## THE BRITISH WAY



A small number of valves used very efficiently typifies the British method of design.



# A Pot-Pourri of Interesting and Practical Articles

were fairly expensive, everyone had enough money to buy them.

We can attribute much of the present cheapness of those big American sets to slump conditions.

And it is undeniable that even if you can buy nine- and ten-valve sets in the U.S. for the price of half a dozen British valves, those sets are far from being junk.

Some of them provide wonderful performances.

## THAT "DISTANT" LOUDSPEAKER

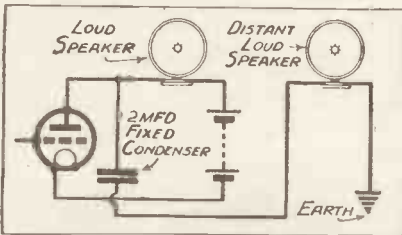
MANY a listener must desire to add a second loudspeaker to his outfit so that the programmes can be heard in another room.

But it is not usually advisable to run leads indiscriminately for such a purpose unless an output filter figures in the set.

When, as is often the case, the loudspeaker terminals are joined directly to the plate of the output valve and H.T. plus, the H.T. current flows through the loudspeaker.

And it is clearly inadvisable to

## NO CHOKE REQUIRED



The loudspeaker directly connected to the set is made to act as an output choke!

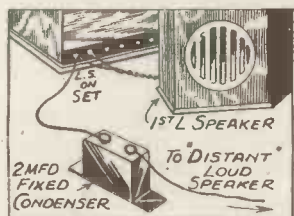
have the H.T. wandering through extension wires if these are not installed with great care and with due regard to the electrical rules which govern the safe conduct of high-tension current.

But there is a method of connecting a second speaker so that the H.T. is confined to the set without the necessity of using a filter.

At least, that is without a special filter; actually, the method we are about to describe makes use of the first loudspeaker as a filter choke!

The connections of this excellent scheme are clearly shown in both

## IN PRACTICE



The method of connecting the two speakers shown in practical form.

theoretical and practical forms in the illustrations on this page.

It will be seen that only one wire need be run to the distant room if it is possible to connect the other loudspeaker terminal to an earthing point such as a water-pipe.

If not, two wires can be employed, the one being connected as shown, and the other joined to H.T. minus.

Of course, although this scheme works very well it does not possess all the advantages of a proper output filter. For example, it doesn't isolate the first speaker from the H.T., although if this has an input transformer that won't matter a scrap.

Anyway, it removes the H.T. from the extension lead, and this can be run with any kind of insulated wire, and no strict precautions regarding it have to be taken.

If possible, the two speakers should have approximately the same resistance, so that the volume from one will be about equal to that from the other. Wide differences in resistance will cause one loudspeaker to reproduce rather weakly. The ideal is for two instruments of identical make and type to be employed.

## PROTECTING YOUR LEADS

JUDGING by some of the home radio outfits we have seen, it is a fairly general impression that flexible leads are unbreakable!

But, of course, they aren't. The flexibility is a valuable quality, and enables the leads to be run through devious routes. However, twisting and pulling will fracture the fine strands of which they are composed, and kinks ought to be avoided at all costs.

Some listeners even tie knots in their flexible leads in order to anchor them, or for other such purposes. That is asking for trouble.

There are very definite grades of quality in wire, and "flexible" leads should not be taken too much at their face value.

An enormous quantity of cheap flexible is sold for wireless purposes, and it ought to be realised that much of this compares very badly with the good quality material employed in electric lighting installations.

This does not cost much more and is well worth buying in preference to the cheaper variety, owing to its greater powers of resisting rough handling.

And the battery and other external leads of a radio set get much harder wear than the majority of flexible leads one encounters in connection with electrical fittings.

## BATTERIES IN CABINETS

A LARGE number of battery sets nowadays have accommodation for the batteries inside the cabinet. This certainly makes for tidiness, but may not be good for the inside of the set if steps are not taken to prevent the batteries from doing harm.

This especially applies to the L.T. accumulator. The acid in this is a very corrosive fluid. And it has a nasty habit of "escaping" out of the cell.

It is a good plan to stand the cell on a piece of thick cardboard which extends at least half an inch from each side of it.

This cardboard should be changed every few months, so that it never has time to get eaten right through. We also always lay a piece of blotting paper loosely on top of our own accumulator cells so that stray acid

droplets are absorbed. This is changed every time the cell is charged.

A further excellent method of preventing creeping is to pour an eighth of an inch layer of hard mineral oil (such as Price's "Blancol") into the cell. This gives fine protection to the terminals.

## HOW MANY KNOBS?

SEVERAL of our correspondents have asked us to deal with the subject of set controls. "Why is it," they ask, "that some sets have only two or three knobs to twiddle, while others may have as many as nine or ten?"

There are several considerations, but probably the most important is indicated by another question—i.e. "Is ganging possible without loss of efficiency?"

Until recently there existed a school of thought which asserted that tuning controls could not be "ganged" without very considerable sacrifice of efficiency.

## SIMPLICITY!



A "one-dial tuning" receiver.

But these critics of the method have all but disappeared since the introduction of matched coils and precision ganged condensers.

Such is the effectiveness of modern mass production that these can now be produced for sale at comparatively reasonable prices.

However, it is still cheaper to build a set with separate tuning condensers, and a great number of home constructors would rather do this than pay the extra money for ganged components.

Also the average ganged condenser is harder to mount on a panel than the simple disc dial type, although, with the artistic escutcheon and panel light that it invariably possesses, it presents a handsome appearance.

It must now be admitted that even with the best of matched coils and ganged condensers there will be a slight loss of efficiency, for perfect ganging through the whole of two wavebands is not possible.

## MULTIPLICITY!



Do you lose a great deal if you do not have a large number of controls? This question is dealt with in the accompanying article.

But with a set of moderately high power such a loss will be of little consequence, and is at once offset by the greater simplicity of tuning.

A fairly small set, say, one having only a single stage of H.F. amplification, can be made to give results out of all proportion to its size if provided

with separate tuning controls and handled by an expert operator.

But it is doubtful if the average constructor would be able to do very much more with it than he could with a similar outfit having properly arranged ganged tuning.

There is a class of radio enthusiast who likes to have plenty of knobs to twiddle. It makes him feel that he is in direct contact with every single function of his set, and that its every single activity is under his immediate control.

We must say we are in sympathy with him. This is the type of "fan" who provides a direct index of radio progress by supplying data on the practical application of new ideas.

There are several applications of ganging which do not affect the efficiency of a set. Wavechange-switch ganging is a good example. Where such are possible at little or no additional cost, it would be a fanatical adherent to the "knob-twiddling" fetish who ignored them.

## PICK-UPS AND H.T.

THE pick-up is nearly always connected to the detector valve of a set which then becomes an L.F. valve "pure and simple."

If it has been operated for radio with a rather low H.T. voltage, perhaps in order to obtain a smooth reaction, it will now probably be an advantage to increase its H.T. quite considerably providing, as should be the case, it is supplied with one and a half or three volts grid bias.

We feel sure many readers will get vastly better pick-up results if they arrange the H.T. and G.B., bearing in mind that the detector has ceased to be a detector and is a straightforward L.F. valve when the pick-up is switched on.

And this is the cue for us to remind you that if there are H.F. valves these ought to be switched off if you want to save the H.T. or L.T. which they consume.

Some sets have switches to do this, but others have not. In the latter case the valves can be withdrawn from their sockets during the record playing.

## TRANSFORMER RATIOS

ONE of these days the terms "step-up" and "step-down" in regard to transformers will probably fall into disuse.

They are quite unnecessary, or would be if transformer ratios were logically stated by manufacturers. There are a few who do so, and in the future there may be a definite standardisation.

Why should a "step-up" transformer be said to have, say, a 4 to 1 ratio?

### Correct Method

Surely 1 to 4 is the correct method of giving the ratio, as it is the secondary which has four times the number of turns.

If these ratios were generally expressed logically, it would only be necessary to state that a transformer had a 1 to 4 ratio for it at once to be known that it was of the "step-up" type.

Similarly, 4 to 1 would convey immediately that it was a "step-down."

There would be a good argument against this if every transformer were in practice quite reversible and could be used either as a "step-down" or "step-up."

# TROUBLE TRACKING



A.C. mains units are not so prone to this effect because there is always a transformer between the mains wiring and the set, although a rectifying valve can, in itself, generate H.F. impulses.

### Choke in Each Lead

Generally speaking, however, it is D.C. mains which are the culprits. The noises can usually be eliminated by inserting H.F. chokes in the mains leads, special chokes being required.

The windings—unlike the ordinary reaction or parallel-feed chokes—must be of stout gauge wire, well insulated and capable of carrying the whole of the current taken by the set.

Two chokes are advisable—one in each mains lead; and on the set side of the chokes a couple of 1-mfd. condensers should be joined in series across the mains wiring. The centre point of these two condensers is then earthed so that any H.F. which gets through the chokes is by-passed to earth instead of flowing into the wiring of the set.

Chokes of this kind are available on the market, and among the makers may be mentioned Messrs. Wright & Weaire, and Messrs. Ward & Goldstone.

### Read the Instructions

By the way, I wonder why some listeners will not read the mains unit makers' instruction booklets.

The intermediate tappings of mains units are not meant to give sufficient milliamps. for a small-power valve, but only to supply an S.G. or a detector which will not need more than about 3 milliamps.

Yet I have known cases where the listener has connected one of his intermediate tappings to the output stage H.T. + terminal, and then complained because he gets distortion.

OCCASIONALLY I meet with cases of background hum and other troubles which prove to be due to the mains unit used for supplying H.T.

With commercial units there is never any excuse for hum, provided the unit is one of reputable make. Those cases that do arise are invariably due to overloading. As many of you know, when an excessive current is passed through the windings of a smoothing choke its inductance drops.

For smoothing purposes a choke relies upon its inductance value, and therefore the current must be kept to within the limits governed by the design of the choke.

### Going Astray

It is, of course, true that mains units are largely self-regulating, and that if an attempt is made to take an excessive current the voltage decreases and so counteracts matters.

At the same time, when a unit is built down to an economic price it is definitely unwise to try and make it give more power than the makers intend it to. And this is where I fear that those who have trouble go astray.

If a unit is designed to give, say, 10 milliamps, then this figure must be taken as the maximum. It is no use connecting such a unit to a set with a large super-power valve in the output and expecting it to supply the heavy current required.

### KEEPING A RECORD



One is apt to forget how long the G.B. battery has been in use unless some record is kept. Why not try this dodge of sticking a label with the date on it on the battery itself?

While on the subject of mains units and the question of output, I would like to say a few words about voltage regulation and Q.P.P.

Q.P.P. is a first-rate method of obtaining "mains" output with battery H.T.; but the current taken by the valves is constantly changing, the extent of the changes depending upon the strength of the received programme.

With battery H.T. the anode voltage remains substantially constant. If, however, you attempt to use a mains H.T. unit instead of a battery, you come up against a "snag."

*Every month the Chief of the "M.W." Query Department discusses some of the common difficulties which can often be so troublesome. This time he deals with mains units and their management.*

A mains unit gives a certain voltage at its terminals when the current remains at a steady value. If the current increases the output voltage decreases and vice versa.

Suppose we use a mains unit with Q.P.P. The output valves may require 10 milliamps. at one instant and 20 at the next. As the volume varies so will the current, and if the H.T. is derived from a mains unit the voltage on the anodes of the valves will also vary.

### No Constant Potential

These variations of voltage mean that the anode potential is never constant, thus preventing the Q.P.P. valves from functioning properly.

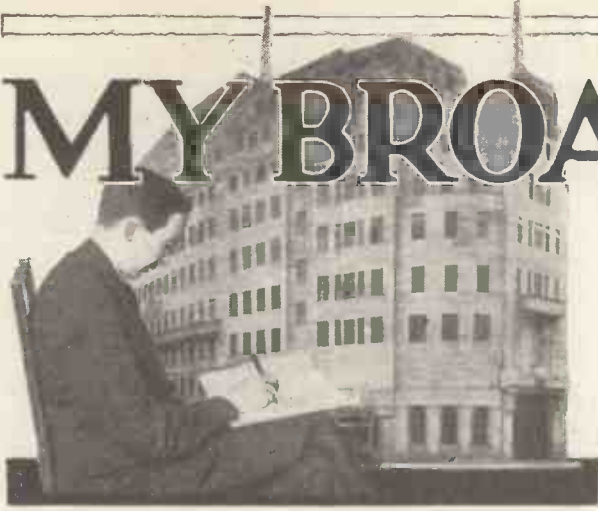
There is a method of maintaining a steady voltage within certain current limits, but this does not apply to the ordinary mains unit operated in the usual manner.

Quite a lot of the crackling and other noises sometimes come in when a D.C. mains unit is in use.

Occasionally the trouble may be due to a faulty resistance or even a choke winding, but often the noises are caused by H.F. ripples picked up by the mains wiring.



# MY BROADCASTING DIARY



## *B.B.C. Salaries*

THIS is the time of year that B.B.C. officials ordinarily discover whether their Director-General and Board of Governors think their work worth any more money. Only, of course, last year still in the "crisis" atmosphere saw no yield.

The salary chits have now gone round, and I have been busy gleaning news of the nature of their reception. I have already learned enough to make it clear that there are remarkable inequalities and some apparent injustices, or at least this appears to be the view of the staff as a whole.

The engineers have not come off too well, although it should be said that in their case there was certainly no injustice or inequality as among themselves. Members of the programme staff were not treated in any uniformity. In particular, the creative and artistic staff was overlooked.

The administrative staff were better done by than usual. And I suppose that is all any of us will find out—so secretive is the B.B.C. on this salary subject.

## *Nucleus of Material*

Surely I cannot be blamed for calling public attention to the absence of nucleus of material which I was assured the B.B.C. had set out to assemble, particularly in the realm of patter for comedy and vaudeville. If, as it appears, nothing has been done to see to this, there has been a grave omission. Admitting many of the ready-made personalities of the music-hall and stage should be utilised, why not equip them with appropriate material for the new medium?

## *That Empire Service*

What is happening about the B.B.C. Empire Service? I don't mean about financing it, obviously the B.B.C. will go on doing this for many years, if not for good and all, and quite right too. But what I am now asking is the degree of robustness and, therefore, the acceptability of the programmes. Mr. Graves, the Service Director, and Mr. Ashbridge, the Chief Engineer, were probably quite right in not pushing off too fast in quality of programmes, but the time has come when the B.B.C. "Service" has got to compete on "service" terms with other established short-wave programmes. Let the best go and at once.

## *The Eckersleys and the B.B.C.*

It is funny how the Eckersley family gets involved with the B.B.C. First of all there was the great

*Our Own Broadcasting Correspondent keeps a critical eye on the affairs of the B.B.C., and each month, for the benefit of listeners, comments frankly and impartially on the policies and personalities controlling British broadcasting.*

"P. P. E.," our chief radio consultant now, who really began broadcasting in this country at Writtle, and afterwards gave the B.B.C. its "set-up" technically and then devised the Regional Scheme.

And then there is Mr. Roger Eckersley, Peter's brother, brought in by Peter from Stoke Poges Golf Club to be the "O.B." man. Cecil Lewis had Roger as his assistant, then Roger became head of programmes. And then,

## LISTENING IN THE AUSTRALIAN BUSH



He's not listening to the Empire transmissions but to the aeroplane overhead, which is on the look-out for bush fires. This radio link is a great aid to the forest fire-fighters in the Australian bush, but we wonder if he ever tunes-in to the Empire Station for a change.

likewise in due course, Charles Siepmann broke away and formed a Talks Branch, and then came Holt Marvell with his new Entertainment Department. And now, I wonder, what next?

## A Programme of Military Pageantry

### B.B.C. and G.T.C.

There has not been much news lately of the state of relations between the B.B.C. and the General Theatres Corporation. Mr. George Black, who runs the latter on behalf of the Gaumont British, has not been declaiming against the B.B.C. so actively as before. On the other hand, certain organs of the group continue their campaign against Broadcasting House. Meanwhile the B.B.C. has gone along tranquilly ignoring these attacks, but steadily strengthening itself against a possible recurrence of unrestricted warfare.

A sign of this attitude of prudence is the handling of the next broadcast of the Don Cossack Choir. If relations between the B.B.C. and the G.T.C. were normal, it is likely that the broadcast would be taken from the Palladium, which, of course, is a G.T.C. theatre; but the B.B.C. is not risking a last-minute ban, and instead is arranging a studio performance without reference to the G.T.C.

### The New Belfast Station

A good deal of agitation has been aroused among listeners in Ulster as the result of the engineers' tests which are now proceeding to discover the best site for the new transmitter for the Belfast Station. Many listeners hold the opinion, which can be readily understood, that the new station should be located in a central position, so as to give a better service over the whole of the province.

But as more than half of the total number of wireless licences in Northern Ireland are held by people in Belfast, that city would certainly seem to have first claim to the station being placed where it is most convenient to their requirements. A short time ago the matter was raised in the Northern Ireland Parliament, when it was stated that the B.B.C. would no doubt be guided in its ultimate

waste of energy in thinly-populated areas, but it would also be undesirable to have it too close to Belfast, and thus prevent the reception of distant stations by "swamping." Meanwhile, the tests are still proceeding, and are likely to go on for some time yet before the engineers are able to decide upon the most suitable site.

### B.B.C. EXPERT GOES TO CANADA

Major Gladstone Murray and his wife at Waterloo when they left for Canada. He is "on loan" from the B.B.C. and is going to reorganise the Canadian system of broadcasting.



### Broadcasting the Tattoo

The Aldershot Tattoo, as well as, we hope, the Southern Command Tattoo, will again have places in the summer programmes. No dates for the broadcasts have yet been announced, but we hear that several excerpts from the Aldershot function have already been decided upon.

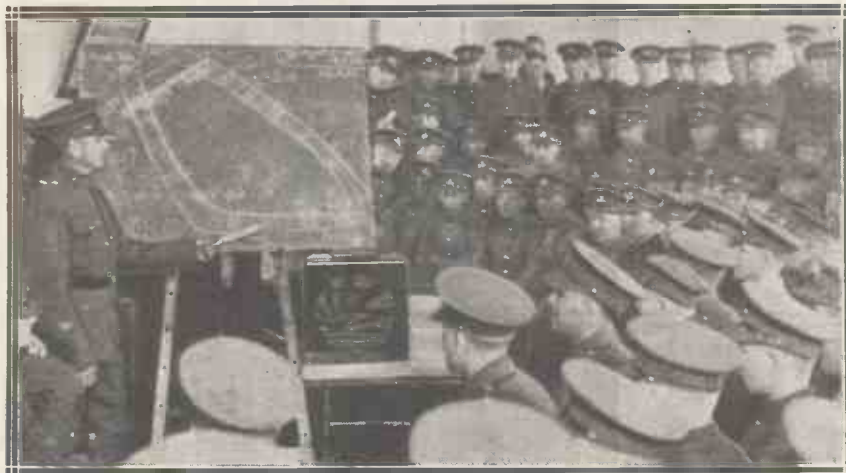
These excerpts will form part of a composite programme of military pageantry which will also include a relay of the fascinating Ceremony of the Keys from the Tower of London, and some musical items from the studios at Broadcasting House. Another part of the Aldershot Tattoo, a reproduction of the Battle of Omdurman, the big spectacle of the event, will also be used as a background of sound to an actual eye-witness account of the original battle, which was sent to England by an army doctor.

This account will be read in the studio, and will form a broadcast more realistic probably than anything ever done in this country.

### Mr. George Allison and the Cup Final

It will be good news to millions of listeners all over the country that arrangements have been completed for broadcasting the final tie of the English Association Cup Competition which takes place at Wembley Stadium on Saturday, April 29th, between Everton and Manchester City. The commentary will be given as usual by Mr. George Allison, who has only been heard twice since last year's Cup Final.

### THE MOST POPULAR PARADE OF THE DAY



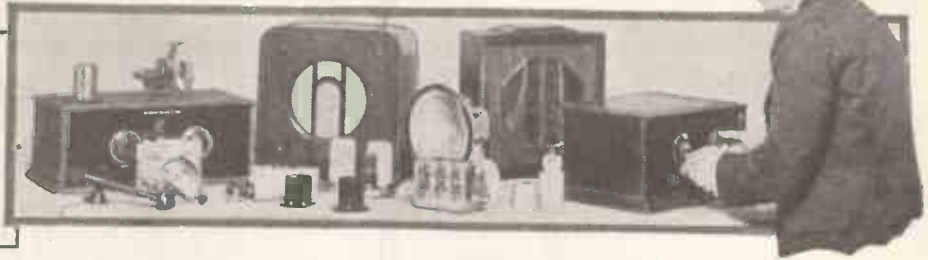
When the Grand National horse race was broadcast, these recruits of the Oxfordshire and Buckinghamshire Light Infantry listened with the aid of a portable receiver and blackboard sketch of the course. It must have been a most welcome break from the normal routine of training.

choice of site by its consideration to secure the best service for the greatest possible number of listeners throughout the province. It would, of course, be quite unsatisfactory to place the station in an isolated spot, however geographically central, which would involve a



# AT YOUR SERVICE

by  
**OUR TRADE  
COMMISSIONER**



## Olympia Again

THE years roll on, and once more we have reached that period when the radio trade is wondering what to show at "The Show."

As last year, the latest radio wonders are to be introduced to the public during August, and contrary to precedent Olympia will open on a Tuesday, August 15th, the exhibition lasting till Thursday, August 24th.

Why these peculiar days have been arranged, I know not, but I do know that for a full nine days (perhaps sweltering hot again) the vast space of London's premier show—the National Radio Exhibition—will be packed with eager listeners and constructors.

## Radio in Cars

Assuming you run a car, do you want radio on it? There are mixed opinions in this country about the latest American craze. In the States something like two million pounds worth of car radio has been sold during the last three years, and a determined effort to capture the British car-radio market (if there is one) is being made by Philco.

One snag appears to me to be the matter of servicing. Presumably new cars would make their appearance already equipped; Morris, or Austin, for example, would take up the idea and fit radio as a £15 extra, say, on certain of their 1934 models, while older cars could be fitted if desired.

Who is going to put the radio right when it fails—as it is bound to do some time or other? Will the car manufacturer take it on and expect his garage service agents to be radio as well as motor "engineers"? Or will the set maker have to run a series of service stations?

This latter would seem the best way of doing things, but to service a radio set on a car in daily use, perhaps running all over the country, will require a good organisation and snappy work, if the owner is not to

*Some trade news and views that will prove of interest to readers, whether or not they are connected with the radio industry. Members of the trade are invited to send items of interest or photographs, to be included under this heading.*

be without his set for a good part of the time.

Incidentally, if the sets are to operate while the car is running, is the idea safe? I am as keen a radio fan and motorist as any, but I should certainly dislike trying to divide my

## ACCURATE TIME-KEEPING



attention between driving and radio. And if we have to stop to listen, why not just carry a portable set, if you must have radio *everywhere*? Perhaps readers will like to give their opinions. I shall be glad to receive postcards on the subject.

## Q.P.P. Batteries

Pertrix H.T. batteries for quiescent push-pull receivers are now available in four forms—Nos. 320, 321, 322, and 323. These provide 120, 130, 150 and 159 volts respectively with a grid-bias section in the same carton.

The type 323 is specially suitable for the Pye receivers.

## "Class B" Amplification

"Class B," following close on the heels of Q.P.P., must be causing some hard thinking in the minds of radio stockists. Which will survive, is the question on every dealer's lips. While the public, also, is torn between two "loves."

At the moment there is only one make of "Class B" valve officially available, though I do not know if large stocks even of that valve are held. But the components to go with it are rapidly increasing in numbers.

"Class B" transformers for input (drive transformers) and output have been marketed by many well-known firms. R.I., Sound Sales, Ferranti, Varley, Benjamin, Multitone, Lissen,



The two electric clocks seen here are for A.C. mains and are handled by Exide Services, Ltd. The one on the right has a glass cover and resembles those dust-proof timepieces so popular in drawing-rooms.

Lotus, have all got ready for what they hope will be big business. And it should be on the merits of the case.

The loudspeaker manufacturers, too, are hard at it bringing out "Class B" speakers, and everything seems set fair for a good steady trade before long.

## Great Valve Activity

Among the valve firms still greater activity is in progress, for having got the "Class B" valve off their chests

## Many Components for "Class B" Now Available

(from the designing point of view, if not from the sales aspect), there is a glorious scramble to get all sorts of multi-grid and unusual mains valves on the market.

The variable- $\mu$  and the "straight" Mullard H.F. pentodes will soon be available; while Ferranti are already "out" with the straight H.F. pentode and a double diode triode. Ferranti valves are good, too!

Next we shall see such things as double diode pentodes, and double diode tetrodes, while steady improvement in the more normal types also goes on. The double diode pentode is, I believe, a Cossor patent and will not be available in other makes.

Farringdon Road, London, E.C.1. As an example of price the S.G. multi- $\mu$  two-volter is only 10s. 6d.

### For Mains or Battery

A new-comer into the field of electric clocks is Messrs. Exide Services, Ltd., 203-231, Shaftesbury Avenue, London, W.C.2, which company offers to the public a series of electric clocks both for battery and mains operation.

We illustrate on the previous page two models from the range, the prices for which are from 30s. upwards.

For those who insist upon a mains operated clock, for use on synchronised mains, there is the model A.C.303

manufacturers of transformers have kept well to the fore, and, as might be expected, "Class B" amplification has provided a new outlet for their energies.

"R.I." were first on the market with the quiescent push-pull transformer, and now that "Class B" has sprung into popularity, "R.I." components are again much in evidence.

"Class B" is not quite as simple to arrange for, from the manufacturing point of view, as Q.P.P., though for the home constructor it is very much simpler.

### Various Ratios Needed

The reason why the manufacturer of "Class B" parts finds things difficult, is that the various makes of "Class B" valves being placed on the market are *not standard*. Each valve manufacturer seems to have his own ideas about the characteristics of his "B" valve, with the result that the input transformer characteristics needed have to be different for each type or make of valve.

As there are some four main types of "Class B" valves there must be four different types of input (or driver) transformer.

Again, there is the question of matching the "Class B" valve to the loudspeaker used, and this calls for various ratios of output chokes.

It would seem a terrible task for anyone to find out exactly what he required for any particular combination of makes and types of valve and speaker, but here "R.I." comes to his rescue in no uncertain manner.

To cover all sorts of contingencies this go-ahead firm has produced a twelve-page folder which covers the whole problem most fully from start to finish.

### A Free Booklet

Full descriptions of the "R.I." "Class B" components are included, and also, very wisely, the authors have covered the requirements of the constructor who wishes to convert his present set to "Class B."

This is done in a very thorough manner, and the whole folder is one that should be in the hands of every battery-set owner. It is obtainable free, from Radio Instruments, Ltd., Purley Way, Croydon, Surrey, and is called "The Importance of 'Driver- $\mu$ ' Transformers and Output Chokes."

## MUSICAL ENTERTAINMENT FOR RADIO WORKERS



In one of the assembly shops of Ferranti's Hollinwood factory, where moving-coil loudspeakers provide music while the workpeople carry out their duties. One of the speakers can be seen above the benches in the foreground.

New mains rectifiers are being developed, and a new Mullard multi- $\mu$  battery valve is promised. By the time the next radio show is on we should have "seen something" in the valve world.

### New Makes of Valves

And talking about valves there are one or two completely new makes on the market. The "Hivac" valves—a complete range of two-volters—have been introduced, and should be very successful.

The prices are very much lower than those of the "ring" valves, while the characteristics are excellent. They are British made by the High Vacuum Valve Co., Ltd.; of 113,

at 30s.; whilst for the people who have no mains available there are at least two battery-operated models, prices from 45s. upwards.

Every clock in the range is guaranteed for three years, whilst the batteries in the battery operated models carry a guarantee of two years. We understand that these clocks are available to the public from any Exide Service station, wireless dealer, electrician, hardware dealer, or jeweller throughout the country.

### R.I. Components

Whenever Radio Instruments, Ltd., tackle anything they do so thoroughly. Right through the history of British broadcasting these famous



# ON THE SHORT WAVES

by  
W.L.S.



IT seems hardly any length of time since I sat down to write "On the Short Waves" for May, 1932, so fast has May, 1933, come round. I always look upon May and June as the most exciting months for short-wave listeners, and they are generally among the best as regards reception conditions.

The days are just becoming long enough for the stations below 30 metres to last well into the night; and this gives us an opportunity of hearing most of them at better strength than is possible throughout the winter.

### Seasonal Changes

Last year W 2 X A D, our famous friend from Schenectady on 19.56 metres, was enormously strong during the late evenings of May; I don't think I have heard him so well since.

The complete change-round in the character of short-wave reception caused by the seasons is, to my mind, one of the most attractive features of short-wave work. One finds completely new stations arriving—although they have been transmitting as usual all through the winter—and some of the old favourites disappear for a while.

### Improving a Two-Valver

No doubt this changeability will only serve to convince the medium-wave broadcast listener that short-waves are not worth the trouble taken over them; but the man who has mastered the particular technique commanded by short-wave work doesn't mind. It is excitement, not entertainment, that most of us

No matter what branch of short-wave reception claims your special interest, you will find these pages by our popular contributor make uncommonly good reading. "W.L.S." combines a ripe experience and knowledge of his subject with a special aptitude for clear writing on the really interesting short-wave topics of the moment.

in some details with the average two-valver and possible ways of improving it.

I will assume that we all use a circuit similar to that shown in Fig. 1. It may be parallel-fed instead of series-fed; it may use a different form of aerial coupling; but, basically, any remarks applied to the Fig. 1 circuit will hold good for the others.

### Are You the One?

Very well. Where can the said Fig. 1 go wrong? (For there are lots of people owning receivers very similar to this who may be quite satisfied with their results, although they are not nearly so good as they might be.)

Let us conduct an inquiry into your set. Can you tune in a station, however weak, take your hands away from the dials, lean back in your chair, and adjust the headphones comfortably on your ears without losing him? At a guess, I should say the odds against this are about three to one.

The "one" is lucky, and need not read this unless he wants to, but the "three" may well profit from a few suggestions. If your station disappears as soon as you remove your

expect from anything under 100 metres.

Last month I said quite a lot about the suitability of the various types of short-wave receivers for the different purposes for which they may be required, and I hinted that probably the best "general-purpose" set was a straightforward two-valver. This month I want to follow this up in the only logical manner by dealing

### STARTING FIRES BY SHORT WAVES



M. Stegen, a short-wave experimenter, and the apparatus with which he produces explosions or fires up to distances of about seven miles from a transmitter. The receiver is contained in the attaché case.

hands from the dials, you must do something about it; we can't put up with hand-capacity in these times.



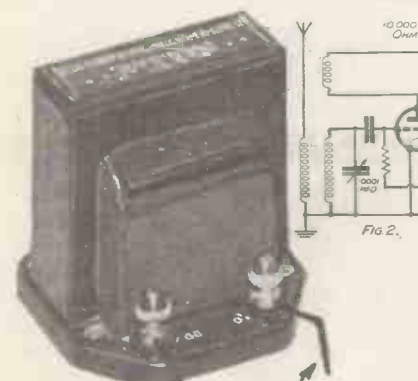
Line the underside of your base-board with copper or aluminium foil and earth it; back the panel with foil and earth it; remove your earth lead altogether and rely on the "capacity earth" effect of the batteries, if that makes things any better.

In short, play around with things until you can get rid of this hand-capacity effect *without* resorting to a dummy panel and extension handles on the condensers. Remember—and this is very important—that the use of extension handles does not cure hand-capacity. It only pushes it six inches farther away from you, and the inherent instability that is causing the trouble is still there, and may be spoiling your results in other ways.

### An Intolerable Fault

I have said this before, but it is sufficiently important to warrant frequent repetition. Even so, there

### HOW TO CURE A THRESHOLD REACTION HOWL



Two megohms across these two terminals generally helps.

**RESISTANCE BETWEEN G.&G.B. TERMINALS**

will be plenty of folk who don't believe it!

I don't propose to go into great details about the cures for hand-capacity, as they have been given so many times by several different writers. But *do* take some notice

of them, for hand-capacity is a perfect blight, and should not be tolerated in the smallest degree.

Proceeding a little further, try moving your head about, touching the phones and grasping the cords. Do you lose the signal now? If you do, don't, for the love of Mike, do as one man I know has done—add a note-mag. and use a loudspeaker! That hasn't cured the trouble; it has simply "shelved the question," as people do when they form a sub-committee that doesn't do anything.

### Remedies to Try

The first thing to do is to try choke-filter output, if you are not already using it. The next stage, if that doesn't cure it, is to connect a .0005 or .001 condenser from the plate of the last valve straight to earth; the earth on the set, that is—not a separate earth-lead.

If you are still unable to move your head about, put a small H.F. choke in series with each phone lead. Suitable chokes may be wound on lengths of wooden skewers about 2 in. long and  $\frac{3}{8}$  in. or so in diameter.

About 1 in. of No. 32 D.C.C., close-wound, stuck down with sealing-wax at each end, is all that is required. These chokes can be made on the kitchen table in five minutes after raiding the junk-box that is beloved of every true short-wave fan.

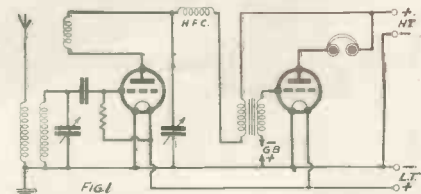
In extreme cases, these two troubles—hand-capacity and "head-capacity"—can lead one a fine dance. Cure

to all cases of trouble. Every set has to be treated on its own merits; but the few hints I can give should save a good deal of time and trouble once you do get on the track for yourself.

### The Thing that Matters

I cannot emphasise too strongly the fact that you *must not* put up with capacity effects of any kind if you want to get the best out of your set. The fact that they make operating difficult is not by any means the worst thing about them. There are no symptoms without a disease, and the disease has got to be found and thoroughly cured before the patient will ever be perfectly normal.

### THE BEST CIRCUIT



Probably the best general purpose set for short-wave work is a two-valver on the lines of this circuit, with which W. L. S. deals this month.

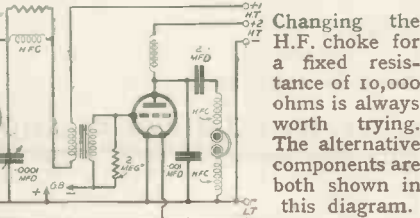
Now let us pass on to our other old friend—"threshold howl." Does your set go into oscillation with a noise as of waves lapping gently on the shore, or is it more like the Pool of London with four or five lusty sirens sounding at once? It's got to be a "seashore" set before it's right!

Never mind what happens when the set is oscillating hard and you increase reaction still further; any set will do funny things under those conditions. It is the actual threshold of oscillation that matters.

### Sets that "Hoot"

If your set "hoots" at this point, it should be stopped as soon as possible. One of the easiest methods of curing this is to connect a leak across the secondary winding of the L.F. transformer, but it isn't the best way of doing it. If a leak of 2 megohms will stop it, all well and good; but if you have to come down as low as .5 or .25 megohm you should try some other method, because by doing the shunting you will be killing the efficiency of your L.F. stage.

Remove your detector H.F. choke altogether and substitute for it a 10,000-ohm resistance. This is generally a complete cure, and one with no disadvantages, but it is not generally applicable to parallel-fed sets. As a matter of fact, I always use series-feed whenever possible, and



Changing the H.F. choke for a fixed resistance of 10,000 ohms is always worth trying. The alternative components are both shown in this diagram.

hand-capacity on the set and it flies up the phone leads. Cure the trouble there and you find it has gone back to the dials again.

I once spent two whole evenings on a really bad set, chasing this particular snag all over the shop. Finally, I did manage to chase it out of the window and right down the earth-lead, but it took some patience and some self-restraint!

### Saving Time and Trouble

You will, of course, appreciate that I can't sit here in my chair and write down infallible advice that will apply



## Tests from Crystal Palace on Five Metres

I strongly advise readers to do the same.

"Threshold howl" is a loathsome business altogether, because so many different things can cause it. But it can all be put down to the one word "instability," as can most of the troubles that arise in a short-wave receiver. Fig. 2 shows the "rejuvenated version" of Fig. 1.

You see, on 30 metres we are working with frequencies ten times as high as those with which we are concerned on the medium broadcast band, and they have every excuse for being ten times as troublesome.

Next month I want to go into the question of practical design for a really efficient short-wave two-valver. The circuit is all right; it is the means of putting it into practice that is so important.

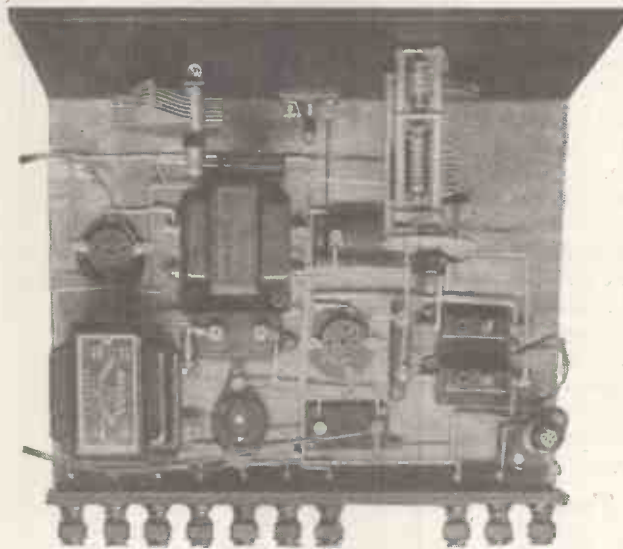
### The "Ultra-Shorts"

The waves of 10 metres and below are not coming in for much use nowadays, except for a large number of amateurs working in the region of 5 metres. This is essentially an "outdoor" wave at present, as so much more can be found out about it by establishing portable transmitters in clear spots and on the tops of hills than by trying to use aerials in town, surrounded by screening of all kinds.

During one week-end in May, Mr. L. H. Thomas (G 6 Q B), already

known to readers of MODERN WIRELESS, is taking a portable 5-metre transmitter and receiver up to the top of the North Tower of the Crystal Palace. With the help of two or three other amateur transmitters, he is going to keep up transmissions

hear him! Aeroplane experiments in the U.S.A. have proved that ranges up to 200 miles can be covered with ridiculously low-powered transmitters working on 5 metres. Mountain-top experiments have also been popular, but less so, on account of the difficulty



### TYPICAL TWO-VALVE SHORT-WAVER

The provision of an output filter on a short-wave set is a good way to overcome tuning alterations that occur when the wearer of the phones moves his head. On this set the choke can be seen at the left-hand end of the baseboard, and the fixed condenser to the right of this component.

throughout the week-end. Readers who have 5-metre receivers are particularly asked to look out for these transmissions, which will take place with interrupted C.W. and telephony.

Five metres is what we shall call a "quasi-optical" wave—if you can't see the other man you aren't likely to

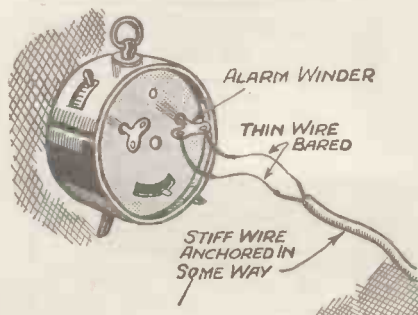
of getting heavy gear up to the said mountain-tops.

We haven't heard much of the B.B.C. 7-metre transmissions lately, probably for this same reason. I think it only needs a few active "hams" in this country to show what can be done reliably on 5 metres to wake things up once more.

No method of switching on a set or other piece of electrical apparatus could be simpler than the following. All you require is a bit of wire and an alarm clock.

The one stipulation is that the winder for the alarm should be of the type with two holes in it. Two short lengths of thin cotton or silk insulated wires are attached to these two holes

### WIRE ONLY NEEDED



So long as you happen to have an alarm clock, this time-switch will cost nothing.

### TIPS THAT TELL

How to make a time-switch, and a method of locking trimmers when set.

after the alarm spring has been twisted once or twice.

These thin wires are bared for an inch or so, and then connected to the two wires of a thick twin cable which is firmly held. When the alarm goes off, the winder twists round and so twists the two bared parts of the thin wires together, making a firm contact.

### Fixing the Trimming

Once a set's ganged condenser has been properly "trimmed," the trimmer should need no further adjustment.

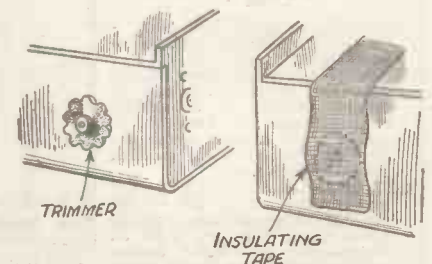
In many sets, however, the trimmer cannot be locked in position, and consequently there is a likelihood of

its getting accidentally mis-adjusted again.

One good way out of this difficulty is provided by an ordinary piece of insulating tape.

Warm the tape a little, pass it over the framework of the condenser, across the trimmer, and over the framework again, and the adjusting wheel will be held firmly until re-adjustment is required, when it is an easy matter to remove and renew the tape.

### WELL "TAPED"



The trimmer is easily unlocked if necessary by stripping off the insulating tape.

**"MODERN WIRELESS" TESTS**

# THE COLUMBIA RADIOGRAPH FOUR

*An outstanding all-electric Radiogram for A.C. mains—*

*—incorporating all the latest technique in up-to-date receiver design.*



The instrument is housed in a handsome cabinet, whose felt-lined lid eliminates all surface noise.

And even if it does, broadcast programmes are not made up entirely of violin solos!

WHENEVER radio-minded folk get together, it's ten chances to one that the conversation will turn round to the question of quality of reproduction.

One will argue that for absolute fidelity of reproduction it is vitally necessary to obtain substantially even response up to seven or eight thousand cycles; another will maintain that tuneful bass as opposed to a "muddy-thump" is the all-important test of a good instrument, while a third will probably put forward the point of view that naturalness of speech should be the deciding factor.

### The True Test

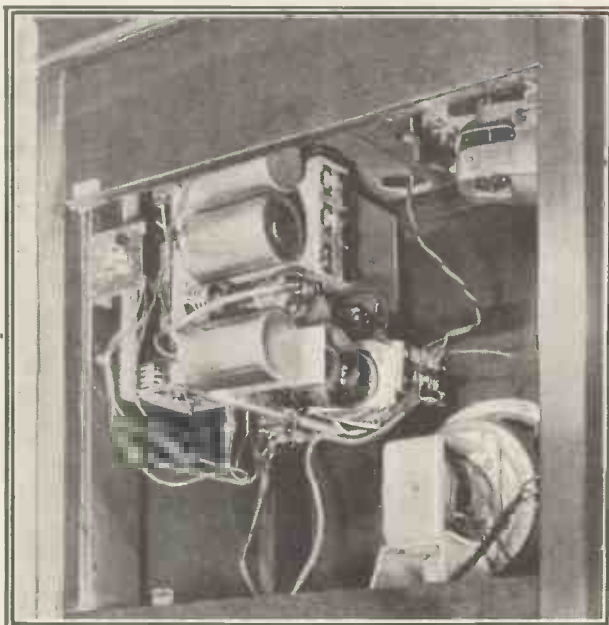
Of course, they are all right—to an extent.

But they have all missed the boat. It isn't directly a question of high notes and low notes or even of naturalness of speech. The whole point is—*does it sound like the real thing?*

Never mind about the frequency response—shut your eyes and become oblivious of your immediate surroundings and then ask yourself a simple question. Does it *sound* like a band? If it doesn't, then there's no argument about it—it's a rotten set!

Time and again you will hear people say: "Hark at that violin! Doesn't it sound wonderful?" Perhaps it does, but the point is does it *sound like* a violin?

### EASY ACCESSIBILITY A FEATURE



This unusual view of the "works" gives an excellent idea of the internal arrangement of the "Radiograph" Four.

Unless the double-bass sounds as much like a double-bass as the violin sounds like a violin, it is still a rotten set!

To get down to brass tacks, it's all a question of *correct balance* with, to touch upon a technical aspect, a width of substantially even frequency response adequate for the realistic reproduction of whatever is being transmitted. Broadly speaking, nothing else matters.

### Tone Purity

It may be wondered why we have elected to preface this set review with a nutshell lecture on quality of reproduction. Frankly, it is in order that you shall attach the proper significance to the words "original tone" as applied to the famous Columbia range of instruments, and in particular to the "Radiograph" Four which is the subject of the present review.

The Columbia people have consistently advocated that tone purity is the paramount consideration. They have not concerned themselves primarily with questions of sensitivity and selectivity simply because they understand the psychology of the listening public. The fascination of searching for distant stations in all but a few cases rapidly dies off, and the lasting test of a radio instrument is nothing more or less than quality of

*(Continued on page 467)*

### TABULATED DATA FOR THE—

**GENERAL DESCRIPTION.**—Self-contained all-electric radiogramophone for A.C. mains.

**CIRCUIT DETAILS.**—Four valves (including rectifier) arranged in circuit sequence of variable-mu S.G., detector and pentode output. Aerial selector switch for regulating selectivity is provided and tuning is ranged.

**CONTROL ARRANGEMENTS.**—For convenience all controls are mounted on gramophone turntable motor-board. The three knobs on tuning-scale escutcheon control (rear), four-position switch giving "medium waves," "long waves,"

### —TECHNICALLY MINDED READER

"gramophone" and "off" positions (centre), main tuning condenser, and (front) volume. Gramophone motor is actuated by automatic "stop" and "start" device.

**SPECIAL FEATURES.**—(1) Tone purity; (2) easy station selection; (3) "station names" calibration; (4) superb cabinet work; (5) provision for use of mains aerial.

**PRICE.**—32 gns. A.C. model; 34 gns. D.C. version.

**MAKERS.**—The Columbia Graphophone Co., Ltd., 98-108, Clerkenwell Road, London, E.C.1.





# On the TEST BENCH

*Our comments regarding some interesting new components.*

## One-Knob Tuning

WHILE it is necessary for us to extend warnings to constructors about the dubious quality to be encountered in many components, this is hardly the case with gang condensers.

We cannot call to mind any make of these components which are not at least adequately sound in design and construction.

We presume that the reason is that variable condensers, and particularly the gang types, are specialised productions, difficult to manufacture and not lightly tackled by opportunists.

But, of course, as with everything, there are the good ones and a fair sprinkling of "not-so-goods."

We definitely place the Lotus gang condensers in the first class. They are excellent components in every way.

Their frames are substantial and their vanes are rigidly mounted. The

reactions are closely matched and their disc drives operate with beautiful smoothness and evenness.

They are provided with clear, sharply engraved scales and neat escutcheons.

## A Screened H.F. Choke

Another new component due to Messrs. Ward & Goldstone is a screened H.F. Choke. It is styled the Type 5 H.F., and its first-class qualities enable it to function in special capacities such as for S.G. and variable- $\mu$  stages, and in filters and superhet circuits, over the wide waveband of from 15 to 2,750 metres.

It has the high inductance of 250,000 microhenries, whilst its D.C. resistance is 550 ohms. It is able to carry at least 50 milliamperes.

Non-rotating terminals are fitted, and the choke is designed for base-board and chassis mounting. It is sold at 4s. complete with extension terminals for adapting the component for sub-base wiring if desired.

It will thus be observed that it is a very well-designed choke, and that everything that can be done to make it highly efficient and widely adaptable has been successfully accomplished.

## Seeing is Believing

You work in the dark if you never

employ meters. Nearly every radio enthusiast probably possesses a voltmeter for battery testing, but that is almost forced on him.

A milliammeter is really quite as essential if first-class results are to be maintained.

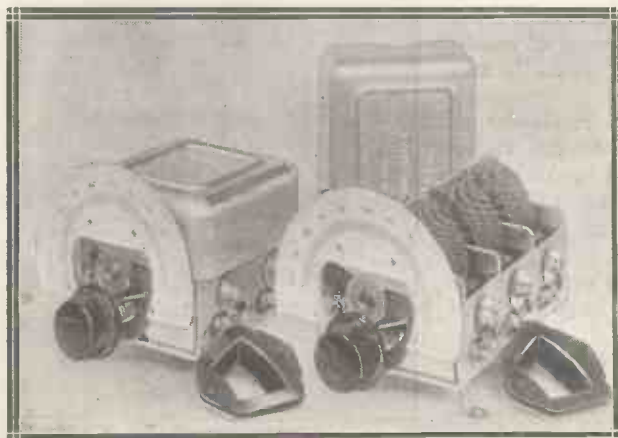


The latest "Goldstone" H.F. choke is fully screened, and its excellent characteristics suit it to S.G. circuits.

Many constructors mount them on the panels of their sets to provide visual indication of the H.T. current flow. This gives a check on the emission of the valves as well as on the condition of all the batteries.

In the case of a mains unit the output can be gauged and controlled in accordance with the conditions if a milliammeter is employed.

Messrs. Bulgin market an excellent range of inexpensive panel mounting



Rigid construction enables these Lotus gang condensers to maintain throughout long periods of use the high degree of matched accuracy they possess when leaving the maker's hands.

## Some Interesting New Radio Productions

meters suitable for all home radio purposes.

The one illustrated is an example of the type of milliammeter which is most suitable for permanent mounting on the panel of a mains unit.



An example of the excellent range of Bulgin panel-mounting meters.

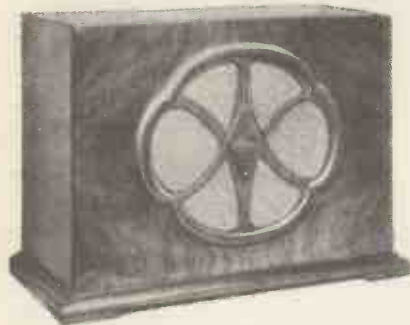
It is a well-made little instrument, perfectly adequate for the purposes for which it is designed.

### A Fine Loudspeaker

The famous trade mark of a dog listening to "His Master's Voice" issuing from a "phonograph," which appears on the front of the "Super-Power" H.M.V. loudspeaker, is a clear reminder of the historical traditions of the great gramophone and radio concern.

The loudspeaker itself provides more than ample proof that H.M.V. can still maintain its position in the van of progress.

It is a magnificent instrument of the permanent magnet moving-coil



This permanent magnet moving-coil loudspeaker is housed in a manner which worthily maintains H.M.V.'s reputation for excellent cabinet work.

type, able to handle with faithfulness any input from that of a small two-valve set up to a power of ten watts.

Although specially designed to operate in conjunction with H.M.V. instruments, it has a universal transformer enabling it to be used with any receiver or amplifier.

This transformer is built on to the chassis, and is adjustable by means of two metal links and a small plug for :

1. All three-electrode output valves used on domestic receivers.
2. All pentode valves.
3. Adjustments whereby the transformer may be directly connected to the anodes of push-pull valve arrangements.
4. Cutting transformer out of circuit for direct attachment to instruments in which a transformer is already incorporated.

Among the other special technical features, it should be noted that the cone is manufactured in accordance with a special process developed by H.M.V., and is treated to resist all atmospheric and climatic changes.

Original methods of fixing and connecting the coil ensure complete freedom from disconnections, turn-loosening, and other such troubles as are liable to affect many ordinary speakers in the course of time.

Also the coil is automatically centred, and the very handsome walnut cabinet has been scientifically designed to avoid resonance.

In short, it is a first-class example of modern loudspeaker technique, and at the price of £7 10s. is a most attractive accessory from every point of view.

### Q.P.P. Tone Control

Messrs. Ward & Goldstone have produced a tone control for connecting across the output of a Q.P.P. stage.

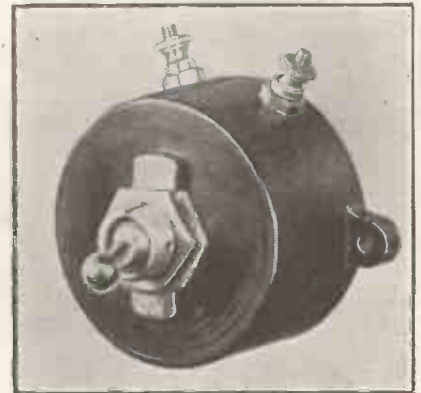
It is a neat one-hole panel-mounting device with a small Q.M.B. switch allowing for a change-over of conditions as between "radio" and "pick-up."

In the first case a condenser of .005 mfd. and a 20,000-ohm resistance are operative, and the resistance is replaced for one of 5,000 ohms for pick-up working or for heterodyne whistle elimination.

No electrical breaks occur on the change-over, so that large voltages cannot build up owing to an "opening" of the loudspeaker circuit, and loud clicking and grating are obviated.

The values of the component parts of the "Goltone" Q.P.P. Tone Control have been carefully chosen, and its results are therefore excellent.

As the "live" parts of the switch are insulated from the frame, it can be mounted on a metal panel.



Control of tone with Q.P.P. receivers is neatly and efficiently provided for by this new "Goltone" fitment. The price is 5s.

### The Celestion P.P.M.29

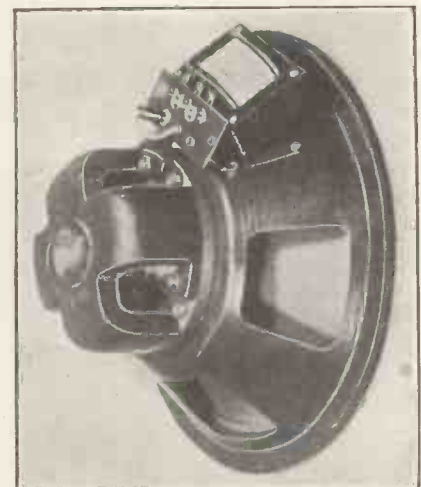
This is one of the larger members of the fine Celestion range of permanent magnet moving-coil loudspeakers.

Its whole construction is on robust lines. There is a massive cobalt magnet, and the diaphragm has a diameter of 10 in.

Also of particular interest is the fact that the universal transformer which is fitted is of far more generous dimensions than is often the case with modern M.C.'s.

Many lose greatly in efficiency through the use of a transformer of inadequate design. But, of course, it was not likely that Celestion would fail in that regard!

(Continued on page 470)



In their P.P.M.29 permanent magnet loudspeaker, Messrs. Celestion have provided a luxury instrument at an exceptionally low price.





# Sorting Out the New Valves

**A** MIDST the welter of rumour and reports of floods of new valves which are going to be offered to the public during the next few months, it is well to try and get our heads above water for a moment and look round to see exactly where we are in the fast rushing stream of valve progress and development.

In the first place it must be realised that, although most of these projected new valves do definitely mean advance in receiver circuit design, it does not necessarily mean also that all the existing valve types, which are so faithfully doing their duty in sets at the present time, will immediately be thrown out high and dry on the banks as obsolete and antiquated. As is usual with a new valve type, the best results with it are never obtained unless used with a specialised circuit.

### The Certain Remedy

When the variable- $\mu$  valve was introduced to this country some two and a half years ago it was hailed as a certain and immediate remedy to all the ills of bad selectivity, and much misleading information was given about it in the lay press.

The variable- $\mu$  valve has proved its worth as one of the most important additions to the valve range, but only by the accompanying progress and development in circuit design to suit the valve, and it is still true that there are sets where the variable- $\mu$  valve does not offer an advantage. So that the new valves, when they appear, should be taken in a sane and rational manner as a means to a step forward in receiving sets designed for them, but as not necessarily throwing overboard their more firmly established brothers.

### A REVIEW OF THE LATEST DEVELOPMENTS AND THEIR APPLICATION TO FUTURE SET DESIGN.

Bearing this in mind, then, let us see what are likely to be the main features in set designs which will be affected by the so-called new valves during next season.

What are the fundamental operations effected in any broadcast re-

2. Voltage amplification.
3. Transference of voltage into A.C. power.

In every set these three functions are carried out by the valve and its associated circuits—different designs of valve being better suited for one purpose than the other.

In a consideration of what any new valves could do to benefit us in receiver design, let us consider such possible improvements under each head separately.

### A Queer Effect

(1) *Detection.* Have you experienced the effect, when tuning up to a loud station, that, just at the point of tune on the dial, the signal which had been increasing in strength suddenly gets weaker and very distorted? Such a state of affairs is probably a failing in practically all present-day receivers, and simply indicates that the pre-detector, or H.F. amplification, for a given signal strength is too great for the detector to stand without overloading—that is, running into a combination of grid and anode bend rectification and thus causing violent frequency and amplitude distortion.

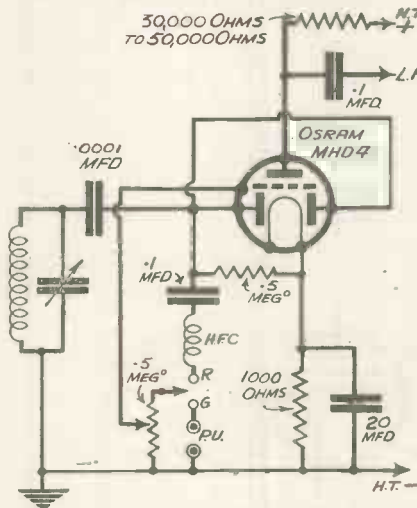
### Distortionless Detection

The only method of increasing the amount of H.F. input voltage a detector will stand without distorting the rectified L.F. voltage is to design its electrodes in such a way that its rectified output is directly proportional to its H.F. input for a very wide range of signal strengths.

This can best be done by avoiding any attempt at *amplification* in the detector, or, in other words, by making it in the form of a *diode*, or two-electrode valve.

Such a valve may be made to give exceedingly distortionless detection

### DOUBLE DIODE TRIODE



The Osram M.H.D.4 double diode triode is here shown connected for simple diode rectification with provision for a gramophone pick-up. The heater wiring has been omitted for the sake of simplicity.

ceiver in which some modification to existing valve design could be used to make an improvement? The three main operations taking place are:

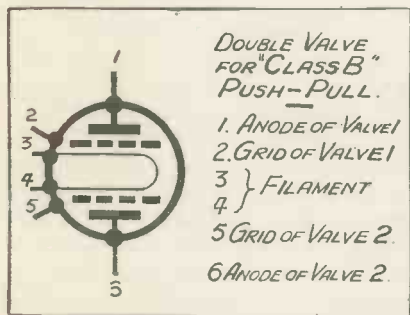
1. Detection, or de-modulation.

even for a very strong signal, but as it contains no amplifying element, the L.F. voltage output will in general be less than that from our good old leaky-grid triode detector, and an additional L.F. valve will usually be required before the loud-speaker valve.

**Midget Diode Anodes**

Here is where one of the new valves will step into the breach—it will combine the diode rectifier and the L.F. amplifier in the one bulb. An example of such a valve is the Osram double diode triode, which will be marketed by the

**FOR POWER OUTPUT**



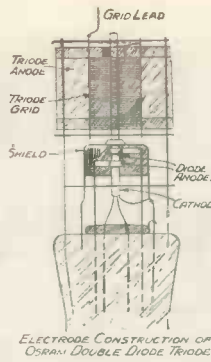
The special double valves used for "Class B" amplification are virtually two triodes in one bulb. The introduction of these valves enables the battery user to obtain a power output comparable with that given by a mains design.

General Electric Co., Ltd., this valve being made with two midget diode anodes surrounding the same cathode as used in the triode amplifying element, but these anodes are very carefully shielded from the amplifier.

**Automatic Volume Control**

Thus, the double diode triode in its simplest application gives a method of getting over detector distortion without loss of L.F. amplification. It may be applied to more complicated circuits designed to overcome fading and maintain the detector input voltage more or less constant, this being known as automatic volume control; but this is too wide a subject for inclusion here—doubtless readers of MODERN WIRELESS will be given the full explanation and practical applications of automatic volume control circuits in due course; such a subject, fascinating as it is, requiring to be tackled with caution and much preliminary experimental work.

A feature of the double diode triode is that, unique among British valves, the grid connection will be, in all probability, taken to the end of the bulb. With the double diode triode



**ELECTRODE ARRANGEMENT**

The double diode triode has two midget diode anodes surrounding the same cathode as used in the triode amplifying element. These may be clearly seen in the sketch.

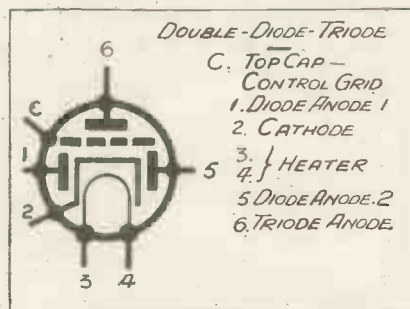
this method of electrode connection has been agreed on as offering certain advantages in circuit design.

Under the head of detection also must be included the process of modulating the oscillator of super-heterodyne sets, such a valve being commonly known as the "1st detector" in superhets. For this purpose it is possible that the pentode will find an application, particularly in a new form of design incorporating modifications to the electrode system and method of connection, by combining the functions of the oscillator and modulator (or first detector) in the one bulb.

**Variable-Mu Pentodes**

Such valves, which may be styled H.F. or screen pentodes, are to come into prominence and consist essentially of our old friend the L.F. pentode, but with a different order of inter-electrode capacities and with the anode brought out to the end of the bulb instead of to a pin in the base. These pentodes are to be available also with a variable-mu characteristic similar to screened-grid

**THE CONNECTIONS**



In the double diode triode the grid connection is taken to the top of the bulb. This terminal is marked "C" in the above diagram.

valves of the variable-mu variety—a fact which makes them applicable also to the next heading on our list.

**2. Voltage Amplification**

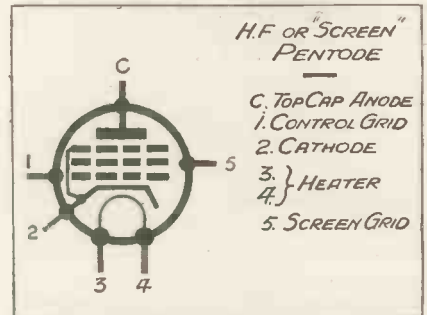
This occurs in any set employing

either a stage or stages of high-frequency or low-frequency amplification, and in the case of superhets in the intermediate-frequency amplifier.

**Remarkably High Standard**

On the L.F. side the principal difficulties at present encountered are those of hum in mains valves and microphonics—the former also largely a question of circuit design. Modern voltage-amplifying valves, both battery and mains types, represent a really remarkably high standard of non-microphonicity and allow very small room for improvement, while

**USED IN H.F. AMPLIFIERS**



Designed primarily for L.F. amplification, the pentode has now been rendered suitable for use in H.F. circuits of certain types.

developments in heater design are continually taking place to remove the blame from the valve where hum occurs in mains sets.

It is in the H.F. and I.F. stages that the projected new valves will show up to most advantage. In such cases the variable-mu valve is almost entirely supplanting the straight variety, owing to its ability to deal with widely differing signal voltages without modulation distortion, or, in other words, to allow of grid-bias volume control without distorting the amplified voltage.

**No Alternative**

Of course, there is no alternative to the use of screened-grid valves in such stages where low values of grid-anode capacity are so important. Changes we may expect in variable-mu screened valves for H.F. and I.F. voltage amplifiers are twofold:

1. A reduction in the working grid base to effect the required reduction in mutual conductance which gives us volume control.

A fortunate coincidence is that with correctly designed variable-mu valves, particularly those of high slope, such reduction in grid base, while increasing the degree of control desirable in many circuits, may considerably

(Continued on page 472.)





# IN PASSING

## Assorted Jottings on Radio Themes

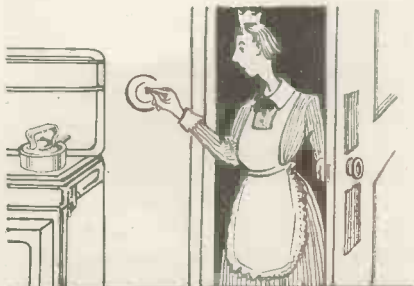
**I** BELIEVE that the warning, which was the subject of a series of articles in a daily paper in February, bidding us beware the growth of a mental dictatorship wielded by the B.B.C., received less attention than it deserves, probably because we are already slightly under the influence of the latest narcotic, Beebicine.

Just let us look for a few moments at the development of this dictatorship. It began with a wireless transmitter in a London office, an early pattern microphone, a handful of amateur "uncles" and "aunts," and used to broadcast the most innocent little programmes that ever bored a Mothers' Meeting.

### Began to Wag the Dog

But one day it became a Corporation and was taken under the command of the Big Corporal, who saw that Fate and a little judicious persuasion had given him a lever to play

### MAID GOES INTO SCULLERY



The maid can be followed round the house by the "pops" the electric-light switches cause in the 'speaker.

with which could move corporals and other things slowly but surely.

It was not long, therefore, before the tail began to wag the dog, and

the thing which the radio trade had created forgot almost all about the radio trade and even began to pipe gently but firmly to the public, that the public might dance.

Next, the Corporal became First Consul—I can't get the Napoleonic parallel out of my mind—and got a coat of arms and a motto, not to mention an Official Bathroom.

And now, you will observe, the children must speak as the B.B.C. dictates and must learn their lessons

### The B.B.C. as Dictator—A "No-Radio" Film—Hitler's Ether Backwash—"Pop" Goes the Electric Light—Radio Jumbling—Just Two Records.

by radio. The B.B.C. literally imposes its will upon us, it is above criticism or correction, everything which it does can be explained—if you will enclose a stamped envelope—and everything else is jolly fine and large.

It is now thought that the B.B.C. will design, manufacture and deliver to us its own type of music-hall artiste, purged of original sin and the tendency to "gag," every "h" in position, every flash of inspiration carefully sterilised by a decinormal solution of Beebicine.

### No Idle Scare

Nay, it has been rumoured, though from biased sources, that the B.B.C. is seeking to control greyhound-racing, chiropody and "running." This shows you that the cry "radio-cracy" is pregnant with prophecy and is no idle scare.

I saw the film, "Cavalcade," recently. It is so good that it causes one to forget that such things as radio, America, money and Hollywood exist. Yes, even in the *Titanic* scene there is absolutely no reference to wireless, an omission which surely must have

made the producers develop supernatural blood-pressure during their efforts at self-restraint.

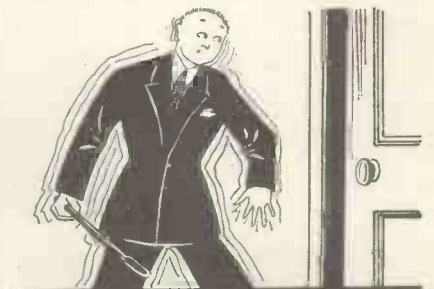
### Case for Suicide

It is whispered in "film circles," with what little truth I do not know, that an acting-deputy-assistant Continuity Controller tried to drown himself in Mack Sennett's bathing-pool because the young couple on the *Titanic* were not supposed to be going to spend their honeymoon in Chicago. But then, you know, he had only just been promoted from Supernumary Megaphone-drier.

According to my receiver the recent introduction of the Hitler regime of liberty, equality, and fraternity has done nothing to abate the flow of German which swashes about in the background of the London Regional. On the contrary, it has given it a sort of Spring Tide; the words are some 3·769 inches longer, on the average, and there is a note of swastika-consciousness in the oratory.

I have been listening to all this because I thought that one evening I might hear, "You will now hear the sound of an explosion in a Berlin

### A DINING-ROOM "POP"



Accompanied by a poker and a fine perspiration.

Department Store containing five Jews and a Rosierucian named Israel Rosenbaum. This comes to you by courtesy of the Nazi Ersatz Press-freheit Corporation!"

## A Hydrometer for an All-Mains Set!

Every time an electric light in my house is switched on or off there occurs a *pop* in the loudspeaker. When this backchat first began to be noticed we exhausted our vocabulary in about three evenings. But then I made a discovery which proved the truth of the proverb, "It's an ill wind," etc., and I pointed out that, after all, it was not so unpleasant and certainly more controllable than the B.B.C.'s time "pips." You see, I had found a first-class electricity saver.

### Boy in Bathroom

It works like this. *Pop.* That's the maid entering the kitchen to get "Home Hints" from the dresser drawer. *Pop.* It's not there and she's looking for it in the dining-room. *Pop.* That's Ethel. She's gone to her room to dress for "gym." *Pop.* Maid has switched on in scullery. Lights are now "on" in kitchen and dining-room. Better tell her about it—tomorrow. *Pop.* Boy in bathroom. It can't be washing, so he must be hunting for one of my razor blades. *Pop.* He's got it and I shall find it tomorrow on the floor of the lounge. *Pop.* Wife in nursery. There are now five lights "on" besides mine. This must stop, etc., etc.

One evening while my wife and I were sitting alone in the house listening to Mühlacker and the ghost of London Reg., *pop* went the loudspeaker. This made me suspect that the maid had sneaked in the back way to scrounge a few cigarettes for the "pictures." "She's gone home," said my wife. "Are all the kids out?" "All! What do you think I am—a baby farmer," replied my partner. "Well, then—it's a burglar. He's after the silver. I'll swear that was a dining-room *pop.*" (*Sensation.*)

### Maybe I'm Wrong

Accompanied by a poker and a fine perspiration I toured the whole house, but found no burglar, though I discovered that the boy had left his bedroom light "on." It took me weeks to realise that the mysterious *pop* came from *next door!* Maybe I have misjudged my folk.

Although I would never criticise my wife adversely, except behind her back, I think that it is unfortunate that she chooses some of the most critical moments of my life in which to drop domestic bombs. When I am

standing, insecurely enough, on the top of a pair of steps, trying to hitch a picture cord over its hook, she will say:

"I suppose you know that the boiler has burst," or "Has Ethel told

### A CRITICAL MOMENT



"But this is a Radio Jumble Sale!" said my wife. "That's worse," I replied.

you that she broke your new camera to-day?"

Last week, while I was pruning the roses and had both hands deeply immersed in a bush with thorns like fish-hooks, she suddenly asked me if I would accompany her to a Jumble Sale.

### Long Skirts and Stage Coaches

"Good gracious," I said, after saying what I did say to the thorns, "I thought those things went out with long skirts and stage coaches. Anyway, I don't want to buy any jumble. I never cared for it and I think it ought to be put down."

"But this—"

"I can't help it. There is no place for jumble in my life. It has passed me by. Look at all this blood! And

### HIS DUAL STAGES



"A corn dealer's manager by day and an amateur conjurer at night."

you've made me prune this rosebush too much. I'll bet I've left only a few root-hairs on it."

"But this is a Radio Jumble Sale!"

"That's worse. They're selling

sets like that every day. Don't we get enough jumble on ours as it is, or do you want nine stations at once? You've trodden on a viola. A *Mrs. Jorkins*, too!"

"Well, I shall go by myself."

### Just the Thing!

When my wife returned, she flung herself on to the tea and muffins like a pack of wolves, and when she was able to breathe she proudly handed me a glass hydrometer.

"There you are," she crowed. "Just what you said you ought to have."

"Thanks—so much. Cheap at five bob! But you surely remember that I stopped charging my batteries years ago. *We are all-mains!* Why do you think I want this? (Have another muffin.)"

"Didn't you say that you ought to have a push-pull?"

"I did. And what about it?"

"There you are, then. This is it."

"My dear, this is a suction hydrometer."

"Well, I thought 'push-pull' was slang for squirt."

And nothing, brothers, absolutely nothing, can be done about it.

I will conclude this recital with a gramophone problem. The man next door is a corn dealer's manager by day and an amateur conjurer at night, which last fact is a source of irreverent amusement to the younger members of my household.

### What is the Connection?

But the problem is this. Twilter has a fine radio set, but only his wife uses it. He has a gramophone, too, and, so far as I have observed, only two records, one being "Christians, awake," and the other a Negro spiritual entitled "Water, boy." He seems to fly to one or the other for comfort or strength, as some men fly to the "Demon Rum."

Just think! Corn, conjuring, "Christians, awake" and "Water, boy." What is the connection, if any, between the first two and the last two? Does the corn make him thirsty and the conjuring sleepy?

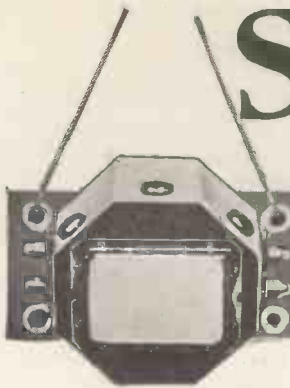
I leave this to your penetration and judgment. "Water, boy" has just started up and is coming through strongly, clearly and with the proper seasoning of phaintiveness. Evidently the corn has been rather dusty to-day.

H. B.



# SPOTLIGHTS

DAYS PROGRAMME



# ON THE PROGRAMMES

## He Couldn't Sing—Much!

WALFORD HYDEN, who is the genius behind the latest broadcasting team—The Magyar Orchestra—had an amusing story to tell me the other day about one of his earlier appearances in the studio.

Just as a concert was due to begin, Hyden had a message to say that his vocalist had been taken ill. A substitute had to be found at a moment's notice, and Hyden, tearing his hair with anxiety, rushed into the corridor and called to the first man he met, "I say, can you sing?" "Not much," said the stranger, gloomily. "I wonder if you'd come into the studio for a try-out."

Hyden sat at the piano while his companion sang the music which had been thrust into his hands.

"That really wasn't at all bad," said Hyden when they had finished. "Do you mind telling me your name?"

"Not at all," said the other; "Melville Gideon."

## The B.B.C.'s Great Tragedy

In the depths of Broadcasting House, hidden away in a basement, lurks the great tragedy of the B.B.C.

There you will find a very nice studio (Television Studio BB), and a very enthusiastic young man (Television Director Eustace Robb). On four evenings in every week the enthusiastic young man leads to the very nice studio a collection of famous people. People like Jeanne de Casalis, Mabel Constanduros, General Critchley and John Tilley. Sometimes he even runs to a complete play with a distinguished cast.

But however hard Eustace Robb works, however distinguished may be

the people he brings to that studio in the basement, it is a sad fact that only about 1 per cent of the people who hold wireless licences can enjoy the programmes.

What a tragedy!

## The Correct Atmosphere

Ernest Longstaffe, who went all sporting last month with a pro-



## THE CAUSE OF THE TROUBLE!

Eric Gill's much heralded sculpture of Prospero and Ariel which now adorns the entrance to Broadcasting House. Indignant M.P.'s have asked questions in the House about it. What do you think?

gramme called "The Saturday Game," is nothing if not thorough. In order to get the correct atmosphere for his scene on "Darts," he set himself to scour a large number of our country inns, sampling their supplies en route.

I can imagine worse ways of working on a radio programme, but other producers in their search for reality appear to have been less fortunate. That is, if we are to judge from the feeling way in which certain scenes were written in a recent production which involved "a little rough weather in the Bay."

## Getting into Bad Habits?

We can put up with a good many things from the B.B.C., but deception in any form we consider as "bad, you chaps, bad form," as the Western Brothers so well express it.

Hardly was the ink dry on last month's MODERN WIRELESS, in which I defended the B.B.C. from the unjust criticisms of a certain radio critic who insisted (quite wrongly) that A. J. Alan had been broadcast via the Blattnerphone, when I heard rumours that there had been occasions on which certain items had been "blatted" without any statement to that effect.

Whether these rumours were true, I don't know, and I shall not trouble to find out, but I would say that unacknowledged Blattnerphone programmes are not going to increase the popularity of the B.B.C. even with its staunchest listeners.

Such conduct brings the B.B.C. on a level with Continental "sponsored" transmitters, which make no bones about playing gramophone records and announcing them as though the artistes were actually in

## Humour Which Drives Us to Honegger!

the studio. Not a very high standard to aim at, surely?

### Why We Switch Off

Here's a fine specimen of the kind of thing which passes as subtle humour in the best B.B.C. circles. It is taken from one of last month's productions which, out of the kindness of my heart, shall remain anonymous.

Bookmaker: "I'll lay on the field—I'll lay on the field!"

Spectator: "What's he want to lay on the field for in this weather? He'll catch his death of cold."

I can just see you all rolling about in your chairs with uncontrollable mirth. It is such bright writing as

thinks) are not given an overwhelmingly generous portion of the week's fare. When occasions do arise for a feast of dramatic entertainment, I can see no reason for anything but rejoicing.

Incidentally, the four plays referred to took up exactly two hours of programme time, with a generous interval between whiles. Less than any theatre performance. Radio drama "knockers" will have to think up some better indictment than this if they are looking for any sympathy in this quarter.

### The Aloof Sir John

Sir John Reith, dictator of the B.B.C., is a great man, looked upon

prove that the Director-General is not so busy being Director-General that he forgets all about us poor listeners.

### All Open and Above Board

Last September, when a certain Dr. John Baker was engaged by the B.B.C. to give a talk on the meeting of the British Medical Association, I urged the Talks Director to let us hear this delightful and persuasive voice again.

Dr. John Baker's recent series of talks—"Biology of To-day"—have been far and away the best series I can ever remember from one individual. His frank, open and (to some people) revolutionary talks must

#### In the Programmes

### JOHN TILLEY

John Tilley is that *rara avis*, the amateur comedian turned successful professional. His first appearance at the Windmill Theatre in 1932 was more in the nature of a joke than anything else; but the joke was on Tilley, for his name is now a household word in theatrical and radio circles.

He has now broadcast ten times; listeners will never be able to enjoy fully his best sketch—"Selling a Tobacco Pouch"—which must be seen to be believed.

As if a week of non-stop variety, with microphone engagements thrown in, was not enough, Tilley spends all his weekends appearing at seaside concerts. His most popular turns are "The Scoutmaster" and the "Colonel who explains the Army Estimates."



Tilley has a style all his own which suits the microphone to perfection. He is far better "on his own" than in sketches with other people.

He likes Scotland for holidays (he forgets when he had his last), and fishes when he is not playing golf. He proposed to his wife in a taxi, married her with a temperature of 103, and had to wait several months for his honeymoon.

Last week, in between two shows, Tilley dressed hurriedly and went out to Piccadilly to buy a present for his wife. Found the assistants looking very amused when he went into two shops and wondered whether he wasn't more famous than he thought. Got back to the theatre and looked in the glass. Found he had forgotten to put on his tie!

He once owned a kitten, but it was given away "for—er—domestic reasons."

Tilley takes no credit for his success and says, simply, "I have been very lucky."

this which drives us to evening poetry readings or the works of Honegger.

### That Drama Question

I have heard very few complaints about the B.B.C.'s policy of relaying Promenade Concerts in their entirety on every night in the week during the season.

And yet, as soon as it is announced that four plays are to be produced on one evening—an event which occurs once in a blue moon—I am inundated with outbursts of wrath.

Lovers of radio drama (and they are more numerous than you think, more numerous even than the B.B.C.

with awe by submissive listeners. Perhaps it would be as well if he made some attempt to become a little less awesome so far as we listeners are concerned. A friendly word now and again would be greatly appreciated and would help to dispel the rumour that Sir John doesn't exist at all, but is just a convenient figurehead, like the statue of Prospero over the entrance to Broadcasting House.

As a matter of fact, since Sir John came well out into the open at a dinner given in his honour and was fully reported in the Press, some of us are beginning to wonder why his voice is not sometimes heard over the microphone. We do not ask much; just a kind word or two, to

have done any amount of good, while Dr. Baker's manner must have disarmed the criticism of even the most supersensitive puritan.

Another series in the same vein, besides being a delight to listen to, would do much to discredit the hole-in-the-corner methods of those who consider that Biology is not a fit subject for children to discuss with their parents.

### Best of the Month

Our thanks for the past month are divided between Sir Dan Godfrey for a succession of first-class Wednesday afternoons, and Vernon Bartlett for his talks on Germany and Poland.

PATRICK CAMPBELL.



# A VISIT TO The TELEVISION STUDIO



**M**R. ROBB, an enthusiastic young man engaged by the B.B.C. when the Corporation first contemplated television broadcasts, is the Big Noise in the Broadcasting House basement during the television broadcasts.

He is the Television Director.

### Fascinating to Watch

I have often seen him at work in the basement studio of Broadcasting House during the rehearsals for the television broadcasts, and he is a veritable source of enthusiasm and of concentrated energy. It is fascinating to watch him putting the artistes through their paces, instructing the men in charge of the scanning mechanism, arranging photo-cell and microphone positions. He does it all with the keenness of a schoolboy.

That is during rehearsals.

In the ordinary way entrance is absolutely forbidden to the studio during an actual broadcast, and so I was particularly gratified when, in view of the public interest in television competition, I was invited to see how a television broadcast is carried out.

### Studio BB

Let me describe the studio to you.

It is studio BB, in the basement of Broadcasting House, and

*Even if you have not had the opportunity of "looking in" to the B.B.C. television broadcasts, you have probably heard the sound part of them. You will be interested, therefore, in this description of what goes on in the basement Studio BB at Broadcasting House.*

By A. ASHTON STEWART.

was used by Henry Hall and his Boys before they were driven out by the television enthusiasts. BB is in one corner of the studio tower and is a little more than half as big as the BA studio normally used for vaudeville.

BB faces a lounge in which the artistes carry out a last-minute rehearsal, and it is also close to the

special dressing-rooms where the artistes have to apply their heavy make-up. But more of this anon. It is next door to one of the engineers' listening rooms, and on the other side of the corridor is the B.B.C. strong room!

### Under the Clock

Inside, the television studio vaguely resembles the vaudeville room next door. It has the usual predominant grey futurist decoration and the same robot-looking indicator lights. There is a rectangular clock in a panel on the wall with studio indicator lights at the bottom of it, and, à la modern B.B.C style, it has plain blobs instead of figures.

Just below this futurist dial on the wall is the window of the listening-room, and it is in here that the "works" of the television transmission takes place.

While Robb presides in the studio, one of the control-room men works in the listening-room.

### The "Stage"

The furniture of BB is simple. There is a piano in the corner, a strip of flooring which forms a stage for the artistes, and a moving screen which can be adjusted for "long shots" or "close-ups."

The four photo-cells (or rather banks of photo-cells) are on telescopic stands with little wheels.



CHANGING FASHIONS IN AN AGE OF CHANGE

Mannequins from a famous dress establishment parade the latest fashions under the all-observing eye of the television transmitting apparatus at a recent B.B.C. evening broadcast.

## The First Transmission is Most Tricky

The engineers move these stands about to get the best pick-up from the reflected light beam. Two of the photo-cell groups have six slots and two have four slots. The photo-cells are contained in rectangular box-like objects, metal screened inside, which can be swivelled round to face the artistes.

### Exceptionally Good Quality

Heavy multiple cords trail off from the photo-cell banks before special insulated plugs down on the wainscoting of the studio, leading through to the amplifier racks which are temporarily housed in the listening-room.

They are using the new bomb-shaped condenser microphone in the television studio. As you've probably noticed, the quality of speech and music in these broadcasts is exceptionally good.

### Artiste's Make-Up

One of the features of Robb's programmes is the inclusion of a big cast. He is so enthusiastic about television that he has managed to get the programme staff enthusiastic, too.

The lounge outside BB is full of artistes, heavily made up. The make-

up is not good to look at. It consists chiefly of bluish smudges on nose, chin and cheeks. This is to counteract the peculiar colour sensitiveness of the photo-cells.

### By Candle-Light!

Inside the studio is practically dark. The ordinary indicator lights on the wall might interfere with the photo-cell pick-up, and even the pianist can only be spared a little reading lamp. In the first days of television he had to use a candle!

### No Room to Spare

Out in the centre a studio official is busy covering the check-patterned dance floor with the thick carpet on which the ordinary artistes stand. The striking check floor is only used as a kind of background for televised dance and acrobat turns.

There is really not much room to spare in BB, and one has to trip warily over the heavy cables leading to the "mike" and to the photo-cell stands.

Inside the listening-room the mirror drum is being run and the powerful lights started up. The pencil of light covering the opening of the listening-room window gives a faint illumination in the studio.

It is impossible to signal in this half light. The people in the studio maintain communication with the control operator by means of switch keys.

A button is pressed. The scanner is moved into position. Slowly the microphone input control is turned.

### Powerful Amplifiers

The first television "act" of the evening is on.

The first transmission is always the most tricky. The engineers find that the photo-cell amplifiers are more tricky to adjust than the microphone amplifiers.

The overall amplification or "gain" is much greater, of course. The photo-cell amplifier is very carefully screened, each stage being in a separate compartment and with even more adequate decoupling than is usual in B.B.C. gear.

### Reception Points

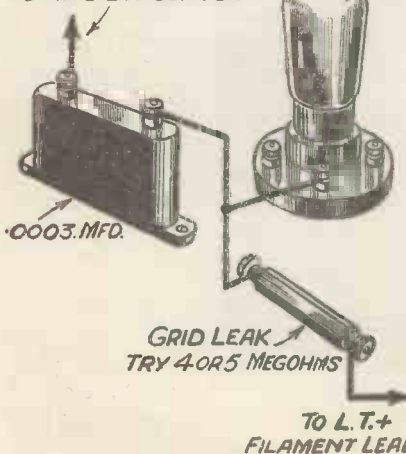
In a listening-room upstairs a check receiver is worked to give an idea of the quality of the transmission. There is also a television receiver in the press listening-room. On special occasions the Nightingale Lane research engineers tune-in to the television transmissions.

### Better Results from Small Sets

LISTENERS who own small sets such as those of the single or two-valve type are invariably seeking ways and means of improving their results from distant stations.

Given a good aerial coil and a

TO "F" VANES OF TUNING CONDENSER



### HINTS FOR BATTERY-SET USERS

Practical suggestions which you can try with your receiver.

smooth reaction effect these little receivers will literally work wonders, but many of them can be "gingered" up by using a grid leak of a higher value than the 2 megohms usually specified.

This value is actually the most suitable for all-round reception, which, of course, includes long periods of local station listening. For purely distant working, however, it is often beneficial to use a grid leak of 4 or 5 megohms, the improvement being noticeable chiefly on the weaker Continental transmissions.

### Curing Dithers

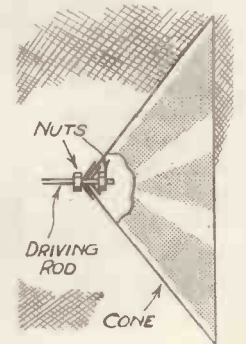
Although dithers and rattles from the loudspeaker are all too often caused by overloading the last valve

—perhaps through using the incorrect grid bias, or insufficient H.T.—there is one possibility that must not be overlooked when the speaker is one of the moving-iron cone types.

An examination of the speaker will reveal a cone, usually of parchment material, which at its apex is attached to the unit driving rod by means of brass washers and small nuts.

If by chance one of these nuts should work loose, the driving rod will be free to vibrate and irritating dithers will emanate from the speaker.

The remedy is to see that the nuts are quite tight, but they must not, of course, be tightened up so much that they strip the thread or distort the cone.







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## CHOOSING RECORDS

*Some sound advice on selecting records of which you will not tire, with notes on some recent releases of special interest.*

WE all know those libraries with their complete editions of famous authors, beautifully bound—and often uncut! How much pleasanter the shelves of odd books, each bought with discrimination, each fulfilling the purpose for which it was written—the ministration to an occasion or mood. Real culture, this, although the cheap thriller is a near neighbour to a philosophical volume!

### The Solution

A gramophone record library should be governed by similar considerations. Now, every radio listener is a potential gramophone enthusiast; in fact, thousands of set-owners use pick-ups with their sets as substitutes for radio-gramophones to be purchased later. For here lies the solution to the only shortcoming of radio—the listener cannot be allowed encores!

What principles should be followed in choosing records? Naturally, individual taste will largely determine the class of selected music, as is the case in book-choosing. But this is not quite the right way to go about it.

Remember that a record will be heard very many more times than a book is read, and must consequently "wear" better in the purchaser's affections. If, then, one continues to "collect" only *light* music (as one buys fiction for perhaps two readings), a time will come when even favourites begin to bore.

### Unlimited Pleasure

This unhappy state of affairs is easily avoidable. Because music is the most catholic of all the arts, and within the average listener's capacity of understanding, increasing enjoyment comes with wider acquaintance. But does this seem "highbrow"? Not a bit of it!

The healthy, normal being can enjoy a symphony and good dance music: if he cannot, there is something wrong in his composition.

Even the smallest record library is a source of unlimited pleasure, when its units are carefully chosen and the determination is made continuously to explore further. There is a boundless field waiting, rich in enjoyment.

Some guidance (shall we say suggestion?) will be helpful, since the ordinary man cannot hear the hundreds of records issued each month. But among them are some of outstanding merit, and from these the library builder may safely choose.

In directing the reader's attention to these carefully selected pieces, every attempt will be made to give as clear an impression to the ordinary listener as words will allow.

One final word: *do* persevere with the determination to mix your selections, for a comedian may be just as great an artist as a pianist! Thus you will be *selecting* instead of *collecting*—the only way to build up a library which will give you the lasting pleasure of a lifetime.

To begin with, here are some new records which are right at the top of their respective classes and will give a sturdy "No" to the question: "Shall I become tired of them after a time?"

### Classical

*No. 3 Symphony in F Major (Brahms).*

A Brahms' centenary piece and a magnificent performance. The popularity of his Hungarian Dances makes it especially welcome, for here is the same spirit and much more. Glorious, stirring passages with sublime, straightforward melody—then, perhaps, a following tune of pure

simplicity. A symphony of delightful contrasts, full of colour.

One may call it a fine musical picture exhibited by a great conductor, Magelberg, with the Amsterdam Concertgebouw Orchestra. Marvellously recorded, too. One, at least, of the four records will captivate you. Columbia LX220-223, 6s. each.

*Pagliacci—Intermezzo, and Cavalleria Rusticana—Intermezzo.*

There is no need to say much about these favourites, except that here is an ideal recording. They are so generously played by the Milan Symphony Orchestra as to provide a feast of good music for all time. On Parlophone E11229 (4s.).

### Light Music

Here are three splendid records, well worth a place in your collection. The first is one of those very festive German affairs: *Jollity on the Mountains* and *Vienna Singing Birds*. There's yodelling and all sorts of side-shows by Marek Weber's Orchestra. H.M.V. B4008 (2s. 6d.)

Next a pair of waltzes, *Skaters* and *Shoenbrunner* by the Vienna Symphony Orchestra. All with the modern touch by a fine orchestra, for half-a-crown. Columbia DB1064.

Then a very, very English couple: Eric Coates' *By the Sleepy Lagoon* and *Under Heaven's Blue*. Two wholly pleasant sedatives by Albert Sandler's Orchestra on Columbia DB1061 (2s. 6d.).

### Vocal

Two foreign singers (each a soprano) have done four popular songs which one *has* to get sooner or later. The first is Supervia. She sings Mendelssohn's *Spring Song* in Spanish and

(Continued on page 471)

### A FAVOURITE DANCE COMBINATION



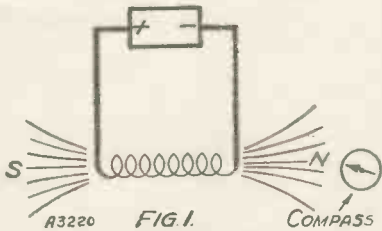
Henry Hall with the B.B.C. Dance Orchestra. One of his recent very successful recordings for Columbia was "Sittin' in the Dark."





**M**ANY readers must have wondered why sometimes a band-pass filter is very carefully screened and very great precautions are taken to see that the coils of the filter cannot in any way interact with one another or with other parts of the set, whereas in other cases you are actually told that screening is quite unnecessary.

**SIMILAR TO A MAGNET**



A tuning coil with current flowing through it behaves in the same way as an ordinary magnet, as this compass experiment will prove.

You will probably have noticed that in the case when the coils are screened the circuit is just a little more complicated than when the unscreened method, as, for example, the Varley Square Peak Coil or Lewcos Band-Pass Filter, is used, and therefore for that reason alone you will probably say that you would like to know just why there is this difference and whether any different result is to be expected.

**The Important Part**

For me to be able to answer this question for you clearly I must first take the trouble to explain that the important part about any ordinary tuning coil is the magnetic field which is produced when any sort of current flows through it.

*A simple and easily understood explanation of that popular and efficient method of selective reception—the double-tuned filter.*

*By L. E. T. BRANCH,  
B.Sc., A.I.C.*

This magnetic field is similar to that which always surrounds an ordinary steel magnet and, as you know quite well, when a needle or a nail or any other small piece of iron is put in this field it is drawn towards the magnet, and also you know that if you move the magnet the magnetic field goes with it; in fact, wherever the magnet may be it is always surrounded by its magnetic field.

**EFFECT OF SHIELDING METAL SCREEN (EARTHED)**

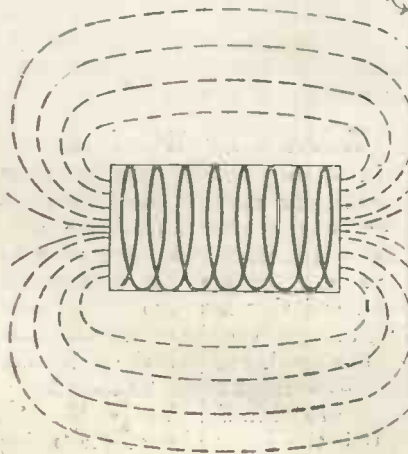


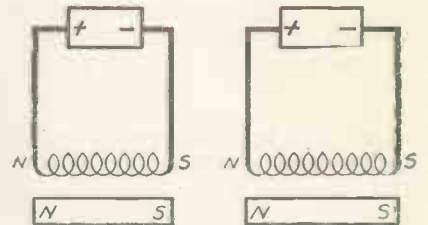
FIG. 3. A3222

A metal screen will, if it is large enough, confine the coil's magnetic field to that side of the screen upon which the coil lies.

Now an ordinary tuning coil is something like that, except that it has no magnetic field unless there is a current flowing through it. Any coil of wire has its own magnetic field when a current is sent through it—this applies, for example, to the moving coil of a loudspeaker.

A very interesting and simple experiment you certainly ought to

**THEIR FIELDS INTERACT**



A3221 FIG. 2.

When two coils in which currents are flowing are placed near each other, their magnetic fields interact.

try for yourself is to take a coil of some kind—for example, an old tuning coil you are not using—and connect its two ends by means of pieces of flex to the terminals of a 2-volt accumulator (do not keep it connected for more than a few seconds or else it will soon run out the accumulator), and then if you have a small pocket compass handy you will find on bringing it near to the coil that it is affected in exactly the same way as if the coil were a magnet, which in fact it is.

**North and South Poles**

As illustrated in Fig. 1, you will find that one end of the coil is a north pole and the other is a south. Moreover, if you reverse the connections

\*\*\*\*\*  
**ALL ABOUT BAND-PASS**  
 —continued from previous page  
 \*\*\*\*\*

from the coil to your accumulator so that the current flows in the opposite direction, then the north and south poles of the field of the coil will change places.

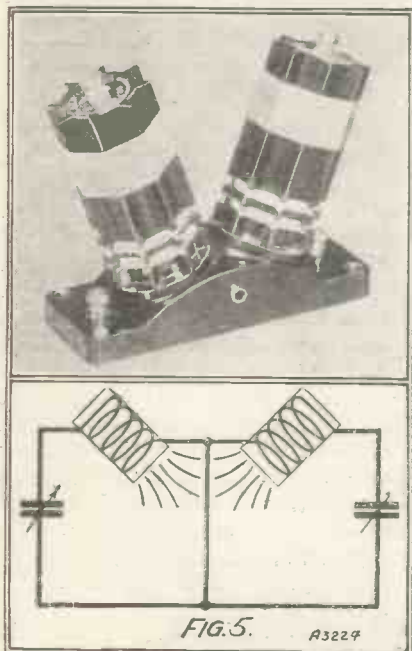
**A Reversing Current**

This is exactly what is happening when you are using a coil for tuning in some station to which you wish to listen, except that the current produced by the wave from the station is many thousands of times smaller than that which you obtained from your accumulator, and also its direction keeps on reversing, first flowing in one direction and then in the other many thousands of times in a second; in fact, if you are listening to the London Regional station it does this approximately one million times every second—the exact number of times which it does this is called the “frequency” and is shown as so many kilocycles, one kilocycle being a thousand cycles.

**The Frequency**

You will see that the frequency given for the London Regional station is 843 kilocycles, which means that the current of the wave sent out from the aerial at Brookmans Park

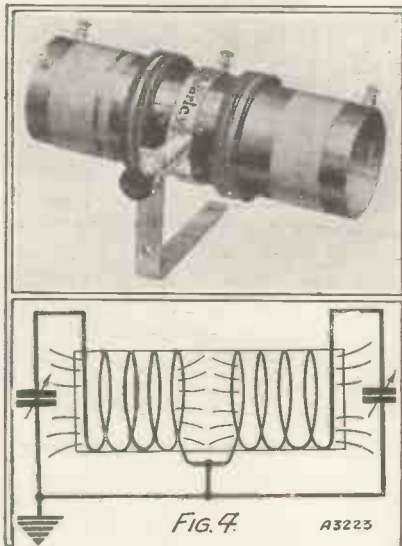
**ARRANGED AT AN ANGLE**



**FIG. 5.** A3224  
 In the case of the Lewcos unit the two coils are arranged at an angle in order to get the correct degree of coupling.

flows once in each direction as many as 843,000 times a second, and the same thing happens in your tuning coil—when you are tuned in.

**PLACED END TO END**



**FIG. 4.** A3223  
 The Varley unit is an inductively coupled band-pass filter in which the coils are arranged coaxially.

Now let us go back for a moment to our steel magnet. Besides the very well-known fact that the magnet will by virtue of its magnetic field attract little pieces of iron, you also know quite well that one magnet will affect another one.

Take two ordinary small bar magnets which you can obtain for a few pence each and bring the north pole of one near to the south pole of the other, when you will find that they will be attracted very powerfully towards one another, although if you bring together either the two north poles or the two south poles they do not attract one another, in fact they actually repel one another with exactly the same force as that with which the north and south poles attracted one another.

**Interacting Windings**

In other words, opposite poles attract one another but like poles repel one another. We have seen that a coil, when it is being used to tune in a station, has a magnetic field, and therefore two tuning coils when tuned in to the same station act on one another in just the same way as two bar magnets do. This similarity is illustrated in Fig. 2.

It is this interaction of one tuning coil upon another which is the important thing which we have to consider when looking into the question of whether or when coils ought

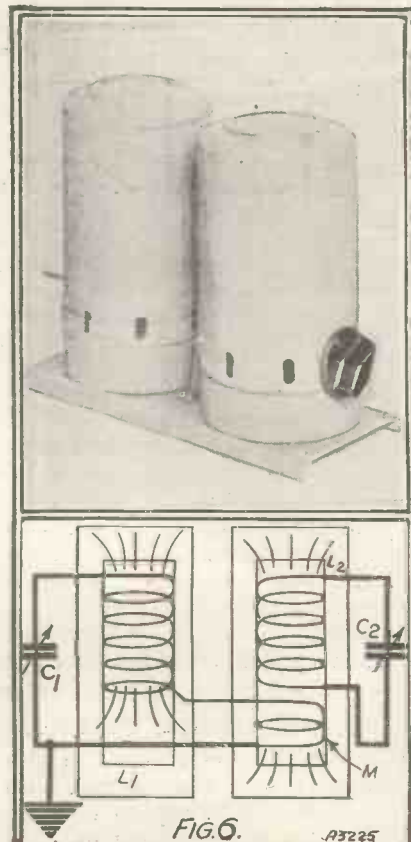
to be screened from one another. Now the only effect of a screen is to act as a barrier to the magnetic field of the coil.

As is well known, sometimes the screen takes the form of a simple sheet of metal, and if the sheet is big enough it keeps the field of the coil almost entirely on that side in which the coil lies as shown diagrammatically in Fig. 3, so that if another coil is placed on the other side of the screen there can be very little interaction; there is always bound to be a very small amount because the field from a coil spreads out everywhere, even very slightly over the top of the screen; but usually the interaction is so small that it has no adverse effect on the operation of the set.

**Extremely Important**

This is generally true when one of the coils is a simple aerial-tuning coil and the other is an H.F.-intervalve coil (as for example in the “S.T. 300”). When, however, the two coils are the two members of a band-pass circuit even such a small amount of interaction is extremely important. Now in band-pass circuits there are

**WITH COUPLING COIL**



**FIG. 6.** A3225  
 When the coils are screened the required degree of inductive coupling can be achieved by the use of a small coil which links both circuits together.



# All Band-Pass Filters Have Two Tuned Coils

two ways of dealing with the difficulty—one is to use to advantage this small interaction, as I shall explain more fully presently, and the other is to enclose each coil within a metal can so that in every direction the field is prevented from spreading further than the walls of the can.

## CAPACITY COUPLED

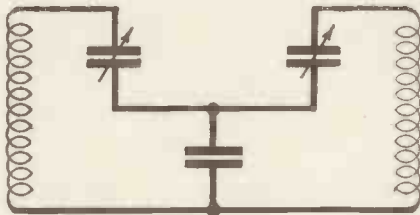


FIG. 7. A3227

Two tuned circuits can be coupled together by a fixed condenser as shown above. This method is called capacity coupling.

It must always be remembered that for any screen to be completely effective it must not be made of iron or nickel, which are magnetic substances, and it must be earthed. Usually either aluminium or copper is the best and most convenient substance to use—brass is, of course, equally good.

## Confined Field

When the screen is a can which encloses the coil completely the magnetic field of the coil is confined entirely inside the can, so that if two coils are built inside metal cans which are earthed, they can be placed

as close as you like to one another and no interaction of the minutest kind can occur.

Now all band-pass filters consist of two tuned coils so arranged that they interact upon one another to a certain definite but small degree and as mentioned above there are two very important ways of doing this. In Fig. 4 we have a diagrammatic illustration of one of the ways, namely, that in which the two tuned coils of the filter are placed exactly the correct distance from one another, so that their magnetic fields do interact exactly to that degree which will give to the filter the properties which it is desired it should have, namely, for modern broadcasting conditions, so that it shall give a selectivity, of 9 kilocycles, which as you know is the amount by which every station in Europe should be separated from the next to it in frequency.

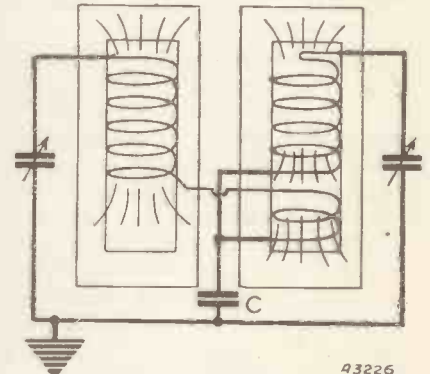
## On One Former

This very desirable result is achieved in the Varley Square Peak Coil, in which the two coils which are to be tuned are wound on one former, so that they lie end to end as shown in Fig. 4. Each coil is, of course, split into two sections so that it operates in the usual manner on both long and short waves and a switch is incorporated in the coil itself for changing from one waveband to the other.

Another example of the same method applied in a slightly different

way is the Lewcos Band-Pass Filter. This only differs in that instead of the coils being coaxial they are arranged side by side at an angle to one another, the spacing being of course again arranged so that exactly the

## A SIMPLE "MIXED" FILTER



A3226

A combination of inductive and capacity coupling can be employed which forms a mixed filter.

correct amount of interaction takes place. This is illustrated in Fig. 5.

Another important point which you ought to notice here is that the actual necessary interaction *only takes place if the coils are tuned*, and then only if they are both tuned to the same station. The reason for this is that the coils only possess magnetic fields when they are actually tuned to a station.

Now let us consider the other method by which we can make two

(Continued on page 470)

"SOMETHING for nothing!" chuckled brother Bill. "Precisely," I remarked, for the article was headed, "Why discard your old H.T. battery?" The author kindly offered attractive advice. To say we were intrigued is putting it mildly. We jumped at the chance, as we usually do, and trust to Providence to see us through. (Usually Providence is busy on another job.)

The first thing to do when you get a new pet is to build it a home to live in. We knocked up a nice wooden sleeping compartment for the battery. Then we bought some little glass jars, lots of them.

Of course, we could have bought a new H.T. battery with the money, but that's not our way. When we start on a job there's no turning back.

To make quite certain of success, we chopped up two or three old dry

\*\*\*\*\*  
**AN EXPERIMENT**  
**—BUT IT WORKED**  
*How a reader turned old H.T. batteries into a useful source of current.*  
 \*\*\*\*\*

batteries, and carefully collected the carbon centres, and such zincs as showed a minimum of wear and tear,

We washed them, and put them in the jars with sal ammoniac solution to ease their creaking joints. Out of curiosity we tested a cell, 1 volt! Pretty poor going even for a Leclanché.

## Worked Nine Months

We hastily collected more jars, and decided to have the battery on the floor. I will pass over the purely hack work of soldering and wiring up. In the end its 100 glass jars looked

quite imposing, and all told it mustered 110 volts. For nine months it functioned perfectly, till corrosion overtook it and the caps on the carbon centres frothed a vivid green.

Having a very roomy cupboard near the set, for some time we toyed with the idea of genuine full-size Leclanchés, such as are used for operating electric bells.

The high initial cost eventually put them out of court, but in the long run they would probably pay the enterprising owner a handsome dividend. They ought to last a lifetime, and think of the number of dry batteries you will go through in even ten years.

The idea is not quite as crazy as it first sounds. But there, I admit economics is not our strong suit, and so far I have not found anyone bold enough to put the idea into practice.

"L. E. C."



# MORSE *in* PRACTICE

WITH the increasing popularity of short-wave work, there must be many readers who have wished that they could read Morse—and quite rightly too, for most of the real DX work is conducted in the Morse code. Most people regard the actual learning of the code as a tedious and uninteresting process, but with the apparatus described below it need not be either. Technically, it is a simple low-frequency oscillator (see Fig. 1a), and its use for this particular job offers several advantages over other methods of learning the code; it gives a clean musical note in the 'phones which closely resembles a C.W. note, and since 'phones are worn in conjunction with the apparatus, the conditions under which the code is first picked up are practically those of actual reception.

### Constructional Details

The components needed are an old L.F. transformer, a valve holder, 4 terminals, 2 terminal strips, a Morse key and an ordinary 4½-volt flashlamp battery. In addition a valve, L.T. battery and a pair of 'phones are needed to complete the outfit.

The type of transformer and age do not matter so long as the windings

are intact, and the key can be obtained very cheaply at almost any second-hand radio dealer's. If it is

*How to make a simple unit for learning the Morse code*  
By E. H. JONES.

desired to construct it, this may be done as Fig. 2.

"A" is a small block of wood, and "B" is a spring composed of two old razor blades, screwed down, one

threaded through a brass strip mounted on a second block of wood. The function of the screw is to keep the key very slightly depressed, thus preventing it from vibrating loosely of its own accord, and also to adjust the gap between "F" and "G." These latter are thin brass bolts which form the contacts, and "H" is a small brass strip through which "G" passes at one end, and a woodscrew and washer "K" at the other. The terminals of the key are then "E" and "K."

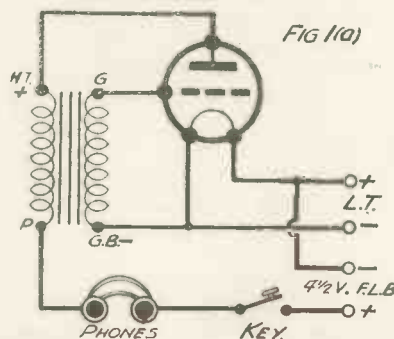
### Two-Way Working

The components may now be mounted on a baseboard of convenient size (say, 8 in. × 4 in. × ½ in.), the flashlamp battery being fastened down by means of a piece of fairly stout wire and two wood screws, as shown in Fig. 3.

On pressing the key, a clear musical note should be heard in the 'phones; if it is not, the connections to "H.T.+" and "P" of the transformer should be reversed.

For two-way working, an extra pair of 'phones and key may be connected up as in Fig. 1, and twin flex can be used for the extension.

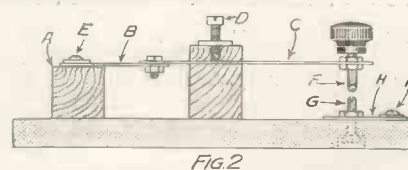
### THE BASIC CIRCUIT



The basis of the unit is the well-known low-frequency reaction oscillator. The H.T. is obtained from a 4½-volt flashlamp battery.

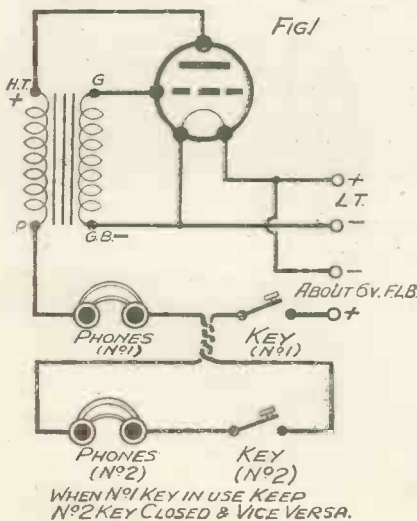
on top of the other, by "E" to "A" (remember to blunt the edges completely before using); "C" is a strip of brass or a 2½ in. Meccano strip bolted to "B," and "D" is a screw

### KEY DETAILS



The above diagram shows the construction of a home-made key in which the spring "B" consists of two old safety-razor blades. On the left is the theoretical circuit suitable for Morse practice by two persons. The simple unit on the right is the one referred to in the article, a small power valve usually giving the best results.

### FOR DUAL OPERATION



### EASILY CONSTRUCTED

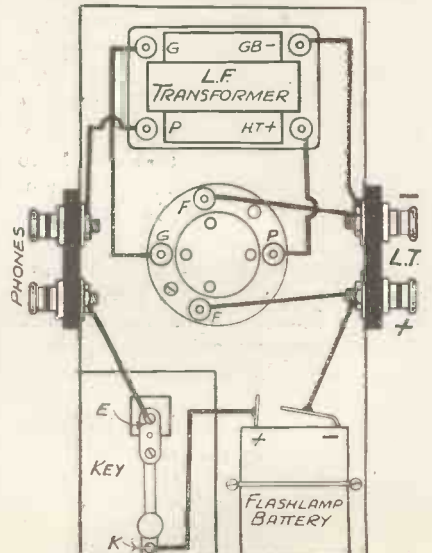


FIG 3.





# SET-TESTING WITH A MILLIAMMETER

By *MARCUS G. SCROGGIE.*

*Reading the anode current of the valves in a set will tell you quite a lot if you know the significance of the various readings.*

**W**HEN the doctor wishes to test the soundness of a person's vitals, he finds it less troublesome to use a stethoscope than to open up the person and make a direct inspection. Similarly, the physical fitness of a receiving set can be examined, and a diagnosis of its ailments made, usually with no other test than that of a milliammeter connected in the anode circuit of each valve in turn.

## *It Saves Hours*

Convenient instruments for this most useful of all tests can now be obtained at such low prices that there is no reason why every constructor and experimenter should not be able to check up his set.

It is worth while to get as good an instrument as one can afford, preferably a multi-range meter reading below 10 and up to 100 milliamps. But even a meter costing only a few shillings can tell one very much about a faulty set and save hours of investigation. And it will certainly help one to get better results all the time.

The simplest method of applying it is by means

of a plug-in adaptor, which is inserted between the valve and its socket, and is provided with leads to which the meter can be connected. All this has often been explained.

But just as a stethoscope discloses

little information to an unqualified person, so it is necessary to be able to interpret the meaning of the milliammeter readings. How does one know whether the receiver is healthy or not?

A reading which is quite normal for one valve may indicate a serious fault in another.

The correct anode current depends, of course, on the type of valve and also on the method of coupling it to the other valves in the set. And also in a battery receiver things are arranged to economise in current rather more severely than in the corresponding valves in a mains-driven set.

It is generally a good plan to work

together, for it is the only one that is called upon to supply considerable power, requiring current as well as voltage.

In fact, with the possible exception of "power grid detectors," it is pretty safe to say that no valve other than the output stage need take more than one or two milliamps.

## *Too Much Current*

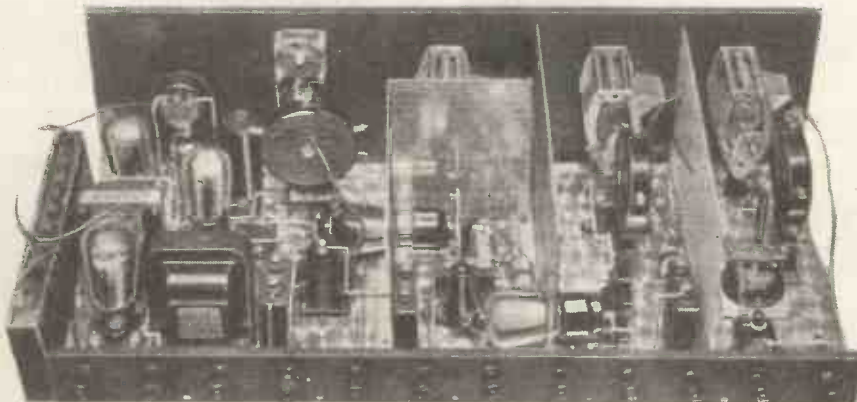
The amount that the power valve should require is revealed by the manufacturer of the valve in the leaflet issued with it, and, speaking broadly, is rather less than half the current that would be passed at the same H.T. voltage if there were no grid bias.

If the current is excessive, and the bias battery has no effect, it is clear that there is a break somewhere in the grid circuit, perhaps due to a faulty transformer or grid leak. Cases have occasionally been known of the grid becoming disconnected in the valve itself.

No time should be lost in putting the matter right, whatever the cause, for besides

spoiling the quality of reproduction, absence of bias shortens the life of the valve and of the H.T. battery (or rectifier valve if an A.C. set). And remember to switch off when actually adjusting the bias, for the same reasons.

## THE BEST TEST FOR ELABORATE SETS



"The physical fitness of a receiving set can be examined, and a diagnosis of its ailments made, usually with no other test than that of a milliammeter connected in the anode circuit of each valve in turn."

the test backwards; that is to say, starting with the power valve and working towards the aerial end. Now, in a properly designed receiver the power valve takes more anode current than all the rest of the valves put

## Troubles Spotted with the Radio "Stethoscope"

If there is a L.F. valve between the detector and the power stage, its current is likely to be less than one milliamp. if the coupling is resistance or the popular parallel-feed transformer, but may be rather more with directly-fed transformer or choke coupling. It is important here also that the current should not be too large; not that it is likely to be enough to endanger the valve, but because the transformer core might be saturated.

This has unpleasant effects on the quality of reproduction. A little work with the bias adjustment is then desirable.

### "Burnt-Out" Primaries

Contrariwise, if there is a total lack of current at this point, one strongly suspects a broken-down transformer. In days of yore this fault was alluded to as a *burnt-out* transformer, but it would take an enormous current to melt a transformer winding, and in actual fact it is caused by one form or another of chemical corrosion.

Manufacturers are getting wise to the possibilities in this direction, and take precautions accordingly. But a years-old transformer may suddenly decide to retire from the active list.

The remarks about the L.F. stage apply in most respects to the detector. But as in the majority of cases grid-leak detection is adopted, one cannot correct excessive anode current by an extra dose of bias for no bias is permissible.

In any case, a rather large current with this class of detector is a good thing from the standpoint of performance, and one must simply see to it that the coupling components can stand up to it.

Of course, if it is a dry battery-driven set you cannot afford to throw your precious milliamps. down the throat of the detector, when there is the output valve howling for more—perhaps literally!—and you must either bring down the battery voltage a socket or two, or else use resistance coupling or parallel-feed.

### About Detectors

The "anode-bend" detector does not find much favour in these days, but where it does exist a very small anode current is correct—quarter of a milliamp. or thereabouts.

The foregoing points on detectors hold good, more or less, for either

triode or S.G. valves. If you want to test the set under working conditions with a valve adaptor in the detector position, it is most desirable to connect a condenser—value not important, but 0.1 mfd. is suitable—across the terminals of the meter.

This gives the H.F. currents a short cut instead of compelling them to find their way through the intricacies of the meter.

### Checking the S.G.

The H.F. valves will now generally be of the so-called "variable-mu" type, and the anode current (easily got at through the top terminal connection) should rise from little more than zero to several milliamps, as the volume control is rotated in the "increase" direction.

The screen current can, of course, be read by use of the adaptor, and varies a good deal with the type of valve. A small part of a milliamp. should satisfy it in most cases.

Disconnections, short-circuits, and unsuitable working voltages can all be

coil speaker. Or the speaker winding itself or the output transformer may be in trouble.

If, however, the loudspeaker confirms the indication of the milliammeter, look to see whether the pointer kicks *up* or *down* when the loud passages come on. If *up*, then the grid bias is too large; if *down*, there is insufficient bias.

And if it kicks both ways you will have to fit a new valve, increase the voltages all round, or be content with less volume. A *slight* trembling of the pointer during the loud parts is quite consistent with good quality.

### Grid-Bias Indications

Neither detector nor L.F. valve (if any) should display any sign of animation, except on an exceptionally sensitive instrument, but it is in order for the detector current to change as a station is tuned in—*up* for anode bend, *down* for grid detection. In fact, this is about the best method of telling when one is exactly in tune.

If the detector current shows two "humps" for one station, then either the tuning arrangements are wrong—bad ganging, for example—or the detector is being overloaded. It is quite easy to tell which, for in the latter case only the stronger transmissions will show the effect.

The H.F. valves should give a practically rock-steady reading. Otherwise several most unwelcome effects may be expected—chiefly poor selectivity and distortion.

The oscillator valve of a superhet may show round about one milliamp. To see how it is behaving, short-circuit the tuning condenser with a piece of wire or a screwdriver. That will give the reading for the valve in a non-oscillating condition.

### A Superhet's Symptoms

If on removing the "short" the current (1) drops to a *very* low reading, or (2) jumps up to a very high one, there is evidence that oscillation is fiercer than it need be, and a crop of false tuning positions of the local station is a probable result.

If the current does nothing at all it is likely that the valve is not oscillating. The condenser across the meter is essential for this test.

Of course, it is quite necessary to make very sure that all the valve pins are making good contact when taking

(Continued on page 467)

### SIMPLIFIES THE TESTS



By inserting this adaptor plug between the valve and its holder, and connecting a meter across the terminals, the current of each individual valve may be tested.

spotted with our radio "stethoscope," simply by noting the amount of current, but one can learn a great deal more by observing the *movements* of current readings under working conditions.

Everybody knows that a dancing pointer, when connected to the power valve, indicates distortion. But not everybody may know what to do about it.

Firstly, if the loudspeaker reproduction is very weak, in spite of the agitation of the meter, there may be something the matter with the field magnetisation in the case of a moving-



**THE COLUMBIA  
RADIOGRAPH FOUR**

—continued from page 446

reproduction, or to put it in another way, entertainment value.

There will be those who disagree with us. Certain readers will maintain that sensitivity and selectivity do matter. Frankly, we are not suggesting otherwise. Of course they matter, but it does not lessen your enjoyment of distant programmes if you can hear every intonation of an orchestra—every inflection of an announcer's voice!

So that for local or distant reception—and the Columbia "Radiograph" Four excels in both respects—it is quality that counts every time.

**Record Realism**

That is the significance of the words "original tone," as applied to the "Radiograph" Four in particular. It gives results that are all but indistinguishable from the real thing, not just on the local stations, not only on the countless number of distant programmes that it receives, but from gramophone records as well. It is a pretty safe conjecture that here is realism as near as we shall know it for many years to come.

What, then, of the secondary considerations? To what extent does the Columbia "Radiograph" Four fit in with accepted modern principles and practices? The correct answer is that it doesn't fit in with anything. It sets a standard of its own that is equalled by few and accepted by none.

**Excellent Range**

From our own experiences with this instrument it is abundantly obvious that realistic reproduction has not been obtained at the expense of performance. You can adjust the tuning pointer to any one of the stations that are named on the dial, and the programme is there. No half-larks about it—no dim and distant murmurings all but lost in an ear-splitting background of cacophony. Real programmes on a par with those that emanate from the local stations!

And how delightfully easy it all is! None of that intricate twisting and turning with an almost unmanageable number of small knobs. Just one simple tuning control with which to command the pick of the programmes from Europe, and with

that and the volume control you could find enough to entertain you for twenty-four hours a day for a year!

That, briefly, is a pen-picture of the Columbia "Radiograph" Four. Nothing more, nothing less. So that if you want superb quality, almost endless programme variety, and ease of operation that will astound you, then you know where to go for it.

The "Radiograph" Four is primarily intended for use with an external aerial and earth, and under these conditions the provision of alternative aerial tapping positions ensures completely satisfactory results for widely varying conditions. But it is also adapted for use with a mains aerial, the results from the use of which are commendably good.

**A Fine Receiver**

Provision is also made for the connection of an external speaker (or speakers) for those who desire to have radio in more than one room.

As a result of our tests we have no hesitation in recommending this creditable Columbia production. Undoubtedly it's a fine set, and one that will satisfy the musician equally as well as the distant station "fan."

**SET TESTING WITH A  
MILLIAMMETER**

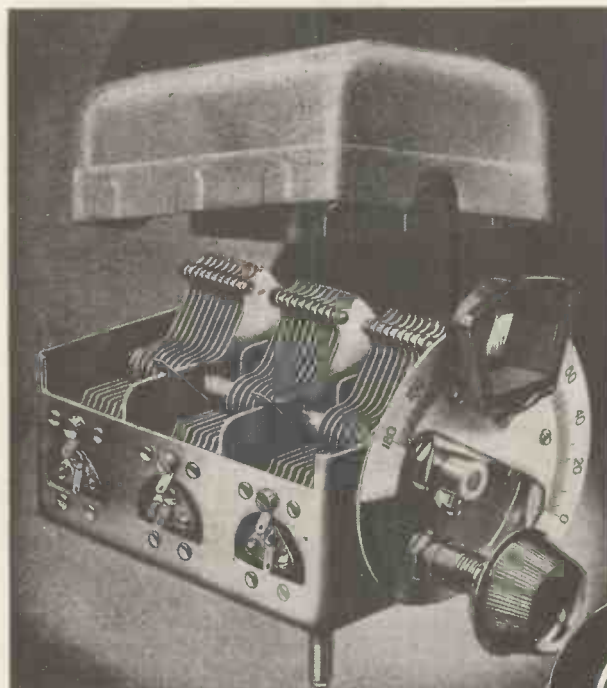
—continued from page 466

meter readings. And if the instrument is a multi-range one, always start off with the highest range, just in case there is a short-circuit somewhere.

**Anode Current Variations**

An anode current which wanders or creeps for no apparent reason is generally a sign of a disconnection in the grid circuit. Or if a grid which receives its bias via a grid leak displays unaccountable symptoms of being more positive than it ought to be, the cause may be a counteracting bias from the H.T. via a leaky coupling condenser.

To attempt to locate a fault in a modern set is well-nigh hopeless without some sort of equipment, but with a milliammeter, an adaptor, and a little practice, one can make short work of most of the troubles that occur. In fact a milliammeter is undoubtedly one of the most useful instruments the keen constructor can possess, both for fault finding and checking quality.



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"FERRO"  
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The J.B. NUGANG type "A." Rigid one-piece chassis. Very robust construction. Trimmer to each stage, operated by external starwheels. Matched to within 1/2 of 1 per cent. plus half a mmfd.

Complete with disc drive and bakelite escutcheon plate. Capacity, '0005.

**PRECISION  
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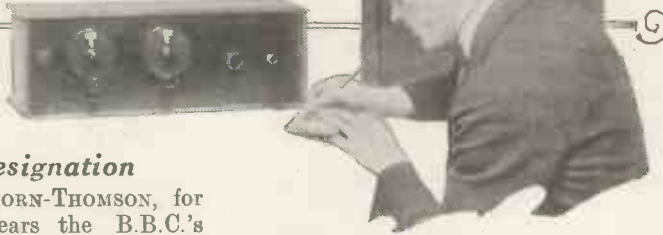
**J.B. NUGANG TYPE "A" 3-Gang - - 27/-**

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**J.B. Gangs are very suitable for all Ferrocart circuits because of their extreme accuracy and mechanical rigidity.**

# RADIO NOTES and NEWS of the MONTH

By G.B.



## *B.B.C. Resignation*

**M**R. D. CLEGHORN-THOMSON, for several years the B.B.C.'s Regional Director for Scotland, has resigned his post—owing, it is stated officially, to difference of opinion with his superiors with regard to B.B.C. policy.

In a statement issued by Mr. Cleghorn-Thomson, he said that his resignation was due to unreadiness to continue working in the face of obstacles which had proved insuperable.

The duties of Scottish Regional Director will be carried out temporarily by Mr. Moray McLaren.

## *First Favourites*

So Mr. Cleghorn-Thomson joins the ranks of that numerous company who have, for one reason or another, resigned from the B.B.C.—Arthur Burrows, Cecil Lewis, P. P. Eckersley, to mention but a few, are names which, in the early days of broadcasting, made the old B.B.C. famous.

How sadly their presence is missed from Broadcasting House to-day—at least from the listener's point of view.

## *Broadcasting Revenue*

Net revenue of the B.B.C.'s publications is shown in accounts for the year 1932 to have increased by £84,450, to £322,284, out of a total income of £1,628,738.

## *The Russian Giant*

News is to hand that the new 500 kw. Russian station at Moscow is contemplating taking up the 351-metre wavelength at present used by Leningrad. This will mean a separation of only 11.7 kc. from London Regional.

If Russia goes on building many more of these giant stations, there's going to be a real war in the ether with a vengeance.

## *Something of a Mystery*

There's something of a mystery as to why the B.B.C. has decided not to broadcast this year the Royal Command Variety Performance from the London Palladium.

Officially it is said that the decision has been arrived at owing to the number of criticisms of the broadcast which the B.B.C. received on each occasion when the Command Performance was transmitted in the past. But this seems rather an unlikely sort of explanation, for it is notorious that the B.B.C. is pretty well hidebound as regards criticism from an outside source.

## *A Critic's Experience*

Only the other day a letter appeared in the "Daily Telegraph" from a reader explaining how in the past he had sent three or four letters of carefully constructive criticism to the B.B.C., how he had received courteous acknowledgements, and how not one of those suggestions which he had made for improvements in programmes, etc., had been adopted, despite the fact that the suggestions made were heartily endorsed by numerous friends, and were obviously well worth while.

## *Taking it Seriously*

The B.B.C. has often invited criticism, and has had one or two sarcastic things to say, especially in its Year Book, concerning the lack of enterprise in Fleet Street, and the dearth of responsible radio critics.

If the B.B.C. is not taken seriously, and criticised seriously, as are classical concerts or legitimate theatrical enterprises, it has only itself to blame, for there are very, very few examples on record of where the B.B.C. has taken the slightest heed of responsible outside criticism.

## *Fewer Summer Talks*

One good bit of news is that there will be fewer talks this summer. The B.B.C. takes the view that talks do not go down so well during daylight evenings, and that people will not find time to listen regularly during long summer evenings.

This must be rather a blow to the Talks Director, Mr. Charles Siepmann, who is a real "educator." He is

reported to be very upset at the abandonment of so much serious time to entertainment, and he has put up a real hard fight in the interests of educationists.

Most listeners will agree, however, that it is really a fine piece of news that common sense has at last ruled in Broadcasting House; and that, during the summer, talks will be fewer in number.

## *The Record-Breaker*

Major Gladstone Murray, probably the B.B.C.'s most brilliant official, who is now in Canada helping to establish a National Broadcasting System, is a very remarkable man. In the war he flew for 1,000 hours—when the average life of a pilot was about a fortnight; and now he has broken a record for one of Eastern Canada's most famous ski runs. At Sainte Marguerite, Quebec, he descended the Mount Baldry run in 2 minutes, 55 seconds, thus making a new and unofficial record.

## *Reorganisation Rumours*

Rumours have been floating about lately that the B.B.C. contemplates obtaining the services of someone outside the existing broadcasting staff to take charge of the reorganisation of the Programme Department. Several changes have taken place lately at Broadcasting headquarters, but they have been confined to the permanent staff members.

## *Too Good to be True!*

There have often been rumours about bringing in some big outside Entertainment Director, but the report that an invitation will be sent to Mr. Charles B. Cochran or Mr. Noel Coward is certainly rather too far-fetched to be regarded as a practical possibility. Mr. Cochran and Mr. Coward are not going to be intrigued by any offer the B.B.C. can make them.

## *Copyright Fees*

A regular ruling has been made to the effect that unless copyright fees are paid, it is illegal to use B.B.C. music broadcasts for public entertainments. This ruling was given recently by Mr. Justice Maughan in a copyright test case, and the Court's decision affects such places as hotels, restaurants, public houses, and shops.

## *The Judgment*

Giving judgment, Mr. Justice Maughan said: "The broadcast

(Continued on page 469)



**MARK HAMBOURG ON "MY THOUGHTS ABOUT BROADCASTING"**

—continued from page 389

is a policy which is far less open to criticism than that of political propagation. The fact is that wireless material is served from British stations in the cleanest possible manner.

"Another argument which appeals to me in favour of broadcasting—though it applies to world-wide broadcasting in general—is that it creates employment. Wireless to-day is not a game; it is an industry. That is a point which, economically at any rate, has a profound significance."

**"Publicity is Not Edible"**

I asked Mr. Hambourg his ideas on broadcasting from the artiste's point of view.

"Much has been said of the publicity value of broadcasting," he answered, "and publicity, in its right place, is doubtless a very useful thing. It has its appeal to a certain type of entertainer, but the suggestion that it should attract the true artist, the best types of vocalist or instrumentalist, is absurd.

"Publicity is not edible, and even artistes must live. The fact that some of the greatest musicians in the world have never yet broadcast has its significance.

**A Certain Risk**

"Kreisler broadcast for the first time recently in the United States. The broadcasting system which prevails there may have certain disadvantages, but it does at least ensure the payment of suitable fees to great players. I fear that in this respect the B.B.C. will never be able to compete.

"There is always a certain risk in broadcasting work. In the first place, it is much easier to give of one's best in the accustomed atmosphere of a concert hall than in the less imaginative surroundings of a wireless studio.

"Again, there is always the possibility of distorted reception, no matter how efficient the broadcasting service may be. No method has as yet been discovered for controlling atmospheric disturbances, and until this is done broadcasting will always involve the risk of jeopardy to a reputation.

"In this respect, there is no real comparison between gramophone re-

ording and broadcasting. Recording is selective, so that from a number of records the artiste may choose those which he thinks fairest to himself and most suitable for public sale. In broadcasting there can be no second choice."

**RADIO NOTES AND NEWS OF THE MONTH**

—continued from page 468

reproduction is as much a performance as the reproduction of a musical piece by gramophone, and with just the same result from the point of view of the writer or the Performing Right Society. But performance is not an infringement of copyright in itself. To be illegal, it has to be in public.

"Looked at from that point of view, it must be held that the hotel proprietors have infringed. . . . In my opinion, loudspeaker reproduction of musical works for the benefit of guests in an hotel is not justified or authorised."

**"Ninety-Nine"**

It is interesting to note that last year the President of the United States of America broadcast ninety-nine times. Every member of his Cabinet spoke at least once on the radio, while a hundred members of both houses at Washington broadcast.

Some 201 officials of the Department of Agriculture broadcast talks 572 times, while Protestant clergymen officiated at 576 services, and Roman Catholic services were broadcast to the tune of 268 hours.

**Radio-Toulouse**

The damage caused by the fire at Radio-Toulouse is estimated at about £23,000. The auditorium was destroyed, but the transmitting room was not, so badly damaged.

It may be some months before a new Radio-Toulouse is built, but it is possible that the Radio-Toulouse station will, now make use of the station at St. Angian, near Toulouse.

**A MAGNIFICENT GIFT**

In the April "Modern Wireless" the radiogram recently presented to the Pope was stated to have been the gift of the City of Milan (p. 373).

We are now informed that it was presented to His Holiness by the makers, Messrs. F. I. M. Marelli, of Milan.



Protect your set, your home, your family from injury by lightning.

Fit a "GARD" between your aerial and earth. It only takes a minute and protects for all time. No interference with your reception of radio entertainment. Fit a "GARD" now and forget to switch off when lightning plays. "GARD" keeps it outside.

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**7 DAYS' FREE TRIAL** (OR 10/- MONTHLY.)

Polished Oak 1 and Piano built! The acoustic Tone brings a fine thrill. Makers to (Radio-Press, B.B.C., 3,000 clients etc).

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**PICKETTS** Piano-Tone Cabinets.  
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Give long service, improved volume and tone; very economical. Replacements for Taylex or Standard batteries at low prices; details post free; also Bargain List. Radio Kits and parts at lowest prices.

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Alternative positions shown by dotted lines



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ALL ABOUT BAND-PASS

—continued from page 463

canned coils interact to produce a band-pass filter. In this method each of the two coils is enclosed completely within a metal can so that their magnetic fields cannot interact at all.

But to get the necessary interaction between the coils we really make use of what we have already learnt by applying it in a slightly different way. What we do is merely to wind an extra small coil (M in Fig. 6) on the former near to one of the tuned coils and connect it so that it forms part of the tuned circuit of the other coil. This is shown quite clearly in Fig. 6.

**Magnetic Interaction**

Here we can see quite easily that the small coil M, which forms part of the tuned coil, will have a magnetic field when the condenser C<sub>1</sub> is adjusted to tune in a station, and then if the condenser C<sub>2</sub> is also adjusted to tune in the same station, the fields of the two coils L<sub>1</sub> and L<sub>2</sub> will interact. The correct amount of interaction is obtained by placing the coil M just the correct distance from the coil L<sub>2</sub> and also using the proper number of turns.

We have considered the various ways of producing band-pass filters by making the coils interact, as it were, magnetically upon one another, but there is another way of coupling two circuits together to produce a band-pass filter, and that is by means of a fixed condenser. This fixed condenser is used to couple the two circuits by arranging it so that it forms part of each of the two tuned circuits. The usual way of doing this is to connect the two tuning condensers together by means of the fixed condenser C as shown in Fig. 7, and I propose to deal with this in a subsequent article, and to explain why in some of the best band-pass filters the coils not only interact with one another in one of the ways which I have already explained, but also the circuits are coupled together at the same time by means of a fixed condenser.

ON THE TEST BENCH

—continued from page 448

The P.P.M.29 is unusually sensitive and can therefore be used with great advantage with a small set, although its performance is relatively more impressive with the larger outputs owing to its fine rendition of bass.

But readers should note that it is a poor economy to employ a small loudspeaker just because the set is "small." A bigger loudspeaker such as the P.P.M.29 will score every time and all the time, whatever the set.

It is actually superior in sensitivity to the majority of the "junior"

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types of speakers, and its response is, as we have indicated, vastly superior.

The price is not as high as the foregoing description may have led readers to believe, and at £3 17s. 6d. it obviously represents very full value for money.

**A Neat Socket**

Lectrolinx, Ltd., have sent us samples of their new model Insulated Socket for metal mounting. This socket has been standardised by many manufacturers in its original form—i.e. with a soldering slot only; but it is now available with thread and nut for screw connection, and will, therefore, have a wide appeal to home constructors.

It is a neat little socket and, of course, it matches excellently with the Chix Master Plug.

It sells at 2½d., and is obtainable in either red or black.

(Continued on page 471)

**LONDON'S FINEST WALNUT RADIOGRAM CABINET**

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**DOWN**



**ON THE TEST BENCH**  
—continued from page 470

**Useful Saw for Constructors**

One of the most useful tools we have come across for a long time is the New Metal-cutting Compass Saw made by Barson and Co., Ltd., of Wood Green, London.

It is something like a keyhole saw in appearance, but it has interchangeable blades. And these blades have varying types of teeth, fine for cutting metal, coarse for wood, etc.

The Compass Saw can be employed for all kinds of work, and it is greatly to be preferred to a hacksaw because there is no frame to get in the way.

With only three different blades it can be used for practically any job the home constructor is ever likely to encounter.

It is well made, and the blades are strong and keen, and cut either wood or metal rapidly and cleanly and with a minimum of effort.

We strongly recommend this tool to all home constructors.

**CHOOSING RECORDS**  
—continued from page 460

*Santa Lucia* in Italian. You know the titles; just hear them, they are delightful. On Parlophone R020202 (4s.). Then Gretl Vernon, the Viennese Nightingale, sings *Il Bacio* and *For You Alone*, on Imperial Z142. The last is in broken English, but she has a charming voice. A wonderful two-shillings-worth.

**Various**

Do you like brass bands? If so, there is a terrific massed performance of two Sousa Marches, *Gladiator* and *Crusader*, on Regal Zono MR844 (1s. 6d.). Quite the best thing of its kind yet.

I must mention a dance record which is quite a star number. This is by Eddie Saxon's Orchestra (German), and is worth a place as very delightful music. Hear *Every Woman Thinks She Wants to Wander* and *When Anybody Plays or Sings*, on Columbia CB550 (2s. 6d.). These are two of the best from "Mother of Pearl."

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**"MACNAMARA"—  
THE GOLDEN VOICE  
ELECTRIC RADIO**  
—continued from page 433

Research Department—tests with the latest version of a famous Telsen instrument. We refer to "Macnamara," The Golden Voice Electric Radio.

**Sensitive and Selective**

Frankly, it is no idle exaggeration to state that our foregoing précis of modern receiver requirements might well have been lifted from the official records of our tests with this outstanding instrument. What we have set out as requirements—and what the Telsen instrument does—are synonymous down to the last degree!

The circuit is based upon the arrangement that we have had in mind; it is both sensitive and selective to a degree that even exceeds our expectations for a set of this type; the quality of reproduction is beyond criticism, and the ease with which the set can be operated is nothing short of astonishing.

**Striking Testimony**

The instrument, complete with its moving-coil speaker of the energised field type, is built into an attractive cabinet, and it is capable of giving an undistorted output of approximately 2 watts, which is considerably in excess of the output required for normal domestic listening.

A striking testimony to the thorough way in which the set has been designed is to be found in the inclusion of a mains "hum" adjuster, a refinement that is so often overlooked in commercial designs, but which may make all the difference between good and indifferent results.

With this set, our "thirty-alternative-programmes" ideal is easily achieved. Within reason, and assuming the use of a good outdoor aerial, there appears to be no limit to the number of distant programmes that can be received, and that leaves no room for doubt concerning the sensitivity of the instrument.

**None Better**

In this respect, consistent with the number of valves employed, we have no hesitation in saying that we know of few sets to equal, and certainly none to better, the performance of the Golden Voice Receiver.

**CLASS**

**B** New Varley Products for a modern need—a range of tested components ensuring maximum results from Class B amplification.

**The Input Transformer, DP40,** price 15/- including royalty, (1) gives good amplification of low notes because of its high primary inductance; (2) prevents grid current distortion by employing a low resistance secondary; (3) permits accurate matching of the Class B and "Driver" valves by means of alternative ratios.

**The Output Choke, DP42,** price 16/6 including royalty, gives a choice of three ratios, making the matching of the Class B valves and loudspeaker an easy matter.

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DP 36

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**SORTING OUT THE NEW VALVES**

—continued from page 450

reduce the percentage modulation distortion or cross modulation over the whole range of variable grid bias.

A word of warning, however. Such new short grid base high slope variable-mu valves may not usually be substituted with success for the variable-mus in an existing set; an attempt to do so will probably result in too highly critical control and instability.

2. The introduction of a pentode suppressor grid to the variable-mu screen-grid valve.

This brings us back to the H.F. or screen pentode which we have already found to be of advantage in detection. When employed as a voltage amplifier of H.F. or I.F. signals, the pentode may be said to have an advantage over the tetrode in the consistency of its screen-grid current, and in the fact that a higher load resistance may be used which slightly increases the permissible amplification without distortion.

**Output Valves**

This latter point is, however, not necessarily the prerogative of a pentode, as it would be possible to design a screen-grid valve with an equivalent result. Owing to other points of adaptability in the H.F. pentode, however, it is scarcely worth while to re-design the tetrode or screen-grid valve in this direction.

*Variable-mu H.F. pentodes* may possibly largely take the place of tetrodes, but it is not safe to assume this in existing sets owing to material differences in screen-grid current between the two types of valve.

**3. Transference of Voltage into A.C. Power.**

This is the function of the valve in the output stage of your set, whether of the power triode or power pentode varieties. The requirements of such a valve is to convert the signal voltages into large variations of the steady H.T. current, and the amount of power output available, therefore, will be as much dependent upon the H.T. supply as on the valve.

In A.C. mains-operated sets there is usually ample H.T. current and voltage available, dependent upon the rectifier employed. In D.C. mains receivers the current is ample, but the voltage available is usually lower, and in battery receivers an economy in both current and voltage is imperative for economic reasons.

**Economical Volume**

Thus it is to the battery-operated set that something better in the efficiency of the power output stage is most applicable. We have already during the last few weeks heard a lot about Q.P.P. circuits, in which a pair of valves are used under certain conditions with a heavy negative grid bias, so that the standing H.T. current is extremely small, and the actual current taken from the H.T. battery is entirely dependent upon the volume of the sound required. Such a method of operation is often called "Class B" amplification, and this principle is to be further extended in one of the new classes of valves by obtaining a similar type of result, but without the necessity for the large negative grid bias. Such a removal of grid bias naturally means that the valves operate into the region of grid current due to the positive voltage impressed on the grid by the signal voltage applied to them. Thus the principle may be

termed "positive grid drive 'Class B' amplification."

It has been established that a pair of such valves can be made to give an equivalent power output to a pair of pentodes in quiescent push-pull, but with a much simpler electrode construction; so that, in fact, the two output valves can be combined on the same base and mounted in the same bulb.

**For Battery Sets**

The introduction of this double valve gives the battery set user, for the first time, an output valve—multiple valve though it may be—which, in a suitable circuit, is at least capable of a comparable power output to a mains valve. It must not be forgotten that such valves will require an additional degree of amplification to precede them, and that they call for an entirely new form of intervalve transformer.

The double "Class B" valve is an interesting innovation where more power output is required without a corresponding increase in average H.T. current, voltage or space occupied in the set, and thus promises to be exceedingly useful for battery and D.C. mains-operated receivers.

Other modifications in existing types of power triode and pentode valves may also appear, but as these cannot be classed as "new" valves, no explanation is required for their acceptance.

The above summarises very briefly some of the novelties in the way of modifications and innovations which we are likely to see in the valve family during the next few months, and it is hoped that the attempt made at classification will help to clear the air somewhat and assist readers to recognise the new valves.

F. E. H.

**INDEX TO ADVERTISERS**

Belling & Lee, Ltd. . . . . 470  
 British Insulated Cables, Ltd. . . Cover ii  
 Bulgin, A. F & Co., Ltd. . . . . 470  
 Burne-Jones & Co., Ltd. . . . . 459  
 Clarke, H. & Co. (Mer.) Ltd. . . . . 459  
 Colvern, Ltd. . . . . Cover iv

"Chums" . . . . . 459  
 Ferranti, Ltd. . . . . 385  
 Graham Farish, Ltd. . . . . 469  
 Gramophone Co., Ltd. . . . . 386  
 Heayberd, F. C. & Co. . . . . 459  
 Jackson Bros. (London), Ltd. . . . . 467  
 Peto-Scott Co., Ltd. . . . . 470  
 Pickett Bros. . . . . 470  
 Pifco, Ltd. . . . . Cover ii

Taylor, M. . . . . 470 & 471  
 Varley Products . . . . . 471  
 Wingrove & Rogers, Ltd. . . . . 459  
 Wright & Weaire, Ltd. . . . . Cover ii  
 World Film Encyclopedia . . . . . Cover iiii

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